

Results of Directional Survey

API number:	30-025-41231	DD
OGRID:		Operator: CONOCOPHILLIPS COMPANY
		Property: EMERALD FEDERAL # 9

surface	ULSTR:	O	17	T 17S	R 32E
				420 FSL	1340 FEL

BH Loc	ULSTR:	P	17	T 17S	R 32E
7043	MD	7026.9	TVD	258 FSL	983 FEL

Top Perf/OH	ULSTR:	O	17	T 17S	R 32E
5510	MD	5499.3	TVD	320 FSL	1094 FEL

Bot Perf/OH	ULSTR:	P	17	T 17S	R 32E
6592	MD	6577.2	TVD	277 FSL	1011 FEL

	MD	N/S	E/W	VD
	5496	-99.41	245.26	5485.3
TOP PERFS/OH	5510	-99.94	246.31	5499.25
	5586	-102.84	252.03	5574.98
	6572	-141.67	327.70	6557.30
BOT PERFS/OH	6592	-142.53	329.13	6577.23
	6661	-145.49	334.08	6645.99

NEXT TO LAST	6988	-159.74	354.84	6972.01
LAST READING	7043	-162.10	357.49	7026.89
TD	7043	-162.10	357.49	7026.89

Surface Location	420	FS	1340	FE
Projected BHL	258	FS	983	FE
Location of				
Top Perfs/OH	320	FS	1094	FE
Bottom Perfs/OH	277	FS	1011	FE

SUMMARY of Subsurface Locations

Surface Location	O-17-17S-32E	420	FS	1340	FE	Vert. Depth
Top Perfs/OH	O-17-17S-32E	320	FS	1094	FE	5499.25
Bottom Perfs/OH	P-17-17S-32E	277	FS	1011	FE	6577.23
Projected TD	P-17-17S-32E	258	FS	983	FE	7026.89

30-025-41231

HOBBS OCD

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ConocoPhillips

Lea County, New Mexico

Emerald Federal

Emerald Federal Well No. 9

Original Hole

Design: Surveys Original Hole

Survey Report - Geographic

10 September, 2013



Survey Report - Geographic

Company:	ConocoPhillips	Local Co-ordinate Reference:	Well Emerald Federal Well No. 9
Project:	Lea County, New Mexico	TVD Reference:	RKB=4032+13 @ 4045.00usft (PD 822)
Site:	Emerald Federal	MD Reference:	RKB=4032+13 @ 4045.00usft (PD 822)
Well:	Emerald Federal Well No. 9	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	EDM 5000.1 Ddatabase

Project	Lea County, New Mexico		
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	Emerald Federal		
Site Position:		Northing:	665,535.91 usft
From:	Map	Easting:	668,774.76 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32.82843890
		Longitude:	-103.78389551
		Grid Convergence:	0.30 "

Well	Emerald Federal Well No. 9		
Well Position	+N/-S	0.00 usft	Northing:
	+E/-W	0.00 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32.82843890
		Longitude:	-103.78389551
		Ground Level:	4,032.00 usft

Wellbore	Original Hole		
Magnetics	Model Name	Sample Date	Declination
	User Defined	6/30/2013	7.59
			Dip Angle
			60.82
			Field Strength
			48,778

Design	Surveys Original Hole		
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
			103.56

Survey Program	Date 9/10/2013		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		Description
858.00	7,043.00	MWD (Original Hole)	MWD
			MWD - Standard

Survey									
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Map	Map	Latitude	Longitude
Depth	(°)	(°)	Depth	(usft)	(usft)	Northing	Easting		
(usft)			(usft)			(usft)	(usft)		
0.00	0.00	0.00	0.00	0.00	0.00	665,535.91	668,774.76	32.82843890	-103.78389551
858.00	0.00	0.01	858.00	0.00	0.00	665,535.91	668,774.76	32.82843890	-103.78389551
MWD surveys									
926.00	0.20	267.30	926.00	-0.01	-0.12	665,535.91	668,774.64	32.82843889	-103.78389589
1,016.00	0.30	223.10	1,016.00	-0.19	-0.44	665,535.73	668,774.32	32.82843840	-103.78389693
1,106.00	0.30	330.40	1,106.00	-0.15	-0.71	665,535.76	668,774.04	32.82843850	-103.78389783
1,195.00	0.40	303.60	1,195.00	0.22	-1.09	665,536.14	668,773.67	32.82843953	-103.78389904
1,285.00	0.60	312.40	1,284.99	0.71	-1.70	665,536.63	668,773.06	32.82844089	-103.78390102
1,375.00	0.40	278.40	1,374.99	1.08	-2.36	665,536.99	668,772.40	32.82844190	-103.78390316
1,464.00	0.70	310.10	1,463.99	1.47	-3.08	665,537.39	668,771.68	32.82844300	-103.78390551
1,554.00	0.70	6.60	1,553.98	2.37	-3.44	665,538.29	668,771.32	32.82844548	-103.78390665
1,643.00	0.90	5.00	1,642.97	3.61	-3.31	665,539.52	668,771.44	32.82844887	-103.78390623



