

NM OIL CONSERVATION

State of New Mexico ARTESIA DISTRICT

Form C-102

Energy, Minerals & Natural Resources Department

Revised August 1, 2011

OIL CONSERVATION DIVISION

Submit one copy to appropriate

1220 South St. Francis Dr.

Santa Fe, NM 87505

RECEIVED

District Office

☐ AMENDED REPORT

District I
1625 N. French Dr., Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720
District III
1000 Rio Brazos Road, Aztec, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

WELL LOCATION AND ACREAGE DEDICATION PLAT

1 API Number 30-015- 43397	2 Pool Code 97565	3 Pool Name N. Seven Rivers; gloreita Yeso
4 Property Code 308178	5 Property Name GRAVE DIGGER STATE COM	
6 Well Number 8H	7 Operator Name COG OPERATING, LLC	
8 GRID NO. 229137	9 Elevation 3387'	

10 Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet From the	East/West line	County
N	2	20S	25E		170	SOUTH	1610	WEST	EDDY

11 Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
3	2	20S	25E		330	NORTH	1550	WEST	EDDY

12 Dedicated Acres 160.32	13 Joint or Infill	14 Consolidation Code	15 Order No.
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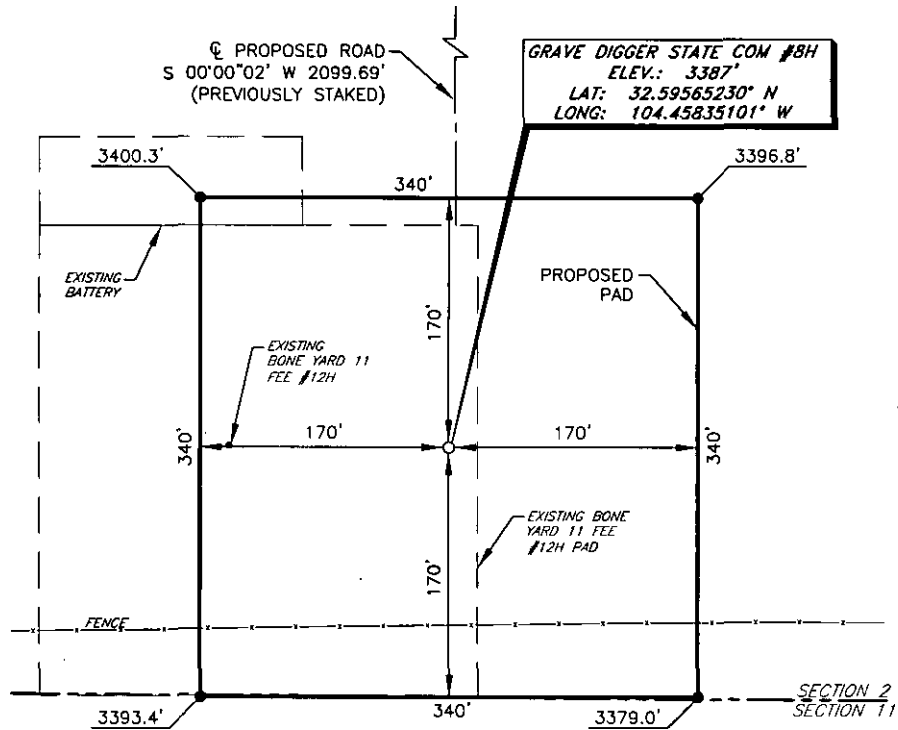
No allowable will be assigned to this completion until all interest have been consolidated or a non-standard unit has been approved by the division.

	LOT 2 40.09 AC. (40.06 GLO) LOT 1 40.13 AC. (40.09 GLO) LOT 3 40.06 AC. (40.04 GLO) LOT 4 40.04 AC. (40.02 GLO)	17 OPERATOR CERTIFICATION I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division. Signature: <u>Kelly J. Holly</u> Date: <u>9-29-15</u> <u>kholly@concho.com</u> E-mail Address
	GEODETIC DATA NAD 27 GRID - NM EAST SURFACE LOCATION N 580432.6 - E 461497.8 LAT: 32.59565230° N LONG: 104.45835101° W BOTTOM HOLE N 585178.7 - E 461454.4 LAT: 32.60869843° N LONG: 104.45851006° W CORNER DATA NAD 27 GRID - NM EAST A: FOUND BRASS CAP "1947" N 580276.9 - E 459887.3 B: FOUND BRASS CAP "1947" N 582882.5 - E 459896.7 C: FOUND BRASS CAP "1947" N 585504.1 - E 459905.9 D: FOUND BRASS CAP "1947" N 585511.7 - E 462548.4 E: FOUND BRASS CAP "1947" N 585520.8 - E 465190.9 F: FOUND BRASS CAP "1947" N 582874.9 - E 465184.7 G: FOUND BRASS CAP "1947" N 580229.1 - E 465177.8 H: FOUND BRASS CAP "1947" N 580253.1 - E 462532.6 1: CALCULATED POINT N 580265.0 - E 461209.9 2: CALCULATED POINT N 585507.9 - E 461227.1	18 SURVEYOR CERTIFICATION I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief. 8-28-2015 Date of Survey Signature and Seal of Robert M. Howett 19680 Certificate Number

RRC - Firm No.: TX 10193838 NM 4655451 - Job No.: LS1508493

COG OPERATING, LLC

GRAVE DIGGER STATE COM #8H
(170' FSL & 1610' FWL)
SECTION 2, T20S, R25E
N. M. P. M., EDDY COUNTY, NEW MEXICO



DIRECTIONS TO LOCATION

From the intersection of US Hwy. 285 and CR-23 (Rock Daisy Rd.)

Go West on CR-23 approx. 3.0 miles to a lease road on the left;

Turn left and go South approx. 1.5 miles to a lease road on the left;

Turn left and go East approx. 0.3 miles to a proposed road on the right;

Turn right and go South approx. 0.4 miles to this location.



