

DISTRICT I
1625 N. FRENCH DR., HOBBS, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720

DISTRICT II
511 S. FIRST ST., ARTESIA, NM 88210
Phone: (575) 746-1283 Fax: (575) 746-9720

DISTRICT III
1000 RIO BRAZOS RD., AZTEC, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170

DISTRICT IV
1220 S. ST. FRANCIS DR., SANTA FE, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 SOUTH ST. FRANCIS DR.
Santa Fe, New Mexico 87505

Form C-102
Revised August 1, 2011
Submit one copy to appropriate
District Office

☒ AMENDED REPORT

As Drilled

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number 30-025-45652	Pool Code 17980	Pool Name DOGIE DRAW;WOLFCAMP
Property Code 326533	Property Name PITCHBLEND FEDERAL 19-30	Well Number 37H
OGRID No. 229137	Operator Name COG OPERATING, LLC	Elevation 3336.8'

Surface Location

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
B	19	25-S	35-E		250	NORTH	2035	EAST	LEA

Bottom Hole Location If Different From Surface

REQUIRES NSL

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
G	30	25-S	35-E		2588	NORTH	2454	EAST	LEA
Dedicated Acres 240	Joint or Infill	Consolidation Code	Order No.						

NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED
OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION

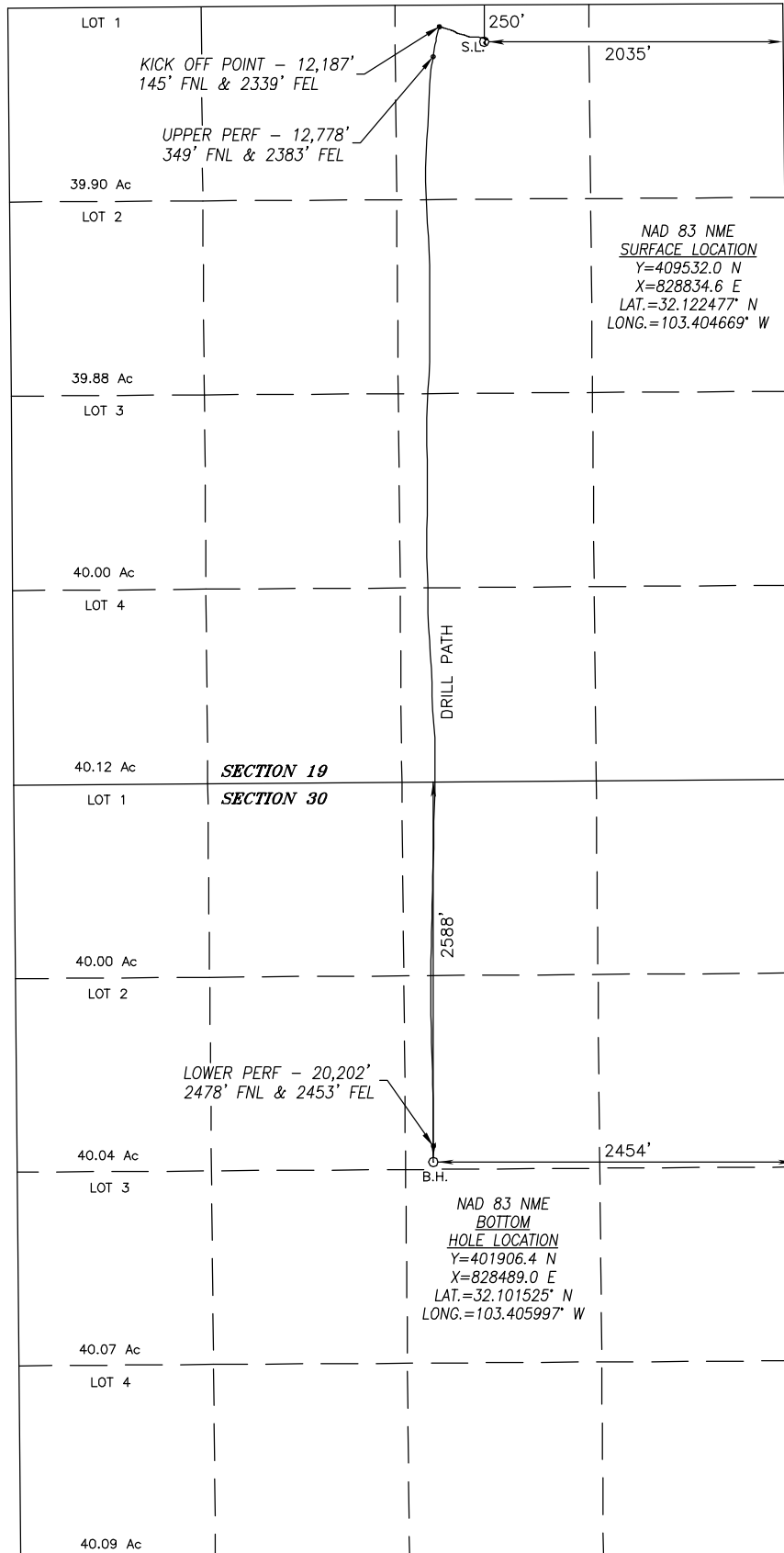
SEE PAGE 2

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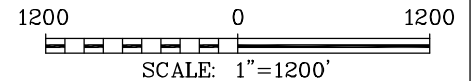
W.O. #20-1395

DRAWN BY: WN

Property Code 326533	Property Name PITCHBLENDE FEDERAL 19-30	Well Number 37H
OGRID No. 229137	Operator Name COG OPERATING, LLC	Elevation 3336.8'



SURFACE INFO AND BOREPATH SHOWN HEREON
IS BASED ON DIRECTIONAL SURVEY REPORT
PROVIDED BY COG OPERATING, LLC FOR THE
PITCHBLENDE FEDERAL 19-30 #37H SUPPLIED
TO HARCROW SURVEYING, LLC ON OCTOBER 22,
2020



OPERATOR CERTIFICATION

I hereby certify that the information
herein is true and complete to the best of
my knowledge and belief, and that this
organization either owns a working interest
or unleased mineral interest in the land
including the proposed bottom hole location
or has a right to drill this well at this
location pursuant to a contract with an
owner of such mineral or working interest,
or to a voluntary pooling agreement or a
compulsory pooling order heretofore entered
by the division.

Amanda Avery 12/2/20

Signature Date

Amanda Avery

Printed Name

aavery@concho.com

E-mail Address

SURVEYOR CERTIFICATION

I hereby certify that the well location
shown on this plat was plotted from field
notes of actual surveys made by me or
under my supervision, and that the same is
true and correct to the best of my belief.

DEC. 5, 2019/FEB. 10, 2020

Date of Survey/Date of Geographic Survey

Signature & Seal of Professional Surveyor



Chad Harcrow 10/26/20

Certificate No. CHAD HARCROW 17777

PAGE 2 OF 2

W.O. #20-1395

DRAWN BY: WN



COG Operating LLC

**Lea Co., NM
Pitchblende Federal
19-30 37H**

Wellbore #1

Design: Survey API:300254565200

Standard Survey Report

10 February, 2020





Nabors Drilling Solutions

Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 37H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Well:	19-30 37H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Survey API:300254565200	Database:	RyanUSA_32Bit

Project	Lea Co., NM, Test		
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	Pitchblende Federal		
Site Position:		Northing:	409,474.100 usft
From:	Map	Easting:	787,678.000 usft
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "
		Latitude:	32° 7' 20.462348 N
		Longitude:	103° 24' 14.780437 W
		Grid Convergence:	0.49 °

Well	19-30 37H		
Well Position	+N/-S	0.00 ft	Northing:
	+E/-W	0.00 ft	Easting:
Position Uncertainty	2.00 ft	Wellhead Elevation:	ft
		Latitude:	32° 7' 20.462929 N
		Longitude:	103° 24' 15.129268 W
		Ground Level:	3,336.80 ft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IFR	1/28/2020	6.54
			Dip Angle (°)
			59.74
			Field Strength (nT)
			47,682.70000000

Design	Survey API:300254565200		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(ft)	(ft)	(ft)
	0.00	0.00	0.00
			Direction (°)
			182.42

Survey Program	Date	2/10/2020		
From	To	Survey (Wellbore)	Tool Name	Description
(ft)	(ft)			
73.76	11,740.84	Survey #2 Gyro (Wellbore #1)	Standard Keeper 104	Standard Wireline Keeper ver 1.0.4
11,663.00	20,312.00	Survey #3 C/L (Wellbore #1)	MWD+IFR1+FDIR	OWSG MWD + IFR1 + FDIR Correction

Survey									
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn
Depth	(°)	(°)	Depth	(ft)	(ft)	Section	Rate	Rate	Rate
(ft)			(ft)			(ft)	(°/100ft)	(°/100ft)	(°/100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
73.76	0.24	335.89	73.76	0.14	-0.06	-0.14	0.33	0.33	0.00
100.00	0.18	352.17	100.00	0.23	-0.09	-0.23	0.32	-0.23	62.04
125.00	0.16	11.32	125.00	0.31	-0.09	-0.30	0.24	-0.08	76.60
150.00	0.26	335.83	150.00	0.39	-0.11	-0.39	0.64	0.40	-141.96
175.00	0.25	331.22	175.00	0.49	-0.16	-0.48	0.09	-0.04	-18.44
200.00	0.13	348.31	200.00	0.57	-0.19	-0.56	0.53	-0.48	68.36
225.00	0.17	316.31	225.00	0.62	-0.22	-0.61	0.36	0.16	-128.00
250.00	0.04	320.23	250.00	0.65	-0.25	-0.64	0.52	-0.52	15.68
275.00	0.08	168.87	275.00	0.64	-0.25	-0.63	0.47	0.16	-605.44



Nabors Drilling Solutions

Survey Report



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Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Well:	19-30 37H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Survey API:300254565200	Database:	RyanUSA_32Bit

