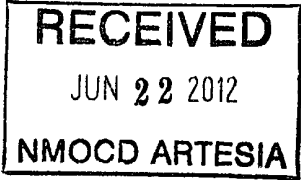


WELL NAME AND NUMBER Carmen 3 Federal Com No. 1H  
 LOCATION Section 3, T17S, R30E, Lot E, 2310 FNL, 330 FWL, Eddy County  
 OPERATOR COG Operating LLC  
 DRILLING CONTRACTOR United Drilling, Inc.

The undersigned hereby certifies that he is an authorized representative of the drilling contractor who drilled the above described well and had conducted deviation test and obtained the following results:

Degrees @ Depth	Degrees @ Depth	Degrees @ Depth
.9° @ 123'	85.6° @ 5084'	
1.8° @ 354'	90.7° @ 7150'	
2.8° @ 494'	91.7° @ 7625'	
2.1° @ 587'		
1.9° @ 802'		
1.9° @ 1048'		
2.3° @ 1277'		
1.6° @ 1523'		
1.3° @ 1769'		
1.1° @ 2024'		
.2° @ 2468'		
.3° @ 2911'		
.4° @ 3388'		
.6° @ 3800'		
50.2° @ 4708'		
64.5° @ 4857'		

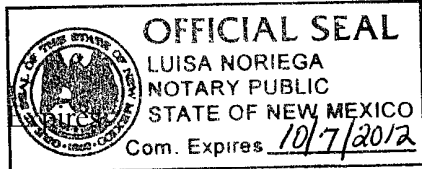


Drilling Contractor- UNITED DRILLING, INC.

By: *Angel Salazar*  
 (Angel Salazar)

Title: Vice President

Subscribed and sworn to before me this 12 day of March, 2012.



My Commission

*Luisa Noriega*  
 Notary Public  
Chaves NM  
 County State



Company: COG Operating LLC (Concho)  
 Lease/Well: Carmen 3 Federal Com/1H  
 Location: Sec 003 T-17S R-30E  
 Rig Name: United 40  
 State/County: New Mexico/Eddy  
 Latitude: 32.86  
 GRID North is 0.20 Degrees East of True North  
 VS-Azi: 89.20 Degrees



30-015-39286

Depth Reference : RKB 14 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: cameron 3 federal com #1\_ed.ut  
 Minimum Curvature Method  
 Report Date/Time: 3/1/2012 / 15:38

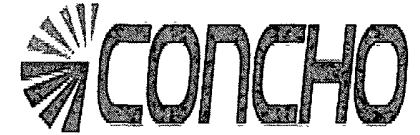
Vaughn Energy Services  
 Shreveport, LA  
 318-549-3860  
 Surveyor: Billy James  
 Carmen 3 Federal Com 1H / API 30-015-39286

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	0.65	23.00	100.00	0.53	0.22	0.23	0.57	23.00	0.65
200.00	1.03	20.36	199.99	1.90	0.76	0.79	2.04	21.83	0.38
300.00	1.50	1.67	299.96	4.05	1.11	1.17	4.20	15.34	0.62
400.00	2.03	6.37	399.91	7.12	1.35	1.45	7.25	10.70	0.54
500.00	2.23	22.75	499.85	10.68	2.29	2.44	10.92	12.13	0.64
600.00	2.04	27.09	599.78	14.05	3.86	4.05	14.57	15.35	0.25
700.00	1.80	32.71	699.72	16.96	5.52	5.75	17.83	18.02	0.30
800.00	1.69	38.96	799.67	19.43	7.29	7.56	20.75	20.58	0.22
900.00	1.78	43.88	899.63	21.69	9.29	9.60	23.60	23.19	0.17
1000.00	1.85	53.14	999.58	23.78	11.66	12.00	26.49	26.13	0.30
1100.00	1.99	67.11	1099.52	25.42	14.56	14.91	29.30	29.79	0.48
1200.00	2.15	78.38	1199.46	26.48	17.99	18.36	32.01	34.20	0.44
1300.00	2.51	83.34	1299.38	27.11	22.01	22.38	34.92	39.07	0.41
1400.00	2.09	85.12	1399.30	27.52	26.00	26.38	37.86	43.37	0.43
1500.00	1.84	82.98	1499.24	27.87	29.41	29.79	40.51	46.54	0.26
1600.00	1.48	85.78	1599.19	28.16	32.29	32.68	42.84	48.90	0.37
1700.00	1.40	87.90	1699.16	28.30	34.79	35.18	44.85	50.88	0.09
1800.00	1.26	90.11	1799.14	28.34	37.11	37.50	46.70	52.63	0.16