SCALE: 1" = 100'

0 50 100

BEARINGS ARE
NAD 27 GRID - NW EAST
DISTANCES ARE GROUND

Firm No.: TX 10193838 NM 4655451

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NO.	REVISION	DATE
JOB NO.:	LS1508493	
DWG. NO.:	1508493PAD	

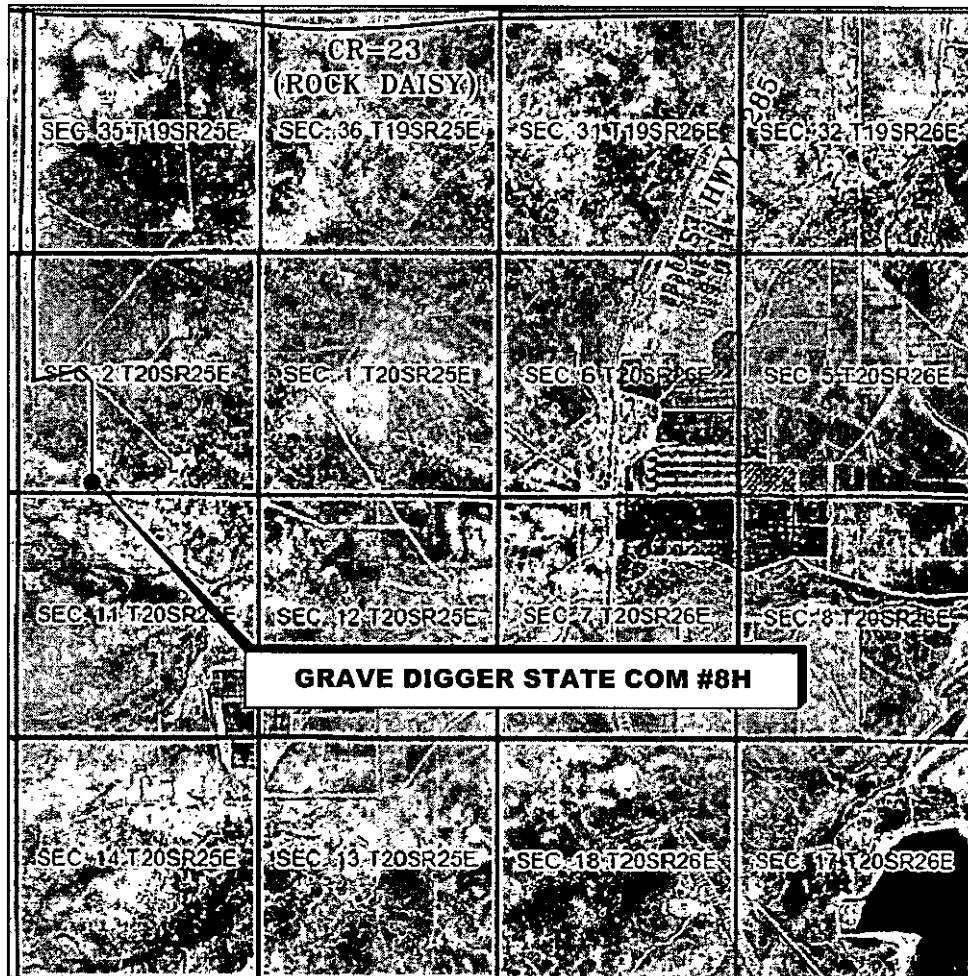
RRC

308 W. BROADWAY ST., HOBBS, NM 88240 (575) 964-8200

SCALE: 1" = 100'
DATE: 8-28-2015
SURVEYED BY: GB
DRAWN BY: LPS
APPROVED BY: RMH
SHEET : 1 OF 1

VICINITY MAP

NOT TO SCALE



*SECTION 2, TWP. 20 SOUTH, RGE. 25 EAST,
N. M. P. M., EDDY CO., NEW MEXICO*

OPERATOR: COG Operating, LLC
 LEASE: Grave Digger State Com
 WELL NO.: 8H

LOCATION: 170' FSL & 1610' FWL
 ELEVATION: 3387'

Firm No.: TX 10193838 NM 4655451

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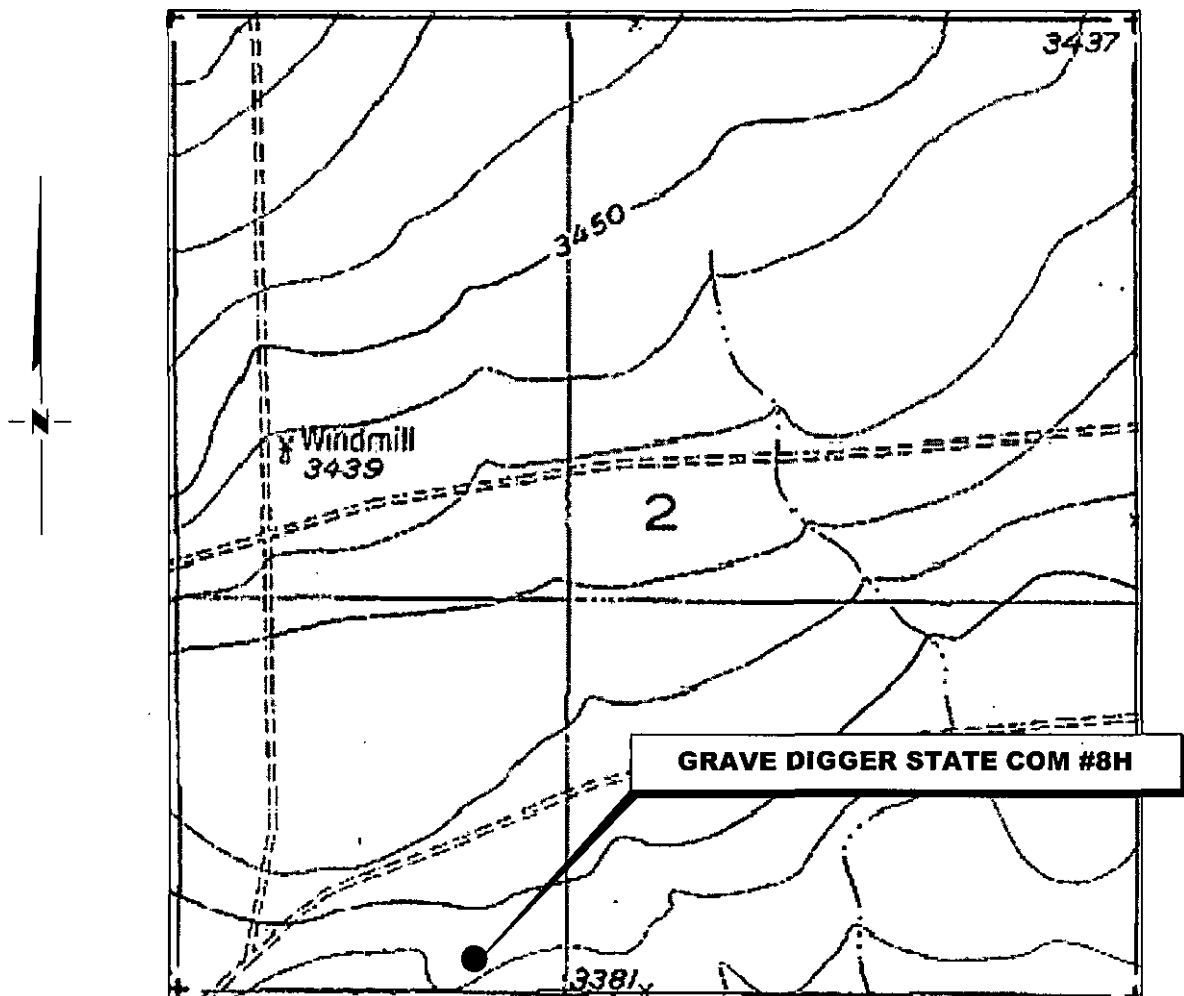
NO.	REVISION	DATE
JOB NO.: LS1508493		
DWG. NO.: 1508493VM		

