

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENTFORM APPROVED
OMB NO. 1004-0137
Expires: January 31, 2018

HOBBBS OGD

FEB 01 2017

RECEIVED

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to recomplete an abandoned well. Use form 3160-3 (APD) for such proposals.

Carlsbad Field Office
OCD Hobbs5. Lease Serial No.
NMNM120908
6. If Unit or CA/Agreement, Name and/or No.

SUBMIT IN TRIPLICATE - Other instructions on page 2

1. Type of Well ☒ Oil Well ☐ Gas Well ☐ Other	8. Well Name and No. WINDWARD FEDERAL 8H
2. Name of Operator COG PRODUCTION LLC Contact: MAYTE X REYES E-Mail: mreyes1@concho.com	9. API Well No. 70-025-43517
3a. Address 2208 W MAIN STREET ARTESIA, NM 88210	10. Field and Pool or Exploratory Area BONE SPRINGS
3b. Phone No. (include area code) Ph: 575-748-6945	11. County or Parish, State LEA COUNTY, NM
4. Location of Well (Footage, Sec., T., R., M., or Survey Description) Sec 30 T24S R32E NWNE 190FNL 2300FEL FWL 210 1900	

12. CHECK THE APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
☒ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
☐ Subsequent Report	☐ Alter Casing	☐ Hydraulic Fracturing	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☒ Other Change to Original A PD
	☐ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	

13. Describe Proposed or Completed Operation: Clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recomplete horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports must be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompletion in a new interval, a Form 3160-4 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed and the operator has determined that the site is ready for final inspection.

COG Production LLC, respectfully requests approval for the following changes to the original approved APD.

BHL Change
From: 50' FSL & 2400' FWL
To: 230' FSL & 2310' FWL
C102 attached.

Drilling Changes
Operator will drill 8-3/4" production hole to 19,233' per the attached plan surveys.
Directional plan attached.

- All previous COA will apply. Additional COA is not required.

14. I hereby certify that the foregoing is true and correct. Electronic Submission #364334 verified by the BLM Well Information System For COG PRODUCTION LLC, sent to the Hobbs Committed to AFMSS for processing by MUSTAFA HAQUE on 01/20/2017 (17MH0015SE)	
Name (Printed/Typed) MAYTE X REYES	Title REGULATORY ANALYST
Signature (Electronic Submission)	Date 01/20/2017

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By MUSTAFA HAQUE	Title PETROLEUM ENGINEER	Date 01/20/2017
Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.		
Office Hobbs		

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(Instructions on page 2)

** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED **



CONCHO

COG PRODUCTION LLC

LEA COUNTY, NM

BULLDOG

WINDWARD FEDERAL #8H

OWB

Plan: PWP1

Survey Report - Geographic

20 January, 2017



COG PRODUCTION LLC

Survey Report - Geographic

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Site: BULLDOG
Well: WINDWARD FEDERAL #8H
Wellbore: OWB
Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM_Users

Project: LEA COUNTY, NM
Map System: US State Plane 1927 (Exact solution)
Geo Datum: NAD 1927 (NADCON CONUS)
Map Zone: New Mexico East 3001
System Datum: Mean Sea Level

Site: BULLDOG
Site Position: Northing: 398,637.10 usft Latitude: 32° 5' 36.820 N
From: Map Easting: 741,887.40 usft Longitude: 103° 33' 8.116 W
Position Uncertainty: 0.0 usft Slot Radius: 13-3/16 " Grid Convergence: 0.42 °

Well: WINDWARD FEDERAL #8H
Well Position: +N/-S 0.0 usft Northing: 435,175.10 usft Latitude: 32° 11' 41.670 N
+E/-W 0.0 usft Easting: 690,857.60 usft Longitude: 103° 42' 58.859 W
Position Uncertainty: 3.0 usft Wellhead Elevation: 0.0 usft Ground Level: 3,543.2 usft

Wellbore: OWB
Magnetics: Model Name Sample Date Declination (°) Dip Angle (°) Field Strength (nT)
WMM2015 10/25/2016 7.10 60.01 47,961.20083475

Design: PWP1
Audit Notes:
Version: Phase: PROTOTYPE Tie On Depth: 0.0
Vertical Section: Depth From (TVD) (usft) +N/-S (usft) +E/-W (usft) Direction (°)
0.0 0.0 0.0 177.34

Survey Tool Program Date: 1/20/2017
From (usft) To (usft) Survey (Wellbore) Tool Name Description
0.0 19,232.0 PWP1 (OWB) MWD OWSG MWD - Standard

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.0	0.00	0.00	0.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
100.0	0.00	0.00	100.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
200.0	0.00	0.00	200.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
300.0	0.00	0.00	300.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
400.0	0.00	0.00	400.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
500.0	0.00	0.00	500.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
600.0	0.00	0.00	600.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
700.0	0.00	0.00	700.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
800.0	0.00	0.00	800.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
900.0	0.00	0.00	900.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
1,000.0	0.00	0.00	1,000.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
1,100.0	0.00	0.00	1,100.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W



COG PRODUCTION LLC

Survey Report - Geographic

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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM_Users

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
1,200.0	0.00	0.00	1,200.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
1,300.0	0.00	0.00	1,300.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
1,400.0	0.00	0.00	1,400.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
1,500.0	0.00	0.00	1,500.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
1,600.0	0.00	0.00	1,600.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
1,700.0	0.00	0.00	1,700.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
1,800.0	0.00	0.00	1,800.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
1,900.0	0.00	0.00	1,900.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
2,000.0	0.00	0.00	2,000.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
2,100.0	0.00	0.00	2,100.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
2,200.0	0.00	0.00	2,200.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
2,300.0	0.00	0.00	2,300.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
2,400.0	0.00	0.00	2,400.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
2,500.0	0.00	0.00	2,500.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
2,600.0	0.00	0.00	2,600.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
2,700.0	0.00	0.00	2,700.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
2,800.0	0.00	0.00	2,800.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
2,900.0	0.00	0.00	2,900.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
3,000.0	0.00	0.00	3,000.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
3,100.0	0.00	0.00	3,100.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
3,200.0	0.00	0.00	3,200.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
3,300.0	0.00	0.00	3,300.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
3,400.0	0.00	0.00	3,400.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
3,500.0	0.00	0.00	3,500.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
3,600.0	0.00	0.00	3,600.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
3,700.0	0.00	0.00	3,700.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
3,800.0	0.00	0.00	3,800.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
3,900.0	0.00	0.00	3,900.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
4,000.0	0.00	0.00	4,000.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
4,100.0	0.00	0.00	4,100.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
4,200.0	0.00	0.00	4,200.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
4,300.0	0.00	0.00	4,300.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
4,400.0	0.00	0.00	4,400.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
4,500.0	0.00	0.00	4,500.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
4,600.0	0.00	0.00	4,600.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
4,700.0	0.00	0.00	4,700.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
4,800.0	0.00	0.00	4,800.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
4,900.0	0.00	0.00	4,900.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
5,000.0	0.00	0.00	5,000.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
5,100.0	0.00	0.00	5,100.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
5,200.0	0.00	0.00	5,200.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
5,300.0	0.00	0.00	5,300.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
5,400.0	0.00	0.00	5,400.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
5,500.0	0.00	0.00	5,500.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
5,600.0	0.00	0.00	5,600.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
5,700.0	0.00	0.00	5,700.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
5,800.0	0.00	0.00	5,800.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
5,900.0	0.00	0.00	5,900.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
6,000.0	0.00	0.00	6,000.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
6,100.0	0.00	0.00	6,100.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
6,200.0	0.00	0.00	6,200.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
6,300.0	0.00	0.00	6,300.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
6,400.0	0.00	0.00	6,400.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
6,500.0	0.00	0.00	6,500.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
6,600.0	0.00	0.00	6,600.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W



COG PRODUCTION LLC

Survey Report - Geographic

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Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
6,700.0	0.00	0.00	6,700.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
6,800.0	0.00	0.00	6,800.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
6,900.0	0.00	0.00	6,900.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
7,000.0	0.00	0.00	7,000.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
7,100.0	0.00	0.00	7,100.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
7,200.0	0.00	0.00	7,200.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
7,300.0	0.00	0.00	7,300.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
7,400.0	0.00	0.00	7,400.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
7,500.0	0.00	0.00	7,500.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
7,600.0	0.00	0.00	7,600.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
7,700.0	0.00	0.00	7,700.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
7,800.0	0.00	0.00	7,800.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
7,900.0	0.00	0.00	7,900.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
8,000.0	0.00	0.00	8,000.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
8,100.0	0.00	0.00	8,100.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
8,200.0	0.00	0.00	8,200.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
8,300.0	0.00	0.00	8,300.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
8,400.0	0.00	0.00	8,400.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
8,500.0	0.00	0.00	8,500.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
8,600.0	0.00	0.00	8,600.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
8,700.0	0.00	0.00	8,700.0	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
8,717.5	0.00	0.01	8,717.5	0.0	0.0	435,175.10	690,857.60	32° 11' 41.670 N	103° 42' 58.859 W
8,800.0	9.90	150.70	8,799.6	-6.2	3.5	435,168.90	690,861.07	32° 11' 41.608 N	103° 42' 58.818 W
8,900.0	21.90	150.70	8,895.6	-30.0	16.9	435,145.05	690,874.46	32° 11' 41.371 N	103° 42' 58.664 W
9,000.0	33.90	150.70	8,983.8	-70.8	39.7	435,104.32	690,897.31	32° 11' 40.967 N	103° 42' 58.401 W
9,100.0	45.90	150.70	9,060.4	-126.6	71.0	435,048.49	690,928.64	32° 11' 40.413 N	103° 42' 58.040 W
9,200.0	57.90	150.70	9,122.0	-195.1	109.5	434,979.99	690,967.08	32° 11' 39.733 N	103° 42' 57.597 W
9,300.0	69.89	150.70	9,165.9	-273.3	153.4	434,901.83	691,010.95	32° 11' 38.957 N	103° 42' 57.092 W
9,400.0	81.89	150.70	9,190.2	-357.7	200.7	434,817.40	691,058.33	32° 11' 38.119 N	103° 42' 56.547 W
9,467.6	90.00	150.70	9,195.0	-416.4	233.7	434,758.69	691,091.28	32° 11' 37.536 N	103° 42' 56.167 W
9,500.0	90.00	152.00	9,195.0	-444.9	249.2	434,730.22	691,106.83	32° 11' 37.253 N	103° 42' 55.988 W
9,600.0	90.00	156.00	9,195.0	-534.7	293.1	434,640.36	691,150.66	32° 11' 36.361 N	103° 42' 55.484 W
9,700.0	90.00	160.00	9,195.0	-627.4	330.5	434,547.66	691,188.12	32° 11' 35.442 N	103° 42' 55.054 W
9,800.0	90.00	164.00	9,195.0	-722.5	361.4	434,452.57	691,219.02	32° 11' 34.499 N	103° 42' 54.701 W
9,900.0	90.00	168.00	9,195.0	-819.5	385.6	434,355.56	691,243.21	32° 11' 33.538 N	103° 42' 54.426 W
10,000.0	90.00	172.00	9,195.0	-918.0	403.0	434,257.10	691,260.58	32° 11' 32.562 N	103° 42' 54.230 W
10,100.0	90.00	176.00	9,195.0	-1,017.4	413.4	434,157.67	691,271.03	32° 11' 31.578 N	103° 42' 54.115 W
10,191.3	90.00	179.65	9,195.0	-1,108.7	416.9	434,066.41	691,274.50	32° 11' 30.675 N	103° 42' 54.081 W
10,200.0	90.00	179.65	9,195.0	-1,117.3	417.0	434,057.75	691,274.55	32° 11' 30.589 N	103° 42' 54.081 W
10,300.0	90.00	179.65	9,195.0	-1,217.3	417.6	433,957.76	691,275.16	32° 11' 29.599 N	103° 42' 54.081 W
10,400.0	90.00	179.65	9,195.0	-1,317.3	418.2	433,857.76	691,275.77	32° 11' 28.610 N	103° 42' 54.080 W
10,500.0	90.00	179.65	9,195.0	-1,417.3	418.8	433,757.76	691,276.37	32° 11' 27.620 N	103° 42' 54.080 W
10,600.0	90.00	179.65	9,195.0	-1,517.3	419.4	433,657.76	691,276.98	32° 11' 26.631 N	103° 42' 54.080 W
10,700.0	90.00	179.65	9,195.0	-1,617.3	420.0	433,557.76	691,277.59	32° 11' 25.641 N	103° 42' 54.079 W
10,800.0	90.00	179.65	9,195.0	-1,717.3	420.6	433,457.76	691,278.20	32° 11' 24.651 N	103° 42' 54.079 W
10,900.0	90.00	179.65	9,195.0	-1,817.3	421.2	433,357.77	691,278.81	32° 11' 23.662 N	103° 42' 54.078 W
11,000.0	90.00	179.65	9,195.0	-1,917.3	421.8	433,257.77	691,279.42	32° 11' 22.672 N	103° 42' 54.078 W
11,100.0	90.00	179.65	9,195.0	-2,017.3	422.4	433,157.77	691,280.02	32° 11' 21.683 N	103° 42' 54.078 W
11,200.0	90.00	179.65	9,195.0	-2,117.3	423.0	433,057.77	691,280.63	32° 11' 20.693 N	103° 42' 54.077 W
11,300.0	90.00	179.65	9,195.0	-2,217.3	423.6	432,957.77	691,281.24	32° 11' 19.703 N	103° 42' 54.077 W
11,400.0	90.00	179.65	9,195.0	-2,317.3	424.3	432,857.78	691,281.85	32° 11' 18.714 N	103° 42' 54.076 W
11,500.0	90.00	179.65	9,195.0	-2,417.3	.9	432,757.78	691,282.46	32° 11' 17.724 N	103° 42' 54.076 W
11,600.0	90.00	179.65	9,195.0	-2,517.3	425.5	432,657.78	691,283.07	32° 11' 16.735 N	103° 42' 54.076 W
11,700.0	90.00	179.65	9,195.0	-2,617.3	426.1	432,557.78	691,283.67	32° 11' 15.745 N	103° 42' 54.075 W
11,800.0	90.00	179.65	9,195.0	-2,717.3	426.7	432,457.78	691,284.28	32° 11' 14.755 N	103° 42' 54.075 W



