

15-42464

October 31, 2014

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

NM OIL CONSERVATION
ARTESIA DISTRICT
JAN 08 2015
RECEIVED

Attn: Kanicia Castillo

RE: Graham Nash State Com No. 006H

Please find enclosed a copy of the survey from 0.00' to 10542.00' ran on the
above referenced well.

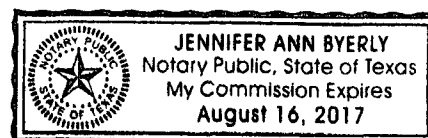
Sincerely,

Deb Salge
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 31 day of October
A.D., 2014, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas





Company: COG Operating, LLC (Concho)
Lease/Well: Graham Nash State Com/No. 006H
Location: Sec33 T26S R28E
Rig Name: Patterson 79
State/County: New Mexico/Eddy
Latitude: 32.00, Longitude: -104.09
GRID North is 0.13 Degrees East of True North
VS-Azi: 0.00 Degrees



Depth Reference : RKB = 22 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro survey.ut
Minimum Curvature Method
Report Date/Time: 10/31/2014 / 10:12

VES Survey International
West Texas
(432) 563-5444
Surveyor: Noe Garza
Graham Nash State Com No. 006H / API 30-015-42464

NM OIL CONSERVATION
ARTESIA DISTRICT
JAN 08 2015
RECEIVED

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	0.56	252.17	100.00	-0.15	-0.46	-0.15	0.48	252.17	0.56
200.00	0.93	266.68	199.99	-0.34	-1.73	-0.34	1.77	258.77	0.42
300.00	0.97	261.57	299.98	-0.52	-3.38	-0.52	3.42	261.34	0.10
400.00	0.85	262.71	399.96	-0.73	-4.96	-0.73	5.01	261.58	0.12
500.00	0.35	239.15	499.96	-0.98	-5.95	-0.98	6.03	260.62	0.55
600.00	0.36	227.00	599.96	-1.35	-6.44	-1.35	6.58	258.14	0.08
700.00	0.21	250.26	699.95	-1.63	-6.84	-1.63	7.03	256.61	0.19
800.00	0.11	168.32	799.95	-1.78	-6.99	-1.78	7.22	255.71	0.22
900.00	0.08	280.14	899.95	-1.86	-7.04	-1.86	7.28	255.20	0.16
1000.00	0.17	322.78	999.95	-1.73	-7.20	-1.73	7.40	256.47	0.12
1100.00	0.08	41.07	1099.95	-1.56	-7.24	-1.56	7.41	257.82	0.17
1200.00	0.05	287.07	1199.95	-1.50	-7.24	-1.50	7.39	258.31	0.11
1300.00	0.07	308.04	1299.95	-1.45	-7.33	-1.45	7.47	258.82	0.03
1400.00	0.05	328.35	1399.95	-1.38	-7.39	-1.38	7.52	259.46	0.03
1500.00	0.31	85.79	1499.95	-1.32	-7.14	-1.32	7.26	259.52	0.34
1600.00	0.44	80.23	1599.95	-1.24	-6.49	-1.24	6.61	259.22	0.13
1700.00	0.72	67.54	1699.95	-0.93	-5.54	-0.93	5.61	260.45	0.31
1800.00	0.93	52.93	1799.94	-0.20	-4.31	-0.20	4.32	267.29	0.29

