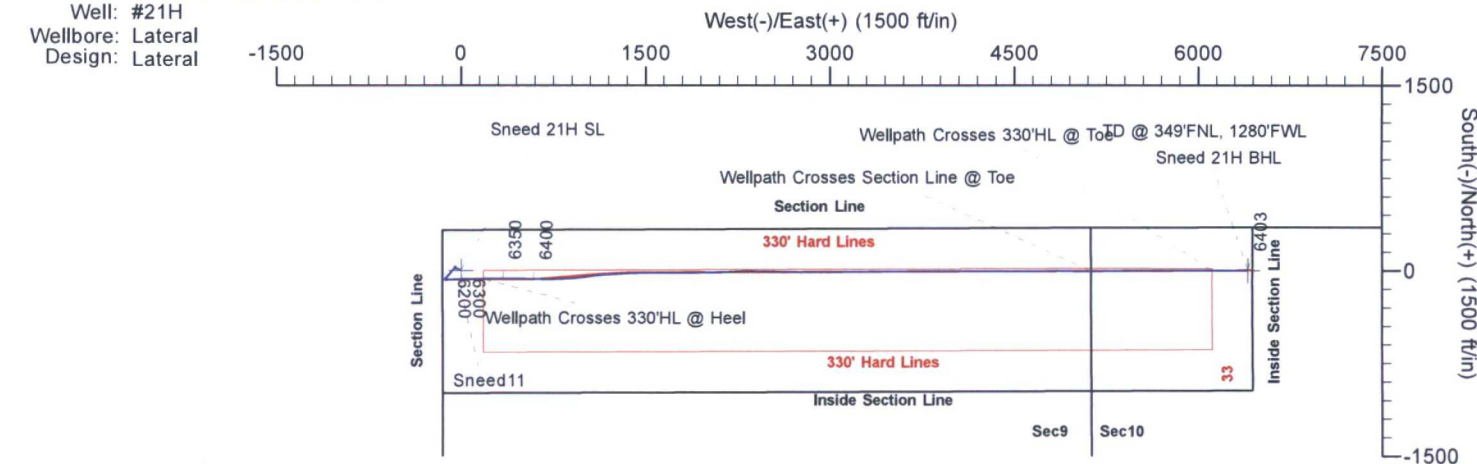


COG OPERATING, LLC

Project: Lea County, NM (NAD83) NMEZ
Site: Sneed 9 Federal COM 21H
Well: #21H
Wellbore: Lateral
Design: Lateral

4089+18 @ 4107.00ft (Patriot6)
North American Datum 1983



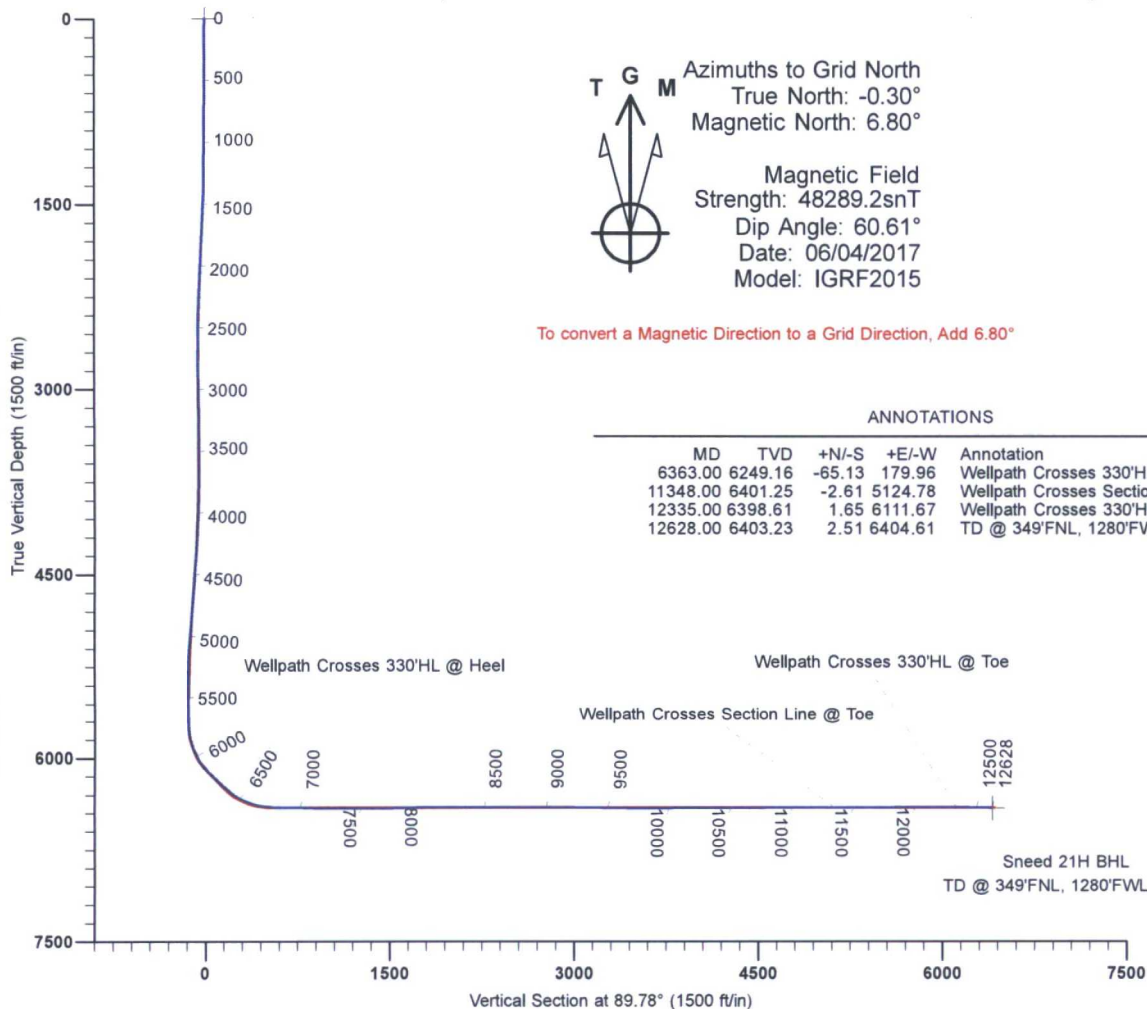
Azimuths to Grid North
True North: -0.30°
Magnetic North: 6.80°

