



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
OCT 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=Chris@directionaldrillers.com, c=US
Date: 2015.06.26 08:44:04 -0500



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 (Scandria Freedom)
Site:	Sec 12, T26S, R26E	MD Reference:	Well @ 3272.0usft (Scandria 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:		Northings:	381,824.00 usft	Latitude:	32° 2' 58.985 N
From:	Map	Easting:	527,501.60 usft	Longitude:	104° 14' 40.449 W
Position Uncertainty:	0.0 usft	Spot Radius:	13-3/16 "	Grid Convergence:	0.05 "

Well: Marsh Owl Federal Com #1H						
Well Position	+N-S	0.0 usft	Northings:	381,824.00 usft	Latitude:	32° 2' 58.985 N
	+E-W	0.0 usft	Easting:	527,501.60 usft	Longitude:	104° 14' 40.449 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	3,255.0 usft

Wellbore		Pilot Hole			
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
	IGRF2015	5/13/2015	7.47	89.82	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	Direction
	(usft)	(usft)	(usft)	(°)
	0.0	0.0	0.0	74.56

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

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	0.96	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	331.8	-1.4	4.5	4.0	3.07	3.00	-18.87
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	391.8	0.4	7.2	7.1	1.34	1.33	-1.67
463.0	3.50	57.30	452.7	2.6	10.4	10.7	0.31	-0.16	4.28
510.0	2.00	57.70	509.7	4.0	12.7	13.3	2.63	-2.63	0.70



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Marsh Owl Federal Com #1H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3272 Dush (Scandria Freedom)
Site:	Sec 12, T26S, R24E	MD Reference:	Well @ 3272 Dush (Scandria Freedom)
Well:	Marsh Owl Federal Com #1H	North Reference:	Grid
Wellbore:	Pilot Hole	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Measured	Inclination	Azimuth	Vertical	NU-S	E-W	Vertical	Dogleg	Budd	Turn
Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Rate
(usft)			(usft)			(usft)	(/100usft)	(/100usft)	(/100usft)
571.0	1.00	36.80	570.6	5.0	13.9	14.7	1.84	-1.64	-34.26
631.0	0.80	24.10	630.6	5.8	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	786.8	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	18.8	0.43	0.33	-8.89
1,156.0	0.60	180.20	1,155.5	16.3	14.6	18.4	2.58	-1.29	-177.31
1,247.0	0.70	137.70	1,246.5	18.4	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	1.26	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	28.11
1,893.0	1.10	332.30	1,892.3	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	14.6	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	24.56
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
5,128.0	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 Coordinate Reference:	Well Marsh Owl Federal Com #1H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3272.0ust (Scandill Freedom)
Site:	Sec 12, T28S, R26E	MD Reference:	Well @ 3272.0ust (Scandill 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 (ust)	Inclination (°)	Azimuth (°)	Vertical Depth (ust)	ΔN-S (ust)	ΔE-W (ust)	Vertical Section (ust)	Dogleg Rate (°/100ust)	Build Rate (°/100ust)	Turn Rate (°/100ust)
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	209.50	6,073.0	30.3	2.2	10.1	0.32	-0.16	-17.57
6,261.0	1.50	198.20	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	1.58	0.11	-169.28
6,636.0	0.80	25.90	6,636.9	24.6	0.7	7.2	0.21	0.11	-12.00
6,732.0	1.10	82.10	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	28.0	3.4	10.2	0.70	-0.21	38.16
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
7,576.0	0.60	253.20	7,574.9	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	10.80	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	-42.08
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
9,848.0	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

Measured Depth (ust)	Vertical Depth (ust)	Local Coordinates ΔN-S (ust)	ΔE-W (ust)	Comment
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 @ 3272.0ush (Scandtl Freedom)
Site:	Sec12, T28S, R28E	MD Reference:	Well @ 3272.0ush (Scandtl 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, T28S, R28E			
Site Position:		Northing:	381,824.00 usft	Latitude:	32° 2' 58.985 N
From:	Map	Easting:	527,501.80 usft	Longitude:	104° 14' 40.449 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.05 °

