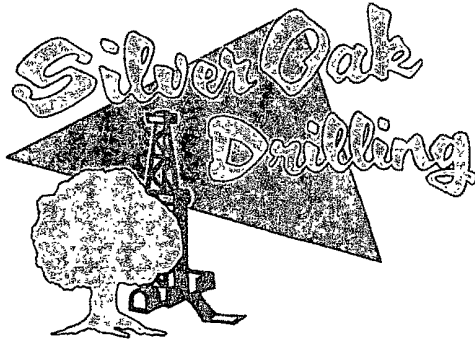
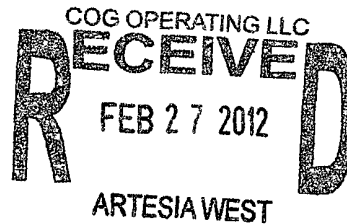




PO Box 1370
Artesia, NM 88211-1370
(575) 748-1288

30-015-39734



February 10, 2012

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

RE: Cottonmouth 13 Federal Com 1-H
810' FSL & 2630' FWL
Sec. 24, T26S, R28E
Eddy County, New Mexico

Dear Sir,

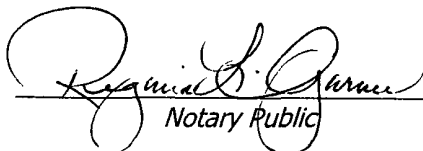
The attached is the Deviation Survey for the above captioned well.

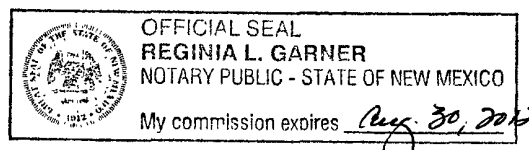
Very truly yours,


Eddie C. LaRue
Operations Manager

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 10th day of February, 2012.


Regina L. Garner
Notary Public



Pason DataHub Deviation Survey

Well Dossier 1325380167 - COTTONMOUTH 13 1-H

#

# Date	Depth	Deviation	Direction	TVD
1/1/2012	189	1.10	0.00	0.00
1/1/2012	427	2.20	0.00	0.00
1/3/2012	685	2.50	0.00	0.00
1/4/2012	768	1.60	0.00	0.00
1/4/2012	1024	1.60	0.00	0.00
1/4/2012	1320	0.80	0.00	0.00
1/5/2012	1500	1.80	0.00	0.00
1/5/2012	1752	1.90	0.00	0.00
1/5/2012	2007	1.80	0.00	0.00
1/5/2012	2364	4.00	0.00	0.00
1/7/2012	2175	3.70	95.00	0.00
1/7/2012	2413	6.90	97.80	0.00
1/8/2012	2540	4.00	98.30	0.00
1/8/2012	2591	3.40	99.40	0.00
1/8/2012	2620	2.00	99.40	0.00
1/10/2012	2860	0.70	0.00	0.00
1/11/2012	3323	1.50	0.00	0.00
1/11/2012	3829	1.20	0.00	0.00
1/11/2012	4303	1.20	0.00	0.00
1/11/2012	4749	1.70	0.00	0.00
1/12/2012	5193	2.10	0.00	0.00
1/12/2012	5668	2.30	0.00	0.00
1/12/2012	6112	1.80	0.00	0.00
1/13/2012	6555	2.50	0.00	0.00
1/13/2012	7002	1.10	0.00	0.00
1/17/2012	6565	12.40	210.00	0.00
1/18/2012	6629	26.60	216.30	0.00
1/18/2012	6883	42.70	227.50	0.00
1/18/2012	7074	61.00	222.10	0.00
1/19/2012	7201	70.70	204.60	0.00
1/20/2012	7329	86.10	207.60	0.00
1/20/2012	7742	91.10	177.60	0.00
1/20/2012	8344	91.60	181.70	0.00
1/21/2012	8473	91.10	182.10	7022.00
1/21/2012	9045	87.30	179.60	7024.00
1/22/2012	9618	91.60	183.00	7028.00
1/22/2012	9713	92.00	180.30	7025.00
1/22/2012	9809	93.00	181.50	0.00
1/23/2012	10191	89.90	180.50	7010.00
1/23/2012	10286	88.40	180.00	7012.00
1/23/2012	10381	88.30	177.80	0.00

#	Date	Depth	Deviation	Direction	TVD
	1/23/2012	10477	88.10	178.80	0.00
	1/23/2012	10763	92.90	179.90	7017.74
	1/24/2012	10858	89.70	179.60	7015.00
	1/24/2012	10953	88.30	179.80	7017.00
	1/24/2012	11049	90.50	181.40	7018.00
	1/30/2012	10502	83.50	182.30	0.00
	2/1/2012	10787	87.90	186.60	7045.00
	2/1/2012	11073	90.90	177.60	0.00
	2/1/2012	11168	91.70	177.10	7044.00
	2/1/2012	11264	92.20	178.10	7040.00
	2/2/2012	11455	90.40	176.70	7037.00
	2/2/2012	11741	91.40	180.50	7032.00
	2/2/2012	11836	91.10	181.40	7029.00
	2/2/2012	11923	91.10	181.30	7027.00
	2/2/2012	12027	90.60	180.80	7026.00
	2/3/2012	12122	90.10	180.50	7026.00
	2/3/2012	12313	89.70	179.90	7026.00
	2/5/2012	12408	88.30	177.30	7026.00
	2/5/2012	12504	87.80	176.70	7029.00

EOF

COG OPERATING

Red Bluff
Eddy County, NM
Cottonmouth "13" Federal Com #1H
VH - Job #32K0112037

Survey: Gyro

SDI Standard Survey Report

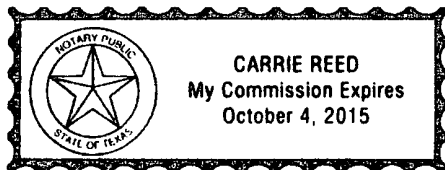
This survey is correct to the best of my knowledge and is supported by actual field data.