RRC

308 W. BROADWAY ST., HOBBS, NM 88240 (575) 964-8200

SCALE: NTS
DATE: 8-28-2015
SURVEYED BY: GB
DRAWN BY: LPS
APPROVED BY: RMH
SHEET : 1 OF 1

LOCATION VERIFICATION MAP



*SECTION 2, TWP. 20 SOUTH, RGE. 25 EAST,
N. M. P. M., EDDY CO., NEW MEXICO*

OPERATOR: COG Operating, LLC
LEASE: Grave Digger State Com
WELL NO.: 8H
ELEVATION: 3387'

LOCATION: 170' FSL & 1610' FWL
CONTOUR INTERVAL: 10'
USGS TOPO. SOURCE MAP:
Seven Rivers, NM (1954).

Firm No.: TX 10193838 NM 4655451

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NO.	REVISION	DATE
JOB NO.:	LS1508493	
DWG. NO.:	1508493LVM	

RRC

308 W. BROADWAY ST., HOBBS, NM 88240 (575) 964-8200

SCALE: 1000'
DATE: 8-28-2015
SURVEYED BY: GB
DRAWN BY: LPS
APPROVED BY: RMH
SHEET : 1 OF 1



COG Operating LLC

Eddy County, NM (NAD27 NME)

Grave Digger State Com

#8H

OH

Plan: Plan #1 09-21-15

Surface: 170' FSL, 1610' FWL, Sec 2, T20S, R25E, Unit N

BHL: 330' FNL, 1550' FWL, Sec 2, T20S, R25E, Lot #3

Standard Planning Report

21 September, 2015





Phoenix Technology Services LP
Planning Report



Database:	Compass 5000 GCR	Local Co-ordinate Reference:	Well #8H
Company:	COG Operating LLC	TVD Reference:	KB @ 3405.00usft (Silver Oak 3)
Project:	Eddy County, NM (NAD27 NME)	MD Reference:	KB @ 3405.00usft (Silver Oak 3)
Site:	Grave Digger State Com	North Reference:	Grid
Well:	#8H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1 09-21-15		

Project	Eddy County, NM (NAD27 NME)		
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	Grave Digger State Com		
Site Position:		Northing:	585,277.40 usft
From:	Map	Easting:	464,199.50 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 36' 32.32192 N
		Longitude:	104° 26' 58.54459 W
		Grid Convergence:	-0.06 °

Well	#8H		
Well Position	+N/-S	-4,844.80 usft	Northing:
	+E/-W	-2,701.70 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft
		Latitude:	32° 35' 44.34861 N
		Longitude:	104° 27' 30.06358 W
		Ground Level:	3,387.00 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
			(°)
	HDGM	9/21/2015	7.68
			Dip Angle
			(°)
			60.42
			Field Strength
			(nT)
			48,417

Design	Plan #1 09-21-15		
Audit Notes:			
Version:	Phase:	PLAN	Tie On Depth:
			0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction
			(°)
			359.48

Plan Sections										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Dogleg	Build	Turn	TFO	Target
Depth	(°)	(°)	Depth	(usft)	(usft)	Rate	Rate	Rate	(°)	
(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	
2,394.56	0.00	0.00	2,394.56	0.00	0.00	0.00	0.00	0.00	0.00	
3,217.29	90.50	359.48	2,915.42	525.39	-4.80	11.00	11.00	0.00	359.48	
7,438.33	90.50	359.48	2,878.58	4,746.10	-43.40	0.00	0.00	0.00	0.00	BHL (Grave Digger #7



Phoenix Technology Services LP
Planning Report



Database:	Compass 5000 GCR	Local Co-ordinate Reference:	Well #8H
Company:	COG Operating LLC	TVD Reference:	KB @ 3405.00usft (Silver Oak 3)
Project:	Eddy County, NM (NAD27 NME)	MD Reference:	KB @ 3405.00usft (Silver Oak 3)
Site:	Grave Digger State Com	North Reference:	Grid
Well:	#8H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1 09-21-15		

