



PO Box 1370
Artesia, NM 88211-1370
(575) 748-1288

30-015-39784

May 9, 2012

COG, LLC
Fasken Center, Tower II
550 West Texas Ave, Suite 1300
Midland, TX 79701

RE: Cottonmouth 23 Federal #1H
330' FNL & 2310' FWL
Sec. 23, T26S, R28E
Eddy County, New Mexico

Dear Sir,

The attached is the Deviation Survey for the above captioned well.

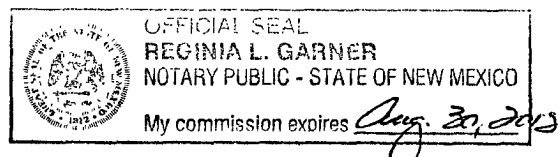
Very truly yours,

A handwritten signature in cursive script, appearing to read "Eddie C. LaRue".

Eddie C. LaRue
Operations Manager

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 9th day of May, 2012.

A handwritten signature in cursive script, appearing to read "Regina L. Garner".
Notary Public

Cottonmouth 23 Federal #1H

Date	Depth	Deviation	Direction	TVD	Horiz. Disp.
4/22/2012	178	0.80			
4/22/2012	358	0.90			
4/24/2012	517	1.10	124.90		
4/24/2012	703	0.50	53.30		
4/24/2012	798	0.60	14.50		
4/24/2012	894	0.70	346.90		
4/24/2012	989	1.10	336.90		
4/24/2012	1085	1.20	309.90		
4/24/2012	1180	1.60	305.20		
4/24/2012	1276	1.93	296.80		
4/24/2012	1371	1.10	292.60		
4/24/2012	1467	1.30	302.60		
4/25/2012	1562	1.60	314.40		
4/25/2012	1658	1.30	325.80		
4/25/2012	1753	1.20	338.70		
4/25/2012	1848	1.70	7.20		
4/25/2012	1944	2.90	51.70		
4/25/2012	2039	2.60	56.10		
4/25/2012	2134	1.60	45.00		
4/25/2012	2230	3.60	75.70		
4/25/2012	2325	3.90	77.90		
4/25/2012	2430	1.50	76.90		
4/27/2012	2620	0.60			
4/27/2012	3097	1.00			
4/28/2012	3575	1.10			
4/28/2012	4052	1.10			
4/28/2012	4500	1.10			
4/28/2012	4846	0.70			
4/28/2012	5419	1.20			
4/29/2012	5896	1.30			
4/29/2012	6437	1.30			
4/29/2012	6913	1.20			
5/1/2012	7541	1.40	158.20		
5/1/2012	7604	3.30	180.50		
5/1/2012	7763	19.30	197.70		
5/1/2012	7953	42.30	196.90		
5/1/2012	7985	45.30	195.60		
5/2/2012	8208	68.20	186.80	8068.00	
5/2/2012	8367	80.70	181.40	8113.00	
5/2/2012	8462	90.00	183.00	8119.00	
5/2/2012	8653	90.00	178.00	8116.00	
5/3/2012	8748	89.90	177.40	8116.00	
5/3/2012	8938	89.40	177.60		

Date	Depth	Deviation	Direction	TVD	Horiz. Disp.
5/3/2012	9128	90.10	177.70		
5/3/2012	9224	92.80	177.80	8117.00	
5/3/2012	9319	91.50	179.30	8113.00	
5/3/2012	9415	89.80	179.40	8112.00	1533.00
5/3/2012	4510	90.50	178.90	8112.00	1628.00
5/3/2012	9606	88.10	178.70		
5/3/2012	9701	88.40	178.80	1819.00	
5/3/2012	9797	90.70	178.40	81.71	
5/3/2012	9988	89.30	177.30	8117.00	
5/3/2012	10083	90.50	177.30		
5/4/2012	10179	90.70	176.10	8116.00	
5/4/2012	10275	89.80	175.80	8115.00	
5/4/2012	10370	92.30	176.40		
5/4/2012	10465	90.30	177.30	8112.00	2581.00
5/4/2012	10561	87.70	178.20	8113.00	2677.00
5/4/2012	10656	88.30	178.50	8117.00	2772.00
5/4/2012	10751	88.50	179.50	8119.00	2867.00
5/4/2012	10847	87.40	180.20	8123.00	
5/4/2012	10943	88.00	181.00	8127.00	
5/4/2012	11038	88.60	181.80	8129.00	
5/4/2012	11229	9.00	181.01	8132.00	
5/4/2012	11325	89.90	181.80	8132.00	
5/5/2012	11420	90.00	180.90	8132.00	
5/5/2012	11611	90.60	180.70	8132.00	
5/5/2012	11707	91.10	180.90	8131.00	
5/5/2012	11802	91.90	181.20	8128.00	3917.00
5/5/2012	11897	90.40	180.90	8126.00	4012.00
5/5/2012	11993	88.90	181.70	8127.00	4108.00
5/5/2012	12088	88.70	181.00	8129.00	4203.00
5/5/2012	12183	88.60	181.10	8131.00	4298.00
5/5/2012	12279	88.80	180.50	8133.00	4393.00
5/5/2012	12375	89.30	180.90	8135.00	4490.00
5/5/2012	12662	87.30	199.80	8140.00	4777.00
5/5/2012	12756	86.70	179.50	8145.00	

