



30-015.43073

COG Operating, LLC

Eddy County, NM (NAD 27)

Sec12, T26S, R26E

Marsh Owl Federal Com #1H

Pilot Hole

Survey: Pilot Hole - MWD

DDC Survey Report

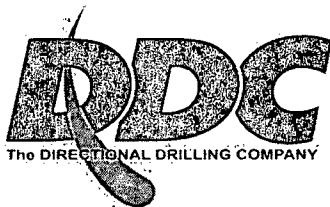
25 June, 2015

NM OIL CONSERVATION
ARTESIA DISTRICT

AUG 27 2015

RECEIVED





Survey Certification Sheet

COG Operating
Company

WT-150382
Job Number

6/25/15
Date

Sec12,T26S,R26E
Lease

Marsh Owl Federal Com #1H
Well Name

Eddy, N.M.
County & State

API: 30-015-43073

Surveyed from a depth of: 116 feet to 9975 feet MD (Pilot Hole)
5885 feet to 14313 feet MD (C&L)

Type of Survey: MWD

Directional Supervisor/Surveyor: Joe Hargrove

The data and calculations for this survey have been checked by me and conform to the standards and procedures set forth by **The Directional Drilling Company (DDC)**. This report represents a true and correct Directional survey of this well based on the original data obtained at the well site. Wellbore Coordinates are calculated using minimum curvature.

Christopher Hughes
MWD Compliance Manager

Christopher Hughes

Digitally signed by Christopher Hughes
DN: cn=Christopher Hughes, o=DDC, ou,
email=Chrish@directionaldrillers.com, c=US
Date: 2015.06.26 08:44:04 -05'00'



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Marsh Owl Federal Com #1H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3272.0usft (Scandril Freedom)
Site:	Sec 12, T26S, R26E	MD Reference:	Well @ 3272.0usft (Scandril Freedom)
Well:	Marsh Owl Federal Com #1H	North Reference:	Grid
Wellbore:	Pilot Hole	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Project:	Eddy County, NM (NAD 27)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site:	Sec 12, T26S, R26E		
Site Position:		Northing:	381,824.00 usft
From:	Map	Easting:	527,501.60 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 2' 58.985 N
		Longitude:	104° 14' 40.449 W
		Grid Convergence:	0.05 °

Well:	Marsh Owl Federal Com #1H		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft
		Latitude:	32° 2' 58.985 N
		Longitude:	104° 14' 40.449 W
		Ground Level:	3,255.0 usft

Wellbore:	Pilot Hole		
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Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
	IGRF2015	5/13/2015	(°)	(°)	(nT)
			7.47	59.82	47,977

Design:	Wellbore #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			74.58

Survey Program	Date: 6/24/2015		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
116.0	9,975.0	Pilot Hole - MWD (Pilot Hole)	MWD default
			Description
			MWD - Standard

Survey	Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn
	Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Rate
	(usft)			(usft)			(usft)	(°/100usft)	(°/100usft)	(°/100usft)
	0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
First MWD Survey @ 116' MD / 116' TVD										
	116.0	1.10	135.40	116.0	-0.8	0.8	0.5	0.95	0.95	0.00
	165.0	1.10	128.70	165.0	-1.4	1.5	1.0	0.26	0.00	-13.67
	240.0	0.70	115.20	240.0	-2.1	2.5	1.8	0.60	-0.53	-18.00
	302.0	1.60	65.80	302.0	-1.9	3.6	3.0	2.04	1.45	-79.68
	332.0	2.50	60.20	331.9	-1.4	4.5	4.0	3.07	3.00	-18.67
	362.0	3.20	55.20	361.9	-0.6	5.8	5.4	2.47	2.33	-16.67
	392.0	3.60	54.70	391.9	0.4	7.2	7.1	1.34	1.33	-1.67
	453.0	3.50	57.30	452.7	2.6	10.4	10.7	0.31	-0.16	4.26
	510.0	2.00	57.70	509.7	4.0	12.7	13.3	2.63	-2.63	0.70



HP
Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Marsh Owl Federal Com #1H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3272.0usft (Scandril Freedom)
Site:	Sec12, T26S, R26E	MD Reference:	Well @ 3272.0usft (Scandril Freedom)
Well:	Marsh Owl Federal Com #1H	North Reference:	Grid
Wellbore:	Pilot Hole	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

