



November 23, 2015

HOBBS OCD

MAY 02 2016

RECEIVED

Concho Resources, Inc.
One Concho Center
600 W. Illinois Avenue
Midland, Texas 79701

Attn: Kanicia Castillo

RE: Gunner 8 Federal No 009H

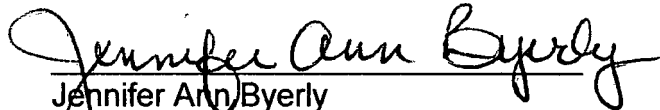
Please find enclosed a copy of the survey from 0' to 9170' ran on the above referenced well.

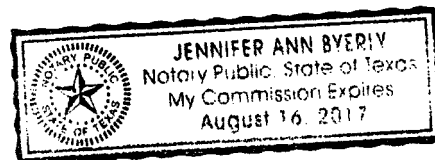
Sincerely,

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 23 day of November A.D., 2015, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas



MAY 10 2016



Company: Concho

Lease/Well: Gunner 8 Federal No/009H

Rig Name: Scan Freedom

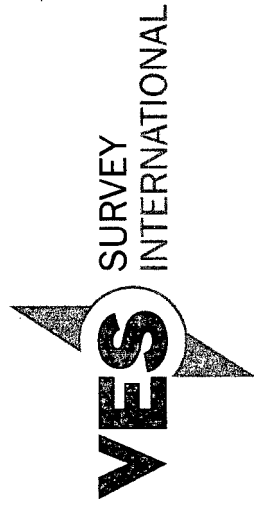
State/County: New Mexico/Lea

VS-Azi: 0.00 Degrees

Latitude: 32.05112, Longitude: -103.49711

Grid North = True North -0.44 degs (NAD 27)

Grid Correction Applied = -0.44 degs



Depth Reference : RKB = 27 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro survey.ut

Minimum Curvature Method

Report Date/Time: 11/23/2015 / 14:27

VES Survey International
Midland, TX

432-563-5444

Surveyor: Andrew Askew

Gunner 8 Federal No 009H / API 30-025-42905

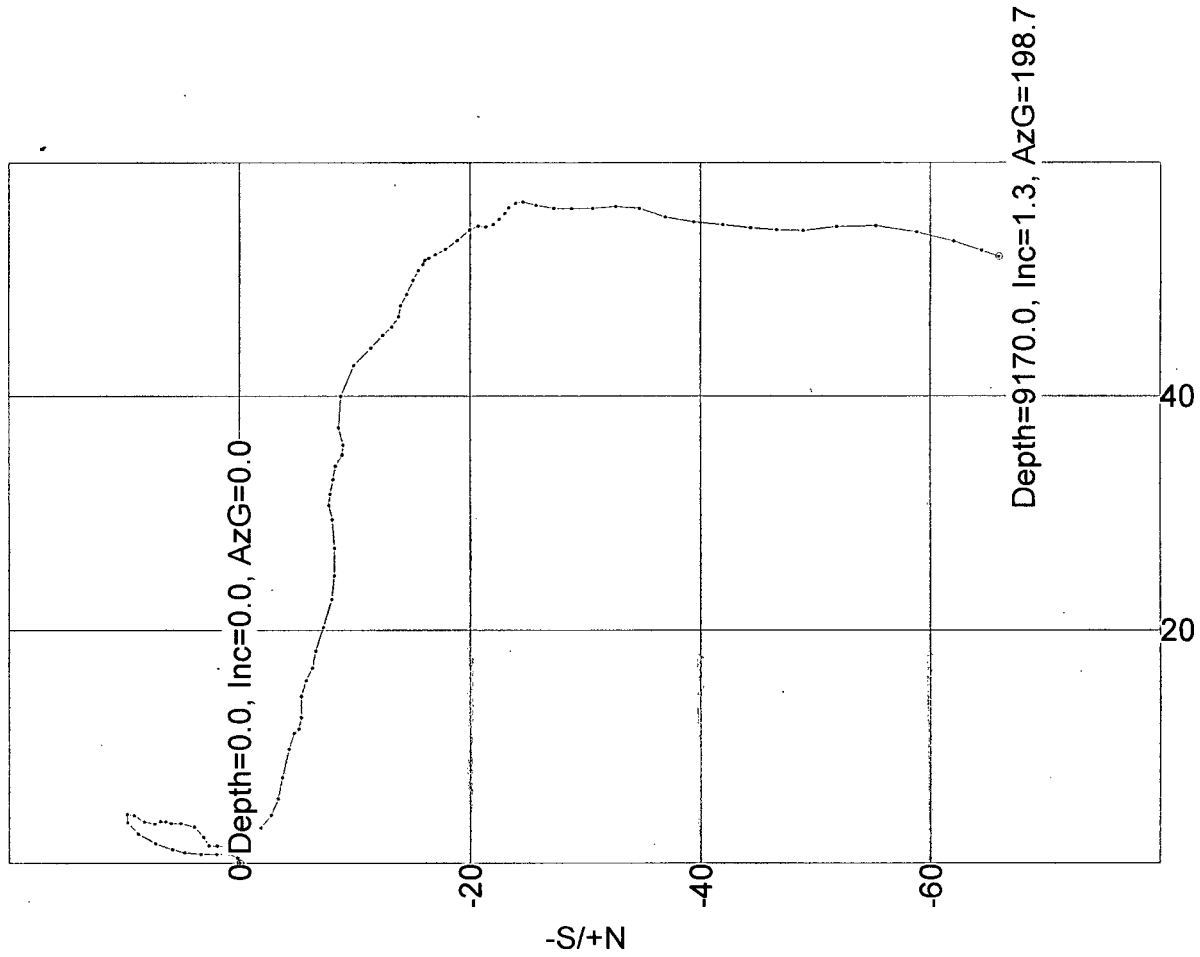
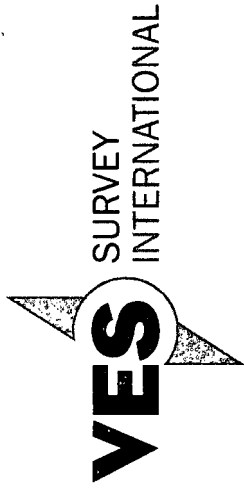
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.55	65.46	100.00	0.20	0.44	0.20	0.48	65.46	0.55
200.00	0.63	352.58	199.99	0.94	0.80	0.94	1.24	40.29	0.70
300.00	0.58	1.34	299.99	2.00	0.74	2.00	2.13	20.34	0.10
400.00	0.98	0.64	399.98	3.36	0.76	3.36	3.45	12.78	0.40
500.00	0.65	10.97	499.97	4.78	0.88	4.78	4.86	10.44	0.36
600.00	0.57	17.85	599.96	5.81	1.14	5.81	5.92	11.11	0.11
700.00	1.23	20.46	699.95	7.29	1.67	7.29	7.47	12.89	0.66
800.00	0.77	42.14	799.94	8.78	2.49	8.78	9.13	15.83	0.59
900.00	0.76	50.43	899.93	9.70	3.45	9.70	10.30	19.57	0.11
1000.00	0.49	151.29	999.92	9.75	4.17	9.75	10.60	23.14	0.98
1100.00	0.44	234.68	1099.92	9.15	4.06	9.15	10.01	23.92	0.62
1200.00	0.81	198.95	1199.91	8.26	3.52	8.26	8.98	23.06	0.52
1300.00	0.26	167.06	1299.91	7.37	3.34	7.37	8.09	24.38	0.60
1400.00	0.39	148.18	1399.91	6.85	3.57	6.85	7.73	27.51	0.16
1500.00	0.28	236.59	1499.91	6.43	3.55	6.43	7.34	28.87	0.47
1600.00	0.42	172.26	1599.91	5.94	3.39	5.94	6.84	29.75	0.39