Magnetic Field
Strength: 48289.2snT
Dip Angle: 60.61°
Date: 06/04/2017
Model: IGRF2015

To convert a Magnetic Direction to a Grid Direction, Add 6.80°

ANNOTATIONS

MD	TVD	+N/-S	+E/-W	Annotation
6363.00	6249.16	-65.13	179.96	Wellpath Crosses 330'HL @ Heel
11348.00	6401.25	-2.61	5124.78	Wellpath Crosses Section Line @ Toe
12335.00	6398.61	1.65	6111.67	Wellpath Crosses 330'HL @ Toe
12628.00	6403.23	2.51	6404.61	TD @ 349'FNL, 1280'FWL



TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
Sneed 21H SL	0.00	0.00	0.00	675412.70	711394.10	Point
Sneed 21H BHL	6403.23	2.51	6404.61	675415.21	717798.71	Point

Design: Lateral (#21H/Lateral)
Created By: Mekka Williams
eSovina Well Design
mekka@esominawell.com
9:30, June 28 2017

VON DIRECTIONAL
12074 FM 3083 Conroe, Texas 77301
936-756-2400





CONCHO

COG OPERATING, LLC

Lea County, NM (NAD83) NMEZ

Sneed 9 Federal COM 21H

#21H - SL: 330'FNL, 150'FWL Sec 9

PP: 399'FNL, 682'FWL Sec 9

Lateral

PLANNED BHL:350'FNL, 1310'FWL Sec 10

ACTUAL BHL:349'FNL, 1280'FWL Sec 10

HOBBS OCD
SEP 11 2017
RECEIVED



Company:	COG OPERATING, LLC	Local Co-ordinate Reference:	Well #21H - Slot Sneed9
Project:	Lea County, NM (NAD83) NMEZ	TVD Reference:	4089+18 @ 4107.00ft (Patriot6)
Site:	Sneed 9 Federal COM 21H	MD Reference:	4089+18 @ 4107.00ft (Patriot6)
Well:	#21H	North Reference:	Grid
Wellbore:	Lateral	Survey Calculation Method:	Minimum Curvature
Design:	Lateral	Database:	VON_EDM

Project	Lea County, NM (NAD83) NMEZ		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site		Sneed 9 Federal COM 21H			
Site Position:		Northing:	675,412.70 ft	Latitude:	32° 51' 19.812 N
From:	Map	Easting:	711,394.10 ft	Longitude:	103° 46' 46.370 W
Position Uncertainty:	0.00 ft	Slot Radius:	13.20 in	Grid Convergence:	0.30 °

Well	#21H - Slot Sneed9					
Well Position	+N/-S	0.00 ft	Northing:	675,412.70 ft	Latitude:	32° 51' 19.812 N
	+E/-W	0.00 ft	Easting:	711,394.10 ft	Longitude:	103° 46' 46.370 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	4,089.00 ft

Wellbore	Lateral				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	06/04/17	7.10	60.61	48,289

Design	Lateral				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00	89.78	

Survey Program	From (ft)	To (ft)	Date	Survey (Wellbore)	Tool Name	Description
	100.00	2,200.00	06/28/17	Survey #1 (Lateral)	GYD_DP_MS	Gyrodata gyro-compassing and drop
	2,376.00	12,567.00		Survey #2 (Lateral)	MWD	MWD v3: standard declination
	12,628.00	12,628.00		Survey #3 (Lateral)	Projection	Projection

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)
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sneed 21H SL										
	100.00	0.31	323.34	100.00	0.22	-0.16	-0.16	0.31	0.31	0.00
	200.00	0.37	352.10	200.00	0.75	-0.37	-0.36	0.18	0.06	28.76
	300.00	0.38	347.55	300.00	1.40	-0.48	-0.48	0.03	0.01	-4.55
	400.00	0.47	334.96	399.99	2.09	-0.73	-0.72	0.13	0.09	-12.59
	500.00	0.31	337.23	499.99	2.71	-1.01	-1.00	0.16	-0.16	2.27
	600.00	0.51	342.89	599.99	3.39	-1.24	-1.23	0.20	0.20	5.66
	700.00	0.36	323.86	699.99	4.07	-1.56	-1.54	0.21	-0.15	-19.03

