

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

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

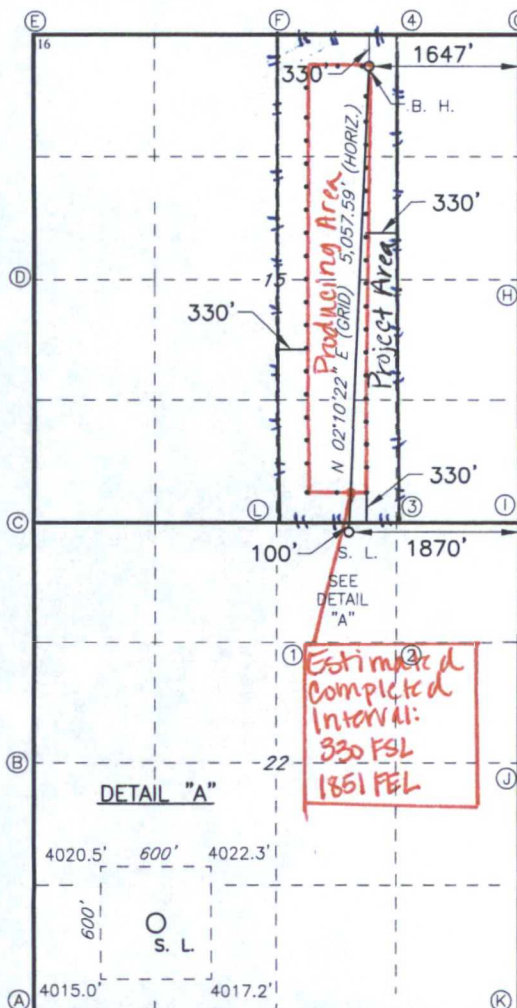
Form C-102
Revised August 1, 2011
Submit one copy to appropriate
District Office

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

1 API Number 30-025- 43272		2 Pool Code 44500		3 Pool Name Maljamar; Yeso West	
4 Property Code 315671		5 Property Name RAGNAR FEDERAL COM			6 Well Number 16H
7 OGRID NO. 229137		8 Operator Name COG OPERATING, LLC			9 Elevation 4016'
10 Surface Location					
UL or lot no. B	Section 22	Township 17S	Range 32E	Lot Idn 100	Feet from the 1870
		North/South line NORTH	Feet From the 1870		East/West line EAST
				County LEA	
11 Bottom Hole Location If Different From Surface					
UL or lot no. B	Section 15	Township 17S	Range 32E	Lot Idn 330	Feet from the 1647
		North/South line NORTH	Feet from the 1647		East/West line EAST
				County LEA	
12 Dedicated Acres 160		13 Joint or Infill		14 Consolidation Code	
				15 Order No.	

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.

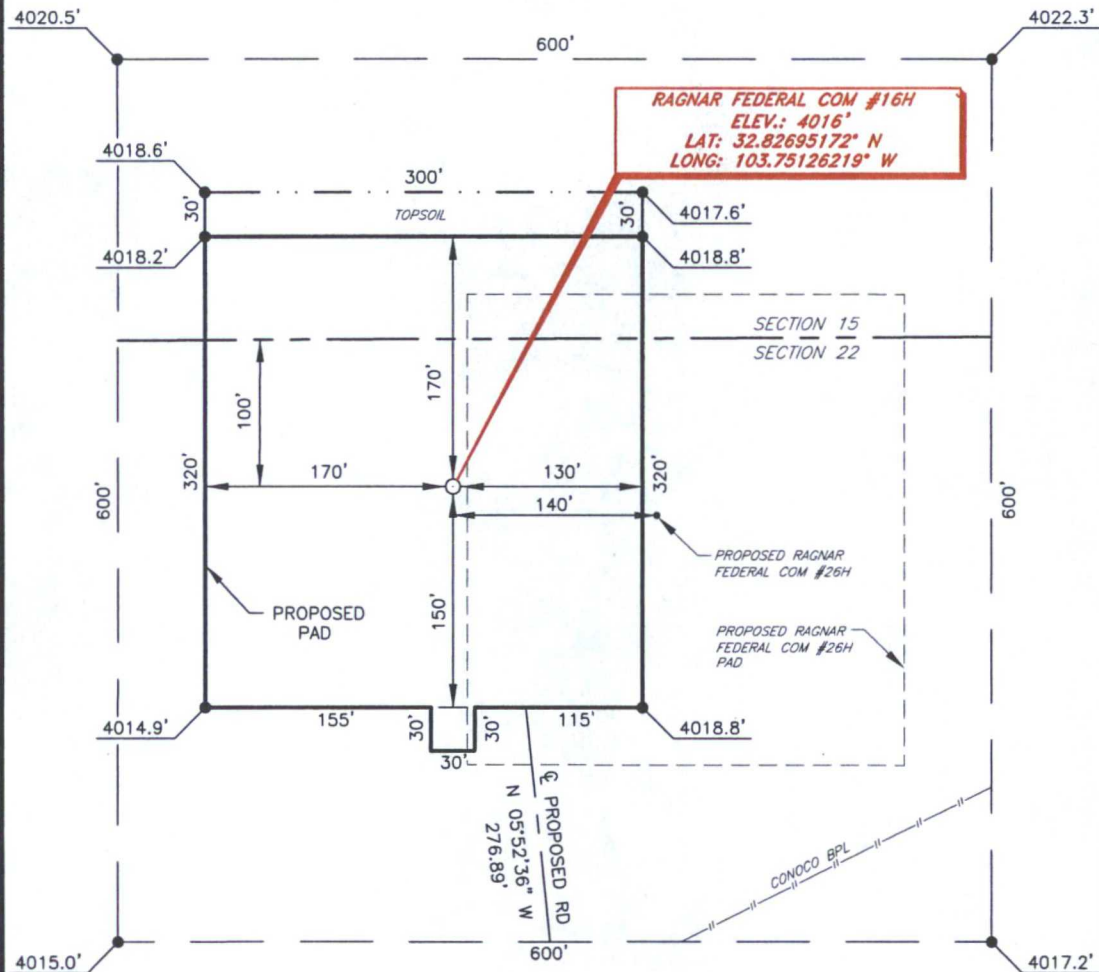


GEODETIC DATA
NAD 27 GRID - NM EAST
SURFACE LOCATION
LAT: 32.82695172° N
LONG: 103.75126245° W
BOTTOM HOLE
N: 670101.2 - E: 678993.7
CORNER DATA
NAD 27 GRID - NM EAST
A: FOUND 1/2" REBAR
N: 659858.7 - E: 675431.5
B: FOUND 2" PIPE
N: 662496.7 - E: 675414.3
C: FOUND 1" NAIL
N: 665135.4 - E: 675398.3
D: FOUND 2" PIPE
N: 667777.2 - E: 675381.9
E: FOUND BRASS CAP "1913"
N: 670415.5 - E: 675366.5
F: FOUND BRASS CAP "1913"
N: 670430.0 - E: 678005.6
G: FOUND BRASS CAP "1913"
N: 670433.3 - E: 680638.7
H: FOUND BRASS CAP "1913"
N: 667794.8 - E: 680655.1
I: FOUND BRASS CAP "1913"
N: 665155.6 - E: 680671.4
J: FOUND 1/2" REBAR
N: 662516.2 - E: 680687.3
K: FOUND BRASS CAP "1913"
N: 659876.2 - E: 680701.5
L: FOUND BRASS CAP "1913"
N: 665145.7 - E: 678029.0

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: [Signature]
Date: 8-18-15
Printed Name: Kelly J. Holly
E-mail Address: kholly@concho.com

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.
Date of Survey: 8-04-2015
Signature and Seal of Professional Surveyor: [Signature]
19680
Certificate Number

COG OPERATING, LLC
 RAGNAR FEDERAL COM #16H
 (100' FNL & 1870' FEL)
 SECTION 22, T17S, R32E
 N. M. P. M., LEA CO., NEW MEXICO



DIRECTIONS TO LOCATION

From the intersection of CR-126 (Conoco Rd.) and CR-126A (Maljamar Rd.);
 Go North on CR-126A approx. 0.6 miles to a lease road on the right;
 Turn right and go Southeast approx. 0.7 miles to to a lease road on the left;
 Turn left and go Northeast approx. 415 feet to the JC Federal #10;
 Location is approx. 500 feet Northwest of the JC Federal #10



Firm No.: TX 10193838 NM 4655451

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NO.	REVISION	DATE
JOB NO.:	LS1508434	
DWG. NO.:	1508434PAD	

RRC

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

SCALE:	1" = 100'
DATE:	8-4-2015
SURVEYED BY:	GB
DRAWN BY:	RMH
APPROVED BY:	RMH
SHEET :	1 OF 1

VICINITY MAP

NOT TO SCALE



*SECTION 22, TWP. 17 SOUTH, RGE. 32 EAST,
N. M. P. M., LEA CO., NEW MEXICO*

OPERATOR: COG Operating
LEASE: Ragnar Federal Com
WELL NO.: 16H

LOCATION: 100' FNL & 1870' FEL
ELEVATION: 4016'

Firm No.: TX 10193838 NM 4655451

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NO.	REVISION	DATE
JOB NO.: LS1508434		
DWG. NO.: 1508434VM		

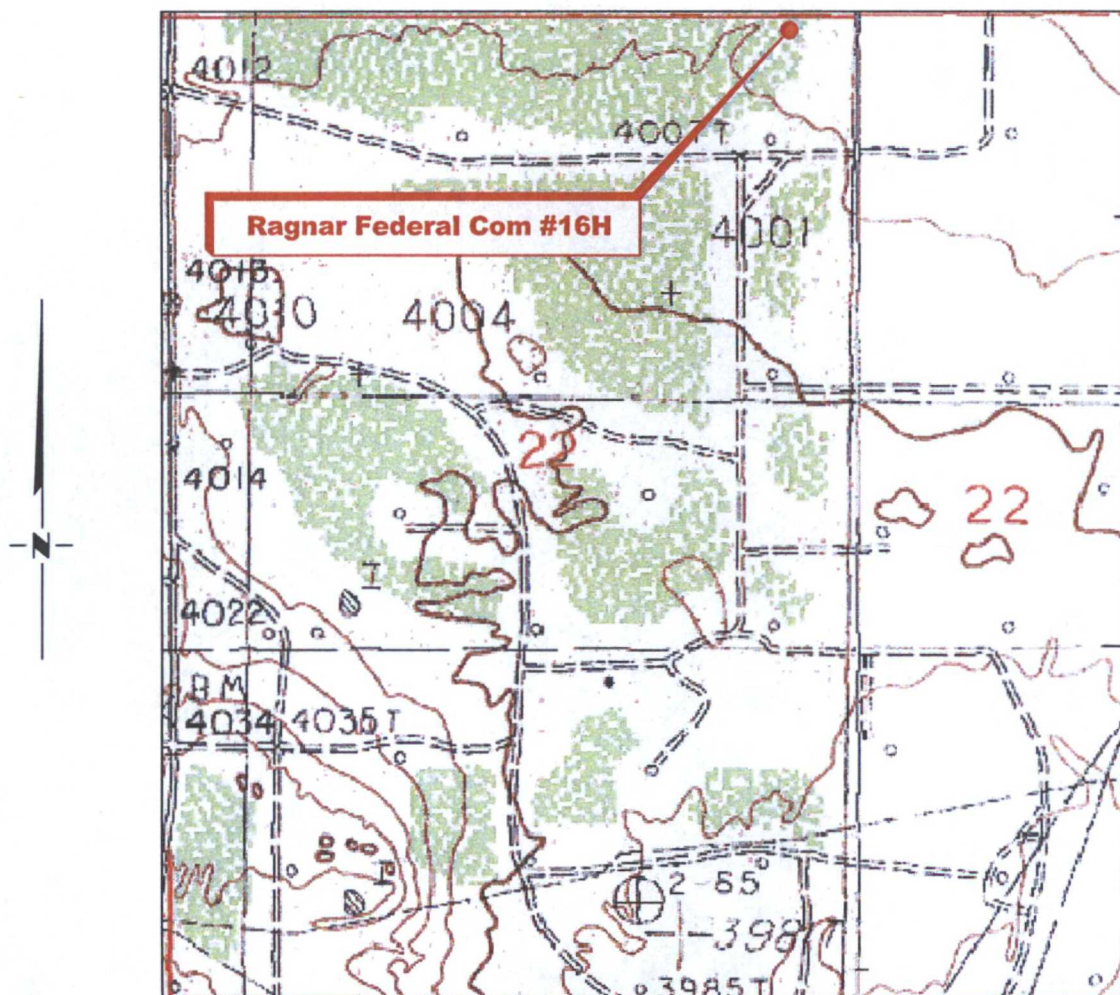
RRC

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

SCALE: NTS
DATE: 8-4-2015
SURVEYED BY: GB
DRAWN BY: CMJ
APPROVED BY: RMH
SHEET : 1 OF 1

VICINITY MAP

NOT TO SCALE



*SECTION 22, TWP. 17 SOUTH, RGE. 32 EAST,
N. M. P. M., LEA CO., NEW MEXICO*

OPERATOR: COG Operating, LLC
LEASE: Ragnar Federal Com
WELL NO.: 16H
ELEVATION: 4016'

