

SURVEY CERTIFICATION FORM

3610 Elkins Road Midland, TX 79705 t:432-684-0057 f: 432-686-7964



HOBBS **OCD**

Company: COG

FEB 06 2017

Job #: 01610297

Well Name: Azores Federal # 11H

County/State: Lea Co., New Mexico

Survey Instrument Type: North Seek Rate Gyro

RECEIVED

API # 30-025-43171

TIE-IN DATA

Measure Depth (ft)	Vertical Depth (ft)	Inclination (°)	Azimuth (°)	N-S Coordinates	E-W Coordinates	Data Source
0	0	0	0	0	0	Surface

First Survey

Date	Depth (ft)	Inclination (°)	Azimuth (°)
2016-06-20	0	0	0

Last Survey

Date	Depth (ft)	Inclination (°)	Azimuth (°)
2016-06-20	4565	0.68	165.06

Projected TD Survey

Date	Depth (ft)	Inclination (°)	Azimuth (°)
0	0	0	0

Grid Correction
-0.34

Gyro Operator: Phoenix Technology Services USA Ltd.

Gyro Supervisor: Jaime Stephenson

To the best of my knowledge I certify this survey data to be correct and true

Date: 06-21-16

Print Name: Noe Garza

Signature: [Signature]



Company: COG
 Well: Azores Federal # 11H
 Location: Lea Co., New Mexico
 Rig: McVay 8

Job Number: _____
 Grid Corr.: -0.34
 Lat: 32.18
 Long: -103.70

Date: 06-21-16
 Calculation Method: Minimum Curvature
 Proposed Azimuth: _____
 RKB - MSL in feet: 28 Feet
 Tie Into: 800 Feet

Survey Tool Type	Survey Depth (ft)	Inclination (deg)	Azimuth (deg)	Course Length (ft)	True Vertical Depth (ft)	Vertical Section (ft)	Coordinates		Closure		Dogleg Severity (d/100')	Build Rate (d/100')	Walk Rate (d/100')
							N/S (ft)	E/W (ft)	Distance (ft)	Angle (deg)			
Enter Tie-In Survey on Line 10													
FIELD COPY, NON-DEFINITIVE													
TIE IN	0			0	0	0	0	0					
Gyro	100.00	0.42	355.72	100	100.00	0.37	0.37 N	0.03 W	0.37	355.72	0.42	0.42	355.72
	200.00	0.22	25.98	100	200.00	0.90	0.90 N	0.03 E	0.90	1.86	0.26	-0.20	-329.74
	300.00	1.10	325.64	100	299.99	1.87	1.87 N	0.43 W	1.92	347.09	1.01	0.88	299.66
	400.00	1.31	94.13	100	399.98	2.58	2.58 N	0.17 E	2.58	3.78	2.17	0.21	-231.51
	500.00	1.55	65.65	100	499.95	3.05	3.05 N	2.54 E	3.97	39.78	0.74	0.24	-28.48
	600.00	1.68	74.31	100	599.91	4.01	4.01 N	5.19 E	6.55	52.30	0.28	0.13	8.66
	700.00	1.64	162.16	100	699.88	3.04	3.04 N	7.04 E	7.67	66.62	2.30	-0.04	87.85
	800.00	1.74	73.26	100	799.85	2.12	2.12 N	8.93 E	9.18	76.66	2.37	0.10	-88.90
	900.00	2.02	67.97	100	899.80	3.22	3.22 N	12.02 E	12.44	75.02	0.33	0.28	-5.29
	1000.00	1.93	71.73	100	999.74	4.40	4.40 N	15.25 E	15.87	73.89	0.16	-0.09	3.76
	1100.00	1.86	74.72	100	1099.68	5.36	5.36 N	18.41 E	19.18	73.77	0.12	-0.07	2.99
	1200.00	1.82	74.22	100	1199.63	6.22	6.22 N	21.51 E	22.39	73.87	0.04	-0.04	-0.50
	1300.00	1.76	71.86	100	1299.58	7.13	7.13 N	24.49 E	25.51	73.77	0.10	-0.06	-2.36
	1400.00	1.77	70.78	100	1399.54	8.12	8.12 N	27.41 E	28.59	73.51	0.03	0.01	-1.08
	1500.00	1.78	70.20	100	1499.49	9.15	9.15 N	30.33 E	31.68	73.21	0.02	0.01	-0.58
	1600.00	1.58	66.39	100	1599.45	10.23	10.23 N	33.06 E	34.60	72.81	0.23	-0.20	-3.81
	1700.00	1.41	72.13	100	1699.41	11.16	11.16 N	35.49 E	37.20	72.55	0.23	-0.17	5.74
	1800.00	1.35	61.47	100	1799.38	12.10	12.10 N	37.70 E	39.59	72.21	0.26	-0.06	-10.66
	1900.00	0.63	258.43	100	1899.38	12.55	12.55 N	38.19 E	40.20	71.81	1.96	-0.72	196.96
	2000.00	0.76	237.82	100	1999.37	12.09	12.09 N	37.09 E	39.01	71.95	0.28	0.13	-20.61
	2100.00	0.54	223.34	100	2099.36	11.39	11.39 N	36.21 E	37.96	72.54	0.27	-0.22	-14.48
	2200.00	0.31	200.38	100	2199.36	10.80	10.80 N	35.79 E	37.38	73.22	0.28	-0.23	-22.96
	2300.00	0.33	131.40	100	2299.36	10.35	10.35 N	35.91 E	37.37	73.92	0.36	0.02	-68.98
	2400.00	0.57	130.21	100	2399.35	9.84	9.84 N	36.51 E	37.81	74.92	0.24	0.24	-1.19
	2500.00	0.88	124.94	100	2499.35	9.08	9.08 N	37.52 E	38.60	76.40	0.32	0.31	-5.27
	2600.00	0.69	136.25	100	2599.34	8.20	8.20 N	38.56 E	39.43	77.99	0.24	-0.19	11.31
	2700.00	0.64	174.78	100	2699.33	7.21	7.21 N	39.03 E	39.69	79.53	0.44	-0.05	38.53