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
300.00	0.04	172.34	300.00	0.62	-0.25	-0.61	0.16	-0.16	13.88
325.00	0.05	184.92	325.00	0.60	-0.25	-0.59	0.06	0.04	50.32
350.00	0.15	110.09	350.00	0.58	-0.22	-0.57	0.58	0.40	-299.32
375.00	0.11	123.89	375.00	0.55	-0.17	-0.54	0.20	-0.16	55.20
400.00	0.13	136.90	400.00	0.52	-0.13	-0.51	0.13	0.08	52.04
425.00	0.21	145.60	425.00	0.46	-0.08	-0.46	0.34	0.32	34.80
450.00	0.20	167.89	450.00	0.38	-0.05	-0.38	0.32	-0.04	89.16
475.00	0.26	167.96	475.00	0.28	-0.03	-0.28	0.24	0.24	0.28
500.00	0.43	170.75	500.00	0.13	0.00	-0.13	0.68	0.68	11.16
525.00	0.40	190.83	525.00	-0.05	0.00	0.05	0.59	-0.12	80.32
550.00	0.47	202.24	550.00	-0.23	-0.06	0.23	0.44	0.28	45.64
575.00	0.44	187.23	575.00	-0.42	-0.11	0.42	0.49	-0.12	-60.04
600.00	0.55	193.64	599.99	-0.63	-0.15	0.63	0.49	0.44	25.64
625.00	0.61	200.35	624.99	-0.87	-0.22	0.88	0.36	0.24	26.84
650.00	0.62	193.65	649.99	-1.13	-0.30	1.14	0.29	0.04	-26.80
675.00	0.64	192.54	674.99	-1.39	-0.36	1.41	0.09	0.08	-4.44
700.00	0.74	185.06	699.99	-1.69	-0.41	1.71	0.54	0.40	-29.92
725.00	0.78	182.90	724.99	-2.02	-0.43	2.04	0.20	0.16	-8.64
750.00	0.77	182.94	749.98	-2.36	-0.45	2.38	0.04	-0.04	0.16
775.00	0.84	188.61	774.98	-2.71	-0.48	2.73	0.42	0.28	22.68
800.00	0.79	192.68	799.98	-3.06	-0.55	3.08	0.31	-0.20	16.28
825.00	0.77	196.26	824.98	-3.39	-0.63	3.41	0.21	-0.08	14.32
850.00	0.64	193.15	849.97	-3.68	-0.71	3.71	0.54	-0.52	-12.44
875.00	0.69	187.38	874.97	-3.97	-0.76	4.00	0.33	0.20	-23.08
900.00	0.74	189.19	899.97	-4.28	-0.81	4.31	0.22	0.20	7.24
925.00	0.68	185.03	924.97	-4.59	-0.85	4.62	0.32	-0.24	-16.64
950.00	0.73	183.22	949.97	-4.89	-0.87	4.92	0.22	0.20	-7.24
975.00	0.77	187.14	974.97	-5.22	-0.90	5.25	0.26	0.16	15.68
1,000.00	0.82	188.88	999.96	-5.56	-0.95	5.60	0.22	0.20	6.96
1,025.00	0.86	189.08	1,024.96	-5.92	-1.00	5.96	0.16	0.16	0.80
1,050.00	0.80	191.97	1,049.96	-6.28	-1.07	6.32	0.29	-0.24	11.56
1,075.00	0.83	193.06	1,074.96	-6.63	-1.15	6.67	0.14	0.12	4.36
1,100.00	0.87	185.33	1,099.95	-6.99	-1.21	7.04	0.49	0.16	-30.92
1,125.00	1.05	173.47	1,124.95	-7.41	-1.20	7.45	1.07	0.72	-47.44
1,150.00	1.13	169.40	1,149.94	-7.88	-1.13	7.92	0.45	0.32	-16.28
1,175.00	1.16	163.78	1,174.94	-8.36	-1.01	8.40	0.46	0.12	-22.48
1,200.00	1.17	164.51	1,199.93	-8.85	-0.87	8.88	0.07	0.04	2.92
1,225.00	1.25	163.00	1,224.93	-9.36	-0.72	9.38	0.34	0.32	-6.04
1,250.00	1.21	158.62	1,249.92	-9.87	-0.55	9.88	0.41	-0.16	-17.52
1,275.00	1.17	151.67	1,274.92	-10.34	-0.33	10.34	0.60	-0.16	-27.80
1,300.00	1.04	148.80	1,299.91	-10.75	-0.09	10.75	0.57	-0.52	-11.48
1,325.00	1.07	150.39	1,324.91	-11.15	0.14	11.14	0.17	0.12	6.36
1,350.00	1.03	151.62	1,349.90	-11.55	0.36	11.53	0.18	-0.16	4.92



Nabors Drilling Solutions

Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 37H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Well:	19-30 37H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Survey API:300254565200	Database:	RyanUSA_32Bit

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
1,375.00	0.89	147.38	1,374.90	-11.91	0.58	11.88	0.63	-0.56	-16.96
1,400.00	0.82	144.72	1,399.90	-12.22	0.78	12.18	0.32	-0.28	-10.64
1,425.00	0.85	138.58	1,424.90	-12.51	1.01	12.45	0.38	0.12	-24.56
1,450.00	0.82	136.79	1,449.89	-12.78	1.25	12.71	0.16	-0.12	-7.16
1,475.00	0.81	132.33	1,474.89	-13.03	1.51	12.95	0.26	-0.04	-17.84
1,500.00	0.89	133.67	1,499.89	-13.28	1.78	13.19	0.33	0.32	5.36
1,525.00	0.87	129.43	1,524.88	-13.53	2.07	13.44	0.27	-0.08	-16.96
1,550.00	0.90	130.11	1,549.88	-13.78	2.36	13.67	0.13	0.12	2.72
1,575.00	0.86	128.83	1,574.88	-14.03	2.66	13.90	0.18	-0.16	-5.12
1,600.00	0.85	120.76	1,599.88	-14.24	2.96	14.10	0.48	-0.04	-32.28
1,625.00	0.93	122.58	1,624.87	-14.44	3.29	14.29	0.34	0.32	7.28
1,650.00	0.89	123.83	1,649.87	-14.66	3.63	14.49	0.18	-0.16	5.00
1,675.00	0.90	125.07	1,674.87	-14.88	3.95	14.70	0.09	0.04	4.96
1,700.00	1.00	126.05	1,699.86	-15.12	4.29	14.93	0.41	0.40	3.92
1,725.00	0.87	123.62	1,724.86	-15.36	4.62	15.15	0.54	-0.52	-9.72
1,750.00	0.91	123.12	1,749.86	-15.57	4.94	15.35	0.16	0.16	-2.00
1,775.00	0.88	122.63	1,774.85	-15.78	5.27	15.54	0.12	-0.12	-1.96
1,800.00	0.85	124.08	1,799.85	-15.99	5.59	15.74	0.15	-0.12	5.80
1,825.00	0.90	123.71	1,824.85	-16.20	5.90	15.94	0.20	0.20	-1.48
1,850.00	0.85	122.61	1,849.85	-16.41	6.22	16.13	0.21	-0.20	-4.40
1,875.00	0.89	123.88	1,874.84	-16.62	6.54	16.33	0.18	0.16	5.08
1,900.00	0.87	120.96	1,899.84	-16.82	6.87	16.52	0.20	-0.08	-11.68
1,925.00	0.90	116.47	1,924.84	-17.01	7.20	16.69	0.30	0.12	-17.96
1,950.00	0.79	118.10	1,949.83	-17.18	7.53	16.84	0.45	-0.44	6.52
1,975.00	0.83	111.62	1,974.83	-17.33	7.85	16.98	0.40	0.16	-25.92
2,000.00	0.92	102.71	1,999.83	-17.44	8.22	17.07	0.65	0.36	-35.64
2,025.00	1.00	100.38	2,024.82	-17.52	8.63	17.14	0.36	0.32	-9.32
2,050.00	0.95	98.22	2,049.82	-17.59	9.05	17.19	0.25	-0.20	-8.64
2,075.00	1.00	93.80	2,074.82	-17.63	9.47	17.22	0.36	0.20	-17.68
2,100.00	1.07	94.04	2,099.81	-17.66	9.92	17.23	0.28	0.28	0.96
2,125.00	1.02	93.47	2,124.81	-17.69	10.37	17.24	0.20	-0.20	-2.28
2,150.00	0.98	90.48	2,149.81	-17.71	10.81	17.24	0.26	-0.16	-11.96
2,175.00	0.46	13.36	2,174.80	-17.61	11.05	17.13	3.94	-2.08	-308.48
2,200.00	1.15	326.31	2,199.80	-17.31	10.93	16.83	3.61	2.76	-188.20
2,225.00	1.30	321.68	2,224.80	-16.88	10.62	16.41	0.72	0.60	-18.52
2,250.00	1.38	320.69	2,249.79	-16.42	10.25	15.97	0.33	0.32	-3.96
2,275.00	1.38	320.60	2,274.78	-15.95	9.87	15.52	0.01	0.00	-0.36
2,300.00	1.36	321.10	2,299.77	-15.49	9.49	15.08	0.09	-0.08	2.00
2,325.00	1.45	320.81	2,324.77	-15.02	9.10	14.62	0.36	0.36	-1.16
2,350.00	1.53	321.67	2,349.76	-14.51	8.70	14.13	0.33	0.32	3.44
2,375.00	1.60	320.90	2,374.75	-13.98	8.27	13.61	0.29	0.28	-3.08
2,400.00	1.61	323.81	2,399.74	-13.42	7.84	13.08	0.33	0.04	11.64
2,425.00	1.70	324.60	2,424.73	-12.84	7.42	12.51	0.37	0.36	3.16