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)
571.0	1.00	36.80	570.6	5.0	13.9	14.7	1.84	-1.64	-34.26
631.0	0.90	24.10	630.6	5.9	14.4	15.5	0.39	-0.17	-21.17
695.0	1.00	15.10	694.6	6.9	14.8	16.1	0.28	0.16	-14.06
787.0	1.20	8.50	786.6	8.6	15.1	16.9	0.26	0.22	-7.17
880.0	1.30	9.90	879.6	10.6	15.4	17.7	0.11	0.11	1.51
972.0	1.50	354.10	971.6	12.8	15.5	18.3	0.47	0.22	-17.17
1,063.0	1.80	345.10	1,062.5	15.4	15.0	18.6	0.43	0.33	-9.89
1,156.0	0.60	180.20	1,155.5	16.3	14.6	18.4	2.56	-1.29	-177.31
1,247.0	0.70	137.70	1,246.5	15.4	15.0	18.6	0.53	0.11	-46.70
1,339.0	1.90	51.70	1,338.5	16.0	16.6	20.2	2.15	1.30	-93.48
1,431.0	2.60	27.60	1,430.4	18.8	18.7	23.0	1.26	0.76	-26.20
1,523.0	1.20	31.30	1,522.4	21.4	20.2	25.2	1.53	-1.52	4.02
1,615.0	0.70	93.90	1,614.4	22.2	21.3	26.4	1.17	-0.54	68.04
1,710.0	0.30	296.90	1,709.4	22.3	21.6	26.8	1.03	-0.42	-165.26
1,805.0	0.80	321.70	1,804.3	22.9	21.0	26.3	0.57	0.53	26.11
1,873.0	1.10	332.30	1,872.3	23.9	20.4	26.0	0.51	0.44	15.59
1,951.0	1.20	328.80	1,950.3	25.2	19.6	25.6	0.16	0.13	-4.49
2,014.0	1.10	326.50	2,013.3	26.3	18.9	25.3	0.17	-0.16	-3.65
2,109.0	1.10	330.50	2,108.3	27.9	18.0	24.8	0.08	0.00	4.21
2,202.0	1.10	333.10	2,201.3	29.4	17.1	24.4	0.05	0.00	2.80
2,295.0	1.10	332.30	2,294.3	31.0	16.3	24.0	0.02	0.00	-0.86
2,389.0	1.40	336.30	2,388.2	32.9	15.4	23.6	0.33	0.32	4.26
2,484.0	1.30	335.60	2,483.2	34.9	14.5	23.3	0.11	-0.11	-0.74
2,578.0	0.80	38.50	2,577.2	36.4	14.5	23.7	1.25	-0.53	66.91
2,673.0	0.60	35.70	2,672.2	37.3	15.2	24.6	0.21	-0.21	-2.95
2,767.0	0.40	25.90	2,766.2	38.0	15.6	25.2	0.23	-0.21	-10.43
2,863.0	0.40	22.90	2,862.2	38.6	15.9	25.6	0.02	0.00	-3.13
2,957.0	0.40	20.80	2,956.2	39.2	16.2	26.0	0.02	0.00	-2.23
3,052.0	0.30	8.60	3,051.2	39.8	16.3	26.3	0.13	-0.11	-12.84
3,241.0	0.40	13.60	3,240.2	40.9	16.5	26.8	0.06	0.05	2.65
3,428.0	0.20	12.20	3,427.2	41.9	16.8	27.3	0.11	-0.11	-0.75
3,618.0	0.20	58.90	3,617.2	42.4	17.1	27.8	0.08	0.00	24.58
3,805.0	0.10	152.60	3,804.2	42.4	17.5	28.1	0.12	-0.05	50.11
3,994.0	0.30	312.00	3,993.2	42.6	17.2	27.9	0.21	0.11	84.34
4,184.0	0.20	344.90	4,183.2	43.2	16.7	27.6	0.09	-0.05	17.32
4,373.0	0.10	152.10	4,372.2	43.4	16.7	27.7	0.16	-0.05	88.47
4,562.0	0.20	187.10	4,561.2	42.9	16.8	27.6	0.07	0.05	18.52
4,750.0	0.30	214.50	4,749.2	42.2	16.4	27.1	0.08	0.05	14.57
4,938.0	0.60	220.60	4,937.2	41.0	15.5	25.9	0.16	0.16	3.24
5,126.0	0.60	202.70	5,125.2	39.4	14.5	24.4	0.10	0.00	-9.52
5,316.0	1.10	214.30	5,315.1	37.0	13.1	22.4	0.28	0.26	6.11
5,505.0	1.10	237.30	5,504.1	34.5	10.5	19.3	0.23	0.00	12.17
5,695.0	0.90	262.60	5,694.1	33.3	7.5	16.1	0.25	-0.11	13.32



HP
Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Marsh Owl Federal Com #1H
Project:	Eddy County, NM (NAD:27)	TVD Reference:	Well @ 3272.0usft (Scandril Freedom)
Site:	Sec12: T26S, R26E	MD Reference:	Well @ 3272.0usft (Scandril Freedom)
Well:	Marsh Owl Federal Com #1H	North Reference:	Grid
Wellbore:	Pilot Hole	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

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)
5,885.0	1.10	242.80	5,884.0	32.3	4.4	12.8	0.21	0.11	-10.42
6,074.0	0.80	209.60	6,073.0	30.3	2.2	10.1	0.32	-0.16	-17.57
6,261.0	1.50	196.20	6,260.0	26.8	0.8	7.9	0.40	0.37	-7.17
6,448.0	0.70	198.10	6,446.9	23.4	-0.2	6.0	0.43	-0.43	1.02
6,543.0	0.80	37.30	6,541.9	23.4	0.0	6.2	1.56	0.11	-169.26
6,638.0	0.90	25.90	6,636.9	24.6	0.7	7.2	0.21	0.11	-12.00
6,732.0	1.10	62.10	6,730.9	25.6	1.9	8.6	0.69	0.21	38.51
6,827.0	0.90	99.30	6,825.9	26.0	3.4	10.2	0.70	-0.21	39.16
6,922.0	0.60	0.20	6,920.9	26.3	4.1	11.0	1.22	-0.32	-104.32
7,016.0	0.30	23.90	7,014.9	27.0	4.2	11.3	0.37	-0.32	25.21
7,110.0	0.30	312.90	7,108.9	27.4	4.2	11.3	0.37	0.00	-75.53
7,299.0	0.40	358.60	7,297.9	28.4	3.8	11.2	0.15	0.05	24.18
7,487.0	0.30	13.60	7,485.9	29.6	3.9	11.6	0.07	-0.05	7.98
7,676.0	0.60	253.20	7,674.9	29.8	3.0	10.9	0.42	0.16	-63.70
7,771.0	0.70	331.20	7,769.9	30.1	2.3	10.2	0.87	0.11	82.11
7,960.0	1.50	355.10	7,958.8	33.6	1.5	10.4	0.48	0.42	12.65
8,150.0	1.70	351.10	8,148.8	38.9	0.9	11.2	0.12	0.11	-2.11
8,338.0	1.00	11.60	8,336.7	43.2	0.8	12.2	0.45	-0.37	10.90
8,527.0	1.10	12.50	8,525.7	46.6	1.5	13.8	0.05	0.05	0.48
8,716.0	0.70	10.60	8,714.7	49.5	2.1	15.2	0.21	-0.21	-1.01
8,905.0	0.70	7.10	8,903.6	51.8	2.5	16.1	0.02	0.00	-1.85
9,094.0	0.50	1.30	9,092.6	53.8	2.6	16.8	0.11	-0.11	-3.07
9,283.0	0.30	281.80	9,281.6	54.7	2.2	16.6	0.28	-0.11	-42.06
9,472.0	0.20	250.40	9,470.6	54.7	1.4	15.9	0.09	-0.05	-16.61
9,660.0	0.70	234.90	9,658.6	53.9	0.1	14.4	0.27	0.27	-8.24
9,849.0	0.80	260.40	9,847.6	53.0	-2.1	12.0	0.18	0.05	13.49
9,921.0	0.80	260.40	9,919.6	52.9	-3.1	11.0	0.00	0.00	0.00
TD Pilot Hole @ 9975' MD / 9974' TVD									
9,975.0	0.80	260.40	9,973.6	52.7	-3.9	10.3	0.00	0.00	0.00