Company: COG
 Well: Azores Federal # 11H
 Location: Lea Co., New Mexico
 Rig: McVay 8

Job Number: _____
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 Lat: 32.18
 Long: -103.70

Calculation Method: Minimum Curvature
 Proposed Azimuth: _____
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Survey Tool Type	Survey Depth (ft)	Inclination (deg)	Azimuth (deg)	Course Length (ft)	True Vertical Depth (ft)	Vertical Section (ft)	Coordinates		Closure		Dogleg Severity (d/100')	Build Rate (d/100')	Walk Rate (d/100')
							N/S (ft)	E/W (ft)	Distance (ft)	Angle (deg)			
	2800.00	0.86	136.37	100	2799.32	6.11	6.11 N	39.60 E	40.07	81.22	0.54	0.22	-38.41
	2900.00	0.66	122.90	100	2899.31	5.26	5.26 N	40.60 E	40.94	82.62	0.27	-0.20	-13.47
	3000.00	0.27	109.00	100	2999.31	4.87	4.87 N	41.31 E	41.59	83.28	0.40	-0.39	-13.90
	3100.00	0.20	181.52	100	3099.31	4.62	4.62 N	41.52 E	41.78	83.66	0.28	-0.07	72.52
	3200.00	0.44	104.35	100	3199.31	4.35	4.35 N	41.89 E	42.12	84.08	0.44	0.24	-77.17
	3300.00	0.27	227.55	100	3299.31	4.09	4.09 N	42.09 E	42.29	84.45	0.63	-0.17	123.20
	3400.00	0.37	250.54	100	3399.31	3.83	3.83 N	41.61 E	41.79	84.75	0.16	0.10	22.99
	3500.00	0.58	308.88	100	3499.30	4.04	4.04 N	40.91 E	41.11	84.37	0.50	0.21	58.34
	3600.00	1.18	256.40	100	3599.29	4.11	4.11 N	39.52 E	39.73	84.06	0.95	0.60	-52.48
	3700.00	1.26	240.16	100	3699.27	3.32	3.32 N	37.56 E	37.71	84.94	0.35	0.08	-16.24
	3800.00	1.20	237.29	100	3799.25	2.21	2.21 N	35.73 E	35.80	86.46	0.09	-0.06	-2.87
	3900.00	0.57	311.45	100	3899.24	1.97	1.97 N	34.48 E	34.53	86.72	1.18	-0.63	74.16
	4000.00	0.56	276.40	100	3999.23	2.36	2.36 N	33.62 E	33.70	85.99	0.34	-0.01	-35.05
	4100.00	0.37	236.55	100	4099.23	2.23	2.23 N	32.86 E	32.94	86.11	0.36	-0.19	-39.85
	4200.00	0.33	301.88	100	4199.23	2.21	2.21 N	32.35 E	32.42	86.10	0.38	-0.04	65.33
	4300.00	0.46	257.03	100	4299.23	2.27	2.27 N	31.71 E	31.79	85.91	0.32	0.13	-44.85
	4400.00	0.77	356.99	100	4399.22	2.85	2.85 N	31.29 E	31.42	84.79	0.96	0.31	99.96
	4500.00	0.79	170.68	100	4499.22	2.84	2.84 N	31.36 E	31.49	84.82	1.56	0.02	-186.31
	4565.00	0.68	165.06	65	4564.21	2.03	2.03 N	31.53 E	31.60	86.32	0.20	-0.17	-8.65

AZORES FEDERAL #11H

30-025-43171

Stage 1	Distance Between Perfs	Shots	Stage 2	Distance Between Perfs	Shots	Stage 3	Distance Between Perfs	Shots	Stage 4	Distance Between Perfs	Shots	Stage 5	Distance Between Perfs	Shots
14,340	40	14	14,189	38	14	14,038	37	14	13,887	37	14	13,735	38	14
14,300	34	12	14,151	38	12	14,007	44	12	13,849	38	12	13,693	33	12
14,266	39	10	14,113	38	10	13,963	39	10	13,811	38	10	13,660	38	10
14,227		8	14,075		8	13,924		8	13,773		8	13,622		8
Plug to Plug	152	44	Plug to Plug	151	44	Plug to Plug	152	44	Plug to Plug	151	44	Plug to Plug	154	44
Frac Plug	14,360	Total Shots	Frac Plug	14,208	Total Shots	Frac Plug	14,057	Total Shots	Frac Plug	13,905	Total Shots	Frac Plug	13,754	Total Shots

Stage 6	Distance Between Perfs	Shots	Stage 7	Distance Between Perfs	Shots	Stage 8	Distance Between Perfs	Shots	Stage 9	Distance Between Perfs	Shots	Stage 10	Distance Between Perfs	Shots
13,584	38	14	13,430	41	14	13,282	38	14	13,124	45	14	12,978	39	14
13,546	37	12	13,397	39	12	13,244	38	12	13,093	38	12	12,942	38	12
13,509	38	10	13,358	38	10	13,206	37	10	13,055	38	10	12,904	40	10
13,471		8	13,320		8	13,169		8	13,017		8	12,864		8
Plug to Plug	148	44	Plug to Plug	156	44	Plug to Plug	146	44	Plug to Plug	160	44	Plug to Plug	143	44
Frac Plug	13,600	Total Shots	Frac Plug	13,452	Total Shots	Frac Plug	13,296	Total Shots	Frac Plug	13,150	Total Shots	Frac Plug	12,990	Total Shots