LOCATION: 100' FNL & 1870' FEL
CONTOUR INTERVAL:
USGS TOPO. SOURCE MAP:
Maljamar (P. E. 1985)

Firm No.: TX 10193838 NM 4655451

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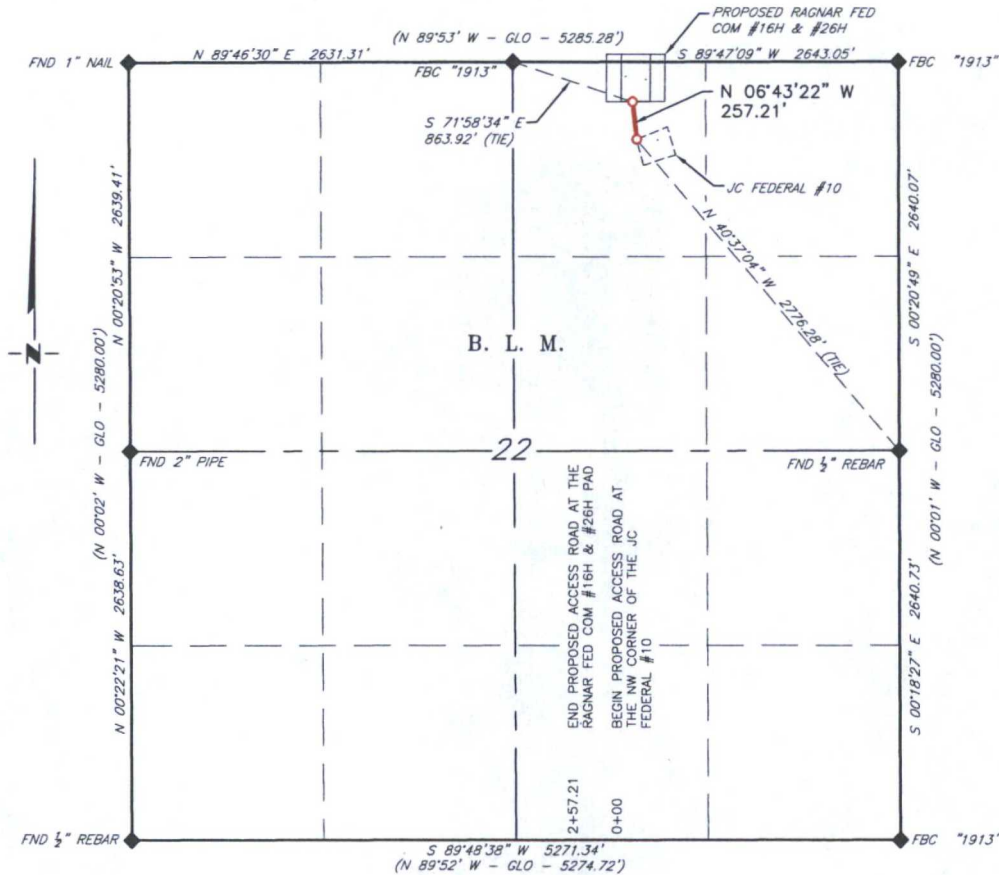
NO.	REVISION	DATE
JOB NO.:	LS1508434	
DWG. NO.:	1508434VM	

RRC

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

SCALE: NTS
DATE: 8-4-2015
SURVEYED BY: GB
DRAWN BY: CMJ
APPROVED BY: RMH
SHEET : 1 OF 1

COG OPERATING, LLC
PROPOSED ACCESS ROAD FOR THE RAGNAR
FED COM #16H & #26H WELL LOCATIONS
SECTION 22, T17S, R32E,
N. M. P. M., LEA CO., NEW MEXICO

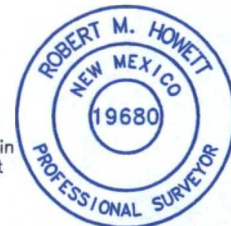


Firm No.: TX 10193838 NM 4655451

NO.	REVISION	DATE
JOB NO.:	LS140551	
DWG. NO.:	140551RD	

RRC

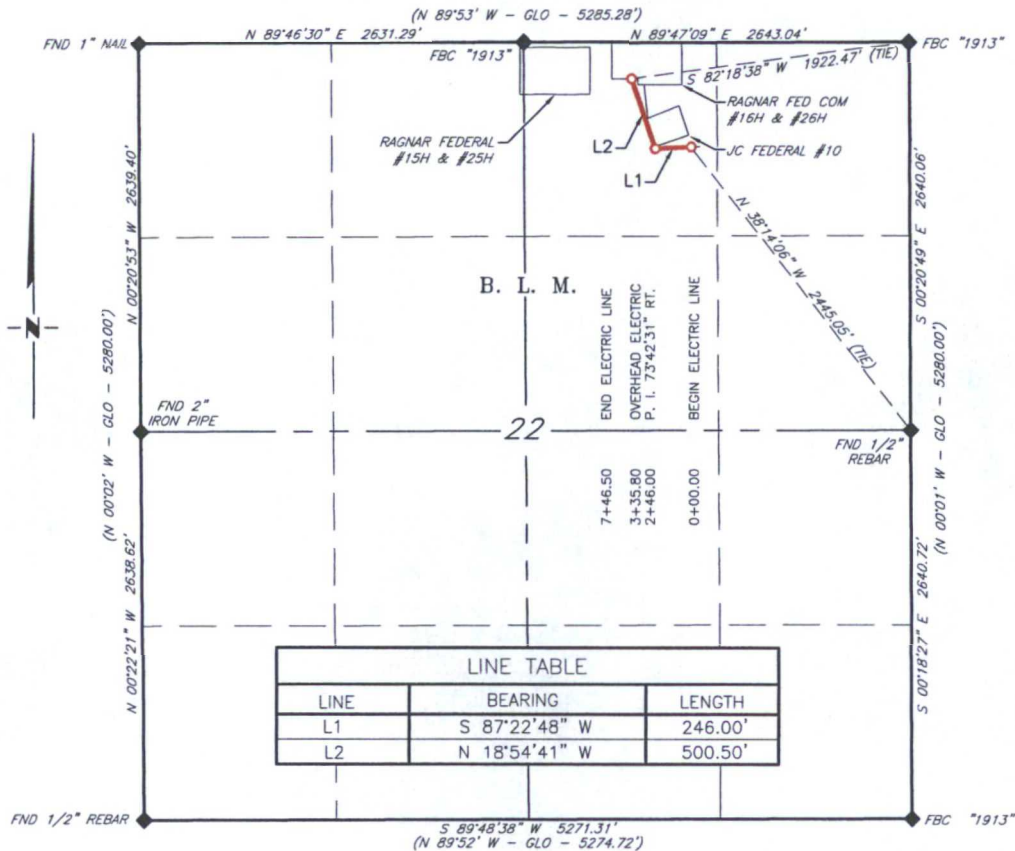
308 W. BROADWAY ST., HOBBS, NM 88240 (575) 964-8200



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SCALE: 1" = 1000'
 DATE: 12-5-2015
 SURVEYED BY: IE/DH
 DRAWN BY: RMH
 APPROVED BY: RMH
 SHEET : 1 OF 1

**COG OPERATING, LLC
PROPOSED ELECTRIC LINE
FOR THE RAGNAR FED COM #16H & #26H
SECTION 22, T17S, R32E,
N. M. P. M., LEA CO., NEW MEXICO**



DESCRIPTION

A strip of land 30 feet wide, being 746.50 feet or 45.242 rods in length lying in Section 22, Township 17 South, Range 32 East, N. M. P. M., Lea County, New Mexico, being 15 feet left and 15 feet right of the following described survey of a centerline across B. L. M. land;

BEGINNING at Engr. Sta. 0+00.00, a point in the Northeast quarter of Section 22, which bears N 38°14'06" W, 2,445.05 feet from a 1/2" Rebar, found for the East quarter corner of Section 22;

Thence S 87°22'48" W, 246.00 feet, to Engr. Sta. 2+46.00, a P. I. of 73°42'31" right;

Thence N 18°54'41" W, 500.50 feet, to Engr. Sta. 7+46.50, the End of Survey, a point in the Northeast quarter of Section 22 which bears S 82°18'38" W, 1922.47 feet, from a brass cap, stamped "1913", found for the Northeast corner of Section 22.

Said strip of land contains 0.514 acres, more or less, and is allocated by forties as follows:

SCALE: 1" = 1000' NW 1/4 NE 1/4 45.242 Rods 0.514 Acres

0 500' 1000'

BEARINGS ARE GRID NAD 27
NM EAST
DISTANCES ARE HORIZ. GROUND.

LEGEND

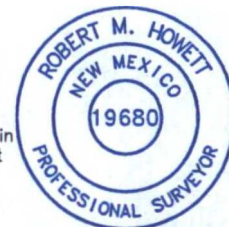
() RECORD DATA - GLO

◆ FOUND MONUMENT
AS NOTED

— PROPOSED ELECTRIC LINE

I, R. M. Howett, a N. M. Professional Surveyor, hereby certify that I prepared this plat from an actual survey made on the ground under my direct supervision, said survey and plat meet the Min. Stds. for Land Surveying in the State of N. M. and are true and correct to the best of my knowledge and belief.

Robert M. Howett
Robert M. Howett NM PS 19680



Firm No.: TX 10193838 NM 4655451

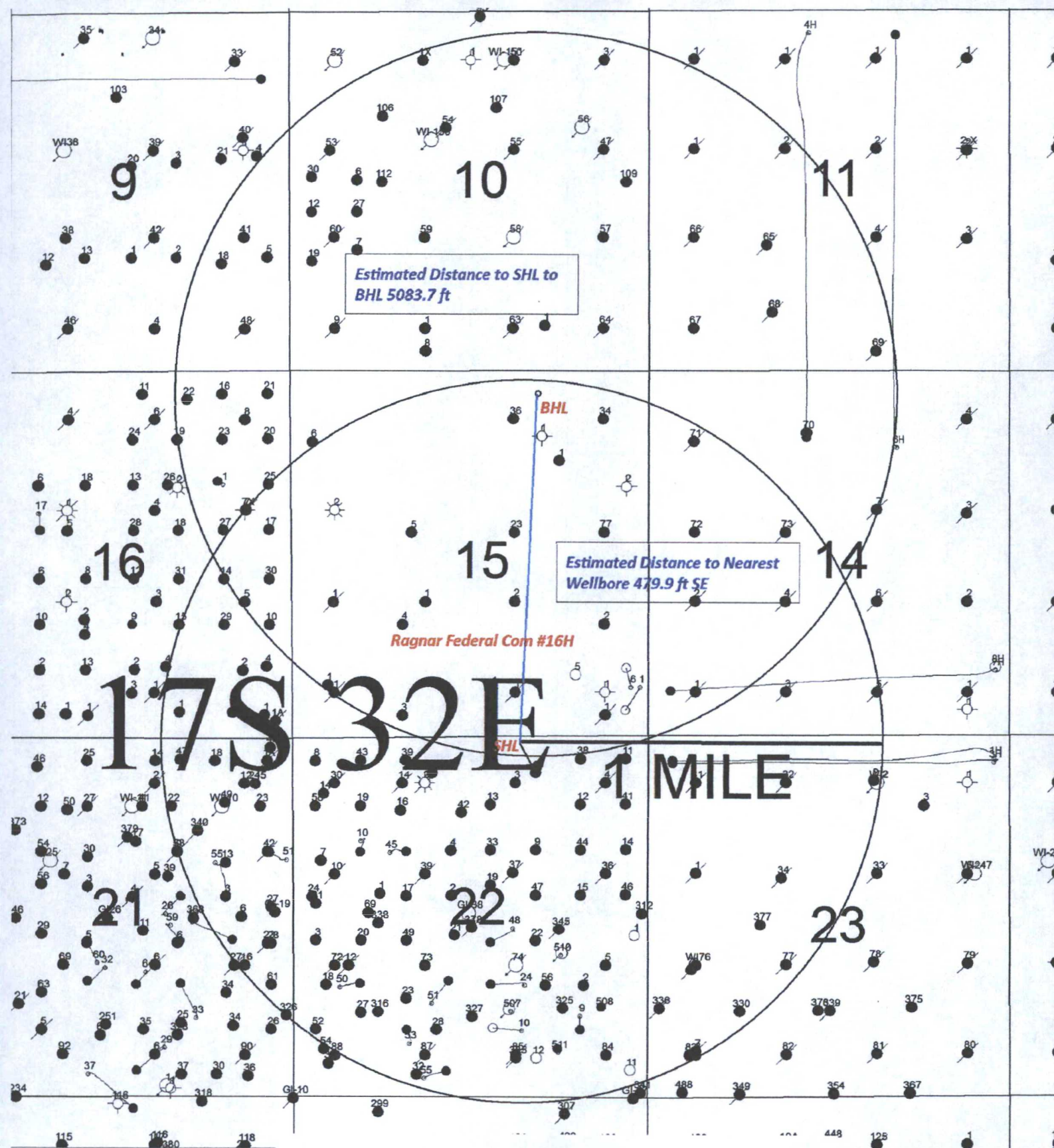
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NO.	REVISION	DATE
JOB NO.:	LS1510570	
DWG. NO.:	1510570	

RRC

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

SCALE: 1" = 1000'
DATE: 10-09-2015
SURVEYED BY: BC/CG
DRAWN BY: LPS
APPROVED BY: RMH
SHEET : 1 OF 1



SENM Shelf Area
Ragnar Federal Com #16H

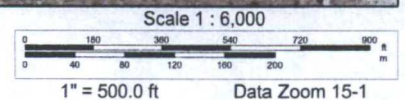
SEC. 22, T17S - R32E SHL 100 FNL 1870 FEL, UNIT B
SEC. 15, T17S - R32E BHL 330 FNL 1647 FEL, UNIT B



Data use subject to license.