Survey Report - Geographic

Company:	ConocoPhillips	Local Co-ordinate Reference:	Well Emerald Federal Well No. 9
Project:	Lea County, New Mexico	TVD Reference:	RKB=4032+13 @ 4045.00usft (PD 822)
Site:	Emerald Federal	MD Reference:	RKB=4032+13 @ 4045.00usft (PD 822)
Well:	Emerald Federal Well No. 9	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	EDM 5000.1 Ddatabase

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
1,733.00	1.10	35.40	1,732.96	5.02	-2.75	665,540.93	668,772.01	32.82845274	-103.78390438	
1,823.00	1.70	34.70	1,822.93	6.82	-1.49	665,542.73	668,773.27	32.82845767	-103.78390025	
1,912.00	2.80	87.40	1,911.87	8.00	1.43	665,543.92	668,776.19	32.82846088	-103.78389071	
2,002.00	2.60	87.20	2,001.77	8.20	5.67	665,544.12	668,780.43	32.82846137	-103.78387692	
2,091.00	2.60	89.00	2,090.68	8.34	9.70	665,544.25	668,784.46	32.82846168	-103.78386378	
2,181.00	2.40	89.70	2,180.59	8.38	13.63	665,544.30	668,788.39	32.82846175	-103.78385100	
2,271.00	2.30	93.90	2,270.52	8.27	17.31	665,544.18	668,792.07	32.82846139	-103.78383901	
2,361.00	3.20	103.10	2,360.41	7.58	21.56	665,543.49	668,796.32	32.82845942	-103.78382519	
2,450.00	3.00	108.90	2,449.28	6.26	26.18	665,542.17	668,800.94	32.82845574	-103.78381016	
2,540.00	4.60	112.30	2,539.08	4.13	31.75	665,540.04	668,806.51	32.82844980	-103.78379207	
2,629.00	4.00	115.10	2,627.83	1.46	37.87	665,537.37	668,812.62	32.82844237	-103.78377222	
2,719.00	3.50	112.20	2,717.64	-0.91	43.25	665,535.00	668,818.01	32.82843578	-103.78375472	
2,808.00	3.80	108.00	2,806.46	-2.75	48.60	665,533.16	668,823.36	32.82843085	-103.78373734	
2,898.00	4.10	104.00	2,896.24	-4.35	54.59	665,531.56	668,829.35	32.82842616	-103.78371787	
2,987.00	2.90	114.00	2,985.08	-6.04	59.73	665,529.88	668,834.49	32.82842145	-103.78370115	
3,077.00	4.10	112.40	3,074.91	-8.19	64.79	665,527.72	668,839.55	32.82841547	-103.78368474	
3,166.00	3.50	111.30	3,163.71	-10.39	70.26	665,525.52	668,845.02	32.82840934	-103.78366696	
3,256.00	3.20	101.50	3,253.56	-11.89	75.28	665,524.03	668,850.04	32.82840515	-103.78365064	
3,346.00	4.40	105.80	3,343.36	-13.33	81.07	665,522.58	668,855.82	32.82840111	-103.78363183	
3,435.00	4.00	110.50	3,432.12	-15.35	87.26	665,520.57	668,862.02	32.82839548	-103.78361171	
3,525.00	4.00	114.80	3,521.90	-17.76	93.05	665,518.15	668,867.81	32.82838875	-103.78359290	
3,615.00	5.50	112.00	3,611.59	-20.69	99.90	665,515.22	668,874.66	32.82838060	-103.78357066	
3,704.00	5.30	115.50	3,700.19	-24.06	107.56	665,511.85	668,882.32	32.82837123	-103.78354576	
3,794.00	5.30	116.60	3,789.81	-27.71	115.03	665,508.20	668,889.79	32.82836109	-103.78352151	
3,883.00	5.00	116.10	3,878.45	-31.26	122.19	665,504.65	668,896.95	32.82835124	-103.78349827	
3,973.00	5.00	119.70	3,968.11	-34.93	129.12	665,500.99	668,903.88	32.82834106	-103.78347578	
4,062.00	4.90	118.00	4,056.78	-38.63	135.84	665,497.28	668,910.60	32.82833077	-103.78345395	
4,152.00	5.00	119.70	4,146.44	-42.38	142.64	665,493.53	668,917.40	32.82832037	-103.78343187	
4,242.00	5.10	117.10	4,236.09	-46.15	149.61	665,489.77	668,924.37	32.82830993	-103.78340925	
4,331.00	4.90	120.80	4,324.75	-49.90	156.40	665,486.02	668,931.16	32.82829953	-103.78338723	
4,421.00	4.70	115.70	4,414.44	-53.46	163.02	665,482.45	668,937.78	32.82828963	-103.78336572	
4,511.00	5.00	119.80	4,504.12	-57.01	169.75	665,478.90	668,944.51	32.82827978	-103.78334389	
4,600.00	6.10	117.70	4,592.77	-60.78	176.62	665,475.14	668,951.37	32.82826933	-103.78332159	
4,690.00	5.10	120.20	4,682.41	-64.65	183.62	665,471.26	668,958.37	32.82825859	-103.78329887	
4,780.00	5.10	119.00	4,772.06	-68.60	190.57	665,467.31	668,965.33	32.82824762	-103.78327630	
4,869.00	5.00	119.60	4,860.71	-72.43	197.40	665,463.48	668,972.16	32.82823699	-103.78325412	
4,959.00	4.80	118.80	4,950.38	-76.22	204.18	665,459.69	668,978.94	32.82822648	-103.78323212	
5,048.00	5.00	119.60	5,039.05	-79.97	210.89	665,455.94	668,985.64	32.82821608	-103.78321036	
5,138.00	5.10	122.30	5,128.70	-84.04	217.68	665,451.87	668,992.44	32.82820479	-103.78318832	
5,228.00	5.10	118.40	5,218.34	-88.08	224.58	665,447.83	668,999.34	32.82819358	-103.78316593	
5,317.00	5.20	119.70	5,306.98	-91.96	231.56	665,443.95	669,006.32	32.82818282	-103.78314326	
5,407.00	5.00	116.70	5,396.62	-95.75	238.61	665,440.17	669,013.36	32.82817232	-103.78312039	
5,496.00	4.80	121.00	5,485.30	-99.41	245.26	665,436.51	669,020.02	32.82816216	-103.78309878	
5,586.00	4.90	112.80	5,574.98	-102.84	252.03	665,433.08	669,026.78	32.82815264	-103.78307680	
5,676.00	4.90	115.70	5,664.65	-105.99	259.04	665,429.92	669,033.80	32.82814387	-103.78305404	
5,765.00	5.00	116.10	5,753.32	-109.35	265.95	665,426.57	669,040.71	32.82813455	-103.78303161	
5,855.00	5.10	118.00	5,842.97	-113.01	272.97	665,422.90	669,047.73	32.82812437	-103.78300882	
6,034.00	5.00	118.10	6,021.27	-120.54	286.81	665,415.37	669,061.57	32.82810348	-103.78296389	
6,124.00	5.10	116.70	6,110.92	-124.19	293.84	665,411.73	669,068.60	32.82809336	-103.78294106	
6,213.00	4.90	116.90	6,199.59	-127.69	300.77	665,408.23	669,075.52	32.82808365	-103.78291858	
6,303.00	5.00	118.30	6,289.25	-131.34	307.62	665,404.57	669,082.37	32.82807349	-103.78289635	
6,393.00	4.80	116.30	6,378.92	-134.93	314.41	665,400.98	669,089.17	32.82806353	-103.78287429	
6,482.00	4.70	115.70	6,467.62	-138.16	321.03	665,397.75	669,095.79	32.82805456	-103.78285278	
6,572.00	4.90	119.70	6,557.30	-141.67	327.70	665,394.25	669,102.45	32.82804483	-103.78283115	
6,661.00	4.70	122.20	6,646.99	-145.49	334.08	665,390.42	669,108.84	32.82803422	-103.78281043	