Luhan

Notarized this date 20th of March, 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 "13" Federal Com #1H
Project:	Red Bluff	TVD Reference:	WELL @ 0 0usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0 0usft (Original Well Elev)
Well:	Cottonmouth "13" Federal Com #1H	North Reference:	Grid
Wellbore:	VH - Job #32K0112037	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0112037	Database:	EDM-Regulatory

Project	Red Bluff		
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:	403,456 01 usft
From:	Lat/Long	Easting:	572,556 11 usft
Position Uncertainty:	0 0 usft	Slot Radius:	13-3/16"
		Latitude:	32° 6' 32 400 N
		Longitude:	104° 5' 56 400 W
		Grid Convergence:	0 12 °

Well:	Cottonmouth "13" Federal Com #1H, Directional (Phoenix)		
Well Position	+N-S	0 0 usft	Northing: 377,475 21 usft
	+E-W	0 0 usft	Easting: 590,776 18 usft
Position Uncertainty	0 0 usft	Wellhead Elevation:	usft
		Latitude:	32° 2' 14 840 N
		Longitude:	104° 2' 25 380 W
		Ground Level:	0 0 usft

Wellbore	VH - Job #32K0112037				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2010	1/13/2012	7 72	59 92	48,419

Design	VH - Job #32K0112037			
Audit Notes:				
Version:	1 0	Phase:	ACTUAL	Tie On Depth: 0 0
Vertical Section:	Depth From (TVD)	+N-S	+E-W	Direction
	(usft)	(usft)	(usft)	(°)
	0 0	0.0	0 0	183 97

Survey Program	Date	4/10/2012		
From	To	Survey (Wellbore)	Tool Name	Description
(usft)	(usft)			
100 0	7,447 0	Gyro (VH - Job #32K0112037)	Keeper	Keeper Gyro

Survey								
Measured Depth	Inclination	Azimuth	True Vertical	North/South	East/West	Closure Azimuth	Closure Distance	
(usft)	(°)	(°)	Depth	(usft)	(usft)	(°)	(usft)	
0 0	0 00	0 00	0 0	0 0	0 0	0 00	0 0	0 0
100 0	0 35	17 33	100 0	0 3	0 1	17 33	0 3	
200 0	0 75	16 23	200 0	1 2	0 4	16 76	1 3	
300 0	0 92	21 58	300 0	2 6	0 8	18 05	2 7	
400 0	1 10	32 50	400 0	4 1	1 7	21 77	4 5	
500 0	1 21	30 91	499 9	5 9	2 7	24 84	6 5	
600 0	1 27	40 83	599 9	7 6	4 0	27 63	8 6	
700 0	1 31	60 16	699 9	9 0	5 7	32 30	10 7	
800 0	1 16	70 20	799 9	9 9	7 6	37 60	12 5	
900 0	0 86	77 57	899 9	10 4	9 3	41 81	14 0	
1,000 0	0 69	75 86	999 9	10 7	10 6	44 75	15 1	
1,100 0	0 73	87 22	1,099 8	10 9	11 9	47 39	16 1	

Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG OPERATING	Local Co-ordinate Reference:	Well Cottonmouth "13" Federal Com #1H
Project:	Red Bluff	TVD Reference:	WELL @ 0 0usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0 0usft (Original Well Elev)
Well:	Cottonmouth "13" Federal Com #1H	North Reference:	Grid
Wellbore:	VH - Job #32K0112037	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0112037	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 0	0 70	106 31	1,199 8	10 8	13 1	50 54	16 9	
1,300 0	0 64	115 91	1,299 8	10 4	14 2	53 84	17 6	
1,400 0	0 32	181 10	1,399 8	9 8	14 7	56 17	17 7	
1,500 0	0 42	185 02	1,499 8	9 2	14 6	57 87	17 3	
1,600 0	0 81	114 98	1,599 8	8 5	15 2	60 78	17 5	
1,700 0	1 36	107 42	1,699 8	7 9	17 0	65 17	18 7	
1,800 0	1 43	113 21	1,799 8	7 0	19 3	69 99	20 5	
1,900 0	0 90	116 42	1,899 8	6 2	21 1	73 70	22 0	
2,000 0	2 96	93 34	1,999 7	5 7	24 4	76 90	25 1	
2,100 0	4 01	95 06	2,099 5	5 2	30 5	80 28	30 9	
2,200 0	4 57	93 18	2,199 2	4 7	37 9	82 95	38 2	
2,300 0	6 59	95 80	2,298 7	3 9	47 6	85 33	47 8	
2,400 0	6 48	95 66	2,398 1	2 8	59 0	87 32	59 0	
2,500 0	5 01	97 12	2,497 6	1 7	68 9	88 62	68 9	
2,600 0	2 59	93 93	2,597 4	1 0	75 5	89 27	75 5	
2,700 0	1 80	91 51	2,697 3	0 8	79 3	89 45	79 3	
2,800 0	1 68	91 06	2,797 2	0 7	82 4	89 51	82 4	
2,900 0	1 39	90 45	2,897 2	0 7	85 0	89 55	85 0	
3,000 0	1 36	90 10	2,997 2	0 7	87 4	89 57	87 4	
3,100 0	1 22	91 21	3,097 2	0 6	89 7	89 60	89 7	
3,200 0	1 11	95 77	3,197 1	0 5	91 7	89 68	91 7	
3,300 0	0 99	101 10	3,297 1	0 2	93 5	89 85	93 5	
3,400 0	0 85	100 85	3,397 1	-0 1	95 1	90 04	95 1	
3,500 0	0 57	108 22	3,497 1	-0 4	96 3	90 21	96 3	
3,600 0	0 36	108 56	3,597 1	-0 6	97 1	90 36	97 1	
3,700 0	0 26	105 84	3,697 1	-0 8	97 6	90 46	97 6	
3,800 0	0 16	87 60	3,797 1	-0 8	97 9	90 49	97 9	
3,900 0	0 10	71 00	3,897 1	-0 8	98 2	90 47	98 2	
4,000 0	0 09	51 40	3,997 1	-0 7	98 3	90 42	98 3	
4,100 0	0 15	234 74	4,097 1	-0 7	98 3	90 44	98 3	
4,200 0	0 17	254 74	4,197 1	-0 9	98 0	90 50	98 0	
4,300 0	0 37	230 69	4,297 1	-1 1	97 6	90 65	97 6	
4,400 0	0 41	222 04	4,397 1	-1 6	97 1	90 93	97 1	
4,500 0	0 42	231 28	4,497 1	-2 1	96 6	91 23	96 6	
4,600 0	0 57	206 47	4,597 1	-2 7	96 1	91 64	96 1	
4,700 0	0 61	196 40	4,697 1	-3 7	95 7	92 21	95 8	
4,800 0	0 67	196 18	4,797 1	-4 8	95 4	92 86	95 5	
4,900 0	0 73	200 87	4,897 1	-5 9	95 0	93 57	95 2	
5,000 0	0 90	197 12	4,997 0	-7 3	94 6	94 40	94 8	
5,100 0	0 98	198 11	5,097 0	-8 8	94 1	95 37	94 5	
5,200 0	1 02	197 92	5,197 0	-10 5	93 5	96 40	94 1	
5,300 0	1 14	202 54	5,297 0	-12 3	92 9	97 52	93 7	
5,400 0	1 18	204 83	5,397 0	-14 1	92 1	98 72	93 1	
5,500 0	1 23	202 96	5,497 0	-16 0	91 2	99 97	92 6	

Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG OPERATING	Local Co-ordinate Reference:	Well Cottonmouth "13" Federal Com #1H
Project:	Red Bluff	TVD Reference:	WELL @ 0 0usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0 0usft (Original Well Elev)
Well:	Cottonmouth "13" Federal Com #1H	North Reference:	Grid
Wellbore:	VH - Job #32K0112037	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0112037	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 0	1 20	198 65	5,596 9	-18 0	90 5	101 27	92 2
5,700 0	1 21	196 40	5,696 9	-20 0	89 8	102 57	92 0
5,800 0	1 24	194 15	5,796 9	-22 1	89 3	103 90	92 0
5,900 0	1 42	192 05	5,896 9	-24 3	88 7	105 34	92 0
6,000 0	1 40	193 36	5,996 8	-26 7	88 2	106 87	92 2
6,100 0	1 45	191 18	6,096 8	-29 2	87 7	108 41	92 4
6,200 0	1 49	195 29	6,196 8	-31 7	87 1	109 99	92 7
6,300 0	1 05	182 49	6,296 7	-33 8	86 7	111 32	93 1
6,400 0	0 51	199 31	6,396 7	-35 2	86 5	112 13	93 4
6,500 0	1 62	293 74	6,496 7	-35 0	85 1	112 38	92 0
6,600 0	1 82	285 98	6,596 7	-34 0	82 2	112 47	89 0
6,700 0	1 39	272 52	6,696 6	-33 5	79 5	112 87	86 3
6,800 0	0 96	266 63	6,796 6	-33 5	77 5	113 41	84 4
6,900 0	0 99	278 18	6,896 6	-33 5	75 8	113 82	82 8
7,000 0	0 59	296 82	6,996 6	-33 1	74 5	113 97	81 5
7,100 0	0 52	283 49	7,096 6	-32 8	73 6	114 01	80 5
7,200 0	1 07	219 27	7,196 6	-33 4	72 5	114 71	79 8
7,300 0	1 33	185 03	7,296 6	-35 3	71 8	116 14	80 0
7,400 0	1 35	185 26	7,396 5	-37 6	71 6	117 69	80 9
7,447 0	1 55	191 16	7,443 5	-38 8	71 4	118 48	81 3



Scientific Drilling
Directional Drilling Operations

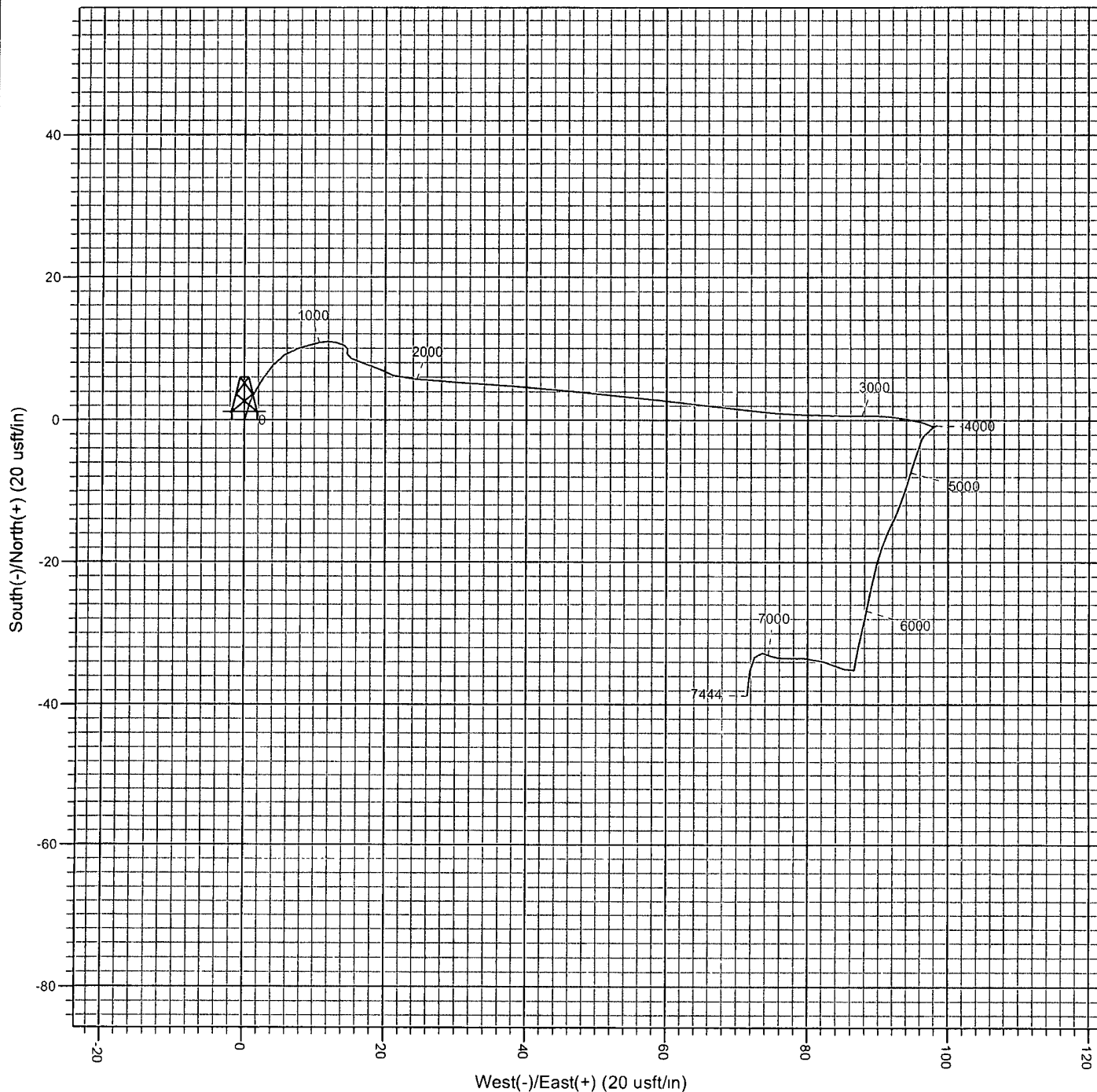
Project: Red Bluff
Eddy County, NM
Well: Cottonmouth "13" Federal Com #1H
Wellbore: VH - Job #32K0112037
Design: VH - Job #32K0112037