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	1.09	94.18	1899.11	28.27	39.16	39.55	48.30	54.17	0.18
2000.00	0.74	105.06	1999.10	28.04	40.73	41.12	49.45	55.46	0.40
2100.00	0.69	112.81	2099.09	27.64	41.90	42.28	50.19	56.59	0.11
2200.00	0.46	129.46	2199.09	27.15	42.76	43.13	50.65	57.59	0.28
2300.00	0.32	201.58	2299.09	26.64	42.96	43.33	50.55	58.20	0.47
2400.00	0.38	305.18	2399.09	26.57	42.59	42.96	50.20	58.04	0.55
2500.00	0.49	321.02	2499.08	27.09	42.05	42.42	50.02	57.20	0.16
2600.00	0.56	338.71	2599.08	27.88	41.60	41.98	50.08	56.17	0.17
2700.00	0.26	10.39	2699.08	28.56	41.46	41.86	50.35	55.44	0.36
2800.00	0.53	28.07	2799.07	29.20	41.72	42.13	50.92	55.02	0.29
2900.00	0.54	334.29	2899.07	30.03	41.74	42.15	51.42	54.27	0.48
3000.00	0.08	326.07	2999.07	30.51	41.50	41.92	51.50	53.68	0.46
3100.00	0.51	323.14	3099.07	30.92	41.19	41.62	51.50	53.10	0.43
3200.00	0.50	321.33	3199.06	31.62	40.65	41.09	51.50	52.12	0.02
3300.00	0.51	323.87	3299.06	32.32	40.12	40.56	51.51	51.15	0.02
3400.00	0.60	304.07	3399.05	32.97	39.42	39.88	51.39	50.10	0.21
3500.00	0.38	279.12	3499.05	33.31	38.67	39.13	51.04	49.26	0.30
3600.00	0.35	296.51	3599.05	33.50	38.07	38.54	50.71	48.66	0.11
3700.00	0.66	316.66	3699.05	34.05	37.41	37.88	50.58	47.69	0.35
3800.00	0.74	321.73	3799.04	34.97	36.62	37.10	50.63	46.32	0.10
3900.00	0.50	354.01	3899.03	35.91	36.17	36.67	50.97	45.21	0.41
4000.00	0.46	318.92	3999.03	36.64	35.86	36.37	51.27	44.38	0.29
4050.00	0.31	294.33	4049.03	36.85	35.61	36.12	51.24	44.02	0.44
4150.00	0.67	279.78	4149.02	37.06	34.78	35.30	50.83	43.18	0.37
4210.00	0.45	245.16	4209.02	37.02	34.23	34.74	50.42	42.75	0.65