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1700.00	0.56	187.90	1699.90	5.10	3.38	5.10	6.11	33.52	0.19
1800.00	0.84	198.63	1799.89	3.92	3.07	3.92	4.98	38.11	0.31
1900.00	0.72	259.80	1899.89	3.11	2.22	3.11	3.82	35.50	0.80
2000.00	0.43	201.69	1999.88	2.65	1.46	2.65	3.03	28.86	0.61
2100.00	0.45	157.79	2099.88	1.95	1.47	1.95	2.44	37.11	0.33
2200.00	0.83	195.64	2199.87	0.89	1.43	0.89	1.68	58.01	0.55
2300.00	0.19	218.45	2299.87	0.06	1.13	0.06	1.13	86.73	0.65
2400.00	0.45	113.44	2399.87	-0.22	1.38	-0.22	1.40	99.16	0.53
2500.00	0.75	141.45	2499.86	-0.89	2.15	-0.89	2.33	112.49	0.41
2600.00	0.69	135.76	2599.86	-1.84	2.98	-1.84	3.50	121.63	0.09
2700.00	0.97	124.70	2699.84	-2.75	4.10	-2.75	4.94	123.87	0.31
2800.00	0.81	98.83	2799.83	-3.34	5.49	-3.34	6.42	121.32	0.43
2900.00	1.34	102.19	2899.82	-3.69	7.33	-3.69	8.21	116.75	0.54
3000.00	1.51	104.77	2999.78	-4.28	9.75	-4.28	10.65	113.69	0.18
3100.00	0.17	134.78	3099.77	-4.72	11.13	-4.72	12.09	112.98	1.36
3200.00	0.44	137.93	3199.77	-5.11	11.50	-5.11	12.59	113.98	0.27
3300.00	0.85	86.06	3299.76	-5.35	12.50	-5.35	13.60	113.17	0.67
3400.00	1.23	92.65	3399.75	-5.35	14.32	-5.35	15.28	110.49	0.40
3500.00	0.52	142.96	3499.74	-5.76	15.67	-5.76	16.69	110.19	0.99
3600.00	0.92	103.59	3599.73	-6.32	16.72	-6.32	17.87	110.69	0.61
3700.00	0.79	97.09	3699.72	-6.59	18.19	-6.59	19.35	109.91	0.16
3800.00	1.65	113.55	3799.69	-7.25	20.20	-7.25	21.46	109.75	0.92
3900.00	1.27	98.32	3899.66	-7.99	22.61	-7.99	23.98	109.45	0.54
4000.00	1.07	93.91	3999.64	-8.21	24.64	-8.21	25.97	108.43	0.22
4100.00	1.66	87.67	4099.61	-8.22	27.01	-8.22	28.23	106.92	0.61
4200.00	1.15	82.17	4199.58	-8.02	29.45	-8.02	30.53	105.23	0.52
4300.00	0.30	56.50	4299.57	-7.74	30.67	-7.74	31.63	104.16	0.89
4400.00	0.91	110.26	4399.57	-7.86	31.64	-7.86	32.60	103.96	0.77
4500.00	0.58	87.59	4499.56	-8.12	32.88	-8.12	33.87	103.87	0.43
4600.00	0.78	108.98	4599.55	-8.32	34.03	-8.32	35.03	103.73	0.32
4700.00	0.54	137.71	4699.55	-8.89	34.99	-8.89	36.10	104.25	0.40
4800.00	0.65	63.30	4799.54	-8.99	35.81	-8.99	36.92	104.09	0.73
4900.00	1.15	81.45	4899.53	-8.58	37.31	-8.58	38.29	102.96	0.57
5000.00	1.97	101.73	4999.49	-8.78	39.99	-8.78	40.94	102.39	0.98
5100.00	1.39	129.73	5099.45	-9.91	42.61	-9.91	43.75	103.09	0.99
5200.00	1.04	140.49	5199.43	-11.39	44.12	-11.39	45.57	104.47	0.42
5300.00	0.70	125.05	5299.42	-12.44	45.20	-12.44	46.88	105.39	0.41
5400.00	0.55	153.47	5399.41	-13.22	45.92	-13.22	47.78	106.06	0.34
5500.00	0.77	104.03	5499.40	-13.81	46.78	-13.81	48.78	106.45	0.59

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section		Closure Distance		Closure Direction		Dogleg Severity Deg/100
						FT	FT	FT	FT	Deg	Deg	
5600.00	0.37	91.64	5599.40	-13.98	47.76	-13.98	47.76	49.76	106.32	106.32	106.32	0.42
5700.00	0.92	129.30	5699.39	-14.50	48.70	-14.50	48.70	50.81	106.58	106.58	106.58	0.66
5800.00	0.71	93.79	5799.38	-15.04	49.94	-15.04	49.94	52.16	106.77	106.77	106.77	0.53
5900.00	0.54	153.82	5899.38	-15.51	50.77	-15.51	50.77	53.08	106.99	106.99	106.99	0.64
6000.00	0.35	86.83	5999.38	-15.91	51.28	-15.91	51.28	53.69	107.24	107.24	107.24	0.52
6100.00	0.22	156.40	6099.37	-16.07	51.66	-16.07	51.66	54.10	107.28	107.28	107.28	0.34
6200.00	0.23	158.57	6199.37	-16.43	51.81	-16.43	51.81	54.35	107.59	107.59	107.59	0.01
6300.00	0.51	147.83	6299.37	-16.99	52.12	-16.99	52.12	54.82	108.06	108.06	108.06	0.29
6400.00	0.63	155.46	6399.37	-17.87	52.59	-17.87	52.59	55.54	108.77	108.77	108.77	0.14
6500.00	0.83	134.53	6499.36	-18.88	53.33	-18.88	53.33	56.58	109.49	109.49	109.49	0.33
6600.00	0.80	145.50	6599.35	-19.97	54.25	-19.97	54.25	57.81	110.21	110.21	110.21	0.16
6700.00	0.19	204.60	6699.34	-20.70	54.58	-20.70	54.58	58.37	110.77	110.77	110.77	0.72
6800.00	0.61	179.76	6799.34	-21.38	54.51	-21.38	54.51	58.55	111.42	111.42	111.42	0.45
6900.00	0.23	115.60	6899.34	-22.00	54.69	-22.00	54.69	58.95	111.91	111.91	111.91	0.55
7000.00	0.61	146.40	6999.34	-22.53	55.17	-22.53	55.17	59.59	112.21	112.21	112.21	0.43
7100.00	0.25	107.10	7099.33	-23.03	55.67	-23.03	55.67	60.24	112.48	112.48	112.48	0.44
7200.00	0.41	135.32	7199.33	-23.35	56.13	-23.35	56.13	60.79	112.59	112.59	112.59	0.23
7300.00	0.44	158.28	7299.33	-23.96	56.52	-23.96	56.52	61.39	112.97	112.97	112.97	0.17
7400.00	0.34	184.63	7399.33	-24.61	56.64	-24.61	56.64	61.75	113.49	113.49	113.49	0.20
7500.00	1.02	197.55	7499.32	-25.75	56.35	-25.75	56.35	61.95	114.56	114.56	114.56	0.69
7600.00	0.79	179.48	7599.31	-27.29	56.09	-27.29	56.09	62.37	115.95	115.95	115.95	0.36
7700.00	0.97	181.97	7699.30	-28.83	56.06	-28.83	56.06	63.04	117.21	117.21	117.21	0.19
7800.00	1.11	176.70	7799.28	-30.65	56.09	-30.65	56.09	63.92	118.65	118.65	118.65	0.17
7900.00	1.20	174.49	7899.26	-32.66	56.25	-32.66	56.25	65.04	120.14	120.14	120.14	0.10
8000.00	1.18	194.55	7999.24	-34.70	56.09	-34.70	56.09	65.95	121.75	121.75	121.75	0.42
8100.00	1.56	201.49	8099.21	-36.97	55.33	-36.97	55.33	66.54	123.75	123.75	123.75	0.41
8200.00	1.35	175.94	8199.18	-39.41	54.91	-39.41	54.91	67.59	125.67	125.67	125.67	0.68
8300.00	1.57	193.30	8299.15	-41.93	54.68	-41.93	54.68	68.90	127.48	127.48	127.48	0.49
8400.00	1.25	177.47	8399.12	-44.35	54.41	-44.35	54.41	70.20	129.18	129.18	129.18	0.50
8500.00	1.37	190.10	8499.09	-46.61	54.25	-46.61	54.25	71.53	130.67	130.67	130.67	0.31
8600.00	1.30	173.25	8599.06	-48.92	54.18	-48.92	54.18	72.99	132.08	132.08	132.08	0.40
8700.00	2.06	173.13	8699.02	-51.82	54.53	-51.82	54.53	75.23	133.55	133.55	133.55	0.76
8800.00	1.91	185.06	8798.96	-55.27	54.59	-55.27	54.59	77.68	135.35	135.35	135.35	0.44
8900.00	2.21	191.69	8898.89	-58.81	54.06	-58.81	54.06	79.88	137.41	137.41	137.41	0.38
9000.00	1.61	196.07	8998.84	-62.04	53.28	-62.04	53.28	81.78	139.35	139.35	139.35	0.62
9100.00	1.31	200.55	9098.81	-64.46	52.49	-64.46	52.49	83.13	140.84	140.84	140.84	0.32
9170.00	1.28	198.68	9168.79	-65.95	51.96	-65.95	51.96	83.96	141.77	141.77	141.77	0.07



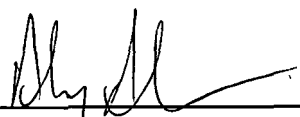
VES Survey International
Midland, TX
432-563-5444
Surveyor: Andrew Askew
Gunner 8 Federal No 009H / API 30-025-42905