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
116.0	116.0	-0.8	0.8	First MWD Survey @ 116' MD / 116' TVD
9,975.0	9,973.6	52.7	-3.9	TD Pilot Hole @ 9975' MD / 9974' TVD

Checked By: _____ Approved By: _____ Date: _____



COG Operating, LLC

Eddy County, NM (NAD 27)

Sec12, T26S, R26E

Marsh Owl Federal Com #1H

Wellbore #1

Design: Wellbore #1

Survey Report - Geographic

24 June, 2015





HP
Survey Report - Geographic



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Marsh Owl Federal Com #1H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3272.0usft (Scandrill Freedom)
Site:	Sec12, T26S, R26E	MD Reference:	Well @ 3272.0usft (Scandrill Freedom)
Well:	Marsh Owl Federal Com #1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Project	Eddy County, NM (NAD 27)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Sec12, T26S, R26E		
Site Position:		Northing:	381,824.00 usft
From:	Map	Easting:	527,501.60 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 2' 58.985 N
		Longitude:	104° 14' 40.449 W
		Grid Convergence:	0.05 °

Well	Marsh Owl Federal Com #1H		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft
		Latitude:	32° 2' 58.985 N
		Longitude:	104° 14' 40.449 W
		Ground Level:	3,255.0 usft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010	6/24/2015	7.39
			Dip Angle
			(°)
			59.81
			Field Strength
			(nT)
			48,038

Design	Wellbore #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	5,885.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			Direction
			(°)
			74.58

Survey Program	Date 6/24/2015		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		Description
116.0	5,885.0	Pilot Hole - MWD (Pilot Hole)	MWD default
5,909.0	14,313.0	Curve & Lateral - MWD (Wellbore #1)	MWD default
			MWD - Standard
			MWD - Standard

Survey									
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Map	Map	Latitude	Longitude
Depth	(°)	(°)	Depth	(usft)	(usft)	Northing	Easting		
(usft)			(usft)			(usft)	(usft)		
0.0	0.00	0.00	0.0	0.0	0.0	381,824.00	527,501.60	32° 2' 58.985 N	104° 14' 40.449 W
116.0	1.10	135.40	116.0	-0.8	0.8	381,823.21	527,502.38	32° 2' 58.977 N	104° 14' 40.440 W
165.0	1.10	128.70	165.0	-1.4	1.5	381,822.58	527,503.08	32° 2' 58.971 N	104° 14' 40.431 W
240.0	0.70	115.20	240.0	-2.1	2.5	381,821.93	527,504.06	32° 2' 58.965 N	104° 14' 40.420 W
302.0	1.60	65.80	302.0	-1.9	3.6	381,822.13	527,505.19	32° 2' 58.966 N	104° 14' 40.407 W
332.0	2.50	60.20	331.9	-1.4	4.5	381,822.62	527,506.14	32° 2' 58.971 N	104° 14' 40.396 W
362.0	3.20	55.20	361.9	-0.6	5.8	381,823.43	527,507.39	32° 2' 58.979 N	104° 14' 40.381 W
392.0	3.60	54.70	391.9	0.4	7.2	381,824.45	527,508.85	32° 2' 58.989 N	104° 14' 40.364 W
453.0	3.50	57.30	452.7	2.6	10.4	381,826.56	527,511.98	32° 2' 59.010 N	104° 14' 40.328 W
510.0	2.00	57.70	509.7	4.0	12.7	381,828.03	527,514.29	32° 2' 59.025 N	104° 14' 40.301 W
571.0	1.00	36.80	570.6	5.0	13.9	381,829.03	527,515.50	32° 2' 59.035 N	104° 14' 40.287 W