**COG Operating LLC**  
**Carmen 3 Fed Com #1H**  
**Eddy County, NM**  
**Plan #3**

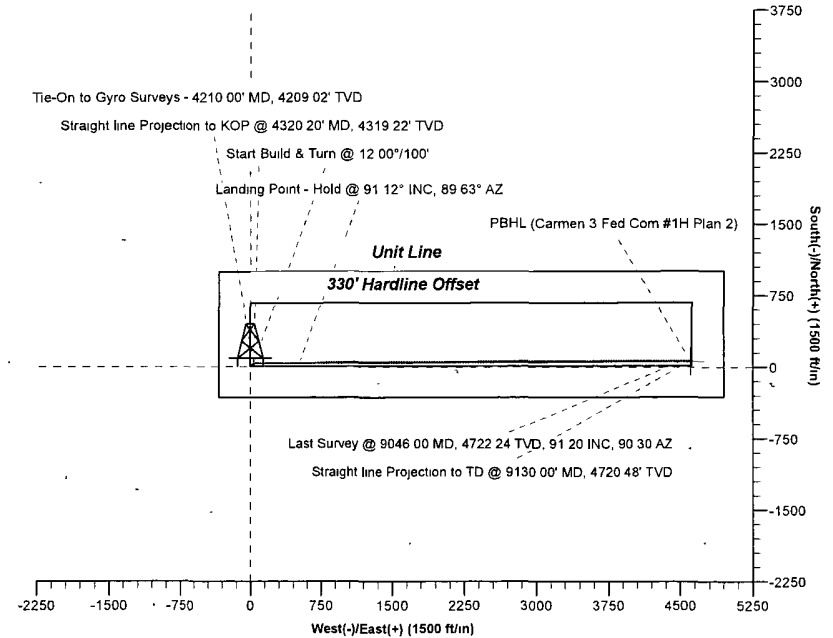
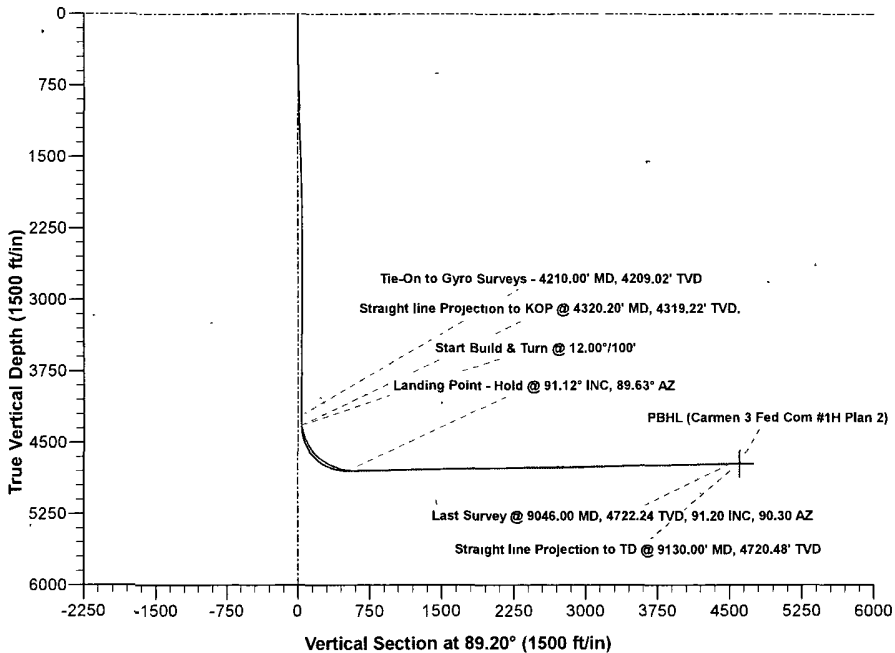


Surface Location		Ground Elev: 3718.00 WELL @ 3732.00ft (United #40)			
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.00	0.00	678341.10	612552.10	32.864302	-103.966781

TARGET DETAILS							
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
PBHL (Carmen 3 Fed Com #1H Plan 2)	4720.00	64.30	4609.30	678405.40	617161.40	32.864434	-103.951769



Azimuths to Grid North  
 True North -0.20°  
 Magnetic North 7.54°  
 Magnetic Field  
 Strength 48890.4snT  
 Dip Angle 60.69°  
 Date 2/9/2012  
 Model IGRF2010



SECTION DETAILS										
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Annotation
1	4210.00	0.45	245.16	4209.02	37.02	34.22	0.00	0.00	34.73	Tie-On to Gyro Surveys - 4210.00' MD, 4209.02' TVD
2	4320.20	0.45	245.16	4319.22	36.66	33.44	0.00	0.00	33.94	Straight line Projection to KOP @ 4320.20' MD, 4319.22' TVD.
3	5082.95	91.12	89.63	4800.00	38.17	520.23	12.00	-155.52	520.71	Landing Point - Hold @ 91.12° INC, 89.63° AZ
4	9172.89	91.12	89.63	4720.00	64.30	4609.30	0.00	0.00	4609.75	TD @ 9172.89' MD, 4720.00' TVD