Nabors Drilling Solutions

Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 37H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Well:	19-30 37H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Survey API:300254565200	Database:	RyanUSA_32Bit

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
2,450.00	1.63	326.65	2,449.72	-12.24	7.01	11.93	0.37	-0.28	8.20	
2,475.00	1.65	329.60	2,474.71	-11.63	6.63	11.34	0.35	0.08	11.80	
2,500.00	1.66	328.60	2,499.70	-11.01	6.26	10.74	0.12	0.04	-4.00	
2,525.00	1.61	334.09	2,524.69	-10.38	5.92	10.13	0.66	-0.20	21.96	
2,550.00	1.56	340.33	2,549.68	-9.75	5.65	9.50	0.72	-0.20	24.96	
2,575.00	1.58	342.34	2,574.67	-9.10	5.43	8.86	0.23	0.08	8.04	
2,600.00	1.63	341.06	2,599.66	-8.43	5.21	8.21	0.25	0.20	-5.12	
2,625.00	1.60	343.38	2,624.65	-7.76	5.00	7.55	0.29	-0.12	9.28	
2,650.00	1.59	349.46	2,649.64	-7.09	4.83	6.88	0.68	-0.04	24.32	
2,675.00	1.60	353.48	2,674.63	-6.40	4.73	6.20	0.45	0.04	16.08	
2,700.00	1.62	355.50	2,699.62	-5.70	4.66	5.50	0.24	0.08	8.08	
2,725.00	1.65	357.47	2,724.61	-4.99	4.62	4.79	0.25	0.12	7.88	
2,750.00	1.68	359.21	2,749.60	-4.26	4.60	4.07	0.24	0.12	6.96	
2,775.00	1.69	2.16	2,774.59	-3.53	4.61	3.33	0.35	0.04	11.80	
2,800.00	1.68	8.01	2,799.58	-2.80	4.67	2.60	0.69	-0.04	23.40	
2,825.00	1.79	15.76	2,824.57	-2.06	4.83	1.85	1.04	0.44	31.00	
2,850.00	1.88	18.43	2,849.55	-1.29	5.07	1.08	0.50	0.36	10.68	
2,875.00	1.88	15.12	2,874.54	-0.51	5.30	0.28	0.43	0.00	-13.24	
2,900.00	1.86	14.47	2,899.53	0.28	5.51	-0.51	0.12	-0.08	-2.60	
2,925.00	1.84	15.01	2,924.51	1.06	5.72	-1.30	0.11	-0.08	2.16	
2,950.00	1.96	15.21	2,949.50	1.86	5.93	-2.11	0.48	0.48	0.80	
2,975.00	2.01	16.21	2,974.48	2.69	6.17	-2.95	0.24	0.20	4.00	
3,000.00	2.00	15.54	2,999.47	3.54	6.41	-3.80	0.10	-0.04	-2.68	
3,025.00	2.03	17.16	3,024.45	4.38	6.65	-4.66	0.26	0.12	6.48	
3,050.00	2.10	15.76	3,049.44	5.24	6.91	-5.53	0.35	0.28	-5.60	
3,075.00	2.22	14.63	3,074.42	6.15	7.16	-6.45	0.51	0.48	-4.52	
3,100.00	2.22	14.87	3,099.40	7.09	7.40	-7.39	0.04	0.00	0.96	
3,125.00	2.22	17.21	3,124.38	8.02	7.67	-8.34	0.36	0.00	9.36	
3,150.00	2.33	19.24	3,149.36	8.96	7.98	-9.29	0.55	0.44	8.12	
3,175.00	2.46	21.23	3,174.34	9.94	8.34	-10.28	0.62	0.52	7.96	
3,200.00	2.49	22.74	3,199.32	10.94	8.75	-11.30	0.29	0.12	6.04	
3,225.00	2.55	21.28	3,224.29	11.96	9.16	-12.34	0.35	0.24	-5.84	
3,250.00	2.54	21.69	3,249.27	12.99	9.56	-13.39	0.08	-0.04	1.64	
3,275.00	2.56	21.35	3,274.24	14.03	9.97	-14.44	0.10	0.08	-1.36	
3,300.00	2.26	24.11	3,299.22	15.00	10.38	-15.42	1.29	-1.20	11.04	
3,325.00	1.29	34.18	3,324.21	15.68	10.74	-16.12	4.06	-3.88	40.28	
3,350.00	0.86	40.88	3,349.21	16.06	11.02	-16.51	1.79	-1.72	26.80	
3,375.00	0.85	42.44	3,374.20	16.33	11.27	-16.80	0.10	-0.04	6.24	
3,400.00	0.91	43.71	3,399.20	16.62	11.53	-17.09	0.25	0.24	5.08	
3,425.00	1.05	41.56	3,424.20	16.93	11.82	-17.41	0.58	0.56	-8.60	
3,450.00	1.05	43.92	3,449.19	17.27	12.13	-17.76	0.17	0.00	9.44	
3,475.00	1.00	43.85	3,474.19	17.59	12.44	-18.10	0.20	-0.20	-0.28	
3,500.00	0.64	58.62	3,499.18	17.82	12.71	-18.34	1.66	-1.44	59.08	
3,525.00	0.49	125.71	3,524.18	17.83	12.91	-18.36	2.55	-0.60	268.36	



Nabors Drilling Solutions

Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 37H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Well:	19-30 37H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Survey API:300254565200	Database:	RyanUSA_32Bit

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
3,550.00	0.48	134.73	3,549.18	17.69	13.08	-18.23	0.31	-0.04	36.08
3,575.00	0.56	126.25	3,574.18	17.55	13.25	-18.09	0.44	0.32	-33.92
3,600.00	0.68	119.22	3,599.18	17.40	13.48	-17.96	0.57	0.48	-28.12
3,625.00	0.76	116.99	3,624.18	17.25	13.75	-17.82	0.34	0.32	-8.92
3,650.00	0.81	115.40	3,649.18	17.10	14.06	-17.68	0.22	0.20	-6.36
3,675.00	0.85	109.86	3,674.17	16.96	14.39	-17.56	0.36	0.16	-22.16
3,700.00	0.85	109.29	3,699.17	16.84	14.74	-17.45	0.03	0.00	-2.28
3,725.00	0.88	105.75	3,724.17	16.73	15.10	-17.35	0.25	0.12	-14.16
3,750.00	0.87	105.96	3,749.17	16.62	15.47	-17.26	0.04	-0.04	0.84
3,775.00	0.84	100.91	3,774.16	16.54	15.83	-17.19	0.32	-0.12	-20.20
3,800.00	0.89	98.92	3,799.16	16.47	16.21	-17.14	0.23	0.20	-7.96
3,825.00	0.87	98.16	3,824.16	16.41	16.59	-17.10	0.09	-0.08	-3.04
3,850.00	0.90	102.87	3,849.15	16.34	16.96	-17.05	0.31	0.12	18.84
3,875.00	0.87	102.41	3,874.15	16.26	17.34	-16.98	0.12	-0.12	-1.84
3,900.00	0.84	101.92	3,899.15	16.18	17.71	-16.91	0.12	-0.12	-1.96
3,925.00	0.86	98.51	3,924.14	16.11	18.07	-16.86	0.22	0.08	-13.64
3,950.00	0.86	97.58	3,949.14	16.06	18.44	-16.83	0.06	0.00	-3.72
3,975.00	0.85	97.38	3,974.14	16.01	18.81	-16.79	0.04	-0.04	-0.80
4,000.00	0.87	95.86	3,999.14	15.97	19.18	-16.77	0.12	0.08	-6.08
4,025.00	0.83	97.08	4,024.13	15.93	19.55	-16.74	0.18	-0.16	4.88
4,050.00	0.71	99.52	4,049.13	15.88	19.89	-16.71	0.50	-0.48	9.76
4,075.00	0.31	210.37	4,074.13	15.80	20.00	-16.63	3.48	-1.60	443.40
4,100.00	1.34	255.63	4,099.13	15.67	19.69	-16.48	4.57	4.12	181.04
4,125.00	1.66	260.35	4,124.12	15.53	19.05	-16.32	1.37	1.28	18.88
4,150.00	1.74	264.85	4,149.11	15.44	18.31	-16.20	0.62	0.32	18.00
4,175.00	1.77	263.58	4,174.10	15.36	17.55	-16.09	0.20	0.12	-5.08
4,200.00	1.80	262.98	4,199.08	15.27	16.78	-15.96	0.14	0.12	-2.40
4,225.00	1.85	269.48	4,224.07	15.22	15.98	-15.88	0.85	0.20	26.00
4,250.00	1.81	271.88	4,249.06	15.23	15.19	-15.85	0.35	-0.16	9.60
4,275.00	1.77	274.79	4,274.05	15.27	14.41	-15.87	0.40	-0.16	11.64
4,300.00	1.75	276.02	4,299.04	15.34	13.64	-15.91	0.17	-0.08	4.92
4,325.00	1.83	282.51	4,324.02	15.47	12.87	-16.00	0.87	0.32	25.96
4,350.00	1.83	284.43	4,349.01	15.66	12.10	-16.15	0.25	0.00	7.68
4,375.00	1.95	285.97	4,374.00	15.87	11.30	-16.34	0.52	0.48	6.16
4,400.00	1.84	284.39	4,398.98	16.09	10.50	-16.52	0.49	-0.44	-6.32
4,425.00	1.90	287.51	4,423.97	16.31	9.72	-16.71	0.47	0.24	12.48
4,450.00	1.88	289.17	4,448.96	16.57	8.94	-16.94	0.23	-0.08	6.64
4,475.00	1.74	287.54	4,473.94	16.82	8.19	-17.15	0.60	-0.56	-6.52
4,500.00	1.72	288.76	4,498.93	17.06	7.47	-17.36	0.17	-0.08	4.88
4,525.00	1.58	289.19	4,523.92	17.29	6.79	-17.56	0.56	-0.56	1.72
4,550.00	1.28	296.91	4,548.91	17.53	6.21	-17.78	1.42	-1.20	30.88
4,575.00	1.17	301.59	4,573.91	17.79	5.75	-18.02	0.59	-0.44	18.72
4,600.00	1.05	307.23	4,598.90	18.06	5.35	-18.27	0.65	-0.48	22.56