Company:	COG OPERATING, LLC	Local Co-ordinate Reference:	Well #21H - Slot Sneed9
Project:	Lea County, NM (NAD83) NMEZ	TVD Reference:	4089+18 @ 4107.00ft (Patriot6)
Site:	Sneed 9 Federal COM 21H	MD Reference:	4089+18 @ 4107.00ft (Patriot6)
Well:	#21H	North Reference:	Grid
Wellbore:	Lateral	Survey Calculation Method:	Minimum Curvature
Design:	Lateral	Database:	VON_EDM

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)
800.00	0.38	351.82	799.98	4.65	-1.79	-1.77	0.18	0.02	27.96
900.00	0.61	329.03	899.98	5.43	-2.11	-2.09	0.30	0.23	-22.79
1,000.00	0.35	321.96	999.98	6.13	-2.57	-2.55	0.27	-0.26	-7.07
1,100.00	0.36	300.37	1,099.97	6.53	-3.03	-3.01	0.13	0.01	-21.59
1,200.00	0.72	300.02	1,199.97	7.00	-3.85	-3.82	0.36	0.36	-0.35
1,300.00	0.73	284.50	1,299.96	7.48	-5.01	-4.98	0.20	0.01	-15.52
1,400.00	1.50	287.97	1,399.94	8.04	-6.87	-6.84	0.77	0.77	3.47
1,500.00	2.05	275.97	1,499.89	8.63	-9.89	-9.86	0.66	0.55	-12.00
1,600.00	2.57	287.26	1,599.81	9.48	-13.81	-13.78	0.69	0.52	11.29
1,700.00	2.49	283.09	1,699.72	10.64	-18.07	-18.03	0.20	-0.08	-4.17
1,800.00	2.37	295.92	1,799.63	12.04	-22.05	-22.00	0.56	-0.12	12.83
1,900.00	2.93	293.00	1,899.52	13.94	-26.26	-26.21	0.58	0.56	-2.92
2,000.00	2.98	302.02	1,999.39	16.31	-30.82	-30.75	0.47	0.05	9.02
2,100.00	3.35	302.62	2,099.23	19.27	-35.48	-35.41	0.37	0.37	0.60
2,200.00	2.69	301.10	2,199.09	22.05	-39.95	-39.87	0.66	-0.66	-1.52
2,376.00	3.09	303.85	2,374.87	26.83	-47.43	-47.32	0.24	0.23	1.56
2,470.00	1.01	292.84	2,468.81	28.56	-50.30	-50.19	2.24	-2.21	-11.71
2,563.00	1.40	165.28	2,561.80	27.78	-50.76	-50.65	2.33	0.42	-137.16
2,656.00	1.41	166.21	2,654.77	25.57	-50.20	-50.10	0.03	0.01	1.00
2,751.00	0.34	91.54	2,749.76	24.43	-49.64	-49.55	1.43	-1.13	-78.60
2,846.00	0.39	70.68	2,844.75	24.53	-49.05	-48.96	0.15	0.05	-21.96
2,940.00	0.48	51.26	2,938.75	24.88	-48.44	-48.35	0.18	0.10	-20.66
3,035.00	0.58	40.91	3,033.75	25.49	-47.82	-47.72	0.15	0.11	-10.89
3,129.00	0.70	48.00	3,127.74	26.24	-47.08	-46.98	0.15	0.13	7.54
3,224.00	0.51	49.96	3,222.74	26.90	-46.33	-46.22	0.20	-0.20	2.06
3,319.00	0.44	52.33	3,317.73	27.39	-45.71	-45.61	0.08	-0.07	2.49
3,414.00	0.38	38.36	3,412.73	27.86	-45.23	-45.12	0.12	-0.06	-14.71
3,509.00	0.28	47.81	3,507.73	28.27	-44.86	-44.75	0.12	-0.11	9.95
3,603.00	0.30	60.29	3,601.73	28.54	-44.48	-44.37	0.07	0.02	13.28
3,698.00	0.38	56.01	3,696.73	28.84	-44.00	-43.89	0.09	0.08	-4.51
3,792.00	1.21	197.59	3,790.72	28.07	-44.04	-43.93	1.62	0.88	150.62
3,887.00	2.79	210.83	3,885.66	25.13	-45.53	-45.43	1.72	1.66	13.94
3,981.00	3.05	214.95	3,979.54	21.11	-48.14	-48.05	0.36	0.28	4.38
4,074.00	4.41	224.67	4,072.34	16.54	-52.07	-52.00	1.61	1.46	10.45
4,168.00	4.55	227.20	4,166.05	11.44	-57.34	-57.30	0.26	0.15	2.69
4,263.00	4.88	226.95	4,260.73	6.12	-63.06	-63.04	0.35	0.35	-0.26
4,357.00	5.10	226.40	4,354.37	0.51	-69.01	-69.01	0.24	0.23	-0.59
4,452.00	5.16	230.38	4,448.99	-5.13	-75.36	-75.38	0.38	0.06	4.19
4,546.00	6.13	216.02	4,542.54	-11.88	-81.56	-81.61	1.82	1.03	-15.28
4,639.00	6.51	215.69	4,634.98	-20.18	-87.56	-87.64	0.41	0.41	-0.35
4,734.00	6.75	219.15	4,729.34	-28.88	-94.23	-94.34	0.49	0.25	3.64
4,828.00	5.60	223.54	4,822.80	-36.49	-100.87	-101.01	1.32	-1.22	4.67
4,922.00	5.73	221.62	4,916.34	-43.32	-107.15	-107.32	0.24	0.14	-2.04