COG PRODUCTION LLC

Survey Report - Geographic

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Site: BULLDOG
Well: WINDWARD FEDERAL #8H
Wellbore: OWB
Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM_Users

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
11,900.0	90.00	179.65	9,195.0	-2,817.3	427.3	432,357.78	691,284.89	32° 11' 13.766 N	103° 42' 54.075 W
12,000.0	90.00	179.65	9,195.0	-2,917.3	427.9	432,257.79	691,285.50	32° 11' 12.776 N	103° 42' 54.074 W
12,100.0	90.00	179.65	9,195.0	-3,017.3	428.5	432,157.79	691,286.11	32° 11' 11.787 N	103° 42' 54.074 W
12,200.0	90.00	179.65	9,195.0	-3,117.3	429.1	432,057.79	691,286.72	32° 11' 10.797 N	103° 42' 54.073 W
12,300.0	90.00	179.65	9,195.0	-3,217.3	429.7	431,957.79	691,287.32	32° 11' 9.807 N	103° 42' 54.073 W
12,400.0	90.00	179.65	9,195.0	-3,317.3	430.3	431,857.79	691,287.93	32° 11' 8.818 N	103° 42' 54.073 W
12,500.0	90.00	179.65	9,195.0	-3,417.3	430.9	431,757.80	691,288.54	32° 11' 7.828 N	103° 42' 54.072 W
12,600.0	90.00	179.65	9,195.0	-3,517.3	431.6	431,657.80	691,289.15	32° 11' 6.839 N	103° 42' 54.072 W
12,700.0	90.00	179.65	9,195.0	-3,617.3	432.2	431,557.80	691,289.76	32° 11' 5.849 N	103° 42' 54.071 W
12,800.0	90.00	179.65	9,195.0	-3,717.3	432.8	431,457.80	691,290.36	32° 11' 4.859 N	103° 42' 54.071 W
12,900.0	90.00	179.65	9,195.0	-3,817.3	433.4	431,357.80	691,290.97	32° 11' 3.870 N	103° 42' 54.071 W
13,000.0	90.00	179.65	9,195.0	-3,917.3	434.0	431,257.80	691,291.58	32° 11' 2.880 N	103° 42' 54.070 W
13,100.0	90.00	179.65	9,195.0	-4,017.3	434.6	431,157.81	691,292.19	32° 11' 1.890 N	103° 42' 54.070 W
13,200.0	90.00	179.65	9,195.0	-4,117.3	435.2	431,057.81	691,292.80	32° 11' 0.901 N	103° 42' 54.069 W
13,300.0	90.00	179.65	9,195.0	-4,217.3	435.8	430,957.81	691,293.41	32° 10' 59.911 N	103° 42' 54.069 W
13,400.0	90.00	179.65	9,195.0	-4,317.3	436.4	430,857.81	691,294.01	32° 10' 58.922 N	103° 42' 54.069 W
13,500.0	90.00	179.65	9,195.0	-4,417.3	437.0	430,757.81	691,294.62	32° 10' 57.932 N	103° 42' 54.068 W
13,600.0	90.00	179.65	9,195.0	-4,517.3	437.6	430,657.82	691,295.23	32° 10' 56.942 N	103° 42' 54.068 W
13,700.0	90.00	179.65	9,195.0	-4,617.3	438.2	430,557.82	691,295.84	32° 10' 55.953 N	103° 42' 54.068 W
13,800.0	90.00	179.65	9,195.0	-4,717.3	438.9	430,457.82	691,296.45	32° 10' 54.963 N	103° 42' 54.067 W
13,900.0	90.00	179.65	9,195.0	-4,817.3	439.5	430,357.82	691,297.06	32° 10' 53.974 N	103° 42' 54.067 W
14,000.0	90.00	179.65	9,195.0	-4,917.3	440.1	430,257.82	691,297.66	32° 10' 52.984 N	103° 42' 54.066 W
14,100.0	90.00	179.65	9,195.0	-5,017.3	440.7	430,157.83	691,298.27	32° 10' 51.994 N	103° 42' 54.066 W
14,200.0	90.00	179.65	9,195.0	-5,117.3	441.3	430,057.83	691,298.88	32° 10' 51.005 N	103° 42' 54.066 W
14,300.0	90.00	179.65	9,195.0	-5,217.3	441.9	429,957.83	691,299.49	32° 10' 50.015 N	103° 42' 54.065 W
14,400.0	90.00	179.65	9,195.0	-5,317.3	442.5	429,857.83	691,300.10	32° 10' 49.026 N	103° 42' 54.065 W
14,500.0	90.00	179.65	9,195.0	-5,417.3	443.1	429,757.83	691,300.71	32° 10' 48.036 N	103° 42' 54.064 W
14,600.0	90.00	179.65	9,195.0	-5,517.3	443.7	429,657.83	691,301.31	32° 10' 47.046 N	103° 42' 54.064 W
14,700.0	90.00	179.65	9,195.0	-5,617.3	444.3	429,557.84	691,301.92	32° 10' 46.057 N	103° 42' 54.064 W
14,800.0	90.00	179.65	9,195.0	-5,717.3	444.9	429,457.84	691,302.53	32° 10' 45.067 N	103° 42' 54.063 W
14,900.0	90.00	179.65	9,195.0	-5,817.3	445.5	429,357.84	691,303.14	32° 10' 44.078 N	103° 42' 54.063 W
15,000.0	90.00	179.65	9,195.0	-5,917.3	446.2	429,257.84	691,303.75	32° 10' 43.088 N	103° 42' 54.062 W
15,100.0	90.00	179.65	9,195.0	-6,017.3	446.8	429,157.84	691,304.36	32° 10' 42.098 N	103° 42' 54.062 W
15,200.0	90.00	179.65	9,195.0	-6,117.3	447.4	429,057.85	691,304.96	32° 10' 41.109 N	103° 42' 54.062 W
15,300.0	90.00	179.65	9,195.0	-6,217.3	448.0	428,957.85	691,305.57	32° 10' 40.119 N	103° 42' 54.061 W
15,400.0	90.00	179.65	9,195.0	-6,317.3	448.6	428,857.85	691,306.18	32° 10' 39.130 N	103° 42' 54.061 W
15,500.0	90.00	179.65	9,195.0	-6,417.2	449.2	428,757.85	691,306.79	32° 10' 38.140 N	103° 42' 54.061 W
15,600.0	90.00	179.65	9,195.0	-6,517.2	449.8	428,657.85	691,307.40	32° 10' 37.150 N	103° 42' 54.060 W
15,700.0	90.00	179.65	9,195.0	-6,617.2	450.4	428,557.85	691,308.01	32° 10' 36.161 N	103° 42' 54.060 W
15,800.0	90.00	179.65	9,195.0	-6,717.2	451.0	428,457.86	691,308.61	32° 10' 35.171 N	103° 42' 54.059 W
15,900.0	90.00	179.65	9,195.0	-6,817.2	451.6	428,357.86	691,309.22	32° 10' 34.182 N	103° 42' 54.059 W
16,000.0	90.00	179.65	9,195.0	-6,917.2	452.2	428,257.86	691,309.83	32° 10' 33.192 N	103° 42' 54.059 W
16,100.0	90.00	179.65	9,195.0	-7,017.2	452.8	428,157.86	691,310.44	32° 10' 32.202 N	103° 42' 54.058 W
16,200.0	90.00	179.65	9,195.0	-7,117.2	453.5	428,057.86	691,311.05	32° 10' 31.213 N	103° 42' 54.058 W
16,300.0	90.00	179.65	9,195.0	-7,217.2	454.1	427,957.87	691,311.66	32° 10' 30.223 N	103° 42' 54.057 W
16,400.0	90.00	179.65	9,195.0	-7,317.2	454.7	427,857.87	691,312.26	32° 10' 29.234 N	103° 42' 54.057 W
16,500.0	90.00	179.65	9,195.0	-7,417.2	455.3	427,757.87	691,312.87	32° 10' 28.244 N	103° 42' 54.057 W
16,600.0	90.00	179.65	9,195.0	-7,517.2	455.9	427,657.87	691,313.48	32° 10' 27.254 N	103° 42' 54.056 W
16,700.0	90.00	179.65	9,195.0	-7,617.2	456.5	427,557.87	691,314.09	32° 10' 26.265 N	103° 42' 54.056 W
16,800.0	90.00	179.65	9,195.0	-7,717.2	457.1	427,457.88	691,314.70	32° 10' 25.275 N	103° 42' 54.055 W
16,900.0	90.00	179.65	9,195.0	-7,817.2	457.7	427,357.88	691,315.31	32° 10' 24.286 N	103° 42' 54.055 W
17,000.0	90.00	179.65	9,195.0	-7,917.2	458.3	427,257.88	691,315.91	32° 10' 23.296 N	103° 42' 54.055 W
17,100.0	90.00	179.65	9,195.0	-8,017.2	458.9	427,157.88	691,316.52	32° 10' 22.306 N	103° 42' 54.054 W
17,200.0	90.00	179.65	9,195.0	-8,117.2	459.5	427,057.88	691,317.13	32° 10' 21.317 N	103° 42' 54.054 W
17,300.0	90.00	179.65	9,195.0	-8,217.2	460.1	426,957.88	691,317.74	32° 10' 20.327 N	103° 42' 54.053 W