Stage 11	Distance Between Perfs	Shots	Stage 12	Distance Between Perfs	Shots	Stage 13	Distance Between Perfs	Shots	Stage 14	Distance Between Perfs	Shots	Stage 15	Distance Between Perfs	Shots
12,830	34	14	12,672	43	14	12,526	42	14	12,370	43	14	12,224	40	14
12,791	38	12	12,640	39	12	12,488	37	12	12,337	40	12	12,186	38	12
12,753	38	10	12,601	33	10	12,451	38	10	12,297	33	10	12,148	37	10
12,715		8	12,568		8	12,413		8	12,264		8	12,111		8
Plug to Plug	165	44	Plug to Plug	137	44	Plug to Plug	165	44	Plug to Plug	137	44	Plug to Plug	166	44
Frac Plug	12,847	Total Shots	Frac Plug	12,682	Total Shots	Frac Plug	12,545	Total Shots	Frac Plug	12,380	Total Shots	Frac Plug	12,243	Total Shots

Stage 16	Distance Between Perfs	Shots	Stage 17	Distance Between Perfs	Shots	Stage 18	Distance Between Perfs	Shots	Stage 19	Distance Between Perfs	Shots	Stage 20	Distance Between Perfs	Shots
12,067	44	14	11,922	38	14	11,771	37	14	11,619	38	14	11,468	38	14
12,035	40	12	11,884	38	12	11,731	32	12	11,582	38	12	11,427	33	12
11,995	35	10	11,846	38	10	11,699	42	10	11,544	38	10	11,394	39	10
11,960		8	11,808		8	11,657		8	11,506		8	11,355		8
Plug to Plug	136	44	Plug to Plug	151	44	Plug to Plug	152	44	Plug to Plug	151	44	Plug to Plug	153	44
Frac Plug	12,077	Total Shots	Frac Plug	11,941	Total Shots	Frac Plug	11,790	Total Shots	Frac Plug	11,638	Total Shots	Frac Plug	11,487	Total Shots

Stage 21	Distance Between Perfs	Shots	Stage 22	Distance Between Perfs	Shots	Stage 23	Distance Between Perfs	Shots	Stage 24	Distance Between Perfs	Shots	Stage 25	Distance Between Perfs	Shots
11,317	38	14	11,164	40	14	11,015	38	14	10,869	32	14	10,713	37	14
11,279	37	12	11,130	40	12	10,977	38	12	10,826	38	12	10,675	38	12
11,242	38	10	11,090	37	10	10,939	38	10	10,788	38	10	10,637	31	10
11,204		8	11,053		8	10,901		8	10,750		8	10,606		8
Plug to Plug	149	44	Plug to Plug	158	44	Plug to Plug	144	44	Plug to Plug	160	44	Plug to Plug	143	44
Frac Plug	11,334	Total Shots	Frac Plug	11,185	Total Shots	Frac Plug	11,027	Total Shots	Frac Plug	10,883	Total Shots	Frac Plug	10,723	Total Shots

Stage 26	Distance Between Perfs	Shots	Stage 27	Distance Between Perfs	Shots	Stage 28	Distance Between Perfs	Shots	Stage 29	Distance Between Perfs	Shots	Stage 30	Distance Between Perfs	Shots
10,563	43	14	10,406	42	14	10,259	40	14	10,108	38	14	9,957	38	14
10,524	38	12	10,372	39	12	10,221	37	12	10,070	33	12	9,919	38	12
10,486	38	10	10,333	34	10	10,184	38	10	10,037	42	10	9,881	38	10
10,448		8	10,299		8	10,146		8	9,995		8	9,843		8
Plug to Plug	164	44	Plug to Plug	138	44	Plug to Plug	149	44	Plug to Plug	153	44	Plug to Plug	151	44
Frac Plug	10,580	Total Shots	Frac Plug	10,416	Total Shots	Frac Plug	10,278	Total Shots	Frac Plug	10,129	Total Shots	Frac Plug	9,976	Total Shots

10449

Stage 31	Distance Between Perfs	Shots	Stage 32	Distance Between Perfs	Shots	Stage 33	Distance Between Perfs	Shots	Stage 34	Distance Between Perfs	Shots	Stage 35	Distance Between Perfs	Shots
9,806	37	14	9,655	37	14	9,503	38	14		9390			0	
9,767	34	12	9,617	38	12	9,462	33	12						
9,733	41	10	9,579	38	10	9,429	39	10						
9,692		8	9,541		8	9,390		8						
Plug to Plug	152	44	Plug to Plug	151	44	Plug to Plug	9522	44	Plug to Plug	0	0	Plug to Plug	0	0
Frac Plug	9,825	Total Shots	Frac Plug	9,673	Total Shots	Frac Plug	9,522	Total Shots	Frac Plug		Total Shots	Frac Plug		Total Shots

AZORES FEDERAL #11H (30-025-43171)