Well:	Marsh Owl Federal Com #1H					
Well Position	+N-S	0.0 usft	Northing:	381,824.00 usft	Latitude:	32° 2' 58.985 N
	+E-W	0.0 usft	Easting:	527,501.80 usft	Longitude:	104° 14' 40.449 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	3,255.0 usft

Wellbore #1					
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
	IGRF2010	6/24/2015	7.39	59.81	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	Direction	
	(usft)	(usft)	(usft)	(°)	
	0.0	0.0	0.0	74.58	

Survey Program		Date: 6/24/2015		
From (mst)	To (mst)	Survey (Wellbore)	Tool Name	Description
118.0	5,885.0	Pilot Hole - MWD (Pilot Hole)	MWD default	MWD - Standard
5,909.0	14,313.0	Curve & Lateral - MWD (Wellbore #1)	MWD default	MWD - Standard

Measured	Vertical	Map	Map	Map	Map	Map	Map	Map	Map
Depth	Inclination	Azimuth	Depth	+N-S	+E-W	Northing	Easting	Latitude	Longitude
(usft)	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
0.0	0.00	0.00	0.0	0.0	0.0	381,824.00	527,501.80	32° 2' 58.985 N	104° 14' 40.449 W
118.0	1.10	135.40	118.0	-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	85.80	302.0	-1.9	3.8	381,822.13	527,505.19	32° 2' 58.968 N	104° 14' 40.407 W
332.0	2.50	60.20	331.9	-1.4	4.5	381,822.82	527,506.14	32° 2' 58.971 N	104° 14' 40.398 W
382.0	3.20	55.20	381.9	-0.6	5.8	381,823.43	527,507.39	32° 2' 58.979 N	104° 14' 40.381 W
392.0	3.80	54.70	381.9	0.4	7.2	381,824.45	527,508.85	32° 2' 58.989 N	104° 14' 40.384 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	381,826.03	527,514.28	32° 2' 59.025 N	104° 14' 40.301 W
571.0	1.00	38.80	570.8	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 (Scandrol Freedom)
Site:	Sec12, T26S, R26E	MD Reference:	Well @ 3272.0usft (Scandrol Freedom)
Well:	Marsh Owl Federal Com #1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	ΔN-B (usft)	ΔE-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
631.0	0.90	24.10	630.8	5.9	14.4	381,829.88	527,518.01	32° 2' 59.043 N	104° 14' 40.281 W
695.0	1.00	15.10	694.6	6.9	14.6	381,830.87	527,518.38	32° 2' 59.053 N	104° 14' 40.277 W
767.0	1.20	8.50	766.8	8.6	15.1	381,832.60	527,518.71	32° 2' 59.070 N	104° 14' 40.273 W
880.0	1.30	0.90	879.8	10.6	15.4	381,834.60	527,517.04	32° 2' 59.090 N	104° 14' 40.289 W
972.0	1.50	354.10	971.8	12.8	15.5	381,838.63	527,517.09	32° 2' 59.112 N	104° 14' 40.288 W
1,063.0	1.60	345.10	1,062.5	15.4	15.0	381,838.40	527,518.60	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	527,518.23	32° 2' 59.146 N	104° 14' 40.276 W
1,247.0	0.70	137.70	1,246.5	15.4	15.0	381,839.43	527,518.60	32° 2' 59.138 N	104° 14' 40.274 W
1,336.0	1.80	51.70	1,335.5	18.0	16.6	381,839.96	527,518.17	32° 2' 59.143 N	104° 14' 40.258 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' 59.187 N	104° 14' 40.214 W
1,615.0	0.70	93.90	1,614.4	22.2	21.3	381,848.21	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	21.8	381,848.29	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	381,848.92	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	381,847.67	527,521.89	32° 2' 59.221 N	104° 14' 40.211 W
1,951.0	1.20	328.60	1,950.3	25.2	19.8	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' 59.278 N	104° 14' 40.249 W
2,285.0	1.10	332.30	2,284.3	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	32.6	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	34.6	14.5	381,858.81	527,516.14	32° 2' 59.330 N	104° 14' 40.279 W
2,578.0	0.60	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	527,516.61	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' 40.287 W
2,863.0	0.40	22.90	2,862.2	38.8	15.9	381,862.62	527,517.52	32° 2' 59.367 N	104° 14' 40.283 W
2,957.0	0.40	20.60	2,956.2	39.2	16.2	381,863.23	527,517.76	32° 2' 59.373 N	104° 14' 40.280 W
3,052.0	0.30	6.60	3,051.2	39.8	16.3	381,863.78	527,517.82	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	381,865.67	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
3,803.0	0.10	152.80	3,802.2	42.4	17.5	381,868.39	527,518.08	32° 2' 59.404 N	104° 14' 40.245 W
3,994.0	0.30	312.00	3,993.2	42.8	17.2	381,868.57	527,518.79	32° 2' 59.408 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	167.10	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	0.80	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	381,860.86	527,514.89	32° 2' 59.351 N	104° 14' 40.286 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	0.60	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	242.60	5,884.0	32.3	4.4	381,856.28	527,508.02	32° 2' 59.304 N	104° 14' 40.397 W
Tie In To Pilot Hole @ 5885' MD / 5884' TVD									
5,908.0	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
5,988.0	0.70	234.80	5,987.0	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	320.10	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	381,858.32	527,504.98	32° 2' 59.305 N	104° 14' 40.409 W
6,061.0	8.30	38.40	6,059.9	34.2	4.9	381,858.24	527,508.52	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	527,508.31	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	81.7	29.9	381,885.70	527,531.51	32° 2' 59.595 N	104° 14' 40.100 W
6,251.0	22.50	61.40	6,242.9	89.1	38.8	381,893.05	527,540.48	32° 2' 59.668 N	104° 14' 39.698 W