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Site: BULLDOG
Well: WINDWARD FEDERAL #8H
Wellbore: OWB
Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM_Users

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
17,400.0	90.00	179.65	9,195.0	-8,317.2	460.8	426,857.89	691,318.35	32° 10' 19.338 N	103° 42' 54.053 W
17,500.0	90.00	179.65	9,195.0	-8,417.2	461.4	426,757.89	691,318.96	32° 10' 18.348 N	103° 42' 54.053 W
17,600.0	90.00	179.65	9,195.0	-8,517.2	462.0	426,657.89	691,319.56	32° 10' 17.358 N	103° 42' 54.052 W
17,700.0	90.00	179.65	9,195.0	-8,617.2	462.6	426,557.89	691,320.17	32° 10' 16.369 N	103° 42' 54.052 W
17,800.0	90.00	179.65	9,195.0	-8,717.2	463.2	426,457.89	691,320.78	32° 10' 15.379 N	103° 42' 54.052 W
17,900.0	90.00	179.65	9,195.0	-8,817.2	463.8	426,357.90	691,321.39	32° 10' 14.389 N	103° 42' 54.051 W
18,000.0	90.00	179.65	9,195.0	-8,917.2	464.4	426,257.90	691,322.00	32° 10' 13.400 N	103° 42' 54.051 W
18,100.0	90.00	179.65	9,195.0	-9,017.2	465.0	426,157.90	691,322.61	32° 10' 12.410 N	103° 42' 54.050 W
18,200.0	90.00	179.65	9,195.0	-9,117.2	465.6	426,057.90	691,323.21	32° 10' 11.421 N	103° 42' 54.050 W
18,300.0	90.00	179.65	9,195.0	-9,217.2	466.2	425,957.90	691,323.82	32° 10' 10.431 N	103° 42' 54.050 W
18,400.0	90.00	179.65	9,195.0	-9,317.2	466.8	425,857.90	691,324.43	32° 10' 9.441 N	103° 42' 54.049 W
18,500.0	90.00	179.65	9,195.0	-9,417.2	467.4	425,757.91	691,325.04	32° 10' 8.452 N	103° 42' 54.049 W
18,600.0	90.00	179.65	9,195.0	-9,517.2	468.1	425,657.91	691,325.65	32° 10' 7.462 N	103° 42' 54.048 W
18,700.0	90.00	179.65	9,195.0	-9,617.2	468.7	425,557.91	691,326.25	32° 10' 6.473 N	103° 42' 54.048 W
18,800.0	90.00	179.65	9,195.0	-9,717.2	469.3	425,457.91	691,326.86	32° 10' 5.483 N	103° 42' 54.048 W
18,900.0	90.00	179.65	9,195.0	-9,817.2	469.9	425,357.91	691,327.47	32° 10' 4.493 N	103° 42' 54.047 W
19,000.0	90.00	179.65	9,195.0	-9,917.2	470.5	425,257.92	691,328.08	32° 10' 3.504 N	103° 42' 54.047 W
19,100.0	90.00	179.65	9,195.0	-10,017.2	471.1	425,157.92	691,328.69	32° 10' 2.514 N	103° 42' 54.046 W
19,200.0	90.00	179.65	9,195.0	-10,117.2	471.7	425,057.92	691,329.30	32° 10' 1.525 N	103° 42' 54.046 W
19,232.7	90.00	179.65	9,195.0	-10,149.9	471.9	425,025.20	691,329.50	32° 10' 1.201 N	103° 42' 54.046 W

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									
PBHL-Windward Fed	0.00	0.01	9,195.0	-10,149.9	471.9	425,025.20	691,329.50	32° 10' 1.201 N	103° 42' 54.046 W
- plan hits target center									
- Point									

Checked By: _____ Approved By: _____ Date: _____



CONCHO

COG PRODUCTION LLC

LEA COUNTY, NM

BULLDOG

WINDWARD FEDERAL #8H

OWB

PWP1

Anticollision Report

20 January, 2017



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Reference	PWP1		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	Stations	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 10,000.0 usft	Error Surface:	Major Axis
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program		Date 1/20/2017		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	19,232.0	PWP1 (OWB)	MWD	OWSG MWD - Standard

Summary						
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						
BULLDOG						
KING TUT FEDERAL #2H - OWB - ACTUAL WELLPATH	5,794.3	5,794.4	248.2	222.0	9.471 CC	
KING TUT FEDERAL #2H - OWB - ACTUAL WELLPATH	6,100.0	6,098.9	248.8	221.2	9.011 ES	
KING TUT FEDERAL #2H - OWB - ACTUAL WELLPATH	19,100.0	18,142.0	1,010.0	672.4	2.992 SF	
KING TUT FEDERAL #2H - OWB - PWP1	8,205.8	8,229.2	225.4	191.4	6.614 CC, ES	
KING TUT FEDERAL #2H - OWB - PWP1	19,100.0	18,332.2	787.4	431.9	2.215 SF	
KING TUT FEDERAL #2H - OWB - PWP2	8,221.1	8,248.5	219.3	185.1	6.413 CC, ES	
KING TUT FEDERAL #2H - OWB - PWP2	19,100.0	18,357.5	787.4	432.3	2.217 SF	
REDHEAD 31 FEDERAL #1H - OWB - ACTUAL WELLP	14,518.6	9,123.8	1,363.9	1,250.1	11.991 CC, ES	
REDHEAD 31 FEDERAL #1H - OWB - ACTUAL WELLP	19,232.7	14,760.0	1,909.0	1,660.0	7.666 SF	
TURQUOIS 30 FEDERAL #1 - OWB - ACTUAL WELLP	10,797.2	8,750.0	528.6	260.4	1.971 Advise and Monitor, CC	
TURQUOIS 30 FEDERAL #1 - OWB - ACTUAL WELLP	10,800.0	8,750.0	528.6	260.4	1.971 Advise and Monitor, ES,	
WINDWARD FEDERAL #2H - LATERAL 01 - AWP-LATE	2,955.4	2,960.7	125.4	110.7	8.507 CC	
WINDWARD FEDERAL #2H - LATERAL 01 - AWP-LATE	5,000.0	5,005.3	130.2	107.4	5.711 ES	
WINDWARD FEDERAL #2H - LATERAL 01 - AWP-LATE	19,200.0	20,401.0	1,248.9	906.5	3.647 SF	
WINDWARD FEDERAL #2H - OWB-PILOT HOLE - AWP	2,955.4	2,960.7	125.4	110.7	8.507 CC	
WINDWARD FEDERAL #2H - OWB-PILOT HOLE - AWP	5,000.0	5,005.3	130.2	107.4	5.711 ES	
WINDWARD FEDERAL #2H - OWB-PILOT HOLE - AWP	8,717.5	8,721.2	153.0	114.9	4.019 SF	
WINDWARD FEDERAL #7H - OWB - ACTUAL WELLP	4,424.8	4,425.2	47.9	27.5	2.356 CC	
WINDWARD FEDERAL #7H - OWB - ACTUAL WELLP	5,400.0	5,400.1	50.3	26.1	2.082 ES	
WINDWARD FEDERAL #7H - OWB - ACTUAL WELLP	5,500.0	5,500.0	51.1	26.5	2.081 SF	