Nabors Drilling Solutions

Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 37H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Well:	19-30 37H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Survey API:300254565200	Database:	RyanUSA_32Bit

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
4,625.00	0.94	312.68	4,623.90	18.34	5.02	-18.54	0.58	-0.44	21.80
4,650.00	0.77	321.59	4,648.90	18.61	4.76	-18.80	0.86	-0.68	35.64
4,675.00	0.65	345.12	4,673.90	18.88	4.62	-19.06	1.25	-0.48	94.12
4,700.00	0.55	23.74	4,698.89	19.13	4.63	-19.31	1.63	-0.40	154.48
4,725.00	0.79	59.42	4,723.89	19.33	4.83	-19.51	1.88	0.96	142.72
4,750.00	1.06	70.95	4,748.89	19.49	5.20	-19.69	1.31	1.08	46.12
4,775.00	1.22	75.14	4,773.88	19.63	5.67	-19.85	0.72	0.64	16.76
4,800.00	1.20	73.27	4,798.88	19.78	6.18	-20.02	0.18	-0.08	-7.48
4,825.00	1.14	68.78	4,823.87	19.94	6.66	-20.21	0.44	-0.24	-17.96
4,850.00	1.12	17.92	4,848.87	20.26	6.97	-20.54	3.88	-0.08	-203.44
4,875.00	1.41	358.87	4,873.86	20.80	7.04	-21.08	2.03	1.16	-76.20
4,900.00	1.44	357.47	4,898.86	21.43	7.02	-21.70	0.18	0.12	-5.60
4,925.00	1.51	357.10	4,923.85	22.07	6.99	-22.34	0.28	0.28	-1.48
4,950.00	1.39	17.79	4,948.84	22.69	7.06	-22.96	2.14	-0.48	82.76
4,975.00	1.44	29.70	4,973.83	23.25	7.31	-23.54	1.19	0.20	47.64
5,000.00	1.42	38.15	4,998.82	23.76	7.66	-24.07	0.85	-0.08	33.80
5,025.00	1.40	46.94	5,023.82	24.22	8.07	-24.54	0.87	-0.08	35.16
5,050.00	1.24	52.71	5,048.81	24.59	8.51	-24.93	0.83	-0.64	23.08
5,075.00	0.22	102.78	5,073.81	24.74	8.77	-25.09	4.45	-4.08	200.28
5,100.00	0.85	204.62	5,098.81	24.56	8.74	-24.91	3.68	2.52	407.36
5,125.00	1.02	210.69	5,123.80	24.20	8.55	-24.54	0.79	0.68	24.28
5,150.00	0.98	205.19	5,148.80	23.82	8.35	-24.15	0.42	-0.16	-22.00
5,175.00	0.95	182.81	5,173.80	23.42	8.25	-23.74	1.50	-0.12	-89.52
5,200.00	0.93	174.80	5,198.79	23.01	8.25	-23.34	0.53	-0.08	-32.04
5,225.00	0.99	172.29	5,223.79	22.59	8.30	-22.92	0.29	0.24	-10.04
5,250.00	0.88	168.84	5,248.79	22.19	8.37	-22.52	0.49	-0.44	-13.80
5,275.00	0.74	169.55	5,273.78	21.84	8.43	-22.18	0.56	-0.56	2.84
5,300.00	0.71	161.39	5,298.78	21.54	8.51	-21.88	0.43	-0.12	-32.64
5,325.00	0.65	162.83	5,323.78	21.25	8.60	-21.60	0.25	-0.24	5.76
5,350.00	0.76	157.60	5,348.78	20.97	8.71	-21.32	0.51	0.44	-20.92
5,375.00	0.78	158.33	5,373.78	20.65	8.84	-21.01	0.09	0.08	2.92
5,400.00	0.52	219.74	5,398.77	20.41	8.83	-20.76	2.80	-1.04	245.64
5,425.00	1.77	283.13	5,423.77	20.41	8.38	-20.75	6.42	5.00	253.56
5,450.00	2.93	290.36	5,448.75	20.72	7.40	-21.01	4.78	4.64	28.92
5,475.00	3.29	290.76	5,473.71	21.20	6.13	-21.44	1.44	1.44	1.60
5,500.00	3.28	289.80	5,498.67	21.69	4.79	-21.88	0.22	-0.04	-3.84
5,525.00	3.18	289.25	5,523.63	22.16	3.46	-22.29	0.42	-0.40	-2.20
5,550.00	3.29	288.16	5,548.59	22.62	2.12	-22.69	0.50	0.44	-4.36
5,575.00	3.21	288.13	5,573.55	23.06	0.78	-23.07	0.32	-0.32	-0.12
5,600.00	3.08	288.83	5,598.51	23.49	-0.52	-23.45	0.54	-0.52	2.80
5,625.00	3.13	289.01	5,623.48	23.93	-1.80	-23.83	0.20	0.20	0.72
5,650.00	3.09	289.01	5,648.44	24.37	-3.09	-24.22	0.16	-0.16	0.00
5,675.00	3.01	289.62	5,673.40	24.81	-4.34	-24.61	0.35	-0.32	2.44



Nabors Drilling Solutions

Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 37H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Well:	19-30 37H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Survey API:300254565200	Database:	RyanUSA_32Bit

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
5,700.00	3.16	290.01	5,698.37	25.27	-5.61	-25.01	0.61	0.60	1.56
5,725.00	3.14	289.99	5,723.33	25.74	-6.90	-25.42	0.08	-0.08	-0.08
5,750.00	3.02	289.34	5,748.29	26.19	-8.16	-25.82	0.50	-0.48	-2.60
5,775.00	2.92	289.52	5,773.26	26.62	-9.38	-26.20	0.40	-0.40	0.72
5,800.00	2.91	289.74	5,798.23	27.05	-10.58	-26.58	0.06	-0.04	0.88
5,825.00	2.85	288.46	5,823.20	27.46	-11.77	-26.94	0.35	-0.24	-5.12
5,850.00	2.91	287.13	5,848.16	27.84	-12.97	-27.27	0.36	0.24	-5.32
5,875.00	2.89	287.69	5,873.13	28.22	-14.17	-27.60	0.14	-0.08	2.24
5,900.00	2.91	286.66	5,898.10	28.60	-15.38	-27.92	0.22	0.08	-4.12
5,925.00	2.82	284.12	5,923.07	28.93	-16.58	-28.20	0.62	-0.36	-10.16
5,950.00	2.67	284.54	5,948.04	29.22	-17.74	-28.45	0.61	-0.60	1.68
5,975.00	2.78	283.28	5,973.01	29.51	-18.90	-28.68	0.50	0.44	-5.04
6,000.00	4.20	276.29	5,997.97	29.75	-20.40	-28.86	5.92	5.68	-27.96
6,025.00	5.11	273.81	6,022.88	29.92	-22.42	-28.95	3.73	3.64	-9.92
6,050.00	5.61	273.97	6,047.77	30.08	-24.75	-29.01	2.00	2.00	0.64
6,075.00	5.57	274.06	6,072.65	30.25	-27.18	-29.08	0.16	-0.16	0.36
6,100.00	5.67	274.08	6,097.53	30.43	-29.62	-29.15	0.40	0.40	0.08
6,125.00	5.68	274.21	6,122.41	30.60	-32.09	-29.22	0.07	0.04	0.52
6,150.00	5.68	273.13	6,147.29	30.76	-34.56	-29.28	0.43	0.00	-4.32
6,175.00	5.63	272.69	6,172.17	30.89	-37.02	-29.30	0.26	-0.20	-1.76
6,200.00	5.64	272.70	6,197.05	31.00	-39.47	-29.31	0.04	0.04	0.04
6,225.00	5.68	272.84	6,221.92	31.12	-41.93	-29.32	0.17	0.16	0.56
6,250.00	5.72	272.62	6,246.80	31.24	-44.41	-29.34	0.18	0.16	-0.88
6,275.00	5.46	272.02	6,271.68	31.34	-46.84	-29.33	1.07	-1.04	-2.40
6,300.00	5.27	270.73	6,296.57	31.40	-49.18	-29.29	0.90	-0.76	-5.16
6,325.00	5.11	270.39	6,321.47	31.42	-51.44	-29.22	0.65	-0.64	-1.36
6,350.00	5.08	270.24	6,346.37	31.43	-53.66	-29.14	0.13	-0.12	-0.60
6,375.00	4.87	270.17	6,371.28	31.44	-55.83	-29.05	0.84	-0.84	-0.28
6,400.00	4.69	270.37	6,396.19	31.45	-57.91	-28.97	0.72	-0.72	0.80
6,425.00	4.66	270.56	6,421.11	31.46	-59.95	-28.91	0.14	-0.12	0.76
6,450.00	4.65	271.22	6,446.02	31.50	-61.98	-28.85	0.22	-0.04	2.64
6,475.00	4.58	271.68	6,470.94	31.55	-63.99	-28.82	0.32	-0.28	1.84
6,500.00	4.49	271.73	6,495.87	31.61	-65.97	-28.79	0.36	-0.36	0.20
6,525.00	4.47	271.34	6,520.79	31.66	-67.92	-28.76	0.15	-0.08	-1.56
6,550.00	4.41	271.55	6,545.71	31.71	-69.85	-28.73	0.25	-0.24	0.84
6,575.00	4.36	271.58	6,570.64	31.76	-71.76	-28.70	0.20	-0.20	0.12
6,600.00	4.28	271.23	6,595.57	31.81	-73.65	-28.67	0.34	-0.32	-1.40
6,625.00	4.30	271.55	6,620.50	31.85	-75.52	-28.63	0.12	0.08	1.28
6,650.00	4.22	270.82	6,645.43	31.89	-77.37	-28.59	0.39	-0.32	-2.92
6,675.00	4.24	269.95	6,670.36	31.90	-79.22	-28.53	0.27	0.08	-3.48
6,700.00	4.06	270.13	6,695.30	31.90	-81.03	-28.45	0.72	-0.72	0.72
6,725.00	4.05	270.18	6,720.23	31.91	-82.79	-28.38	0.04	-0.04	0.20
6,750.00	3.98	270.43	6,745.17	31.92	-84.54	-28.32	0.29	-0.28	1.00
6,775.00	3.92	272.25	6,770.11	31.96	-86.27	-28.29	0.56	-0.24	7.28