COG OPERATING

Hay Hollow

Eddy County, NM

Cottonmouth "23" Federal Com #1H

VH - Job #32K0412490

Survey: Gyro

SDI Standard Survey Report

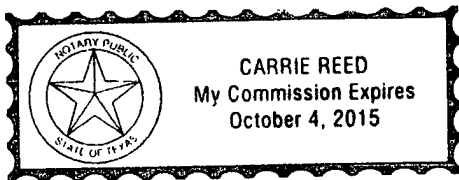
This survey is correct to the best of my knowledge and is supported by actual field data.

Richard

Notarized this date 14th of May, 2012.

Carrie Reed

Notary Signature
County of Midland
State of Texas



Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG OPERATING	Local Co-ordinate Reference:	Well Cottonmouth "23" Federal Com #1H
Project:	Hay Hollow	TVD Reference:	WELL @ 0 00usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0 00usft (Original Well Elev)
Well:	Cottonmouth "23" Federal Com #1H	North Reference:	Grid
Wellbore:	VH - Job #32K0412490	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0412490	Database:	EDM-Regulatory

Project:	Hay Hollow		
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:	Eddy County, NM		
Site Position:		Northing:	386,239 33 usft
From:	Lat/Long	Easting:	572,312 98 usft
Position Uncertainty:	0 00 usft	Slot Radius:	13-3/16"
		Latitude:	32° 3' 42 020 N
		Longitude:	104° 5' 59 660 W
		Grid Convergence:	0 12 °

Well:	Cottonmouth "23" Federal Com #1H, Directional (Pathfinder)		
Well Position	+N/-S	0 00 usft	Northing: 376,621 13 usft
	+E/-W	0 00 usft	Easting: 584,907 13 usft
Position Uncertainty	0 00 usft	Wellhead Elevation:	usft
		Latitude:	32° 2' 6 540 N
		Longitude:	104° 3' 33 590 W
		Ground Level:	0 00 usft

Wellbore:	VH - Job #32K0412490		
Magnetics	Model Name	Sample Date	Declination
	IGRF2010	04/30/12	7 69
			(°)
		Dip Angle	Field Strength
		59 90	48,386
		(°)	(nT)

Design:	VH - Job #32K0412490		
Audit Notes:			
Version:	1 0	Phase:	ACTUAL
		Tie On Depth:	0 00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0 00	0 00	0 00
		Direction	
		(°)	180 96

Survey Program	Date	05/11/12		
From	To	Survey (Wellbore)	Tool Name	Description
(usft)	(usft)			
100 00	7,503 00	Gyro (VH - Job #32K0412490)	Keeper	Keeper Gyro

Survey	Measured Depth	Inclination	Azimuth	True Vertical	North/South	East/West	Closure Azimuth	Closure Distance
	(usft)	(°)	(°)	Depth	(usft)	(usft)	(°)	(usft)
	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	100 00	0 62	76 63	100 00	0 13	0 53	76 63	0 54
	200 00	0 72	101 78	199 99	0 12	1 67	85 82	1 67
	300 00	0 67	101 93	299 98	-0 13	2 85	92 55	2 86
	400 00	0 99	115 86	399 97	-0 62	4 20	98 45	4 25
	500 00	0 93	120 56	499 96	-1 41	5 68	103 98	5 85
	600 00	0 74	103 13	599 95	-1 97	7 01	105 73	7 28
	700 00	0 50	50 57	699 94	-1 84	7 97	103 01	8 18
	800 00	0 63	18 90	799 94	-1 05	8 49	97 02	8 55
	900 00	0 89	342 24	899 93	0 21	8 43	88 55	8 43
	1,000.00	1 08	330 88	999 92	1 78	7 73	77 06	7 94
	1,100.00	1 24	309 49	1,099 90	3 29	6 44	62 96	7 23

Scientific Drilling International, Inc.
SDI Standard Survey Report



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Project:	Hay Hollow	TVD Reference:	WELL @ 0 00usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0 00usft (Original Well Elev)
Well:	Cottonmouth "23" Federal Com #1H	North Reference:	Grid
Wellbore:	VH - Job #32K0412490	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0412490	Database:	EDM-Regulatory