Company:	COG OPERATING, LLC	Local Co-ordinate Reference:	Well #21H - Slot Sneed9
Project:	Lea County, NM (NAD83) NMEZ	TVD Reference:	4089+18 @ 4107.00ft (Patriot6)
Site:	Sneed 9 Federal COM 21H	MD Reference:	4089+18 @ 4107.00ft (Patriot6)
Well:	#21H	North Reference:	Grid
Wellbore:	Lateral	Survey Calculation Method:	Minimum Curvature
Design:	Lateral	Database:	VON_EDM

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)
5,016.00	6.04	221.89	5,009.84	-50.51	-113.57	-113.76	0.33	0.33	0.29
5,110.00	6.24	225.37	5,103.30	-57.78	-120.51	-120.73	0.45	0.21	3.70
5,205.00	4.55	226.30	5,197.88	-64.02	-126.91	-127.15	1.78	-1.78	0.98
5,299.00	2.85	219.13	5,291.68	-68.40	-131.08	-131.34	1.87	-1.81	-7.63
5,394.00	1.14	190.44	5,386.62	-71.17	-132.74	-133.01	2.03	-1.80	-30.20
5,485.10	0.59	118.83	5,477.71	-72.28	-132.49	-132.77	1.21	-0.60	-78.60
Sneed 21H Tgt p3									
5,488.00	0.60	115.54	5,480.61	-72.30	-132.46	-132.74	1.21	0.29	-113.46
5,583.00	0.89	99.54	5,575.60	-72.64	-131.29	-131.57	0.37	0.31	-16.84
5,678.00	0.83	107.67	5,670.59	-72.97	-129.90	-130.18	0.14	-0.06	8.56
5,709.00	0.98	96.96	5,701.59	-73.07	-129.43	-129.71	0.73	0.48	-34.55
5,741.00	2.30	91.08	5,733.57	-73.11	-128.51	-128.79	4.15	4.13	-18.38
5,773.00	4.59	88.01	5,765.51	-73.08	-126.59	-126.87	7.18	7.16	-9.59
5,803.00	7.55	86.48	5,795.34	-72.92	-123.42	-123.70	9.88	9.87	-5.10
5,835.00	11.60	85.03	5,826.89	-72.51	-118.12	-118.40	12.68	12.66	-4.53
5,867.00	14.77	84.31	5,858.04	-71.83	-110.85	-111.13	9.92	9.91	-2.25
5,898.00	17.96	82.75	5,887.78	-70.83	-102.18	-102.45	10.39	10.29	-5.03
5,930.00	21.07	83.33	5,917.94	-69.54	-91.57	-91.83	9.74	9.72	1.81
5,961.00	24.05	86.07	5,946.57	-68.46	-79.73	-79.99	10.19	9.61	8.84
5,993.00	27.31	89.24	5,975.40	-67.91	-65.88	-66.14	11.05	10.19	9.91
6,024.00	30.88	90.60	6,002.49	-67.90	-50.81	-51.07	11.71	11.52	4.39
6,055.00	34.42	90.85	6,028.59	-68.12	-34.09	-34.35	11.43	11.42	0.81
6,087.00	37.83	90.13	6,054.43	-68.27	-15.22	-15.49	10.74	10.66	-2.25
6,118.00	41.02	89.83	6,078.37	-68.26	4.46	4.20	10.31	10.29	-0.97
6,149.00	44.13	89.39	6,101.20	-68.12	25.43	25.17	10.08	10.03	-1.42
6,180.00	45.11	89.24	6,123.26	-67.86	47.20	46.94	3.18	3.16	-0.48
6,212.00	45.66	88.69	6,145.74	-67.45	69.98	69.72	2.11	1.72	-1.72
6,243.00	46.23	89.01	6,167.29	-67.00	92.25	91.99	1.98	1.84	1.03
6,274.00	46.60	88.73	6,188.67	-66.56	114.70	114.45	1.36	1.19	-0.90
6,306.00	46.93	88.95	6,210.59	-66.09	138.01	137.76	1.15	1.03	0.69
6,337.00	47.34	88.82	6,231.67	-65.64	160.73	160.48	1.36	1.32	-0.42
6,363.00	48.13	88.14	6,249.16	-65.13	179.96	179.71	3.59	3.03	-2.60
Wellpath Crosses 330'HL @ Heel									
6,369.00	48.31	87.99	6,253.16	-64.98	184.43	184.18	3.59	3.04	-2.56
6,400.00	51.41	88.84	6,273.14	-64.33	208.12	207.87	10.22	10.00	2.74
6,431.00	55.14	89.25	6,291.67	-63.92	232.96	232.71	12.08	12.03	1.32
6,463.00	58.91	88.80	6,309.09	-63.46	259.80	259.55	11.84	11.78	-1.41
6,494.00	60.95	89.67	6,324.62	-63.10	286.62	286.38	7.01	6.58	2.81
6,526.00	63.21	90.12	6,339.60	-63.05	314.89	314.65	7.17	7.06	1.41
6,557.00	65.67	90.25	6,352.98	-63.14	342.86	342.61	7.94	7.94	0.42
6,588.00	69.29	90.14	6,364.85	-63.24	371.49	371.24	11.68	11.68	-0.35
6,620.00	73.45	89.80	6,375.07	-63.22	401.80	401.56	13.04	13.00	-1.06
6,652.00	77.32	89.97	6,383.14	-63.16	432.76	432.52	12.10	12.09	0.53
6,684.00	80.37	90.64	6,389.33	-63.33	464.15	463.91	9.75	9.53	2.09