HP
Survey Report - Geographic



Company:	COG Operating, LLC	Local Coordinate Reference:	Well Marsh Owl Federal Com #1H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3272.0usft (Scandrol Freedom)
Block:	Sec12, T26S, R28E	MD Reference:	Well @ 3272.0usft (Scandrol Freedom)
Well:	Marsh Owl Federal Com #1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

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	48.80	6,271.2	77.4	48.4	381,801.40	527,550.04	32° 2' 59.751 N	104° 14' 39.885 W
6,314.0	28.30	41.00	6,299.5	88.1	58.7	381,812.12	527,560.26	32° 2' 59.857 N	104° 14' 39.798 W
6,345.0	33.20	38.20	6,328.0	100.5	68.9	381,824.52	527,570.49	32° 2' 59.978 N	104° 14' 39.647 W
6,376.0	37.40	38.40	6,351.3	114.6	80.0	381,838.57	527,581.59	32° 3' 0.118 N	104° 14' 39.518 W
6,407.0	41.40	38.90	6,375.3	128.9	92.3	381,853.94	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	381,871.00	527,607.70	32° 3' 0.439 N	104° 14' 39.214 W
6,470.0	49.20	40.80	6,419.8	164.4	120.7	381,888.44	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	527,638.84	32° 3' 0.799 N	104° 14' 38.851 W
6,534.0	58.70	42.90	6,457.0	203.0	155.4	382,026.98	527,656.85	32° 3' 0.992 N	104° 14' 38.642 W
6,566.0	60.80	42.40	6,473.1	223.3	174.1	382,047.30	527,675.89	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	41.80	6,503.1	264.4	211.3	382,088.38	527,712.90	32° 3' 1.600 N	104° 14' 37.981 W
6,661.0	63.90	41.90	6,517.5	285.8	230.4	382,109.65	527,731.89	32° 3' 1.810 N	104° 14' 37.769 W
6,692.0	68.30	41.00	6,530.5	308.7	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	382,197.78	527,807.88	32° 3' 2.681 N	104° 14' 36.888 W
6,817.0	71.70	40.80	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	40.80	6,582.4	419.3	343.3	382,243.28	527,846.88	32° 3' 3.132 N	104° 14' 36.433 W
6,880.0	73.40	40.80	6,591.3	441.8	364.8	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
6,978.0	74.10	41.20	6,618.2	511.3	425.1	382,335.30	527,928.72	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	527,968.89	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	6,668.8	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	528,087.89	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	665.8	382,608.83	528,167.16	32° 3' 6.727 N	104° 14' 32.708 W
7,448.0	74.10	42.80	6,747.4	850.5	728.8	382,674.50	528,228.41	32° 3' 7.399 N	104° 14' 31.995 W
7,542.0	71.70	41.00	6,775.0	917.5	788.7	382,741.48	528,288.29	32° 3' 8.058 N	104° 14' 31.289 W
7,638.0	71.80	41.70	6,805.1	985.9	848.9	382,809.80	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	908.4	382,878.71	528,408.05	32° 3' 9.398 N	104° 14' 29.906 W
7,828.0	73.40	41.90	6,861.5	1,119.7	968.3	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	1,028.6	383,011.89	528,528.21	32° 3' 10.731 N	104° 14' 28.508 W
8,015.0	71.60	42.09	6,918.1	1,254.6	1,088.0	383,078.58	528,587.59	32° 3' 11.392 N	104° 14' 27.818 W
8,109.0	73.30	44.30	6,948.5	1,320.0	1,147.3	383,143.95	528,646.89	32° 3' 12.039 N	104° 14' 27.105 W