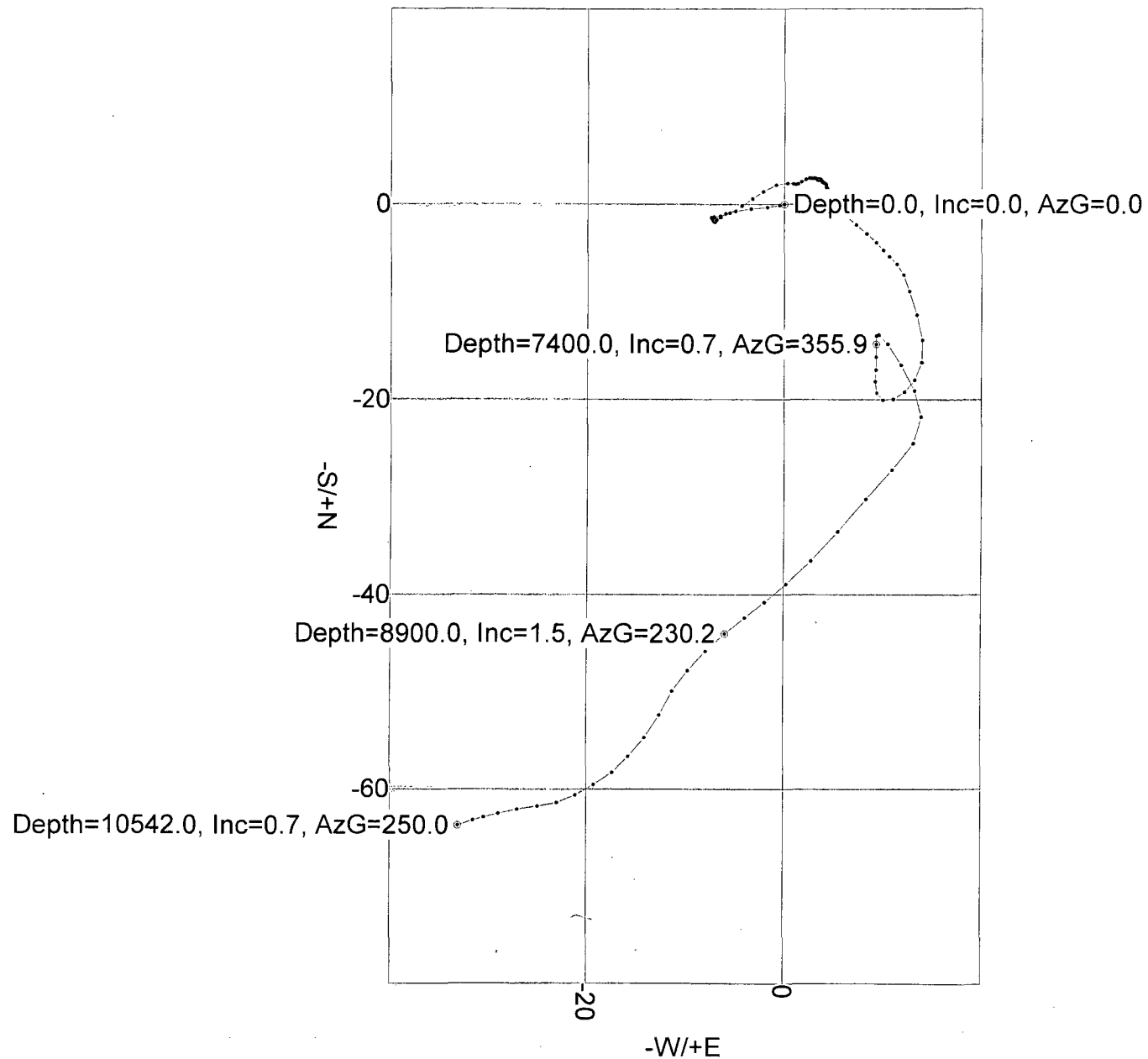
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1900.00	0.59	60.21	1899.93	0.54	-3.22	0.54	3.27	279.47	0.35
2000.00	0.92	52.24	1999.92	1.28	-2.14	1.28	2.50	300.94	0.35
2100.00	0.81	74.60	2099.91	1.96	-0.82	1.96	2.13	337.28	0.35
2200.00	0.53	92.01	2199.90	2.14	0.32	2.14	2.16	8.62	0.35
2300.00	0.14	114.43	2299.90	2.07	0.90	2.07	2.26	23.49	0.40
2400.00	0.16	96.97	2399.90	2.00	1.15	2.00	2.31	29.84	0.05
2500.00	0.14	47.99	2499.90	2.07	1.37	2.07	2.48	33.62	0.12
2600.00	0.34	61.06	2599.90	2.29	1.73	2.29	2.87	36.98	0.21
2700.00	0.26	64.25	2699.90	2.54	2.20	2.54	3.36	40.88	0.08
2800.00	0.14	83.80	2799.89	2.65	2.53	2.65	3.66	43.66	0.14
2900.00	0.15	102.24	2899.89	2.64	2.78	2.64	3.83	46.50	0.05
3000.00	0.15	70.18	2999.89	2.66	3.03	2.66	4.03	48.74	0.08
3100.00	0.10	136.31	3099.89	2.63	3.21	2.63	4.15	50.64	0.14
3200.00	0.08	155.52	3199.89	2.50	3.31	2.50	4.15	52.87	0.04
3300.00	0.06	73.12	3299.89	2.45	3.38	2.45	4.18	54.08	0.09
3400.00	0.06	337.58	3399.89	2.51	3.41	2.51	4.24	53.63	0.09
3500.00	0.01	79.83	3499.89	2.56	3.40	2.56	4.26	53.01	0.06
3600.00	0.06	98.30	3599.89	2.55	3.45	2.55	4.29	53.50	0.05
3700.00	0.09	83.45	3699.89	2.56	3.58	2.56	4.40	54.46	0.04
3800.00	0.06	167.13	3799.89	2.51	3.67	2.51	4.45	55.59	0.10
3900.00	0.07	172.24	3899.89	2.40	3.69	2.40	4.40	56.95	0.01
4000.00	0.09	70.34	3999.89	2.37	3.77	2.37	4.45	57.90	0.13
4100.00	0.08	204.84	4099.89	2.33	3.82	2.33	4.47	58.64	0.16
4200.00	0.04	106.56	4199.89	2.25	3.82	2.25	4.43	59.48	0.10
4300.00	0.22	113.20	4299.89	2.17	4.02	2.17	4.57	61.69	0.18
4400.00	0.13	176.95	4399.89	1.98	4.20	1.98	4.65	64.78	0.20
4500.00	0.20	157.90	4499.89	1.70	4.27	1.70	4.60	68.28	0.09
4600.00	0.05	134.85	4599.89	1.51	4.37	1.51	4.63	70.96	0.15
4700.00	0.22	184.38	4699.89	1.28	4.39	1.28	4.57	73.71	0.19
4800.00	0.19	176.76	4799.89	0.93	4.38	0.93	4.48	78.05	0.05
4900.00	0.24	181.49	4899.89	0.56	4.39	0.56	4.42	82.74	0.06
5000.00	0.26	148.54	4999.89	0.16	4.50	0.16	4.50	87.99	0.14
5100.00	0.20	151.95	5099.89	-0.19	4.70	-0.19	4.71	92.30	0.06
5200.00	0.22	119.70	5199.89	-0.44	4.95	-0.44	4.97	95.05	0.12
5300.00	0.53	120.79	5299.89	-0.77	5.51	-0.77	5.57	97.94	0.31
5400.00	0.63	124.69	5399.88	-1.32	6.37	-1.32	6.50	101.72	0.11
5500.00	0.79	134.67	5499.87	-2.12	7.31	-2.12	7.61	106.17	0.20
5600.00	0.81	129.02	5599.86	-3.05	8.35	-3.05	8.88	110.05	0.08
5700.00	0.72	133.89	5699.85	-3.93	9.35	-3.93	10.14	112.79	0.11