ConocoPhillips

Lea County, New Mexico

Emerald Federal

Emerald Federal Well No. 9

Original Hole

Design: Surveys Original Hole

Standard Survey Report

10 September, 2013

Company:	ConocoPhillips	Local Co-ordinate Reference:	Well Emerald Federal Well No. 9
Project:	Lea County, New Mexico	TVD Reference:	RKB=4032+13 @ 4045.00usft (PD 822)
Site:	Emerald Federal	MD Reference:	RKB=4032+13 @ 4045.00usft (PD 822)
Well:	Emerald Federal Well No. 9	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	EDM 5000.1 Ddatabase

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
6,751.00	4.70	124.00	6,735.69	-149.52	340.26	665,386.39	669,115.02	32.82802307	-103.78279039
6,840.00	4.70	119.50	6,824.39	-153.35	346.46	665,382.56	669,121.21	32.82801244	-103.78277028
6,930.00	3.90	131.40	6,914.13	-157.19	351.96	665,378.72	669,126.72	32.82800181	-103.78275242
6,988.00	3.70	131.70	6,972.01	-159.74	354.84	665,376.17	669,129.60	32.82799476	-103.78274310
7,043.00	3.70	131.70	7,026.89	-162.10	357.49	665,373.81	669,132.25	32.82798823	-103.78273452
Survey projected to 7043 MD									

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
858.00	858.00	0.00	0.00	MWD surveys
7,043.00	7,026.89	-162.10	357.49	Survey projected to 7043 MD

Checked By: _____	Approved By: _____	Date: _____
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Company:	ConocoPhillips	Local Co-ordinate Reference:	Well Emerald Federal Well No. 9
Project:	Lea County, New Mexico	TVD Reference:	RKB=4032+13 @ 4045.00usft (PD 822)
Site:	Emerald Federal	MD Reference:	RKB=4032+13 @ 4045.00usft (PD 822)
Well:	Emerald Federal Well No. 9	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	EDM 5000.1 Database

Project	Lea County, New Mexico		
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	Emerald Federal		
Site Position:		Northing:	665,535.91 usft
From:	Map	Easting:	668,774.76 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32.82843890
		Longitude:	-103.78389551
		Grid Convergence:	0.30 °

Well	Emerald Federal Well No. 9		
Well Position	+N/-S	0.00 usft	Northing:
	+E/-W	0.00 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32.82843890
		Longitude:	-103.78389551
		Ground Level:	4,032.00 usft

Wellbore	Original Hole		
Magnetics	Model Name	Sample Date	Declination
	User Defined	6/30/2013	7.59
			Dip Angle
			60.62
			Field Strength
			48,778