Planned 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)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,394.56	0.00	0.00	2,394.56	0.00	0.00	0.00	0.00	0.00	0.00
KOP, Begin 11°/100' Build									
2,400.00	0.60	359.48	2,400.00	0.03	0.00	0.03	10.99	10.99	0.00
2,500.00	11.60	359.48	2,499.28	10.63	-0.10	10.63	11.00	11.00	0.00
2,600.00	22.60	359.48	2,594.72	39.99	-0.37	39.99	11.00	11.00	0.00
2,700.00	33.60	359.48	2,682.79	87.01	-0.80	87.02	11.00	11.00	0.00
2,800.00	44.60	359.48	2,760.28	149.98	-1.37	149.98	11.00	11.00	0.00
2,814.06	46.14	359.48	2,770.16	159.98	-1.46	159.99	11.00	11.00	0.00
PP (Grave Digger #7H)									
2,900.00	55.60	359.48	2,824.33	226.57	-2.07	226.58	11.00	11.00	0.00
3,000.00	66.60	359.48	2,872.59	313.98	-2.87	313.99	11.00	11.00	0.00
3,100.00	77.60	359.48	2,903.28	408.99	-3.74	409.00	11.00	11.00	0.00
3,200.00	88.60	359.48	2,915.28	508.10	-4.65	508.13	11.00	11.00	0.00
3,216.72	90.44	359.48	2,915.42	524.82	-4.80	524.84	11.00	11.00	0.00
TL, 2920' TVD @ 0 VZ, 90.5° Inc									
3,217.29	90.50	359.48	2,915.42	525.39	-4.80	525.41	11.00	11.00	0.00
Begin 90.5° Inc. Hold, 359.48° Azm									
3,300.00	90.50	359.48	2,914.69	608.10	-5.56	608.12	0.00	0.00	0.00
3,400.00	90.50	359.48	2,913.82	708.09	-6.48	708.12	0.00	0.00	0.00
3,500.00	90.50	359.48	2,912.95	808.08	-7.39	808.11	0.00	0.00	0.00
3,600.00	90.50	359.48	2,912.08	908.07	-8.30	908.11	0.00	0.00	0.00
3,700.00	90.50	359.48	2,911.20	1,008.06	-9.22	1,008.11	0.00	0.00	0.00
3,800.00	90.50	359.48	2,910.33	1,108.06	-10.13	1,108.10	0.00	0.00	0.00
3,900.00	90.50	359.48	2,909.46	1,208.05	-11.05	1,208.10	0.00	0.00	0.00
4,000.00	90.50	359.48	2,908.58	1,308.04	-11.96	1,308.09	0.00	0.00	0.00
4,100.00	90.50	359.48	2,907.71	1,408.03	-12.88	1,408.09	0.00	0.00	0.00
4,200.00	90.50	359.48	2,906.84	1,508.02	-13.79	1,508.09	0.00	0.00	0.00
4,300.00	90.50	359.48	2,905.97	1,608.02	-14.70	1,608.08	0.00	0.00	0.00
4,400.00	90.50	359.48	2,905.09	1,708.01	-15.62	1,708.08	0.00	0.00	0.00
4,500.00	90.50	359.48	2,904.22	1,808.00	-16.53	1,808.08	0.00	0.00	0.00
4,600.00	90.50	359.48	2,903.35	1,907.99	-17.45	1,908.07	0.00	0.00	0.00
4,700.00	90.50	359.48	2,902.48	2,007.98	-18.36	2,008.07	0.00	0.00	0.00
4,800.00	90.50	359.48	2,901.60	2,107.98	-19.28	2,108.06	0.00	0.00	0.00
4,900.00	90.50	359.48	2,900.73	2,207.97	-20.19	2,208.06	0.00	0.00	0.00
5,000.00	90.50	359.48	2,899.86	2,307.96	-21.10	2,308.06	0.00	0.00	0.00
5,100.00	90.50	359.48	2,898.99	2,407.95	-22.02	2,408.05	0.00	0.00	0.00
5,200.00	90.50	359.48	2,898.11	2,507.94	-22.93	2,508.05	0.00	0.00	0.00
5,300.00	90.50	359.48	2,897.24	2,607.94	-23.85	2,608.05	0.00	0.00	0.00
5,400.00	90.50	359.48	2,896.37	2,707.93	-24.76	2,708.04	0.00	0.00	0.00
5,500.00	90.50	359.48	2,895.50	2,807.92	-25.68	2,808.04	0.00	0.00	0.00
5,600.00	90.50	359.48	2,894.62	2,907.91	-26.59	2,908.03	0.00	0.00	0.00
5,700.00	90.50	359.48	2,893.75	3,007.90	-27.51	3,008.03	0.00	0.00	0.00
5,800.00	90.50	359.48	2,892.88	3,107.90	-28.42	3,108.03	0.00	0.00	0.00
5,900.00	90.50	359.48	2,892.00	3,207.89	-29.33	3,208.02	0.00	0.00	0.00
6,000.00	90.50	359.48	2,891.13	3,307.88	-30.25	3,308.02	0.00	0.00	0.00
6,100.00	90.50	359.48	2,890.26	3,407.87	-31.16	3,408.01	0.00	0.00	0.00
6,200.00	90.50	359.48	2,889.39	3,507.86	-32.08	3,508.01	0.00	0.00	0.00
6,300.00	90.50	359.48	2,888.51	3,607.86	-32.99	3,608.01	0.00	0.00	0.00
6,400.00	90.50	359.48	2,887.64	3,707.85	-33.91	3,708.00	0.00	0.00	0.00
6,500.00	90.50	359.48	2,886.77	3,807.84	-34.82	3,808.00	0.00	0.00	0.00
6,600.00	90.50	359.48	2,885.90	3,907.83	-35.73	3,908.00	0.00	0.00	0.00
6,700.00	90.50	359.48	2,885.02	4,007.82	-36.65	4,007.99	0.00	0.00	0.00
6,800.00	90.50	359.48	2,884.15	4,107.82	-37.56	4,107.99	0.00	0.00	0.00



Phoenix Technology Services LP
Planning Report



Database:	Compass 5000 GCR	Local Co-ordinate Reference:	Well #8H
Company:	COG Operating LLC	TVD Reference:	KB @ 3405.00usft (Silver Oak 3)
Project:	Eddy County, NM (NAD27 NME)	MD Reference:	KB @ 3405.00usft (Silver Oak 3)
Site:	Grave Digger State Corn	North Reference:	Grid
Well:	#8H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1 09-21-15		

Planned 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)
6,900.00	90.50	359.48	2,883.28	4,207.81	-38.48	4,207.98	0.00	0.00	0.00
7,000.00	90.50	359.48	2,882.41	4,307.80	-39.39	4,307.98	0.00	0.00	0.00
7,100.00	90.50	359.48	2,881.53	4,407.79	-40.31	4,407.98	0.00	0.00	0.00
7,200.00	90.50	359.48	2,880.66	4,507.78	-41.22	4,507.97	0.00	0.00	0.00
7,300.00	90.50	359.48	2,879.79	4,607.78	-42.14	4,607.97	0.00	0.00	0.00
7,400.00	90.50	359.48	2,878.91	4,707.77	-43.05	4,707.97	0.00	0.00	0.00
7,438.33	90.50	359.48	2,878.58	4,746.10	-43.40	4,746.29	0.00	0.00	0.00
TD at 7438.33' MD - BHL (Grave Digger #7H)									