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
5800.00	0.49	143.37	5799.85	-4.71	10.06	-4.71	11.10	115.08	0.25
5900.00	0.52	134.43	5899.84	-5.37	10.64	-5.37	11.92	116.79	0.09
6000.00	0.69	137.61	5999.84	-6.13	11.37	-6.13	12.92	118.35	0.17
6100.00	0.80	156.49	6099.83	-7.22	12.05	-7.22	14.05	120.92	0.27
6200.00	1.26	162.73	6199.81	-8.91	12.66	-8.91	15.48	125.15	0.48
6300.00	1.62	161.44	6299.78	-11.31	13.44	-11.31	17.57	130.09	0.36
6400.00	1.42	174.83	6399.75	-13.89	14.00	-13.89	19.72	134.77	0.41
6500.00	1.24	189.49	6499.72	-16.19	13.93	-16.19	21.36	139.29	0.38
6600.00	1.02	215.90	6599.70	-17.99	13.23	-17.99	22.33	143.66	0.56
6700.00	0.81	225.34	6699.69	-19.21	12.20	-19.21	22.76	147.57	0.26
6800.00	0.76	248.27	6799.68	-19.95	11.08	-19.95	22.82	150.96	0.32
6900.00	0.51	289.40	6899.67	-20.05	10.04	-20.05	22.43	153.40	0.51
7000.00	0.72	338.15	6999.67	-19.33	9.39	-19.33	21.49	154.08	0.54
7100.00	0.67	7.74	7099.66	-18.17	9.24	-18.17	20.38	153.04	0.36
7200.00	0.72	358.86	7199.65	-16.96	9.31	-16.96	19.34	151.24	0.12
7300.00	0.77	2.56	7299.65	-15.65	9.32	-15.65	18.22	149.22	0.07
7400.00	0.74	355.94	7399.64	-14.33	9.31	-14.33	17.09	146.99	0.09
7500.00	0.23	13.70	7499.63	-13.49	9.31	-13.49	16.39	145.38	0.53
7600.00	0.30	107.53	7599.63	-13.37	9.60	-13.37	16.46	144.30	0.39
7700.00	1.23	143.64	7699.62	-14.31	10.49	-14.31	17.75	143.76	1.01
7800.00	1.69	151.86	7799.59	-16.48	11.83	-16.48	20.29	144.34	0.50
7900.00	1.69	152.18	7899.55	-19.09	13.21	-19.09	23.21	145.32	0.01
8000.00	1.57	180.52	7999.51	-21.76	13.88	-21.76	25.81	147.46	0.80
8100.00	1.80	210.92	8099.47	-24.48	13.06	-24.48	27.75	151.92	0.91
8200.00	2.15	223.12	8199.41	-27.20	10.97	-27.20	29.33	158.04	0.55
8300.00	2.47	220.18	8299.33	-30.22	8.29	-30.22	31.34	164.65	0.33
8400.00	2.52	220.07	8399.23	-33.55	5.49	-33.55	33.99	170.71	0.06
8500.00	2.13	224.86	8499.15	-36.55	2.76	-36.55	36.65	175.68	0.44
8600.00	1.83	228.06	8599.09	-38.93	0.26	-38.93	38.93	179.61	0.32
8700.00	1.45	232.23	8699.05	-40.77	-1.92	-40.77	40.82	182.70	0.40
8800.00	1.48	231.12	8799.01	-42.35	-3.92	-42.35	42.53	185.29	0.04
8900.00	1.49	230.18	8898.98	-43.99	-5.92	-43.99	44.39	187.67	0.03
9000.00	1.56	224.53	8998.95	-45.80	-7.88	-45.80	46.47	189.76	0.17
9100.00	1.55	221.27	9098.91	-47.79	-9.73	-47.79	48.77	191.51	0.09
9200.00	1.48	212.18	9198.87	-49.90	-11.31	-49.90	51.16	192.77	0.25
9300.00	1.67	204.64	9298.84	-52.31	-12.60	-52.31	53.81	193.54	0.29
9400.00	1.55	221.05	9398.80	-54.66	-14.10	-54.66	56.45	194.46	0.48
9500.00	1.37	219.03	9498.76	-56.61	-15.74	-56.61	58.76	195.54	0.19
9600.00	1.33	231.46	9598.74	-58.26	-17.40	-58.26	60.81	196.63	0.30

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
9700.00	1.24	240.47	9698.71	-59.52	-19.24	-59.52	62.55	197.92	0.22
9800.00	1.25	238.42	9798.69	-60.62	-21.11	-60.62	64.19	199.20	0.05
9900.00	1.12	257.85	9898.67	-61.39	-22.99	-61.39	65.56	200.53	0.42
10000.00	1.16	261.76	9998.65	-61.74	-24.95	-61.74	66.59	202.00	0.09
10100.00	1.22	260.16	10098.63	-62.07	-27.00	-62.07	67.69	203.51	0.07
10200.00	1.04	253.82	10198.61	-62.50	-28.92	-62.50	68.87	204.83	0.22
10300.00	0.69	257.49	10298.60	-62.89	-30.38	-62.89	69.84	205.79	0.35
10400.00	0.61	251.65	10398.59	-63.19	-31.48	-63.19	70.60	206.48	0.10
10542.00	0.69	249.96	10540.58	-63.72	-33.01	-63.72	71.76	207.38	0.06