Offset Design BULLDOG - KING TUT FEDERAL #2H - OWB - ACTUAL WELLPATH												Offset Site Error:	0.0 usft
Survey Program: 100- VES GyroFlex, 7835-MWD												Offset Well Error:	3.0 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)			
0.0	0.0	0.0	0.0	3.0	3.0	-85.84	18.2	-250.5	251.2				
100.0	100.0	99.4	99.4	3.0	3.0	-85.87	18.1	-250.6	251.2	245.2	6.00	41.848	
200.0	200.0	199.4	199.4	3.0	3.0	-85.94	17.8	-250.8	251.4	245.3	6.05	41.569	
300.0	300.0	298.8	298.8	3.1	3.0	-85.98	17.6	-251.0	251.7	245.5	6.14	41.004	
400.0	400.0	398.6	398.6	3.2	3.0	-86.00	17.6	-251.5	252.1	245.8	6.27	40.195	
500.0	500.0	497.3	497.3	3.4	3.1	-86.07	17.3	-252.2	252.8	246.4	6.45	39.202	
600.0	600.0	596.5	596.5	3.6	3.1	-86.19	16.9	-253.4	254.0	247.3	6.66	38.108	
700.0	700.0	696.1	696.1	3.8	3.1	-86.32	16.4	-254.8	255.4	248.4	6.91	36.940	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - KING TUT FEDERAL #2H - OWB - ACTUAL WELLPATH														Offset Site Error:	0.0 usft
Survey Program: 100- VES GyroFlex, 7835-MWD														Offset Well Error:	3.0 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)					
800.0	800.0	797.1	797.1	4.0	3.2	-86.45	15.9	-256.1	256.6	249.4	7.19	35.692			
900.0	900.0	898.2	898.2	4.2	3.2	-86.56	15.5	-257.0	257.5	250.0	7.49	34.366			
1,000.0	1,000.0	998.9	998.9	4.5	3.3	-86.62	15.2	-257.5	258.0	250.2	7.81	33.012			
1,100.0	1,100.0	1,099.2	1,099.2	4.8	3.4	-86.70	14.9	-257.8	258.3	250.1	8.15	31.678			
1,200.0	1,200.0	1,200.5	1,200.4	5.1	3.4	-86.72	14.8	-257.9	258.3	249.8	8.45	30.562			
1,300.0	1,300.0	1,300.2	1,300.1	5.4	3.4	-86.74	14.7	-257.7	258.1	249.4	8.74	29.527			
1,400.0	1,400.0	1,401.1	1,401.0	5.7	3.4	-86.79	14.4	-257.4	257.8	248.7	9.05	28.489			
1,487.0	1,487.0	1,486.8	1,486.8	5.9	3.4	-86.68	14.9	-257.2	257.6	248.3	9.30	27.686			
1,500.0	1,500.0	1,499.7	1,499.6	6.0	3.4	-86.65	15.1	-257.2	257.6	248.3	9.34	27.572			
1,600.0	1,600.0	1,595.9	1,595.8	6.3	3.4	-86.44	16.1	-257.9	258.4	248.7	9.68	26.708			
1,700.0	1,700.0	1,697.5	1,697.4	6.6	3.5	-86.47	16.0	-259.2	259.7	249.6	10.05	25.828			
1,800.0	1,800.0	1,802.0	1,802.0	6.9	3.5	-86.65	15.2	-259.3	259.7	249.3	10.42	24.928			
1,900.0	1,900.0	1,902.5	1,902.4	7.2	3.5	-86.68	15.0	-258.4	258.8	248.1	10.74	24.106			
2,000.0	2,000.0	1,999.9	1,999.9	7.6	3.5	-86.52	15.7	-257.9	258.3	247.3	11.05	23.372			
2,002.3	2,002.3	2,002.2	2,002.1	7.6	3.5	-86.52	15.7	-257.9	258.3	247.3	11.06	23.356			
2,100.0	2,100.0	2,096.8	2,096.7	7.9	3.5	-86.35	16.5	-258.4	258.9	247.5	11.41	22.697			
2,200.0	2,200.0	2,199.0	2,198.9	8.2	3.6	-86.31	16.7	-259.2	259.7	247.9	11.81	22.001			
2,300.0	2,300.0	2,299.3	2,299.2	8.6	3.7	-86.37	16.4	-259.5	260.0	247.8	12.22	21.281			
2,400.0	2,400.0	2,401.8	2,401.7	8.9	3.7	-86.37	16.5	-259.2	259.8	247.2	12.58	20.642			
2,500.0	2,500.0	2,501.2	2,501.1	9.2	3.7	-86.23	17.0	-258.6	259.2	246.3	12.91	20.080			
2,560.1	2,560.1	2,560.0	2,559.9	9.4	3.7	-86.11	17.6	-258.4	259.0	245.9	13.11	19.751			
2,600.0	2,600.0	2,599.1	2,599.0	9.6	3.7	-86.02	18.0	-258.5	259.1	245.8	13.25	19.548			
2,700.0	2,700.0	2,697.8	2,697.7	9.9	3.7	-85.83	18.9	-258.9	259.6	246.0	13.64	19.042			
2,800.0	2,800.0	2,798.2	2,798.1	10.3	3.8	-85.82	19.0	-259.7	260.4	246.3	14.05	18.536			
2,900.0	2,900.0	2,899.9	2,899.8	10.6	3.9	-85.96	18.4	-260.1	260.7	246.3	14.46	18.030			
3,000.0	3,000.0	3,001.0	3,000.9	10.9	3.9	-86.09	17.8	-259.9	260.5	245.7	14.85	17.548			
3,100.0	3,100.0	3,101.3	3,101.2	11.3	3.9	-86.18	17.3	-259.4	260.0	244.8	15.21	17.093			
3,200.0	3,200.0	3,202.1	3,202.0	11.6	3.9	-86.22	17.1	-258.8	259.3	243.8	15.57	16.656			
3,300.0	3,300.0	3,301.8	3,301.6	12.0	3.9	-86.08	17.7	-257.9	258.6	242.6	15.92	16.243			
3,348.4	3,348.4	3,348.3	3,348.2	12.2	3.9	-85.96	18.2	-257.7	258.4	242.3	16.10	16.052			
3,400.0	3,400.0	3,398.0	3,397.9	12.3	4.0	-85.85	18.7	-257.9	258.6	242.3	16.29	15.875			
3,500.0	3,500.0	3,498.4	3,498.3	12.7	4.0	-85.74	19.3	-258.5	259.2	242.5	16.70	15.527			
3,600.0	3,600.0	3,598.4	3,598.2	13.0	4.1	-85.79	19.1	-259.1	259.8	242.7	17.12	15.173			
3,700.0	3,700.0	3,700.4	3,700.3	13.4	4.2	-85.96	18.3	-259.4	260.1	242.5	17.55	14.820			
3,800.0	3,800.0	3,802.3	3,802.1	13.7	4.2	-85.99	18.2	-258.9	259.5	241.6	17.93	14.477			
3,900.0	3,900.0	3,900.5	3,900.3	14.1	4.2	-85.80	19.0	-258.3	259.0	240.7	18.28	14.165			
3,929.8	3,929.8	3,929.8	3,929.6	14.2	4.2	-85.74	19.3	-258.2	258.9	240.6	18.40	14.074			
4,000.0	4,000.0	3,998.8	3,998.6	14.4	4.2	-85.64	19.7	-258.4	259.1	240.4	18.67	13.876			
4,100.0	4,100.0	4,099.3	4,099.1	14.8	4.3	-85.62	19.8	-258.7	259.5	240.4	19.10	13.584			
4,200.0	4,200.0	4,200.4	4,200.3	15.1	4.4	-85.68	19.5	-258.8	259.5	240.0	19.52	13.295			
4,300.0	4,300.0	4,302.1	4,301.9	15.5	4.4	-85.81	18.9	-258.3	259.0	239.1	19.91	13.007			
4,400.0	4,400.0	4,403.7	4,403.6	15.8	4.5	-86.00	18.0	-257.2	257.9	237.6	20.30	12.702			
4,500.0	4,500.0	4,502.3	4,502.1	16.2	4.5	-86.16	17.2	-256.1	256.7	236.0	20.69	12.408			
4,600.0	4,600.0	4,601.4	4,601.2	16.5	4.5	-86.27	16.6	-255.5	256.0	234.9	21.09	12.142			
4,700.0	4,700.0	4,701.5	4,701.3	16.9	4.6	-86.37	16.2	-254.9	255.5	234.0	21.49	11.889			
4,800.0	4,800.0	4,802.3	4,802.1	17.2	4.6	-86.48	15.6	-254.2	254.7	232.8	21.89	11.635			
4,900.0	4,900.0	4,903.4	4,903.2	17.6	4.7	-86.67	14.7	-253.1	253.6	231.3	22.30	11.370			
5,000.0	5,000.0	5,002.9	5,002.7	18.0	4.8	-86.90	13.7	-252.0	252.3	229.6	22.72	11.106			
5,100.0	5,100.0	5,102.6	5,102.4	18.3	4.8	-87.13	12.6	-250.9	251.3	228.1	23.15	10.856			
5,200.0	5,200.0	5,201.3	5,201.1	18.7	4.9	-87.29	11.8	-250.2	250.5	226.9	23.57	10.628			
5,300.0	5,300.0	5,302.0	5,301.8	19.0	5.0	-87.39	11.4	-249.6	249.9	225.9	24.00	10.412			
5,400.0	5,400.0	5,401.3	5,401.0	19.4	5.1	-87.50	10.9	-249.0	249.2	224.8	24.43	10.202			