WELL DETAILS: Cottonmouth "13" Federal Com #1H

WELL @ 0.0usft (Original Well Elev)

Ground Level: 0.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	377475.21	590776.18	32° 2' 14.840 N	104° 2' 25.380 W	



PROJECT DETAILS: Red Bluff	SITE DETAILS: Eddy County, NM
Geodetic System: US State Plane 1927 (Exact solution)	Site Centre Latitude: 32° 6' 32.400 N
Datum: NAD 1927 (NADCON CONUS)	Longitude: 104° 5' 56.400 W
Ellipsoid: Clarke 1866	Positional Uncertainty: 0 0
Zone: New Mexico East 3001	Convergence: 0.12
System Datum: Mean Sea Level	Local North: Grid



Concho

**Eddy County, New Mexico (Nad83)
Cottonmouth 13 Federal Com
Cottonmouth 13 Fed Com 1H
Wellbore #1**

Design: Wellbore #1

Concho

06 February, 2012





Phoenix Technology Services
Concho



Company:	Concho	Local Co-ordinate Reference:	Well Cottonmouth 13 Fed Com 1H
Project:	Eddy County, New Mexico (Nad83)	TVD Reference:	WELL @ 2937.99usft (Original Well Elev + 18' KB)
Site:	Cottonmouth 13 Federal Com	MD Reference:	WELL @ 2937.99usft (Original Well Elev + 18' KB)
Well:	Cottonmouth 13 Fed Com 1H	North Reference:	Gnd
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	GCR DB v5000

Project	Eddy County, New Mexico (Nad83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site	Cottonmouth 13 Federal Com				
Site Position:		Northing:	377,532.35 usft	Latitude:	32° 2' 15.2849 N
From:	Map	Easting:	631,960.93 usft	Longitude:	104° 2' 27.1307 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.16 °

Well	Cottonmouth 13 Fed Com 1H					
Well Position	+N/-S	0.00 usft	Northing:	377,532.35 usft	Latitude:	32° 2' 15.2849 N
	+E/-W	0.00 usft	Easting:	631,960.93 usft	Longitude:	104° 2' 27.1307 W
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft	Ground Level:	2,919.99 usft	

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010_14	09/14/11	7.76	59.93	48,430

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	183.97	



Phoenix Technology Services
Concho



Company: Concho
Project: Eddy County, New Mexico (Nad83)
Site: Cottonmouth 13 Federal Com
Well: Cottonmouth 13 Fed Com 1H
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well Cottonmouth 13 Fed Com 1H
TVD Reference: WELL @ 2937.99usft (Original Well Elev + 18' KB)
MD Reference: WELL @ 2937.99usft (Original Well Elev + 18' KB)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: GCR DB v5000

Survey Program		Date	02/06/12		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100 00	6,400.00	Gyro Surveys (Wellbore #1)	MWD	MWD - Standard	
6,470 00	10,381.00	Phoenix MWD Surveys (Wellbore #1)	MWD	MWD - Standard	
10,502 00	12,586 00	Phoenix ST MWD Surveys (Wellbore #1)	MWD	MWD - Standard	