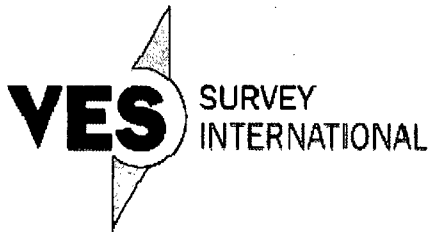
-W/+E
V.E.S. Survey Date: 11/17/2015



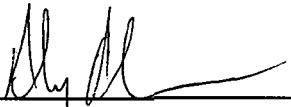
I Andy Askew certify that I am employed by VES Survey International. That I did on the day(s) of 11/18/15 through 11/18/15 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 9,170.00 feet; that the data is true, correct, complete and within the limitations of the tool as set forth by Vaughn Energy Services, that I am authorized and qualified to make this report; that this survey was conducted at the request of Concho for the Gunner 8 Federal Com Well # 9H API # 30-025-42905 in Lea County / Parish New Mexico; and that I have reviewed this report and find that it conforms to the principles and procedures as set forth by Vaughn Energy Services



Andy Askew
Service Technician
Vaughn Energy Services



I Andy Askew certify that I am employed by VES Survey International. That I did on the day(s) of 11/18/15 through 11/18/15 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 9,170.00 feet; that the data is true, correct, complete and within the limitations of the tool as set forth by Vaughn Energy Services, that I am authorized and qualified to make this report; that this survey was conducted at the request of Concho for the Gunner 8 Federal Com Well # 9H API # 30-025-42905 in Lea County / Parish New Mexico; and that I have reviewed this report and find that it conforms to the principles and procedures as set forth by Vaughn Energy Services



Andy Askew
Service Technician
Vaughn Energy Services

HOBBS OCD

MAY 02 2016

RECEIVED

COG Operating, LLC

Lea County, NM

Sec 8, T26S, R34E

Gunner 8 Federal Com #9H

Wellbore #1

Design: Wellbore #1

Survey Report - Geographic

10 December, 2015



HP

Survey Report - Geographic



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gunner 8 Federal Com #9H
Project:	Lea County, NM	TVD Reference:	WELL @ 3387.3usft (Scandriill Freedom)
Site:	Sec 8, T26S, R34E	MD Reference:	WELL @ 3387.3usft (Scandriill Freedom)
Well:	Gunner 8 Federal Com #9H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

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 8, T26S, R34E				
Site Position:		Northing:	383,330.50 usft	Latitude:	32° 3' 3.943 N
From:	Map	Easting:	760,820.40 usft	Longitude:	103° 29' 29.432 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.45 °

Well	Gunner 8 Federal Com #9H					
Well Position	+N/-S	0.0 usft	Northing:	383,327.30 usft	Latitude:	32° 3' 4.044 N
	+E/-W	0.0 usft	Easting:	759,085.60 usft	Longitude:	103° 29' 49.588 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	3,361.3 usft

Wellbore	Wellbore #1				
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	11/2/2015	7.08	59.94	48,010

Design	Wellbore #1				
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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	359.95

Survey Program		Date 12/10/2015			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	9,170.0	GYRO (Wellbore #1)	Good_gyro	Good Gyro	
9,170.0	19,727.0	MWD (Wellbore #1)	MWD default	MWD - Standard	

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	383,327.30	759,085.60	32° 3' 4.044 N	103° 29' 49.588 W
100.0	0.55	65.46	100.0	0.2	0.4	383,327.50	759,086.03	32° 3' 4.046 N	103° 29' 49.583 W
200.0	0.63	352.58	200.0	0.9	0.8	383,328.24	759,086.40	32° 3' 4.054 N	103° 29' 49.578 W
300.0	0.58	1.34	300.0	2.0	0.7	383,329.29	759,086.34	32° 3' 4.064 N	103° 29' 49.579 W
400.0	0.98	0.64	400.0	3.4	0.8	383,330.65	759,086.36	32° 3' 4.078 N	103° 29' 49.579 W
500.0	0.65	10.97	500.0	4.8	0.9	383,332.07	759,086.48	32° 3' 4.092 N	103° 29' 49.577 W
600.0	0.57	17.85	600.0	5.8	1.1	383,333.10	759,086.74	32° 3' 4.102 N	103° 29' 49.574 W
700.0	1.23	20.46	700.0	7.3	1.7	383,334.58	759,087.27	32° 3' 4.116 N	103° 29' 49.568 W
800.0	0.77	42.14	799.9	8.8	2.5	383,336.08	759,088.09	32° 3' 4.131 N	103° 29' 49.558 W
900.0	0.76	50.43	899.9	9.7	3.5	383,337.00	759,089.06	32° 3' 4.140 N	103° 29' 49.547 W
1,000.0	0.49	151.29	999.9	9.7	4.2	383,337.05	759,089.77	32° 3' 4.141 N	103° 29' 49.539 W