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - KING TUT FEDERAL #2H - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 100- VES GyroFlex, 7835-MWD													Offset Well Error: 3.0 usft
Reference	Offset	Semi Major Axis		Distance		Minimum Separation		Separation Factor		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	Warning
5,500.0	5,500.0	5,500.7	5,500.5	19.7	5.2	-87.61	10.4	-248.6	248.8	224.0	24.87	10.004	
5,600.0	5,600.0	5,600.5	5,600.3	20.1	5.2	-87.70	10.0	-248.4	248.6	223.3	25.32	9.818	
5,700.0	5,700.0	5,700.8	5,700.6	20.4	5.3	-87.81	9.5	-248.2	248.4	222.6	25.78	9.635	
5,794.3	5,794.3	5,794.4	5,794.1	20.8	5.4	-87.90	9.1	-248.1	248.2	222.0	26.21	9.471 CC	
5,800.0	5,800.0	5,800.0	5,799.8	20.8	5.5	-87.91	9.1	-248.1	248.2	222.0	26.23	9.462	
5,900.0	5,900.0	5,899.7	5,899.4	21.1	5.6	-88.01	8.6	-248.2	248.3	221.6	26.69	9.302	
6,000.0	6,000.0	5,999.5	5,999.3	21.5	5.7	-88.15	8.0	-248.4	248.5	221.3	27.15	9.151	
6,100.0	6,100.0	6,098.9	6,098.7	21.8	5.8	-88.29	7.4	-248.7	248.8	221.2	27.61	9.011 ES	
6,200.0	6,200.0	6,198.3	6,198.1	22.2	5.9	-88.42	6.9	-249.3	249.4	221.3	28.06	8.887	
6,300.0	6,300.0	6,297.7	6,297.5	22.6	5.9	-88.56	6.3	-250.1	250.2	221.7	28.50	8.777	
6,400.0	6,400.0	6,396.3	6,396.0	22.9	6.0	-88.72	5.6	-251.3	251.4	222.5	28.94	8.686	
6,500.0	6,500.0	6,496.4	6,496.1	23.3	6.1	-88.87	5.0	-252.8	252.9	223.5	29.38	8.606	
6,600.0	6,600.0	6,595.7	6,595.4	23.6	6.2	-89.02	4.4	-254.4	254.5	224.6	29.82	8.532	
6,700.0	6,700.0	6,695.0	6,694.7	24.0	6.3	-89.21	3.5	-256.3	256.3	226.1	30.27	8.468	
6,800.0	6,800.0	6,794.8	6,794.4	24.3	6.4	-89.48	2.4	-258.3	258.4	227.7	30.72	8.410	
6,900.0	6,900.0	6,894.9	6,894.5	24.7	6.5	-89.75	1.1	-260.4	260.4	229.3	31.18	8.353	
7,000.0	7,000.0	6,995.9	6,995.5	25.0	6.6	-90.00	0.0	-262.2	262.3	230.6	31.64	8.290	
7,100.0	7,100.0	7,096.1	7,095.7	25.4	6.7	-90.26	-1.2	-263.8	263.9	231.8	32.11	8.219	
7,200.0	7,200.0	7,195.1	7,194.7	25.8	6.8	-90.55	-2.5	-265.5	265.6	233.0	32.57	8.154	
7,300.0	7,300.0	7,294.1	7,293.6	26.1	6.9	-90.88	-4.1	-267.6	267.7	234.7	33.04	8.103	
7,400.0	7,400.0	7,394.3	7,393.8	26.5	7.0	-91.22	-5.8	-269.9	270.0	236.5	33.51	8.057	
7,500.0	7,500.0	7,494.8	7,494.3	26.8	7.2	-91.56	-7.4	-272.0	272.2	238.2	33.99	8.008	
7,600.0	7,600.0	7,596.3	7,595.7	27.2	7.3	-91.89	-9.1	-273.7	273.9	239.5	34.47	7.948	
7,700.0	7,700.0	7,696.3	7,695.7	27.5	7.4	-92.22	-10.7	-275.2	275.4	240.5	34.95	7.881	
7,800.0	7,800.0	7,794.1	7,793.5	27.9	7.5	-92.57	-12.4	-276.8	277.1	241.7	35.42	7.824	
7,900.0	7,900.0	7,888.5	7,887.3	28.3	7.6	-94.28	-20.9	-279.4	280.4	244.6	35.83	7.827	
8,000.0	8,000.0	7,969.0	7,964.8	28.6	7.6	-98.49	-42.3	-283.2	288.5	252.2	36.24	7.961	
8,100.0	8,100.0	8,070.5	8,058.5	29.0	7.7	-105.67	-80.6	-287.4	301.3	264.6	36.67	8.217	
8,200.0	8,200.0	8,153.2	8,128.1	29.3	7.8	-113.73	-125.0	-284.3	318.7	281.6	37.13	8.582	
8,300.0	8,300.0	8,226.1	8,184.2	29.7	7.9	-121.60	-171.1	-278.1	346.4	308.8	37.62	9.207	
8,400.0	8,400.0	8,282.9	8,224.9	30.0	8.1	-127.71	-210.3	-272.1	385.8	347.7	38.13	10.119	
8,500.0	8,500.0	8,328.1	8,254.8	30.4	8.3	-132.41	-243.8	-266.9	436.6	398.0	38.65	11.298	
8,600.0	8,600.0	8,368.0	8,279.0	30.7	8.4	-136.38	-275.1	-262.1	497.3	458.1	39.20	12.686	
8,700.0	8,700.0	8,407.6	8,302.0	31.1	8.7	-139.95	-307.2	-258.2	565.0	525.2	39.80	14.197	
8,717.5	8,717.5	8,415.0	8,306.2	31.2	8.7	-140.57	-313.2	-257.5	577.4	537.5	39.91	14.468	
8,725.0	8,725.0	8,418.2	8,308.0	31.2	8.8	67.63	-315.8	-257.3	582.8	542.8	39.96	14.584	
8,750.0	8,750.0	8,429.0	8,314.0	31.3	8.8	64.07	-324.7	-256.2	600.5	560.4	40.12	14.969	
8,775.0	8,774.9	8,437.8	8,318.9	31.4	8.9	60.87	-332.0	-255.4	618.1	577.8	40.27	15.350	
8,800.0	8,799.6	8,446.3	8,323.5	31.4	9.0	57.89	-339.1	-254.5	635.5	595.1	40.41	15.725	
8,825.0	8,824.1	8,455.0	8,328.0	31.5	9.0	55.12	-346.4	-253.7	652.7	612.2	40.56	16.091	
8,850.0	8,848.3	8,463.0	8,332.2	31.6	9.1	52.58	-353.2	-252.9	669.7	629.0	40.71	16.450	
8,875.0	8,872.2	8,473.8	8,337.6	31.7	9.2	50.16	-362.5	-251.8	686.3	645.4	40.89	16.786	
8,900.0	8,895.6	8,483.8	8,342.6	31.7	9.3	47.99	-371.2	-250.8	702.6	661.5	41.06	17.112	
8,925.0	8,918.5	8,494.0	8,347.5	31.8	9.4	46.02	-380.0	-249.9	718.4	677.2	41.23	17.425	
8,950.0	8,940.9	8,504.3	8,352.4	31.9	9.5	44.24	-389.0	-249.0	733.8	692.4	41.40	17.722	
8,975.0	8,962.7	8,514.7	8,357.2	32.0	9.6	42.64	-398.2	-248.0	748.6	707.1	41.58	18.004	
9,000.0	8,983.8	8,525.0	8,361.8	32.1	9.7	41.20	-407.4	-247.1	763.0	721.3	41.76	18.272	
9,025.0	9,004.2	8,534.3	8,365.9	32.1	9.8	39.90	-415.7	-246.3	776.9	734.9	41.93	18.527	
9,050.0	9,023.8	8,543.6	8,369.8	32.2	9.9	38.74	-424.1	-245.5	790.2	748.1	42.10	18.768	
9,075.0	9,042.5	8,557.0	8,375.2	32.3	10.0	37.72	-436.3	-244.5	803.0	760.7	42.32	18.974	
9,100.0	9,060.4	8,557.0	8,375.2	32.4	10.0	36.71	-436.3	-244.5	815.2	772.8	42.40	19.226	
9,125.0	9,077.3	8,571.1	8,380.6	32.4	10.2	35.91	-449.3	-243.3	826.8	784.2	42.64	19.390	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - KING TUT FEDERAL #2H - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 100- VES GyroFlex, 7835-MWD													Offset Well Error: 3.0 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)	Offset Wellbore Centre +E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
9,150.0	9,093.2	8,588.0	8,386.5	32.5	10.4	35.25	-465.0	-241.7	838.0	795.1	42.92	19.524	
9,175.0	9,108.1	8,588.0	8,386.5	32.6	10.4	34.46	-465.0	-241.7	848.4	805.4	43.01	19.725	
9,200.0	9,122.0	8,597.6	8,389.6	32.7	10.5	33.87	-474.1	-240.8	858.2	815.0	43.22	19.858	
9,225.0	9,134.7	8,606.1	8,392.2	32.8	10.6	33.34	-482.1	-239.9	867.5	824.1	43.42	19.981	
9,250.0	9,146.3	8,615.0	8,394.7	32.9	10.7	32.88	-490.6	-239.0	876.1	832.5	43.63	20.083	
9,275.0	9,156.7	8,624.7	8,397.3	33.0	10.8	32.50	-499.9	-237.9	884.1	840.3	43.85	20.161	
9,300.0	9,165.9	8,635.0	8,399.9	33.1	11.0	32.19	-509.8	-236.8	891.4	847.4	44.09	20.217	
9,325.0	9,173.9	8,647.0	8,402.6	33.2	11.1	31.98	-521.4	-235.5	898.1	853.7	44.36	20.244	
9,350.0	9,180.6	8,656.8	8,404.8	33.4	11.3	31.78	-530.9	-234.3	904.0	859.4	44.62	20.263	
9,375.0	9,186.1	8,668.7	8,407.1	33.5	11.4	31.69	-542.5	-232.9	909.2	864.3	44.90	20.250	
9,400.0	9,190.2	8,678.0	8,408.9	33.6	11.5	31.60	-551.5	-231.8	913.7	868.5	45.15	20.235	
9,425.0	9,193.1	8,694.7	8,411.8	33.8	11.8	31.74	-567.9	-229.8	917.4	871.9	45.52	20.154	
9,450.0	9,194.7	8,710.0	8,414.3	33.9	12.0	31.92	-582.9	-228.1	920.3	874.5	45.87	20.063	
9,467.6	9,195.0	8,719.2	8,415.8	34.0	12.1	32.05	-591.9	-227.0	921.9	875.8	46.10	19.997	
9,500.0	9,195.0	8,741.0	8,419.1	34.2	12.4	32.67	-613.3	-224.7	924.5	877.9	46.60	19.838	
9,600.0	9,195.0	8,795.4	8,426.5	34.9	13.2	34.22	-667.0	-220.0	933.2	885.2	48.04	19.426	
9,700.0	9,195.0	8,852.0	8,432.6	35.6	14.0	35.64	-723.1	-216.2	942.9	893.3	49.60	19.011	
9,800.0	9,195.0	8,898.0	8,434.5	36.4	14.7	36.64	-769.0	-213.5	954.3	903.3	51.06	18.690	
9,900.0	9,195.0	8,960.0	8,434.2	37.2	15.6	37.60	-830.9	-210.8	966.6	913.8	52.80	18.308	
10,000.0	9,195.0	9,057.0	8,432.8	38.0	17.0	38.52	-927.9	-208.1	976.8	921.8	55.08	17.734	
10,100.0	9,195.0	9,168.6	8,432.7	38.9	18.8	39.06	-1,039.5	-205.0	981.7	924.1	57.62	17.039	
10,191.3	9,195.0	9,247.6	8,432.9	39.6	20.0	39.14	-1,118.4	-203.1	982.3	922.7	59.59	16.486	
10,200.0	9,195.0	9,254.8	8,432.9	39.7	20.1	39.13	-1,125.6	-202.9	982.3	922.5	59.77	16.435	
10,300.0	9,195.0	9,363.2	8,431.7	40.5	21.8	38.97	-1,234.0	-199.7	981.7	919.4	62.30	15.756	
10,400.0	9,195.0	9,456.3	8,430.6	41.4	23.3	38.81	-1,327.0	-196.3	980.7	916.0	64.67	15.165	
10,500.0	9,195.0	9,568.9	8,428.7	42.3	25.1	38.53	-1,439.5	-191.2	979.5	912.1	67.41	14.532	
10,600.0	9,195.0	9,690.6	8,429.0	43.3	27.1	38.29	-1,560.9	-184.9	976.5	906.1	70.36	13.879	
10,700.0	9,195.0	9,785.5	8,430.5	44.3	28.6	38.12	-1,655.7	-179.5	972.1	899.2	72.92	13.331	
10,800.0	9,195.0	9,868.9	8,430.5	45.3	30.0	37.97	-1,739.0	-175.7	969.7	894.4	75.33	12.872	
10,900.0	9,195.0	9,957.8	8,430.4	46.4	31.5	37.84	-1,827.8	-172.6	968.0	890.1	77.87	12.431	
10,920.4	9,195.0	9,971.3	8,430.4	46.6	31.7	37.83	-1,841.4	-172.3	967.9	889.6	78.32	12.359	
11,000.0	9,195.0	10,027.0	8,429.7	47.5	32.6	37.83	-1,897.1	-172.5	969.0	888.9	80.11	12.096	
11,100.0	9,195.0	10,126.7	8,427.9	48.7	34.2	37.87	-1,996.7	-174.0	971.8	888.9	82.86	11.727	
11,200.0	9,195.0	10,245.8	8,427.2	49.9	36.1	37.90	-2,115.8	-174.6	972.8	886.8	85.97	11.316	
11,300.0	9,195.0	10,338.2	8,427.6	51.1	37.6	38.01	-2,208.2	-176.0	973.8	885.1	88.67	10.982	
11,400.0	9,195.0	10,428.6	8,427.5	52.3	39.1	38.11	-2,298.6	-177.7	975.4	884.1	91.37	10.676	
11,500.0	9,195.0	10,518.5	8,425.6	53.6	40.5	38.14	-2,388.5	-179.4	978.6	884.5	94.08	10.402	
11,600.0	9,195.0	10,643.7	8,424.8	54.8	42.6	38.23	-2,513.7	-181.1	980.3	882.9	97.39	10.066	
11,700.0	9,195.0	10,745.8	8,425.5	56.1	44.2	38.34	-2,615.7	-182.3	980.8	880.4	100.35	9.773	
11,800.0	9,195.0	10,847.5	8,425.8	57.4	45.9	38.40	-2,717.4	-182.9	981.3	878.0	103.33	9.497	
11,900.0	9,195.0	10,939.8	8,425.5	58.8	47.4	38.41	-2,809.7	-182.8	981.9	875.7	106.18	9.247	