# **COG Operating LLC**

**Eddy County, NM**

**Carmen 3 Fed Com #1H**

**Carmen 3 Fed Com #1H**

**Wellbore #1**

**Survey: MWD Surveys**

## **Standard Survey Report**

**03 March, 2012**

## Crescent Directional Drilling Survey Report

<b>Company:</b>	COG Operating LLC	<b>Local Co-ordinate Reference:</b>	Site Carmen 3 Fed Com #1H
<b>Project:</b>	Eddy County, NM	<b>TVD Reference:</b>	WELL @ 3732 00ft (United #40)
<b>Site:</b>	Carmen 3 Fed Com #1H	<b>MD Reference:</b>	WELL @ 3732 00ft (United #40)
<b>Well:</b>	Carmen 3 Fed Com #1H	<b>North Reference:</b>	Grd
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	R5000 Houston DB

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

<b>Site:</b> Carmen 3 Fed Com #1H			
<b>Site Position:</b>		<b>Northing:</b>	678,341 10 ft
<b>From:</b>	Map	<b>Easting:</b>	612,552 10 ft
<b>Position Uncertainty:</b>	0 00 ft	<b>Slot Radius:</b>	13 200 in
		<b>Latitude:</b>	32 864302
		<b>Longitude:</b>	-103 966781
		<b>Grid Convergence:</b>	0 20 °

<b>Well:</b> Carmen 3 Fed Com #1H			
<b>Well Position</b>	<b>+N/-S</b>	0 00 ft	<b>Northing:</b> 678,341 10 ft
	<b>+E/-W</b>	0 00 ft	<b>Easting:</b> 612,552 10 ft
<b>Position Uncertainty</b>		0 00 ft	<b>Wellhead Elevation:</b> ft
			<b>Latitude:</b> 32 864302
			<b>Longitude:</b> -103 966781
			<b>Ground Level:</b> 3,718 00 ft

<b>Wellbore:</b> Wellbore #1					
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2/9/2012	7 74	60 69	48,890

<b>Design:</b> Wellbore #1					
<b>Audit Notes:</b>					
<b>Version:</b>	1 0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0 00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0 00	0 00	0 00	89 20	

<b>Survey Program:</b> Date 3/3/2012					
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
100 00	4,210 00	Gyro Surveys (Wellbore #1)	Good_mag	Good Magnetic	
4,233 00	9,130 00	MWD Surveys (Wellbore #1)	Good_mag	Good Magnetic	

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
4,210 00	0 45	245 16	4,209 02	37 02	34 22	34 73	0 00	0 00	0 00
4,233 00	0 40	282 60	4,232 02	37 00	34 06	34 57	1 20	-0 22	162 78
4,264 00	0 20	324 60	4,263 02	37 07	33 92	34 44	0 92	-0 65	135 48
4,296 00	2 70	90 70	4,295 01	37 10	34 64	35 16	8 82	7 81	394 06
4,328 00	6 80	90 00	4,326 89	37 09	37 29	37 81	12 81	12 81	-2 19
4,360 00	11 10	89 10	4,358 49	37 14	42 27	42 79	13 44	13 44	-2 81
4,391 00	15 40	90 90	4,388 66	37 13	49 37	49 89	13 93	13 87	5 81
4,423 00	18 90	91 00	4,419 24	36 97	58 81	59 32	10 94	10 94	0 31
4,455 00	22 20	91 20	4,449 19	36 75	70 04	70 54	10 31	10 31	0 63
4,486 00	24 80	92 60	4,477 62	36 33	82 39	82 89	8 58	8 39	4 52

# Crescent Directional Drilling

## Survey Report

<b>Company:</b>	COG Operating LLC	<b>Local Co-ordinate Reference</b>	Site Carmen 3 Fed Com #1H
<b>Project:</b>	Eddy County, NM	<b>TVD Reference:</b>	WELL @ 3732 00ft (United #40)
<b>Site:</b>	Carmen 3 Fed Com #1H	<b>MD Reference:</b>	WELL @ 3732 00ft (United #40)
<b>Well:</b>	Carmen 3 Fed Com #1H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	R5000 Houston DB