HP Survey Report - Geographic



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gunner 8 Federal Com #9H
Project:	Lea County, NM	TVD Reference:	WELL @ 3387.3usft (Scandrift Freedom)
Site:	Sec 8, T26S, R34E	MD Reference:	WELL @ 3387.3usft (Scandrift Freedom)
Well:	Gunner 8 Federal Com #9H	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
1,100.0	0.44	234.68	1,099.9	9.2	4.1	383,336.45	759,089.66	32° 3' 4.135 N	103° 29' 49.540 W
1,200.0	0.81	198.95	1,199.9	8.3	3.5	383,335.56	759,089.12	32° 3' 4.126 N	103° 29' 49.546 W
1,300.0	0.26	167.06	1,299.9	7.4	3.3	383,334.67	759,088.94	32° 3' 4.117 N	103° 29' 49.548 W
1,400.0	0.39	148.18	1,399.9	6.9	3.6	383,334.16	759,089.17	32° 3' 4.112 N	103° 29' 49.546 W
1,500.0	0.28	236.59	1,499.9	6.4	3.6	383,333.74	759,089.15	32° 3' 4.108 N	103° 29' 49.546 W
1,600.0	0.42	172.26	1,599.9	5.9	3.4	383,333.24	759,088.99	32° 3' 4.103 N	103° 29' 49.548 W
1,700.0	0.56	187.90	1,699.9	5.1	3.4	383,332.39	759,088.98	32° 3' 4.095 N	103° 29' 49.548 W
1,800.0	0.84	198.63	1,799.9	3.9	3.1	383,331.21	759,088.67	32° 3' 4.083 N	103° 29' 49.552 W
1,900.0	0.72	259.80	1,899.9	3.1	2.2	383,330.41	759,087.82	32° 3' 4.075 N	103° 29' 49.562 W
2,000.0	0.43	201.69	1,999.9	2.6	1.5	383,329.95	759,087.06	32° 3' 4.071 N	103° 29' 49.571 W
2,100.0	0.45	157.79	2,099.9	1.9	1.5	383,329.24	759,087.07	32° 3' 4.064 N	103° 29' 49.571 W
2,200.0	0.83	195.64	2,199.9	0.9	1.4	383,328.17	759,087.03	32° 3' 4.053 N	103° 29' 49.571 W
2,300.0	0.19	218.45	2,299.9	0.0	1.1	383,327.35	759,086.73	32° 3' 4.045 N	103° 29' 49.575 W
2,400.0	0.45	113.44	2,399.9	-0.2	1.4	383,327.06	759,086.99	32° 3' 4.042 N	103° 29' 49.572 W
2,500.0	0.75	141.45	2,499.9	-0.9	2.2	383,326.39	759,087.75	32° 3' 4.035 N	103° 29' 49.563 W
2,600.0	0.69	135.76	2,599.9	-1.8	3.0	383,325.45	759,088.58	32° 3' 4.026 N	103° 29' 49.553 W
2,700.0	0.97	124.70	2,699.8	-2.8	4.1	383,324.54	759,089.70	32° 3' 4.017 N	103° 29' 49.540 W
2,800.0	0.81	98.83	2,799.8	-3.4	5.5	383,323.95	759,091.09	32° 3' 4.011 N	103° 29' 49.524 W
2,900.0	1.34	102.19	2,899.8	-3.7	7.3	383,323.59	759,092.93	32° 3' 4.007 N	103° 29' 49.503 W
3,000.0	1.51	104.77	2,999.8	-4.3	9.8	383,323.01	759,095.35	32° 3' 4.001 N	103° 29' 49.475 W
3,100.0	0.17	134.78	3,099.8	-4.7	11.1	383,322.57	759,096.73	32° 3' 3.997 N	103° 29' 49.459 W
3,200.0	0.44	137.93	3,199.8	-5.1	11.5	383,322.18	759,097.09	32° 3' 3.993 N	103° 29' 49.455 W
3,300.0	0.85	86.06	3,299.8	-5.4	12.5	383,321.94	759,098.09	32° 3' 3.991 N	103° 29' 49.443 W
3,400.0	1.23	92.65	3,399.7	-5.4	14.3	383,321.94	759,099.90	32° 3' 3.990 N	103° 29' 49.422 W
3,500.0	0.52	142.96	3,499.7	-5.8	15.7	383,321.53	759,101.25	32° 3' 3.986 N	103° 29' 49.407 W
3,600.0	0.92	103.59	3,599.7	-6.3	16.7	383,320.98	759,102.30	32° 3' 3.981 N	103° 29' 49.394 W
3,700.0	0.79	97.09	3,699.7	-6.6	18.2	383,320.71	759,103.77	32° 3' 3.978 N	103° 29' 49.377 W
3,800.0	1.65	113.55	3,799.7	-7.3	20.2	383,320.05	759,105.77	32° 3' 3.971 N	103° 29' 49.354 W
3,900.0	1.27	98.32	3,899.7	-8.0	22.6	383,319.31	759,108.19	32° 3' 3.964 N	103° 29' 49.326 W
4,000.0	1.07	93.91	3,999.6	-8.2	24.6	383,319.09	759,110.21	32° 3' 3.961 N	103° 29' 49.303 W
4,100.0	1.66	87.67	4,099.6	-8.2	27.0	383,319.08	759,112.59	32° 3' 3.961 N	103° 29' 49.275 W
4,200.0	1.15	82.17	4,199.6	-8.0	29.4	383,319.28	759,115.03	32° 3' 3.963 N	103° 29' 49.247 W
4,300.0	0.30	56.50	4,299.6	-7.7	30.7	383,319.56	759,116.25	32° 3' 3.966 N	103° 29' 49.232 W
4,400.0	0.91	110.26	4,399.6	-7.9	31.6	383,319.43	759,117.21	32° 3' 3.964 N	103° 29' 49.221 W
4,500.0	0.58	87.59	4,499.6	-8.1	32.9	383,319.18	759,118.46	32° 3' 3.962 N	103° 29' 49.207 W
4,600.0	0.78	108.98	4,599.6	-8.3	34.0	383,318.98	759,119.61	32° 3' 3.960 N	103° 29' 49.193 W
4,700.0	0.54	137.71	4,699.5	-8.9	35.0	383,318.41	759,120.57	32° 3' 3.954 N	103° 29' 49.182 W
4,800.0	0.65	63.30	4,799.5	-9.0	35.8	383,318.31	759,121.40	32° 3' 3.953 N	103° 29' 49.173 W
4,900.0	1.15	81.45	4,899.5	-8.6	37.3	383,318.72	759,122.89	32° 3' 3.957 N	103° 29' 49.155 W
5,000.0	1.97	101.73	4,999.5	-8.8	40.0	383,318.52	759,125.57	32° 3' 3.954 N	103° 29' 49.124 W
5,100.0	1.39	129.73	5,099.5	-9.9	42.6	383,317.39	759,128.19	32° 3' 3.943 N	103° 29' 49.094 W
5,200.0	1.04	140.49	5,199.4	-11.4	44.1	383,315.92	759,129.70	32° 3' 3.928 N	103° 29' 49.077 W
5,300.0	0.70	125.05	5,299.4	-12.4	45.2	383,314.87	759,130.77	32° 3' 3.918 N	103° 29' 49.064 W
5,400.0	0.55	153.47	5,399.4	-13.2	45.9	383,314.09	759,131.49	32° 3' 3.910 N	103° 29' 49.056 W
5,500.0	0.77	104.03	5,499.4	-13.8	46.8	383,313.49	759,132.35	32° 3' 3.904 N	103° 29' 49.046 W
5,600.0	0.37	91.64	5,599.4	-14.0	47.7	383,313.32	759,133.33	32° 3' 3.902 N	103° 29' 49.035 W
5,700.0	0.92	129.30	5,699.4	-14.5	48.7	383,312.80	759,134.27	32° 3' 3.897 N	103° 29' 49.024 W
5,800.0	0.71	93.79	5,799.4	-15.0	49.9	383,312.25	759,135.51	32° 3' 3.892 N	103° 29' 49.009 W
5,900.0	0.54	153.82	5,899.4	-15.5	50.7	383,311.79	759,136.34	32° 3' 3.887 N	103° 29' 49.000 W
6,000.0	0.35	86.83	5,999.4	-15.9	51.3	383,311.38	759,136.85	32° 3' 3.883 N	103° 29' 48.994 W
6,100.0	0.22	156.40	6,099.4	-16.1	51.6	383,311.22	759,137.23	32° 3' 3.881 N	103° 29' 48.989 W
6,200.0	0.23	158.57	6,199.4	-16.4	51.8	383,310.86	759,137.38	32° 3' 3.878 N	103° 29' 48.988 W
6,300.0	0.51	147.83	6,299.4	-17.0	52.1	383,310.30	759,137.69	32° 3' 3.872 N	103° 29' 48.984 W
6,400.0	0.63	155.46	6,399.4	-17.9	52.6	383,309.42	759,138.16	32° 3' 3.864 N	103° 29' 48.979 W
6,500.0	0.83	134.53	6,499.4	-18.9	53.3	383,308.41	759,138.90	32° 3' 3.854 N	103° 29' 48.970 W