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
hit/miss target									
- Shape									
PP (Grave Digger #7H)	0.00	0.00	2,770.18	160.00	-1.46	580,592.60	461,496.34	32° 35' 45.93192 N	104° 27' 30.08288 W
- plan hits target center									
- Point									
BHL (Grave Digger #7H)	0.00	360.00	2,878.58	4,746.10	-43.40	585,178.70	461,454.40	32° 36' 31.31436 N	104° 27' 30.63620 W
- plan hits target center									
- Point									

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
3,216.72	2,915.42	TL, 2920' TVD @ 0 VZ, 90.5° Inc		-0.50	359.48	

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
2,394.56	2,394.56	0.00	0.00	KOP, Begin 11"/100' Build	
3,217.29	2,915.42	525.39	-4.80	Begin 90.5° Inc Hold, 359.48° Azm	
7,438.33	2,878.58	4,746.10	-43.40	TD at 7438.33' MD	



Project: Eddy County, NM (NAD27 NME)
Site: Grave Digger State Com
Well: #8H
Wellbore: OH
Design: Plan #1 09-21-15
Rig: Silver Oak 3

PHOENIX
TECHNOLOGY SERVICES

Asimuths to Grid North
True North: 0.07°
Magnetic North: 7.75°
Magnetic Field
Strength: 48416.9nT
Dip Angle: 80.42°
Magnetic Model:
Model: HDGM

Noise Federal Com #8H

WELL DETAILS

Ground Level	3337.00	Latitude	37° 35' 44.34861 N
Easting	481457.80	Longitude	104° 27' 30.63820 W

SECTION DETAILS

Sec	MD	Inc	Asn	TVD	+E/W	-N/S	Depth	True	Vsect	Target	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	KOP: Begin 11°/100° Build
2	2394.58	0.00	0.00	2394.58	0.00	0.00	0.00	0.00	0.00	0.00	Begin 90.5° Inc Hold 359.48° Azm
3	3217.29	90.50	859.48	2915.42	525.39	-4.80	11.00	359.48	925.42		
4	7438.33	90.50	359.48	2818.58	4748.10	-43.40	0.00	0.00	4748.30	BHL (Grave Digger #7H)	TD at 7438.33 MD

DESIGN TARGET DETAILS

Name	TVD	+E/W	-N/S	Easting	Latitude	Longitude	Shape
BHL (Grave Digger #7H)	2818.58	4748.10	-43.40	565178.70	461454.40	104° 27' 30.63820 W	Point

- plan has target center

LEGEND

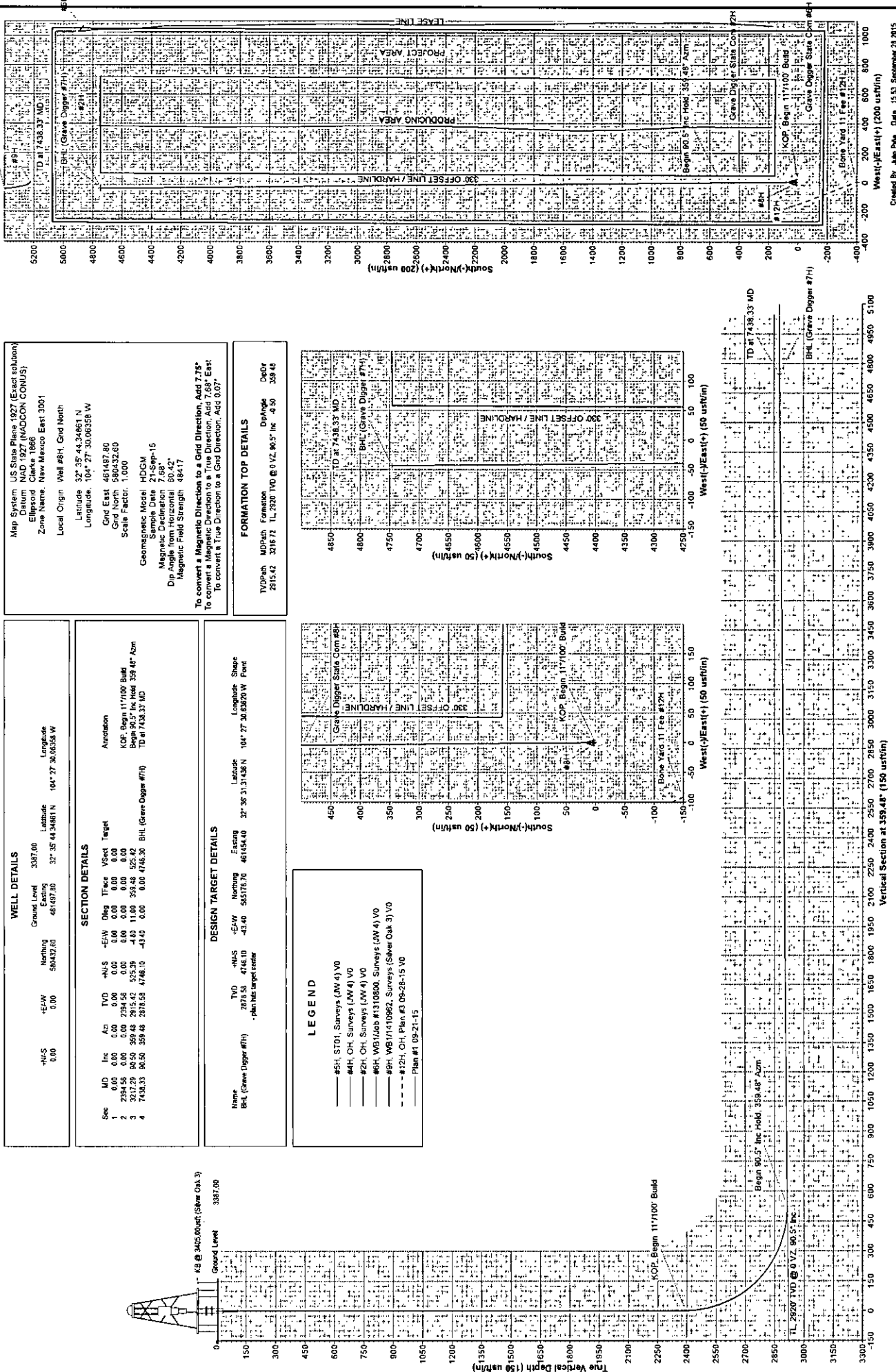
- #5H, ST01, Surveys (JW 4) VO
- #4H, OH, Surveys (JW 4) VO
- #2H, OH, Surveys (JW 4) VO
- #6H, V03/J03 #1310800, Surveys (JW 4) VO
- #9H, V03/J03 #1410982, Surveys (Silver Oak 3) VO
- - - #12H, OH, Plan #0 09-28-15 VO
- Plan #1 09-21-15