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www.delorme.com



Water Well Map

Legend

RA11684

RA11684 pod2

32.848961, -103.735745

RA11684 pod3

044
17S32E

Google earth

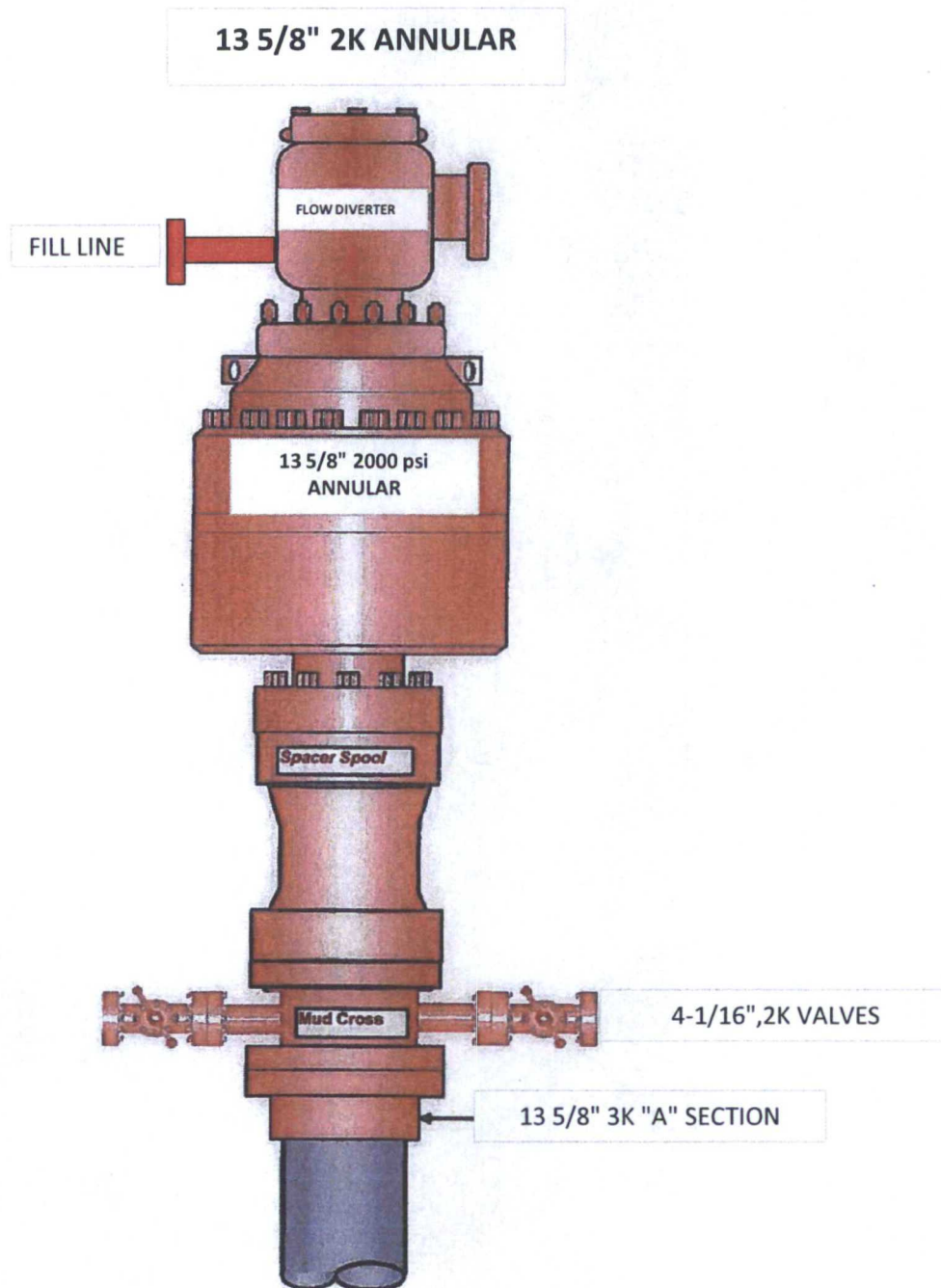
© 2015 Google

700 ft



Exhibit #10

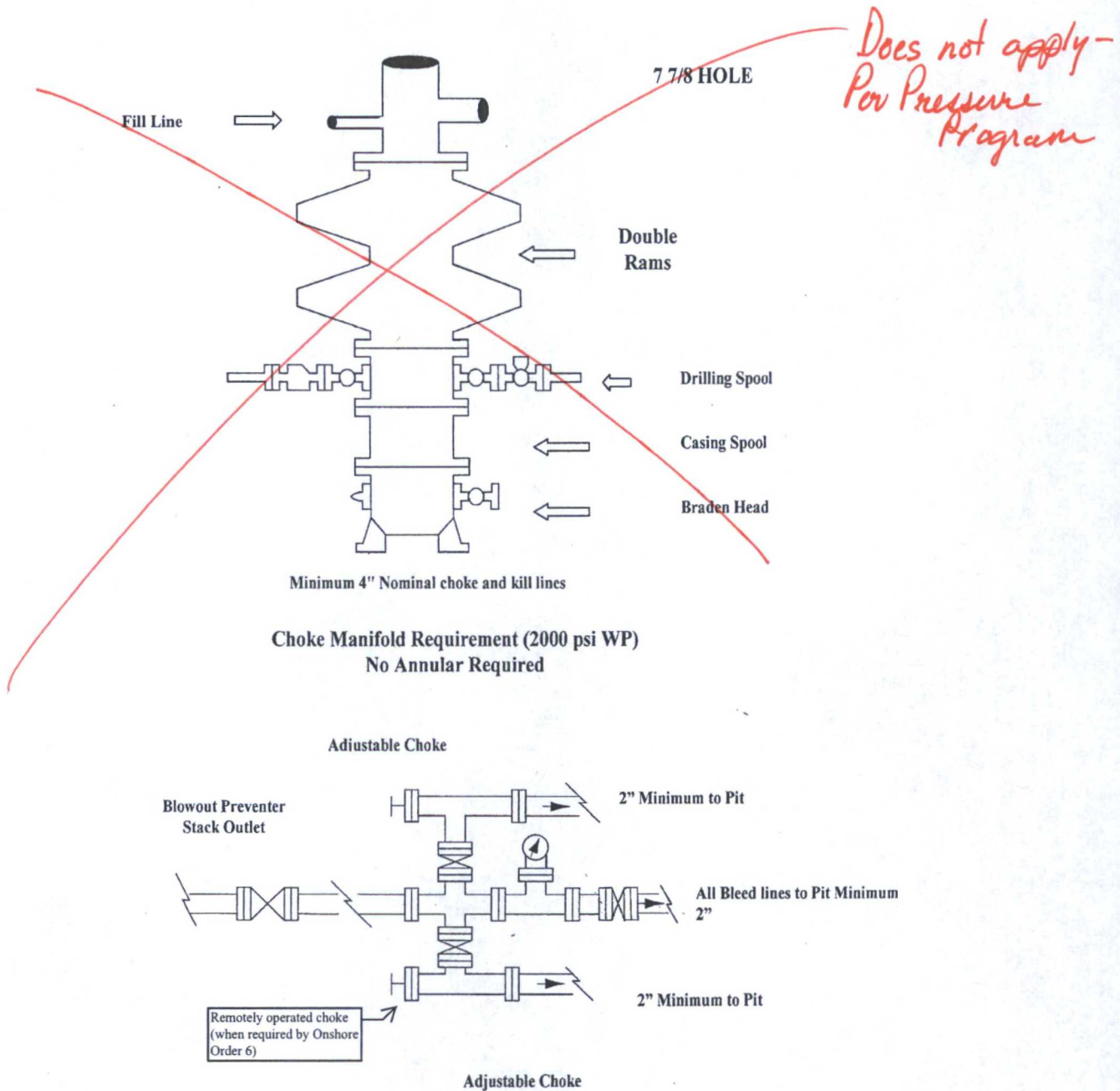
(Choke Manifold Schematic same as Exhibit #9)



COG Operating LLC

Exhibit #9

BOPE and Choke Schematic



NOTES REGARDING THE BLOWOUT PREVENTERS
Master Drilling Plan
Eddy County, New Mexico

1. Drilling nipple to be so constructed that it can be removed without use of a welder through rotary table opening, with minimum I.D. equal to preventer bore.
2. Wear ring to be properly installed in head.
3. Blow out preventer and all fittings must be in good condition, 2000 psi WP minimum.
4. All fittings to be flanged.
5. Safety valve must be available on rig floor at all times with proper connections, valve to be full 2000 psi WP minimum.
6. All choke and fill lines to be securely anchored especially ends of choke lines.
7. Equipment through which bit must pass shall be at least as large as the diameter of the casing being drilled through.
8. Kelly cock on Kelly.
9. Extension wrenches and hands wheels to be properly installed.
10. Blow out preventer control to be located as close to driller's position as feasible.
11. Blow out preventer closing equipment to include minimum 40-gallon accumulator, two independent sources of pump power on each closing unit installation all API specifications.

Closed Loop Operation & Maintenance Procedure

All drilling fluid circulated over shaker(s) with cuttings discharged into roll off container.

Fluid and fines below shaker(s) are circulated with transfer pump through centrifuge(s) or solids separator with cuttings and fines discharged into roll off container.

Fluid is continuously re-circulated through equipment with polymer added to aid separation of cutting fines.

Roll off containers are lined and de-watered with fluids re-circulated into system.

Additional tank is used to capture unused drilling fluid or cement returns from casing jobs.

This equipment will be maintained 24 hrs./day by solids control personnel and or rig crews that stay on location.

Cuttings will be hauled to either:

CRI (permit number R9166)

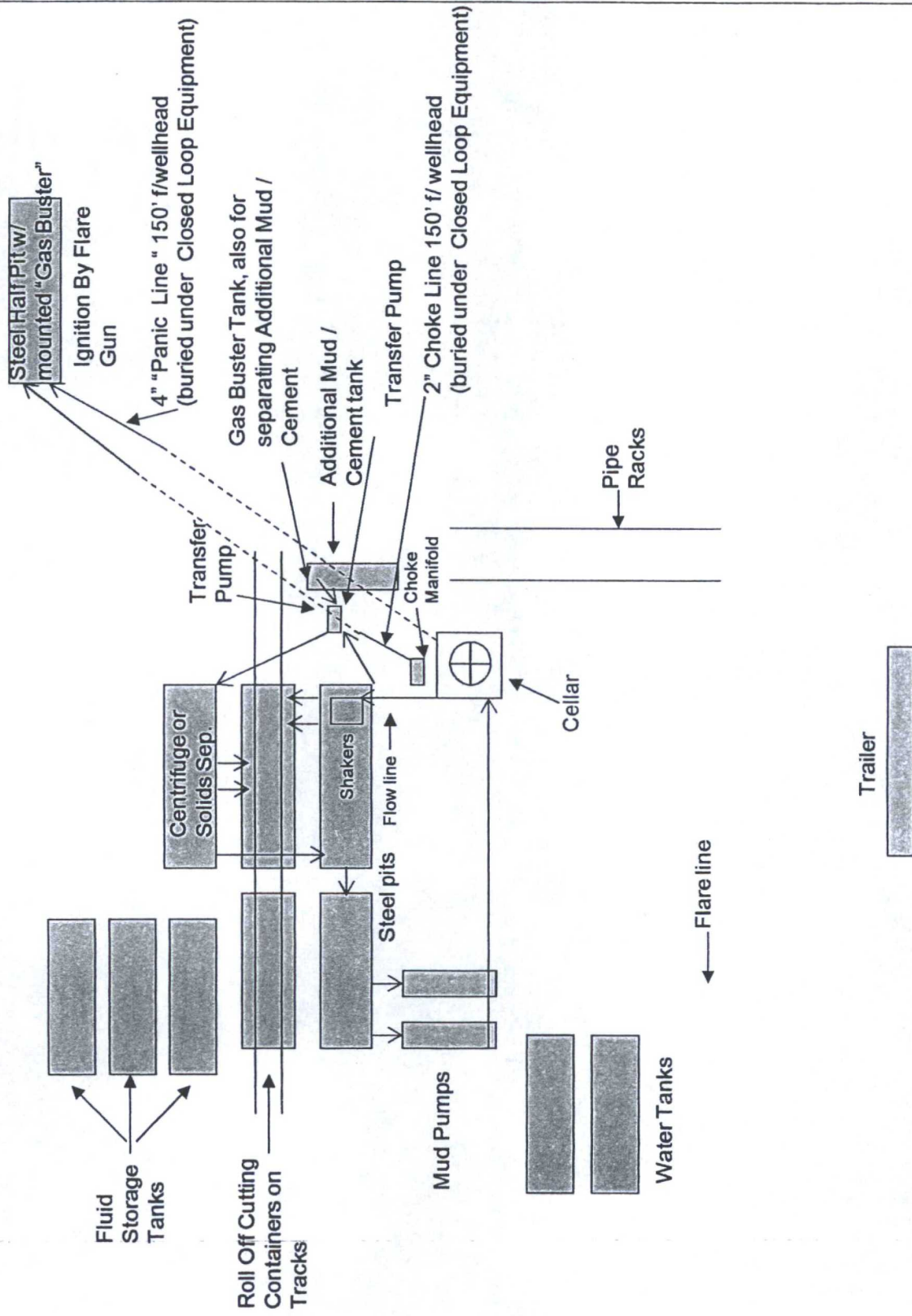
or

GMI (permit number 711-019-001)