Survey								
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)	
1,200 00	1 71	296 84	1,199 86	4 65	4 27	42 59	6 32	
1,300 00	1 82	299 67	1,299 82	6 11	1 56	14 36	6 31	
1,400 00	1 30	296 68	1,399 78	7 41	-0 83	353 61	7 45	
1,500 00	1 32	300 91	1,499 75	8 51	-2 83	341 59	8 96	
1,600 00	1 44	324 37	1,599 72	10 12	-4 55	335 78	11 10	
1,700 00	1 18	327 18	1,699 70	12 01	-5 84	334 05	13 35	
1,800 00	1 37	356 18	1,799 67	14 06	-6 48	335 26	15 48	
1,900 00	2 11	26 16	1,899 63	16 91	-5 75	341 23	17 86	
2,000 00	3 03	55 27	1,999 53	20 07	-2 76	352 16	20 26	
2,100 00	1 70	53 00	2,099 44	22 47	0 59	1 51	22 47	
2,200 00	2 86	73 79	2,199 36	24 05	4 17	9 84	24 41	
2,300 00	3 50	79 00	2,299 21	25 33	9 57	20 69	27 08	
2,400 00	2 11	78 89	2,399 09	26 27	14 37	28 68	29 94	
2,500 00	0 74	70 88	2,499 05	26 84	16 79	32 02	31 65	
2,600 00	0 47	22 68	2,599 05	27 43	17 55	32 62	32 56	
2,700 00	0 33	31 56	2,699 05	28 05	17 86	32 49	33 26	
2,800 00	0 34	1 97	2,799 05	28 59	18 02	32 23	33 80	
2,900 00	0 39	343 50	2,899 04	29 22	17 94	31 55	34 28	
3,000 00	0 57	313 60	2,999 04	29 89	17 48	30 32	34 62	
3,100 00	0 54	310 26	3,099 04	30 53	16 76	28 76	34 83	
3,200 00	0 65	294 39	3,199 03	31 07	15 88	27 08	34 90	
3,300 00	0 73	299 75	3,299 02	31 62	14 81	25 10	34 92	
3,400 00	0 91	274 07	3,399 01	31 99	13 47	22 83	34 71	
3,500 00	0 96	270 07	3,499 00	32 05	11 84	20 27	34 17	
3,600 00	0 99	279 93	3,598 99	32 20	10 15	17 50	33 76	
3,700 00	1 05	273 83	3,698 97	32 41	8 39	14 51	33 48	
3,800 00	0 93	275 86	3,798 95	32 56	6 66	11 57	33 23	
3,900 00	1 24	278 00	3,898 94	32 79	4 79	8 30	33 14	
4,000 00	1 10	279 55	3,998 92	33 10	2 77	4 78	33 21	
4,100 00	1 15	268 38	4,098 90	33 23	0 82	1 41	33 24	
4,200 00	1 27	249 87	4,198 87	32 82	-1 23	357 86	32 84	
4,300 00	1 35	250 89	4,298 85	32 05	-3 38	353 98	32 23	
4,400 00	1 48	254 31	4,398 82	31 32	-5 74	349 62	31 84	
4,500 00	1 49	244 78	4,498 78	30 42	-8 16	344 99	31 49	
4,600 00	1 36	257 91	4,598 75	29 61	-10 49	340 49	31 42	
4,700 00	1 19	228 92	4,698 73	28 68	-12 44	336 56	31 26	
4,800 00	1 08	233 19	4,798 71	27 43	-13 97	333 01	30 79	
4,900 00	1 26	232 19	4,898 69	26 20	-15 60	329 23	30 49	
5,000 00	1 58	237 31	4,998 66	24 78	-17 62	324 58	30 41	
5,100 00	1 66	233 76	5,098 62	23 18	-19 95	319 27	30 58	
5,200 00	1 63	234 01	5,198 58	21 48	-22 27	313 97	30 95	
5,300 00	1 54	229 32	5,298 54	19 77	-24 44	308 97	31 44	
5,400 00	1 82	221 03	5,398 50	17 70	-26 50	303 74	31 87	
5,500 00	1 89	219 67	5,498 44	15 23	-28 60	298 04	32 40	

Scientific Drilling International, Inc.

SDI Standard Survey Report



Company:	COG OPERATING	Local Co-ordinate Reference:	Well Cottonmouth "23" Federal Com #1H
Project:	Hay Hollow	TVD Reference:	WELL @ 0 00usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0 00usft (Original Well Elev)
Well:	Cottonmouth "23" Federal Com #1H	North Reference:	Grid
Wellbore:	VH - Job #32K0412490	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0412490	Database:	EDM-Regulatory