<u>Perfs</u>	<u>7 1/2% Acid (Gal)</u>	<u>Sand (#)</u>	<u>Fluid (Gal)</u>
1	4032	452548	526890
2	3024	452372	507528
3	3024	452965	503832
4	3234	446150	513408
5	3024	451295	503748
6	3024	447180	501816
7	2940	452519	500514
8	3150	421650	555996
9	3024	573903	713076
10	3024	451115	497616
11	3024	450850	499128
12	2982	450219	496902
13	2940	450011	495138
14	3024	446574	494340
15	3024	449925	500556
16	3024	450003	497658
17	3024	451654	503748
18	2940	450066	501816
19	3024	450198	498204
20	3024	450635	501942
21	3024	450093	500892
22	3024	449828	502698
23	3024	450584	532350
24	3024	450003	498834
25	2982	450396	498582
26	2982	447951	489006
27	3024	449887	497406
28	3024	447900	494844
29	3024	450327	498876
30	3024	452011	499170
31	2982	450874	498456
32	3024	450020	493668
33	3024	450388	490476
Totals	100716	14952094	16809114

**McVAY DRILLING COMPANY**

P.O. Box 2450
Hobbs, New Mexico 88241
(575) 397-3311
FAX: 39-DRILL

Well Name and Num: Azores Fed Com #11 H
Location: Sec 32, T24S, R32 E
Operator: COG Operating
Drilling Contractor: McVay Drilling Company

The undersigned certifies that he is an authorized representative of the drilling contractor who drilled the above described well and that he has conducted deviation tests and obtained the following results:

<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>
0.40	320	0.90	6806	92.30	13355		
0.10	602	0.70	7184	89.40	13732		
2.10	933	0.70	7562	89.60	14016		
2.30	1302	0.70	7939				
1.70	1680	1.40	8317				
0.90	2057	16.00	8749				
0.60	2624	32.00	8891				
0.70	3001	49.50	9033				
0.80	3567	88.80	9574				
0.40	3945	89.90	10051				
0.30	4134	90.40	10429				
1.00	4511	92.50	10615				
0.90	4919	89.40	11089				
0.90	5296	90.90	11561				
0.90	5674	90.90	12033				
0.90	6051	90.20	12505				
1.10	6429	87.80	12883				

By: Mario A. Benavente

Subscribed and sworn to before me this 28th day of July, 2016

Tina Flemens
Notary Public, Lea County, New Mexico





COG Operating, LLC

Lea County, NM

Sec 32, T24-S, R32E

Azores Federal #11H

Wellbore #1

Design: Wellbore #1

Survey Report - Geographic

29 June, 2016

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FEB 06 2017
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QES Directional Drilling, LLC
Survey Report - Geographic



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Azores Federal #11H
Project:	Lea County, NM	TVD Reference:	Well @ 3518.0usft (McVay 8)
Site:	Sec 32, T24-S, R32E	MD Reference:	Well @ 3518.0usft (McVay 8)
Well:	Azores Federal #11H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM5002

Project	Lea County, NM		
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 32, T24-S, R32E				
Site Position:		Northing:	429,960.20 usft	Latitude:	32° 10' 49.697 N
From:	Map	Easting:	697,210.20 usft	Longitude:	103° 41' 45.292 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.34 °

Well	Azores Federal #11H					
Well Position	+N/-S	0.0 usft	Northing:	429,961.10 usft	Latitude:	32° 10' 49.702 N
	+E/-W	0.0 usft	Easting:	697,290.20 usft	Longitude:	103° 41' 44.362 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	3,492.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	6/16/2016	7.12	60.02	48,001

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	1.26	

Survey Program	Date 6/29/2016				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	4,565.0	Gyro (Wellbore #1)	MWD default	MWD - Standard	
4,730.0	14,396.0	MWD Survey (Wellbore #1)	MWD default	MWD - Standard	

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
0.0	0.00	0.00	0.0	0.0	0.0	429,961.10	697,290.20	32° 10' 49.702 N	103° 41' 44.362 W	
100.0	0.42	355.72	100.0	0.4	0.0	429,961.47	697,290.17	32° 10' 49.705 N	103° 41' 44.362 W	
200.0	0.22	25.98	200.0	0.9	0.0	429,962.00	697,290.22	32° 10' 49.710 N	103° 41' 44.361 W	
300.0	1.10	325.64	300.0	1.9	-0.4	429,962.97	697,289.77	32° 10' 49.720 N	103° 41' 44.366 W	
400.0	1.31	94.13	400.0	2.6	0.2	429,963.68	697,290.37	32° 10' 49.727 N	103° 41' 44.359 W	
500.0	1.55	65.65	500.0	3.1	2.5	429,964.15	697,292.74	32° 10' 49.732 N	103° 41' 44.332 W	
600.0	1.68	74.31	599.9	4.0	5.2	429,965.11	697,295.38	32° 10' 49.741 N	103° 41' 44.301 W	
700.0	1.64	162.16	699.9	3.0	7.0	429,964.14	697,297.23	32° 10' 49.731 N	103° 41' 44.280 W	
800.0	1.74	73.26	799.9	2.1	8.9	429,963.22	697,299.12	32° 10' 49.722 N	103° 41' 44.258 W	
900.0	2.02	67.97	899.8	3.2	12.0	429,964.32	697,302.21	32° 10' 49.733 N	103° 41' 44.222 W	
1,000.0	1.93	71.73	999.7	4.4	15.2	429,965.50	697,305.44	32° 10' 49.744 N	103° 41' 44.184 W	



QES Directional Drilling, LLC

Survey Report - Geographic



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Azores Federal #11H
Project:	Lea County, NM	TVD Reference:	Well @ 3518.0usft (McVay 8)
Site:	Sec 32, T24-S, R32E	MD Reference:	Well @ 3518.0usft (McVay 8)
Well:	Azores Federal #11H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM5002