Nabors Drilling Solutions

Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 37H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Well:	19-30 37H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Survey API:300254565200	Database:	RyanUSA_32Bit

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
6,800.00	3.97	272.53	6,795.05	32.03	-87.98	-28.29	0.21	0.20	1.12
6,825.00	3.94	271.58	6,819.99	32.09	-89.71	-28.27	0.29	-0.12	-3.80
6,850.00	3.94	271.86	6,844.94	32.14	-91.42	-28.25	0.08	0.00	1.12
6,875.00	4.00	270.94	6,869.88	32.18	-93.15	-28.22	0.35	0.24	-3.68
6,900.00	3.93	271.04	6,894.82	32.21	-94.88	-28.18	0.28	-0.28	0.40
6,925.00	3.89	272.31	6,919.76	32.26	-96.59	-28.16	0.38	-0.16	5.08
6,950.00	4.36	286.07	6,944.69	32.56	-98.35	-28.38	4.37	1.88	55.04
6,975.00	4.72	291.07	6,969.61	33.19	-100.22	-28.93	2.14	1.44	20.00
7,000.00	4.84	292.28	6,994.53	33.96	-102.16	-29.62	0.63	0.48	4.84
7,025.00	4.94	291.86	7,019.44	34.76	-104.13	-30.34	0.42	0.40	-1.68
7,050.00	4.86	291.25	7,044.35	35.55	-106.12	-31.04	0.38	-0.32	-2.44
7,075.00	4.82	291.48	7,069.26	36.32	-108.08	-31.72	0.18	-0.16	0.92
7,100.00	4.69	290.65	7,094.17	37.06	-110.01	-32.38	0.59	-0.52	-3.32
7,125.00	4.54	290.94	7,119.09	37.78	-111.90	-33.02	0.61	-0.60	1.16
7,150.00	4.52	292.15	7,144.01	38.50	-113.73	-33.66	0.39	-0.08	4.84
7,175.00	4.47	292.29	7,168.93	39.24	-115.55	-34.33	0.20	-0.20	0.56
7,200.00	4.43	290.97	7,193.86	39.96	-117.35	-34.97	0.44	-0.16	-5.28
7,225.00	4.32	290.84	7,218.79	40.64	-119.13	-35.57	0.44	-0.44	-0.52
7,250.00	4.13	290.92	7,243.72	41.29	-120.85	-36.15	0.76	-0.76	0.32
7,275.00	4.09	291.42	7,268.65	41.94	-122.52	-36.73	0.21	-0.16	2.00
7,300.00	4.06	292.24	7,293.59	42.60	-124.17	-37.32	0.26	-0.12	3.28
7,325.00	3.88	292.20	7,318.53	43.26	-125.77	-37.91	0.72	-0.72	-0.16
7,350.00	3.83	290.72	7,343.47	43.87	-127.34	-38.46	0.45	-0.20	-5.92
7,375.00	3.54	288.51	7,368.42	44.41	-128.85	-38.93	1.29	-1.16	-8.84
7,400.00	3.36	289.08	7,393.38	44.90	-130.27	-39.36	0.73	-0.72	2.28
7,425.00	3.45	290.25	7,418.33	45.40	-131.67	-39.80	0.45	0.36	4.68
7,450.00	3.51	290.00	7,443.29	45.92	-133.10	-40.26	0.25	0.24	-1.00
7,475.00	3.55	288.28	7,468.24	46.42	-134.55	-40.70	0.45	0.16	-6.88
7,500.00	3.60	287.31	7,493.19	46.90	-136.04	-41.11	0.31	0.20	-3.88
7,525.00	4.27	284.72	7,518.13	47.37	-137.69	-41.51	2.77	2.68	-10.36
7,550.00	4.65	284.16	7,543.06	47.85	-139.57	-41.92	1.53	1.52	-2.24
7,575.00	4.81	284.84	7,567.97	48.37	-141.56	-42.35	0.68	0.64	2.72
7,600.00	4.91	283.89	7,592.88	48.90	-143.62	-42.79	0.51	0.40	-3.80
7,625.00	4.83	282.69	7,617.79	49.38	-145.68	-43.19	0.52	-0.32	-4.80
7,650.00	4.68	283.41	7,642.70	49.85	-147.70	-43.57	0.65	-0.60	2.88
7,675.00	4.52	282.87	7,667.62	50.31	-149.65	-43.94	0.66	-0.64	-2.16
7,700.00	4.32	283.40	7,692.55	50.74	-151.53	-44.30	0.82	-0.80	2.12
7,725.00	4.44	283.89	7,717.48	51.20	-153.38	-44.67	0.50	0.48	1.96
7,750.00	4.40	283.43	7,742.40	51.65	-155.26	-45.05	0.21	-0.16	-1.84
7,775.00	4.17	283.95	7,767.33	52.09	-157.07	-45.41	0.93	-0.92	2.08
7,800.00	4.13	281.81	7,792.27	52.50	-158.83	-45.74	0.64	-0.16	-8.56
7,825.00	3.98	282.92	7,817.20	52.87	-160.56	-46.05	0.68	-0.60	4.44
7,850.00	3.87	283.42	7,842.15	53.26	-162.23	-46.37	0.46	-0.44	2.00



Nabors Drilling Solutions

Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 37H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Well:	19-30 37H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Survey API:300254565200	Database:	RyanUSA_32Bit

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
7,875.00	3.80	282.64	7,867.09	53.64	-163.86	-46.67	0.35	-0.28	-3.12
7,900.00	3.81	282.85	7,892.03	54.01	-165.47	-46.97	0.07	0.04	0.84
7,925.00	3.80	281.08	7,916.98	54.35	-167.10	-47.25	0.47	-0.04	-7.08
7,950.00	3.67	280.30	7,941.93	54.65	-168.70	-47.48	0.56	-0.52	-3.12
7,975.00	3.65	282.01	7,966.88	54.96	-170.26	-47.72	0.44	-0.08	6.84
8,000.00	3.67	281.64	7,991.82	55.29	-171.83	-47.98	0.12	0.08	-1.48
8,025.00	3.71	281.34	8,016.77	55.61	-173.40	-48.24	0.18	0.16	-1.20
8,050.00	3.77	281.74	8,041.72	55.94	-175.00	-48.50	0.26	0.24	1.60
8,075.00	3.60	283.40	8,066.67	56.28	-176.57	-48.78	0.80	-0.68	6.64
8,100.00	3.85	293.90	8,091.62	56.81	-178.10	-49.24	2.90	1.00	42.00
8,125.00	3.89	296.48	8,116.56	57.52	-179.63	-49.89	0.71	0.16	10.32
8,150.00	3.83	296.87	8,141.50	58.28	-181.13	-50.58	0.26	-0.24	1.56
8,175.00	3.87	297.23	8,166.45	59.04	-182.62	-51.28	0.19	0.16	1.44
8,200.00	3.79	297.57	8,191.39	59.81	-184.11	-51.98	0.33	-0.32	1.36
8,225.00	3.39	295.05	8,216.34	60.51	-185.51	-52.62	1.72	-1.60	-10.08
8,250.00	3.38	295.50	8,241.30	61.14	-186.84	-53.19	0.11	-0.04	1.80
8,275.00	3.50	298.69	8,266.25	61.82	-188.18	-53.82	0.90	0.48	12.76
8,300.00	3.59	303.52	8,291.20	62.62	-189.50	-54.56	1.25	0.36	19.32
8,325.00	3.89	306.73	8,316.15	63.56	-190.83	-55.44	1.46	1.20	12.84
8,350.00	3.85	304.33	8,341.09	64.54	-192.20	-56.37	0.67	-0.16	-9.60
8,375.00	3.74	307.41	8,366.04	65.51	-193.55	-57.28	0.93	-0.44	12.32
8,400.00	3.52	305.92	8,390.99	66.45	-194.81	-58.17	0.96	-0.88	-5.96
8,425.00	3.44	304.71	8,415.94	67.33	-196.05	-58.99	0.43	-0.32	-4.84
8,450.00	3.51	305.25	8,440.90	68.20	-197.29	-59.81	0.31	0.28	2.16
8,475.00	3.88	300.12	8,465.84	69.07	-198.65	-60.62	1.98	1.48	-20.52
8,500.00	4.16	297.20	8,490.78	69.90	-200.19	-61.39	1.39	1.12	-11.68
8,525.00	4.38	295.85	8,515.71	70.74	-201.85	-62.15	0.97	0.88	-5.40
8,550.00	4.20	296.22	8,540.64	71.56	-203.54	-62.90	0.73	-0.72	1.48
8,575.00	4.18	294.64	8,565.58	72.34	-205.18	-63.61	0.47	-0.08	-6.32
8,600.00	3.91	295.20	8,590.51	73.08	-206.78	-64.29	1.09	-1.08	2.24
8,625.00	3.75	295.00	8,615.46	73.79	-208.30	-64.93	0.64	-0.64	-0.80
8,650.00	3.87	294.61	8,640.40	74.49	-209.80	-65.56	0.49	0.48	-1.56
8,675.00	4.17	291.38	8,665.34	75.17	-211.42	-66.18	1.50	1.20	-12.92
8,700.00	4.60	289.56	8,690.27	75.84	-213.21	-66.77	1.81	1.72	-7.28
8,725.00	4.76	289.77	8,715.19	76.52	-215.13	-67.37	0.64	0.64	0.84
8,750.00	4.76	289.52	8,740.10	77.22	-217.08	-67.99	0.08	0.00	-1.00
8,775.00	4.57	288.91	8,765.02	77.89	-219.00	-68.58	0.79	-0.76	-2.44
8,800.00	4.38	287.19	8,789.94	78.50	-220.86	-69.10	0.93	-0.76	-6.88
8,825.00	4.27	288.03	8,814.87	79.07	-222.65	-69.59	0.51	-0.44	3.36
8,850.00	5.03	285.41	8,839.79	79.65	-224.60	-70.09	3.16	3.04	-10.48
8,875.00	5.95	286.54	8,864.67	80.31	-226.89	-70.65	3.71	3.68	4.52
8,900.00	6.63	287.48	8,889.52	81.11	-229.51	-71.35	2.75	2.72	3.76
8,925.00	6.56	286.75	8,914.36	81.95	-232.26	-72.07	0.44	-0.28	-2.92