dependent upon which rig is available to drill this well.

COG Operating LLC

Closed Loop Equipment Diagram





COG Operating LLC

Lea County, NM (NAD-27 2015)

Ragnar Federal Com #16H

SHL: 100' FNL, 1870' FEL, Sec 22, T17S, R32E, Unit B

PP: 330' FSL, 1851' FEL, Sec 15, T17S, R32E, Unit O

BHL: 330' FNL, 1647' FEL, Sec 15, T17S, R32E, Unit B

Plan: Design #1

Standard Planning Report

16 May, 2016



Database: EDM 5000.1 Single User Db
Company: COG Operating LLC
Project: Lea County, NM (NAD-27 2015)
Site: Ragnar Federal Com #16H
Well: SHL: 100' FNL, 1870' FEL, Sec 22, T17S, R32E, Unit B
Wellbore: BHL: 330' FNL, 1647' FEL, Sec 15, T17S, R32E, Unit B
Design: Design #1

Local Co-ordinate Reference: Site Ragnar Federal Com #16H
TVD Reference: KB @ 4034.00usft (Silver Oak 3)
MD Reference: KB @ 4034.00usft (Silver Oak 3)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Project	Lea County, NM (NAD-27 2015)		
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	Ragnar Federal Com #16H				
Site Position:		Northing:	665,048.50 usft	Latitude:	32° 49' 37.026 N
From:	Map	Easting:	678,802.00 usft	Longitude:	103° 45' 4.545 W
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence:	0.32 °

Well	SHL: 100' FNL, 1870' FEL, Sec 22, T17S, R32E, Unit B					
Well Position	+N/-S	0.00 usft	Northing:	665,048.50 usft	Latitude:	32° 49' 37.026 N
	+E/-W	0.00 usft	Easting:	678,802.00 usft	Longitude:	103° 45' 4.545 W
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	4,016.00 usft	

Wellbore BHL: 330' FNL, 1647' FEL, Sec 15, T17S, R32E, Unit B

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	5/16/2016	7.20	60.60	48,385

Design Design #1

Audit Notes:

Version: Phase: PLAN Tie On Depth: 0.00

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	2.17

Plan Sections

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,254.21	0.00	0.00	5,254.21	0.00	0.00	0.00	0.00	0.00	0.00	
6,081.48	91.00	2.17	5,775.00	529.58	20.09	11.00	11.00	0.26	2.17	
10,608.55	91.00	2.17	5,695.99	5,052.70	191.70	0.00	0.00	0.00	0.00	PBHL (RFC #16H/L1)

Database: EDM 5000.1 Single User Db
Company: COG Operating LLC
Project: Lea County, NM (NAD-27 2015)
Site: Ragnar Federal Com #16H
Well: SHL: 100' FNL, 1870' FEL, Sec 22, T17S, R32E, Unit B
Wellbore: BHL: 330' FNL, 1647' FEL, Sec 15, T17S, R32E, Unit B
Design: Design #1

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:

Site Ragnar Federal Com #16H
KB @ 4034.00usft (Silver Oak 3)
KB @ 4034.00usft (Silver Oak 3)
Grid
Minimum Curvature

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
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
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00
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1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00	0.00	0.00
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	0.00
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00	0.00	0.00
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2,300.00	0.00	0.00	2,300.00	0.00	0.00	0.00	0.00	0.00	0.00
2,400.00	0.00	0.00	2,400.00	0.00	0.00	0.00	0.00	0.00	0.00
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00	0.00	0.00
2,600.00	0.00	0.00	2,600.00	0.00	0.00	0.00	0.00	0.00	0.00
2,700.00	0.00	0.00	2,700.00	0.00	0.00	0.00	0.00	0.00	0.00
2,800.00	0.00	0.00	2,800.00	0.00	0.00	0.00	0.00	0.00	0.00
2,900.00	0.00	0.00	2,900.00	0.00	0.00	0.00	0.00	0.00	0.00
3,000.00	0.00	0.00	3,000.00	0.00	0.00	0.00	0.00	0.00	0.00
3,100.00	0.00	0.00	3,100.00	0.00	0.00	0.00	0.00	0.00	0.00
3,200.00	0.00	0.00	3,200.00	0.00	0.00	0.00	0.00	0.00	0.00
3,300.00	0.00	0.00	3,300.00	0.00	0.00	0.00	0.00	0.00	0.00
3,400.00	0.00	0.00	3,400.00	0.00	0.00	0.00	0.00	0.00	0.00
3,500.00	0.00	0.00	3,500.00	0.00	0.00	0.00	0.00	0.00	0.00
3,600.00	0.00	0.00	3,600.00	0.00	0.00	0.00	0.00	0.00	0.00
3,700.00	0.00	0.00	3,700.00	0.00	0.00	0.00	0.00	0.00	0.00
3,800.00	0.00	0.00	3,800.00	0.00	0.00	0.00	0.00	0.00	0.00
3,900.00	0.00	0.00	3,900.00	0.00	0.00	0.00	0.00	0.00	0.00
4,000.00	0.00	0.00	4,000.00	0.00	0.00	0.00	0.00	0.00	0.00
4,100.00	0.00	0.00	4,100.00	0.00	0.00	0.00	0.00	0.00	0.00
4,200.00	0.00	0.00	4,200.00	0.00	0.00	0.00	0.00	0.00	0.00
4,300.00	0.00	0.00	4,300.00	0.00	0.00	0.00	0.00	0.00	0.00
4,400.00	0.00	0.00	4,400.00	0.00	0.00	0.00	0.00	0.00	0.00
4,500.00	0.00	0.00	4,500.00	0.00	0.00	0.00	0.00	0.00	0.00
4,600.00	0.00	0.00	4,600.00	0.00	0.00	0.00	0.00	0.00	0.00
4,700.00	0.00	0.00	4,700.00	0.00	0.00	0.00	0.00	0.00	0.00
4,800.00	0.00	0.00	4,800.00	0.00	0.00	0.00	0.00	0.00	0.00
4,900.00	0.00	0.00	4,900.00	0.00	0.00	0.00	0.00	0.00	0.00
5,000.00	0.00	0.00	5,000.00	0.00	0.00	0.00	0.00	0.00	0.00
5,100.00	0.00	0.00	5,100.00	0.00	0.00	0.00	0.00	0.00	0.00

Database: EDM 5000.1 Single User Db
Company: COG Operating LLC
Project: Lea County, NM (NAD-27 2015)
Site: Ragnar Federal Com #16H
Well: SHL: 100' FNL, 1870' FEL, Sec 22, T17S, R32E, Unit B
Wellbore: BHL: 330' FNL, 1647' FEL, Sec 15, T17S, R32E, Unit B
Design: Design #1

Local Co-ordinate Reference: Site Ragnar Federal Com #16H
TVD Reference: KB @ 4034.00usft (Silver Oak 3)
MD Reference: KB @ 4034.00usft (Silver Oak 3)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

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)
5,200.00	0.00	0.00	5,200.00	0.00	0.00	0.00	0.00	0.00	0.00
5,254.21	0.00	0.00	5,254.21	0.00	0.00	0.00	0.00	0.00	0.00
Start DLS 11.00 TFO 2.17									
5,300.00	5.04	2.17	5,299.94	2.01	0.08	2.01	11.00	11.00	0.00
5,350.00	10.54	2.17	5,349.46	8.78	0.33	8.78	11.00	11.00	0.00
5,400.00	16.04	2.17	5,398.10	20.26	0.77	20.27	11.00	11.00	0.00
5,450.00	21.54	2.17	5,445.42	36.34	1.38	36.37	11.00	11.00	0.00
5,500.00	27.04	2.17	5,490.98	56.88	2.16	56.92	11.00	11.00	0.00
5,550.00	32.54	2.17	5,534.36	81.69	3.10	81.75	11.00	11.00	0.00
5,600.00	38.04	2.17	5,575.15	110.55	4.19	110.63	11.00	11.00	0.00
5,650.00	43.54	2.17	5,613.00	143.17	5.43	143.28	11.00	11.00	0.00
5,700.00	49.04	2.17	5,647.54	179.27	6.80	179.40	11.00	11.00	0.00
5,750.00	54.54	2.17	5,678.45	218.52	8.29	218.67	11.00	11.00	0.00
5,800.00	60.04	2.17	5,705.47	260.54	9.88	260.73	11.00	11.00	0.00
5,850.00	65.54	2.17	5,728.32	304.96	11.57	305.17	11.00	11.00	0.00
5,900.00	71.04	2.17	5,746.81	351.36	13.33	351.61	11.00	11.00	0.00
5,950.00	76.54	2.17	5,760.77	399.31	15.15	399.60	11.00	11.00	0.00
6,000.00	82.04	2.17	5,770.06	448.39	17.01	448.71	11.00	11.00	0.00
6,050.00	87.54	2.17	5,774.60	498.13	18.90	498.49	11.00	11.00	0.00
6,081.48	91.00	2.17	5,775.00	529.58	20.09	529.96	11.00	11.00	0.00
Start 4527.06 hold at 6081.48 MD									
6,100.00	91.00	2.17	5,774.68	548.08	20.79	548.48	0.00	0.00	0.00
6,200.00	91.00	2.17	5,772.93	647.99	24.58	648.46	0.00	0.00	0.00
6,300.00	91.00	2.17	5,771.19	747.91	28.38	748.45	0.00	0.00	0.00
6,400.00	91.00	2.17	5,769.44	847.82	32.17	848.43	0.00	0.00	0.00
6,500.00	91.00	2.17	5,767.70	947.73	35.96	948.41	0.00	0.00	0.00
6,600.00	91.00	2.17	5,765.95	1,047.65	39.75	1,048.40	0.00	0.00	0.00
6,700.00	91.00	2.17	5,764.21	1,147.56	43.54	1,148.38	0.00	0.00	0.00
6,800.00	91.00	2.17	5,762.46	1,247.47	47.33	1,248.37	0.00	0.00	0.00
6,900.00	91.00	2.17	5,760.72	1,347.38	51.12	1,348.35	0.00	0.00	0.00
7,000.00	91.00	2.17	5,758.97	1,447.30	54.91	1,448.34	0.00	0.00	0.00
7,100.00	91.00	2.17	5,757.23	1,547.21	58.70	1,548.32	0.00	0.00	0.00
7,200.00	91.00	2.17	5,755.48	1,647.12	62.49	1,648.31	0.00	0.00	0.00
7,300.00	91.00	2.17	5,753.74	1,747.04	66.28	1,748.29	0.00	0.00	0.00
7,400.00	91.00	2.17	5,751.99	1,846.95	70.07	1,848.28	0.00	0.00	0.00
7,500.00	91.00	2.17	5,750.24	1,946.86	73.86	1,948.26	0.00	0.00	0.00
7,600.00	91.00	2.17	5,748.50	2,046.77	77.65	2,048.25	0.00	0.00	0.00
7,700.00	91.00	2.17	5,746.75	2,146.69	81.45	2,148.23	0.00	0.00	0.00
7,800.00	91.00	2.17	5,745.01	2,246.60	85.24	2,248.22	0.00	0.00	0.00
7,900.00	91.00	2.17	5,743.26	2,346.51	89.03	2,348.20	0.00	0.00	0.00
8,000.00	91.00	2.17	5,741.52	2,446.43	92.82	2,448.19	0.00	0.00	0.00
8,100.00	91.00	2.17	5,739.77	2,546.34	96.61	2,548.17	0.00	0.00	0.00
8,200.00	91.00	2.17	5,738.03	2,646.25	100.40	2,648.16	0.00	0.00	0.00
8,300.00	91.00	2.17	5,736.28	2,746.16	104.19	2,748.14	0.00	0.00	0.00
8,400.00	91.00	2.17	5,734.54	2,846.08	107.98	2,848.13	0.00	0.00	0.00
8,500.00	91.00	2.17	5,732.79	2,945.99	111.77	2,948.11	0.00	0.00	0.00
8,600.00	91.00	2.17	5,731.05	3,045.90	115.56	3,048.09	0.00	0.00	0.00
8,700.00	91.00	2.17	5,729.30	3,145.82	119.35	3,148.08	0.00	0.00	0.00
8,800.00	91.00	2.17	5,727.56	3,245.73	123.14	3,248.06	0.00	0.00	0.00
8,900.00	91.00	2.17	5,725.81	3,345.64	126.93	3,348.05	0.00	0.00	0.00
9,000.00	91.00	2.17	5,724.07	3,445.56	130.72	3,448.03	0.00	0.00	0.00
9,100.00	91.00	2.17	5,722.32	3,545.47	134.52	3,548.02	0.00	0.00	0.00