Survey								
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)	
5,600 00	1 99	215 32	5,598 39	12 55	-30 65	292 26	33 12	
5,700 00	1 75	211 89	5,698 33	9 83	-32 47	286 85	33 92	
5,800 00	1 50	212 87	5,798 29	7 44	-33 98	282 34	34 79	
5,900 00	1 38	208 69	5,898 26	5 28	-35 27	278 52	35 66	
6,000 00	1 21	210 78	5,998 24	3 32	-36 39	275 21	36 54	
6,100 00	1 04	216 67	6,098 22	1 68	-37 47	272 57	37 51	
6,200 00	1 29	222 09	6,198 20	0 12	-38 77	270 18	38 77	
6,300 00	1 82	225 90	6,298 16	-1 82	-40 66	267 44	40 70	
6,400 00	2 81	249 10	6,398 08	-3 80	-44 09	265 07	44 26	
6,500 00	2 48	257 86	6,497 97	-5 13	-48 50	263 96	48 77	
6,600 00	2 51	273 66	6,597 88	-5 45	-52 80	264 11	53 08	
6,700 00	2 12	278 89	6,697 80	-5 02	-56 81	264 95	57 03	
6,800 00	1 30	273 92	6,797 75	-4 66	-59 77	265 55	59 95	
6,900 00	1 34	299 82	6,897 73	-4 00	-61 92	266 31	62 05	
7,000 00	1 66	306 96	6,997 69	-2 54	-64 09	267 73	64 14	
7,100 00	1 65	284 51	7,097 65	-1 31	-66 64	268 87	66 65	
7,200 00	1 37	227 76	7,197 62	-1 76	-68 92	268 54	68 94	
7,300 00	1 96	219 48	7,297 58	-3 88	-70 89	266 87	71 00	
7,400 00	1 80	212 03	7,397 52	-6 53	-72 81	264 87	73 10	
7,500 00	1 51	171 51	7,497 49	-9 17	-73 45	262 89	74 02	
7,503 00	1 52	168 67	7,500 49	-9 24	-73 44	262 83	74 02	

COG OPERATING



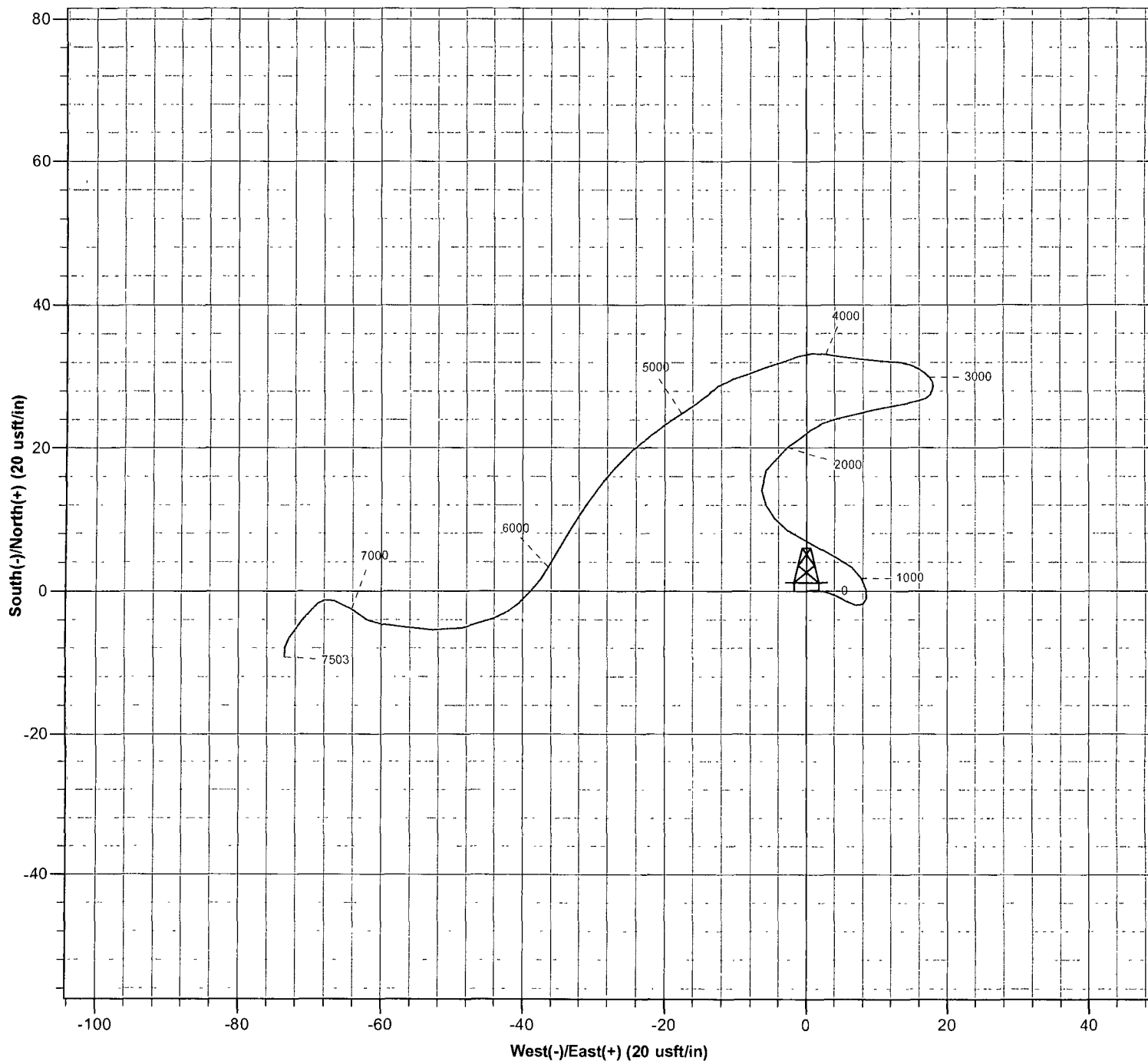
Azimuths to Grid North
True North -0.14°
Magnetic North 7.54°