Design	Surveys Original Hole		
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
			(°)
			103.56

Survey Program	Date 9/10/2013		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
858.00	7,043.00	MWD (Original Hole)	MWD
			Description
			MWD - Standard

Survey	Measured Depth	Inclination	Azimuth	Vertical Depth	+N/-S	+E/-W	Vertical Section	Dogleg Rate	Build Rate	Turn Rate
	(usft)	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(°/100usft)	(°/100usft)	(°/100usft)
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
	200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
	300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
	400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00
	500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00
	600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00
	700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00
	800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00
	858.00	0.00	0.01	858.00	0.00	0.00	0.00	0.00	0.00	0.00
MWD surveys										

Company:	ConocoPhillips	Local Co-ordinate Reference:	Well Emerald Federal Well No. 9
Project:	Lea County, New Mexico	TVD Reference:	RKB=4032+13 @ 4045.00usft (PD 822)
Site:	Emerald Federal	MD Reference:	RKB=4032+13 @ 4045.00usft (PD 822)
Well:	Emerald Federal Well No. 9	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	EDM 5000.1 Ddatabase

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)
900.00	0.12	267.30	900.00	0.00	-0.05	-0.04	0.29	0.29	0.00
1,000.00	0.27	228.30	1,000.00	-0.13	-0.38	-0.34	0.19	0.15	-39.00
1,100.00	0.27	326.41	1,100.00	-0.18	-0.70	-0.64	0.41	0.00	98.11
1,200.00	0.41	304.31	1,200.00	0.24	-1.12	-1.14	0.19	0.14	-22.10
1,300.00	0.56	308.56	1,299.99	0.81	-1.81	-1.95	0.15	0.15	4.25
1,400.00	0.47	291.20	1,399.99	1.13	-2.54	-2.73	0.18	-0.09	-17.36
1,500.00	0.62	332.22	1,499.98	1.79	-3.34	-3.66	0.41	0.15	41.02
1,600.00	0.80	5.67	1,599.98	2.97	-3.37	-3.98	0.45	0.18	33.46
1,700.00	1.00	25.74	1,699.96	4.50	-3.06	-4.03	0.37	0.19	20.07
1,800.00	1.55	34.83	1,799.94	6.28	-1.86	-3.28	0.59	0.55	9.09
1,900.00	2.57	83.33	1,899.88	7.96	0.87	-1.02	1.93	1.02	48.50
2,000.00	2.60	87.20	1,999.77	8.20	5.58	3.50	0.18	0.04	3.88
2,100.00	2.58	89.07	2,099.67	8.34	10.11	7.87	0.09	-0.02	1.86
2,200.00	2.38	90.56	2,199.58	8.38	14.42	12.05	0.21	-0.20	1.49
2,300.00	2.58	97.56	2,299.49	8.14	18.54	16.12	0.37	0.20	7.00
2,400.00	3.11	105.55	2,399.35	7.05	23.64	21.33	0.66	0.53	7.99
2,500.00	3.89	111.13	2,499.19	5.23	29.00	26.97	0.85	0.78	5.58
2,600.00	4.19	114.10	2,598.91	2.32	35.98	34.43	0.37	0.31	2.97
2,700.00	3.60	112.88	2,698.67	-0.46	42.16	41.10	0.60	-0.59	-1.22
2,800.00	3.77	106.52	2,798.48	-2.60	48.09	47.36	0.44	0.17	-6.36
2,900.00	4.07	104.16	2,898.24	-4.39	54.73	54.23	0.34	0.30	-2.36
3,000.00	3.07	113.69	2,998.06	-6.31	60.35	60.15	1.16	-1.00	9.53
3,100.00	3.94	112.15	3,097.85	-8.80	66.28	66.50	0.88	0.87	-1.54
3,200.00	3.38	107.80	3,197.65	-11.07	72.18	72.77	0.83	-0.57	-4.34
3,300.00	3.78	103.84	3,297.48	-12.48	77.80	78.65	0.47	0.41	-3.86
3,400.00	4.15	108.54	3,397.21	-14.62	84.91	85.95	0.49	0.37	4.60
3,500.00	4.00	113.61	3,496.96	-17.05	91.46	92.91	0.39	-0.16	5.06
3,600.00	5.25	112.36	3,596.66	-20.16	98.60	100.58	1.26	1.25	-1.25
3,700.00	5.31	115.34	3,696.21	-23.90	107.23	109.84	0.28	0.06	2.98
3,800.00	5.28	116.57	3,795.78	-27.96	115.53	118.86	0.12	-0.03	1.23
3,900.00	5.00	116.78	3,895.39	-31.92	123.52	127.56	0.28	-0.28	0.21
4,000.00	4.97	119.19	3,995.01	-36.08	131.16	135.97	0.21	-0.03	2.41
4,100.00	4.94	118.73	4,094.64	-40.18	138.71	144.27	0.05	-0.03	-0.47
4,200.00	5.05	118.30	4,194.26	-44.42	146.32	152.66	0.12	0.11	-0.43
4,300.00	4.97	119.48	4,293.87	-48.56	154.09	161.18	0.13	-0.08	1.18
4,400.00	4.74	116.93	4,393.51	-52.70	161.47	169.33	0.31	-0.22	-2.55
4,500.00	4.96	119.33	4,493.16	-56.54	168.92	177.47	0.30	0.22	2.40
4,600.00	5.10	117.70	4,592.77	-60.78	176.62	185.94	0.20	0.14	-1.63
4,700.00	5.10	120.07	4,692.37	-65.10	184.38	194.51	0.21	0.00	2.37
4,800.00	5.08	118.13	4,791.98	-69.46	192.12	203.05	0.09	-0.02	-0.93
4,900.00	4.97	119.33	4,891.60	-73.76	199.75	211.47	0.11	-0.11	0.20
5,000.00	4.95	119.17	4,991.23	-77.83	207.26	218.75	0.02	-0.02	-0.16
5,100.00	5.06	121.17	5,090.84	-82.28	214.82	228.12	0.21	0.11	2.00