Database: EDM 5000.1 Single User Db
Company: COG Operating LLC
Project: Lea County, NM (NAD-27 2015)
Site: Ragnar Federal Com #16H
Well: SHL: 100' FNL, 1870' FEL, Sec 22, T17S, R32E, Unit B
Wellbore: BHL: 330' FNL, 1647' FEL, Sec 15, T17S, R32E, Unit B
Design: Design #1

Local Co-ordinate Reference: Site Ragnar Federal Com #16H
TVD Reference: KB @ 4034.00usft (Silver Oak 3)
MD Reference: KB @ 4034.00usft (Silver Oak 3)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Planned Survey

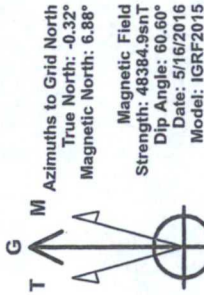
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
9,200.00	91.00	2.17	5,720.58	3,645.38	138.31	3,648.00	0.00	0.00	0.00
9,300.00	91.00	2.17	5,718.83	3,745.29	142.10	3,747.99	0.00	0.00	0.00
9,400.00	91.00	2.17	5,717.08	3,845.21	145.89	3,847.97	0.00	0.00	0.00
9,500.00	91.00	2.17	5,715.34	3,945.12	149.68	3,947.96	0.00	0.00	0.00
9,600.00	91.00	2.17	5,713.59	4,045.03	153.47	4,047.94	0.00	0.00	0.00
9,700.00	91.00	2.17	5,711.85	4,144.95	157.26	4,147.93	0.00	0.00	0.00
9,800.00	91.00	2.17	5,710.10	4,244.86	161.05	4,247.91	0.00	0.00	0.00
9,900.00	91.00	2.17	5,708.36	4,344.77	164.84	4,347.90	0.00	0.00	0.00
10,000.00	91.00	2.17	5,706.61	4,444.68	168.63	4,447.88	0.00	0.00	0.00
10,100.00	91.00	2.17	5,704.87	4,544.60	172.42	4,547.87	0.00	0.00	0.00
10,200.00	91.00	2.17	5,703.12	4,644.51	176.21	4,647.85	0.00	0.00	0.00
10,300.00	91.00	2.17	5,701.38	4,744.42	180.00	4,747.84	0.00	0.00	0.00
10,400.00	91.00	2.17	5,699.63	4,844.34	183.79	4,847.82	0.00	0.00	0.00
10,500.00	91.00	2.17	5,697.89	4,944.25	187.59	4,947.81	0.00	0.00	0.00
10,608.55	91.00	2.17	5,695.99	5,052.70	191.70	5,056.34	0.00	0.00	0.00
TD at 10608.55									

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									
61.47' Radius @ 5720.4	0.00	0.00	0.00	3,631.15	757.55	668,679.65	679,559.55	32° 50' 12.915 N	103° 44' 55.432 W
- plan misses target center by 3709.33usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Circle (radius 61.47)									
KOP (RFC #16H/L1 Des	0.00	0.00	5,254.21	0.00	0.00	665,048.50	678,802.00	32° 49' 37.026 N	103° 45' 4.545 W
- plan hits target center									
- Point									
PBHL (RFC #16H/L1)	0.00	0.00	5,695.99	5,052.70	191.70	670,101.20	678,993.70	32° 50' 27.012 N	103° 45' 1.972 W
- plan hits target center									
- Point									
PP (RFC #16H/L1 Desig	0.00	0.00	5,767.17	430.15	16.32	665,478.65	678,818.32	32° 49' 41.281 N	103° 45' 4.326 W
- plan hits target center									
- Point									
EOC (RFC #16H/L1 Des	0.00	0.00	5,775.00	529.58	20.09	665,578.08	678,822.09	32° 49' 42.265 N	103° 45' 4.275 W
- plan hits target center									
- Point									

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
5,254.21	5,254.21	0.00	0.00	Start DLS 11.00 TFO 2.17
6,081.48	5,775.00	529.58	20.09	Start 4527.06 hold at 6081.48 MD
10,608.55	5,695.99	5,052.70	191.70	TD at 10608.55



Section Details

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	5254.21	0.00	0.00	5254.21	0.00	0.00	0.00	0.00	0.00	
3	6081.48	91.00	2.17	5775.00	529.58	20.09	11.00	2.17	529.96	
4	10608.55	91.00	2.17	5695.99	5052.70	191.70	0.00	0.00	5056.34	PBHL (RFC #16H/L1)

Ground Elevation: 4016.00

RKB Elevation: KB @ 4034.00usft (Silver Oak 3)

COG Operating LLC
Northing: 665048.50
Easting: 678802.00
Latitude: 32° 49' 37.026 N
Longitude: 103° 45' 4.545 W