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
1,100.0	1.86	74.72	1,099.7	5.4	18.4	429,966.46	697,308.61	32° 10' 49.753 N	103° 41' 44.147 W
1,200.0	1.82	74.22	1,199.6	6.2	21.5	429,967.32	697,311.70	32° 10' 49.762 N	103° 41' 44.111 W
1,300.0	1.76	71.86	1,299.6	7.1	24.5	429,968.23	697,314.69	32° 10' 49.771 N	103° 41' 44.076 W
1,400.0	1.77	70.78	1,399.5	8.1	27.4	429,969.22	697,317.61	32° 10' 49.780 N	103° 41' 44.042 W
1,500.0	1.78	70.20	1,499.5	9.2	30.3	429,970.25	697,320.53	32° 10' 49.790 N	103° 41' 44.008 W
1,600.0	1.58	66.39	1,599.4	10.2	33.1	429,971.33	697,323.25	32° 10' 49.801 N	103° 41' 43.976 W
1,700.0	1.41	72.13	1,699.4	11.2	35.5	429,972.26	697,325.69	32° 10' 49.810 N	103° 41' 43.948 W
1,800.0	1.35	61.47	1,799.4	12.1	37.7	429,973.20	697,327.89	32° 10' 49.819 N	103° 41' 43.922 W
1,900.0	0.63	258.43	1,899.4	12.6	38.2	429,973.65	697,328.39	32° 10' 49.823 N	103° 41' 43.916 W
2,000.0	0.76	237.82	1,999.4	12.1	37.1	429,973.19	697,327.29	32° 10' 49.819 N	103° 41' 43.929 W
2,100.0	0.54	223.34	2,099.4	11.4	36.2	429,972.49	697,326.40	32° 10' 49.812 N	103° 41' 43.940 W
2,200.0	0.31	200.38	2,199.4	10.8	35.8	429,971.89	697,325.99	32° 10' 49.806 N	103° 41' 43.944 W
2,300.0	0.33	131.40	2,299.4	10.4	35.9	429,971.45	697,326.11	32° 10' 49.802 N	103° 41' 43.943 W
2,400.0	0.57	130.21	2,399.4	9.8	36.5	429,970.94	697,326.70	32° 10' 49.797 N	103° 41' 43.936 W
2,500.0	0.88	124.94	2,499.3	9.1	37.5	429,970.18	697,327.71	32° 10' 49.789 N	103° 41' 43.924 W
2,600.0	0.69	136.25	2,599.3	8.2	38.6	429,969.30	697,328.76	32° 10' 49.780 N	103° 41' 43.912 W
2,700.0	0.64	174.78	2,699.3	7.2	39.0	429,968.31	697,329.23	32° 10' 49.771 N	103° 41' 43.907 W
2,800.0	0.86	136.37	2,799.3	6.1	39.6	429,967.21	697,329.79	32° 10' 49.760 N	103° 41' 43.900 W
2,900.0	0.66	122.90	2,899.3	5.3	40.6	429,966.36	697,330.80	32° 10' 49.751 N	103° 41' 43.889 W
3,000.0	0.27	109.00	2,999.3	4.9	41.3	429,965.97	697,331.50	32° 10' 49.747 N	103° 41' 43.881 W
3,100.0	0.20	181.52	3,099.3	4.6	41.5	429,965.72	697,331.72	32° 10' 49.745 N	103° 41' 43.878 W
3,200.0	0.44	104.35	3,199.3	4.3	41.9	429,965.45	697,332.09	32° 10' 49.742 N	103° 41' 43.874 W
3,300.0	0.27	227.55	3,299.3	4.1	42.1	429,965.19	697,332.29	32° 10' 49.740 N	103° 41' 43.872 W
3,400.0	0.37	250.54	3,399.3	3.8	41.6	429,964.93	697,331.81	32° 10' 49.737 N	103° 41' 43.877 W
3,500.0	0.58	308.88	3,499.3	4.0	40.9	429,965.14	697,331.11	32° 10' 49.739 N	103° 41' 43.885 W
3,600.0	1.18	256.40	3,599.3	4.1	39.5	429,965.21	697,329.71	32° 10' 49.740 N	103° 41' 43.901 W
3,700.0	1.26	240.16	3,699.3	3.3	37.6	429,964.42	697,327.76	32° 10' 49.732 N	103° 41' 43.924 W
3,800.0	1.20	237.29	3,799.2	2.2	35.7	429,963.31	697,325.93	32° 10' 49.721 N	103° 41' 43.946 W
3,900.0	0.57	311.45	3,899.2	2.0	34.5	429,963.07	697,324.67	32° 10' 49.719 N	103° 41' 43.960 W
4,000.0	0.56	276.40	3,999.2	2.4	33.6	429,963.46	697,323.81	32° 10' 49.723 N	103° 41' 43.970 W
4,100.0	0.37	236.55	4,099.2	2.2	32.9	429,963.33	697,323.06	32° 10' 49.722 N	103° 41' 43.979 W
4,200.0	0.33	301.88	4,199.2	2.2	32.3	429,963.31	697,322.54	32° 10' 49.721 N	103° 41' 43.985 W
4,300.0	0.46	257.03	4,299.2	2.3	31.7	429,963.37	697,321.91	32° 10' 49.722 N	103° 41' 43.992 W
4,400.0	0.77	356.99	4,399.2	2.9	31.3	429,963.95	697,321.48	32° 10' 49.728 N	103° 41' 43.997 W
4,500.0	0.79	170.68	4,499.2	2.8	31.4	429,963.94	697,321.56	32° 10' 49.728 N	103° 41' 43.996 W
4,565.0	0.68	165.06	4,564.2	2.0	31.5	429,963.13	697,321.73	32° 10' 49.720 N	103° 41' 43.995 W
Gyro Tie-In @4565' MD / 4564' TVD									
4,730.0	0.70	174.80	4,729.2	0.1	31.9	429,961.18	697,322.07	32° 10' 49.700 N	103° 41' 43.991 W
4,919.0	0.90	178.70	4,918.2	-2.6	32.0	429,958.54	697,322.21	32° 10' 49.674 N	103° 41' 43.989 W
5,108.0	0.70	187.80	5,107.2	-5.2	31.9	429,955.91	697,322.09	32° 10' 49.648 N	103° 41' 43.991 W
5,296.0	0.90	192.40	5,295.1	-7.8	31.4	429,953.34	697,321.62	32° 10' 49.623 N	103° 41' 43.997 W
5,485.0	1.10	198.70	5,484.1	-10.9	30.5	429,950.17	697,320.72	32° 10' 49.592 N	103° 41' 44.007 W
5,674.0	0.90	199.10	5,673.1	-14.1	29.5	429,947.05	697,319.65	32° 10' 49.561 N	103° 41' 44.020 W
5,863.0	0.70	193.50	5,862.1	-16.6	28.7	429,944.52	697,318.89	32° 10' 49.536 N	103° 41' 44.029 W
6,051.0	0.90	190.60	6,050.1	-19.1	28.2	429,941.95	697,318.35	32° 10' 49.510 N	103° 41' 44.035 W
6,240.0	1.20	207.90	6,239.0	-22.4	27.0	429,938.74	697,317.15	32° 10' 49.479 N	103° 41' 44.049 W
6,429.0	1.10	190.30	6,428.0	-25.9	25.7	429,935.21	697,315.90	32° 10' 49.444 N	103° 41' 44.064 W
6,618.0	0.90	179.80	6,617.0	-29.2	25.4	429,931.94	697,315.58	32° 10' 49.411 N	103° 41' 44.068 W
6,806.0	0.90	198.70	6,804.9	-32.0	24.9	429,929.07	697,315.12	32° 10' 49.383 N	103° 41' 44.074 W
6,995.0	0.70	185.40	6,993.9	-34.6	24.3	429,926.51	697,314.53	32° 10' 49.358 N	103° 41' 44.081 W
7,184.0	0.70	179.10	7,182.9	-36.9	24.2	429,924.21	697,314.44	32° 10' 49.335 N	103° 41' 44.082 W
7,373.0	0.70	172.70	7,371.9	-39.2	24.4	429,921.91	697,314.61	32° 10' 49.312 N	103° 41' 44.080 W
7,562.0	0.70	158.30	7,560.9	-41.4	25.0	429,919.69	697,315.18	32° 10' 49.290 N	103° 41' 44.074 W
7,750.0	0.90	148.10	7,748.9	-43.7	26.2	429,917.37	697,316.38	32° 10' 49.267 N	103° 41' 44.060 W
7,939.0	1.20	152.70	7,937.8	-46.7	27.9	429,914.35	697,318.08	32° 10' 49.237 N	103° 41' 44.040 W