HP
Survey Report - Geographic



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Marsh Owl Federal Com #1H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3272.0usft (Scandrill Freedom)
Site:	Sec12, T26S, R26E	MD Reference:	Well @ 3272.0usft (Scandrill Freedom)
Well:	Marsh Owl Federal Com #1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
631.0	0.90	24.10	630.6	5.9	14.4	381,829.88	527,516.01	32° 2' 59.043 N	104° 14' 40.281 W
695.0	1.00	15.10	694.6	6.9	14.8	381,830.87	527,516.36	32° 2' 59.053 N	104° 14' 40.277 W
787.0	1.20	8.50	786.6	8.6	15.1	381,832.60	527,516.71	32° 2' 59.070 N	104° 14' 40.273 W
880.0	1.30	9.90	879.6	10.6	15.4	381,834.60	527,517.04	32° 2' 59.090 N	104° 14' 40.269 W
972.0	1.50	354.10	971.6	12.8	15.5	381,836.83	527,517.09	32° 2' 59.112 N	104° 14' 40.268 W
1,063.0	1.80	345.10	1,062.5	15.4	15.0	381,839.40	527,516.60	32° 2' 59.137 N	104° 14' 40.274 W
1,156.0	0.60	180.20	1,155.5	16.3	14.6	381,840.32	527,516.23	32° 2' 59.146 N	104° 14' 40.279 W
1,247.0	0.70	137.70	1,246.5	15.4	15.0	381,839.43	527,516.60	32° 2' 59.138 N	104° 14' 40.274 W
1,339.0	1.90	51.70	1,338.5	16.0	16.6	381,839.96	527,518.17	32° 2' 59.143 N	104° 14' 40.256 W
1,431.0	2.60	27.60	1,430.4	18.8	18.7	381,842.76	527,520.34	32° 2' 59.170 N	104° 14' 40.231 W
1,523.0	1.20	31.30	1,522.4	21.4	20.2	381,845.43	527,521.81	32° 2' 59.197 N	104° 14' 40.214 W
1,615.0	0.70	93.90	1,614.4	22.2	21.3	381,846.21	527,522.87	32° 2' 59.205 N	104° 14' 40.201 W
1,710.0	0.30	296.90	1,709.4	22.3	21.6	381,846.29	527,523.22	32° 2' 59.205 N	104° 14' 40.197 W
1,805.0	0.80	321.70	1,804.3	22.9	21.0	381,846.92	527,522.59	32° 2' 59.212 N	104° 14' 40.205 W
1,873.0	1.10	332.30	1,872.3	23.9	20.4	381,847.87	527,521.99	32° 2' 59.221 N	104° 14' 40.211 W
1,951.0	1.20	328.80	1,950.3	25.2	19.6	381,849.23	527,521.22	32° 2' 59.235 N	104° 14' 40.220 W
2,014.0	1.10	326.50	2,013.3	26.3	18.9	381,850.30	527,520.55	32° 2' 59.245 N	104° 14' 40.228 W
2,109.0	1.10	330.50	2,108.3	27.9	18.0	381,851.86	527,519.59	32° 2' 59.261 N	104° 14' 40.239 W
2,202.0	1.10	333.10	2,201.3	29.4	17.1	381,853.43	527,518.75	32° 2' 59.276 N	104° 14' 40.249 W
2,295.0	1.10	332.30	2,294.3	31.0	16.3	381,855.01	527,517.93	32° 2' 59.292 N	104° 14' 40.259 W
2,389.0	1.40	336.30	2,388.2	32.9	15.4	381,856.86	527,517.05	32° 2' 59.310 N	104° 14' 40.269 W
2,484.0	1.30	335.60	2,483.2	34.9	14.5	381,858.91	527,516.14	32° 2' 59.330 N	104° 14' 40.279 W
2,578.0	0.80	38.50	2,577.2	36.4	14.5	381,860.39	527,516.11	32° 2' 59.345 N	104° 14' 40.280 W
2,673.0	0.60	35.70	2,672.2	37.3	15.2	381,861.32	527,516.81	32° 2' 59.354 N	104° 14' 40.272 W
2,767.0	0.40	25.90	2,766.2	38.0	15.6	381,862.01	527,517.24	32° 2' 59.361 N	104° 14' 40.267 W
2,863.0	0.40	22.90	2,862.2	38.6	15.9	381,862.62	527,517.52	32° 2' 59.367 N	104° 14' 40.263 W
2,957.0	0.40	20.80	2,956.2	39.2	16.2	381,863.23	527,517.76	32° 2' 59.373 N	104° 14' 40.260 W
3,052.0	0.30	8.60	3,051.2	39.8	16.3	381,863.79	527,517.92	32° 2' 59.379 N	104° 14' 40.259 W
3,241.0	0.40	13.60	3,240.2	40.9	16.5	381,864.92	527,518.15	32° 2' 59.390 N	104° 14' 40.256 W
3,428.0	0.20	12.20	3,427.2	41.9	16.8	381,865.87	527,518.37	32° 2' 59.399 N	104° 14' 40.253 W
3,618.0	0.20	58.90	3,617.2	42.4	17.1	381,866.37	527,518.72	32° 2' 59.404 N	104° 14' 40.249 W
3,805.0	0.10	152.60	3,804.2	42.4	17.5	381,866.39	527,519.08	32° 2' 59.404 N	104° 14' 40.245 W
3,994.0	0.30	312.00	3,993.2	42.6	17.2	381,866.57	527,518.79	32° 2' 59.406 N	104° 14' 40.249 W
4,184.0	0.20	344.90	4,183.2	43.2	16.7	381,867.23	527,518.33	32° 2' 59.413 N	104° 14' 40.254 W
4,373.0	0.10	152.10	4,372.2	43.4	16.7	381,867.40	527,518.32	32° 2' 59.414 N	104° 14' 40.254 W
4,562.0	0.20	187.10	4,561.2	42.9	16.8	381,866.93	527,518.36	32° 2' 59.410 N	104° 14' 40.254 W
4,750.0	0.30	214.50	4,749.2	42.2	16.4	381,866.20	527,518.04	32° 2' 59.402 N	104° 14' 40.257 W
4,938.0	0.60	220.60	4,937.2	41.0	15.5	381,865.04	527,517.12	32° 2' 59.391 N	104° 14' 40.268 W
5,126.0	0.60	202.70	5,125.2	39.4	14.5	381,863.39	527,516.10	32° 2' 59.375 N	104° 14' 40.280 W
5,316.0	1.10	214.30	5,315.1	37.0	13.1	381,860.96	527,514.69	32° 2' 59.351 N	104° 14' 40.296 W
5,505.0	1.10	237.30	5,504.1	34.5	10.5	381,858.48	527,512.14	32° 2' 59.326 N	104° 14' 40.326 W
5,695.0	0.90	262.60	5,694.1	33.3	7.5	381,857.31	527,509.12	32° 2' 59.315 N	104° 14' 40.361 W
5,885.0	1.10	242.80	5,884.0	32.3	4.4	381,856.28	527,506.02	32° 2' 59.304 N	104° 14' 40.397 W
Tie In To Pilot Hole @ 5885' MD / 5884' TVD									
5,909.0	1.10	249.60	5,908.0	32.1	4.0	381,856.10	527,505.60	32° 2' 59.303 N	104° 14' 40.402 W
5,968.0	0.70	234.90	5,967.0	31.7	3.2	381,855.69	527,504.77	32° 2' 59.299 N	104° 14' 40.411 W
5,999.0	0.30	326.10	5,998.0	31.7	3.0	381,855.65	527,504.57	32° 2' 59.298 N	104° 14' 40.414 W
6,030.0	2.80	37.10	6,029.0	32.3	3.4	381,856.32	527,504.99	32° 2' 59.305 N	104° 14' 40.409 W
6,061.0	6.30	39.40	6,059.9	34.2	4.9	381,858.24	527,506.52	32° 2' 59.324 N	104° 14' 40.391 W
6,093.0	9.50	39.20	6,091.6	37.6	7.7	381,861.64	527,509.31	32° 2' 59.357 N	104° 14' 40.359 W
6,125.0	12.50	38.70	6,123.0	42.4	11.5	381,866.39	527,513.14	32° 2' 59.404 N	104° 14' 40.314 W
6,156.0	15.30	40.30	6,153.1	48.1	16.3	381,872.13	527,517.89	32° 2' 59.461 N	104° 14' 40.259 W
6,188.0	18.00	44.70	6,183.8	54.9	22.5	381,878.87	527,524.10	32° 2' 59.528 N	104° 14' 40.187 W
6,219.0	20.00	49.80	6,213.1	61.7	29.9	381,885.70	527,531.51	32° 2' 59.595 N	104° 14' 40.100 W
6,251.0	22.50	51.40	6,242.9	69.1	38.9	381,893.05	527,540.48	32° 2' 59.668 N	104° 14' 39.996 W