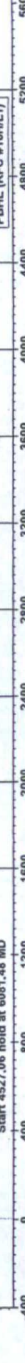
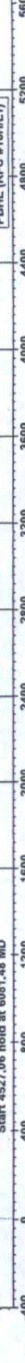
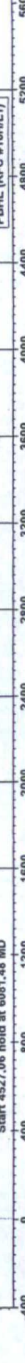
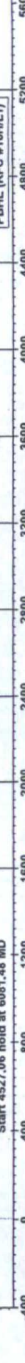
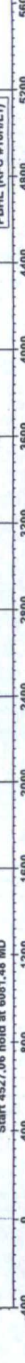
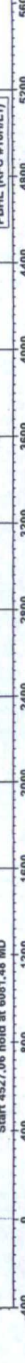
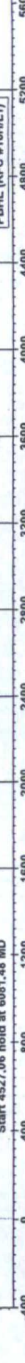
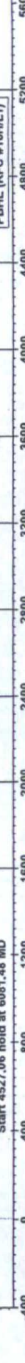
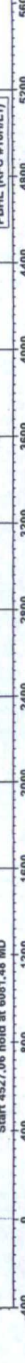
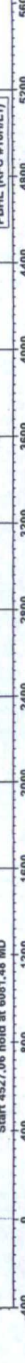
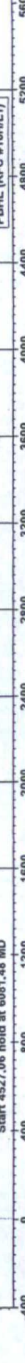
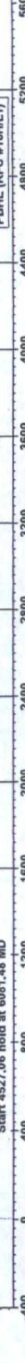
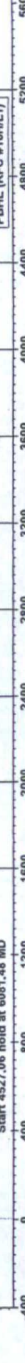
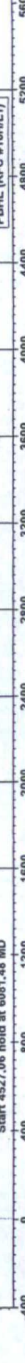
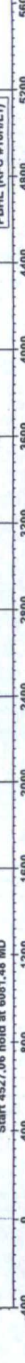
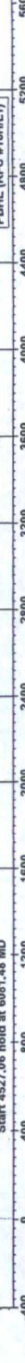
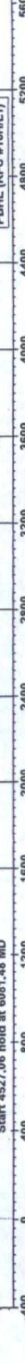
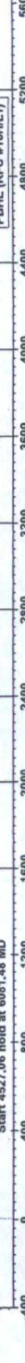
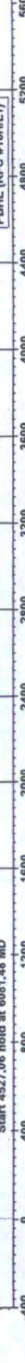
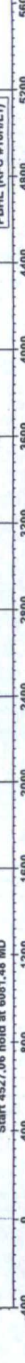
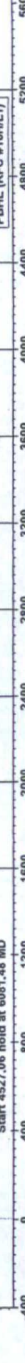
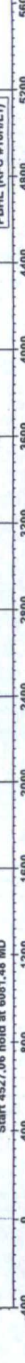
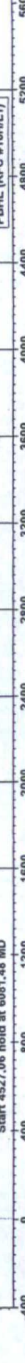
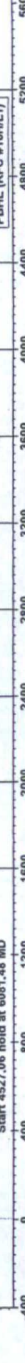
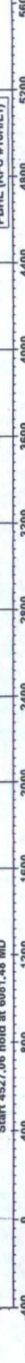
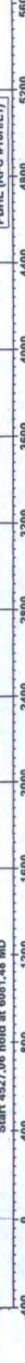
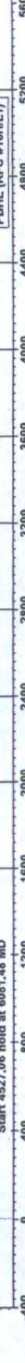
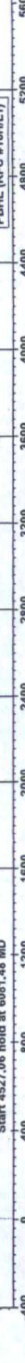
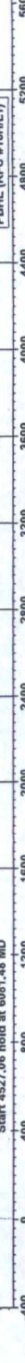
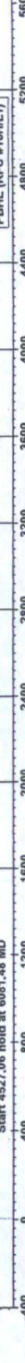
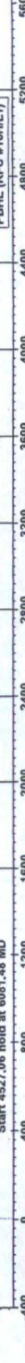
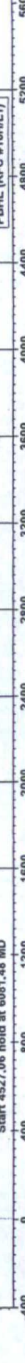
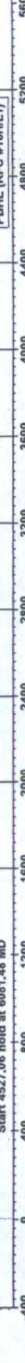
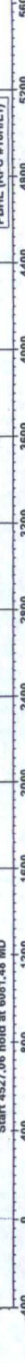
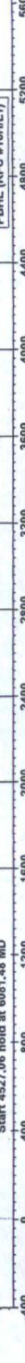
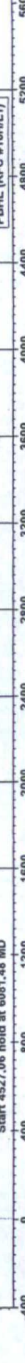
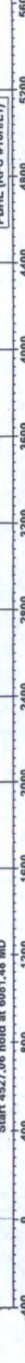
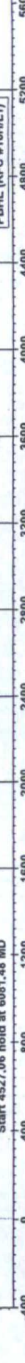
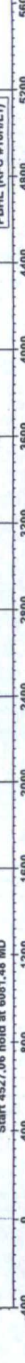
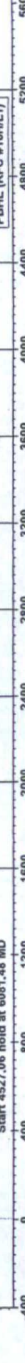
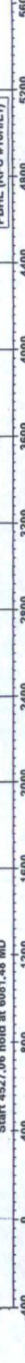
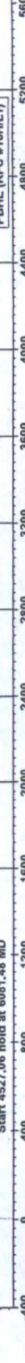
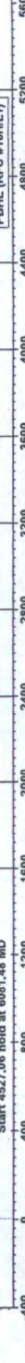
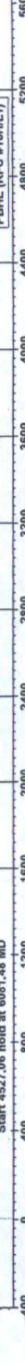
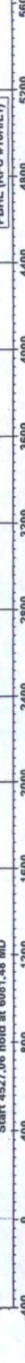
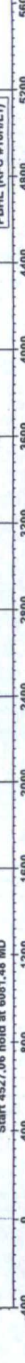
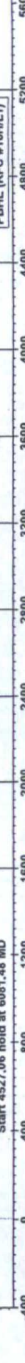
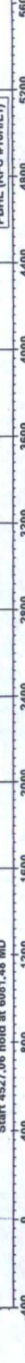
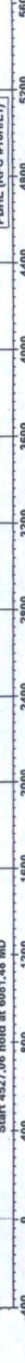
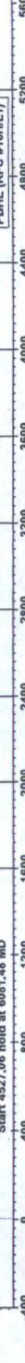
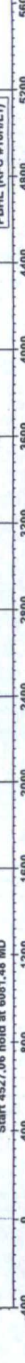
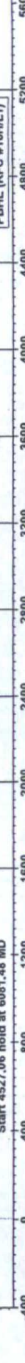
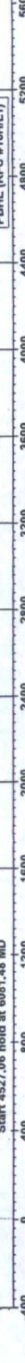
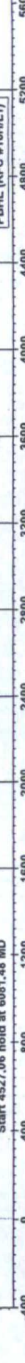
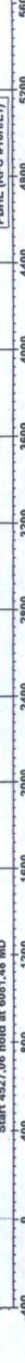
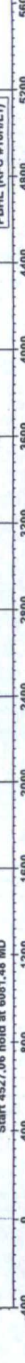
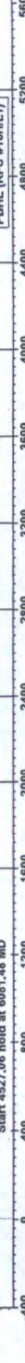
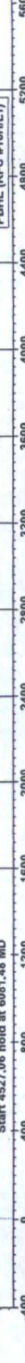
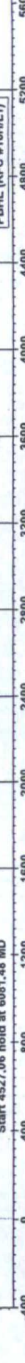
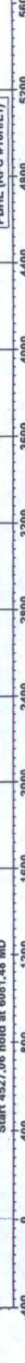
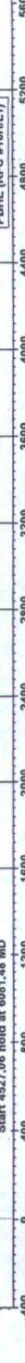
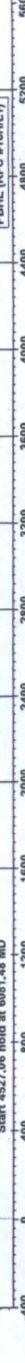
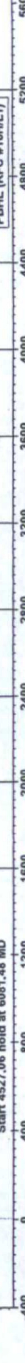
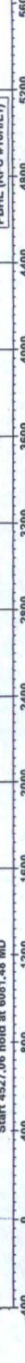
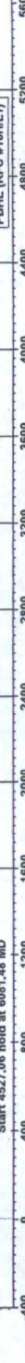
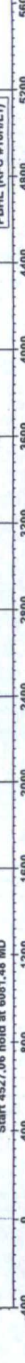
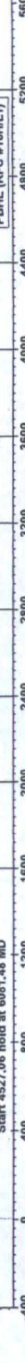
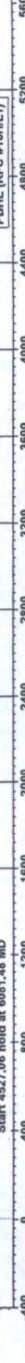
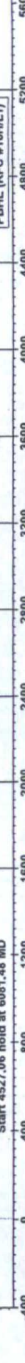
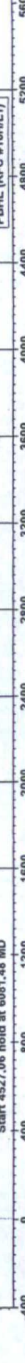
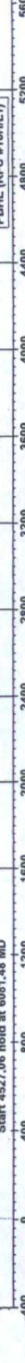
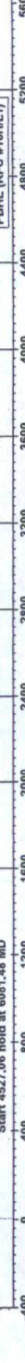
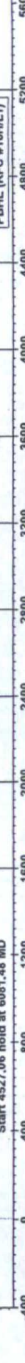
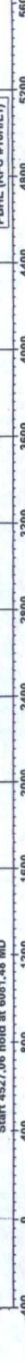
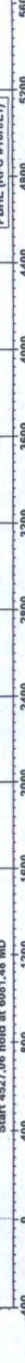
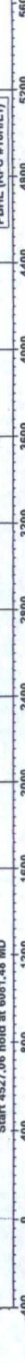
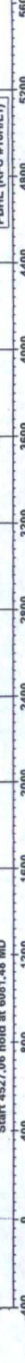
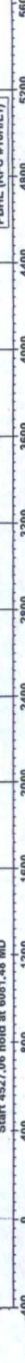
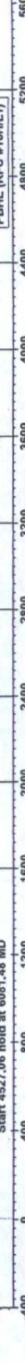
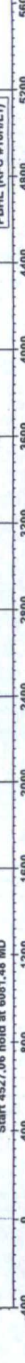
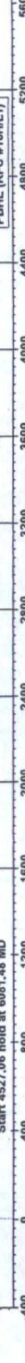
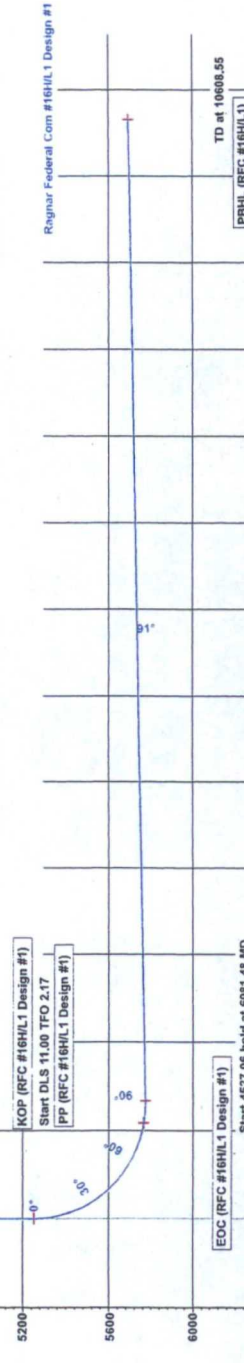
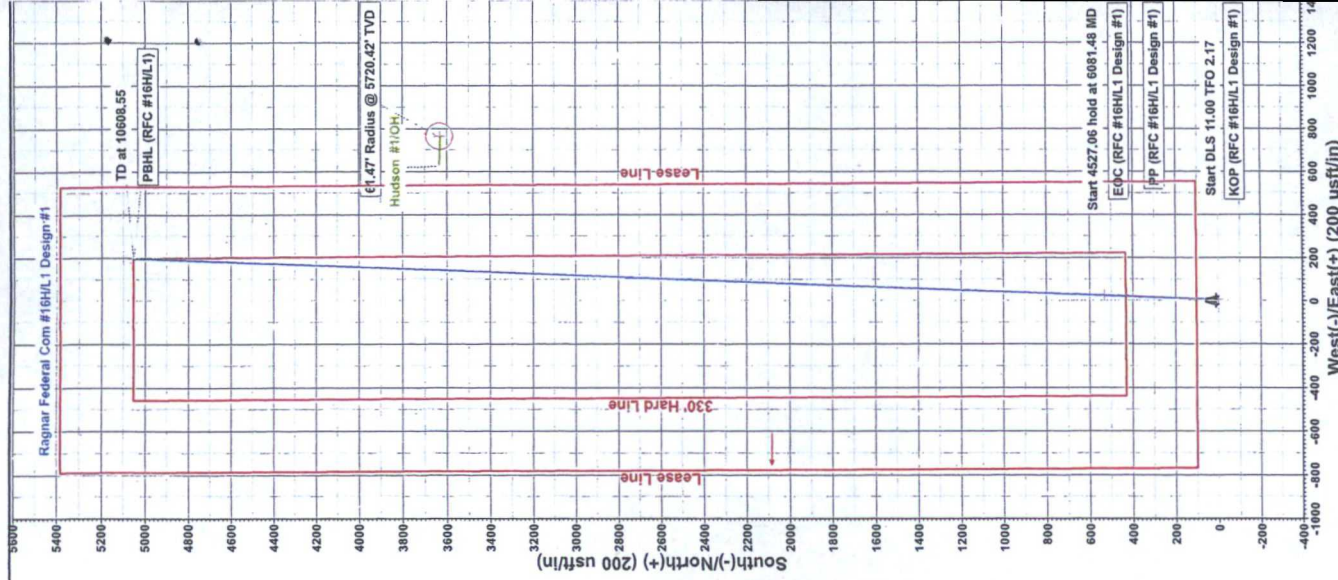
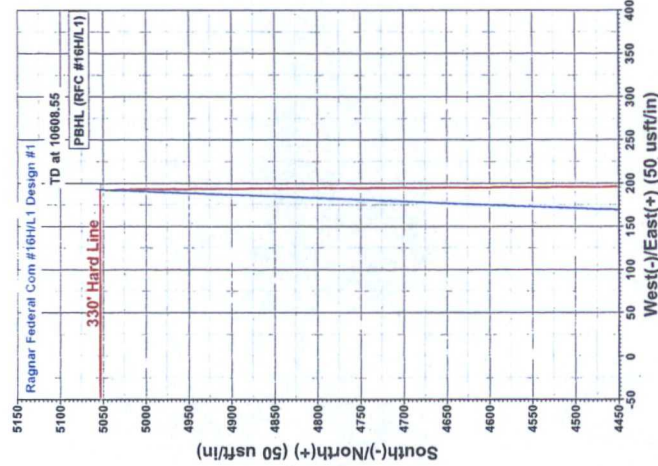
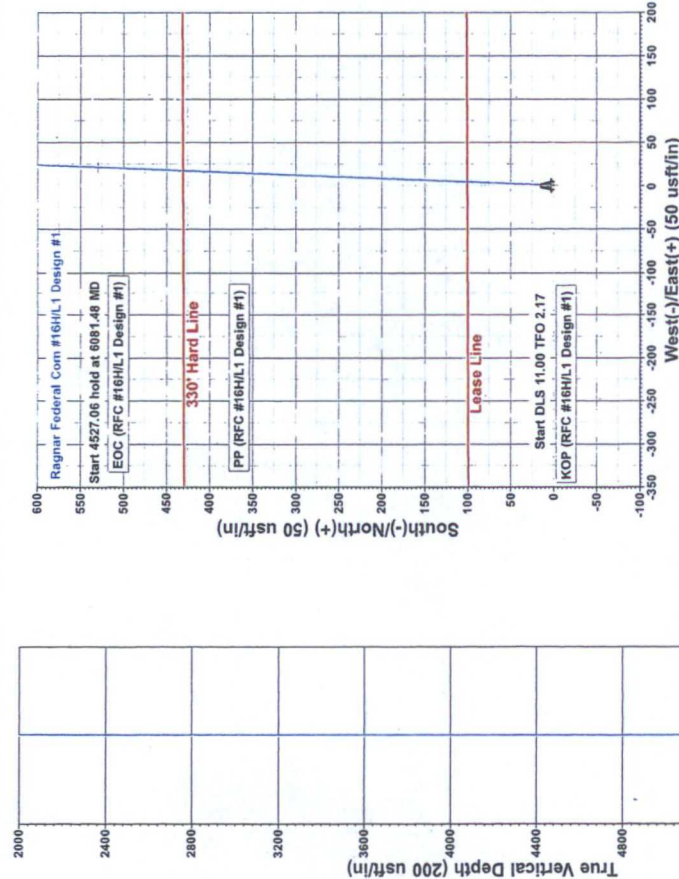
Project: Lea County, NM (NAD-27 2015)

Site: Ragnar Federal Com #16H

Well: SHL: 100' FNL, 1870' FEL, Sec 22, T17S, R32E, Unit B

Wellbore: BHL: 330' FNL, 1647' FEL, Sec 15, T17S, R32E, Unit B

Plan: Design #1 (SHL: 100' FNL, 1870' FEL, Sec 22, T17S, R32E, Unit B/BHL: 330' FNL, 1647' FEL, Sec 15, T17S, R32E, Unit B)





COG Operating LLC

Lea County, NM (NAD-27 2015)

Ragnar Federal Com #16H

SHL: 100' FNL, 1870' FEL, Sec 22, T17S, R32E, Unit B

PP: 330' FSL, 1851' FEL, Sec 15, T17S, R32E, Unit O

BHL: 330' FNL, 1647' FEL, Sec 15, T17S, R32E, Unit B

Design #1

Anticollision Report

16 May, 2016



Company: COG Operating LLC
Project: Lea County, NM (NAD-27 2015)
Reference Site: Ragnar Federal Com #16H
Site Error: 0.00 usft
Reference Well: SHL: 100' FNL, 1870' FEL, Sec 22, T17S, R32E, Unit B
Well Error: 0.00 usft
Reference Wellbore: BHL: 330' FNL, 1647' FEL, Sec 15, T17S, R32E, Unit B
Reference Design: Design #1

Local Co-ordinate Reference: Site Ragnar Federal Com #16H
TVD Reference: KB @ 4034.00usft (Silver Oak 3)
MD Reference: KB @ 4034.00usft (Silver Oak 3)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM 5000.1 Single User Db
Offset TVD Reference: Offset Datum

Reference	Design #1
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria
Interpolation Method:	Stations
Depth Range:	Unlimited
Results Limited by:	Maximum center-center distance of 9,999.98 usft
Warning Levels Evaluated at:	2.00 Sigma
Error Model:	ISCWSA
Scan Method:	Closest Approach 3D
Error Surface:	Elliptical Conic
Casing Method:	Not applied

Survey Tool Program	Date	5/16/2016
From (usft)	To (usft)	Survey (Wellbore)
0.00	10,608.48	Design #1 (BHL: 330' FNL, 1647' FEL, Sec
		MWD
		Description
		MWD - Standard

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						
Hudson #1						
Hudson #1 - OH - OH	9,209.16	5,708.15	557.89	376.60	3.077	CC, ES
Hudson #1 - OH - OH	9,400.00	5,704.83	589.62	392.79	2.996	SF