12,000.0	9,195.0	11,054.3	8,424.2	60.1	49.3	38.36	-2,924.2	-181.9	982.8	873.3	109.42	8.982	
12,053.4	9,195.0	11,104.5	8,424.1	60.9	50.1	38.34	-2,974.4	-181.3	982.6	871.6	110.98	8.854	
12,100.0	9,195.0	11,145.9	8,423.6	61.5	50.8	38.30	-3,015.8	-180.6	982.7	870.4	112.30	8.751	
12,200.0	9,195.0	11,258.4	8,422.1	62.9	52.7	38.16	-3,128.2	-178.0	982.8	867.2	115.54	8.506	
12,300.0	9,195.0	11,363.4	8,422.1	64.3	54.4	38.06	-3,233.3	-175.3	981.5	862.8	118.68	8.270	
12,365.9	9,195.0	11,417.0	8,422.2	65.2	55.3	38.05	-3,286.9	-174.6	981.1	860.6	120.49	8.142	
12,400.0	9,195.0	11,446.5	8,422.2	65.7	55.8	38.06	-3,316.3	-174.5	981.2	859.8	121.46	8.078	
12,500.0	9,195.0	11,548.6	8,423.5	67.1	57.4	38.20	-3,418.4	-176.1	981.5	856.9	124.55	7.880	
12,600.0	9,195.0	11,638.1	8,424.9	68.5	58.9	38.38	-3,507.8	-178.3	982.2	854.8	127.45	7.707	
12,700.0	9,195.0	11,718.8	8,424.2	70.0	60.2	38.46	-3,588.6	-180.0	984.5	854.3	130.21	7.561	
12,800.0	9,195.0	11,841.9	8,423.9	71.4	62.2	38.58	-3,711.6	-182.4	986.3	852.6	133.68	7.378	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - KING TUT FEDERAL #2H - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 100- VES GyroFlex, 7835-MWD													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	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)					
12,900.0	9,195.0	11,932.4	8,424.2	72.9	63.7	38.70	-3,802.1	-184.1	987.6	851.0	136.62	7.229	
13,000.0	9,195.0	12,022.7	8,422.8	74.4	65.2	38.75	-3,892.4	-185.8	990.3	850.8	139.57	7.096	
13,100.0	9,195.0	12,140.8	8,422.5	75.8	67.1	38.87	-4,010.4	-188.0	992.0	849.0	142.98	6.938	
13,200.0	9,195.0	12,258.3	8,423.0	77.3	69.1	38.96	-4,128.0	-188.8	992.6	846.1	146.40	6.780	
13,294.3	9,195.0	12,345.8	8,424.4	78.7	70.5	39.03	-4,215.4	-188.8	991.8	842.6	149.25	6.645	
13,300.0	9,195.0	12,350.4	8,424.4	78.8	70.6	39.03	-4,220.0	-188.8	991.8	842.4	149.42	6.638	
13,400.0	9,195.0	12,439.7	8,423.8	80.3	72.1	39.03	-4,309.3	-188.7	992.6	840.2	152.39	6.514	
13,500.0	9,195.0	12,556.4	8,422.9	81.8	74.0	39.01	-4,426.0	-188.1	993.4	837.6	155.83	6.375	
13,548.6	9,195.0	12,600.1	8,423.2	82.6	74.7	39.02	-4,469.7	-187.9	993.2	835.9	157.29	6.315	
13,600.0	9,195.0	12,641.7	8,423.0	83.3	75.4	39.02	-4,511.3	-187.9	993.4	834.7	158.75	6.258	
13,700.0	9,195.0	12,771.3	8,424.1	84.8	77.6	39.09	-4,640.8	-187.8	993.2	830.8	162.41	6.116	
13,800.0	9,195.0	12,861.9	8,426.6	86.4	79.1	39.21	-4,731.4	-187.8	991.5	826.1	165.43	5.993	
13,830.9	9,195.0	12,882.4	8,426.9	86.8	79.4	39.23	-4,751.9	-187.9	991.4	825.1	166.24	5.963	
13,900.0	9,195.0	12,928.4	8,426.5	87.9	80.2	39.24	-4,797.9	-188.1	992.2	824.1	168.06	5.904	
14,000.0	9,195.0	13,050.0	8,424.7	89.4	82.2	39.22	-4,919.6	-188.5	994.1	822.5	171.60	5.793	
14,100.0	9,195.0	13,135.3	8,423.7	91.0	83.6	39.21	-5,004.8	-188.5	995.3	820.7	174.55	5.702	
14,200.0	9,195.0	13,252.1	8,423.4	92.5	85.5	39.21	-5,121.6	-188.1	995.6	817.6	178.03	5.592	
14,203.4	9,195.0	13,255.0	8,423.4	92.6	85.6	39.21	-5,124.5	-188.0	995.6	817.5	178.13	5.589	
14,300.0	9,195.0	13,346.6	8,422.1	94.1	87.1	39.13	-5,216.1	-186.7	996.1	815.0	181.14	5.499	
14,400.0	9,195.0	13,455.6	8,422.1	95.6	88.9	39.10	-5,325.1	-185.5	995.8	811.3	184.50	5.397	
14,447.6	9,195.0	13,499.2	8,422.5	96.3	89.6	39.14	-5,368.6	-185.7	995.7	809.7	185.96	5.354	
14,500.0	9,195.0	13,542.9	8,422.9	97.2	90.3	39.19	-5,412.4	-186.2	995.9	808.4	187.50	5.311	
14,600.0	9,195.0	13,638.7	8,422.0	98.7	91.9	39.21	-5,508.2	-186.9	997.5	806.9	190.64	5.232	
14,700.0	9,195.0	13,753.3	8,422.1	100.3	93.8	39.24	-5,622.7	-186.8	997.7	803.6	194.10	5.140	
14,761.1	9,195.0	13,812.8	8,422.0	101.2	94.8	39.23	-5,682.2	-186.2	997.6	801.6	196.04	5.089	
14,800.0	9,195.0	13,847.8	8,421.9	101.8	95.4	39.22	-5,717.2	-185.9	997.7	800.5	197.23	5.058	
14,900.0	9,195.0	13,939.3	8,421.2	103.4	96.9	39.22	-5,808.8	-185.8	998.5	798.2	200.32	4.985	
15,000.0	9,195.0	14,048.4	8,419.8	105.0	98.7	39.17	-5,917.8	-185.2	999.6	796.0	203.70	4.908	
15,100.0	9,195.0	14,141.6	8,419.3	106.6	100.3	39.15	-6,011.0	-184.6	1,000.0	793.2	206.82	4.835	
15,200.0	9,195.0	14,274.5	8,418.6	108.1	102.5	39.07	-6,144.0	-182.6	1,000.0	789.4	210.61	4.748	
15,266.6	9,195.0	14,318.3	8,418.6	109.2	103.2	39.05	-6,187.7	-182.0	999.5	787.2	212.38	4.706	
15,300.0	9,195.0	14,343.8	8,418.3	109.7	103.6	39.04	-6,213.2	-181.6	999.7	786.3	213.34	4.686	
15,400.0	9,195.0	14,469.3	8,419.2	111.3	105.7	39.03	-6,338.7	-180.1	998.7	781.7	217.00	4.602	
15,458.0	9,195.0	14,509.7	8,419.5	112.2	106.4	39.04	-6,379.1	-179.7	998.2	779.6	218.59	4.566	
15,500.0	9,195.0	14,542.0	8,419.2	112.9	106.9	39.03	-6,411.4	-179.5	998.4	778.6	219.80	4.543	
15,600.0	9,195.0	14,648.9	8,418.7	114.5	108.7	39.05	-6,518.3	-179.7	999.3	776.1	223.15	4.478	
15,700.0	9,195.0	14,742.9	8,417.9	116.0	110.3	39.04	-6,612.2	-179.6	1,000.3	774.0	226.30	4.420	
15,800.0	9,195.0	14,860.5	8,419.1	117.6	112.2	39.06	-6,729.9	-178.5	999.1	769.2	229.84	4.347	
15,829.6	9,195.0	14,881.4	8,419.2	118.1	112.6	39.06	-6,750.7	-178.3	998.9	768.3	230.66	4.331	
15,900.0	9,195.0	14,943.5	8,418.4	119.2	113.6	39.04	-6,812.8	-178.0	999.6	766.7	232.82	4.293	
15,994.1	9,195.0	15,045.8	8,419.3	120.7	115.3	39.09	-6,915.2	-177.9	999.2	763.2	236.01	4.234	
16,000.0	9,195.0	15,050.3	8,419.3	120.8	115.4	39.10	-6,919.6	-177.9	999.2	763.1	236.18	4.231	
16,100.0	9,195.0	15,132.3	8,418.9	122.4	116.7	39.14	-7,001.7	-178.7	1,000.5	761.4	239.13	4.184	
16,200.0	9,195.0	15,274.3	8,418.4	124.0	119.1	39.17	-7,143.6	-179.0	1,001.7	758.6	243.08	4.121	
16,300.0	9,195.0	15,370.9	8,422.3	125.6	120.7	39.35	-7,240.1	-179.2	999.1	752.8	246.28	4.057	
16,400.0	9,195.0	15,468.2	8,425.2	127.2	122.3	39.50	-7,337.3	-179.6	997.5	748.0	249.49	3.998	
16,500.0	9,195.0	15,579.7	8,428.1	128.8	124.1	39.60	-7,448.8	-178.7	995.4	742.4	252.95	3.935	
16,600.0	9,195.0	15,672.4	8,430.1	130.4	125.7	39.62	-7,541.5	-177.1	993.0	736.9	256.10	3.877	
16,659.0	9,195.0	15,711.0	8,430.4	131.4	126.3	39.62	-7,580.1	-176.6	992.4	734.7	257.69	3.851	
16,700.0	9,195.0	15,738.3	8,430.1	132.0	126.8	39.61	-7,607.4	-176.4	992.7	733.9	258.80	3.836	
16,800.0	9,195.0	15,827.9	8,427.5	133.6	128.3	39.52	-7,697.0	-176.1	995.0	733.1	261.90	3.799	
16,900.0	9,195.0	15,927.5	8,423.9	135.2	129.9	39.36	-7,796.5	-174.8	997.4	732.2	265.16	3.761	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - KING TUT FEDERAL #2H - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 100- VES GyroFlex, 7835-MWD													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	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)					
17,000.0	9,195.0	16,033.1	8,420.1	136.9	131.7	39.19	-7,902.0	-173.4	999.7	731.2	268.53	3.723	
17,100.0	9,195.0	16,176.9	8,419.1	138.5	134.1	39.08	-8,045.7	-170.9	999.6	727.1	272.54	3.668	
17,200.0	9,195.0	16,281.2	8,421.2	140.1	135.8	39.02	-8,149.9	-167.1	996.1	720.2	275.90	3.610	
17,300.0	9,195.0	16,358.3	8,422.0	141.7	137.1	39.00	-8,227.1	-165.5	994.3	715.5	278.80	3.566	
17,326.2	9,195.0	16,378.5	8,421.9	142.1	137.4	38.98	-8,247.2	-165.1	994.2	714.7	279.56	3.556	
17,400.0	9,195.0	16,436.4	8,420.8	143.3	138.4	38.91	-8,305.1	-164.1	994.9	713.2	281.72	3.531	
17,500.0	9,195.0	16,521.8	8,418.4	144.9	139.8	38.84	-8,390.5	-163.9	997.3	712.5	284.75	3.502	
17,600.0	9,195.0	16,633.3	8,416.7	146.5	141.7	38.88	-8,502.0	-165.5	999.7	711.5	288.21	3.469	
17,700.0	9,195.0	16,740.6	8,415.8	148.2	143.4	38.92	-8,609.2	-166.5	1,001.3	709.7	291.60	3.434	
17,800.0	9,195.0	16,850.3	8,415.4	149.8	145.3	38.93	-8,719.0	-166.3	1,001.9	706.9	295.04	3.396	
17,900.0	9,195.0	16,938.6	8,416.0	151.4	146.7	39.01	-8,807.2	-167.1	1,002.4	704.2	298.12	3.362	
18,000.0	9,195.0	17,028.3	8,415.8	153.0	148.2	39.14	-8,896.9	-169.6	1,004.6	703.4	301.22	3.335	
18,100.0	9,195.0	17,130.7	8,416.0	154.6	149.9	39.31	-8,999.2	-172.8	1,006.8	702.2	304.52	3.306	
18,200.0	9,195.0	17,224.9	8,415.4	156.3	151.4	39.42	-9,093.4	-175.1	1,009.2	701.5	307.70	3.280	
18,300.0	9,195.0	17,344.7	8,414.4	157.9	153.4	39.51	-9,213.2	-177.4	1,011.6	700.3	311.30	3.250	
18,400.0	9,195.0	17,451.2	8,416.3	159.5	155.2	39.70	-9,319.7	-179.5	1,011.8	697.1	314.68	3.215	
18,500.0	9,195.0	17,535.4	8,417.1	161.1	156.5	39.82	-9,403.8	-181.1	1,012.7	695.0	317.69	3.188	
18,600.0	9,195.0	17,642.0	8,416.9	162.8	158.3	39.92	-9,510.4	-182.8	1,014.3	693.2	321.08	3.159	
18,700.0	9,195.0	17,751.3	8,417.1	164.4	160.1	39.98	-9,619.7	-183.4	1,014.9	690.4	324.52	3.127	
18,800.0	9,195.0	17,851.5	8,416.8	166.0	161.8	39.98	-9,719.9	-183.0	1,015.3	687.5	327.81	3.097	
18,900.0	9,195.0	17,966.7	8,415.7	167.7	163.7	39.82	-9,835.1	-179.6	1,014.5	683.1	331.37	3.061	
19,000.0	9,195.0	18,087.5	8,414.8	169.3	165.7	39.57	-9,955.7	-173.9	1,012.4	677.4	335.03	3.022	
19,089.1	9,195.0	18,142.0	8,415.4	170.7	166.7	39.49	-10,010.1	-171.2	1,009.9	672.5	337.40	2.993	
19,100.0	9,195.0	18,142.0	8,415.4	170.9	166.7	39.49	-10,010.1	-171.2	1,010.0	672.4	337.57	2.992 SF	
19,200.0	9,195.0	18,142.0	8,415.4	172.5	166.7	39.49	-10,010.1	-171.2	1,016.0	676.8	339.20	2.995	
19,232.7	9,195.0	18,142.0	8,415.4	173.1	166.7	39.49	-10,010.1	-171.2	1,020.1	680.3	339.74	3.003	