Magnetic Field
Strength 48385.8nT
Dip Angle 59.90°
Date 04/30/2012
Model IGRF2010

WELL DETAILS: Cottonmouth "23" Federal Com #1H

Ground Level: 0.00

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	376621.13	584907.13	32° 2' 6.540 N	104° 3' 33.590 W	



Project: Hay Hollow
Site: Eddy County, NM
Well: Cottonmouth "23" Federal Com #1H
Wellbore: VH - Job #32K0412490
Design: VH - Job #32K0412490

SITE DETAILS: Eddy County, NM
Site Centre Latitude: 32° 3' 42.020 N
Longitude: 104° 5' 59.660 W

Positional Uncertainty: 0.00
Convergence: 0.12
Local North: Grid

CRESCENT

DIRECTIONAL DRILLING

Minimum Curvature Calculation

Client: C.O.G Operating **M.W.D. OPERATORS:** Thomas Nawara/ J.R. Jones
Well: Cottonmouth 23 Federal Com 1H **DIRECTIONAL DRILLERS:** Scott Brandt/ Steve Bibb
County: Eddy **Tool Azimuth to Grid North:** 7.54
Rig: Silver Oak 7 **Job #:** PB-12236
Vertical Section Angle: 180.96 **API#:** 30-015-39784

Sur #	Meas Depth	Inc.	Azm.	T.V.D.	Ver Sect	+N/-S	+E/-W	DLS
Tie In	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gyro	100.00	0.62	76.63	100.00	-0.13	0.13	0.53	0.62
Gyro	200.00	0.72	101.78	199.99	-0.15	0.12	1.67	0.31
Gyro	300.00	0.67	101.93	299.98	0.08	-0.13	2.85	0.05
Gyro	400.00	0.99	115.86	399.97	0.55	-0.62	4.20	0.38
Gyro	500.00	0.93	120.56	499.96	1.32	-1.41	5.68	0.10
Gyro	600.00	0.74	103.13	599.95	1.86	-1.97	7.01	0.32
Gyro	700.00	0.50	50.57	699.94	1.71	-1.84	7.97	0.59
Gyro	800.00	0.63	18.90	799.94	0.90	-1.05	8.49	0.33
Gyro	900.00	0.89	342.24	899.93	-0.36	0.21	8.43	0.54
Gyro	1000.00	1.08	330.88	999.92	-1.91	1.78	7.73	0.27
Gyro	1100.00	1.24	309.49	1099.90	-3.40	3.29	6.44	0.46
Gyro	1200.00	1.71	296.84	1199.86	-4.72	4.65	4.27	0.57
Gyro	1300.00	1.82	299.67	1299.82	-6.14	6.11	1.56	0.14
Gyro	1400.00	1.30	296.68	1399.78	-7.39	7.41	-0.83	0.53
Gyro	1500.00	1.32	300.91	1499.75	-8.46	8.51	-2.83	0.10
Gyro	1600.00	1.44	324.37	1599.72	-10.04	10.12	-4.55	0.57
Gyro	1700.00	1.18	327.18	1699.70	-11.91	12.01	-5.84	0.27
Gyro	1800.00	1.37	356.18	1799.67	-13.95	14.06	-6.48	0.66
Gyro	1900.00	2.11	26.16	1899.63	-16.81	16.91	-5.75	1.15
Gyro	2000.00	3.03	55.27	1999.53	-20.02	20.07	-2.76	1.57
Gyro	2100.00	1.70	53.00	2099.44	-22.47	22.47	0.59	1.33
Gyro	2200.00	2.86	73.79	2199.36	-24.12	24.05	4.17	1.41
Gyro	2300.00	3.50	79.00	2299.21	-25.49	25.33	9.57	0.70
Gyro	2400.00	2.11	78.89	2399.09	-26.51	26.27	14.37	1.39
Gyro	2500.00	0.74	70.88	2499.05	-27.11	26.84	16.79	1.38
Gyro	2600.00	0.47	22.68	2599.05	-27.72	27.43	17.55	0.55
Gyro	2700.00	0.33	31.56	2699.05	-28.35	28.05	17.86	0.15
Gyro	2800.00	0.34	1.97	2799.05	-28.89	28.59	18.02	0.17
Gyro	2900.00	0.39	343.50	2899.04	-29.51	29.22	17.94	0.13
Gyro	3000.00	0.57	313.60	2999.04	-30.17	29.89	17.48	0.30
Gyro	3100.00	0.54	310.26	3099.04	-30.81	30.53	16.76	0.04
Gyro	3200.00	0.65	294.39	3199.03	-31.33	31.07	15.88	0.20
Gyro	3300.00	0.73	299.75	3299.02	-31.87	31.62	14.81	0.10
Gyro	3400.00	0.91	274.07	3399.01	-32.22	31.99	13.47	0.40
Gyro	3500.00	0.96	270.07	3499.00	-32.25	32.05	11.84	0.08
Gyro	3600.00	0.99	279.93	3598.99	-32.37	32.20	10.15	0.17
Gyro	3700.00	1.05	273.83	3698.97	-32.55	32.41	8.39	0.12
Gyro	3800.00	0.93	275.86	3798.95	-32.66	32.56	6.66	0.13
Gyro	3900.00	1.24	278.00	3898.94	-32.86	32.79	4.79	0.31