VES Survey International
West Texas
(432) 563-5444
Surveyor: Noe Garza
Graham Nash State Com No. 006H / API 30-015-42464



VES Survey Date: 10/21/2014



COG Operating, LLC

Eddy County, NM (NAD 27)

Sec 33, T26-S, R28-E

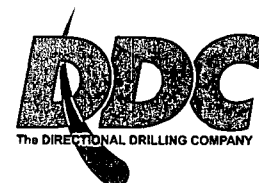
Graham Nash State Com #6H

Wellbore #1

Design: Wellbore #1

DDC Survey Report

02 December, 2014





Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Graham Nash State Com #6H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3044.0usft (Patterson #79)
Site:	Sec 33, T26-S, R28-E	MD Reference:	Well @ 3044.0usft (Patterson #79)
Well:	Graham Nash State Com #6H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Project:	Eddy County, NM (NAD 27)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site:	Sec 33, T26-S, R28-E		
Site Position:		Northing:	364,153.70 usft
From:	Map	Easting:	574,731.90 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 0' 3.395 N
		Longitude:	104° 5' 23.123 W
		Grid Convergence:	0.13 °

Well:	Graham Nash State Com #6H		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft
		Latitude:	32° 0' 4.991 N
		Longitude:	104° 5' 23.858 W
		Ground Level:	3,026.0 usft

Wellbore:	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010	10/22/2014	7.40
			Dip Angle
			(°)
			59.81
			Field Strength
			(nT)
			48,094

Design:	Wellbore #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			Direction
			(°)
			1.84

Survey Program	Date 12/2/2014		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.0	7,300.0	Gyro (Wellbore #1)	Good_gyro
7,362.0	14,299.0	MWD (Wellbore #1)	MWD default
			Description
			Good Gyro
			MWD - Standard

Survey										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn	
Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Rate	
(usft)			(usft)			(usft)	(°/100usft)	(°/100usft)	(°/100usft)	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	
100.0	0.56	252.17	100.0	-0.1	-0.5	-0.2	0.56	0.56	0.00	
200.0	0.93	266.68	200.0	-0.3	-1.7	-0.4	0.41	0.37	14.51	
300.0	0.97	261.57	300.0	-0.5	-3.4	-0.6	0.09	0.04	-5.11	
400.0	0.85	262.71	400.0	-0.7	-5.0	-0.9	0.12	-0.12	1.14	
500.0	0.35	239.15	500.0	-1.0	-6.0	-1.2	0.55	-0.50	-23.56	
600.0	0.36	227.00	600.0	-1.4	-6.5	-1.6	0.08	0.01	-12.15	
700.0	0.21	250.26	700.0	-1.6	-6.9	-1.9	0.19	-0.15	23.26	
800.0	0.11	168.32	800.0	-1.8	-7.0	-2.0	0.22	-0.10	-81.94	
900.0	0.08	280.14	900.0	-1.9	-7.1	-2.1	0.16	-0.03	111.82	



Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Graham Nash State Com #6H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3044.0usft (Patterson #79)
Site:	Sec 33, T26-S, R28-E	MD Reference:	Well @ 3044.0usft (Patterson #79)
Well:	Graham Nash State Com #6H	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)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,000.0	0.17	322.78	1,000.0	-1.7	-7.2	-2.0	0.12	0.09	42.64
1,100.0	0.08	41.07	1,100.0	-1.6	-7.3	-1.8	0.17	-0.09	78.29
1,200.0	0.05	287.07	1,200.0	-1.5	-7.3	-1.7	0.11	-0.03	-114.00
1,300.0	0.07	308.04	1,300.0	-1.5	-7.3	-1.7	0.03	0.02	20.97
1,400.0	0.05	328.35	1,400.0	-1.4	-7.4	-1.6	0.03	-0.02	20.31
1,500.0	0.31	85.79	1,500.0	-1.3	-7.2	-1.6	0.34	0.26	117.44
1,600.0	0.44	80.23	1,600.0	-1.2	-6.5	-1.4	0.13	0.13	-5.56
1,700.0	0.72	67.54	1,699.9	-0.9	-5.6	-1.1	0.31	0.28	-12.69
1,800.0	0.93	52.93	1,799.9	-0.2	-4.3	-0.3	0.30	0.21	-14.61
1,900.0	0.59	60.21	1,899.9	0.5	-3.2	0.4	0.35	-0.34	7.28
2,000.0	0.92	52.24	1,999.9	1.3	-2.2	1.2	0.35	0.33	-7.97
2,100.0	0.81	74.60	2,099.9	2.0	-0.8	1.9	0.35	-0.11	22.36
2,200.0	0.53	92.01	2,199.9	2.1	0.3	2.1	0.34	-0.28	17.41
2,300.0	0.14	114.43	2,299.9	2.1	0.9	2.1	0.40	-0.39	22.42
2,400.0	0.16	96.97	2,399.9	2.0	1.1	2.0	0.05	0.02	-17.46
2,500.0	0.14	47.99	2,499.9	2.1	1.4	2.1	0.13	-0.02	-48.98
2,600.0	0.34	61.06	2,599.9	2.3	1.7	2.4	0.21	0.20	13.07
2,700.0	0.26	64.25	2,699.9	2.5	2.2	2.6	0.08	-0.08	3.19
2,800.0	0.14	83.80	2,799.9	2.7	2.5	2.7	0.14	-0.12	19.55
2,900.0	0.15	102.24	2,899.9	2.6	2.7	2.7	0.05	0.01	18.44
3,000.0	0.15	70.18	2,999.9	2.7	3.0	2.7	0.08	0.00	-32.06
3,100.0	0.10	136.31	3,099.9	2.6	3.2	2.7	0.14	-0.05	66.13
3,200.0	0.08	155.52	3,199.9	2.5	3.3	2.6	0.04	-0.02	19.21
3,300.0	0.06	73.12	3,299.9	2.5	3.3	2.6	0.09	-0.02	-82.40
3,400.0	0.06	337.58	3,399.9	2.5	3.4	2.6	0.09	0.00	-95.54
3,500.0	0.01	79.83	3,499.9	2.6	3.4	2.7	0.06	-0.05	102.25
3,600.0	0.06	98.30	3,599.9	2.6	3.4	2.7	0.05	0.05	18.47
3,700.0	0.09	83.45	3,699.9	2.6	3.6	2.7	0.04	0.03	-14.85
3,800.0	0.06	167.13	3,799.9	2.5	3.6	2.6	0.10	-0.03	83.68
3,900.0	0.07	172.24	3,899.9	2.4	3.7	2.5	0.01	0.01	5.11
4,000.0	0.09	70.34	3,999.9	2.4	3.7	2.5	0.12	0.02	-101.90
4,100.0	0.08	204.84	4,099.9	2.3	3.8	2.5	0.16	-0.01	134.50
4,200.0	0.04	106.56	4,199.9	2.3	3.8	2.4	0.09	-0.04	-98.28
4,300.0	0.22	113.20	4,299.9	2.2	4.0	2.3	0.18	0.18	6.64
4,400.0	0.13	176.95	4,399.9	2.0	4.2	2.1	0.20	-0.09	63.75
4,500.0	0.20	157.90	4,499.9	1.7	4.3	1.9	0.09	0.07	-19.05
4,600.0	0.05	134.85	4,599.9	1.5	4.4	1.7	0.16	-0.15	-23.05
4,700.0	0.22	184.38	4,699.9	1.3	4.4	1.4	0.19	0.17	49.53
4,800.0	0.19	176.76	4,799.9	0.9	4.4	1.1	0.04	-0.03	-7.62
4,900.0	0.24	181.49	4,899.9	0.6	4.4	0.7	0.05	0.05	4.73
5,000.0	0.26	148.54	4,999.9	0.2	4.5	0.3	0.14	0.02	-32.95
5,100.0	0.20	151.95	5,099.9	-0.2	4.7	0.0	0.06	-0.06	3.41
5,200.0	0.22	119.70	5,199.9	-0.4	4.9	-0.3	0.12	0.02	-32.25



Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Graham Nash State Com #6H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3044.0usft (Patterson #79)
Site:	Sec 33, T26-S, R28-E	MD Reference:	Well @ 3044.0usft (Patterson #79)
Well:	Graham Nash State Com #6H	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)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
5,300.0	0.53	120.79	5,299.9	-0.8	5.5	-0.6	0.31	0.31	1.09	
5,400.0	0.63	124.69	5,399.9	-1.3	6.3	-1.1	0.11	0.10	3.90	
5,500.0	0.79	134.67	5,499.9	-2.1	7.3	-1.9	0.20	0.16	9.98	
5,600.0	0.81	129.02	5,599.9	-3.0	8.3	-2.8	0.08	0.02	-5.65	
5,700.0	0.72	133.89	5,699.9	-3.9	9.3	-3.6	0.11	-0.09	4.87	
5,800.0	0.49	143.37	5,799.8	-4.7	10.0	-4.4	0.25	-0.23	9.48	
5,900.0	0.52	134.43	5,899.8	-5.4	10.6	-5.0	0.08	0.03	-8.94	
6,000.0	0.69	137.61	5,999.8	-6.1	11.4	-5.7	0.17	0.17	3.18	
6,100.0	0.80	156.49	6,099.8	-7.2	12.0	-6.8	0.27	0.11	18.88	
6,200.0	1.26	162.73	6,199.8	-8.9	12.6	-8.5	0.47	0.46	6.24	
6,300.0	1.62	161.44	6,299.8	-11.3	13.4	-10.8	0.36	0.36	-1.29	
6,400.0	1.42	174.83	6,399.7	-13.9	14.0	-13.4	0.41	-0.20	13.39	
6,500.0	1.24	189.49	6,499.7	-16.2	13.9	-15.7	0.38	-0.18	14.66	
6,600.0	1.02	215.90	6,599.7	-17.9	13.2	-17.5	0.56	-0.22	26.41	
6,700.0	0.81	225.34	6,699.7	-19.2	12.2	-18.8	0.26	-0.21	9.44	
6,800.0	0.76	248.27	6,799.7	-19.9	11.1	-19.5	0.32	-0.05	22.93	
6,900.0	0.51	289.40	6,899.7	-20.0	10.0	-19.7	0.50	-0.25	41.13	
7,000.0	0.72	338.15	6,999.7	-19.3	9.4	-19.0	0.54	0.21	48.75	
7,100.0	0.67	7.74	7,099.7	-18.1	9.2	-17.8	0.36	-0.05	29.59	
7,200.0	0.72	358.86	7,199.7	-16.9	9.3	-16.6	0.12	0.05	-8.88	
Tie In @ 7300' MD / 7300' TVD										
7,300.0	0.77	2.56	7,299.6	-15.6	9.3	-15.3	0.07	0.05	3.70	
7,362.0	2.20	4.30	7,361.6	-14.0	9.4	-13.7	2.31	2.31	2.81	
7,393.0	5.40	3.10	7,392.6	-11.9	9.5	-11.6	10.33	10.32	-3.87	
7,425.0	9.20	6.00	7,424.3	-7.9	9.9	-7.6	11.93	11.88	9.06	
7,456.0	13.00	7.30	7,454.7	-2.0	10.6	-1.6	12.28	12.26	4.19	
7,488.0	16.50	7.30	7,485.6	6.1	11.6	6.5	10.94	10.94	0.00	
7,519.0	19.90	7.40	7,515.1	15.7	12.9	16.1	10.97	10.97	0.32	
7,551.0	23.10	6.40	7,544.9	27.3	14.3	27.8	10.07	10.00	-3.13	
7,582.0	26.90	5.70	7,572.9	40.4	15.6	40.9	12.29	12.26	-2.26	
7,614.0	30.50	4.60	7,601.0	55.7	17.0	56.2	11.37	11.25	-3.44	
7,645.0	34.10	3.40	7,627.2	72.2	18.2	72.7	11.80	11.61	-3.87	
7,677.0	38.00	2.00	7,653.1	91.0	19.0	91.6	12.46	12.19	-4.38	
7,709.0	41.10	1.10	7,677.7	111.4	19.6	111.9	9.85	9.69	-2.81	
7,740.0	43.40	1.50	7,700.7	132.2	20.1	132.8	7.47	7.42	1.29	
7,772.0	45.30	1.80	7,723.6	154.6	20.7	155.2	5.97	5.94	0.94	
7,803.0	47.70	1.30	7,744.9	177.0	21.3	177.6	7.83	7.74	-1.61	
7,835.0	50.00	1.30	7,766.0	201.1	21.9	201.7	7.19	7.19	0.00	
7,867.0	52.30	2.00	7,786.0	226.0	22.6	226.6	7.39	7.19	2.19	
7,899.0	54.70	2.50	7,805.1	251.7	23.6	252.4	7.60	7.50	1.56	
7,931.0	57.20	3.60	7,823.0	278.2	25.0	278.9	8.32	7.81	3.44	
7,962.0	59.50	3.80	7,839.3	304.5	26.7	305.2	7.44	7.42	0.65	
7,994.0	62.40	3.60	7,854.8	332.5	28.5	333.2	9.08	9.06	-0.63	