HP

Survey Report - Geographic



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gunner 8 Federal Com #9H
Project:	Lea County, NM	TVD Reference:	WELL @ 3387.3usft (Scandril Freedom)
Site:	Sec 8, T26S, R34E	MD Reference:	WELL @ 3387.3usft (Scandril Freedom)
Well:	Gunner 8 Federal Com #9H	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
6,600.0	0.80	145.50	6,599.3	-20.0	54.2	383,307.33	759,139.81	32° 3' 3.843 N	103° 29' 48.960 W
6,700.0	0.19	204.60	6,699.3	-20.7	54.5	383,306.60	759,140.14	32° 3' 3.836 N	103° 29' 48.956 W
6,800.0	0.61	179.76	6,799.3	-21.4	54.5	383,305.92	759,140.07	32° 3' 3.829 N	103° 29' 48.957 W
6,900.0	0.23	115.60	6,899.3	-22.0	54.7	383,305.30	759,140.26	32° 3' 3.823 N	103° 29' 48.955 W
7,000.0	0.61	146.40	6,999.3	-22.5	55.1	383,304.77	759,140.73	32° 3' 3.817 N	103° 29' 48.949 W
7,100.0	0.25	107.10	7,099.3	-23.0	55.6	383,304.26	759,141.24	32° 3' 3.812 N	103° 29' 48.944 W
7,200.0	0.41	135.32	7,199.3	-23.4	56.1	383,303.95	759,141.70	32° 3' 3.809 N	103° 29' 48.938 W
7,300.0	0.44	158.28	7,299.3	-24.0	56.5	383,303.33	759,142.09	32° 3' 3.803 N	103° 29' 48.934 W
7,400.0	0.34	184.63	7,399.3	-24.6	56.6	383,302.68	759,142.21	32° 3' 3.797 N	103° 29' 48.932 W
7,500.0	1.02	197.55	7,499.3	-25.8	56.3	383,301.54	759,141.92	32° 3' 3.785 N	103° 29' 48.936 W
7,600.0	0.79	179.48	7,599.3	-27.3	56.1	383,300.00	759,141.65	32° 3' 3.770 N	103° 29' 48.939 W
7,700.0	0.97	181.97	7,699.3	-28.8	56.0	383,298.46	759,141.63	32° 3' 3.755 N	103° 29' 48.939 W
7,800.0	1.11	176.70	7,799.3	-30.6	56.1	383,296.65	759,141.66	32° 3' 3.737 N	103° 29' 48.939 W
7,900.0	1.20	174.49	7,899.3	-32.7	56.2	383,294.64	759,141.81	32° 3' 3.717 N	103° 29' 48.938 W
8,000.0	1.18	194.55	7,999.2	-34.7	56.1	383,292.60	759,141.66	32° 3' 3.697 N	103° 29' 48.940 W
8,100.0	1.56	201.49	8,099.2	-37.0	55.3	383,290.34	759,140.90	32° 3' 3.675 N	103° 29' 48.949 W
8,200.0	1.35	175.94	8,199.2	-39.4	54.9	383,287.90	759,140.48	32° 3' 3.650 N	103° 29' 48.954 W
8,300.0	1.57	193.30	8,299.1	-41.9	54.7	383,285.39	759,140.25	32° 3' 3.626 N	103° 29' 48.957 W
8,400.0	1.25	177.47	8,399.1	-44.3	54.4	383,282.97	759,139.98	32° 3' 3.602 N	103° 29' 48.960 W
8,500.0	1.37	190.10	8,499.1	-46.6	54.2	383,280.70	759,139.82	32° 3' 3.579 N	103° 29' 48.962 W
8,600.0	1.30	173.25	8,599.1	-48.9	54.1	383,278.40	759,139.75	32° 3' 3.556 N	103° 29' 48.963 W
8,700.0	2.06	173.13	8,699.0	-51.8	54.5	383,275.49	759,140.09	32° 3' 3.528 N	103° 29' 48.959 W
8,800.0	1.91	185.06	8,799.0	-55.3	54.6	383,272.04	759,140.16	32° 3' 3.493 N	103° 29' 48.959 W
8,900.0	2.21	191.69	8,898.9	-58.8	54.0	383,268.49	759,139.63	32° 3' 3.458 N	103° 29' 48.965 W
9,000.0	1.61	196.07	8,998.8	-62.0	53.2	383,265.26	759,138.85	32° 3' 3.426 N	103° 29' 48.975 W
9,100.0	1.31	200.55	9,098.8	-64.5	52.5	383,262.84	759,138.06	32° 3' 3.403 N	103° 29' 48.984 W
9,170.0	1.28	198.68	9,168.8	-66.0	51.9	383,261.35	759,137.52	32° 3' 3.388 N	103° 29' 48.991 W
Tie into Gyro @ 9170' MD / 9169' TVD									
9,207.0	1.50	204.90	9,205.8	-66.8	51.6	383,260.51	759,137.19	32° 3' 3.380 N	103° 29' 48.995 W
9,238.0	1.30	223.40	9,236.8	-67.4	51.2	383,259.89	759,136.78	32° 3' 3.374 N	103° 29' 48.999 W
9,270.0	1.10	302.80	9,268.8	-67.5	50.7	383,259.79	759,136.27	32° 3' 3.373 N	103° 29' 49.005 W
9,302.0	3.60	346.30	9,300.7	-66.4	50.2	383,260.94	759,135.77	32° 3' 3.384 N	103° 29' 49.011 W
9,333.0	6.20	0.80	9,331.6	-63.7	50.0	383,263.56	759,135.56	32° 3' 3.410 N	103° 29' 49.013 W
9,365.0	9.10	5.10	9,363.3	-59.5	50.2	383,267.81	759,135.81	32° 3' 3.452 N	103° 29' 49.010 W
9,397.0	12.00	2.30	9,394.8	-53.6	50.6	383,273.65	759,136.17	32° 3' 3.510 N	103° 29' 49.005 W
9,428.0	15.20	358.70	9,424.9	-46.4	50.6	383,280.94	759,136.21	32° 3' 3.582 N	103° 29' 49.004 W
9,460.0	18.10	357.10	9,455.6	-37.2	50.3	383,290.10	759,135.86	32° 3' 3.672 N	103° 29' 49.007 W
9,492.0	21.30	356.40	9,485.7	-26.4	49.6	383,300.86	759,135.25	32° 3' 3.779 N	103° 29' 49.013 W
9,523.0	24.60	357.50	9,514.2	-14.4	49.0	383,312.93	759,134.61	32° 3' 3.899 N	103° 29' 49.020 W
9,555.0	28.00	359.40	9,542.9	-0.2	48.6	383,327.10	759,134.24	32° 3' 4.039 N	103° 29' 49.023 W
9,587.0	31.20	0.10	9,570.7	15.6	48.6	383,342.91	759,134.18	32° 3' 4.195 N	103° 29' 49.022 W
9,618.0	33.70	359.60	9,596.9	32.2	48.5	383,359.54	759,134.13	32° 3' 4.360 N	103° 29' 49.021 W
9,650.0	35.90	359.40	9,623.2	50.5	48.4	383,377.80	759,133.97	32° 3' 4.541 N	103° 29' 49.021 W
9,682.0	38.70	359.30	9,648.6	69.9	48.2	383,397.19	759,133.75	32° 3' 4.732 N	103° 29' 49.022 W
9,713.0	41.20	0.50	9,672.4	89.8	48.1	383,417.09	759,133.72	32° 3' 4.929 N	103° 29' 49.021 W
9,745.0	43.20	2.40	9,696.1	111.3	48.7	383,438.58	759,134.27	32° 3' 5.142 N	103° 29' 49.012 W
9,772.8	43.29	2.75	9,716.3	130.3	49.5	383,457.60	759,135.13	32° 3' 5.330 N	103° 29' 49.001 W
Crossed Hard Line @ 9773' MD / 9716' TVD									
9,777.0	43.30	2.80	9,719.4	133.2	49.7	383,460.48	759,135.27	32° 3' 5.359 N	103° 29' 48.999 W
9,808.0	45.00	2.40	9,741.6	154.8	50.6	383,482.05	759,136.24	32° 3' 5.572 N	103° 29' 48.986 W
9,840.0	47.80	2.60	9,763.7	177.9	51.7	383,505.20	759,137.26	32° 3' 5.801 N	103° 29' 48.972 W
9,872.0	51.10	3.10	9,784.5	202.2	52.9	383,529.48	759,138.47	32° 3' 6.041 N	103° 29' 48.955 W
9,903.0	54.50	3.00	9,803.3	226.8	54.2	383,554.13	759,139.78	32° 3' 6.285 N	103° 29' 48.938 W
9,935.0	57.30	2.10	9,821.2	253.3	55.4	383,580.60	759,140.96	32° 3' 6.547 N	103° 29' 48.922 W
9,967.0	60.20	1.50	9,837.8	280.6	56.2	383,607.94	759,141.81	32° 3' 6.817 N	103° 29' 48.909 W