HP
Survey Report - Geographic



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Marsh Owl Federal Com #1H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3272.0usft (Scandrift Freedom)
Site:	Sec12, T26S, R26E	MD Reference:	Well @ 3272.0usft (Scandrift Freedom)
Well:	Marsh Owl Federal Com #1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
6,282.0	25.90	46.60	6,271.2	77.4	48.4	381,901.40	527,550.04	32° 2' 59.751 N	104° 14' 39.885 W
6,314.0	29.30	41.00	6,299.5	88.1	58.7	381,912.12	527,560.26	32° 2' 59.857 N	104° 14' 39.766 W
6,345.0	33.20	38.20	6,326.0	100.5	68.9	381,924.52	527,570.49	32° 2' 59.979 N	104° 14' 39.647 W
6,376.0	37.40	38.40	6,351.3	114.6	80.0	381,938.57	527,581.59	32° 3' 0.118 N	104° 14' 39.518 W
6,407.0	41.40	38.90	6,375.3	129.9	92.3	381,953.94	527,593.88	32° 3' 0.270 N	104° 14' 39.375 W
6,439.0	45.30	39.10	6,398.5	147.0	106.1	381,971.00	527,607.70	32° 3' 0.439 N	104° 14' 39.214 W
6,470.0	49.20	40.80	6,419.6	164.4	120.7	381,988.44	527,622.32	32° 3' 0.611 N	104° 14' 39.044 W
6,502.0	54.30	42.00	6,439.4	183.3	137.3	382,007.28	527,638.94	32° 3' 0.798 N	104° 14' 38.851 W
6,534.0	58.70	42.90	6,457.0	203.0	155.4	382,026.96	527,656.95	32° 3' 0.992 N	104° 14' 38.642 W
6,566.0	60.90	42.40	6,473.1	223.3	174.1	382,047.30	527,675.69	32° 3' 1.194 N	104° 14' 38.424 W
6,598.0	61.50	42.20	6,488.5	244.0	193.0	382,068.04	527,694.56	32° 3' 1.399 N	104° 14' 38.204 W
6,629.0	62.60	41.90	6,503.1	264.4	211.3	382,088.38	527,712.90	32° 3' 1.600 N	104° 14' 37.991 W
6,661.0	63.90	41.90	6,517.5	285.6	230.4	382,109.65	527,731.99	32° 3' 1.810 N	104° 14' 37.769 W
6,692.0	66.30	41.00	6,530.5	306.7	249.0	382,130.72	527,750.60	32° 3' 2.018 N	104° 14' 37.553 W
6,723.0	69.10	40.30	6,542.3	328.5	267.7	382,152.48	527,769.28	32° 3' 2.234 N	104° 14' 37.335 W
6,755.0	71.40	40.50	6,553.1	351.4	287.2	382,175.41	527,788.80	32° 3' 2.460 N	104° 14' 37.108 W
6,786.0	71.50	40.50	6,563.0	373.8	306.3	382,197.76	527,807.88	32° 3' 2.681 N	104° 14' 36.886 W
6,817.0	71.70	40.60	6,572.8	396.1	325.4	382,220.11	527,827.01	32° 3' 2.903 N	104° 14' 36.664 W
6,849.0	73.20	40.60	6,582.4	419.3	345.3	382,243.28	527,846.86	32° 3' 3.132 N	104° 14' 36.433 W
6,880.0	73.40	40.80	6,591.3	441.8	364.6	382,265.79	527,866.22	32° 3' 3.354 N	104° 14' 36.208 W
6,912.0	73.60	41.00	6,600.4	465.0	384.7	382,288.98	527,886.31	32° 3' 3.584 N	104° 14' 35.974 W
6,976.0	74.10	41.20	6,618.2	511.3	425.1	382,335.30	527,926.72	32° 3' 4.042 N	104° 14' 35.504 W
7,039.0	74.30	41.30	6,635.4	556.9	465.1	382,380.88	527,966.69	32° 3' 4.492 N	104° 14' 35.039 W
7,102.0	74.70	41.90	6,652.2	602.3	505.4	382,426.28	528,007.00	32° 3' 4.941 N	104° 14' 34.570 W
7,165.0	75.20	41.50	6,668.6	647.7	545.9	382,471.70	528,047.47	32° 3' 5.391 N	104° 14' 34.100 W
7,228.0	73.70	41.50	6,685.4	693.2	586.1	382,517.16	528,087.69	32° 3' 5.840 N	104° 14' 33.632 W
7,291.0	73.20	41.50	6,703.4	738.4	626.1	382,562.39	528,127.70	32° 3' 6.287 N	104° 14' 33.167 W
7,353.0	73.70	41.70	6,721.0	782.8	665.6	382,606.83	528,167.16	32° 3' 6.727 N	104° 14' 32.708 W
7,448.0	74.10	42.60	6,747.4	850.5	726.8	382,674.50	528,228.41	32° 3' 7.396 N	104° 14' 31.995 W
7,542.0	71.70	41.00	6,775.0	917.5	786.7	382,741.46	528,288.29	32° 3' 8.058 N	104° 14' 31.299 W
7,638.0	71.80	41.70	6,805.1	985.9	846.9	382,809.90	528,348.53	32° 3' 8.735 N	104° 14' 30.598 W
7,732.0	72.50	41.70	6,833.9	1,052.7	906.4	382,876.71	528,408.05	32° 3' 9.396 N	104° 14' 29.906 W
7,826.0	73.40	41.90	6,861.5	1,119.7	966.3	382,943.70	528,467.95	32° 3' 10.058 N	104° 14' 29.209 W
7,921.0	72.60	41.20	6,889.2	1,187.7	1,026.6	383,011.69	528,528.21	32° 3' 10.731 N	104° 14' 28.508 W
8,015.0	71.60	42.00	6,918.1	1,254.6	1,086.0	383,078.58	528,587.59	32° 3' 11.392 N	104° 14' 27.818 W
8,109.0	73.30	44.30	6,946.5	1,320.0	1,147.3	383,143.95	528,648.89	32° 3' 12.039 N	104° 14' 27.105 W
8,204.0	74.20	45.60	6,973.1	1,384.5	1,211.7	383,208.50	528,713.32	32° 3' 12.677 N	104° 14' 26.355 W
8,235.0	73.90	46.40	6,981.6	1,405.2	1,233.2	383,229.20	528,734.76	32° 3' 12.882 N	104° 14' 26.106 W
8,267.0	73.90	47.70	6,990.5	1,426.2	1,255.7	383,250.15	528,757.26	32° 3' 13.089 N	104° 14' 25.844 W
8,298.0	73.30	49.10	6,999.2	1,445.9	1,277.9	383,269.89	528,779.50	32° 3' 13.284 N	104° 14' 25.586 W
8,330.0	72.70	51.00	7,008.6	1,465.5	1,301.4	383,289.54	528,802.96	32° 3' 13.478 N	104° 14' 25.313 W
8,361.0	72.20	52.80	7,017.9	1,483.8	1,324.6	383,307.78	528,826.22	32° 3' 13.658 N	104° 14' 25.043 W
8,393.0	72.20	54.20	7,027.7	1,501.9	1,349.1	383,325.90	528,850.71	32° 3' 13.838 N	104° 14' 24.758 W
8,424.0	72.30	55.80	7,037.2	1,518.8	1,373.3	383,342.84	528,874.89	32° 3' 14.005 N	104° 14' 24.477 W
8,456.0	72.50	56.50	7,046.8	1,535.8	1,398.6	383,359.83	528,900.22	32° 3' 14.173 N	104° 14' 24.182 W
8,487.0	73.30	57.00	7,055.9	1,552.1	1,423.4	383,376.07	528,925.00	32° 3' 14.333 N	104° 14' 23.894 W
8,519.0	74.60	57.20	7,064.8	1,568.8	1,449.2	383,392.78	528,950.82	32° 3' 14.499 N	104° 14' 23.594 W
8,550.0	75.00	57.20	7,072.9	1,585.0	1,474.4	383,408.98	528,975.97	32° 3' 14.659 N	104° 14' 23.301 W
8,582.0	74.50	56.80	7,081.3	1,601.8	1,500.3	383,425.80	529,001.86	32° 3' 14.825 N	104° 14' 23.000 W
8,613.0	74.10	57.30	7,089.7	1,618.0	1,525.3	383,442.03	529,026.90	32° 3' 14.985 N	104° 14' 22.709 W
8,645.0	74.80	59.30	7,098.3	1,634.2	1,551.5	383,458.23	529,053.13	32° 3' 15.145 N	104° 14' 22.404 W
8,677.0	74.80	61.60	7,106.7	1,649.5	1,578.4	383,473.46	529,079.99	32° 3' 15.296 N	104° 14' 22.092 W
8,709.0	75.10	63.50	7,115.0	1,663.7	1,605.8	383,487.70	529,107.42	32° 3' 15.437 N	104° 14' 21.773 W
8,740.0	75.10	65.80	7,123.0	1,676.5	1,632.9	383,500.52	529,134.49	32° 3' 15.563 N	104° 14' 21.459 W
8,772.0	74.70	68.60	7,131.3	1,688.5	1,661.4	383,512.50	529,162.96	32° 3' 15.682 N	104° 14' 21.128 W