Offset Design Hudson #1 - Hudson #1 - OH - OH													Offset Site Error:	0.00 usft
Survey Program: 232-INC													Offset Well Error:	0.00 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
0.00	0.00	0.00	0.00	0.00	0.00	11.78	3,631.15	757.55	3,709.37					
100.00	100.00	82.97	82.97	0.09	1.24	11.78	3,631.15	757.49	3,709.32	3,707.99	1.33	2,786.838		
200.00	200.00	184.14	184.14	0.32	2.76	11.78	3,631.16	757.23	3,709.28	3,706.21	3.07	1,209.678		
300.00	300.00	284.70	284.70	0.54	4.89	11.77	3,631.18	756.81	3,709.21	3,703.79	5.42	684.943		
400.00	400.00	384.70	384.70	0.77	7.57	11.77	3,631.19	756.38	3,709.14	3,700.82	8.32	446.067		
500.00	500.00	484.70	484.70	0.99	10.26	11.76	3,631.21	755.94	3,709.06	3,697.85	11.22	330.720		
600.00	600.00	587.28	587.28	1.22	13.37	11.75	3,631.23	755.34	3,708.96	3,694.44	14.52	255.373		
700.00	700.00	690.52	690.50	1.44	16.93	11.73	3,631.28	754.17	3,708.78	3,690.50	18.28	202.937		
800.00	800.00	792.68	792.66	1.67	21.70	11.71	3,631.34	752.58	3,708.52	3,685.31	23.21	159.796		
900.00	900.00	892.22	892.18	1.89	26.65	11.68	3,631.40	750.88	3,708.24	3,679.92	28.32	130.944		
1,000.00	1,000.00	991.68	991.63	2.12	31.61	11.66	3,631.46	749.27	3,707.97	3,674.53	33.44	110.883		
1,100.00	1,100.00	1,091.14	1,091.07	2.34	36.56	11.63	3,631.52	747.75	3,707.72	3,669.15	38.56	96.145		
1,200.00	1,200.00	1,190.60	1,190.52	2.56	41.52	11.61	3,631.58	746.32	3,707.48	3,663.79	43.69	84.860		
1,300.00	1,300.00	1,290.06	1,289.98	2.79	46.48	11.59	3,631.63	744.97	3,707.26	3,658.44	48.82	75.944		
1,400.00	1,400.00	1,390.61	1,390.52	3.01	51.63	11.57	3,631.68	743.60	3,707.04	3,652.90	54.14	68.477		
1,500.00	1,500.00	1,491.22	1,491.12	3.24	56.80	11.55	3,631.73	742.14	3,706.80	3,647.33	59.47	62.332		
1,600.00	1,600.00	1,591.84	1,591.72	3.46	61.97	11.53	3,631.79	740.57	3,706.54	3,641.74	64.80	57.197		
1,700.00	1,700.00	1,692.45	1,692.32	3.69	67.13	11.50	3,631.86	738.89	3,706.27	3,636.13	70.14	52.843		
1,800.00	1,800.00	1,792.10	1,791.96	3.91	72.27	11.47	3,631.92	737.19	3,706.00	3,630.55	75.45	49.120		
1,900.00	1,900.00	1,891.40	1,891.25	4.14	77.40	11.45	3,631.98	735.60	3,705.74	3,624.99	80.75	45.892		
2,000.00	2,000.00	1,990.71	1,990.54	4.36	82.53	11.43	3,632.04	734.12	3,705.50	3,619.45	86.05	43.062		
2,100.00	2,100.00	2,090.02	2,089.84	4.59	87.66	11.41	3,632.09	732.75	3,705.28	3,613.92	91.35	40.560		
2,200.00	2,200.00	2,189.17	2,188.98	4.81	91.21	11.39	3,632.14	731.52	3,705.08	3,609.97	95.10	38.960		

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

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Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM 5000.1 Single User Db
Offset TVD Reference: Offset Datum

Offset Design Hudson #1 - Hudson #1 - OH - OH													Offset Site Error: 0.00 usft
Survey Program: 232-INC													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis			Distance						Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
2,300.00	2,300.00	2,288.31	2,288.12	5.04	94.62	11.37	3,632.18	730.42	3,704.90	3,606.19	98.71	37.532	
2,400.00	2,400.00	2,387.45	2,387.26	5.26	98.03	11.36	3,632.21	729.47	3,704.74	3,602.42	102.32	36.206	
2,500.00	2,500.00	2,486.60	2,486.40	5.49	101.45	11.34	3,632.24	728.66	3,704.61	3,598.68	105.94	34.970	
2,600.00	2,600.00	2,585.75	2,585.54	5.71	104.86	11.33	3,632.27	728.00	3,704.51	3,594.96	109.55	33.816	
2,700.00	2,700.00	2,684.89	2,684.69	5.94	108.27	11.33	3,632.29	727.47	3,704.42	3,591.26	113.16	32.736	
2,800.00	2,800.00	2,785.11	2,784.91	6.16	111.14	11.32	3,632.31	727.01	3,704.35	3,588.11	116.24	31.869	
2,900.00	2,900.00	2,885.50	2,885.29	6.39	113.92	11.31	3,632.33	726.48	3,704.27	3,585.04	119.22	31.070	
3,000.00	3,000.00	2,985.89	2,985.68	6.61	116.70	11.30	3,632.35	725.89	3,704.17	3,581.96	122.21	30.309	
3,100.00	3,100.00	3,086.27	3,086.07	6.84	119.48	11.29	3,632.37	725.22	3,704.07	3,578.86	125.20	29.585	
3,200.00	3,200.00	3,186.66	3,186.45	7.06	122.26	11.28	3,632.40	724.50	3,703.95	3,575.76	128.19	28.894	
3,300.00	3,300.00	3,287.05	3,286.83	7.28	125.04	11.27	3,632.43	723.70	3,703.83	3,572.64	131.18	28.234	
3,400.00	3,400.00	3,387.47	3,387.25	7.51	128.18	11.25	3,632.47	722.84	3,703.69	3,569.17	134.52	27.532	
3,500.00	3,500.00	3,487.97	3,487.74	7.73	132.21	11.24	3,632.50	721.90	3,703.54	3,564.80	138.74	26.694	
3,600.00	3,600.00	3,588.47	3,588.24	7.96	136.24	11.22	3,632.54	720.86	3,703.38	3,560.42	142.96	25.904	
3,700.00	3,700.00	3,688.97	3,688.73	8.18	140.27	11.21	3,632.58	719.75	3,703.21	3,556.02	147.19	25.160	
3,800.00	3,800.00	3,789.46	3,789.22	8.41	144.30	11.19	3,632.63	718.54	3,703.02	3,551.61	151.41	24.457	
3,900.00	3,900.00	3,889.83	3,889.58	8.63	148.46	11.17	3,632.68	717.25	3,702.82	3,547.05	155.77	23.771	
4,000.00	4,000.00	3,989.82	3,989.56	8.86	153.05	11.15	3,632.73	715.94	3,702.61	3,542.07	160.54	23.064	
4,100.00	4,100.00	4,089.81	4,089.55	9.08	157.63	11.13	3,632.78	714.64	3,702.41	3,537.10	165.31	22.397	
4,200.00	4,200.00	4,189.81	4,189.53	9.31	162.22	11.11	3,632.83	713.33	3,702.20	3,532.12	170.08	21.767	
4,300.00	4,300.00	4,289.80	4,289.51	9.53	166.80	11.09	3,632.88	712.02	3,702.00	3,527.15	174.85	21.172	
4,400.00	4,400.00	4,389.34	4,389.05	9.76	171.05	11.07	3,632.92	710.74	3,701.80	3,522.51	179.29	20.647	
4,500.00	4,500.00	4,488.46	4,488.16	9.98	174.97	11.05	3,632.97	709.59	3,701.62	3,518.22	183.40	20.183	
4,600.00	4,600.00	4,587.59	4,587.28	10.21	178.89	11.04	3,633.00	708.60	3,701.47	3,513.95	187.52	19.739	
4,700.00	4,700.00	4,687.76	4,687.45	10.43	182.85	11.02	3,633.04	707.69	3,701.33	3,509.65	191.67	19.311	
4,800.00	4,800.00	4,788.49	4,788.17	10.66	186.83	11.01	3,633.08	706.66	3,701.17	3,505.32	195.85	18.898	
4,900.00	4,900.00	4,889.21	4,888.89	10.88	190.82	10.99	3,633.12	705.51	3,700.99	3,500.96	200.04	18.502	
5,000.00	5,000.00	4,989.67	4,989.34	11.11	194.79	10.97	3,633.17	704.23	3,700.80	3,496.59	204.21	18.123	
5,100.00	5,100.00	5,089.40	5,089.06	11.33	198.74	10.95	3,633.22	702.96	3,700.61	3,492.25	208.35	17.761	
5,200.00	5,200.00	5,189.13	5,188.78	11.56	202.69	10.93	3,633.26	701.74	3,700.42	3,487.92	212.50	17.414	
5,254.21	5,254.21	5,243.19	5,242.84	11.68	204.83	10.92	3,633.29	701.09	3,700.32	3,485.57	214.75	17.231	
5,300.00	5,299.94	5,288.80	5,288.45	11.78	206.64	8.78	3,633.31	700.56	3,698.25	3,481.61	216.65	17.071	
5,350.00	5,349.46	5,338.19	5,337.83	11.90	208.60	8.90	3,633.33	700.00	3,691.47	3,472.77	218.70	16.879	
5,400.00	5,398.10	5,386.70	5,386.34	12.01	210.52	9.13	3,633.35	699.45	3,680.04	3,459.33	220.71	16.674	
5,450.00	5,445.42	5,433.89	5,433.53	12.13	212.39	9.46	3,633.37	698.93	3,664.05	3,441.38	222.66	16.455	
5,500.00	5,490.98	5,479.33	5,478.96	12.24	214.19	9.92	3,633.39	698.44	3,643.66	3,419.12	224.54	16.227	
5,550.00	5,534.36	5,522.59	5,522.22	12.35	215.90	10.53	3,633.41	697.99	3,619.06	3,392.73	226.33	15.990	
5,600.00	5,575.15	5,563.28	5,562.91	12.50	217.51	11.34	3,633.42	697.56	3,590.47	3,362.47	228.00	15.748	
5,650.00	5,613.00	5,601.02	5,600.65	12.68	219.00	12.39	3,633.44	697.18	3,558.16	3,328.61	229.55	15.501	
5,700.00	5,647.54	5,635.47	5,635.10	12.88	220.37	13.79	3,633.45	696.83	3,522.43	3,291.48	230.95	15.252	
5,750.00	5,678.45	5,666.30	5,665.93	13.13	221.59	15.67	3,633.46	696.53	3,483.61	3,251.41	232.20	15.003	
5,800.00	5,705.47	5,693.24	5,692.87	13.42	222.66	18.26	3,633.47	696.27	3,442.07	3,208.78	233.28	14.755	
5,850.00	5,728.32	5,716.04	5,715.66	13.75	223.56	21.96	3,633.48	696.05	3,398.18	3,163.99	234.19	14.510	
5,900.00	5,746.81	5,734.48	5,734.10	14.13	224.29	27.54	3,633.49	695.87	3,352.35	3,117.44	234.91	14.271	
5,950.00	5,760.77	5,748.40	5,748.02	14.55	224.84	36.50	3,633.49	695.74	3,305.02	3,069.58	235.44	14.038	
6,000.00	5,770.06	5,757.66	5,757.29	15.01	225.21	51.76	3,633.50	695.65	3,256.61	3,020.84	235.77	13.813	
6,050.00	5,774.60	5,762.19	5,761.82	15.51	225.39	76.82	3,633.50	695.61	3,207.57	2,971.67	235.90	13.597	
6,081.48	5,775.00	5,762.59	5,762.22	15.84	225.40	96.12	3,633.50	695.61	3,176.58	2,940.69	235.89	13.467	
6,100.00	5,774.68	5,762.27	5,761.89	16.04	225.39	96.09	3,633.50	695.61	3,158.35	2,922.50	235.85	13.391	
6,200.00	5,772.93	5,760.53	5,760.15	17.19	225.32	95.91	3,633.50	695.63	3,059.99	2,824.32	235.67	12.984	
6,300.00	5,771.19	5,758.79	5,758.41	18.46	225.25	95.74	3,633.50	695.64	2,961.74	2,726.25	235.49	12.577	

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

Company: COG Operating LLC
Project: Lea County, NM (NAD-27 2015)
Reference Site: Ragnar Federal Com #16H
Site Error: 0.00 usft
Reference Well: SHL: 100' FNL, 1870' FEL, Sec 22, T17S, R32E, Unit B
Well Error: 0.00 usft
Reference Wellbore: BHL: 330' FNL, 1647' FEL, Sec 15, T17S, R32E, Unit B
Reference Design: Design #1

Local Co-ordinate Reference: Site Ragnar Federal Com #16H
TVD Reference: KB @ 4034.00usft (Silver Oak 3)
MD Reference: KB @ 4034.00usft (Silver Oak 3)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: EDM 5000.1 Single User Db
Offset TVD Reference: Offset Datum