Company:	ConocoPhillips	Local Co-ordinate Reference:	Well Emerald Federal Well No. 9
Project:	Lea County, New Mexico	TVD Reference:	RKB=4032+13 @ 4045.00usft (PD 822)
Site:	Emerald Federal	MD Reference:	RKB=4032+13 @ 4045.00usft (PD 822)
Well:	Emerald Federal Well No. 9	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original Hole	Database:	EDM 5000.1 Database

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)	
5,200.00	5.10	119.61	5,190.45	-86.88	222.40	236.57	0.14	0.04	-1.56	
5,300.00	5.18	119.46	5,290.05	-91.21	230.22	245.19	0.08	0.08	-0.16	
5,400.00	5.02	116.94	5,389.65	-95.47	238.06	253.81	0.28	-0.17	-2.51	
5,500.00	4.80	120.63	5,489.29	-99.58	245.55	262.05	0.38	-0.21	3.69	
5,600.00	4.90	113.25	5,588.93	-103.30	253.14	270.30	0.63	0.10	-7.38	
5,700.00	4.93	115.81	5,688.56	-106.89	260.89	278.68	0.22	0.03	2.56	
5,800.00	5.04	117.24	5,788.18	-110.72	268.69	287.16	0.17	0.11	1.43	
5,900.00	5.07	118.78	5,887.79	-114.94	276.46	295.71	0.14	0.04	1.54	
6,000.00	5.02	118.27	5,987.40	-119.14	284.19	304.21	0.07	-0.06	-0.50	
6,100.00	5.07	117.07	6,087.02	-123.23	291.95	312.70	0.12	0.05	-1.21	
6,200.00	4.93	116.87	6,186.63	-127.18	299.77	321.24	0.14	-0.14	-0.20	
6,300.00	5.00	119.22	6,286.26	-131.22	307.39	329.58	0.21	0.07	2.35	
6,400.00	4.79	116.25	6,385.90	-135.19	314.94	337.85	0.33	-0.20	-2.87	
6,500.00	4.74	116.53	6,485.55	-138.82	322.36	345.93	0.06	-0.05	0.27	
6,600.00	4.84	120.46	6,585.20	-142.86	329.75	354.06	0.34	0.10	3.94	
6,700.00	4.70	122.98	6,684.86	-147.21	336.78	361.90	0.25	-0.14	2.52	
6,800.00	4.70	121.52	6,784.52	-151.69	343.63	369.62	0.12	0.00	-1.48	
6,900.00	4.15	126.93	6,884.21	-155.87	350.33	377.11	0.69	-0.55	5.41	
7,000.00	3.70	131.70	6,983.98	-160.26	355.42	383.08	0.55	-0.45	4.77	

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N-S (usft)	+E-W (usft)	
858.00	858.00	0.00	0.00	MWD surveys
7,043.00	7,026.89	-162.10	357.49	Survey projected to 7043 MD