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
0.00	0.00	0.00	-2,937.99	0.00	0.00	0.00	0.00	0.00	377,532.35	631,960.93
100.00	0.35	17.33	-2,837.99	100.00	0.29	0.09	-0.30	0.35	377,532.65	631,961.02
200.00	0.75	16.23	-2,738.00	199.99	1.21	0.36	-1.23	0.40	377,533.57	631,961.30
300.00	0.92	21.58	-2,638.01	299.98	2.59	0.84	-2.64	0.19	377,534.94	631,961.78
400.00	1.10	32.50	-2,538.03	399.97	4.14	1.65	-4.25	0.26	377,536.50	631,962.59
500.00	1.21	30.91	-2,438.05	499.95	5.86	2.71	-6.03	0.11	377,538.21	631,963.65
600.00	1.27	40.83	-2,338.07	599.92	7.60	3.98	-7.86	0.22	377,539.96	631,964.91
700.00	1.31	60.16	-2,238.09	699.90	9.01	5.70	-9.38	0.43	377,541.36	631,966.63
800.00	1.16	70.20	-2,138.12	799.88	9.92	7.64	-10.43	0.26	377,542.28	631,968.57
900.00	0.86	77.57	-2,038.13	899.86	10.43	9.32	-11.05	0.33	377,542.78	631,970.26
1,000.00	0.69	75.86	-1,938.14	999.85	10.73	10.64	-11.45	0.17	377,543.09	631,971.57
1,100.00	0.73	87.22	-1,838.15	1,099.84	10.91	11.86	-11.71	0.15	377,543.27	631,972.79
1,200.00	0.70	106.31	-1,738.16	1,199.84	10.77	13.08	-11.65	0.24	377,543.13	631,974.02
1,300.00	0.64	115.91	-1,638.16	1,299.83	10.36	14.17	-11.31	0.13	377,542.71	631,975.11
1,400.00	0.32	181.10	-1,538.17	1,399.83	9.83	14.67	-10.82	0.58	377,542.19	631,975.60
1,500.00	0.42	185.02	-1,438.17	1,499.82	9.19	14.63	-10.18	0.10	377,541.54	631,975.57
1,600.00	0.81	114.98	-1,338.17	1,599.82	8.53	15.24	-9.56	0.77	377,540.88	631,976.17
1,700.00	1.36	107.42	-1,238.19	1,699.80	7.87	17.01	-9.03	0.57	377,540.23	631,977.95
1,800.00	1.43	113.21	-1,138.22	1,799.77	7.02	19.29	-8.34	0.16	377,539.38	631,980.23
1,900.00	0.90	116.42	-1,038.24	1,899.75	6.18	21.14	-7.63	0.53	377,538.54	631,982.08



Phoenix Technology Services
Concho



Company: Concho
Project: Eddy County, New Mexico (Nad83)
Site: Cottonmouth 13 Federal Com
Well: Cottonmouth 13 Fed Com 1H
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well Cottonmouth 13 Fed Com 1H
TVD Reference: WELL @ 2937.99usft (Original Well Elev + 18' KB)
MD Reference: WELL @ 2937.99usft (Original Well Elev + 18' KB)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: GCR DB v5000

Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
2,000.00	2.96	93.34	-938.30	1,999.69	5.68	24.42	-7.36	2.16	377,538.04	631,985.36	
2,100.00	4.01	95.06	-838.49	2,099.50	5.22	30.48	-7.32	1.06	377,537.58	631,991.42	
2,200.00	4.57	93.18	-738.77	2,199.22	4.69	37.95	-7.31	0.58	377,537.05	631,998.88	
2,300.00	6.59	95.80	-639.25	2,298.74	3.89	47.63	-7.18	2.04	377,536.25	632,008.57	
2,400.00	6.48	95.66	-539.90	2,398.09	2.76	58.96	-6.83	0.11	377,535.11	632,019.89	
2,500.00	5.01	97.12	-440.40	2,497.59	1.66	68.91	-6.43	1.48	377,534.01	632,029.84	
2,600.00	2.59	93.93	-340.63	2,597.36	0.96	75.49	-6.19	2.43	377,533.32	632,036.43	
2,700.00	1.80	91.51	-240.71	2,697.29	0.77	79.32	-6.26	0.80	377,533.12	632,040.25	
2,800.00	1.68	91.06	-140.75	2,797.24	0.70	82.35	-6.40	0.12	377,533.05	632,043.29	
2,900.00	1.39	90.45	-40.79	2,897.21	0.66	85.03	-6.55	0.29	377,533.02	632,045.97	
3,000.00	1.36	90.10	59.18	2,997.18	0.65	87.43	-6.70	0.03	377,533.01	632,048.36	
3,100.00	1.22	91.21	159.16	3,097.15	0.63	89.68	-6.83	0.14	377,532.98	632,050.62	
3,200.00	1.11	95.77	259.14	3,197.13	0.51	91.71	-6.85	0.14	377,532.86	632,052.64	
3,300.00	0.99	101.10	359.12	3,297.11	0.24	93.52	-6.72	0.15	377,532.60	632,054.46	
3,400.00	0.85	100.85	459.11	3,397.10	-0.06	95.10	-6.52	0.14	377,532.29	632,056.03	
3,500.00	0.57	108.22	559.10	3,497.09	-0.36	96.30	-6.31	0.29	377,532.00	632,057.23	
3,600.00	0.36	108.56	659.10	3,597.09	-0.61	97.07	-6.11	0.21	377,531.74	632,058.00	
3,700.00	0.26	105.84	759.10	3,697.09	-0.78	97.59	-5.98	0.10	377,531.58	632,058.52	
3,800.00	0.16	87.60	859.09	3,797.09	-0.83	97.94	-5.95	0.12	377,531.52	632,058.88	
3,900.00	0.10	71.00	959.09	3,897.09	-0.80	98.17	-6.00	0.07	377,531.56	632,059.10	
4,000.00	0.09	51.40	1,059.09	3,997.09	-0.72	98.31	-6.09	0.03	377,531.63	632,059.24	
4,100.00	0.15	234.74	1,159.09	4,097.09	-0.75	98.26	-6.06	0.24	377,531.61	632,059.20	
4,200.00	0.17	254.74	1,259.09	4,197.09	-0.86	98.01	-5.93	0.06	377,531.49	632,058.95	
4,300.00	0.37	230.69	1,359.09	4,297.09	-1.11	97.62	-5.66	0.23	377,531.25	632,058.55	
4,400.00	0.41	222.04	1,459.09	4,397.08	-1.58	97.13	-5.15	0.07	377,530.78	632,058.06	
4,500.00	0.42	231.28	1,559.09	4,497.08	-2.07	96.61	-4.62	0.07	377,530.28	632,057.54	
4,600.00	0.57	206.47	1,659.08	4,597.08	-2.75	96.10	-3.91	0.26	377,529.61	632,057.03	