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - KING TUT FEDERAL #2H - OWB - PWP1												Offset Site Error: 0.0 usft	
Survey Program: 0-GYD_DP_MS, 7867-MWD												Offset Well Error: 3.0 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	
0.0	0.0	0.2	-0.2	3.0	3.0	-85.84	18.2	-250.5	251.2				
100.0	100.0	100.2	99.8	3.0	3.0	-85.84	18.2	-250.5	251.2	245.2	6.00	41.832	
200.0	200.0	200.2	199.8	3.0	3.0	-85.84	18.2	-250.5	251.2	245.1	6.05	41.524	
300.0	300.0	300.2	299.8	3.1	3.0	-85.84	18.2	-250.5	251.2	245.0	6.13	40.942	
400.0	400.0	400.2	399.8	3.2	3.0	-85.84	18.2	-250.5	251.2	244.9	6.26	40.128	
500.0	500.0	500.2	499.8	3.4	3.0	-85.84	18.2	-250.5	251.2	244.7	6.42	39.134	
600.0	600.0	600.2	599.8	3.6	3.0	-85.84	18.2	-250.5	251.2	244.6	6.61	38.014	
700.0	700.0	700.2	699.8	3.8	3.1	-85.84	18.2	-250.5	251.2	244.3	6.82	36.816	
800.0	800.0	800.2	799.8	4.0	3.1	-85.84	18.2	-250.5	251.2	244.1	7.06	35.580	
900.0	900.0	900.2	899.8	4.2	3.1	-85.84	18.2	-250.5	251.2	243.8	7.31	34.338	
1,000.0	1,000.0	1,000.2	999.8	4.5	3.1	-85.84	18.2	-250.5	251.2	243.6	7.59	33.111	
1,100.0	1,100.0	1,100.2	1,099.8	4.8	3.1	-85.84	18.2	-250.5	251.2	243.3	7.87	31.916	
1,200.0	1,200.0	1,200.2	1,199.8	5.1	3.1	-85.84	18.2	-250.5	251.2	243.0	8.16	30.764	
1,300.0	1,300.0	1,300.2	1,299.8	5.4	3.1	-85.84	18.2	-250.5	251.2	242.7	8.47	29.659	
1,400.0	1,400.0	1,400.2	1,399.8	5.7	3.1	-85.84	18.2	-250.5	251.2	242.4	8.78	28.605	
1,500.0	1,500.0	1,500.2	1,499.8	6.0	3.1	-85.84	18.2	-250.5	251.2	242.1	9.10	27.602	
1,600.0	1,600.0	1,600.2	1,599.8	6.3	3.2	-85.84	18.2	-250.5	251.2	241.7	9.42	26.652	
1,700.0	1,700.0	1,700.2	1,699.8	6.6	3.2	-85.84	18.2	-250.5	251.2	241.4	9.75	25.751	
1,800.0	1,800.0	1,800.2	1,799.8	6.9	3.2	-85.84	18.2	-250.5	251.2	241.1	10.09	24.899	
1,900.0	1,900.0	1,900.2	1,899.8	7.2	3.2	-85.84	18.2	-250.5	251.2	240.7	10.42	24.092	
2,000.0	2,000.0	2,000.2	1,999.8	7.6	3.2	-85.84	18.2	-250.5	251.2	240.4	10.77	23.329	
2,100.0	2,100.0	2,100.2	2,099.8	7.9	3.2	-85.84	18.2	-250.5	251.2	240.1	11.11	22.607	
2,200.0	2,200.0	2,200.2	2,199.8	8.2	3.2	-85.84	18.2	-250.5	251.2	239.7	11.46	21.923	
2,300.0	2,300.0	2,300.2	2,299.8	8.6	3.2	-85.84	18.2	-250.5	251.2	239.4	11.81	21.275	
2,400.0	2,400.0	2,400.2	2,399.8	8.9	3.3	-85.84	18.2	-250.5	251.2	239.0	12.16	20.660	
2,500.0	2,500.0	2,500.2	2,499.8	9.2	3.3	-85.84	18.2	-250.5	251.2	238.7	12.51	20.077	
2,600.0	2,600.0	2,600.2	2,599.8	9.6	3.3	-85.84	18.2	-250.5	251.2	238.3	12.86	19.524	
2,700.0	2,700.0	2,700.2	2,699.8	9.9	3.3	-85.84	18.2	-250.5	251.2	237.9	13.22	18.997	
2,800.0	2,800.0	2,800.2	2,799.8	10.3	3.3	-85.84	18.2	-250.5	251.2	237.6	13.58	18.497	
2,900.0	2,900.0	2,900.2	2,899.8	10.6	3.3	-85.84	18.2	-250.5	251.2	237.2	13.94	18.020	
3,000.0	3,000.0	3,000.2	2,999.8	10.9	3.4	-85.84	18.2	-250.5	251.2	236.9	14.30	17.566	
3,100.0	3,100.0	3,100.2	3,099.8	11.3	3.4	-85.84	18.2	-250.5	251.2	236.5	14.66	17.133	
3,200.0	3,200.0	3,200.2	3,199.8	11.6	3.4	-85.84	18.2	-250.5	251.2	236.1	15.02	16.719	
3,300.0	3,300.0	3,300.2	3,299.8	12.0	3.4	-85.84	18.2	-250.5	251.2	235.8	15.39	16.324	
3,400.0	3,400.0	3,400.2	3,399.8	12.3	3.4	-85.84	18.2	-250.5	251.2	235.4	15.75	15.947	
3,500.0	3,500.0	3,500.2	3,499.8	12.7	3.4	-85.84	18.2	-250.5	251.2	235.0	16.12	15.585	
3,600.0	3,600.0	3,600.2	3,599.8	13.0	3.5	-85.84	18.2	-250.5	251.2	234.7	16.48	15.239	
3,700.0	3,700.0	3,700.2	3,699.8	13.4	3.5	-85.84	18.2	-250.5	251.2	234.3	16.85	14.907	
3,800.0	3,800.0	3,800.2	3,799.8	13.7	3.5	-85.84	18.2	-250.5	251.2	233.9	17.22	14.589	
3,900.0	3,900.0	3,900.2	3,899.8	14.1	3.5	-85.84	18.2	-250.5	251.2	233.6	17.58	14.284	
4,000.0	4,000.0	4,000.2	3,999.8	14.4	3.5	-85.84	18.2	-250.5	251.2	233.2	17.95	13.990	
4,100.0	4,100.0	4,100.2	4,099.8	14.8	3.5	-85.84	18.2	-250.5	251.2	232.8	18.32	13.708	
4,200.0	4,200.0	4,200.2	4,199.8	15.1	3.6	-85.84	18.2	-250.5	251.2	232.5	18.69	13.437	
4,300.0	4,300.0	4,300.2	4,299.8	15.5	3.6	-85.84	18.2	-250.5	251.2	232.1	19.06	13.175	
4,400.0	4,400.0	4,400.2	4,399.8	15.8	3.6	-85.84	18.2	-250.5	251.2	231.7	19.43	12.924	
4,500.0	4,500.0	4,500.2	4,499.8	16.2	3.6	-85.84	18.2	-250.5	251.2	231.4	19.81	12.681	
4,600.0	4,600.0	4,600.2	4,599.8	16.5	3.6	-85.84	18.2	-250.5	251.2	231.0	20.18	12.448	
4,700.0	4,700.0	4,700.2	4,699.8	16.9	3.7	-85.84	18.2	-250.5	251.2	230.6	20.55	12.222	
4,800.0	4,800.0	4,800.2	4,799.8	17.2	3.7	-85.84	18.2	-250.5	251.2	230.2	20.92	12.004	
4,900.0	4,900.0	4,900.2	4,899.8	17.6	3.7	-85.84	18.2	-250.5	251.2	229.9	21.30	11.794	
5,000.0	5,000.0	5,000.2	4,999.8	18.0	3.7	-85.84	18.2	-250.5	251.2	229.5	21.67	11.590	
5,100.0	5,100.0	5,100.2	5,099.8	18.3	3.7	-85.84	18.2	-250.5	251.2	229.1	22.04	11.394	