Checked By: _____ Approved By: _____ Date: _____

			Customer: ConocoPhillips			Directional Driller: Greg Nazzal					
			Well: Emerald Federal 9			MWD Operator: Joe Meyer					
			Field/Block: Yaso			API #: 30-025-41231					
MWD SURVEY SHEET			Co./Parish: Lea County			Date of First Survey: September 4, 2013					
			State: New Mexico			Date of Last Survey: September 8, 2013					
			BSM Job #: 588			BSM Survey Instrument Type: Good MWD					
			BGGM: 2012			Total Correction: 7.29 West Grid					
Vertical Section Plane: 103.56			Nominal Dip Angle: 60.62			Magnetic Field Strength: 0.48778					
Meas			Coordinates				Closure		Temp		
Depth	Inc.	Azm.	T.V.D.	Ver. Sect.	+N / -S	+E / -W	Dist.	Angle	DLS	°F	
Survey's are tied into:			Assumed vertical to bottom of surface casing at 858 MD					Date Received:			
TIE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1	858.00	0.00	0.00	858.00	0.00	0.00	0.00	0.00	45.00	0.00	
2	926.00	0.20	267.30	926.00	-0.11	-0.01	-0.12	0.12	267.30	0.29	95 °F
3	1016.00	0.30	223.10	1016.00	-0.38	-0.19	-0.44	0.47	247.03	0.23	96 °F
4	1106.00	0.30	330.40	1106.00	-0.66	-0.15	-0.71	0.73	257.96	0.54	98 °F
5	1195.00	0.40	303.60	1195.00	-1.11	0.22	-1.09	1.11	281.55	0.21	98 °F
6	1285.00	0.60	312.40	1284.99	-1.82	0.71	-1.70	1.84	292.81	0.24	99 °F
7	1375.00	0.40	278.40	1374.99	-2.54	1.08	-2.36	2.59	294.58	0.39	99 °F
8	1464.00	0.70	310.10	1463.99	-3.34	1.47	-3.08	3.41	295.57	0.47	100 °F
9	1554.00	0.70	6.60	1553.98	-3.90	2.37	-3.44	4.18	304.63	0.74	100 °F
10	1643.00	0.90	5.00	1642.97	-4.07	3.61	-3.31	4.90	317.45	0.23	100 °F
11	1733.00	1.10	35.40	1732.96	-3.85	5.02	-2.75	5.72	331.27	0.62	100 °F
12	1823.00	1.70	34.70	1822.93	-3.05	6.82	-1.49	6.98	347.67	0.67	100 °F
13	1912.00	2.80	87.40	1911.87	-0.48	8.00	1.43	8.13	10.15	2.50	100 °F
14	2002.00	2.60	87.20	2001.77	3.59	8.20	5.67	9.97	34.64	0.22	100 °F
15	2091.00	2.60	89.00	2090.68	7.48	8.34	9.70	12.79	49.33	0.09	100 °F
16	2181.00	2.40	89.70	2180.59	11.28	8.38	13.63	16.00	58.40	0.22	100 °F
17	2271.00	2.30	93.90	2270.52	14.89	8.27	17.31	19.19	64.47	0.22	100 °F
18	2361.00	3.20	103.10	2360.41	19.18	7.58	21.56	22.85	70.64	1.11	100 °F
19	2450.00	3.00	108.90	2449.28	23.99	6.26	26.18	26.92	76.55	0.42	100 °F
20	2540.00	4.60	112.30	2539.08	29.90	4.13	31.75	32.02	82.59	1.79	102 °F
21	2629.00	4.00	115.10	2627.83	36.47	1.46	37.87	37.89	87.80	0.71	104 °F
22	2719.00	3.50	112.20	2717.64	42.26	-0.91	43.25	43.26	91.21	0.59	106 °F
23	2808.00	3.80	106.00	2806.46	47.89	-2.75	48.60	48.68	93.24	0.56	108 °F
24	2898.00	4.10	104.00	2896.24	54.09	-4.35	54.59	54.76	94.56	0.37	108 °F
25	2987.00	2.90	114.00	2985.08	59.49	-6.04	59.73	60.04	95.77	1.51	106 °F
26	3077.00	4.10	112.40	3074.91	64.90	-8.19	64.79	65.31	97.20	1.34	107 °F
27	3166.00	3.50	111.30	3163.71	70.74	-10.39	70.26	71.03	98.41	0.68	108 °F
28	3256.00	3.20	101.50	3253.56	75.97	-11.89	75.28	76.22	98.97	0.72	108 °F
29	3346.00	4.40	105.80	3343.36	81.93	-13.33	81.07	82.16	99.34	1.37	108 °F
30	3435.00	4.00	110.50	3432.12	88.43	-15.35	87.26	88.60	99.97	0.59	108 °F
31	3525.00	4.00	114.80	3521.90	94.62	-17.76	93.05	94.73	100.81	0.33	108 °F
32	3615.00	5.50	112.00	3611.59	101.97	-20.69	99.90	102.02	101.70	1.69	108 °F
33	3704.00	5.30	115.50	3700.19	110.21	-24.06	107.56	110.22	102.61	0.43	108 °F
34	3794.00	5.30	116.60	3789.81	118.32	-27.71	115.03	118.32	103.55	0.11	108 °F
35	3883.00	5.00	116.10	3878.45	126.11	-31.26	122.19	126.12	104.35	0.34	109 °F
36	3973.00	5.00	119.70	3968.11	133.71	-34.93	129.12	133.76	105.14	0.35	109 °F
37	4062.00	4.90	118.00	4056.78	141.12	-38.63	135.84	141.23	105.88	0.20	111 °F
38	4152.00	5.00	119.70	4146.44	148.61	-42.38	142.64	148.81	106.55	0.20	111 °F
39	4242.00	5.10	117.10	4236.09	156.26	-46.15	149.61	156.57	107.14	0.28	99 °F
40	4331.00	4.90	120.80	4324.75	163.74	-49.90	156.40	164.16	107.69	0.43	99 °F
41	4421.00	4.70	115.70	4414.44	171.01	-53.46	163.02	171.57	108.16	0.52	96 °F
42	4511.00	5.00	119.80	4504.12	178.38	-57.01	169.75	179.07	108.56	0.51	97 °F
43	4600.00	5.10	117.70	4592.77	185.94	-60.78	176.62	186.78	108.99	0.24	111 °F
44	4690.00	5.10	120.20	4682.41	193.66	-64.65	183.62	194.66	109.40	0.25	113 °F



Customer: ConocoPhillips
 Well: Emerald Federal 9
 Field/Block: Yaso
 Co./Parish: Lea County
 State: New Mexico
 BSM Job #: 588
 BGGM: 2012