CRESCENT

DIRECTIONAL DRILLING

Minimum Curvature Calculation

Client: C.O.G Operating **M.W.D. OPERATORS:** Thomas Nawara/ J.R. Jones
Well: Cottonmouth 23 Federal Com 1H **DIRECTIONAL DRILLERS:** Scott Brandt/ Steve Bibb
County: Eddy **Tool Azimuth to Grid North:** 7.54
Rig: Silver Oak 7 **Job #:** PB-12236
Vertical Section Angle: 180.96 **API#:** 30-015-39784

Sur #	Meas. Depth	Inc	Azm	T.V.D	Ver.Sect	+N/-S	+E/-W	DLS
Gyro	4000.00	1.10	279.55	3998.92	-33.14	33.10	2.77	0.14
Gyro	4100.00	1.15	268.38	4098.90	-33.24	33.23	0.82	0.22
Gyro	4200.00	1.27	249.87	4198.87	-32.80	32.82	-1.23	0.41
Gyro	4300.00	1.35	250.89	4298.85	-31.99	32.05	-3.38	0.08
Gyro	4400.00	1.48	254.31	4398.82	-31.22	31.32	-5.74	0.15
Gyro	4500.00	1.49	244.78	4498.78	-30.27	30.42	-8.16	0.25
Gyro	4600.00	1.36	257.91	4598.75	-29.43	29.61	-10.49	0.35
Gyro	4700.00	1.19	228.92	4698.73	-28.47	28.68	-12.44	0.66
Gyro	4800.00	1.08	233.19	4798.71	-27.20	27.43	-13.97	0.14
Gyro	4900.00	1.26	232.19	4898.69	-25.93	26.20	-15.60	0.18
Gyro	5000.00	1.58	237.31	4998.66	-24.48	24.78	-17.62	0.34
Gyro	5100.00	1.66	233.76	5098.62	-22.84	23.18	-19.95	0.13
Gyro	5200.00	1.63	234.01	5198.58	-21.11	21.48	-22.27	0.03
Gyro	5300.00	1.54	229.32	5298.54	-19.36	19.77	-24.44	0.16
Gyro	5400.00	1.82	221.03	5398.50	-17.25	17.70	-26.50	0.37
Gyro	5500.00	1.89	219.67	5498.44	-14.75	15.23	-28.60	0.08
Gyro	5600.00	1.99	215.32	5598.39	-12.03	12.55	-30.65	0.18
Gyro	5700.00	1.75	211.89	5698.33	-9.29	9.83	-32.47	0.26
Gyro	5800.00	1.50	212.87	5798.29	-6.87	7.44	-33.98	0.25
Gyro	5900.00	1.38	208.69	5898.26	-4.69	5.28	-35.27	0.16
Gyro	6000.00	1.21	210.78	5998.24	-2.71	3.32	-36.39	0.18
Gyro	6100.00	1.04	216.67	6098.22	-1.05	1.68	-37.47	0.21
Gyro	6200.00	1.29	222.09	6198.20	0.53	0.12	-38.77	0.27
Gyro	6300.00	1.82	225.90	6298.16	2.50	-1.82	-40.66	0.54
Gyro	6400.00	2.81	249.10	6398.08	4.54	-3.80	-44.09	1.34
Gyro	6500.00	2.48	257.86	6497.97	5.94	-5.13	-48.50	0.52
Gyro	6600.00	2.51	273.66	6597.88	6.33	-5.45	-52.80	0.69
Gyro	6700.00	2.12	278.89	6697.80	5.97	-5.02	-56.81	0.44
Gyro	6800.00	1.30	273.92	6797.75	5.66	-4.66	-59.77	0.83
Gyro	6900.00	1.34	299.82	6897.73	5.03	-4.00	-61.92	0.59
Gyro	7000.00	1.66	306.96	6997.69	3.62	-2.54	-64.09	0.37
Gyro	7100.00	1.65	284.51	7097.65	2.43	-1.31	-66.64	0.64
Gyro	7200.00	1.37	227.76	7197.62	2.91	-1.76	-68.92	1.46
Gyro	7300.00	1.96	219.48	7297.58	5.07	-3.88	-70.89	0.64
Gyro	7400.00	1.80	212.03	7397.52	7.75	-6.53	-72.81	0.29
Gyro	7500.00	1.51	171.51	7497.49	10.40	-9.17	-73.45	1.18
Gyro	7503.00	1.52	168.67	7500.49	10.47	-9.24	-73.44	2.52
22	7541.00	1.40	158.20	7538.47	11.39	-10.17	-73.16	0.77
23	7572.00	1.80	129.70	7569.46	12.05	-10.83	-72.65	2.83
24	7604.00	3.30	159.10	7601.43	13.22	-12.01	-71.93	6.07
25	7636.00	7.00	180.50	7633.30	16.02	-14.82	-71.62	12.83
26	7668.00	10.70	190.70	7664.91	20.90	-19.70	-72.19	12.52
27	7699.00	13.80	192.30	7695.20	27.37	-26.14	-73.51	10.06
28	7731.00	16.60	193.20	7726.08	35.58	-34.32	-75.37	8.78
29	7763.00	19.30	197.70	7756.52	45.11	-43.81	-78.02	9.48
30	7795.00	22.50	201.40	7786.41	55.91	-54.55	-81.87	10.81
31	7827.00	25.90	202.10	7815.60	68.17	-66.73	-86.73	10.66
32	7858.00	29.60	200.70	7843.03	81.70	-80.17	-91.99	12.12
33	7890.00	33.80	199.30	7870.25	97.59	-95.97	-97.72	13.32