Company:	COG OPERATING, LLC	Local Co-ordinate Reference:	Well #21H - Slot Sneed9
Project:	Lea County, NM (NAD83) NMEZ	TVD Reference:	4089+18 @ 4107.00ft (Patriot6)
Site:	Sneed 9 Federal COM 21H	MD Reference:	4089+18 @ 4107.00ft (Patriot6)
Well:	#21H	North Reference:	Grid
Wellbore:	Lateral	Survey Calculation Method:	Minimum Curvature
Design:	Lateral	Database:	VON_EDM

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)
6,715.00	82.77	90.86	6,393.88	-63.73	494.81	494.57	7.77	7.74	0.71
6,752.00	85.73	91.28	6,397.58	-64.42	531.62	531.37	8.08	8.00	1.14
6,753.01	85.80	91.29	6,397.66	-64.44	532.62	532.37	6.60	6.50	1.13
Sneed 21H LP p2									
6,784.00	87.81	91.64	6,399.39	-65.23	563.55	563.30	6.60	6.50	1.12
6,815.00	89.01	91.52	6,400.25	-66.09	594.53	594.27	3.89	3.87	-0.39
6,847.00	89.24	91.63	6,400.73	-66.97	626.51	626.25	0.80	0.72	0.34
6,942.00	89.60	89.83	6,401.70	-68.18	721.50	721.23	1.93	0.38	-1.89
7,036.00	88.97	87.53	6,402.87	-66.01	815.46	815.20	2.54	-0.67	-2.45
7,131.00	88.23	84.35	6,405.19	-59.29	910.18	909.94	3.44	-0.78	-3.35
7,226.00	88.94	83.43	6,407.54	-49.18	1,004.61	1,004.41	1.22	0.75	-0.97
7,321.00	89.77	83.21	6,408.61	-38.13	1,098.96	1,098.80	0.90	0.87	-0.23
7,417.00	91.21	85.72	6,407.79	-28.87	1,194.50	1,194.38	3.01	1.50	2.61
7,512.00	90.91	87.20	6,406.03	-23.01	1,289.30	1,289.20	1.59	-0.32	1.56
7,607.00	90.43	87.99	6,404.92	-19.02	1,384.20	1,384.12	0.97	-0.51	0.83
7,702.00	90.67	88.57	6,404.00	-16.17	1,479.16	1,479.08	0.66	0.25	0.61
7,798.00	91.45	90.73	6,402.23	-15.58	1,575.13	1,575.06	2.39	0.81	2.25
7,893.00	91.00	90.08	6,400.20	-16.26	1,670.11	1,670.03	0.83	-0.47	-0.68
7,988.00	90.52	89.63	6,398.94	-16.01	1,765.10	1,765.02	0.69	-0.51	-0.47
8,083.00	90.38	89.68	6,398.19	-15.44	1,860.09	1,860.02	0.16	-0.15	0.05
8,178.00	90.27	89.44	6,397.65	-14.71	1,955.09	1,955.02	0.28	-0.12	-0.25
8,273.00	89.89	89.02	6,397.52	-13.44	2,050.08	2,050.01	0.60	-0.40	-0.44
8,369.00	89.66	88.45	6,397.90	-11.32	2,146.06	2,146.00	0.64	-0.24	-0.59
8,463.00	89.92	88.71	6,398.24	-8.99	2,240.03	2,239.97	0.39	0.28	0.28
8,557.00	89.70	89.08	6,398.55	-7.18	2,334.01	2,333.96	0.46	-0.23	0.39
8,652.00	89.68	89.63	6,399.07	-6.11	2,429.00	2,428.96	0.58	-0.02	0.58
8,747.00	90.19	91.41	6,399.17	-6.97	2,523.99	2,523.95	1.95	0.54	1.87
8,842.00	90.49	91.56	6,398.61	-9.43	2,618.96	2,618.90	0.35	0.32	0.16
8,935.00	90.11	90.21	6,398.12	-10.87	2,711.94	2,711.88	1.51	-0.41	-1.45
9,030.00	89.72	90.57	6,398.27	-11.51	2,806.94	2,806.88	0.56	-0.41	0.38
9,125.00	89.47	89.29	6,398.94	-11.40	2,901.94	2,901.87	1.37	-0.26	-1.35
9,220.00	89.33	89.44	6,399.93	-10.34	2,996.93	2,996.86	0.22	-0.15	0.16
9,315.00	88.82	89.62	6,401.47	-9.56	3,091.91	3,091.85	0.57	-0.54	0.19
9,410.00	89.34	88.82	6,402.99	-8.27	3,186.89	3,186.83	1.00	0.55	-0.84
9,504.00	89.48	89.11	6,403.96	-6.57	3,280.87	3,280.82	0.34	0.15	0.31
9,598.00	89.23	89.80	6,405.02	-5.68	3,374.86	3,374.81	0.78	-0.27	0.73
9,693.00	90.31	89.43	6,405.40	-5.04	3,469.85	3,469.81	1.20	1.14	-0.39
9,786.00	90.43	88.90	6,404.80	-3.69	3,562.84	3,562.80	0.58	0.13	-0.57
9,881.00	90.41	89.65	6,404.10	-2.48	3,657.83	3,657.79	0.79	-0.02	0.79
9,976.00	90.30	89.84	6,403.51	-2.06	3,752.83	3,752.79	0.23	-0.12	0.20
10,070.00	90.37	90.11	6,402.96	-2.02	3,846.82	3,846.79	0.30	0.07	0.29
10,166.00	90.00	90.09	6,402.65	-2.19	3,942.82	3,942.79	0.39	-0.39	-0.02
10,259.00	89.75	90.52	6,402.86	-2.68	4,035.82	4,035.78	0.53	-0.27	0.46