HP

Survey Report - Geographic



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gunner 8 Federal Com #9H
Project:	Lea County, NM	TVD Reference:	WELL @ 3387.3usft (Scandriil Freedom)
Site:	Sec 8, T26S, R34E	MD Reference:	WELL @ 3387.3usft (Scandriil Freedom)
Well:	Gunner 8 Federal Com #9H	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
9,998.0	62.80	1.00	9,852.6	307.9	56.8	383,635.18	759,142.41	32° 3' 7.087 N	103° 29' 48.900 W
10,030.0	66.00	0.70	9,866.4	336.7	57.2	383,664.03	759,142.83	32° 3' 7.372 N	103° 29' 48.893 W
10,062.0	69.80	1.20	9,878.4	366.4	57.7	383,693.67	759,143.33	32° 3' 7.665 N	103° 29' 48.884 W
10,093.0	73.30	2.30	9,888.3	395.8	58.6	383,723.06	759,144.23	32° 3' 7.956 N	103° 29' 48.871 W
10,125.0	75.00	2.10	9,897.0	426.5	59.8	383,753.82	759,145.41	32° 3' 8.261 N	103° 29' 48.855 W
10,157.0	76.80	2.80	9,904.8	457.5	61.1	383,784.82	759,146.74	32° 3' 8.567 N	103° 29' 48.836 W
10,188.0	80.00	2.60	9,911.0	487.9	62.6	383,815.15	759,148.17	32° 3' 8.867 N	103° 29' 48.817 W
10,220.0	83.40	2.10	9,915.6	519.5	63.9	383,846.78	759,149.46	32° 3' 9.180 N	103° 29' 48.799 W
10,252.0	85.70	1.90	9,918.7	551.3	65.0	383,878.62	759,150.58	32° 3' 9.495 N	103° 29' 48.783 W
10,283.0	88.80	1.90	9,920.2	582.3	66.0	383,909.56	759,151.60	32° 3' 9.801 N	103° 29' 48.769 W
10,313.0	90.70	2.10	9,920.3	612.2	67.1	383,939.54	759,152.65	32° 3' 10.098 N	103° 29' 48.754 W
10,408.0	92.20	1.50	9,917.9	707.2	70.0	384,034.46	759,155.63	32° 3' 11.037 N	103° 29' 48.711 W
10,503.0	90.50	0.10	9,915.7	802.1	71.4	384,129.42	759,156.96	32° 3' 11.976 N	103° 29' 48.687 W
10,598.0	89.90	359.80	9,915.3	897.1	71.3	384,224.42	759,156.87	32° 3' 12.917 N	103° 29' 48.679 W
10,693.0	91.30	359.30	9,914.3	992.1	70.5	384,319.41	759,156.13	32° 3' 13.857 N	103° 29' 48.679 W
10,788.0	92.30	358.70	9,911.3	1,087.0	68.9	384,414.34	759,154.47	32° 3' 14.796 N	103° 29' 48.690 W
10,883.0	92.70	0.00	9,907.2	1,181.9	67.8	384,509.25	759,153.39	32° 3' 15.735 N	103° 29' 48.694 W
10,978.0	90.50	0.70	9,904.5	1,276.9	68.4	384,604.20	759,153.97	32° 3' 16.675 N	103° 29' 48.679 W
11,073.0	90.90	0.50	9,903.4	1,371.9	69.4	384,699.19	759,154.97	32° 3' 17.615 N	103° 29' 48.658 W
11,168.0	91.50	0.00	9,901.4	1,466.9	69.8	384,794.17	759,155.38	32° 3' 18.555 N	103° 29' 48.645 W
11,263.0	92.30	359.40	9,898.2	1,561.8	69.3	384,889.11	759,154.89	32° 3' 19.494 N	103° 29' 48.642 W
11,358.0	92.20	358.90	9,894.5	1,656.7	67.9	384,984.03	759,153.48	32° 3' 20.434 N	103° 29' 48.650 W
11,453.0	92.70	357.90	9,890.5	1,751.6	65.2	385,078.90	759,150.83	32° 3' 21.373 N	103° 29' 48.672 W
11,548.0	92.90	359.60	9,885.8	1,846.5	63.2	385,173.76	759,148.76	32° 3' 22.311 N	103° 29' 48.688 W
11,643.0	92.20	0.10	9,881.6	1,941.4	62.9	385,268.67	759,148.51	32° 3' 23.251 N	103° 29' 48.682 W
11,738.0	90.80	359.80	9,879.1	2,036.3	62.8	385,363.63	759,148.43	32° 3' 24.190 N	103° 29' 48.675 W
11,833.0	91.40	359.40	9,877.3	2,131.3	62.2	385,458.61	759,147.76	32° 3' 25.130 N	103° 29' 48.674 W
11,928.0	92.80	358.50	9,873.8	2,226.2	60.4	385,553.53	759,146.03	32° 3' 26.070 N	103° 29' 48.685 W
12,023.0	94.10	358.00	9,868.1	2,321.0	57.5	385,648.31	759,143.13	32° 3' 27.008 N	103° 29' 48.711 W
12,118.0	94.30	0.30	9,861.1	2,415.7	56.1	385,743.04	759,141.72	32° 3' 27.945 N	103° 29' 48.718 W
12,212.0	92.70	1.00	9,855.4	2,509.6	57.2	385,836.85	759,142.79	32° 3' 28.874 N	103° 29' 48.697 W
12,307.0	91.60	0.70	9,851.8	2,604.5	58.6	385,931.77	759,144.20	32° 3' 29.813 N	103° 29' 48.673 W
12,401.0	90.80	359.40	9,849.9	2,698.5	58.7	386,025.75	759,144.28	32° 3' 30.743 N	103° 29' 48.663 W
12,496.0	90.50	359.10	9,848.8	2,793.4	57.4	386,120.74	759,143.04	32° 3' 31.683 N	103° 29' 48.669 W
12,591.0	90.50	359.10	9,847.9	2,888.4	55.9	386,215.72	759,141.54	32° 3' 32.623 N	103° 29' 48.678 W
12,686.0	91.90	358.70	9,846.0	2,983.4	54.1	386,310.68	759,139.72	32° 3' 33.563 N	103° 29' 48.690 W
12,781.0	91.30	359.60	9,843.3	3,078.3	52.7	386,405.63	759,138.31	32° 3' 34.502 N	103° 29' 48.698 W
12,876.0	91.20	0.00	9,841.2	3,173.3	52.4	386,500.61	759,137.98	32° 3' 35.442 N	103° 29' 48.694 W
12,971.0	90.50	359.40	9,839.8	3,268.3	51.9	386,595.59	759,137.48	32° 3' 36.382 N	103° 29' 48.691 W
13,065.0	90.20	359.40	9,839.2	3,362.3	50.9	386,689.59	759,136.50	32° 3' 37.312 N	103° 29' 48.694 W
13,160.0	88.40	359.30	9,840.4	3,457.3	49.8	386,784.57	759,135.42	32° 3' 38.252 N	103° 29' 48.698 W
13,254.0	89.90	359.10	9,841.8	3,551.2	48.5	386,878.55	759,134.11	32° 3' 39.182 N	103° 29' 48.705 W
13,349.0	89.60	359.80	9,842.2	3,646.2	47.6	386,973.54	759,133.20	32° 3' 40.123 N	103° 29' 48.707 W
13,469.0	90.30	359.80	9,842.3	3,766.2	47.2	387,093.54	759,132.78	32° 3' 41.310 N	103° 29' 48.701 W
13,564.0	90.30	0.00	9,841.8	3,861.2	47.0	387,188.54	759,132.61	32° 3' 42.250 N	103° 29' 48.694 W
13,659.0	90.20	359.80	9,841.4	3,956.2	46.8	387,283.54	759,132.45	32° 3' 43.190 N	103° 29' 48.687 W
13,753.0	90.10	359.30	9,841.2	4,050.2	46.1	387,377.53	759,131.71	32° 3' 44.120 N	103° 29' 48.688 W
13,849.0	88.10	358.70	9,842.7	4,146.2	44.4	387,473.50	759,130.03	32° 3' 45.070 N	103° 29' 48.698 W
13,944.0	87.50	358.70	9,846.3	4,241.1	42.3	387,568.41	759,127.88	32° 3' 46.009 N	103° 29' 48.715 W
14,039.0	88.50	358.90	9,849.6	4,336.0	40.3	387,663.33	759,125.89	32° 3' 46.949 N	103° 29' 48.729 W
14,134.0	89.60	359.30	9,851.2	4,431.0	38.8	387,758.30	759,124.40	32° 3' 47.889 N	103° 29' 48.738 W
14,230.0	90.70	358.70	9,851.0	4,527.0	37.1	387,854.28	759,122.72	32° 3' 48.839 N	103° 29' 48.749 W
14,325.0	91.10	359.10	9,849.5	4,622.0	35.3	387,949.25	759,120.90	32° 3' 49.779 N	103° 29' 48.762 W
14,420.0	91.40	358.90	9,847.4	4,716.9	33.6	388,044.22	759,119.24	32° 3' 50.719 N	103° 29' 48.772 W
14,514.0	90.80	358.90	9,845.6	4,810.9	31.8	388,138.18	759,117.44	32° 3' 51.649 N	103° 29' 48.785 W