Map System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone Name: New Mexico East 3001
Local Origin: Well #8H, Grid North
Latitude: 32° 35' 44.34861 N
Longitude: 104° 27' 30.63820 W
Grid East: 461457.80
Grid North: 580432.60
Scale Factor: 1.000
Geomagnetic Model: HDGM
Sample Date: 7/15/15
Magnetic Declination: 7.75°
Dip Angle from Horizontal: 80.42°
Magnetic Field Strength: 48417

To convert a Magnetic Direction to a Grid Direction, Add 7.75°
To convert a Magnetic Direction to a True Direction, Add 7.69° East
To convert a True Direction to a Grid Direction, Add 0.07°

FORMATION TOP DETAILS

TVD Path	MD Path	Formation	Depth	Depth
2815.42	3216.72	TL 2820 TVD @ 0 VZ 90.5° Inc	4.30	359.48



Vertical Section at 359.48° (150 usft/in)

West-(yEast) (+) (50 usft/in)

South-(yNorth) (+) (50 usft/in)

West-(yEast) (+) (200 usft/in)

South-(yNorth) (+) (200 usft/in)

Created By: John Pate Date: 15:53 September 28 2015



COG Operating LLC

Eddy County, NM (NAD27 NME)

Grave Digger State Com

#8H

OH

Plan #1 09-21-15

Anticollision Report

28 September, 2015





Phoenix Technology Services LP
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #8H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3405.00usft (Silver Oak 3)
Reference Site:	Grave Digger State Corn	MD Reference:	KB @ 3405.00usft (Silver Oak 3)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	Compass 5000 GCR
Reference Design:	Plan #1 09-21-15	Offset TVD Reference:	Offset Datum

Reference	Plan #1 09-21-15		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	Stations	Error Model:	ISCWSA
Depth Range:	2,387.00 to 2,431.00usft	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 9,999,999,999.00	Error Surface:	Circular Conic
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program		Date	9/24/2015		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.00	7,438.33	Plan #1 09-21-15 (OH)	PHX+MWD+HDGM	PHX+MWD+HDGM	

Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Bone Yard 11 Fee						
#12H - OH - Plan #3 09-28-15	2,400.00	2,419.68	147.88	131.05	8.786	CC, ES, SF
Grave Digger State Corn						
#2H - OH - Surveys (JW 4)	2,400.00	7,060.00	463.95	375.61	5.252	CC, ES, SF
#4H - OH - Surveys (JW 4)	2,400.00	7,207.00	3,341.13	3,252.84	37.844	CC, ES, SF
#5H - ST01 - Surveys (JW 4)	2,400.00	7,316.00	767.76	677.60	8.515	CC, ES, SF
#6H - WB1/Job #1310800 - Surveys (JW 4)	2,400.00	7,440.00	1,176.37	1,085.79	12.987	CC, ES, SF
Noose Federal Corn						
#9H - WB1/1410962 - Surveys (Silver Oak 3)	2,387.00	2,243.43	5,246.15	5,233.90	428.229	CC, ES
#9H - WB1/1410962 - Surveys (Silver Oak 3)	2,400.00	2,250.42	5,246.68	5,234.37	426.375	SF

Offset Design												Bone Yard 11 Fee - #12H - OH - Plan #3 09-28-15		Offset Site Error:		0.00 usft	
Survey Program:												0-PHX+MWD+HDGM		Offset Well Error:		0.00 usft	
Reference		Offset		Semi Major Axis				Distance									
Measured	Vertical	Measured	Vertical	Reference	Offset	Highside	Offset Wellbore	Centre	Between	Between	Minimum	Separation	Warning				
Depth	Depth	Depth	Depth	Reference	Offset	Toolface	+N/-S	+E/-W	Centres	Ellipses	Separation	Factor					
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)						
2,387.00	2,387.00	2,405.51	2,405.24	8.35	8.39	-91.52	-3.93	-148.33	148.56	131.82	16.74	8.876					
2,394.56	2,394.56	2,413.77	2,413.41	8.37	8.42	-91.98	-5.11	-147.88	148.18	131.38	16.79	8.824					
2,400.00	2,400.00	2,419.68	2,419.23	8.39	8.44	-91.86	-6.02	-147.53	147.88	131.05	16.83	8.786	CC, ES, SF				



Phoenix Technology Services LP
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #8H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3405.00usft (Silver Oak 3)
Reference Site:	Grave Digger State Com	MD Reference:	KB @ 3405.00usft (Silver Oak 3)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	Compass 5000 GCR
Reference Design:	Plan #1 09-21-15	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.00 usft
Grave Digger State Com - #2H - OH - Surveys (JW 4)													Offset Well Error:	0.00 usft
Survey Program: 100-NS-GYRO-MS, 2344-MWD														
Reference		Offset		Semi Major Axis		Distance								
Measured	Vertical	Measured	Vertical	Reference	Offset	Highside	Offset Wellbore Centre	Between	Between	Minimum	Separation	Warning		
Depth	Depth	Depth	Depth			Toothface	+N/-S	+E/-W	Centres	Ellipses	Separation	Factor		
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(")	(usft)	(usft)	(usft)	(usft)	(usft)			
2,387.00	2,387.00	7,060.00	2,679.34	8.35	79.96	64.53	178.52	374.71	469.92	381.62	88.30	5.322		
2,394.56	2,394.56	7,060.00	2,679.34	8.37	79.96	64.53	178.52	374.71	466.42	378.09	88.33	5.281		
2,400.00	2,400.00	7,060.00	2,679.34	8.39	79.96	65.33	178.52	374.71	463.95	375.61	88.35	5.252	CC, ES, SF	



Phoenix Technology Services LP
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #8H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3405.00usft (Silver Oak 3)
Reference Site:	Grave Digger State Com	MD Reference:	KB @ 3405.00usft (Silver Oak 3)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan #1 09-21-15	Offset TVD Reference:	Offset Datum