Nabors Drilling Solutions

Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 37H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Well:	19-30 37H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Survey API:300254565200	Database:	RyanUSA_32Bit

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
8,950.00	6.59	287.34	8,939.19	82.79	-234.99	-72.80	0.30	0.12	2.36
8,975.00	6.24	287.06	8,964.03	83.62	-237.66	-73.51	1.41	-1.40	-1.12
9,000.00	5.92	286.81	8,988.89	84.39	-240.20	-74.17	1.28	-1.28	-1.00
9,025.00	5.64	287.89	9,013.77	85.14	-242.60	-74.82	1.20	-1.12	4.32
9,050.00	5.62	286.71	9,038.65	85.87	-244.94	-75.45	0.47	-0.08	-4.72
9,075.00	5.52	286.95	9,063.53	86.57	-247.26	-76.05	0.41	-0.40	0.96
9,100.00	5.50	286.57	9,088.41	87.26	-249.56	-76.65	0.17	-0.08	-1.52
9,125.00	5.30	286.70	9,113.30	87.94	-251.82	-77.23	0.80	-0.80	0.52
9,150.00	5.06	285.73	9,138.20	88.57	-253.98	-77.77	1.02	-0.96	-3.88
9,175.00	4.87	285.25	9,163.11	89.15	-256.07	-78.26	0.78	-0.76	-1.92
9,200.00	4.52	286.63	9,188.02	89.71	-258.04	-78.73	1.47	-1.40	5.52
9,225.00	4.40	285.81	9,212.95	90.25	-259.90	-79.20	0.54	-0.48	-3.28
9,250.00	4.20	285.87	9,237.88	90.76	-261.71	-79.63	0.80	-0.80	0.24
9,275.00	4.26	286.50	9,262.81	91.28	-263.48	-80.07	0.30	0.24	2.52
9,300.00	4.23	284.86	9,287.74	91.78	-265.26	-80.49	0.50	-0.12	-6.56
9,325.00	4.35	286.74	9,312.67	92.29	-267.06	-80.93	0.74	0.48	7.52
9,350.00	4.48	287.71	9,337.59	92.86	-268.89	-81.42	0.60	0.52	3.88
9,375.00	4.73	287.76	9,362.51	93.47	-270.81	-81.95	1.00	1.00	0.20
9,400.00	4.53	288.93	9,387.43	94.10	-272.72	-82.50	0.88	-0.80	4.68
9,425.00	4.02	289.55	9,412.36	94.72	-274.48	-83.04	2.05	-2.04	2.48
9,450.00	3.65	290.96	9,437.31	95.29	-276.05	-83.55	1.53	-1.48	5.64
9,475.00	3.59	291.41	9,462.26	95.86	-277.52	-84.06	0.27	-0.24	1.80
9,500.00	3.02	289.24	9,487.22	96.37	-278.87	-84.51	2.33	-2.28	-8.68
9,525.00	2.74	291.45	9,512.18	96.80	-280.05	-84.89	1.20	-1.12	8.84
9,550.00	2.71	291.99	9,537.16	97.24	-281.16	-85.28	0.16	-0.12	2.16
9,575.00	2.40	289.31	9,562.13	97.64	-282.20	-85.63	1.33	-1.24	-10.72
9,600.00	2.28	290.61	9,587.11	97.99	-283.16	-85.94	0.52	-0.48	5.20
9,625.00	2.11	290.59	9,612.09	98.32	-284.05	-86.24	0.68	-0.68	-0.08
9,650.00	1.99	287.59	9,637.08	98.62	-284.90	-86.50	0.64	-0.48	-12.00
9,675.00	1.95	288.33	9,662.06	98.88	-285.71	-86.73	0.19	-0.16	2.96
9,700.00	1.82	287.76	9,687.05	99.13	-286.50	-86.95	0.53	-0.52	-2.28
9,725.00	1.63	287.63	9,712.04	99.36	-287.21	-87.15	0.76	-0.76	-0.52
9,750.00	1.64	293.01	9,737.03	99.61	-287.88	-87.37	0.62	0.04	21.52
9,775.00	1.57	290.48	9,762.02	99.87	-288.53	-87.60	0.40	-0.28	-10.12
9,800.00	1.46	291.52	9,787.01	100.11	-289.15	-87.81	0.45	-0.44	4.16
9,825.00	1.41	290.25	9,812.00	100.33	-289.73	-88.01	0.24	-0.20	-5.08
9,850.00	1.20	290.15	9,836.99	100.53	-290.27	-88.18	0.84	-0.84	-0.40
9,875.00	1.28	290.16	9,861.99	100.71	-290.78	-88.35	0.32	0.32	0.04
9,900.00	1.25	288.77	9,886.98	100.90	-291.30	-88.51	0.17	-0.12	-5.56
9,925.00	1.33	291.14	9,911.97	101.09	-291.83	-88.68	0.38	0.32	9.48
9,950.00	1.31	292.35	9,936.97	101.30	-292.36	-88.87	0.14	-0.08	4.84
9,975.00	1.19	288.28	9,961.96	101.49	-292.87	-89.04	0.60	-0.48	-16.28
10,000.00	1.18	290.74	9,986.96	101.67	-293.36	-89.19	0.21	-0.04	9.84
10,025.00	1.26	291.15	10,011.95	101.86	-293.86	-89.36	0.32	0.32	1.64



Nabors Drilling Solutions

Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 37H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Well:	19-30 37H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Survey API:300254565200	Database:	RyanUSA_32Bit

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
10,050.00	1.28	294.64	10,036.94	102.07	-294.37	-89.55	0.32	0.08	13.96
10,075.00	1.27	293.53	10,061.94	102.30	-294.87	-89.76	0.11	-0.04	-4.44
10,100.00	1.28	292.20	10,086.93	102.52	-295.39	-89.95	0.12	0.04	-5.32
10,125.00	1.33	289.51	10,111.93	102.72	-295.92	-90.13	0.32	0.20	-10.76
10,150.00	1.28	293.99	10,136.92	102.93	-296.45	-90.32	0.45	-0.20	17.92
10,175.00	1.31	291.84	10,161.91	103.15	-296.97	-90.52	0.23	0.12	-8.60
10,200.00	1.41	291.87	10,186.91	103.37	-297.52	-90.71	0.40	0.40	0.12
10,225.00	1.35	289.00	10,211.90	103.58	-298.08	-90.90	0.37	-0.24	-11.48
10,250.00	1.23	287.88	10,236.89	103.76	-298.62	-91.06	0.49	-0.48	-4.48
10,275.00	1.21	295.58	10,261.89	103.95	-299.11	-91.23	0.66	-0.08	30.80
10,300.00	1.31	293.85	10,286.88	104.18	-299.61	-91.44	0.43	0.40	-6.92
10,325.00	1.14	291.74	10,311.87	104.39	-300.10	-91.63	0.70	-0.68	-8.44
10,350.00	1.08	291.11	10,336.87	104.57	-300.55	-91.78	0.24	-0.24	-2.52
10,375.00	1.02	297.70	10,361.87	104.76	-300.97	-91.95	0.54	-0.24	26.36
10,400.00	0.82	310.70	10,386.86	104.98	-301.30	-92.16	1.15	-0.80	52.00
10,425.00	0.95	334.31	10,411.86	105.28	-301.53	-92.45	1.54	0.52	94.44
10,450.00	1.04	353.98	10,436.86	105.69	-301.64	-92.86	1.41	0.36	78.68
10,475.00	0.96	359.70	10,461.85	106.13	-301.66	-93.30	0.51	-0.32	22.88
10,500.00	1.02	357.82	10,486.85	106.56	-301.67	-93.73	0.27	0.24	-7.52
10,525.00	0.96	349.30	10,511.84	106.99	-301.72	-94.15	0.64	-0.24	-34.08
10,550.00	1.21	321.72	10,536.84	107.40	-301.92	-94.56	2.29	1.00	-110.32
10,575.00	2.04	299.53	10,561.83	107.83	-302.47	-94.96	4.11	3.32	-88.76
10,600.00	2.36	296.15	10,586.81	108.27	-303.32	-95.37	1.38	1.28	-13.52
10,625.00	2.46	296.77	10,611.79	108.74	-304.27	-95.80	0.41	0.40	2.48
10,650.00	2.38	297.52	10,636.77	109.22	-305.20	-96.24	0.34	-0.32	3.00
10,675.00	2.00	292.73	10,661.75	109.63	-306.07	-96.61	1.69	-1.52	-19.16
10,700.00	1.95	286.18	10,686.73	109.92	-306.88	-96.86	0.92	-0.20	-26.20
10,725.00	1.86	287.12	10,711.72	110.16	-307.67	-97.07	0.38	-0.36	3.76
10,750.00	1.91	284.73	10,736.71	110.38	-308.46	-97.26	0.37	0.20	-9.56
10,775.00	2.05	284.91	10,761.69	110.60	-309.30	-97.44	0.56	0.56	0.72
10,800.00	2.07	284.62	10,786.68	110.83	-310.17	-97.64	0.09	0.08	-1.16
10,825.00	2.08	285.27	10,811.66	111.07	-311.04	-97.83	0.10	0.04	2.60
10,850.00	1.69	296.62	10,836.65	111.35	-311.81	-98.08	2.15	-1.56	45.40
10,875.00	1.24	302.11	10,861.64	111.66	-312.37	-98.37	1.88	-1.80	21.96
10,900.00	1.05	306.87	10,886.63	111.94	-312.78	-98.63	0.85	-0.76	19.04
10,925.00	0.86	304.22	10,911.63	112.18	-313.12	-98.86	0.78	-0.76	-10.60
10,950.00	0.75	304.11	10,936.63	112.38	-313.41	-99.05	0.44	-0.44	-0.44
10,975.00	0.72	304.88	10,961.62	112.56	-313.68	-99.22	0.13	-0.12	3.08
11,000.00	0.63	303.01	10,986.62	112.73	-313.92	-99.37	0.37	-0.36	-7.48
11,025.00	0.48	301.58	11,011.62	112.86	-314.12	-99.49	0.60	-0.60	-5.72
11,050.00	0.34	286.30	11,036.62	112.93	-314.28	-99.56	0.71	-0.56	-61.12
11,075.00	0.22	234.96	11,061.62	112.93	-314.39	-99.55	1.06	-0.48	-205.36
11,100.00	0.33	205.08	11,086.62	112.83	-314.46	-99.45	0.71	0.44	-119.52