HP

Survey Report - Geographic



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gunner 8 Federal Com #9H
Project:	Lea County, NM	TVD Reference:	WELL @ 3387.3usft (Scandril Freedom)
Site:	Sec 8, T26S, R34E	MD Reference:	WELL @ 3387.3usft (Scandril Freedom)
Well:	Gunner 8 Federal Com #9H	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	
14,608.0	91.40	359.10	9,843.8	4,904.9	30.2	388,232.15	759,115.80	32° 3' 52.579 N	103° 29' 48.795 W	
14,702.0	90.00	358.50	9,842.6	4,998.8	28.2	388,326.12	759,113.83	32° 3' 53.509 N	103° 29' 48.810 W	
14,797.0	90.70	358.40	9,842.1	5,093.8	25.7	388,421.08	759,111.26	32° 3' 54.448 N	103° 29' 48.831 W	
14,891.0	91.30	358.90	9,840.4	5,187.7	23.4	388,515.04	759,109.05	32° 3' 55.378 N	103° 29' 48.848 W	
14,986.0	90.00	358.50	9,839.3	5,282.7	21.3	388,610.01	759,106.89	32° 3' 56.318 N	103° 29' 48.865 W	
15,080.0	90.10	358.90	9,839.3	5,376.7	19.2	388,703.98	759,104.76	32° 3' 57.248 N	103° 29' 48.881 W	
15,174.0	90.00	358.70	9,839.2	5,470.7	17.2	388,797.96	759,102.79	32° 3' 58.179 N	103° 29' 48.896 W	
15,269.0	87.10	357.70	9,841.6	5,565.6	14.2	388,892.88	759,099.81	32° 3' 59.118 N	103° 29' 48.922 W	
15,365.0	88.30	358.40	9,845.4	5,661.4	10.9	388,988.74	759,096.54	32° 4' 0.067 N	103° 29' 48.951 W	
15,459.0	89.10	359.10	9,847.6	5,755.4	8.9	389,082.69	759,094.49	32° 4' 0.997 N	103° 29' 48.966 W	
15,553.0	89.90	359.10	9,848.4	5,849.4	7.4	389,176.68	759,093.02	32° 4' 1.927 N	103° 29' 48.975 W	
15,648.0	90.00	358.90	9,848.5	5,944.4	5.8	389,271.66	759,091.36	32° 4' 2.867 N	103° 29' 48.986 W	
15,742.0	90.20	359.10	9,848.3	6,038.3	4.1	389,365.65	759,089.72	32° 4' 3.797 N	103° 29' 48.996 W	
15,837.0	90.60	359.60	9,847.6	6,133.3	3.0	389,460.64	759,088.64	32° 4' 4.737 N	103° 29' 49.000 W	
15,931.0	91.00	0.10	9,846.3	6,227.3	2.8	389,554.63	759,088.39	32° 4' 5.667 N	103° 29' 48.995 W	
16,026.0	91.90	0.10	9,843.9	6,322.3	3.0	389,649.60	759,088.56	32° 4' 6.607 N	103° 29' 48.984 W	
16,121.0	89.50	359.30	9,842.8	6,417.3	2.5	389,744.58	759,088.06	32° 4' 7.547 N	103° 29' 48.981 W	
16,215.0	88.60	359.60	9,844.3	6,511.3	1.6	389,838.56	759,087.16	32° 4' 8.477 N	103° 29' 48.983 W	
16,309.0	88.60	359.30	9,846.6	6,605.2	0.7	389,932.53	759,086.26	32° 4' 9.407 N	103° 29' 48.986 W	
16,404.0	89.40	358.90	9,848.3	6,700.2	-0.8	390,027.50	759,084.77	32° 4' 10.347 N	103° 29' 48.994 W	
16,499.0	91.00	359.60	9,847.9	6,795.2	-2.1	390,122.49	759,083.52	32° 4' 11.287 N	103° 29' 49.000 W	
16,593.0	92.10	359.60	9,845.4	6,889.2	-2.7	390,216.45	759,082.87	32° 4' 12.217 N	103° 29' 49.009 W	
16,687.0	91.40	359.30	9,842.5	6,983.1	-3.6	390,310.40	759,081.97	32° 4' 13.147 N	103° 29' 49.001 W	
16,782.0	92.80	358.50	9,839.0	7,078.0	-5.5	390,405.32	759,080.14	32° 4' 14.086 N	103° 29' 49.014 W	
16,876.0	94.30	358.20	9,833.2	7,171.8	-8.2	390,499.10	759,077.44	32° 4' 15.014 N	103° 29' 49.037 W	
16,971.0	91.90	357.90	9,828.1	7,266.6	-11.4	390,593.90	759,074.21	32° 4' 15.953 N	103° 29' 49.066 W	
17,066.0	91.80	357.90	9,825.0	7,361.5	-14.9	390,688.78	759,070.73	32° 4' 16.892 N	103° 29' 49.098 W	
17,160.0	90.10	358.70	9,823.5	7,455.4	-17.7	390,782.72	759,067.95	32° 4' 17.822 N	103° 29' 49.122 W	
17,255.0	89.20	359.60	9,824.0	7,550.4	-19.1	390,877.71	759,066.54	32° 4' 18.762 N	103° 29' 49.130 W	
17,349.0	89.30	359.60	9,825.3	7,644.4	-19.7	390,971.70	759,065.88	32° 4' 19.692 N	103° 29' 49.129 W	
17,444.0	89.40	359.80	9,826.4	7,739.4	-20.2	391,066.69	759,065.38	32° 4' 20.632 N	103° 29' 49.126 W	
17,538.0	89.60	359.80	9,827.2	7,833.4	-20.5	391,160.69	759,065.06	32° 4' 21.562 N	103° 29' 49.121 W	
17,633.0	90.30	359.80	9,827.3	7,928.4	-20.9	391,255.69	759,064.72	32° 4' 22.502 N	103° 29' 49.117 W	
17,727.0	91.10	359.80	9,826.1	8,022.4	-21.2	391,349.68	759,064.40	32° 4' 23.432 N	103° 29' 49.112 W	
17,821.0	91.20	359.80	9,824.2	8,116.4	-21.5	391,443.66	759,064.07	32° 4' 24.362 N	103° 29' 49.107 W	
17,915.0	91.40	359.40	9,822.1	8,210.3	-22.2	391,537.63	759,063.41	32° 4' 25.292 N	103° 29' 49.106 W	
18,010.0	90.30	359.80	9,820.7	8,305.3	-22.8	391,632.62	759,062.75	32° 4' 26.232 N	103° 29' 49.106 W	
18,105.0	88.60	359.60	9,821.6	8,400.3	-23.3	391,727.61	759,062.25	32° 4' 27.172 N	103° 29' 49.103 W	
18,199.0	89.30	359.80	9,823.3	8,494.3	-23.8	391,821.59	759,061.76	32° 4' 28.102 N	103° 29' 49.100 W	
18,294.0	89.00	0.30	9,824.7	8,589.3	-23.8	391,916.58	759,061.84	32° 4' 29.042 N	103° 29' 49.091 W	
18,388.0	89.30	0.70	9,826.1	8,683.3	-22.9	392,010.57	759,062.66	32° 4' 29.972 N	103° 29' 49.073 W	
18,482.0	89.70	0.50	9,826.9	8,777.3	-21.9	392,104.56	759,063.65	32° 4' 30.902 N	103° 29' 49.053 W	
18,576.0	89.90	0.10	9,827.3	8,871.3	-21.5	392,198.55	759,064.14	32° 4' 31.832 N	103° 29' 49.038 W	
18,670.0	90.80	0.50	9,826.7	8,965.3	-21.0	392,292.55	759,064.63	32° 4' 32.762 N	103° 29' 49.024 W	
18,765.0	89.00	1.00	9,826.9	9,060.2	-19.7	392,387.54	759,065.87	32° 4' 33.702 N	103° 29' 49.001 W	
18,859.0	88.70	1.40	9,828.7	9,154.2	-17.8	392,481.50	759,067.84	32° 4' 34.632 N	103° 29' 48.970 W	
18,954.0	88.60	1.90	9,831.0	9,249.1	-15.0	392,576.43	759,070.58	32° 4' 35.571 N	103° 29' 48.930 W	
19,048.0	89.30	0.80	9,832.7	9,343.1	-12.8	392,670.39	759,072.79	32° 4' 36.501 N	103° 29' 48.895 W	
19,143.0	89.30	0.70	9,833.9	9,438.1	-11.6	392,765.37	759,074.04	32° 4' 37.441 N	103° 29' 48.872 W	
19,237.0	90.60	359.40	9,833.9	9,532.1	-11.5	392,859.37	759,074.12	32° 4' 38.371 N	103° 29' 48.863 W	
19,331.0	91.30	359.80	9,832.4	9,626.1	-12.1	392,953.35	759,073.46	32° 4' 39.301 N	103° 29' 48.862 W	
19,425.0	89.90	359.10	9,831.4	9,720.0	-13.0	393,047.34	759,072.56	32° 4' 40.231 N	103° 29' 48.864 W	
19,519.0	90.50	0.00	9,831.1	9,814.0	-13.8	393,141.34	759,071.82	32° 4' 41.161 N	103° 29' 48.864 W	
19,613.0	91.20	0.50	9,829.7	9,908.0	-13.4	393,235.32	759,072.23	32° 4' 42.091 N	103° 29' 48.851 W	
19,668.0	91.20	0.50	9,828.5	9,963.0	-12.9	393,290.31	759,072.71	32° 4' 42.635 N	103° 29' 48.840 W	

HP

Survey Report - Geographic



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Gunner 8 Federal Com #9H
Project:	Lea County, NM	TVD Reference:	WELL @ 3387.3usft (Scandrill Freedom)
Site:	Sec 8, T26S, R34E	MD Reference:	WELL @ 3387.3usft (Scandrill Freedom)
Well:	Gunner 8 Federal Com #9H	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
19,727.0	91.20	0.50	9,827.3	10,022.0	-12.4	393,349.29	759,073.23	32° 4' 43.219 N	103° 29' 48.829 W
TD @ 19727' MD / 9827' TVD									

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
9,170.0	9,168.8	-66.0	51.9	Tie into Gyro @ 9170' MD / 9169' TVD	
9,772.8	9,716.3	130.3	49.5	Crossed Hard Line @ 9773' MD / 9716' TVD	
19,727.0	9,827.3	10,022.0	-12.4	TD @ 19727' MD / 9827' TVD	

Checked By: _____	Approved By: _____	Date: _____
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Gunner 8 Federal Com #9H (30-025-42905)
Sec 8-T26S-R34E

<u>Stages</u>	<u>7 1/2% Acid (Gals)</u>	<u>Proppant (#)</u>	<u>Clean Fluid (Gals)</u>
1	7014	299682	487662
2	3024	303728	309834
3	3024	302240	313908
4	3024	300977	309750
5	2982	299129	305550
6	3024	300258	302358
7	3066	301908	301140
8	3108	300599	297654
9	3108	299836	297948
10	3066	300694	297528
11	2982	297864	300552
12	3024	300032	295806
13	3024	299759	295638
14	2898	301095	292656
15	2982	300515	292656
16	2982	300002	288036
17	3024	300719	290766
18	2982	299688	288498
19	7560	298512	382830
20	3024	298791	284550
21	3024	300187	289254
22	3024	297928	299670
23	3024	299841	283416
24	2982	303742	285432
25	2772	301631	280854
26	2772	299868	280434
27	4032	299706	314370
28	2688	299893	279888
29	2772	299867	277998
30	2772	299842	278586
31	2772	300058	302778
32	2772	300704	276696
33	2772	299360	273840
34	3234	299986	276654
35	3024	299869	273966
36	2982	298761	283500
37	2730	300261	276360
38	2772	301473	275772
39	2772	299977	274848
40	2772	298147	275226
41	2772	300721	274974
42	3024	300728	276780
43	3024	301781	277368
44	3024	301408	274848
45	3024	300155	276234
46	3024	303038	274302
47	3024	300027	272244
Totals	148,302	14,114,987	13,821,612