Offset Design												Offset Site Error:	0.00 usft
Grave Digger State Com - #4H - OH - Surveys (JW 4)												Offset Well Error:	0.00 usft
Survey Program: 100-Scientific Gyro, 2344-MWD													
Reference		Offset		Semi Major Axis		Distance							
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
2,387.00	2,387.00	7,207.00	2,868.87	8.35	79.90	87.57	140.75	3,311.27	3,342.80	3,254.56	88.24	37.883	
2,394.56	2,394.56	7,207.00	2,868.87	8.37	79.90	87.57	140.75	3,311.27	3,341.82	3,253.56	88.27	37.860	
2,400.00	2,400.00	7,207.00	2,868.87	8.39	79.90	88.17	140.75	3,311.27	3,341.13	3,252.84	88.29	37.844	CC, ES, SF

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Phoenix Technology Services LP
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #8H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3405.00usft (Silver Oak 3)
Reference Site:	Grave Digger State Com	MD Reference:	KB @ 3405.00usft (Silver Oak 3)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan #1 09-21-15	Offset TVD Reference:	Offset Datum

Offset Design													Offset Site Error:	0.00 usft
Grave Digger State Com - #5H - ST01 - Surveys (JW 4)													Offset Well Error:	0.00 usft
Survey Program: 100-Scientific Gyro, 2339-MWD														
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)				
2,387.00	2,387.00	7,316.00	2,859.12	8.35	81.77	-72.95	195.88	-638.85	774.26	684.14	90.12	8.592		
2,394.56	2,394.56	7,316.00	2,859.12	8.37	81.77	-72.95	195.88	-638.85	770.46	680.32	90.14	8.547		
2,400.00	2,400.00	7,316.00	2,859.12	8.39	81.77	-72.76	195.88	-638.85	767.76	677.60	90.16	8.515 CC, ES, SF		

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Phoenix Technology Services LP
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #8H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3405.00usft (Silver Oak 3)
Reference Site:	Grave Digger State Com	MD Reference:	KB @ 3405.00usft (Silver Oak 3)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH	Database:	Compass 5000 GCR
Reference Design:	Plan #1 09-21-15	Offset TVD Reference:	Offset Datum

Offset Design													Grave Digger State Com - #6H - WB1/Job #1310800 - Surveys (JW 4)		Offset Site Error:		0.00 usft	
Survey Program:													100-VES-ISCWSA-GYRO-3, 2370-MWD		Offset Well Error:		0.00 usft	
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning					
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)								
2,387.00	2,387.00	7,440.00	2,933.84	8.35	82.19	80.91	170.49	1,065.79	1,181.60	1,091.07	90.53	13.051						
2,394.56	2,394.56	7,440.00	2,933.84	8.37	82.19	80.91	170.49	1,065.79	1,178.55	1,087.99	90.56	13.014						
2,400.00	2,400.00	7,440.00	2,933.84	8.39	82.19	81.69	170.49	1,065.79	1,176.37	1,085.79	90.58	12.987	CC, ES, SF					

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Phoenix Technology Services LP
Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #8H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3405.00usft (Silver Oak 3)
Reference Site:	Grave Digger State Com	MD Reference:	KB @ 3405.00usft (Silver Oak 3)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan #1 09-21-15	Offset TVD Reference:	Offset Datum

Offset Design												Offset Site Error:	0.00 usft
Survey Program: 100-VES-ISCWSA-GYRO-3, 2281-PHX-MWD-IGRF												Offset Well Error:	0.00 usft
Reference													
Offset													
Semi Major Axis													
Measured	Vertical	Measured	Vertical	Reference	Offset	Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning
Depth	Depth	Depth	Depth			Toolface	+N/-S	+E/-W	Between	Between	Separation	Factor	
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(°)	(usft)	(usft)	Centres	Ellipses	(usft)		
									(usft)	(usft)			
2,387.00	2,387.00	2,243.43	2,243.08	8.35	3.91	-0.19	5,241.42	-17.77	5,246.15	5,233.90	12.25	428.229 CC, ES	
2,394.56	2,394.56	2,247.50	2,247.14	8.37	3.91	-0.20	5,241.60	-17.90	5,246.47	5,234.19	12.28	427.150	
2,400.00	2,400.00	2,250.42	2,250.06	8.39	3.91	0.33	5,241.72	-18.00	5,246.68	5,234.37	12.31	426.375 SF	

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Phoenix Technology Services LP
Anticollision Report