Directional Driller: Greg Nazzari
 MWD Operator: Joe Meyer
 API #: 30-025-41231
 Date of First Survey: September 4, 2013
 Date of Last Survey: September 8, 2013
 SM Survey Instrument Type: Good MWD

MWD **SURVEY SHEET**

Vertical Section Plane: 103.56

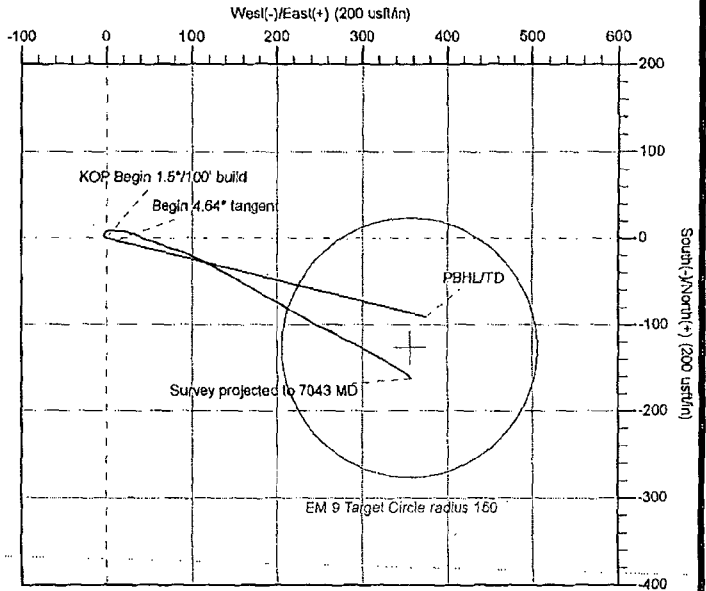
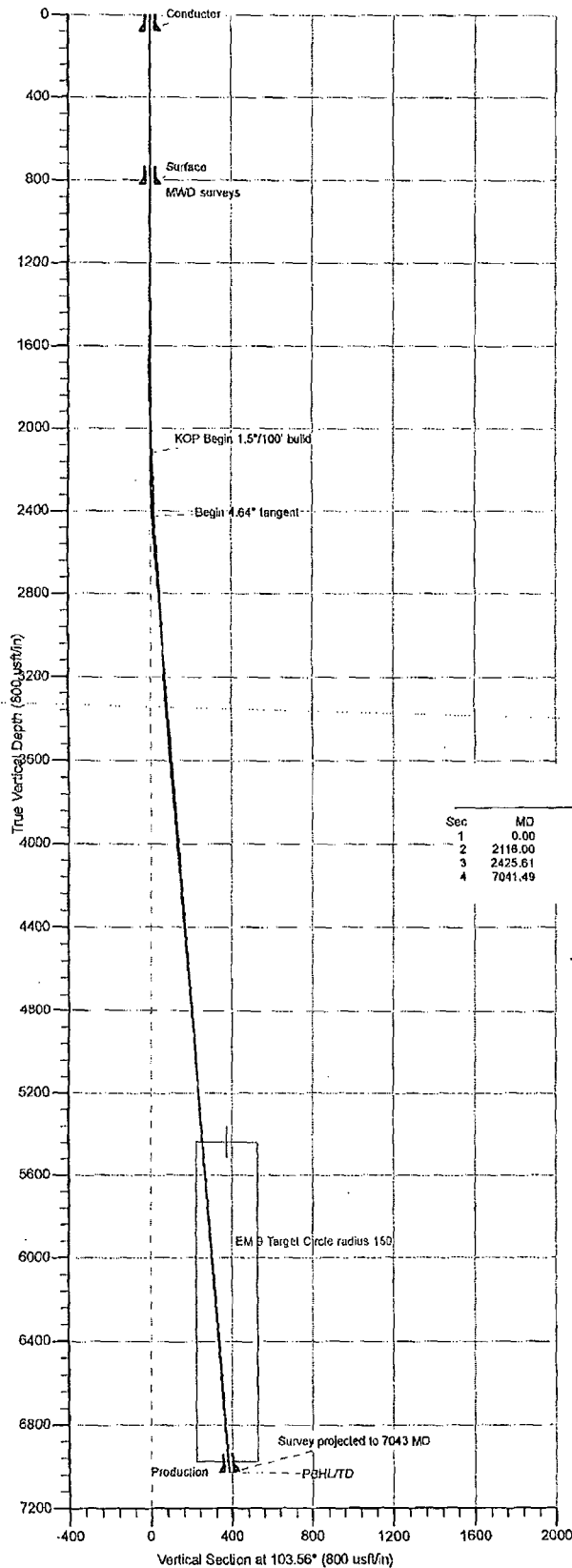
Nominal Dip Angle: 60.62