Company:	COG OPERATING, LLC	Local Co-ordinate Reference:	Well #21H - Slot Sneed9
Project:	Lea County, NM (NAD83) NMEZ	TVD Reference:	4089+18 @ 4107.00ft (Patriot6)
Site:	Sneed 9 Federal COM 21H	MD Reference:	4089+18 @ 4107.00ft (Patriot6)
Well:	#21H	North Reference:	Grid
Wellbore:	Lateral	Survey Calculation Method:	Minimum Curvature
Design:	Lateral	Database:	VON_EDM

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)	
10,354.00	89.82	90.82	6,403.21	-3.79	4,130.81	4,130.77	0.32	0.07	0.32	
10,449.00	90.14	89.67	6,403.25	-4.20	4,225.81	4,225.76	1.26	0.34	-1.21	
10,544.00	90.53	89.94	6,402.69	-3.88	4,320.81	4,320.76	0.50	0.41	0.28	
10,639.00	90.19	89.98	6,402.09	-3.81	4,415.81	4,415.76	0.36	-0.36	0.04	
10,734.00	89.54	90.00	6,402.32	-3.79	4,510.81	4,510.76	0.68	-0.68	0.02	
10,829.00	89.83	89.57	6,402.84	-3.44	4,605.80	4,605.76	0.55	0.31	-0.45	
10,924.00	90.54	89.77	6,402.53	-2.89	4,700.80	4,700.76	0.78	0.75	0.21	
11,018.00	90.08	89.87	6,402.02	-2.59	4,794.80	4,794.75	0.50	-0.49	0.11	
11,113.00	90.11	90.23	6,401.87	-2.68	4,889.80	4,889.75	0.38	0.03	0.38	
11,208.00	90.04	90.72	6,401.74	-3.47	4,984.79	4,984.74	0.52	-0.07	0.52	
11,302.00	90.30	89.15	6,401.46	-3.36	5,078.79	5,078.74	1.69	0.28	-1.67	
11,348.00	90.22	89.00	6,401.25	-2.61	5,124.78	5,124.74	0.38	-0.18	-0.33	
Wellpath Crosses Section Line @ Toe										
11,398.00	90.13	88.83	6,401.10	-1.67	5,174.78	5,174.73	0.38	-0.18	-0.33	
11,493.00	90.27	89.29	6,400.77	-0.11	5,269.76	5,269.72	0.51	0.15	0.48	
11,588.00	90.47	89.67	6,400.16	0.75	5,364.76	5,364.72	0.45	0.21	0.40	
11,682.00	90.46	89.88	6,399.39	1.12	5,458.75	5,458.72	0.22	-0.01	0.22	
11,777.00	90.39	89.98	6,398.69	1.24	5,553.75	5,553.71	0.13	-0.07	0.11	
11,872.00	90.29	90.01	6,398.13	1.25	5,648.75	5,648.71	0.11	-0.11	0.03	
11,967.00	90.36	90.02	6,397.59	1.22	5,743.75	5,743.71	0.07	0.07	0.01	
12,062.00	91.07	91.10	6,396.40	0.29	5,838.73	5,838.69	1.36	0.75	1.14	
12,157.00	89.18	90.54	6,396.19	-1.06	5,933.72	5,933.67	2.07	-1.99	-0.59	
12,252.00	89.29	88.73	6,397.46	-0.46	6,028.70	6,028.66	1.91	0.12	-1.91	
12,335.00	89.13	88.35	6,398.61	1.65	6,111.67	6,111.63	0.50	-0.19	-0.46	
Wellpath Crosses 330°HL @ Toe										
12,346.00	89.11	88.30	6,398.78	1.98	6,122.66	6,122.62	0.50	-0.19	-0.46	
12,441.00	89.62	90.21	6,399.83	3.21	6,217.64	6,217.61	2.08	0.54	2.01	
12,536.00	88.87	90.10	6,401.08	2.95	6,312.63	6,312.60	0.80	-0.79	-0.12	
12,567.00	88.62	90.31	6,401.76	2.84	6,343.63	6,343.59	1.05	-0.81	0.68	
12,628.00	88.62	90.31	6,403.23	2.51	6,404.61	6,404.57	0.00	0.00	0.00	
TD @ 349°FNL, 1280°FWL - Sneed 21H PBHL										