CRESCENT

DIRECTIONAL DRILLING

Minimum Curvature Calculation

Client: C.O.G Operating
Well: Cottonmouth 23 Federal Com 1H
County: Eddy
Rig: Silver Oak 7

M.W.D. OPERATORS: Thomas Nawara/ J.R. Jones
DIRECTIONAL DRILLERS: Scott Brandt/ Steve Bibb
Tool Azimuth to Grid North: 7 54
Job #: PB-12236
API#: 30-015-39784

Vertical Section Angle: 180.96

Sur #	Meas Depth	Inc.	Azm.	T.V.D.	Ver Sect	+N/-S	+E/-W	DLS
34	7922.00	38.30	197.90	7896.11	115.54	-113.82	-103.72	14.30
35	7953.00	42.30	196.90	7919.75	134.77	-132.95	-109.70	13.07
36	7985.00	45.30	195.60	7942.85	156.13	-154.21	-115.90	9.79
37	8017.00	47.10	195.50	7964.99	178.48	-176.46	-122.09	5.63
38	8049.00	50.30	193.70	7986.11	201.84	-199.72	-128.14	10.86
39	8081.00	53.30	190.90	8005.90	226.49	-224.29	-133.48	11.62
40	8113.00	56.50	191.20	8024.30	252.26	-249.98	-138.50	10.03
41	8144.00	59.70	189.30	8040.68	278.23	-275.87	-143.17	11.56
42	8176.00	63.80	188.40	8055.82	306.15	-303.72	-147.50	13.05
43	8208.00	68.20	186.80	8068.84	335.18	-332.69	-151.36	14.49
44	8240.00	72.40	184.20	8079.62	365.20	-362.67	-154.24	15.19
45	8272.00	73.20	183.30	8089.09	395.73	-393.17	-156.24	3.67
46	8304.00	72.60	183.00	8098.49	426.30	-423.71	-157.92	2.08
47	8336.00	75.50	182.30	8107.29	457.05	-454.44	-159.34	9.30
48	8367.00	80.70	181.40	8113.68	487.37	-484.75	-160.32	17.01
49	8399.00	85.70	181.20	8117.47	519.13	-516.51	-161.04	15.64
50	8431.00	89.40	182.40	8118.83	551.09	-548.46	-162.04	12.15
51	8462.00	90.00	183.00	8119.00	582.08	-579.42	-163.50	2.74
52	8494.00	90.20	183.00	8118.94	614.06	-611.38	-165.18	0.63
53	8526.00	90.60	181.90	8118.72	646.05	-643.35	-166.54	3.66
54	8558.00	91.70	182.10	8118.07	678.03	-675.32	-167.66	3.49
55	8590.00	91.10	180.50	8117.29	710.02	-707.30	-168.39	5.34
56	8622.00	90.30	180.50	8116.90	742.02	-739.30	-168.67	2.50
57	8653.00	90.00	178.00	8116.82	773.00	-770.29	-168.26	8.12
58	8747.00	89.90	177.40	8116.90	866.85	-864.22	-164.49	0.65
59	8842.00	89.30	177.00	8117.57	961.64	-959.10	-159.85	0.76
60	8938.00	89.40	177.60	8118.65	1057.44	-1054.99	-155.33	0.63
61	9033.00	89.60	177.20	8119.48	1152.25	-1149.88	-151.02	0.47
62	9128.00	90.10	177.70	8119.73	1247.07	-1244.79	-146.79	0.74
63	9224.00	92.80	177.80	8117.30	1342.88	-1340.68	-143.02	2.81
64	9319.00	91.50	179.30	8113.74	1437.73	-1435.57	-140.62	2.09
65	9415.00	89.80	179.40	8112.65	1533.68	-1531.56	-139.53	1.77
66	9510.00	90.50	178.90	8112.40	1628.63	-1626.55	-138.12	0.91
67	9606.00	88.10	178.70	8113.57	1724.55	-1722.51	-136.11	2.51
68	9701.00	88.40	178.80	8116.48	1819.43	-1817.44	-134.04	0.33
69	9797.00	90.70	178.40	8117.23	1915.34	-1913.41	-131.70	2.43
70	9892.00	90.00	178.60	8116.65	2010.25	-2008.37	-129.21	0.77
71	9988.00	89.30	177.30	8117.24	2106.12	-2104.30	-125.78	1.54
72	10083.00	90.50	177.30	8117.40	2200.92	-2199.20	-121.30	1.26
73	10179.00	90.70	176.10	8116.40	2296.65	-2295.03	-115.77	1.27
74	10275.00	89.80	175.80	8115.98	2392.28	-2390.79	-108.99	0.99
75	10370.00	92.30	176.40	8114.24	2486.91	-2485.55	-102.53	2.71
76	10465.00	90.30	177.30	8112.08	2581.64	-2580.37	-97.32	2.31
77	10561.00	87.70	178.20	8113.76	2677.47	-2676.27	-93.55	2.87
78	10656.00	88.30	178.50	8117.07	2772.31	-2771.18	-90.81	0.71
79	10751.00	88.50	179.50	8119.72	2867.21	-2866.12	-89.16	1.07
80	10847.00	87.40	180.20	8123.16	2963.13	-2962.06	-88.91	1.36
81	10943.00	88.00	181.00	8127.01	3059.05	-3057.98	-89.91	1.04
82	11038.00	88.60	181.80	8129.83	3154.01	-3152.90	-92.23	1.05