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Graham Nash State Com #6H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	Well @ 3044.0usft (Patterson #79)
Site:	Sec 33, T26-S, R28-E	MD Reference:	Well @ 3044.0usft (Patterson #79)
Well:	Graham Nash State Com #6H	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)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,029.0	66.00	2.30	7,870.0	363.9	30.1	364.7	10.82	10.29	-3.71
8,061.0	67.60	2.30	7,882.6	393.3	31.3	394.1	5.00	5.00	0.00
8,093.0	68.60	2.20	7,894.6	423.0	32.5	423.8	3.14	3.13	-0.31
8,124.0	69.60	1.60	7,905.6	451.9	33.4	452.8	3.70	3.23	-1.94
8,156.0	72.70	1.60	7,916.0	482.2	34.3	483.0	9.69	9.69	0.00
8,187.0	76.20	1.60	7,924.3	512.0	35.1	512.9	11.29	11.29	0.00
8,219.0	79.90	2.30	7,930.9	543.3	36.2	544.2	11.76	11.56	2.19
8,250.0	82.20	2.70	7,935.7	573.9	37.5	574.8	7.53	7.42	1.29
8,282.0	83.60	2.30	7,939.7	605.6	38.9	606.6	4.55	4.38	-1.25
8,314.0	84.50	2.30	7,943.0	637.4	40.2	638.4	2.81	2.81	0.00
8,345.0	86.20	2.00	7,945.5	668.3	41.3	669.3	5.57	5.48	-0.97
8,504.0	91.50	1.30	7,948.7	827.2	45.9	828.2	3.36	3.33	-0.44
8,598.0	92.60	0.90	7,945.3	921.1	47.7	922.1	1.25	1.17	-0.43
8,693.0	91.80	1.60	7,941.7	1,016.0	49.8	1,017.1	1.12	-0.84	0.74
8,788.0	90.40	2.70	7,939.9	1,110.9	53.3	1,112.0	1.87	-1.47	1.16
8,883.0	89.70	1.60	7,939.8	1,205.8	56.9	1,207.0	1.37	-0.74	-1.16
8,977.0	88.90	1.30	7,940.9	1,299.8	59.3	1,301.0	0.91	-0.85	-0.32
9,072.0	91.00	1.30	7,941.0	1,394.8	61.4	1,396.0	2.21	2.21	0.00
9,168.0	88.90	0.90	7,941.1	1,490.7	63.3	1,492.0	2.23	-2.19	-0.42
9,263.0	87.30	1.60	7,944.2	1,585.7	65.4	1,586.9	1.84	-1.68	0.74
9,357.0	89.60	1.60	7,946.8	1,679.6	68.0	1,680.9	2.45	2.45	0.00
9,453.0	89.20	2.30	7,947.8	1,775.5	71.2	1,776.9	0.84	-0.42	0.73
9,548.0	89.00	2.70	7,949.3	1,870.4	75.4	1,871.9	0.47	-0.21	0.42
Crossed Section Line @ 9625' MD / 7950' TVD									
9,624.5	89.88	1.58	7,950.0	1,946.9	78.2	1,948.4	1.85	1.15	-1.46
9,644.0	90.10	1.30	7,950.0	1,966.4	78.7	1,967.9	1.85	1.15	-1.46
9,739.0	88.20	2.00	7,951.4	2,061.3	81.5	2,062.9	2.13	-2.00	0.74
9,834.0	88.50	0.90	7,954.2	2,156.2	83.9	2,157.8	1.20	0.32	-1.16
9,929.0	88.90	0.90	7,956.3	2,251.2	85.4	2,252.8	0.42	0.42	0.00
10,024.0	89.40	0.90	7,957.7	2,346.2	86.9	2,347.7	0.53	0.53	0.00
10,120.0	90.80	0.90	7,957.6	2,442.2	88.4	2,443.7	1.46	1.46	0.00
10,215.0	90.40	1.60	7,956.6	2,537.1	90.4	2,538.7	0.85	-0.42	0.74
10,310.0	89.20	1.30	7,956.9	2,632.1	92.8	2,633.7	1.30	-1.26	-0.32
10,406.0	90.30	1.30	7,957.3	2,728.1	95.0	2,729.7	1.15	1.15	0.00
10,501.0	89.60	2.00	7,957.4	2,823.0	97.8	2,824.7	1.04	-0.74	0.74
10,596.0	90.30	3.10	7,957.5	2,917.9	102.0	2,919.7	1.37	0.74	1.16
10,691.0	89.00	2.00	7,958.1	3,012.8	106.2	3,014.7	1.79	-1.37	-1.16
10,786.0	89.70	1.60	7,959.2	3,107.8	109.2	3,109.7	0.85	0.74	-0.42
10,881.0	88.70	1.30	7,960.5	3,202.7	111.6	3,204.7	1.10	-1.05	-0.32
10,977.0	89.90	0.90	7,961.7	3,298.7	113.4	3,300.6	1.32	1.25	-0.42
11,072.0	91.10	1.30	7,960.8	3,393.7	115.3	3,395.6	1.33	1.26	0.42
11,168.0	89.70	1.30	7,960.2	3,489.7	117.4	3,491.6	1.46	-1.46	0.00
11,262.0	88.90	2.00	7,961.3	3,583.6	120.1	3,585.6	1.13	-0.85	0.74
11,356.0	90.30	2.30	7,962.0	3,677.5	123.7	3,679.6	1.52	1.49	0.32



Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Graham Nash State Corn #6H
Project:	Eddy County, NM.(NAD 27)	TVD Reference:	Well @ 3044.0usft (Patterson #79)
Site:	Sec 33, T26-S, R28-E	MD Reference:	Well @ 3044.0usft (Patterson #79)
Well:	Graham Nash State Corn #6H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

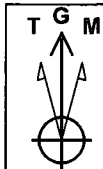
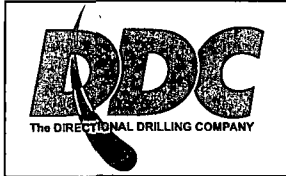
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
11,450.0	91.00	1.30	7,960.9	3,771.5	126.6	3,773.6	1.30	0.74	-1.06
11,547.0	90.60	0.60	7,959.5	3,868.5	128.2	3,870.6	0.83	-0.41	-0.72
11,642.0	89.00	0.60	7,959.9	3,963.4	129.2	3,965.6	1.68	-1.68	0.00
11,737.0	88.00	1.30	7,962.4	4,058.4	130.8	4,060.5	1.28	-1.05	0.74
11,832.0	88.90	0.20	7,964.9	4,153.4	132.0	4,155.5	1.50	0.95	-1.16
11,928.0	89.90	0.90	7,965.9	4,249.3	133.0	4,251.4	1.27	1.04	0.73
12,023.0	90.80	0.20	7,965.4	4,344.3	133.9	4,346.4	1.20	0.95	-0.74
12,118.0	90.60	0.90	7,964.2	4,439.3	134.8	4,441.4	0.77	-0.21	0.74
12,214.0	89.60	0.60	7,964.0	4,535.3	136.0	4,537.3	1.09	-1.04	-0.31
12,310.0	88.20	2.00	7,965.9	4,631.3	138.2	4,633.3	2.06	-1.46	1.46
12,404.0	89.00	0.90	7,968.2	4,725.2	140.6	4,727.3	1.45	0.85	-1.17
12,499.0	89.60	0.60	7,969.3	4,820.2	141.8	4,822.3	0.71	0.63	-0.32
12,594.0	90.80	0.60	7,969.0	4,915.2	142.8	4,917.2	1.26	1.26	0.00
12,689.0	92.40	0.20	7,966.3	5,010.1	143.5	5,012.2	1.74	1.68	-0.42
12,784.0	91.10	0.90	7,963.4	5,105.1	144.4	5,107.1	1.55	-1.37	0.74
12,880.0	89.90	359.90	7,962.6	5,201.1	145.1	5,203.1	1.63	-1.25	-1.04
12,975.0	88.70	0.60	7,963.8	5,296.1	145.5	5,298.0	1.46	-1.26	0.74
13,071.0	89.40	1.60	7,965.4	5,392.0	147.3	5,394.0	1.27	0.73	1.04
13,166.0	88.90	1.30	7,966.8	5,487.0	149.7	5,489.0	0.61	-0.53	-0.32
13,261.0	89.00	1.30	7,968.5	5,582.0	151.9	5,584.0	0.11	0.11	0.00
13,357.0	90.30	1.60	7,969.1	5,677.9	154.3	5,679.9	1.39	1.35	0.31
13,453.0	88.20	0.90	7,970.3	5,773.9	156.4	5,775.9	2.31	-2.19	-0.73
13,548.0	88.70	0.20	7,972.9	5,868.8	157.3	5,870.9	0.91	0.53	-0.74
13,643.0	89.40	359.90	7,974.5	5,963.8	157.4	5,965.8	0.80	0.74	-0.32
13,738.0	89.60	358.80	7,975.3	6,058.8	156.3	6,060.7	1.18	0.21	-1.16
13,833.0	90.30	359.20	7,975.4	6,153.8	154.7	6,155.6	0.85	0.74	0.42
13,929.0	90.40	359.50	7,974.8	6,249.8	153.6	6,251.5	0.33	0.10	0.31
14,024.0	91.10	358.50	7,973.6	6,344.8	151.9	6,346.4	1.28	0.74	-1.05
14,119.0	89.00	358.50	7,973.5	6,439.7	149.4	6,441.2	2.21	-2.21	0.00
TD @ 14299' MD / 7977' TVD									
14,299.0	89.00	358.50	7,976.6	6,619.6	144.7	6,620.9	0.00	0.00	0.00