QES Directional Drilling, LLC
Survey Report - Geographic



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Azores Federal #11H
Project:	Lea County, NM	TVD Reference:	Well @ 3518.0usft (McVay 8)
Site:	Sec 32, T24-S, R32E	MD Reference:	Well @ 3518.0usft (McVay 8)
Well:	Azores Federal #11H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM5002

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
8,128.0	1.40	156.60	8,126.8	-50.6	29.7	429,910.47	697,319.90	32° 10' 49.199 N	103° 41' 44.019 W
8,317.0	1.40	166.00	8,315.7	-55.0	31.2	429,906.11	697,321.38	32° 10' 49.156 N	103° 41' 44.003 W
8,506.0	1.40	170.30	8,504.7	-59.5	32.1	429,901.60	697,322.32	32° 10' 49.111 N	103° 41' 43.992 W
8,608.0	0.50	70.90	8,606.6	-60.6	32.8	429,900.52	697,322.96	32° 10' 49.100 N	103° 41' 43.985 W
8,655.0	5.80	20.50	8,653.6	-58.3	33.8	429,902.81	697,323.98	32° 10' 49.123 N	103° 41' 43.972 W
8,702.0	11.40	15.20	8,700.0	-51.6	35.8	429,909.52	697,326.03	32° 10' 49.189 N	103° 41' 43.948 W
8,749.0	16.00	9.10	8,745.7	-40.7	38.1	429,920.41	697,328.28	32° 10' 49.297 N	103° 41' 43.921 W
8,797.0	21.70	2.90	8,791.1	-25.3	39.6	429,935.81	697,329.77	32° 10' 49.449 N	103° 41' 43.903 W
8,844.0	26.80	3.40	8,833.9	-6.0	40.6	429,955.08	697,330.84	32° 10' 49.640 N	103° 41' 43.889 W
8,891.0	32.00	11.50	8,874.9	16.8	43.8	429,977.89	697,333.96	32° 10' 49.865 N	103° 41' 43.851 W
8,938.0	37.60	14.70	8,913.5	42.9	49.9	430,003.98	697,340.08	32° 10' 50.123 N	103° 41' 43.778 W
8,986.0	44.70	11.00	8,949.6	73.7	56.8	430,034.76	697,347.03	32° 10' 50.427 N	103° 41' 43.695 W
9,033.0	49.50	6.80	8,981.6	107.7	62.1	430,068.76	697,352.30	32° 10' 50.763 N	103° 41' 43.632 W
9,080.0	55.50	5.90	9,010.2	144.7	66.2	430,105.80	697,356.41	32° 10' 51.130 N	103° 41' 43.581 W
9,127.0	61.80	6.80	9,034.6	184.6	70.7	430,145.67	697,360.86	32° 10' 51.524 N	103° 41' 43.527 W
9,134.1	62.39	7.12	9,037.9	190.8	71.4	430,151.90	697,361.62	32° 10' 51.585 N	103° 41' 43.517 W
Crossed Lease Line @ 9134' MD / 9038' TVD									
9,175.0	65.80	8.90	9,055.8	227.2	76.6	430,188.32	697,366.76	32° 10' 51.946 N	103° 41' 43.455 W
9,222.0	69.50	11.20	9,073.7	270.0	84.2	430,231.11	697,374.35	32° 10' 52.369 N	103° 41' 43.364 W
9,248.0	72.20	11.90	9,082.2	294.1	89.1	430,255.17	697,379.27	32° 10' 52.606 N	103° 41' 43.305 W
9,295.0	75.10	12.60	9,095.4	338.1	98.6	430,299.24	697,388.84	32° 10' 53.042 N	103° 41' 43.191 W
9,342.0	79.10	9.60	9,105.9	383.1	107.5	430,344.18	697,397.65	32° 10' 53.486 N	103° 41' 43.085 W
9,390.0	83.70	7.50	9,113.1	430.0	114.5	430,391.10	697,404.70	32° 10' 53.950 N	103° 41' 43.000 W
9,437.0	87.80	4.00	9,116.6	476.6	119.2	430,437.72	697,409.39	32° 10' 54.411 N	103° 41' 42.942 W
9,484.0	88.30	3.10	9,118.2	523.5	122.1	430,484.60	697,412.29	32° 10' 54.875 N	103° 41' 42.905 W
9,579.0	88.80	5.00	9,120.6	618.2	128.8	430,579.33	697,419.00	32° 10' 55.812 N	103° 41' 42.820 W