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
4,518 00	28.10	90 90	4,506 27	35 91	96 63	97 12	10 58	10 31	-5 31
4,550 00	31 00	88 80	4,534 10	35 96	112 41	112 90	9 62	9 06	-6 56
4,582 00	34 60	87 50	4,561 00	36 53	129 73	130 23	11 46	11 25	-4 06
4,613 00	38 00	89 30	4,585 98	37 03	148 07	148 58	11 49	10 97	5 81
4,645 00	41 90	90 70	4,610 51	37 02	168 62	169 12	12 51	12 19	4 38
4,677 00	46 00	90 90	4,633 54	36 71	190 82	191 31	12 82	12 81	0 63
4,708 00	50 20	90 70	4,654 24	36 39	213 88	214 37	13 56	13 55	-0 65
4,740 00	53 60	90 50	4,673 98	36.13	239 06	239 54	10 64	10 63	-0 63
4,772 00	56 40	89 60	4,692 33	36 11	265 27	265 75	9 05	8 75	-2 81
4,804 00	59 30	89 30	4,709 36	36 37	292 36	292 84	9 10	9 06	-0 94
4,835 00	62 00	90 00	4,724 55	36 53	319 38	319 86	8 93	8 71	2 26
4,867 00	64 50	90 70	4,738 95	36 36	347 95	348 42	8 05	7 81	2 19
4,899 00	67 00	91 90	4,752 10	35 69	377 11	377 58	8 53	7 81	3 75
4,930 00	69 70	91 40	4,763 53	34 86	405 91	406 36	8 84	8 71	-1 61
4,962 00	72 30	90 70	4,773 95	34 31	436 16	436 60	8 38	8 13	-2 19
4,994 00	75 40	90 50	4,782 85	33 99	466 89	467 32	9 71	9 69	-0 63
5,026 00	78 60	90 70	4,790 05	33 66	498 07	498 49	10 02	10 00	0 63
5,058 00	82 60	90 70	4,795 27	33 28	529 63	530 04	12 50	12 50	0 00
5,089 00	85 60	88 90	4,798 46	33.39	560 46	560 87	11 27	9 68	-5 81
5,121 00	89 10	87 20	4,799 94	34 47	592 40	592 82	12 16	10 94	-5 31
5,152 00	90 70	85 80	4,799 99	36 37	623 34	623 79	6 86	5 16	-4 52
5,248 00	91 60	85 20	4,798 07	43 90	719 02	719 57	1 13	0 94	-0 63
5,343 00	91 60	86 80	4,795 41	50 52	813 75	814 38	1 68	0 00	1 68
5,438 00	91 90	90 00	4,792 51	53 17	908 66	909 31	3 38	0 32	3 37
5,533 00	92 60	90 00	4,788 78	53 17	1,003 59	1,004 23	0 74	0 74	0 00
5,628 00	91 50	90 00	4,785 38	53 17	1,098 52	1,099 16	1 16	-1 16	0 00
5,724 00	92 60	89 60	4,781 95	53 51	1,194 46	1,195 09	1 22	1 15	-0 42
5,819 00	90 10	90 00	4,779 71	53 84	1,289 43	1,290 05	2 67	-2 63	0 42
5,914 00	90 40	90 20	4,779 30	53 67	1,384 42	1,385 04	0 38	0 32	0 21
6,009 00	90 90	90 30	4,778 22	53 26	1,479 42	1,480 02	0 54	0 53	0 11
6,104 00	90 40	90 00	4,777 14	53 01	1,574 41	1,575 00	0 61	-0 53	-0 32
6,199 00	91 10	90 00	4,775 90	53 01	1,669 40	1,669 98	0 74	0 74	0 00
6,294 00	91 30	89 50	4,773 91	53 42	1,764 38	1,764 95	0 57	0 21	-0 53
6,389 00	91 80	90 20	4,771 34	53 67	1,859 34	1,859 91	0 91	0 53	0 74
6,485 00	89 80	89 10	4,770 00	54 26	1,955 33	1,955 89	2 38	-2 08	-1 15
6,580 00	90 90	89 50	4,769 42	55 42	2,050 31	2,050 89	1 23	1 16	0 42
6,675 00	90 20	89 50	4,768 51	56 25	2,145 31	2,145 88	0 74	-0 74	0 00
6,770 00	91 20	89 50	4,767 35	57 08	2,240 29	2,240 87	1 05	1 05	0 00
6,865 00	89 90	89 10	4,766 43	58 24	2,335 28	2,335 87	1 43	-1 37	-0 42
6,960 00	90 10	89 30	4,766 43	59 56	2,430 27	2,430 87	0 30	0 21	0 21
7,055 00	90 00	88 80	4,766 35	61 14	2,525 26	2,525 87	0 54	-0 11	-0 53
7,150 00	90 70	89 10	4,765 77	62 88	2,620 24	2,620 86	0 80	0 74	0 32
7,245 00	91 00	89 10	4,764 36	64 37	2,715 22	2,715 85	0 32	0 32	0 00