Phoenix Technology Services
Concho



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Local Co-ordinate Reference: Well Cottonmouth 13 Fed Com 1H
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Survey Calculation Method: Minimum Curvature
Database: GCR DB v5000

Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
4,700.00	0.61	196.40	1,759.08	4,697.07	-3.70	95.73	-2.94	0.11	377,528.65	632,056.66	
4,800.00	0.67	196.18	1,859.07	4,797.07	-4.77	95.41	-1.84	0.06	377,527.58	632,056.35	
4,900.00	0.73	200.87	1,959.06	4,897.06	-5.93	95.02	-0.66	0.08	377,526.42	632,055.96	
5,000.00	0.90	197.12	2,059.05	4,997.05	-7.28	94.57	0.71	0.18	377,525.08	632,055.50	
5,100.00	0.98	198.11	2,159.04	5,097.04	-8.84	94.07	2.31	0.08	377,523.52	632,055.00	
5,200.00	1.02	197.92	2,259.03	5,197.02	-10.50	93.53	4.00	0.04	377,521.86	632,054.46	
5,300.00	1.14	202.54	2,359.01	5,297.00	-12.26	92.87	5.81	0.15	377,520.09	632,053.81	
5,400.00	1.18	204.83	2,458.99	5,396.98	-14.12	92.06	7.71	0.06	377,518.24	632,052.99	
5,500.00	1.23	202.96	2,558.97	5,496.96	-16.04	91.21	9.69	0.06	377,516.31	632,052.14	
5,600.00	1.20	198.65	2,658.94	5,596.94	-18.02	90.45	11.72	0.10	377,514.33	632,051.39	
5,700.00	1.21	196.40	2,758.92	5,696.92	-20.03	89.82	13.76	0.05	377,512.33	632,050.75	
5,800.00	1.24	194.15	2,858.90	5,796.89	-22.09	89.26	15.86	0.06	377,510.27	632,050.19	
5,900.00	1.42	192.05	2,958.87	5,896.87	-24.35	88.74	18.15	0.19	377,508.01	632,049.67	
6,000.00	1.40	193.36	3,058.84	5,996.84	-26.75	88.20	20.58	0.04	377,505.61	632,049.13	
6,100.00	1.45	191.18	3,158.81	6,096.80	-29.18	87.67	23.04	0.07	377,503.18	632,048.60	
6,200.00	1.49	195.29	3,258.78	6,196.77	-31.67	87.08	25.57	0.11	377,500.68	632,048.01	
6,300.00	1.05	182.49	3,358.75	6,296.75	-33.84	86.70	27.76	0.52	377,498.51	632,047.63	
6,400.00	0.51	199.31	3,458.74	6,396.74	-35.18	86.51	29.11	0.58	377,497.18	632,047.44	
6,470.00	7.30	197.80	3,528.54	6,466.53	-39.71	85.05	33.73	9.70	377,492.64	632,045.98	
6,502.00	12.40	210.00	3,560.06	6,498.05	-44.63	82.70	38.79	17.13	377,487.73	632,043.64	
6,533.00	15.80	207.80	3,590.12	6,528.12	-51.25	79.07	45.65	11.10	377,481.11	632,040.00	
6,565.00	19.60	216.20	3,620.61	6,558.60	-59.43	73.87	54.18	14.28	377,472.92	632,034.80	
6,597.00	23.30	215.70	3,650.39	6,588.38	-68.91	67.00	64.10	11.58	377,463.45	632,027.93	
6,629.00	26.60	216.30	3,679.40	6,617.39	-79.82	59.06	75.54	10.34	377,452.53	632,020.00	
6,661.00	27.90	217.60	3,707.84	6,645.84	-91.53	50.25	87.83	4.47	377,440.82	632,011.19	
6,693.00	30.10	219.10	3,735.83	6,673.82	-103.69	40.62	100.63	7.24	377,428.66	632,001.56	
6,724.00	33.60	221.40	3,762.16	6,700.15	-116.16	30.05	113.80	11.95	377,416.19	631,990.98	



Phoenix Technology Services
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Local Co-ordinate Reference: Well Cottonmouth 13 Fed Com 1H
TVD Reference: WELL @ 2937.99usft (Original Well Elev + 18' KB)
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Survey Calculation Method: Minimum Curvature
Database: GCR DB v5000