Design Targets										
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude		Longitude
- hit/miss target										
- Shape										
Sneed 21H SL	0.00	0.00	0.00	0.00	0.00	675,412.70	711,394.10	32° 51' 19.812 N		103° 46' 46.370 W
- actual wellpath hits target center										
- Point										
Sneed 21H BHL	0.00	0.00	6,403.23	2.51	6,404.61	675,415.21	717,798.71	32° 51' 19.499 N		103° 45' 31.289 W
- actual wellpath hits target center										
- Point										

Company:	COG OPERATING, LLC	Local Co-ordinate Reference:	Well #21H - Slot Sneed9
Project:	Lea County, NM (NAD83) NMEZ	TVD Reference:	4089+18 @ 4107.00ft (Patriot6)
Site:	Sneed 9 Federal COM 21H	MD Reference:	4089+18 @ 4107.00ft (Patriot6)
Well:	#21H	North Reference:	Grid
Wellbore:	Lateral	Survey Calculation Method:	Minimum Curvature
Design:	Lateral	Database:	VON_EDM

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
6,363.00	6,249.16	-65.13	179.96	Wellpath Crosses 330'HL @ Heel
11,348.00	6,401.25	-2.61	5,124.78	Wellpath Crosses Section Line @ Toe
12,335.00	6,398.61	1.65	6,111.67	Wellpath Crosses 330'HL @ Toe
12,628.00	6,403.23	2.51	6,404.61	TD @ 349'FNL, 1280'FWL

Checked By: _____	Approved By: _____	Date: _____
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June 26, 2017

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

Attn: Kanicia Castillo

RE: **Sneed 9 Federal Com 21H**

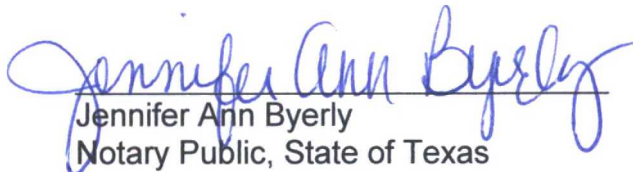
Please find enclosed a copy of the survey from 0' to 2200' ran on the above referenced well.

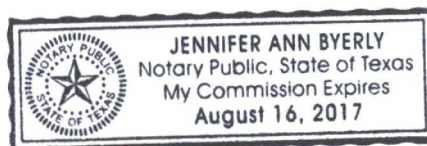
~~Sincerely,~~

~~Keith Havelka~~
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 26th day of June, A.D., 2017, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas



Company: COG OPERATING
Lease/Well: SNEED 9 FEDERAL COM/21H



Rig Name: PATRIOT 6
State/County: NEW MEXICO/LEA
VS-Azi: 0.00 Degrees
Latitude: 32.85551, Longitude: -103.77954
Grid North = True North -0.30 degs (NAD 27)
Grid Correction Applied = -0.30 degs



Depth Reference : RKB 18 FEET

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: eline-de_01.ut
Minimum Curvature Method
Report Date/Time: 6/22/2017 / 11:13