# Crescent Directional Drilling

## Survey Report

<b>Company:</b>	COG Operating LLC	<b>Local Co-ordinate Reference:</b>	Site Carmen 3 Fed Com #1H
<b>Project:</b>	Eddy County, NM	<b>TVD Reference:</b>	WELL @ 3732 00ft (United #40)
<b>Site:</b>	Carmen 3 Fed Com #1H	<b>MD Reference:</b>	WELL @ 3732 00ft (United #40)
<b>Well:</b>	Carmen 3 Fed Com #1H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1	<b>Database:</b>	R5000 Houston DB

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
7,340 00	91 40	89 10	4,762.37	65 86	2,810 18	2,810 83	0 42	0.42	0 00	
7,435 00	91 90	89 80	4,759.64	66 78	2,905.14	2,905 79	0 91	0 53	0 74	
7,530 00	91 40	90 20	4,756 90	66 78	3,000 10	3,000 74	0 67	-0 53	0 42	
7,625 00	91 70	90 00	4,754 33	66 61	3,095 06	3,095.69	0 38	0 32	-0.21	
7,720 00	92 60	89 50	4,750 77	67 02	3,190 00	3,190 62	1 08	0 95	-0 53	
7,815 00	91 10	89 60	4,747 70	67 77	3,284 94	3,285 57	1 58	-1 58	0 11	
7,910 00	91 30	89 60	4,745 71	68 43	3,379 92	3,380 54	0 21	0 21	0 00	
8,005.00	92 20	89 80	4,742 81	68 93	3,474 87	3,475 49	0 97	0 95	0 21	
8,100 00	92 00	89 80	4,739 33	69 26	3,569 81	3,570 43	0.21	-0 21	0.00	
8,196.00	90 40	89 60	4,737 32	69 76	3,665 78	3,666 40	1 68	-1.67	-0 21	
8,291 00	91 00	89 80	4,736 16	70 26	3,760 77	3,761 39	0 67	0 63	0 21	
8,386 00	91 50	89 50	4,734 08	70 84	3,855 75	3,856.36	0 61	0 53	-0 32	
8,475 00	92.00	89 30	4,731 37	71 77	3,944 70	3,945 32	0 61	0 56	-0 22	
8,570 00	91 80	90 30	4,728 22	72 10	4,039 65	4,040 26	1 07	-0 21	1 05	
8,665.00	90 70	90 90	4,726 14	71 11	4,134 62	4,135 21	1 32	-1 16	0 63	
8,760 00	91 00	90 90	4,724 74	69 62	4,229 59	4,230 15	0 32	0 32	0 00	
8,856 00	90 00	90 50	4,723 90	68 45	4,325 58	4,326 12	1 12	-1 04	-0 42	
8,951 00	90 40	90.50	4,723 57	67 62	4,420 58	4,421 09	0 42	0 42	0 00	
9,046 00	91 20	90 30	4,722 24	66 95	4,515 57	4,516 06	0 87	0 84	-0 21	
<b>Last Survey @ 9046.00 MD, 4722.24 TVD, 91.20 INC, 90.30 AZ</b>										
9,130 00	91.20	90 30	4,720 48	66 51	4,599 55	4,600 03	0 00	0 00	0 00	
<b>Straight line Projection to TD @ 9130.00' MD, 4720.48' TVD.</b>										

Survey Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
9,046 00	4,722 24	66 95	4,515 57	Last Survey @ 9046 00 MD, 4722 24 TVD, 91 20 INC, 90 30 AZ
9,130 00	4,720 48	66 51	4,599 55	Straight line Projection to TD @ 9130 00' MD, 4720 48' TVD

Checked By _____	Approved By _____	Date _____
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