HP
Survey Report - Geographic



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Marsh Owl Federal Com #1H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3272.0usft (Scandrift Freedom)
Site:	Sec12, T26S, R26E	MD Reference:	Well @ 3272.0usft (Scandrift Freedom)
Well:	Marsh Owl Federal Com #1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
8,803.0	74.60	71.10	7,139.5	1,698.8	1,689.4	383,522.79	529,191.03	32° 3' 15.783 N	104° 14' 20.801 W
8,835.0	75.40	73.00	7,147.8	1,708.3	1,718.8	383,532.32	529,220.43	32° 3' 15.877 N	104° 14' 20.460 W
8,866.0	76.00	74.70	7,155.5	1,716.7	1,747.7	383,540.67	529,249.28	32° 3' 15.960 N	104° 14' 20.124 W
8,897.0	75.80	76.70	7,163.0	1,724.1	1,776.8	383,548.10	529,278.42	32° 3' 16.033 N	104° 14' 19.786 W
8,929.0	76.00	79.00	7,170.8	1,730.6	1,807.2	383,554.63	529,308.75	32° 3' 16.097 N	104° 14' 19.433 W
8,961.0	75.50	81.40	7,178.7	1,735.9	1,837.7	383,559.91	529,339.31	32° 3' 16.149 N	104° 14' 19.078 W
8,992.0	74.80	84.60	7,186.6	1,739.6	1,867.4	383,563.56	529,369.05	32° 3' 16.185 N	104° 14' 18.732 W
9,023.0	73.10	86.90	7,195.2	1,741.8	1,897.2	383,565.77	529,398.76	32° 3' 16.207 N	104° 14' 18.387 W
9,055.0	70.40	87.80	7,205.2	1,743.2	1,927.5	383,567.18	529,429.11	32° 3' 16.220 N	104° 14' 18.034 W
9,086.0	68.00	89.20	7,216.2	1,743.9	1,956.5	383,567.94	529,458.08	32° 3' 16.228 N	104° 14' 17.698 W
9,118.0	65.30	90.60	7,228.9	1,744.0	1,985.9	383,568.00	529,487.45	32° 3' 16.228 N	104° 14' 17.356 W
9,149.0	62.70	90.40	7,242.5	1,743.8	2,013.7	383,567.75	529,515.31	32° 3' 16.225 N	104° 14' 17.033 W
9,180.0	60.60	89.20	7,257.2	1,743.8	2,041.0	383,567.84	529,542.59	32° 3' 16.226 N	104° 14' 16.716 W
9,212.0	58.70	88.60	7,273.4	1,744.4	2,068.6	383,568.37	529,570.20	32° 3' 16.231 N	104° 14' 16.395 W
9,243.0	58.20	88.60	7,289.6	1,745.0	2,095.0	383,569.02	529,596.61	32° 3' 16.237 N	104° 14' 16.088 W
9,275.0	59.40	88.50	7,306.2	1,745.7	2,122.4	383,569.71	529,623.97	32° 3' 16.244 N	104° 14' 15.770 W
9,306.0	60.80	88.10	7,321.6	1,746.5	2,149.2	383,570.51	529,650.83	32° 3' 16.251 N	104° 14' 15.458 W
9,329.8	61.34	88.10	7,333.2	1,747.2	2,170.0	383,571.20	529,671.65	32° 3' 16.258 N	104° 14' 15.216 W
Crossed Lease Line @ 9330' MD / 7333' TVD									
9,337.0	61.50	88.10	7,336.6	1,747.4	2,176.4	383,571.41	529,677.97	32° 3' 16.260 N	104° 14' 15.143 W
9,369.0	62.30	88.10	7,351.7	1,748.3	2,204.6	383,572.34	529,706.18	32° 3' 16.269 N	104° 14' 14.815 W
9,401.0	64.70	87.80	7,366.0	1,749.4	2,233.2	383,573.37	529,734.80	32° 3' 16.279 N	104° 14' 14.482 W
9,432.0	67.60	87.80	7,378.5	1,750.5	2,261.5	383,574.46	529,763.13	32° 3' 16.289 N	104° 14' 14.153 W
9,464.0	70.70	87.20	7,389.9	1,751.8	2,291.4	383,575.76	529,793.00	32° 3' 16.302 N	104° 14' 13.806 W
9,495.0	72.60	86.50	7,399.6	1,753.4	2,320.8	383,577.38	529,822.38	32° 3' 16.318 N	104° 14' 13.464 W
9,527.0	74.80	86.70	7,408.6	1,755.2	2,351.4	383,579.20	529,853.04	32° 3' 16.336 N	104° 14' 13.108 W