9,673.0	89.30	5.90	9,122.1	711.8	137.7	430,672.89	697,427.93	32° 10' 56.737 N	103° 41' 42.710 W
9,767.0	89.70	6.30	9,123.0	805.3	147.7	430,766.36	697,437.92	32° 10' 57.662 N	103° 41' 42.587 W
9,862.0	88.60	2.90	9,124.4	899.9	155.3	430,861.02	697,445.53	32° 10' 58.598 N	103° 41' 42.492 W
9,956.0	87.80	1.50	9,127.3	993.8	158.9	430,954.90	697,449.14	32° 10' 59.527 N	103° 41' 42.444 W
10,051.0	89.90	1.30	9,129.2	1,088.8	161.3	431,049.85	697,451.46	32° 11' 0.466 N	103° 41' 42.410 W
10,145.0	90.80	1.50	9,128.7	1,182.7	163.6	431,143.82	697,453.76	32° 11' 1.396 N	103° 41' 42.377 W
10,240.0	91.20	1.90	9,127.0	1,277.7	166.4	431,238.76	697,456.58	32° 11' 2.335 N	103° 41' 42.338 W
10,334.0	90.00	359.90	9,126.0	1,371.6	167.1	431,332.74	697,457.31	32° 11' 3.265 N	103° 41' 42.322 W
10,429.0	90.40	358.70	9,125.7	1,466.6	165.2	431,427.72	697,455.41	32° 11' 4.205 N	103° 41' 42.338 W
10,523.0	91.40	359.60	9,124.2	1,560.6	163.8	431,521.70	697,454.01	32° 11' 5.135 N	103° 41' 42.348 W
10,617.0	92.50	359.80	9,121.0	1,654.5	163.3	431,615.64	697,453.52	32° 11' 6.065 N	103° 41' 42.347 W
10,712.0	91.30	358.50	9,117.9	1,749.5	161.9	431,710.58	697,452.11	32° 11' 7.005 N	103° 41' 42.357 W
10,806.0	91.90	358.30	9,115.2	1,843.4	159.3	431,804.50	697,449.49	32° 11' 7.934 N	103° 41' 42.381 W
10,900.0	89.90	358.90	9,113.8	1,937.4	157.0	431,898.46	697,447.19	32° 11' 8.864 N	103° 41' 42.401 W
10,995.0	89.60	359.40	9,114.2	2,032.3	155.6	431,993.45	697,445.78	32° 11' 9.804 N	103° 41' 42.411 W
11,089.0	89.40	359.20	9,115.0	2,126.3	154.4	432,087.44	697,444.63	32° 11' 10.734 N	103° 41' 42.418 W
11,184.0	89.80	359.40	9,115.7	2,221.3	153.3	432,182.43	697,443.47	32° 11' 11.674 N	103° 41' 42.425 W
11,278.0	90.50	359.40	9,115.4	2,315.3	152.3	432,276.42	697,442.49	32° 11' 12.605 N	103° 41' 42.430 W
11,372.0	91.80	359.00	9,113.5	2,409.3	151.0	432,370.39	697,441.18	32° 11' 13.535 N	103° 41' 42.439 W
11,467.0	90.30	359.90	9,111.8	2,504.3	150.1	432,465.37	697,440.27	32° 11' 14.475 N	103° 41' 42.443 W
11,561.0	90.90	1.00	9,110.8	2,598.3	150.8	432,559.36	697,441.00	32° 11' 15.405 N	103° 41' 42.428 W
11,656.0	89.40	0.10	9,110.5	2,693.2	151.7	432,654.35	697,441.92	32° 11' 16.345 N	103° 41' 42.410 W
11,750.0	88.70	0.30	9,112.1	2,787.2	152.0	432,748.33	697,442.24	32° 11' 17.275 N	103° 41' 42.400 W
11,844.0	88.90	0.10	9,114.1	2,881.2	152.4	432,842.31	697,442.57	32° 11' 18.205 N	103° 41' 42.390 W
11,939.0	89.70	1.00	9,115.2	2,976.2	153.3	432,937.30	697,443.48	32° 11' 19.144 N	103° 41' 42.373 W
12,033.0	90.90	2.40	9,114.7	3,070.2	156.1	433,031.25	697,446.27	32° 11' 20.074 N	103° 41' 42.334 W
12,128.0	92.20	2.40	9,112.2	3,165.0	160.1	433,126.13	697,450.25	32° 11' 21.013 N	103° 41' 42.281 W
12,222.0	89.40	1.10	9,110.9	3,259.0	162.9	433,220.07	697,453.12	32° 11' 21.942 N	103° 41' 42.241 W
12,316.0	88.80	0.60	9,112.3	3,352.9	164.3	433,314.04	697,454.51	32° 11' 22.872 N	103° 41' 42.218 W