Magnetic Field Strength: 0.48778

	Meas					Coordinates		Closure		DLS	Temp (°F)
	Depth	Inc.	Azm.	T.V.D.	Ver. Sect.	+N/-S	+E/-W	Dist.	Angle		
45	4780.00	5.10	119.00	4772.06	201.34	-68.60	190.57	202.54	109.80	0.12	113 °F
46	4869.00	5.00	119.60	4860.71	208.88	-72.43	197.40	210.27	110.15	0.13	115 °F
47	4959.00	4.90	118.80	4950.38	216.36	-76.22	204.18	217.95	110.47	0.14	115 °F
48	5048.00	5.00	119.60	5039.04	223.76	-79.97	210.89	225.54	110.77	0.14	115 °F
49	5138.00	5.10	122.30	5128.70	231.31	-84.04	217.68	233.34	111.11	0.29	115 °F
50	5228.00	5.10	118.40	5218.34	238.97	-88.08	224.58	241.23	111.42	0.39	115 °F
51	5317.00	5.20	119.70	5306.98	246.67	-91.96	231.56	249.15	111.66	0.17	115 °F
52	5407.00	5.00	116.70	5396.62	254.40	-95.75	238.61	257.10	111.86	0.37	115 °F
53	5496.00	4.80	121.00	5485.30	261.73	-99.41	245.26	264.64	112.06	0.47	113 °F
54	5586.00	4.90	112.80	5574.98	269.12	-102.84	252.03	272.21	112.20	0.78	115 °F
55	5676.00	4.90	115.70	5664.65	276.67	-105.99	259.04	279.89	112.25	0.28	113 °F
56	5765.00	5.00	116.10	5753.32	284.17	-109.35	265.95	287.55	112.35	0.12	115 °F
57	5855.00	5.10	119.00	5842.97	291.86	-113.01	272.97	295.44	112.49	0.30	115 °F
58	6034.00	5.00	118.10	6021.27	307.08	-120.54	286.81	311.11	112.80	0.07	115 °F
59	6124.00	5.10	116.70	6110.92	314.77	-124.19	293.84	319.01	112.91	0.18	115 °F
60	6213.00	4.90	116.90	6199.59	322.32	-127.69	300.77	326.75	113.00	0.23	117 °F
61	6303.00	5.00	119.30	6289.25	329.84	-131.34	307.62	334.48	113.12	0.26	117 °F
62	6393.00	4.80	116.30	6378.92	337.28	-134.93	314.41	342.14	113.23	0.36	116 °F
63	6482.00	4.70	115.70	6467.62	344.48	-138.16	321.03	349.50	113.29	0.13	117 °F
64	6572.00	4.90	119.70	6557.30	351.78	-141.67	327.70	357.01	113.38	0.43	117 °F
65	6661.00	4.70	122.20	6645.99	358.88	-145.49	334.08	364.39	113.53	0.33	117 °F
66	6751.00	4.70	124.00	6735.69	365.83	-149.52	340.26	371.66	113.72	0.16	117 °F
67	6840.00	4.70	119.50	6824.39	372.76	-153.35	346.46	378.88	113.88	0.41	117 °F
68	6930.00	3.90	131.40	6914.13	379.01	-157.19	351.96	385.47	114.07	1.33	118 °F
69	6988.00	3.70	131.70	6972.01	382.40	-159.74	354.84	389.14	114.24	0.35	118 °F
PROJ	7043.00	3.70	131.70	7026.89	385.53	-162.10	357.49	392.53	114.39	0.00	PTB



Lea County, New Mexico
 Emerald Federal
 Emerald Federal Well No. 9
 rev0
 PD 822



Section Details

Sec	MD	Inc	Azi	TVD	+N-S	+E-W	Dleg	TFace	VSec	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	2116.00	0.00	0.00	2116.00	0.00	0.00	0.00	0.00	0.00	KOP Begin 1.5°/100' build
3	2425.61	4.64	103.56	2425.27	-2.94	12.19	1.50	193.56	12.54	Begin 4.64° tangent
4	7041.49	4.64	103.56	7028.00	-90.60	375.50	0.00	0.00	386.28	PBHLTD

ANNOTATIONS

TVD	MD	Inc	Azi	+N-S	+E-W	VSec	Departure	Annotation
858.00	858.00	0.00	0.00	0.00	0.00	0.00	0.00	MWD surveys
7026.89	7043.00	3.70	131.70	-162.10	357.49	385.53	411.63	Survey projected to 7043 MD

Surface Location: RKB=4032+13 @ 4045.00usft (PD 822)
 US State Plane 1927 (Exact solution)
 New Mexico East 3001

Northing: 665535.91 Easting: 668774.75 Latitude: 32.82843891 Longitude: -103.78380551

Total Correction (M => G) To convert a Magnetic Direction to a Grid Direction, Add 7.29°



Azimuths to Grid North
 True North: -0.30°
 Magnetic North: 7.29°

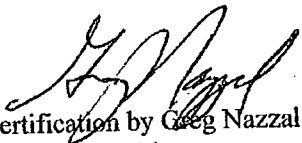
Magnetic Field
 Strength: 48778.0snT
 Dip Angle: 60.62°
 Date: 6/30/2013
 Model: USER DEFINED





1407 Northpark Dr.
Kingwood, TX 77339
Cell: (281) 851-8112
Efax: (281) 966-1566

BlueStar MWD, LP performed a MWD survey for ConocoPhillips' Emerald Federal 9, located in Lea Co., NM. The API number is: 30-025-41231. The surveys were taken from 858 MD to 6988 MD and ranged over the dates from 4-Sept-13 to 8-Sept-13 and are certified as being true and correct.


Certification by Greg Nazzari
President