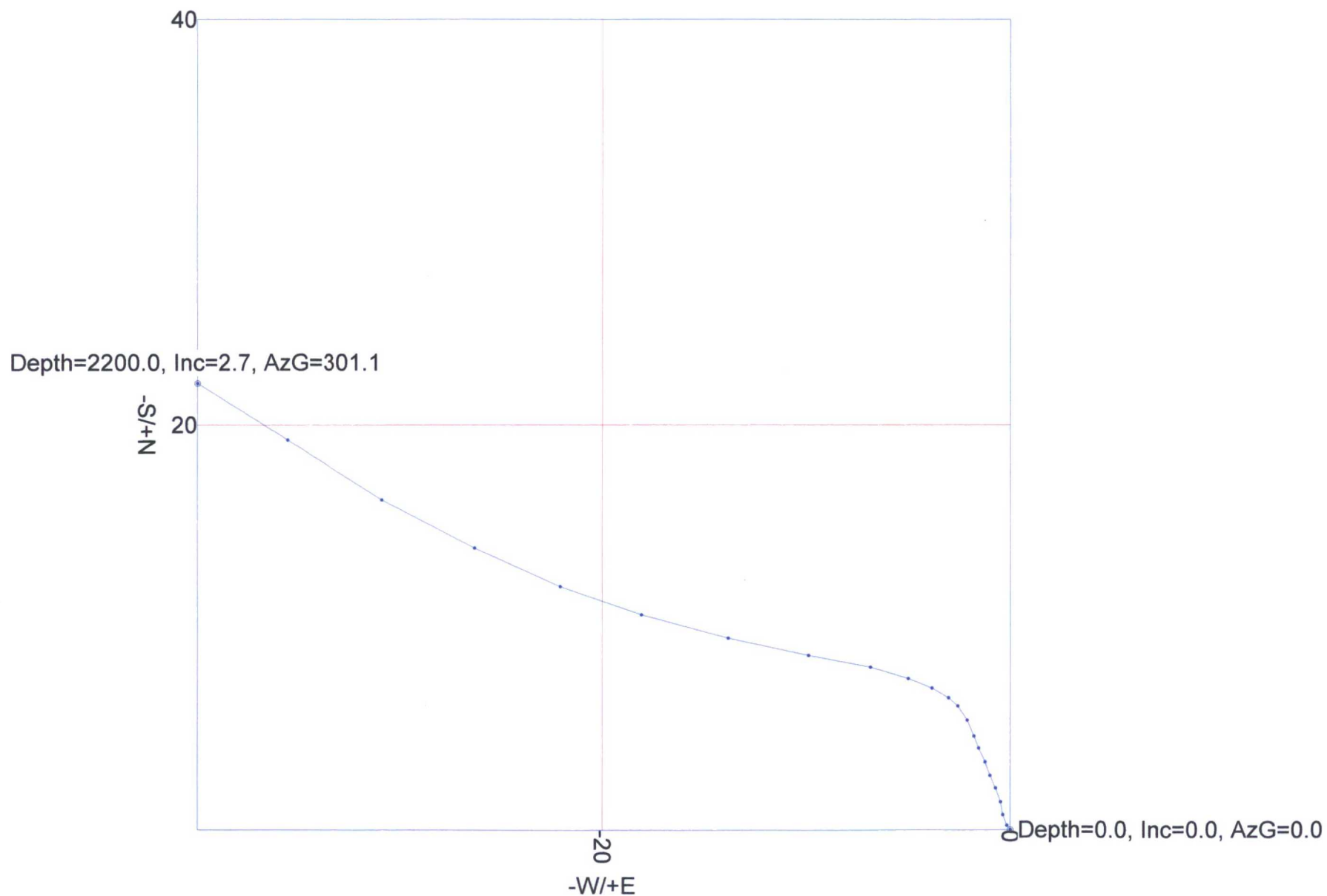
VES Survey International
Midland, Texas
432-563-5444
Surveyor: Dustin Byers
Sneed 9 Federal Com 21H / API: 30-025-41489

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	0.31	323.34	100.00	0.22	-0.16	0.22	0.27	323.34	0.31
200.00	0.37	352.10	200.00	0.75	-0.36	0.75	0.83	334.04	0.18
300.00	0.38	347.55	300.00	1.39	-0.48	1.39	1.47	340.93	0.03
400.00	0.47	334.96	399.99	2.08	-0.72	2.08	2.20	340.80	0.13
500.00	0.31	337.23	499.99	2.70	-1.00	2.70	2.88	339.63	0.17
600.00	0.51	342.89	599.99	3.37	-1.24	3.37	3.59	339.85	0.20
700.00	0.36	323.86	699.99	4.04	-1.55	4.04	4.33	339.01	0.20
800.00	0.38	351.82	799.98	4.63	-1.78	4.63	4.96	338.91	0.18
900.00	0.61	329.03	899.98	5.41	-2.11	5.41	5.81	338.74	0.30
1000.00	0.35	321.96	999.98	6.11	-2.57	6.11	6.63	337.20	0.27
1100.00	0.36	300.37	1099.97	6.51	-3.03	6.51	7.18	335.04	0.13
1200.00	0.72	300.02	1199.97	6.99	-3.85	6.99	7.98	331.15	0.35
1300.00	0.73	284.50	1299.96	7.46	-5.01	7.46	8.99	326.12	0.20
1400.00	1.50	287.97	1399.94	8.02	-6.87	8.02	10.56	319.43	0.77
1500.00	2.05	275.97	1499.89	8.61	-9.90	8.61	13.12	311.04	0.67
1600.00	2.57	287.26	1599.81	9.47	-13.82	9.47	16.75	304.40	0.69

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	2.49	283.09	1699.71	10.62	-18.08	10.62	20.97	300.44	0.20
1800.00	2.37	295.92	1799.63	12.02	-22.06	12.02	25.12	298.59	0.55
1900.00	2.93	293.00	1899.52	13.93	-26.28	13.93	29.74	297.92	0.57
2000.00	2.98	302.02	1999.39	16.31	-30.84	16.31	34.88	297.87	0.47
2100.00	3.35	302.62	2099.23	19.26	-35.50	19.26	40.39	298.48	0.37
2200.00	2.69	301.10	2199.09	22.05	-39.98	22.05	45.66	298.88	0.67



VES Survey International
Midland, Texas
432-563-5444
Surveyor: Dustin Byers
Sneed 9 Federal Com 21H / API: 30-025-41489



VES Survey Date: 6/16/2017



I Dustin Byers certify that I am employed by VES Survey International. That I did on the day(s) of 06/16/17 through 06/16/17 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 2,200.00 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 COG Operating for the Sneed 9 Fed Com Well # 21H API # 30-025-41489 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 VES Survey International.

A handwritten signature in blue ink, appearing to read "Dustin Byers", is written over a horizontal line.

Dustin Byers
Service Technician
VES Survey International