Nabors Drilling Solutions

Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 37H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Well:	19-30 37H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Survey API:300254565200	Database:	RyanUSA_32Bit

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
11,125.00	0.83	205.79	11,111.62	112.60	-314.57	-99.22	2.00	2.00	2.84
11,150.00	1.13	203.75	11,136.62	112.22	-314.75	-98.83	1.21	1.20	-8.16
11,175.00	1.22	203.88	11,161.61	111.75	-314.96	-98.35	0.36	0.36	0.52
11,200.00	1.39	203.52	11,186.60	111.23	-315.19	-97.82	0.68	0.68	-1.44
11,225.00	1.36	198.65	11,211.60	110.67	-315.40	-97.25	0.48	-0.12	-19.48
11,250.00	1.35	196.15	11,236.59	110.10	-315.58	-96.68	0.24	-0.04	-10.00
11,275.00	1.34	190.30	11,261.58	109.53	-315.71	-96.10	0.55	-0.04	-23.40
11,300.00	1.42	185.56	11,286.58	108.94	-315.80	-95.50	0.56	0.32	-18.96
11,325.00	1.44	188.89	11,311.57	108.32	-315.88	-94.88	0.34	0.08	13.32
11,350.00	1.43	181.66	11,336.56	107.69	-315.93	-94.26	0.72	-0.04	-28.92
11,375.00	1.46	179.26	11,361.55	107.06	-315.94	-93.63	0.27	0.12	-9.60
11,400.00	1.49	176.78	11,386.54	106.42	-315.92	-92.99	0.28	0.12	-9.92
11,425.00	1.65	176.80	11,411.53	105.74	-315.88	-92.31	0.64	0.64	0.08
11,450.00	1.72	179.90	11,436.52	105.00	-315.86	-91.57	0.46	0.28	12.40
11,475.00	1.60	177.25	11,461.51	104.28	-315.84	-90.85	0.57	-0.48	-10.60
11,500.00	1.17	171.13	11,486.51	103.68	-315.78	-90.25	1.82	-1.72	-24.48
11,525.00	0.67	129.64	11,511.50	103.33	-315.63	-89.91	3.21	-2.00	-165.96
11,550.00	0.90	88.98	11,536.50	103.24	-315.32	-89.84	2.35	0.92	-162.64
11,575.00	1.28	84.45	11,561.50	103.27	-314.85	-89.89	1.56	1.52	-18.12
11,600.00	1.57	89.06	11,586.49	103.31	-314.23	-89.95	1.25	1.16	18.44
11,625.00	1.92	96.62	11,611.48	103.26	-313.47	-89.94	1.67	1.40	30.24
11,650.00	2.02	97.15	11,636.46	103.16	-312.62	-89.87	0.41	0.40	2.12
11,740.84	2.03	100.44	11,727.25	102.67	-309.44	-89.51	0.13	0.01	3.62
11,934.00	1.62	66.12	11,920.31	103.16	-303.58	-90.24	0.59	-0.21	-17.77
11,966.00	1.73	50.38	11,952.30	103.65	-302.80	-90.77	1.47	0.34	-49.19
11,997.00	1.92	18.64	11,983.28	104.44	-302.27	-91.58	3.27	0.61	-102.39
12,029.00	1.90	15.26	12,015.27	105.46	-301.96	-92.61	0.36	-0.06	-10.56
12,061.00	2.04	7.73	12,047.25	106.53	-301.74	-93.70	0.92	0.44	-23.53
12,092.00	1.51	356.28	12,078.23	107.49	-301.70	-94.65	2.05	-1.71	-36.94
12,123.00	2.72	210.42	12,109.22	107.26	-302.10	-94.41	13.09	3.90	-470.52
12,155.00	4.75	212.74	12,141.15	105.49	-303.20	-92.59	6.36	6.34	7.25
12,186.00	4.59	208.57	12,172.05	103.32	-304.48	-90.37	1.21	-0.52	-13.45
12,218.00	4.02	209.34	12,203.96	101.22	-305.65	-88.22	1.79	-1.78	2.41
12,250.00	3.51	185.71	12,235.89	99.27	-306.29	-86.25	5.06	-1.59	-73.84
12,282.00	3.76	181.20	12,267.83	97.24	-306.41	-84.22	1.19	0.78	-14.09
12,313.00	4.16	174.54	12,298.75	95.11	-306.33	-82.09	1.96	1.29	-21.48
12,345.00	3.97	177.73	12,330.67	92.85	-306.17	-79.83	0.92	-0.59	9.97
12,376.00	3.48	201.93	12,361.61	90.90	-306.48	-77.88	5.27	-1.58	78.06
12,408.00	6.48	210.51	12,393.49	88.44	-307.76	-75.37	9.63	9.38	26.81
12,439.00	7.12	212.28	12,424.27	85.31	-309.68	-72.16	2.17	2.06	5.71
12,461.00	8.55	199.62	12,446.06	82.62	-310.95	-69.41	10.15	6.50	-57.55
12,493.00	14.16	200.15	12,477.42	76.70	-313.10	-63.41	17.53	17.53	1.66
12,524.00	18.94	196.40	12,507.13	68.31	-315.83	-54.91	15.79	15.42	-12.10



Nabors Drilling Solutions

Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 37H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Well:	19-30 37H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Survey API:300254565200	Database:	RyanUSA_32Bit

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
12,556.00	25.41	192.55	12,536.75	56.61	-318.79	-43.10	20.71	20.22	-12.03
12,587.00	32.21	191.49	12,563.90	42.01	-321.89	-28.38	22.00	21.94	-3.42
12,619.00	37.93	189.35	12,590.08	23.93	-325.19	-10.18	18.28	17.88	-6.69
12,651.00	43.54	190.11	12,614.32	3.36	-328.72	10.53	17.60	17.53	2.38
12,682.00	50.40	190.84	12,635.46	-18.91	-332.85	32.95	22.20	22.13	2.35
12,714.00	58.48	189.61	12,654.05	-44.51	-337.45	58.72	25.44	25.25	-3.84
12,746.00	63.53	189.15	12,669.56	-72.12	-342.01	86.49	15.83	15.78	-1.44
12,778.00	69.12	189.60	12,682.40	-101.02	-346.78	115.57	17.52	17.47	1.41
12,809.00	77.41	189.94	12,691.32	-130.25	-351.82	144.99	26.76	26.74	1.10
12,841.00	85.36	189.62	12,696.11	-161.41	-357.19	176.34	24.86	24.84	-1.00
12,873.00	88.15	185.33	12,697.92	-193.07	-361.34	208.16	15.97	8.72	-13.41
12,968.00	90.02	184.73	12,699.44	-287.69	-369.67	303.04	2.07	1.97	-0.63
13,063.00	90.03	182.93	12,699.40	-382.47	-376.01	398.01	1.89	0.01	-1.89
13,158.00	90.03	182.62	12,699.35	-477.36	-380.61	493.01	0.33	0.00	-0.33
13,253.00	88.73	181.94	12,700.38	-572.28	-384.39	588.00	1.54	-1.37	-0.72
13,348.00	90.05	183.99	12,701.39	-667.14	-389.30	682.98	2.57	1.39	2.16
13,442.00	91.12	183.46	12,700.43	-760.93	-395.41	776.95	1.27	1.14	-0.56
13,537.00	91.61	180.27	12,698.17	-855.84	-398.50	871.91	3.40	0.52	-3.36
13,632.00	92.44	179.14	12,694.81	-950.78	-398.01	966.74	1.48	0.87	-1.19
13,727.00	89.54	178.37	12,693.17	-1,045.73	-395.95	1,061.52	3.16	-3.05	-0.81
13,821.00	87.78	176.97	12,695.37	-1,139.62	-392.13	1,155.17	2.39	-1.87	-1.49
13,916.00	86.60	175.57	12,700.02	-1,234.31	-385.96	1,249.50	1.93	-1.24	-1.47
14,011.00	88.42	176.38	12,704.15	-1,328.98	-379.30	1,343.81	2.10	1.92	0.85
14,105.00	89.39	177.15	12,705.95	-1,422.81	-373.99	1,437.33	1.32	1.03	0.82
14,201.00	90.00	178.86	12,706.46	-1,518.74	-370.65	1,533.04	1.89	0.64	1.78
14,295.00	90.86	179.73	12,705.75	-1,612.73	-369.49	1,626.90	1.30	0.91	0.93
14,390.00	91.26	179.71	12,704.00	-1,707.72	-369.03	1,721.77	0.42	0.42	-0.02
14,485.00	91.44	180.12	12,701.76	-1,802.69	-368.89	1,816.66	0.47	0.19	0.43
14,579.00	91.46	180.42	12,699.38	-1,896.66	-369.33	1,910.56	0.32	0.02	0.32
14,673.00	91.20	180.42	12,697.20	-1,990.63	-370.02	2,004.48	0.28	-0.28	0.00
14,769.00	90.89	180.24	12,695.45	-2,086.61	-370.57	2,100.40	0.37	-0.32	-0.19
14,864.00	91.15	180.96	12,693.76	-2,181.59	-371.57	2,195.33	0.81	0.27	0.76
14,958.00	92.79	185.28	12,690.52	-2,275.37	-376.68	2,289.25	4.91	1.74	4.60
15,052.00	90.20	183.09	12,688.07	-2,369.07	-383.53	2,383.16	3.61	-2.76	-2.33
15,147.00	89.54	182.23	12,688.29	-2,463.97	-387.94	2,478.15	1.14	-0.69	-0.91
15,242.00	89.57	181.79	12,689.02	-2,558.91	-391.27	2,573.15	0.46	0.03	-0.46
15,337.00	88.65	179.12	12,690.50	-2,653.89	-392.03	2,668.07	2.97	-0.97	-2.81
15,432.00	88.68	178.50	12,692.71	-2,748.84	-390.06	2,762.86	0.65	0.03	-0.65
15,527.00	88.19	177.91	12,695.31	-2,843.76	-387.08	2,857.56	0.81	-0.52	-0.62
15,622.00	89.14	179.76	12,697.52	-2,938.71	-385.15	2,952.35	2.19	1.00	1.95
15,717.00	90.66	181.90	12,697.69	-3,033.69	-386.53	3,047.30	2.76	1.60	2.25
15,811.00	88.65	180.05	12,698.25	-3,127.66	-388.13	3,141.26	2.91	-2.14	-1.97
15,906.00	88.47	179.81	12,700.64	-3,222.63	-388.01	3,236.14	0.32	-0.19	-0.25
16,001.00	90.54	181.47	12,701.46	-3,317.61	-389.07	3,331.08	2.79	2.18	1.75