9,558.0	77.90	87.90	7,415.9	1,756.6	2,381.5	383,580.62	529,883.12	32° 3' 16.349 N	104° 14' 12.759 W
9,589.0	80.50	88.80	7,421.7	1,757.5	2,412.0	383,581.50	529,913.56	32° 3' 16.358 N	104° 14' 12.405 W
9,620.0	83.00	89.00	7,426.2	1,758.1	2,442.6	383,582.08	529,944.23	32° 3' 16.363 N	104° 14' 12.049 W
9,662.0	84.90	86.70	7,430.6	1,759.7	2,484.4	383,583.65	529,985.96	32° 3' 16.379 N	104° 14' 11.564 W
9,679.6	85.07	86.47	7,432.2	1,760.7	2,501.9	383,584.70	530,003.46	32° 3' 16.389 N	104° 14' 11.360 W
Crossed 330' Hard Line @ 9680' MD / 7432' TVD									
9,693.0	85.20	86.30	7,433.3	1,761.5	2,515.2	383,585.54	530,016.79	32° 3' 16.397 N	104° 14' 11.205 W
9,723.0	87.00	86.90	7,435.3	1,763.3	2,545.1	383,587.31	530,046.67	32° 3' 16.414 N	104° 14' 10.858 W
9,815.0	89.60	88.10	7,438.1	1,767.3	2,636.9	383,591.32	530,138.53	32° 3' 16.453 N	104° 14' 9.791 W
9,907.0	90.00	89.00	7,438.4	1,769.7	2,728.9	383,593.65	530,230.50	32° 3' 16.475 N	104° 14' 8.722 W
9,999.0	87.10	87.20	7,440.7	1,772.7	2,820.8	383,596.70	530,322.40	32° 3' 16.505 N	104° 14' 7.654 W
10,092.0	87.40	87.60	7,445.2	1,776.9	2,913.6	383,600.91	530,415.20	32° 3' 16.545 N	104° 14' 6.576 W
10,185.0	88.00	88.10	7,448.9	1,780.4	3,006.5	383,604.40	530,508.06	32° 3' 16.579 N	104° 14' 5.497 W
10,280.0	87.90	88.30	7,452.3	1,783.4	3,101.3	383,607.38	530,602.95	32° 3' 16.608 N	104° 14' 4.394 W
10,375.0	89.00	86.50	7,454.9	1,787.7	3,196.2	383,611.69	530,697.81	32° 3' 16.650 N	104° 14' 3.292 W
10,470.0	88.40	86.30	7,457.0	1,793.7	3,291.0	383,617.65	530,792.60	32° 3' 16.708 N	104° 14' 2.190 W
10,564.0	89.40	86.70	7,458.8	1,799.4	3,384.8	383,623.39	530,886.41	32° 3' 16.764 N	104° 14' 1.100 W
10,659.0	89.40	86.70	7,459.8	1,804.9	3,479.6	383,628.86	530,981.24	32° 3' 16.817 N	104° 13' 59.998 W
10,754.0	89.30	87.10	7,460.9	1,810.0	3,574.5	383,634.00	531,076.10	32° 3' 16.867 N	104° 13' 58.896 W
10,848.0	89.10	87.40	7,462.2	1,814.5	3,668.4	383,638.50	531,169.98	32° 3' 16.911 N	104° 13' 57.805 W
10,943.0	89.00	87.40	7,463.8	1,818.8	3,763.3	383,642.81	531,264.87	32° 3' 16.952 N	104° 13' 56.702 W
11,038.0	86.60	87.90	7,467.4	1,822.7	3,858.1	383,646.71	531,359.71	32° 3' 16.990 N	104° 13' 55.600 W
11,132.0	87.80	88.10	7,472.0	1,826.0	3,951.9	383,649.98	531,453.54	32° 3' 17.022 N	104° 13' 54.510 W
11,226.0	90.10	88.60	7,473.7	1,828.7	4,045.9	383,652.69	531,547.48	32° 3' 17.048 N	104° 13' 53.418 W
11,320.0	88.30	88.10	7,475.1	1,831.4	4,139.8	383,655.39	531,641.43	32° 3' 17.073 N	104° 13' 52.326 W
11,414.0	85.80	87.20	7,479.9	1,835.2	4,233.6	383,659.24	531,735.22	32° 3' 17.111 N	104° 13' 51.236 W
11,508.0	85.70	87.40	7,486.9	1,839.7	4,327.3	383,663.66	531,828.85	32° 3' 17.153 N	104° 13' 50.148 W
11,603.0	87.00	87.20	7,492.9	1,844.1	4,422.0	383,668.12	531,923.55	32° 3' 17.197 N	104° 13' 49.048 W
11,696.0	87.50	87.40	7,497.4	1,848.5	4,514.7	383,672.50	532,016.34	32° 3' 17.239 N	104° 13' 47.970 W