QES Directional Drilling, LLC

Survey Report - Geographic



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Azores Federal #11H
Project:	Lea County, NM	TVD Reference:	Well @ 3518.0usft (McVay 8)
Site:	Sec 32, T24-S, R32E	MD Reference:	Well @ 3518.0usft (McVay 8)
Well:	Azores Federal #11H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM5002

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
12,411.0	89.60	0.80	9,113.7	3,447.9	165.5	433,409.03	697,455.67	32° 11' 23.812 N	103° 41' 42.198 W
12,505.0	90.20	1.00	9,113.8	3,541.9	167.0	433,503.02	697,457.15	32° 11' 24.742 N	103° 41' 42.174 W
12,600.0	88.00	358.70	9,115.3	3,636.9	166.7	433,597.99	697,456.90	32° 11' 25.682 N	103° 41' 42.171 W
12,694.0	87.60	358.70	9,118.9	3,730.8	164.6	433,691.90	697,454.77	32° 11' 26.611 N	103° 41' 42.189 W
12,788.0	87.80	358.70	9,122.7	3,824.7	162.4	433,785.80	697,452.64	32° 11' 27.541 N	103° 41' 42.207 W
12,883.0	87.40	358.30	9,126.7	3,919.6	160.0	433,880.68	697,450.16	32° 11' 28.480 N	103° 41' 42.230 W
12,977.0	90.30	356.60	9,128.6	4,013.5	155.8	433,974.56	697,445.97	32° 11' 29.409 N	103° 41' 42.272 W
13,072.0	91.90	356.20	9,126.7	4,108.2	149.8	434,069.35	697,440.01	32° 11' 30.347 N	103° 41' 42.335 W
13,166.0	92.70	356.40	9,123.0	4,202.0	143.8	434,163.08	697,433.95	32° 11' 31.275 N	103° 41' 42.399 W
13,260.0	93.50	356.40	9,117.9	4,295.7	137.9	434,256.75	697,428.06	32° 11' 32.202 N	103° 41' 42.461 W
13,355.0	92.30	357.50	9,113.1	4,390.4	132.8	434,351.49	697,423.01	32° 11' 33.140 N	103° 41' 42.513 W
13,449.0	90.00	359.60	9,111.2	4,484.3	130.4	434,445.43	697,420.63	32° 11' 34.070 N	103° 41' 42.534 W
13,544.0	90.70	359.80	9,110.6	4,579.3	129.9	434,540.43	697,420.13	32° 11' 35.010 N	103° 41' 42.534 W
13,638.0	91.40	0.30	9,108.9	4,673.3	130.0	434,634.41	697,420.22	32° 11' 35.940 N	103° 41' 42.526 W
13,732.0	89.40	359.90	9,108.2	4,767.3	130.2	434,728.40	697,420.38	32° 11' 36.870 N	103° 41' 42.518 W
13,827.0	89.30	359.40	9,109.3	4,862.3	129.6	434,823.40	697,419.80	32° 11' 37.810 N	103° 41' 42.518 W
13,921.0	89.60	359.60	9,110.2	4,956.3	128.8	434,917.39	697,418.98	32° 11' 38.741 N	103° 41' 42.521 W
14,016.0	89.60	358.70	9,110.9	5,051.3	127.4	435,012.37	697,417.57	32° 11' 39.681 N	103° 41' 42.531 W
14,110.0	90.80	359.00	9,110.6	5,145.3	125.5	435,106.35	697,415.68	32° 11' 40.611 N	103° 41' 42.546 W
14,205.0	90.80	359.00	9,109.2	5,240.2	123.8	435,201.33	697,414.03	32° 11' 41.551 N	103° 41' 42.559 W
14,396.0	90.80	359.00	9,106.6	5,431.2	120.5	435,392.28	697,410.69	32° 11' 43.440 N	103° 41' 42.585 W

TD @ 14396' MD / 9106' TVD

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
4,565.0	4,564.2	2.0	31.5	Gyro Tie-In @ 4565' MD / 4564' TVD
9,134.1	9,037.9	190.8	71.4	Crossed Lease Line @ 9134' MD / 9038' TVD
14,396.0	9,106.6	5,431.2	120.5	TD @ 14396' MD / 9106' TVD

Checked By: _____ Approved By: _____ Date: _____