8,204.0	74.20	45.80	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	6,981.8	1,405.2	1,233.2	383,229.20	528,734.78	32° 3' 12.882 N	104° 14' 26.108 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	383,288.54	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	1,519.6	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	1,388.8	383,358.83	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	383,378.07	528,925.00	32° 3' 14.333 N	104° 14' 23.884 W
8,519.0	74.80	57.20	7,084.8	1,588.8	1,449.2	383,392.78	528,950.82	32° 3' 14.489 N	104° 14' 23.584 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	58.80	7,081.3	1,601.8	1,500.3	383,425.80	529,001.88	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	529,028.90	32° 3' 14.985 N	104° 14' 22.709 W
8,645.0	74.80	59.30	7,096.3	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	61.80	7,108.7	1,649.5	1,578.4	383,473.48	529,079.99	32° 3' 15.298 N	104° 14' 22.092 W
8,708.0	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	1,678.5	1,632.9	383,500.52	529,134.49	32° 3' 15.583 N	104° 14' 21.459 W
8,772.0	74.70	66.80	7,131.3	1,688.5	1,661.4	383,512.50	529,162.98	32° 3' 15.882 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 (Scandin Freedom)
Site:	Sec12, T28S, R28E	MD Reference:	Well @ 3272.0usft (Scandin Freedom)
Well:	Marsh Owl Federal Com #1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Measured	Vertical	Map	Map						
Depth	Inclination	Asimuth	Depth	N-S	E-W	North	East	Latitude	Longitude
(usft)	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
8,803.0	74.80	71.10	7,139.5	1,668.8	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' 20.480 W
8,868.0	76.00	74.70	7,155.5	1,716.7	1,747.7	383,540.87	529,249.28	32° 3' 15.880 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' 19.788 W
8,929.0	78.00	79.00	7,170.8	1,730.8	1,807.2	383,554.63	529,308.75	32° 3' 16.067 N	104° 14' 19.433 W
8,961.0	75.50	81.40	7,178.7	1,735.9	1,837.7	383,559.81	529,339.31	32° 3' 16.149 N	104° 14' 19.078 W
8,992.0	74.80	84.80	7,186.6	1,739.8	1,867.4	383,563.56	529,368.05	32° 3' 16.185 N	104° 14' 18.732 W
9,023.0	73.10	86.90	7,185.2	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	88.00	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	85.30	90.60	7,228.8	1,744.0	1,985.9	383,568.00	529,487.45	32° 3' 16.228 N	104° 14' 17.358 W
9,149.0	82.70	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	80.60	89.20	7,257.2	1,743.8	2,041.0	383,567.84	529,542.59	32° 3' 16.226 N	104° 14' 16.718 W
9,212.0	58.70	88.60	7,273.4	1,744.4	2,068.8	383,568.37	529,570.20	32° 3' 16.231 N	104° 14' 16.395 W
9,243.0	58.20	88.60	7,289.8	1,745.0	2,095.0	383,568.02	529,598.81	32° 3' 16.237 N	104° 14' 16.088 W
9,275.0	58.40	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	80.80	88.10	7,321.6	1,748.5	2,149.2	383,570.51	529,650.83	32° 3' 16.251 N	104° 14' 15.458 W
9,329.8	81.34	88.10	7,333.2	1,747.2	2,170.0	383,571.20	529,671.85	32° 3' 16.258 N	104° 14' 15.218 W
Crossed Lease Line @ 9330' MD / 7333' TVD									
9,337.0	81.50	88.10	7,338.8	1,747.4	2,178.4	383,571.41	529,677.97	32° 3' 16.280 N	104° 14' 15.143 W