Nabors Drilling Solutions

Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 37H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Well:	19-30 37H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Survey API:300254565200	Database:	RyanUSA_32Bit

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
16,096.00	91.38	180.53	12,699.87	-3,412.58	-390.73	3,426.04	1.33	0.88	-0.99
16,190.00	91.29	178.70	12,697.68	-3,506.55	-390.10	3,519.90	1.95	-0.10	-1.95
16,285.00	89.34	176.93	12,697.16	-3,601.47	-386.48	3,614.58	2.77	-2.05	-1.86
16,379.00	91.00	179.74	12,696.88	-3,695.42	-383.75	3,708.33	3.47	1.77	2.99
16,474.00	91.81	179.94	12,694.55	-3,790.39	-383.48	3,803.20	0.88	0.85	0.21
16,570.00	89.77	177.75	12,693.22	-3,886.35	-381.55	3,899.00	3.12	-2.13	-2.28
16,665.00	88.85	178.00	12,694.37	-3,981.28	-378.02	3,993.69	1.00	-0.97	0.26
16,760.00	89.05	175.73	12,696.11	-4,076.11	-372.83	4,088.22	2.40	0.21	-2.39
16,855.00	88.65	175.37	12,698.02	-4,170.81	-365.46	4,182.52	0.57	-0.42	-0.38
16,950.00	88.36	177.04	12,700.49	-4,265.56	-359.17	4,276.93	1.78	-0.31	1.76
17,045.00	90.03	177.49	12,701.83	-4,360.44	-354.64	4,371.53	1.82	1.76	0.47
17,140.00	92.90	181.05	12,699.40	-4,455.38	-353.43	4,466.33	4.81	3.02	3.75
17,235.00	90.46	174.74	12,696.61	-4,550.22	-349.94	4,560.94	7.12	-2.57	-6.64
17,328.00	88.36	174.73	12,697.57	-4,642.82	-341.41	4,653.09	2.26	-2.26	-0.01
17,422.00	88.93	177.98	12,699.79	-4,736.59	-335.43	4,746.53	3.51	0.61	3.46
17,517.00	90.40	179.43	12,700.35	-4,831.56	-333.29	4,841.32	2.17	1.55	1.53
17,609.00	92.87	180.55	12,697.72	-4,923.51	-333.27	4,933.19	2.95	2.68	1.22
17,704.00	90.60	181.13	12,694.85	-5,018.45	-334.66	5,028.11	2.47	-2.39	0.61
17,799.00	89.28	181.21	12,694.95	-5,113.43	-336.60	5,123.08	1.39	-1.39	0.08
17,894.00	91.06	182.92	12,694.67	-5,208.36	-340.03	5,218.07	2.60	1.87	1.80
17,989.00	89.94	180.77	12,693.84	-5,303.30	-343.08	5,313.06	2.55	-1.18	-2.26
18,083.00	89.07	179.30	12,694.65	-5,397.29	-343.14	5,406.97	1.82	-0.93	-1.56
18,177.00	89.85	181.72	12,695.53	-5,491.28	-343.98	5,500.90	2.70	0.83	2.57
18,272.00	88.98	181.73	12,696.50	-5,586.23	-346.84	5,595.89	0.92	-0.92	0.01
18,367.00	88.59	181.70	12,698.52	-5,681.16	-349.68	5,690.86	0.41	-0.41	-0.03
18,462.00	87.95	181.43	12,701.39	-5,776.08	-352.27	5,785.81	0.73	-0.67	-0.28
18,558.00	90.13	181.47	12,702.99	-5,872.03	-354.70	5,881.77	2.27	2.27	0.04
18,652.00	90.66	180.93	12,702.35	-5,966.01	-356.67	5,975.75	0.80	0.56	-0.57
18,747.00	91.00	181.24	12,700.97	-6,060.98	-358.47	6,070.71	0.48	0.36	0.33
18,842.00	90.86	180.99	12,699.43	-6,155.95	-360.32	6,165.68	0.30	-0.15	-0.26
18,937.00	91.03	181.18	12,697.86	-6,250.92	-362.12	6,260.64	0.27	0.18	0.20
19,030.00	90.91	181.14	12,696.29	-6,343.89	-364.00	6,353.60	0.14	-0.13	-0.04
19,125.00	90.47	179.59	12,695.14	-6,438.88	-364.60	6,448.53	1.70	-0.46	-1.63
19,218.00	90.77	179.22	12,694.14	-6,531.87	-363.64	6,541.40	0.51	0.32	-0.40
19,312.00	91.61	179.51	12,692.19	-6,625.84	-362.60	6,635.24	0.95	0.89	0.31
19,407.00	90.86	178.35	12,690.14	-6,720.80	-360.82	6,730.04	1.45	-0.79	-1.22
19,500.00	91.39	178.60	12,688.31	-6,813.75	-358.35	6,822.80	0.63	0.57	0.27
19,595.00	90.35	177.41	12,686.87	-6,908.68	-355.04	6,917.51	1.66	-1.09	-1.25
19,691.00	90.75	178.49	12,685.95	-7,004.61	-351.61	7,013.21	1.20	0.42	1.13
19,785.00	89.74	179.29	12,685.55	-7,098.59	-349.79	7,107.03	1.37	-1.07	0.85
19,879.00	89.96	179.50	12,685.79	-7,192.58	-348.80	7,200.90	0.32	0.23	0.22
19,974.00	88.25	178.79	12,687.28	-7,287.56	-347.38	7,295.72	1.95	-1.80	-0.75
20,069.00	88.23	179.78	12,690.19	-7,382.50	-346.19	7,390.54	1.04	-0.02	1.04



Nabors Drilling Solutions

Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 19-30 37H
Project:	Lea Co., NM	TVD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Site:	Pitchblende Federal	MD Reference:	RT=27(Nabors 893) @ 3363.80ft (Nabors 893)
Well:	19-30 37H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Survey API:300254565200	Database:	RyanUSA_32Bit

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
20,164.00	88.31	180.19	12,693.06	-7,477.46	-346.17	7,485.41	0.44	0.08	0.43	
20,247.00	87.67	179.83	12,695.97	-7,560.41	-346.18	7,568.28	0.88	-0.77	-0.43	
20,263.74	87.67	179.83	12,696.65	-7,577.13	-346.13	7,584.99	0.00	0.00	0.00	
LTP @ 20263.74' MD										
20,312.00	87.67	179.83	12,698.61	-7,625.35	-345.99	7,633.16	0.00	0.00	0.00	
PTB @ 20312' MD										

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
20,263.74	12,696.65	-7,577.13	-346.13	LTP @ 20263.74' MD	
20,312.00	12,698.61	-7,625.35	-345.99	PTB @ 20312' MD	

Checked By: _____ Approved By: _____ Date: _____

District I
1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720
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811 S. First St., Artesia, NM 88210
Phone:(575) 748-1283 Fax:(575) 748-9720
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1000 Rio Brazos Rd., Aztec, NM 87410
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District IV
1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

CONDITIONS

Action 11979

CONDITIONS OF APPROVAL

Operator:	COG OPERATING LLC	600 W Illinois Ave	Midland, TX79701	OGRID:	229137	Action Number:	11979	Action Type:	C-102
OCD Reviewer	Condition								
pkautz	REQUIRES NSL								