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
7,300.0	7,299.6	-15.6	9.3	Tie In @ 7300' MD / 7300' TVD
9,624.5	7,950.0	1,946.9	78.2	Crossed Section Line @ 9625' MD / 7950' TVD
14,299.0	7,976.6	6,619.6	144.7	TD @ 14299' MD / 7977' TVD

Checked By: _____ Approved By: _____ Date: _____

Company Name: COG Operating, LLC
 Graham Nash State Com #6H
 Eddy County, NM (NAD 27)
 Rig: Patterson #7D
 Created By: Kaleigh DeCordova
 Date: 12/02/2014

Graham Nash State Com #6H
 Eddy County, NM (NAD 27)
 Quote 141070 & WT-141022
 Design #3



Azimuths to Grid North

Correction: 7.27°

Magnetic Field
 Strength: 48093.9snT
 Dip Angle: 59.81°
 Date: 10/22/2014
 Model: IGRF2010

PROJECT DETAILS: Eddy County, NM (NAD 27)

Geodetic System: US State Plane 1927 (Exact solution)
 Datum: NAD 1927 (NADCON CONUS)
 Ellipsoid: Clarke 1866
 Zone: New Mexico East 3001
 System Datum: Mean Sea Level

WELL DETAILS: Graham Nash State Com #6H

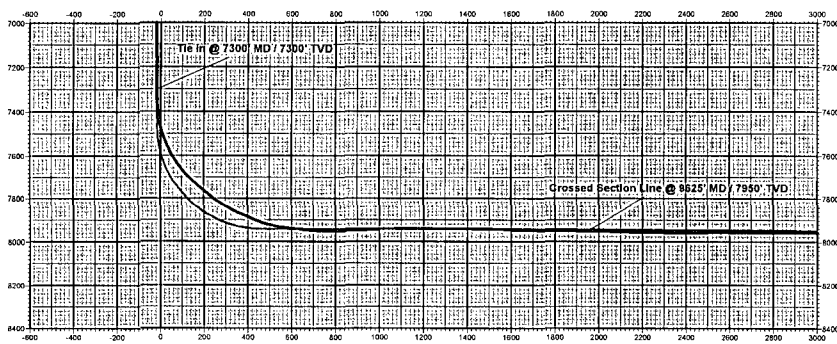
Ground Level: 3026.0
 +N-S +E-W Northing Easting Latitude Longitude
 0.0 0.0 354315.60 675443.20 32° 0' 4.991" N 104° 5' 23.858" W

DESIGN TARGET DETAILS

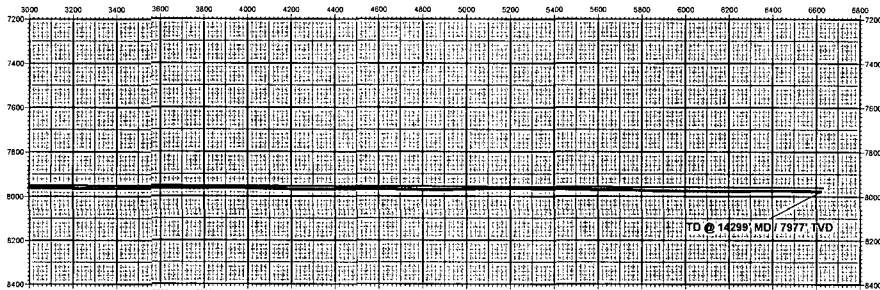
Name	TVD	+N-S	+E-W	Northing	Easting	Latitude	Longitude
PGHL Graham Nash State Com #6H DP3 - plan hits target center	7960.0	6529.7	213.4	370946.30	575656.60	32° 1' 10.898" N	104° 5' 21.206" W

ANNOTATIONS

MD	Inc	Azi	TVD	+N-S	+E-W	V-Sect	Departure	Annotation
7300.0	0.77	2.56	7299.6	-15.6	9.3	-15.3	64.8	Tie in @ 7300' MD / 7300' TVD
9624.6	89.88	1.58	7950.0	1946.9	78.2	1948.4	2018.8	Crossed Section Line @ 9625' MD / 7950' TVD
14299.0	89.00	358.50	7976.6	6619.6	144.7	6620.9	6692.8	TD @ 14299' MD / 7977' TVD



Vertical Section at 1.84° (200 usft/in)



Vertical Section at 1.84° (200 usft/in)