9,369.0	82.30	88.10	7,351.7	1,748.3	2,204.6	383,572.34	529,706.18	32° 3' 16.289 N	104° 14' 14.815 W
9,401.0	84.70	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	87.80	87.80	7,378.5	1,750.5	2,281.5	383,574.48	529,763.13	32° 3' 16.289 N	104° 14' 14.153 W
9,464.0	70.70	87.20	7,388.9	1,751.8	2,281.4	383,575.76	529,793.00	32° 3' 16.302 N	104° 14' 13.808 W
9,495.0	72.60	86.50	7,399.8	1,753.4	2,320.8	383,577.38	529,822.38	32° 3' 16.318 N	104° 14' 13.484 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' 16.338 N	104° 14' 13.108 W
9,558.0	77.90	87.90	7,415.9	1,758.6	2,381.5	383,580.82	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' 16.383 N	104° 14' 12.048 W
9,682.0	84.90	88.70	7,430.8	1,759.7	2,484.4	383,583.65	529,985.96	32° 3' 16.379 N	104° 14' 11.584 W
9,678.8	85.07	88.47	7,432.2	1,760.7	2,501.9	383,584.70	530,003.46	32° 3' 16.389 N	104° 14' 11.380 W
Crossed 330' Hard Line @ 9680' MD / 7432' TVD									
9,693.0	85.20	88.30	7,433.3	1,761.5	2,515.2	383,585.54	530,018.79	32° 3' 16.397 N	104° 14' 11.205 W
9,723.0	87.00	88.90	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	89.10	7,438.1	1,767.3	2,838.9	383,591.32	530,138.53	32° 3' 16.453 N	104° 14' 9.781 W
9,807.0	90.00	89.00	7,438.4	1,768.7	2,728.9	383,593.65	530,230.50	32° 3' 16.475 N	104° 14' 8.722 W
9,899.0	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	1,778.9	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	3,008.5	383,604.40	530,508.06	32° 3' 16.579 N	104° 14' 5.497 W
10,280.0	87.90	86.30	7,452.3	1,783.4	3,101.3	383,607.38	530,602.85	32° 3' 16.608 N	104° 14' 4.394 W
10,375.0	88.00	86.50	7,454.9	1,787.7	3,198.2	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	383,617.85	530,792.80	32° 3' 16.708 N	104° 14' 2.180 W
10,564.0	89.40	86.70	7,458.8	1,799.4	3,384.8	383,623.39	530,888.41	32° 3' 16.764 N	104° 14' 1.100 W
10,659.0	89.40	86.70	7,459.8	1,804.9	3,479.8	383,628.88	530,981.24	32° 3' 16.817 N	104° 13' 59.898 W
10,754.0	89.30	87.10	7,460.9	1,810.0	3,574.5	383,634.00	531,078.10	32° 3' 16.867 N	104° 13' 58.899 W
10,848.0	89.10	87.40	7,462.2	1,814.5	3,668.4	383,638.50	531,189.88	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	531,284.87	32° 3' 16.952 N	104° 13' 56.702 W
11,038.0	88.60	87.60	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	1,828.0	3,951.9	383,649.98	531,453.54	32° 3' 17.022 N	104° 13' 54.510 W
11,228.0	90.10	88.60	7,473.7	1,828.7	4,045.9	383,652.88	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	7,478.9	1,835.2	4,233.6	383,659.24	531,735.22	32° 3' 17.111 N	104° 13' 51.238 W
11,508.0	85.70	87.40	7,486.9	1,839.7	4,327.3	383,663.88	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
11,698.0	87.50	87.40	7,497.4	1,848.5	4,514.7	383,672.50	532,018.34	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 (Scandril Freedom)
Site:	Sec12, T28S, R28E	MD Reference:	Well @ 3272.0usft (Scandril Freedom)
Well:	Marsh Owl Federal Com #1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