Offset Design										Hudson #1 - Hudson #1 - OH - OH		Offset Site Error: 0.00 usft	
Survey Program: 232-INC												Offset Well Error: 0.00 usft	
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance				Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)			Minimum Separation (usft)
6,400.00	5,769.44	5,757.05	5,756.67	19.81	225.18	95.56	3,633.50	695.66	2,863.61	2,628.30	235.30	12.170	
6,500.00	5,767.70	5,755.31	5,754.93	21.23	225.11	95.38	3,633.49	695.68	2,765.61	2,530.49	235.12	11.763	
6,600.00	5,765.95	5,753.57	5,753.19	22.71	225.05	95.20	3,633.49	695.69	2,667.75	2,432.82	234.93	11.355	
6,700.00	5,764.21	5,751.83	5,751.45	24.24	224.98	95.03	3,633.49	695.71	2,570.06	2,335.31	234.75	10.948	
6,800.00	5,762.46	5,750.09	5,749.71	25.80	224.91	94.85	3,633.49	695.73	2,472.56	2,237.99	234.57	10.541	
6,900.00	5,760.72	5,748.35	5,747.97	27.40	224.84	94.67	3,633.49	695.74	2,375.26	2,140.87	234.38	10.134	
7,000.00	5,758.97	5,746.60	5,746.23	29.02	224.77	94.49	3,633.49	695.76	2,278.19	2,043.99	234.20	9.727	
7,100.00	5,757.23	5,744.86	5,744.49	30.67	224.70	94.32	3,633.49	695.77	2,181.39	1,947.37	234.02	9.321	
7,200.00	5,755.48	5,743.12	5,742.75	32.33	224.63	94.14	3,633.49	695.79	2,084.89	1,851.05	233.84	8.916	
7,300.00	5,753.74	5,741.38	5,741.01	34.01	224.56	93.96	3,633.49	695.81	1,988.73	1,755.07	233.66	8.511	
7,400.00	5,751.99	5,739.64	5,739.27	35.71	224.49	93.78	3,633.49	695.82	1,892.97	1,659.50	233.47	8.108	
7,500.00	5,750.24	5,737.90	5,737.53	37.41	224.43	93.60	3,633.49	695.84	1,797.66	1,564.39	233.27	7.706	
7,600.00	5,748.50	5,736.16	5,735.79	39.13	224.36	93.42	3,633.49	695.86	1,702.90	1,469.85	233.05	7.307	
7,700.00	5,746.75	5,734.42	5,734.04	40.86	224.29	93.25	3,633.49	695.87	1,608.76	1,375.96	232.81	6.910	
7,800.00	5,745.01	5,732.68	5,732.30	42.59	224.22	93.07	3,633.49	695.89	1,515.38	1,282.87	232.52	6.517	
7,900.00	5,743.26	5,730.94	5,730.56	44.33	224.15	92.89	3,633.49	695.91	1,422.89	1,190.74	232.16	6.129	
8,000.00	5,741.52	5,729.20	5,728.82	46.08	224.08	92.71	3,633.49	695.92	1,331.49	1,099.80	231.69	5.747	
8,100.00	5,739.77	5,727.46	5,727.08	47.84	224.01	92.53	3,633.48	695.94	1,241.42	1,010.35	231.07	5.372	
8,200.00	5,738.03	5,725.72	5,725.34	49.59	223.94	92.35	3,633.48	695.96	1,152.97	922.76	230.22	5.008	
8,300.00	5,736.28	5,723.98	5,723.60	51.36	223.87	92.18	3,633.48	695.97	1,066.57	837.55	229.02	4.657	
8,400.00	5,734.54	5,722.24	5,721.86	53.13	223.80	92.00	3,633.48	695.99	982.75	755.41	227.33	4.323	
8,500.00	5,732.79	5,720.49	5,720.12	54.90	223.74	91.82	3,633.48	696.01	902.22	677.29	224.93	4.011	
8,600.00	5,731.05	5,718.75	5,718.38	56.67	223.67	91.64	3,633.48	696.02	825.96	604.45	221.51	3.729	
8,700.00	5,729.30	5,717.01	5,716.64	58.45	223.60	91.46	3,633.48	696.04	755.26	538.55	216.71	3.485	
8,800.00	5,727.56	5,715.27	5,714.90	60.23	223.53	91.28	3,633.48	696.06	691.82	481.66	210.16	3.292	
8,900.00	5,725.81	5,713.53	5,713.16	62.01	223.46	91.10	3,633.48	696.07	637.81	436.05	201.76	3.161	
9,000.00	5,724.07	5,711.79	5,711.42	63.79	223.39	90.92	3,633.48	696.09	595.80	403.56	192.25	3.099	
9,100.00	5,722.32	5,710.05	5,709.68	65.58	223.32	90.75	3,633.48	696.11	568.47	384.42	184.05	3.089	
9,200.00	5,720.58	5,708.31	5,707.94	67.37	223.25	90.57	3,633.48	696.12	557.97	376.80	181.17	3.080	
9,209.16	5,720.42	5,708.15	5,707.78	67.53	223.25	90.55	3,633.48	696.12	557.89	376.60	181.30	3.077	CC, ES
9,300.00	5,718.83	5,706.57	5,706.19	69.16	223.18	90.39	3,633.48	696.14	565.24	379.10	186.14	3.037	
9,400.00	5,717.08	5,704.83	5,704.45	70.95	223.12	90.21	3,633.48	696.16	589.62	392.79	196.84	2.996	SF
9,500.00	5,715.34	5,703.09	5,702.71	72.75	223.05	90.03	3,633.48	696.17	629.13	420.15	208.99	3.010	
9,600.00	5,713.59	5,701.35	5,700.97	74.54	222.98	89.85	3,633.48	696.19	681.14	461.41	219.74	3.100	
9,700.00	5,711.85	5,699.61	5,699.23	76.34	222.91	89.67	3,633.47	696.21	743.03	514.88	228.15	3.257	
9,800.00	5,710.10	5,697.87	5,697.49	78.13	222.84	89.49	3,633.47	696.22	812.55	578.21	234.34	3.467	
9,900.00	5,708.36	5,696.12	5,695.75	79.93	222.77	89.32	3,633.47	696.24	887.90	649.17	238.73	3.719	
10,000.00	5,706.61	5,694.38	5,694.01	81.73	222.70	89.14	3,633.47	696.26	967.72	725.94	241.78	4.002	
10,100.00	5,704.87	5,692.64	5,692.27	83.53	222.63	88.96	3,633.47	696.27	1,051.00	807.13	243.87	4.310	
10,200.00	5,703.12	5,690.90	5,690.53	85.34	222.56	88.78	3,633.47	696.29	1,136.97	891.69	245.28	4.635	
10,300.00	5,701.38	5,689.16	5,688.79	87.14	222.50	88.60	3,633.47	696.31	1,225.08	978.87	246.21	4.976	
10,400.00	5,699.63	5,687.42	5,687.05	88.94	222.43	88.42	3,633.47	696.32	1,314.88	1,068.09	246.79	5.328	
10,500.00	5,697.89	5,685.68	5,685.31	90.75	222.36	88.24	3,633.47	696.34	1,406.06	1,158.92	247.14	5.689	
10,608.55	5,695.99	5,683.79	5,683.42	92.71	222.28	88.05	3,633.47	696.36	1,506.30	1,258.97	247.32	6.090	

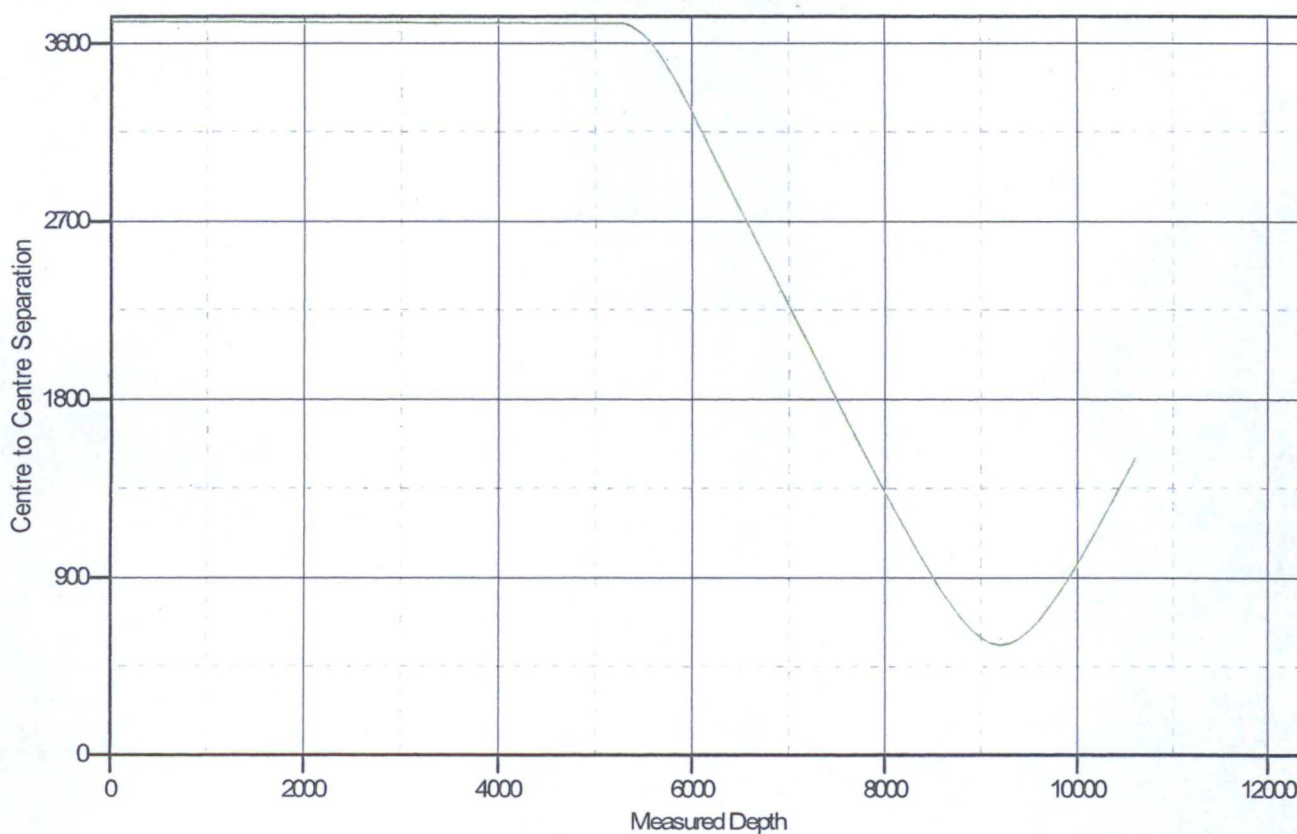
Company: COG Operating LLC
 Project: Lea County, NM (NAD-27 2015)
 Reference Site: Ragnar Federal Com #16H
 Site Error: 0.00 usft
 Reference Well: SHL: 100' FNL, 1870' FEL, Sec 22, T17S, R32E, Unit B
 Well Error: 0.00 usft
 Reference Wellbore: BHL: 330' FNL, 1647' FEL, Sec 15, T17S, R32E, Unit B
 Reference Design: Design #1

Local Co-ordinate Reference: Site Ragnar Federal Com #16H
 TVD Reference: KB @ 4034.00usft (Silver Oak 3)
 MD Reference: KB @ 4034.00usft (Silver Oak 3)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at: 2.00 sigma
 Database: EDM 5000.1 Single User Db
 Offset TVD Reference: Offset Datum

Reference Depths are relative to KB @ 4034.00usft (Silver Oak 3)
 Offset Depths are relative to Offset Datum
 Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: Ragnar Federal Com #16H
 Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
 Grid Convergence at Surface is: 0.32°

Ladder Plot



LEGEND

— Hudson #1, OH, OHV0

Company: COG Operating LLC
 Project: Lea County, NM (NAD-27 2015)
 Reference Site: Ragnar Federal Com #16H
 Site Error: 0.00 usft
 Reference Well: SHL: 100' FNL, 1870' FEL, Sec 22, T17S, R32E, Unit B
 Well Error: 0.00 usft
 Reference Wellbore: BHL: 330' FNL, 1647' FEL, Sec 15, T17S, R32E, Unit B
 Reference Design: Design #1

Local Co-ordinate Reference: Site Ragnar Federal Com #16H
 TVD Reference: KB @ 4034.00usft (Silver Oak 3)
 MD Reference: KB @ 4034.00usft (Silver Oak 3)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at: 2.00 sigma
 Database: EDM 5000.1 Single User Db
 Offset TVD Reference: Offset Datum

Reference Depths are relative to KB @ 4034.00usft (Silver Oak 3)
 Offset Depths are relative to Offset Datum
 Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: Ragnar Federal Com #16H
 Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
 Grid Convergence at Surface is: 0.32°