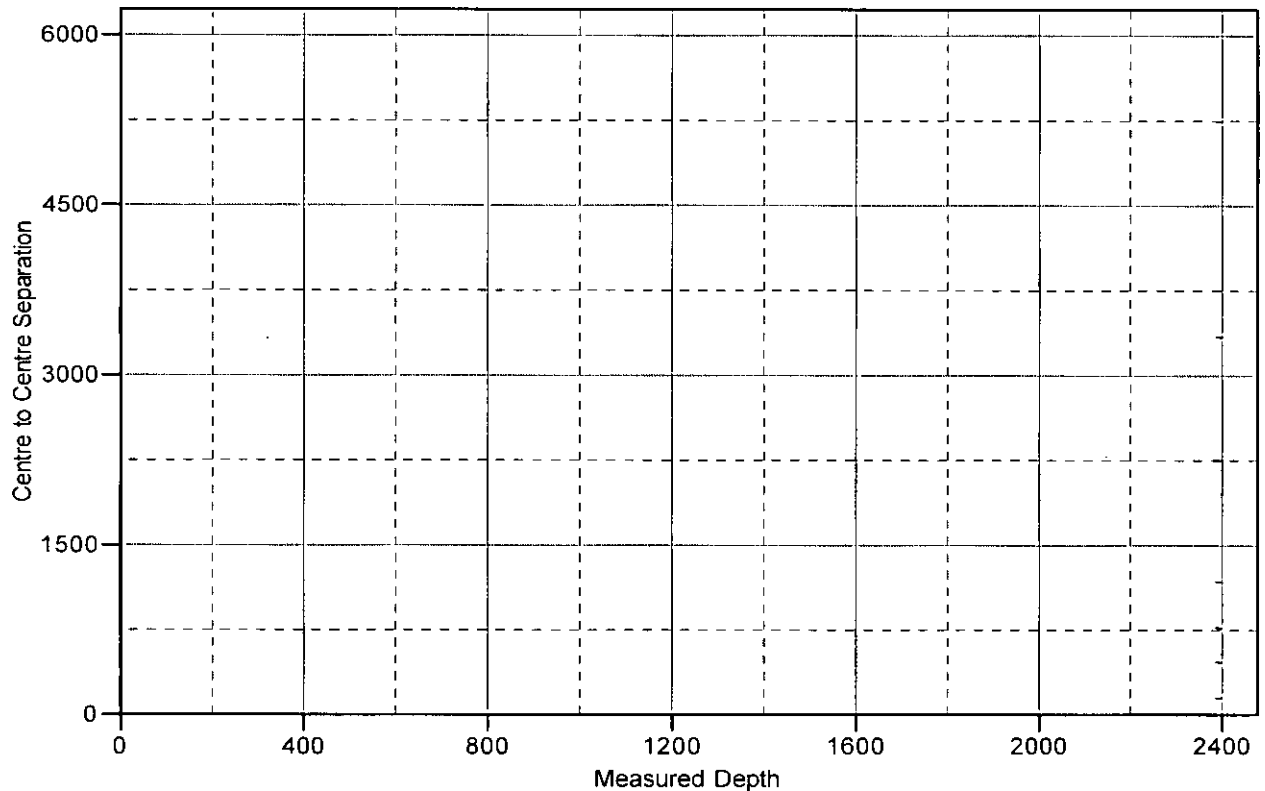


Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #8H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3405.00usft (Silver Oak 3)
Reference Site:	Grave Digger State Com	MD Reference:	KB @ 3405.00usft (Silver Oak 3)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan #1 09-21-15	Offset TVD Reference:	Offset Datum

Reference Depths are relative to KB @ 3405.00usft (Silver Oak 3)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 19' 60.00000 W

Coordinates are relative to: #8H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: -0.07°

Ladder Plot



LEGEND

- | | | |
|-------------------------------|---|---|
| ◆ #5H, ST01, Surveys (JW4) V0 | ✱ #2H, OH, Surveys (JW4) V0 | ✱ #9H, WB1/1410962, Surveys (Silver Oak 3) V0 |
| ● #4H, OH, Surveys (JW4) V0 | ■ #6H, WB1/Job #1310800, Surveys (JW4) V0 | ▲ #12H, OH, Plan#3 09-28-15 V0 |



Phoenix Technology Services LP
Anticollision Report

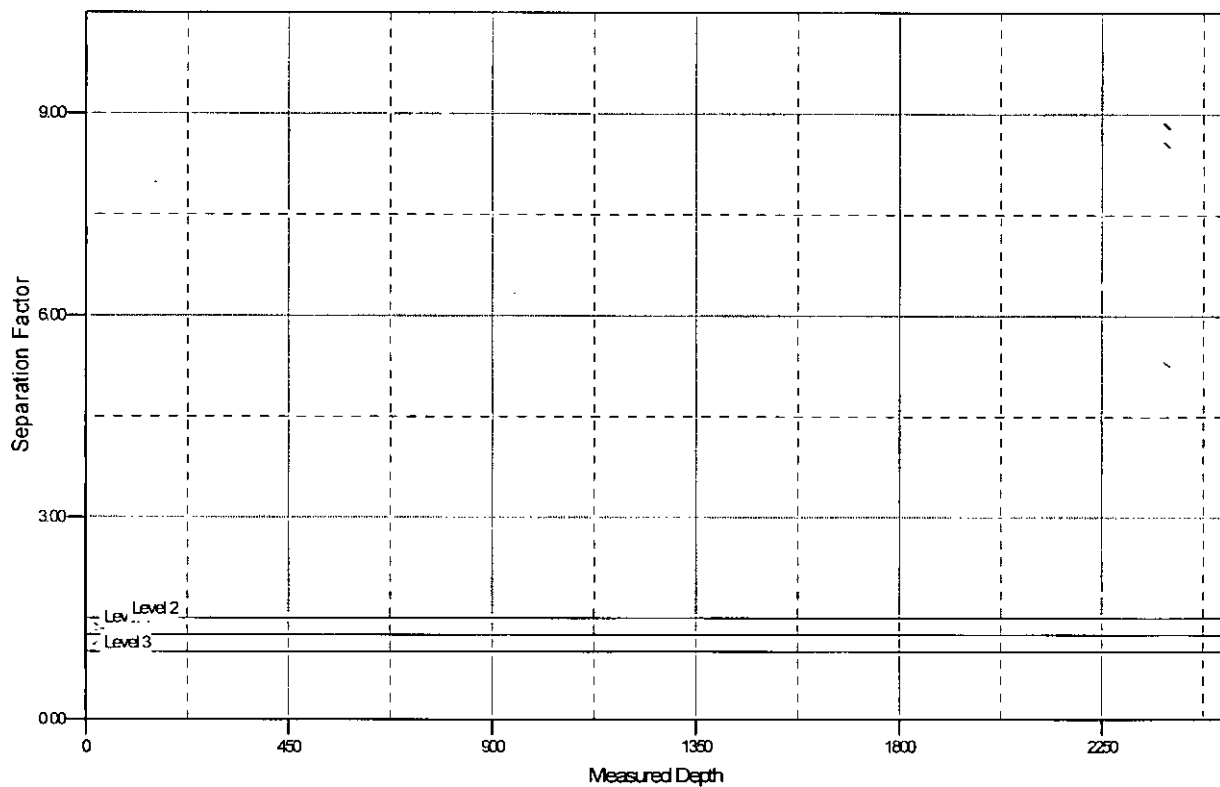


Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #8H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	KB @ 3405.00usft (Silver Oak 3)
Reference Site:	Grave Digger State Com	MD Reference:	KB @ 3405.00usft (Silver Oak 3)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	#8H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan #1 09-21-15	Offset TVD Reference:	Offset Datum

Reference Depths are relative to KB @ 3405.00usft (Silver Oak 3)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 19' 60.00000 W

Coordinates are relative to: #8H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: -0.07°

Separation Factor Plot



LEGEND

- | | | |
|--------------------------------|--|---|
| ◆ #5H, ST01, Surveys (JW 4) V0 | ✕ #2H, OH, Surveys (JW 4) V0 | ✕ #9H, WB1/1410962, Surveys (Silver Oak 3) V0 |
| ⊖ #4H, OH, Surveys (JW 4) V0 | ⊖ #6H, WB1/Job #1310800, Surveys (JW 4) V0 | ▲ #12H, OH, Plan #3 09-28-15 V0 |