(entered data to be carried to each stage)			Fluid Database			Proppant Database			Chemical Database		
Date	3/14/2016		1	Treated Water		1	100 Mesh		1	Lowsurf-360	
Pressure test	9500		2	7.5 % Acid		2	40/70 White		2	Clay Web	
Well Name/number	Gunner 8 Fed Com #9H		3	Slickwater		3			3	HPH Breaker	
Casing 1 size	5 1/2	Casing 2 size	4	Water Frac G-R(11)		4			4	BCA-23003	
Capacity-bbls/lin. ft.	0.0232	Capacity-bbls/lin. ft.	5			5			5	Scaletrol	
Top of Casing	0	Top of Casing	6			6			6	Optikleen-WF	
TD of casing	19,686	TD of casing	7			7			7	Optiflo H TE	
TVD	9850		8			8			8	Parasorb	
AFE	6639		9			9			9	Scalesorb 12	
Shallowest Plug	10,284		10			10			10	WG-36	
			11								
			12								

From Bottom to Top	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
	19,546	31	11	19,363	51	11	19,161	51	11	18,957	57	11	18,757	51	11
	19,515	51	10	19,313	51	10	19,111	51	10	18,909	51	10	18,707	46	10
	19,464	50	8	19,262	50	8	19,060	46	8	18,858	50	8	18,661	57	8
	19,414		7	19,212		7	19,014		7	18,808		7	18,604		7
	Plug to Plug	170	36	Plug to Plug	204	36	Plug to Plug	200	36	Plug to Plug	192	36	Plug to Plug	211	36
	Frac Plug	19,558	Total Shots	Frac Plug	19,388	Total Shots	Frac Plug	19,184	Total Shots	Frac Plug	18,984	Total Shots	Frac Plug	18,792	Total Shots

From Bottom to Top	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
	18,555	49	11	18,353	51	11	18,152	45	11	17,950	50	11	17,748	49	11
	18,505	51	10	18,304	56	10	18,101	50	10	17,899	48	10	17,697	50	10
	18,454	50	8	18,248	51	8	18,051	51	8	17,851	54	8	17,647	51	8
	18,404		7	18,197		7	18,000		7	17,797		7	17,596		7
	Plug to Plug	209	36	Plug to Plug	195	36	Plug to Plug	207	36	Plug to Plug	197	36	Plug to Plug	211	36
	Frac Plug	18,581	Total Shots	Frac Plug	18,372	Total Shots	Frac Plug	18,177	Total Shots	Frac Plug	17,970	Total Shots	Frac Plug	17,773	Total Shots

From Bottom to Top	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
	17,546	50	11	17,341	54	11	17,142	50	11	16,938	49	11	16,738	51	11
	17,495	50	10	17,293	50	10	17,091	50	10	16,890	51	10	16,688	51	10
	17,445	50	8	17,243	51	8	17,041	54	8	16,839	50	8	16,637	50	8
	17,395		7	17,192		7	16,987		7	16,789		7	16,587		7
	Plug to Plug	193	36	Plug to Plug	195	36	Plug to Plug	209	36	Plug to Plug	195	36	Plug to Plug	209	36
	Frac Plug	17,562	Total Shots	Frac Plug	17,369	Total Shots	Frac Plug	17,174	Total Shots	Frac Plug	16,965	Total Shots	Frac Plug	16,770	Total Shots

From Bottom to Top	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
	16,537	50	11	16,334	51	11	16,132	51	11	15,928	56	11	15,728	51	11
	16,481	46	10	16,284	51	10	16,082	51	10	15,880	51	10	15,678	51	10
	16,435	50	8	16,233	50	8	16,031	47	8	15,829	50	8	15,627	50	8
	16,385		7	16,183		7	15,984		7	15,779		7	15,577		7
	Plug to Plug	202	36	Plug to Plug	208	36	Plug to Plug	195	36	Plug to Plug	198	36	Plug to Plug	207	36
	Frac Plug	16,561	Total Shots	Frac Plug	16,359	Total Shots	Frac Plug	16,151	Total Shots	Frac Plug	15,956	Total Shots	Frac Plug	15,758	Total Shots

From Bottom to Top	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
	15,527	50	11	15,324	797	11	15,123	50	11	14,923	48	11	14,719	50	11
	15,476	949	10	15,274	50	10	15,072	50	10	14,867	47	10	14,668	50	10
	14,527	-844	8	15,224	51	8	15,022	51	8	14,820	51	8	14,618	51	8
	15,371		7	15,173		7	14,971		7	14,769		7	14,567		7
	Plug to Plug	201	36	Plug to Plug	194	36	Plug to Plug	210	36	Plug to Plug	202	36	Plug to Plug	204	36
	Frac Plug	15,551	Total Shots	Frac Plug	15,350	Total Shots	Frac Plug	15,156	Total Shots	Frac Plug	14,946	Total Shots	Frac Plug	14,744	Total Shots

From Bottom to Top	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
	14,517	50	11	14,304	60	11	14,113	51	11	13,911	46	11	13,709	51	11
	14,466	50	10	14,264	50	10	14,063	51	10	13,861	51	10	13,661	51	10
	14,416	52	8	14,214	50	8	14,012	55	8	13,810	50	8	13,608	50	8
	14,364		7	14,164		7	13,957		7	13,760		7	13,558		7
	Plug to Plug	227	36	Plug to Plug	180	36	Plug to Plug	197	36	Plug to Plug	194	36	Plug to Plug	209	36
	Frac Plug	14,540	Total Shots	Frac Plug	14,313	Total Shots	Frac Plug	14,133	Total Shots	Frac Plug	13,936	Total Shots	Frac Plug	13,742	Total Shots

From Bottom to Top	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
	13,509	49	11	13,305	51	11	13,107	47	11	12,902	50	11	12,702	50	11
	13,456	50	10	13,255	51	10	13,053	51	10	12,851	50	10	12,645	47	10
	13,406	50	8	13,204	50	8	13,002	50	8	12,801	49	8	12,598	50	8
	13,356		7	13,154		7	12,952		7	12,752		7	12,548		7
	Plug to Plug	202	36	Plug to Plug	204	36	Plug to Plug	207	36	Plug to Plug	195	36	Plug to Plug	200	36
	Frac Plug	13,533	Total Shots	Frac Plug	13,331	Total Shots	Frac Plug	13,127	Total Shots	Frac Plug	12,920	Total Shots	Frac Plug	12,725	Total Shots

From Bottom to Top	Stage 36	Distance Between Perfs	Shots	Stage 37	Distance Between Perfs	Shots	Stage 38	Distance Between Perfs	Shots	Stage 39	Distance Between Perfs	Shots	Stage 40	Distance Between Perfs	Shots
	12,498	50	11	12,296	50	11	12,094	47	11	11,892	50	11	11,693	47	11
	12,447	50	10	12,245	48	10	12,043	50	10	11,841	50	10	11,637	48	10
	12,397	51	8	12,197	56	8	11,993	51	8	11,791	51	8	11,589	50	8
	12,346		7	12,141		7	11,942		7	11,740		7	11,539		7
	Plug to Plug	212	36	Plug to Plug	194	36	Plug to Plug	210	36	Plug to Plug	194	36	Plug to Plug	198	36
	Frac Plug	12,525	Total Shots	Frac Plug	12,313	Total Shots	Frac Plug	12,119	Total Shots	Frac Plug	11,909	Total Shots	Frac Plug	11,715	Total Shots

From Bottom to Top	Stage 41	Distance Between Perfs	Shots	Stage 42	Distance Between Perfs	Shots	Stage 43	Distance Between Perfs	Shots	Stage 44	Distance Between Perfs	Shots	Stage 45	Distance Between Perfs	Shots
	11,488	51	11	11,286	51	11	11,084	51	11	10,882	51	11	10,680	51	11
	11,438	51	10	11,236	51	10	11,037	57	10	10,832	51	10	10,630	49	10
	11,387	50	8	11,185	50	8	10,980	47	8	10,781	50	8	10,581	55	8
	11,337		7	11,135		7	10,933		7	10,731		7	10,526		7
	Plug to Plug	206	36	Plug to Plug	202	36	Plug to Plug	201	36	Plug to Plug	203	36	Plug to Plug	201	36
	Frac Plug	11,517	Total Shots	Frac Plug	11,311	Total Shots	Frac Plug	11,109	Total Shots	Frac Plug	10,908	Total Shots	Frac Plug	10,705	Total Shots

From Bottom to Top	Stage 46	Distance Between Perfs	Shots	Stage 47	Distance Between Perfs	Shots	Stage 48	Distance Between Perfs	Shots	Stage 49	Distance Between Perfs	Shots	Stage 5
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