Survey											
MD (usft)	Inc (°)	Azi.(azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
6,756.00	36 10	224 20	3,788 42	6,726 41	-129 57	17.62	128 04	9 27	377,402.79	631,978.55	
6,788 00	37.90	223.80	3,813 97	6,751 97	-143 42	4 24	142 78	5 68	377,388 94	631,965 17	
6,820.00	36.80	223.10	3,839.41	6,777.41	-157.51	-9.11	157 76	3 68	377,374 84	631,951.82	
6,851 00	38.90	225 10	3,863.89	6,801.88	-171 16	-22 35	172.30	7 85	377,361.19	631,938 58	
6,883.00	42.70	227.50	3,888 11	6,826 11	-185 59	-37 48	187 74	12 84	377,346.76	631,923 46	
6,915 00	46.00	229.90	3,910.99	6,848 99	-200 34	-54 29	203.62	11 57	377,332.01	631,906 65	
6,947 00	48.70	231.50	3,932 67	6,870.67	-215.24	-72.50	219 74	9 20	377,317 11	631,888 43	
6,979 00	53.10	231.60	3,952.85	6,890.84	-230 68	-91.95	236 49	13 75	377,301.68	631,868.99	
7,010 00	58 10	231 50	3,970.36	6,908 35	-246 58	-111.97	253 74	16 13	377,285.77	631,848 96	
7,042.00	60 70	227.50	3,986 65	6,924 64	-264.47	-132.90	273 04	13 48	377,267 88	631,828 03	
7,074.00	61 00	222.10	4,002 25	6,940 24	-284 29	-152 58	294.17	14.77	377,248.06	631,808 35	
7,105 00	61 30	216 20	4,017.21	6,955.21	-305 34	-169 71	316.35	16.70	377,227 02	631,791 22	
7,137.00	61.80	210.20	4,032 47	6,970 46	-328.87	-185.10	340.89	16 56	377,203 49	631,775 83	
7,169.00	66.00	206.70	4,046.55	6,984 54	-354.13	-198.77	367 04	16.39	377,178 23	631,762 16	
7,201 00	70 70	204 60	4,058 35	6,996 35	-380 93	-211.63	394 67	15 90	377,151 42	631,749 30	
7,235.00	75 70	203 90	4,068 18	7,006 17	-410.60	-225.00	425.19	14 84	377,121 75	631,735 94	
7,267 00	79.70	205 70	4,074.99	7,012.99	-438.98	-238 11	454 41	13 65	377,093.38	631,722 82	
7,298.00	83 00	206 70	4,079 65	7,017 65	-466 47	-251 64	482.77	11 11	377,065.88	631,709.29	
7,329 00	86 10	207 60	4,082.60	7,020.59	-493.93	-265 72	511 14	10 41	377,038.43	631,695 21	
7,361 00	86 90	206 90	4,084 55	7,022 55	-522 32	-280.34	540 48	3 32	377,010 03	631,680.59	
7,393 00	87 60	203 90	4,086 09	7,024 08	-551.19	-294.05	570 23	9.62	376,981 16	631,666 88	
7,425 00	88 70	199 70	4,087 12	7,025.11	-580.88	-305 93	600.67	13.56	376,951 47	631,655 01	
Tie On From Gyro Survey											
7,456.00	88 70	196.40	4,087.82	7,025.82	-610.34	-315.53	630.72	10.64	376,922.01	631,645 40	
First Phoenix MWD Survey											
7,488 00	90 10	192 70	4,088.16	7,026.15	-641.31	-323.57	662.17	12.36	376,891.05	631,637.37	
7,520 00	91 10	189 40	4,087 82	7,025 82	-672 71	-329 70	693.92	10 77	376,859.65	631,631.23	



Phoenix Technology Services
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Local Co-ordinate Reference: Well Cottonmouth 13 Fed Com 1H
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Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
7,615.00	93.00	178.50	4,084.42	7,022.41	-767.27	-336.23	788.71	11.64	376,765.08	631,624.70	
7,711.00	91.60	177.30	4,080.56	7,018.56	-863.13	-332.72	884.09	1.92	376,669.23	631,628.22	
7,806.00	91.10	177.80	4,078.32	7,016.32	-958.01	-328.66	978.47	0.74	376,574.34	631,632.27	
7,902.00	88.10	176.40	4,078.99	7,016.99	-1,053.88	-323.80	1,073.77	3.45	376,478.48	631,637.13	
7,997.00	87.80	180.10	4,082.39	7,020.39	-1,148.75	-320.90	1,168.22	3.91	376,383.60	631,640.03	
8,092.00	89.30	181.40	4,084.80	7,022.79	-1,243.71	-322.15	1,263.03	2.09	376,288.64	631,638.79	
8,187.00	89.20	180.70	4,086.04	7,024.04	-1,338.69	-323.89	1,357.90	0.74	376,193.67	631,637.05	
8,282.00	91.60	181.70	4,085.38	7,023.37	-1,433.66	-325.88	1,452.78	2.74	376,098.70	631,635.06	
8,378.00	90.30	180.60	4,083.79	7,021.78	-1,529.62	-327.80	1,548.64	1.77	376,002.74	631,633.13	
8,473.00	91.10	182.10	4,082.63	7,020.62	-1,624.58	-330.04	1,643.53	1.79	375,907.77	631,630.89	
8,568.00	90.60	182.00	4,081.22	7,019.21	-1,719.51	-333.44	1,738.47	0.54	375,812.84	631,627.49	
8,664.00	90.20	180.60	4,080.55	7,018.54	-1,815.48	-335.62	1,834.36	1.52	375,716.87	631,625.32	
8,759.00	91.10	181.40	4,079.47	7,017.46	-1,910.46	-337.27	1,929.23	1.27	375,621.90	631,623.66	
8,854.00	88.30	180.40	4,079.97	7,017.96	-2,005.43	-338.77	2,024.08	3.13	375,526.92	631,622.17	
8,950.00	88.30	180.00	4,082.81	7,020.81	-2,101.39	-339.10	2,119.83	0.42	375,430.96	631,621.83	
9,045.00	87.30	179.60	4,086.46	7,024.46	-2,196.32	-338.77	2,214.50	1.13	375,336.03	631,622.16	
9,140.00	89.00	181.50	4,089.53	7,027.52	-2,291.26	-339.68	2,309.28	2.68	375,241.10	631,621.25	
9,236.00	88.70	181.80	4,091.45	7,029.45	-2,387.20	-342.45	2,405.18	0.44	375,145.16	631,618.49	
9,332.00	90.20	183.60	4,092.38	7,030.37	-2,483.08	-346.97	2,501.14	2.44	375,049.27	631,613.97	
9,427.00	89.60	181.20	4,092.54	7,030.54	-2,577.99	-350.95	2,596.10	2.60	374,954.36	631,609.99	
9,522.00	90.70	183.10	4,092.29	7,030.29	-2,672.92	-354.51	2,691.05	2.31	374,859.44	631,606.42	
9,618.00	91.60	183.00	4,090.37	7,028.36	-2,768.76	-359.62	2,787.01	0.94	374,763.59	631,601.32	
9,713.00	92.00	180.30	4,087.38	7,025.38	-2,863.67	-362.35	2,881.88	2.87	374,668.69	631,598.58	
9,809.00	93.00	181.50	4,083.19	7,021.19	-2,959.56	-363.86	2,977.65	1.63	374,572.80	631,597.08	
9,904.00	92.70	181.10	4,078.47	7,016.47	-3,054.42	-366.01	3,072.43	0.53	374,477.94	631,594.92	
10,000.00	91.60	181.50	4,074.87	7,012.86	-3,150.32	-368.19	3,168.26	1.22	374,382.03	631,592.75	
10,096.00	90.80	181.70	4,072.86	7,010.85	-3,246.26	-370.87	3,264.15	0.86	374,286.09	631,590.07	