HP
Survey Report - Geographic



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Marsh Owl Federal Com #1H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3272.0usft (Scandrift Freedom)
Site:	Sec12, T26S, R26E	MD Reference:	Well @ 3272.0usft (Scandrift Freedom)
Well:	Marsh Owl Federal Com #1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
11,791.0	88.10	87.80	7,501.0	1,852.5	4,609.6	383,676.48	532,111.19	32° 3' 17.278 N	104° 13' 46.867 W
11,886.0	88.20	88.10	7,504.1	1,855.9	4,704.5	383,679.87	532,206.08	32° 3' 17.310 N	104° 13' 45.765 W
11,980.0	88.60	88.60	7,506.7	1,858.6	4,798.4	383,682.58	532,300.00	32° 3' 17.336 N	104° 13' 44.673 W
12,074.0	89.00	88.80	7,508.7	1,860.7	4,892.4	383,684.71	532,393.96	32° 3' 17.356 N	104° 13' 43.582 W
12,169.0	89.20	89.50	7,510.2	1,862.1	4,987.3	383,686.12	532,488.93	32° 3' 17.369 N	104° 13' 42.478 W
12,262.0	88.30	89.00	7,512.2	1,863.3	5,080.3	383,687.34	532,581.90	32° 3' 17.381 N	104° 13' 41.398 W
12,357.0	87.50	88.80	7,515.7	1,865.2	5,175.2	383,689.16	532,676.82	32° 3' 17.398 N	104° 13' 40.295 W
12,451.0	87.50	89.20	7,519.8	1,866.8	5,269.1	383,690.80	532,770.72	32° 3' 17.413 N	104° 13' 39.204 W
12,545.0	87.30	86.50	7,524.0	1,870.3	5,362.9	383,694.32	532,864.55	32° 3' 17.447 N	104° 13' 38.113 W
12,639.0	90.00	86.30	7,526.3	1,876.2	5,456.7	383,700.22	532,958.33	32° 3' 17.504 N	104° 13' 37.023 W
12,733.0	90.80	86.50	7,525.6	1,882.1	5,550.5	383,706.12	533,052.14	32° 3' 17.562 N	104° 13' 35.933 W
12,827.0	91.70	86.70	7,523.6	1,887.7	5,644.3	383,711.70	533,145.95	32° 3' 17.616 N	104° 13' 34.843 W
12,921.0	92.40	87.20	7,520.2	1,892.7	5,738.2	383,716.69	533,239.75	32° 3' 17.665 N	104° 13' 33.753 W
13,015.0	90.60	87.10	7,517.7	1,897.4	5,832.0	383,721.37	533,333.60	32° 3' 17.710 N	104° 13' 32.663 W
13,109.0	88.80	86.50	7,518.2	1,902.6	5,925.8	383,726.61	533,427.45	32° 3' 17.761 N	104° 13' 31.572 W
13,204.0	89.90	86.50	7,519.3	1,908.4	6,020.7	383,732.41	533,522.26	32° 3' 17.818 N	104° 13' 30.470 W
13,298.0	90.60	86.90	7,518.9	1,913.8	6,114.5	383,737.82	533,616.11	32° 3' 17.870 N	104° 13' 29.380 W
13,392.0	89.00	87.20	7,519.2	1,918.7	6,208.4	383,742.66	533,709.98	32° 3' 17.917 N	104° 13' 28.289 W
13,486.0	88.30	87.40	7,521.4	1,923.1	6,302.2	383,747.09	533,803.85	32° 3' 17.960 N	104° 13' 27.198 W
13,580.0	88.70	87.80	7,523.9	1,927.0	6,396.1	383,751.02	533,897.73	32° 3' 17.998 N	104° 13' 26.107 W
13,674.0	89.90	88.10	7,525.0	1,930.4	6,490.1	383,754.38	533,991.66	32° 3' 18.030 N	104° 13' 25.015 W
13,769.0	90.00	88.30	7,525.1	1,933.4	6,585.0	383,757.37	534,086.62	32° 3' 18.059 N	104° 13' 23.912 W
13,862.0	90.70	88.60	7,524.6	1,935.9	6,678.0	383,759.88	534,179.58	32° 3' 18.083 N	104° 13' 22.832 W
13,957.0	89.10	87.60	7,524.7	1,939.0	6,772.9	383,763.03	534,274.52	32° 3' 18.113 N	104° 13' 21.729 W
14,051.0	89.70	87.20	7,525.7	1,943.3	6,866.8	383,767.30	534,368.42	32° 3' 18.154 N	104° 13' 20.637 W
14,145.0	90.70	87.20	7,525.4	1,947.9	6,960.7	383,771.89	534,462.31	32° 3' 18.199 N	104° 13' 19.546 W
14,240.0	90.90	86.90	7,524.1	1,952.8	7,055.6	383,776.78	534,557.17	32° 3' 18.246 N	104° 13' 18.444 W
14,264.0	91.00	86.70	7,523.7	1,954.1	7,079.5	383,778.12	534,581.13	32° 3' 18.259 N	104° 13' 18.166 W
14,313.0	91.00	86.70	7,522.8	1,956.9	7,128.4	383,780.94	534,630.04	32° 3' 18.287 N	104° 13' 17.597 W
TD @ 14313' MD / 7523' TVD									

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
5,885.0	5,884.0	32.3	4.4	Tie In To Pilot Hole @ 5885' MD / 5884' TVD
9,329.8	7,333.2	1,747.2	2,170.0	Crossed Lease Line @ 9330' MD / 7333' TVD
9,679.6	7,432.2	1,760.7	2,501.9	Crossed 330' Hard Line @ 9680' MD / 7432' TVD
14,313.0	7,522.8	1,956.9	7,128.4	TD @ 14313' MD / 7523' TVD

Checked By: _____	Approved By: _____	Date: _____
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