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	383,678.48	532,111.19	32° 3' 17.278 N	104° 13' 48.887 W
11,888.0	88.20	88.10	7,504.1	1,855.9	4,704.5	383,679.87	532,208.08	32° 3' 17.310 N	104° 13' 45.785 W
11,980.0	88.60	88.60	7,506.7	1,858.8	4,788.4	383,682.58	532,300.00	32° 3' 17.338 N	104° 13' 44.673 W
12,074.0	89.00	88.80	7,508.7	1,860.7	4,882.4	383,684.71	532,393.96	32° 3' 17.358 N	104° 13' 43.582 W
12,169.0	89.20	89.50	7,510.2	1,862.1	4,967.3	383,686.12	532,486.93	32° 3' 17.389 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	383,689.18	532,676.82	32° 3' 17.388 N	104° 13' 40.295 W
12,451.0	87.50	89.20	7,519.8	1,868.8	5,269.1	383,690.60	532,770.72	32° 3' 17.413 N	104° 13' 39.204 W
12,545.0	87.30	88.50	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	88.30	7,528.3	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	88.50	7,525.8	1,882.1	5,550.5	383,708.12	533,052.14	32° 3' 17.582 N	104° 13' 35.933 W
12,827.0	91.70	88.70	7,523.8	1,887.7	5,644.3	383,711.70	533,145.95	32° 3' 17.618 N	104° 13' 34.843 W
12,921.0	92.40	87.20	7,520.2	1,892.7	5,738.2	383,716.89	533,239.75	32° 3' 17.685 N	104° 13' 33.753 W
13,015.0	90.80	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	88.50	7,518.2	1,902.8	5,925.8	383,726.81	533,427.45	32° 3' 17.781 N	104° 13' 31.572 W
13,204.0	89.80	88.50	7,519.3	1,908.4	6,020.7	383,732.41	533,522.28	32° 3' 17.818 N	104° 13' 30.470 W
13,298.0	90.80	88.00	7,518.8	1,913.8	6,114.5	383,737.82	533,618.11	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	383,742.88	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' 17.980 N	104° 13' 27.198 W
13,580.0	88.70	87.80	7,523.8	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	533,991.88	32° 3' 18.030 N	104° 13' 25.015 W
13,768.0	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	7,524.8	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	1,938.0	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	1,947.8	6,960.7	383,771.89	534,462.31	32° 3' 18.199 N	104° 13' 19.548 W
14,240.0	90.90	88.80	7,524.1	1,952.8	7,055.6	383,776.78	534,557.17	32° 3' 18.248 N	104° 13' 18.444 W
14,284.0	81.00	88.70	7,523.7	1,954.1	7,079.5	383,778.12	534,581.13	32° 3' 18.259 N	104° 13' 18.188 W
14,313.0	91.00	88.70	7,522.8	1,958.8	7,128.4	383,780.94	534,630.04	32° 3' 18.287 N	104° 13' 17.597 W

TD @ 14313' MD / 7623' TVD

Measured Depth (usft)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Comment
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 @ 8330' MD / 7333' TVD
9,879.8	7,432.2	1,760.7	2,501.9	Crossed 330' Hard Line @ 9880' MD / 7432' TVD
14,313.0	7,522.8	1,958.8	7,128.4	TD @ 14313' MD / 7523' TVD

Checked By: _____ Approved By: _____ Date: _____