CRESCENT

DIRECTIONAL DRILLING

Minimum Curvature Calculation

Client: C.O.G Operating
Well: Cottonmouth 23 Federal Com 1H
County: Eddy
Rig: Silver Oak 7

M.W.D. OPERATORS: Thomas Nawara/ J.R. Jones
DIRECTIONAL DRILLERS: Scott Brandt/ Steve Bibb
Tool Azimuth to Grid North: 7.54
Job #: PB-12236

Vertical Section Angle: 180.96
API#: 30-015-39784

Sur #	Meas. Depth	Inc.	Azm.	T.V.D.	Ver. Sect.	+N/-S	+E/-W	DLS
83	11133.00	89.20	181.70	8131.65	3248.98	-3247.84	-95.13	0.64
84	11229.00	90.00	181.00	8132.32	3344.97	-3343.81	-97.39	1.11
85	11325.00	89.90	181.80	8132.41	3440.97	-3439.78	-99.74	0.84
86	11420.00	90.00	180.90	8132.49	3535.97	-3534.75	-101.98	0.95
87	11516.00	89.70	180.40	8132.74	3631.96	-3630.75	-103.06	0.61
88	11611.00	90.60	180.70	8132.49	3726.96	-3725.74	-103.98	1.00
89	11707.00	91.10	180.90	8131.07	3822.95	-3821.72	-105.32	0.56
90	11802.00	91.90	181.20	8128.58	3917.92	-3916.67	-107.06	0.90
91	11897.00	90.40	180.90	8126.67	4012.89	-4011.63	-108.80	1.61
92	11993.00	88.90	181.70	8127.26	4108.89	-4107.60	-110.98	1.77
93	12088.00	88.70	181.00	8129.25	4203.86	-4202.56	-113.21	0.77
94	12183.00	88.60	181.10	8131.49	4298.84	-4297.51	-114.95	0.15
95	12279.00	88.80	180.50	8133.67	4394.81	-4393.48	-116.29	0.66
96	12375.00	89.30	180.90	8135.26	4490.80	-4489.46	-117.47	0.67
97	12470.00	89.00	181.20	8136.67	4585.79	-4584.43	-119.21	0.45
98	12566.00	89.70	181.20	8137.76	4681.78	-4680.40	-121.22	0.73
99	12662.00	87.30	179.80	8140.27	4777.73	-4776.36	-122.06	2.89
100	12756.00	86.70	179.50	8145.19	4871.58	-4870.23	-121.48	0.71
PTB	12805.00	86.70	179.50	8148.01	4920.48	-4919.14	-121.05	0.00