Phoenix Technology Services
Concho



Company:	Concho	Local Co-ordinate Reference:	Well Cottonmouth 13 Fed Com 1H
Project:	Eddy County, New Mexico (Nad83)	TVD Reference:	WELL @ 2937.99usft (Original Well Elev + 18' KB)
Site:	Cottonmouth 13 Federal Com	MD Reference:	WELL @ 2937.99usft (Original Well Elev + 18' KB)
Well:	Cottonmouth 13 Fed Com 1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	GCR DB v5000

Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
10,191.00	89.80	180.50	4,072.36	7,010.36	-3,341.24	-372.69	3,359.03	1.64	374,191.11	631,588.24
10,286.00	88.40	180.00	4,073.85	7,011.85	-3,436.23	-373.10	3,453.81	1.56	374,096.13	631,587.83
10,381.00	88.30	177.90	4,076.59	7,014.58	-3,531.17	-371.36	3,548.40	2.21	374,001.19	631,589.57
10,502.00	83.50	182.30	4,085.24	7,023.24	-3,651.79	-371.56	3,668.75	5.37	373,880.56	631,589.37
First Phoenix ST MWD Survey										
10,596.00	85.50	187.70	4,094.26	7,032.25	-3,744.96	-379.72	3,762.27	6.10	373,787.39	631,581.21
10,692.00	86.00	186.50	4,101.37	7,039.37	-3,839.96	-391.55	3,857.86	1.35	373,692.39	631,569.38
10,787.00	87.90	186.60	4,106.43	7,044.42	-3,934.20	-402.37	3,952.62	2.00	373,598.15	631,558.56
10,882.00	89.40	183.70	4,108.67	7,046.66	-4,028.78	-410.90	4,047.56	3.44	373,503.57	631,550.04
10,978.00	90.30	177.80	4,108.92	7,046.91	-4,124.73	-412.15	4,143.37	6.22	373,407.63	631,548.78
11,073.00	90.90	177.60	4,107.92	7,045.92	-4,219.65	-408.34	4,237.79	0.67	373,312.71	631,552.59
11,168.00	91.70	177.10	4,105.77	7,043.76	-4,314.52	-403.95	4,332.13	0.99	373,217.83	631,556.99
11,264.00	92.20	178.10	4,102.50	7,040.49	-4,410.38	-399.93	4,427.48	1.16	373,121.98	631,561.00
11,359.00	91.20	177.10	4,099.68	7,037.68	-4,505.25	-395.95	4,521.85	1.49	373,027.10	631,564.98
11,455.00	90.40	176.70	4,098.34	7,036.34	-4,601.10	-390.76	4,617.11	0.93	372,931.25	631,570.17
11,550.00	90.30	177.10	4,097.76	7,035.76	-4,695.96	-385.63	4,711.39	0.43	372,836.40	631,575.31
11,645.00	91.60	178.40	4,096.19	7,034.18	-4,790.87	-381.90	4,805.81	1.94	372,741.49	631,579.04
11,741.00	91.40	180.50	4,093.67	7,031.67	-4,886.83	-380.97	4,901.48	2.20	372,645.53	631,579.96
11,836.00	91.30	181.40	4,091.43	7,029.43	-4,981.79	-382.55	4,996.32	0.95	372,550.57	631,578.38
11,932.00	91.10	181.30	4,089.42	7,027.42	-5,077.74	-384.81	5,092.20	0.23	372,454.62	631,576.12
12,027.00	90.60	180.80	4,088.02	7,026.01	-5,172.71	-386.55	5,187.06	0.74	372,359.64	631,574.38
12,122.00	90.10	180.50	4,087.43	7,025.43	-5,267.70	-387.63	5,281.90	0.61	372,264.65	631,573.30
12,218.00	89.90	180.10	4,087.43	7,025.43	-5,363.70	-388.13	5,377.70	0.47	372,168.65	631,572.80
12,313.00	89.70	179.90	4,087.77	7,025.76	-5,458.70	-388.13	5,472.47	0.30	372,073.65	631,572.80
12,408.00	88.30	177.30	4,089.42	7,027.42	-5,553.65	-385.81	5,567.03	3.11	371,978.71	631,575.12
12,504.00	87.80	176.70	4,092.69	7,030.69	-5,649.46	-380.79	5,662.27	0.81	371,882.90	631,580.14



Phoenix Technology Services
Concho



Company:	Concho	Local Co-ordinate Reference:	Well Cottonmouth 13 Fed Com 1H
Project:	Eddy County, New Mexico (Nad83)	TVD Reference:	WELL @ 2937.99usft (Original Well Elev + 18' KB)
Site:	Cottonmouth 13 Federal Com	MD Reference:	WELL @ 2937.99usft (Original Well Elev + 18' KB)
Well:	Cottonmouth 13 Fed Com 1H	North Reference:	Grd
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	GCR DB v5000

Survey.											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
12,533.00	87.40	176.40	4,093.91	7,031.90	-5,678.38	-379.05	5,691.00	1.72	371,853.97	631,581.89	
Last Phoenix ST MWD Survey											
12,586.00	87.40	176.40	4,096.31	7,034.30	-5,731.22	-375.72	5,743.48	0.00	371,801.13	631,585.21	
Projection to TD											

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
7,425.00	7,025.11	-580.88	-305.93	Tie On From Gyro Survey
7,456.00	7,025.82	-610.34	-315.53	First Phoenix MWD Survey
10,502.00	7,023.24	-3,651.79	-371.56	First Phoenix ST MWD Survey
12,533.00	7,031.90	-5,678.38	-379.05	Last Phoenix ST MWD Survey
12,586.00	7,034.30	-5,731.22	-375.72	Projection to TD

Checked By: _____	Approved By: _____	Date: _____
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