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



COG PRODUCTION LLC

Anticollision Report

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Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - KING TUT FEDERAL #2H - OWB - PWP1													Offset Site Error: 0.0 usft
Survey Program: 0-GYD_DP_MS, 7867-MWD													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance				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)	Minimum Separation (usft)	Separation Factor	
5,200.0	5,200.0	5,200.2	5,199.8	18.7	3.8	-85.84	18.2	-250.5	251.2	228.7	22.42	11.203	
5,300.0	5,300.0	5,300.2	5,299.8	19.0	3.8	-85.84	18.2	-250.5	251.2	228.4	22.79	11.019	
5,400.0	5,400.0	5,400.2	5,399.8	19.4	3.8	-85.84	18.2	-250.5	251.2	228.0	23.17	10.841	
5,500.0	5,500.0	5,500.2	5,499.8	19.7	3.8	-85.84	18.2	-250.5	251.2	227.6	23.54	10.668	
5,600.0	5,600.0	5,600.2	5,599.8	20.1	3.8	-85.84	18.2	-250.5	251.2	227.2	23.92	10.500	
5,700.0	5,700.0	5,700.2	5,699.8	20.4	3.9	-85.84	18.2	-250.5	251.2	226.9	24.30	10.338	
5,800.0	5,800.0	5,800.2	5,799.8	20.8	3.9	-85.84	18.2	-250.5	251.2	226.5	24.67	10.180	
5,900.0	5,900.0	5,900.2	5,899.8	21.1	3.9	-85.84	18.2	-250.5	251.2	226.1	25.05	10.027	
6,000.0	6,000.0	6,000.2	5,999.8	21.5	3.9	-85.84	18.2	-250.5	251.2	225.7	25.43	9.878	
6,100.0	6,100.0	6,100.2	6,099.8	21.8	4.0	-85.84	18.2	-250.5	251.2	225.4	25.80	9.734	
6,200.0	6,200.0	6,200.2	6,199.8	22.2	4.0	-85.84	18.2	-250.5	251.2	225.0	26.18	9.593	
6,300.0	6,300.0	6,300.2	6,299.8	22.6	4.0	-85.84	18.2	-250.5	251.2	224.6	26.56	9.457	
6,400.0	6,400.0	6,400.2	6,399.8	22.9	4.0	-85.84	18.2	-250.5	251.2	224.2	26.94	9.324	
6,500.0	6,500.0	6,500.2	6,499.8	23.3	4.0	-85.84	18.2	-250.5	251.2	223.8	27.32	9.195	
6,600.0	6,600.0	6,600.2	6,599.8	23.6	4.1	-85.84	18.2	-250.5	251.2	223.5	27.69	9.069	
6,700.0	6,700.0	6,700.2	6,699.8	24.0	4.1	-85.84	18.2	-250.5	251.2	223.1	28.07	8.947	
6,800.0	6,800.0	6,800.2	6,799.8	24.3	4.1	-85.84	18.2	-250.5	251.2	222.7	28.45	8.828	
6,900.0	6,900.0	6,900.2	6,899.8	24.7	4.1	-85.84	18.2	-250.5	251.2	222.3	28.83	8.712	
7,000.0	7,000.0	7,000.2	6,999.8	25.0	4.2	-85.84	18.2	-250.5	251.2	222.0	29.21	8.598	
7,100.0	7,100.0	7,100.2	7,099.8	25.4	4.2	-85.84	18.2	-250.5	251.2	221.6	29.59	8.488	
7,200.0	7,200.0	7,200.2	7,199.8	25.8	4.2	-85.84	18.2	-250.5	251.2	221.2	29.97	8.381	
7,300.0	7,300.0	7,300.2	7,299.8	26.1	4.2	-85.84	18.2	-250.5	251.2	220.8	30.35	8.276	
7,400.0	7,400.0	7,400.2	7,399.8	26.5	4.3	-85.84	18.2	-250.5	251.2	220.4	30.73	8.173	
7,500.0	7,500.0	7,500.2	7,499.8	26.8	4.3	-85.84	18.2	-250.5	251.2	220.1	31.11	8.073	
7,600.0	7,600.0	7,600.2	7,599.8	27.2	4.3	-85.84	18.2	-250.5	251.2	219.7	31.49	7.976	
7,700.0	7,700.0	7,700.2	7,699.8	27.5	4.3	-85.84	18.2	-250.5	251.2	219.3	31.87	7.881	
7,800.0	7,800.0	7,800.2	7,799.8	27.9	4.4	-85.84	18.2	-250.5	251.2	218.9	32.25	7.787	
7,900.0	7,900.0	7,907.6	7,907.6	28.3	4.4	-86.14	16.9	-250.0	250.7	218.0	32.63	7.681	
8,000.0	8,000.0	8,027.3	8,025.2	28.6	4.4	-90.58	-2.5	-242.2	243.5	210.5	33.04	7.369	
8,100.0	8,100.0	8,134.3	8,124.7	29.0	4.6	-99.62	-38.6	-227.6	232.2	198.6	33.52	6.926	
8,200.0	8,200.0	8,224.5	8,201.8	29.3	4.7	-111.30	-81.9	-210.1	225.5	191.4	34.05	6.622	
8,205.8	8,205.8	8,229.2	8,205.6	29.3	4.7	-112.00	-84.5	-209.0	225.4	191.4	34.08	6.614 CC, ES	
8,300.0	8,300.0	8,298.2	8,258.6	29.7	5.0	-123.04	-125.2	-192.5	233.4	198.7	34.67	6.732	
8,400.0	8,400.0	8,357.6	8,299.8	30.0	5.4	-133.05	-164.9	-176.5	261.4	226.0	35.46	7.373	
8,500.0	8,500.0	8,405.5	8,329.7	30.4	5.9	-140.87	-199.7	-162.5	308.6	272.2	36.33	8.493	
8,600.0	8,600.0	8,444.6	8,351.6	30.7	6.4	-146.78	-229.6	-150.4	370.0	332.9	37.18	9.951	
8,700.0	8,700.0	8,476.7	8,368.0	31.1	6.9	-151.25	-255.2	-140.0	441.4	403.4	38.00	11.617	
8,717.5	8,717.5	8,481.7	8,370.4	31.2	7.0	-151.91	-259.3	-138.4	454.7	416.5	38.13	11.924	
8,725.0	8,725.0	8,483.9	8,371.4	31.2	7.0	56.22	-261.1	-137.7	460.4	422.2	38.19	12.056	
8,750.0	8,750.0	8,491.2	8,374.9	31.3	7.1	52.51	-267.1	-135.2	479.4	441.0	38.38	12.491	
8,775.0	8,774.9	8,500.0	8,378.9	31.4	7.2	48.96	-274.3	-132.3	498.2	459.6	38.59	12.911	
8,800.0	8,799.6	8,500.0	8,378.9	31.4	7.2	46.47	-274.3	-132.3	516.9	478.2	38.67	13.367	
8,825.0	8,824.1	8,515.0	8,385.5	31.5	7.5	43.03	-286.8	-127.3	535.1	496.1	38.98	13.726	
8,850.0	8,848.3	8,523.5	8,389.0	31.6	7.6	40.43	-294.0	-124.4	553.0	513.8	39.20	14.109	
8,875.0	8,872.2	8,532.2	8,392.5	31.7	7.7	38.08	-301.3	-121.4	570.6	531.2	39.41	14.477	
8,900.0	8,895.6	8,550.0	8,399.4	31.7	8.0	35.59	-316.6	-115.2	587.9	548.1	39.78	14.779	
8,925.0	8,918.5	8,550.0	8,399.4	31.8	8.0	34.08	-316.6	-115.2	604.4	564.5	39.85	15.165	
8,950.0	8,940.9	8,550.0	8,399.4	31.9	8.0	32.66	-316.6	-115.2	620.7	580.8	39.93	15.544	
8,975.0	8,962.7	8,568.7	8,406.0	32.0	8.3	30.87	-332.8	-108.7	636.2	595.9	40.33	15.776	
9,000.0	8,983.8	8,578.3	8,409.2	32.1	8.5	29.51	-341.2	-105.3	651.2	610.7	40.56	16.054	
9,025.0	9,004.2	8,588.0	8,412.2	32.1	8.7	28.30	-349.7	-101.9	665.7	624.9	40.81	16.314	
9,050.0	9,023.8	8,600.0	8,415.8	32.2	8.9	27.18	-360.4	-97.6	679.6	638.5	41.09	16.538	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - KING TUT FEDERAL #2H - OWB - PWP1													Offset Site Error: 0.0 usft
Survey Program: 0-GYD_DP_MS, 7867-MWD													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance				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)	Minimum Separation (usft)	Separation Factor	
9,075.0	9,042.5	8,600.0	8,415.8	32.3	8.9	26.33	-360.4	-97.6	692.9	651.7	41.17	16.830	
9,100.0	9,060.4	8,617.7	8,420.6	32.4	9.2	25.39	-376.1	-91.2	705.4	663.8	41.57	16.969	
9,125.0	9,077.3	8,627.8	8,423.2	32.4	9.4	24.62	-385.2	-87.5	717.3	675.5	41.83	17.147	
9,150.0	9,093.2	8,638.0	8,425.5	32.5	9.6	23.94	-394.4	-83.8	728.6	686.5	42.10	17.304	
9,175.0	9,108.1	8,650.0	8,428.1	32.6	9.8	23.33	-405.3	-79.4	739.1	696.7	42.41	17.428	
9,200.0	9,122.0	8,650.0	8,428.1	32.7	9.8	22.82	-405.3	-79.4	749.0	706.5	42.50	17.624	
9,225.0	9,134.7	8,669.0	8,431.6	32.8	10.1	22.34	-422.6	-72.4	758.0	715.1	42.95	17.648	
9,250.0	9,146.3	8,679.5	8,433.3	32.9	10.3	21.94	-432.2	-68.5	766.4	723.2	43.25	17.720	
9,275.0	9,156.7	8,700.0	8,436.1	33.0	10.7	21.61	-451.0	-60.9	774.2	730.5	43.74	17.699	
9,300.0	9,165.9	8,700.0	8,436.1	33.1	10.7	21.30	-451.0	-60.9	780.9	737.1	43.85	17.808	
9,325.0	9,173.9	8,700.0	8,436.1	33.2	10.7	21.02	-451.0	-60.9	787.2	743.3	43.97	17.905	
9,350.0	9,180.6	8,721.8	8,438.2	33.4	11.1	20.87	-471.1	-52.8	792.4	747.9	44.51	17.805	
9,375.0	9,186.1	8,732.4	8,439.0	33.5	11.3	20.72	-481.0	-48.8	797.0	752.2	44.84	17.775	
9,400.0	9,190.2	8,750.0	8,439.7	33.6	11.7	20.66	-497.3	-42.2	800.9	755.6	45.31	17.676	
9,425.0	9,193.1	8,750.0	8,439.7	33.8	11.7	20.53	-497.3	-42.2	803.9	758.4	45.45	17.689	
9,450.0	9,194.7	8,767.1	8,440.0	33.9	12.0	20.56	-513.1	-35.9	806.1	760.2	45.92	17.556	
9,467.6	9,195.0	8,778.4	8,440.0	34.0	12.2	20.61	-523.6	-31.6	807.2	761.0	46.24	17.456	
9,500.0	9,195.0	8,810.6	8,440.0	34.2	12.9	20.90	-553.5	-19.5	808.5	761.5	47.07	17.178	
9,600.0	9,195.0	8,910.4	8,440.0	34.9	14.8	21.46	-645.9	17.8	811.1	761.4	49.71	16.316	
9,700.0	9,195.0	9,010.4	8,440.0	35.6	16.8	21.46	-738.6	55.3	811.1	758.6	52.45	15.463	
9,800.0	9,195.0	9,110.1	8,440.0	36.4	18.9	20.90	-831.1	92.6	808.6	753.3	55.26	14.633	
9,900.0	9,195.0	9,209.1	8,440.0	37.2	20.9	19.80	-922.9	129.7	803.7	745.6	58.08	13.836	
10,000.0	9,195.0	9,303.5	8,440.0	38.0	22.8	18.23	-1,010.6	164.9	796.9	736.1	60.80	13.106	
10,100.0	9,195.0	9,392.6	8,440.0	38.9	24.4	16.41	-1,094.1	195.9	789.3	726.0	63.29	12.471	
10,191.3	9,195.0	9,473.8	8,439.9	39.6	25.9	14.51	-1,171.0	221.9	782.1	716.6	65.54	11.933	
10,200.0	9,195.0	9,481.5	8,439.9	39.7	26.1	14.35	-1,178.3	224.3	781.5	715.7	65.76	11.884	
10,300.0	9,195.0	9,571.3	8,439.8	40.5	27.8	12.52	-1,264.2	250.2	774.7	706.5	68.25	11.352	
10,400.0	9,195.0	9,662.6	8,439.7	41.4	29.4	10.83	-1,352.5	273.9	769.5	698.7	70.80	10.869	
10,500.0	9,195.0	9,755.5	8,439.6	42.3	31.1	9.32	-1,442.9	295.0	765.7	692.3	73.41	10.431	
10,600.0	9,195.0	9,849.6	8,439.4	43.3	32.8	7.99	-1,535.2	313.4	763.0	686.9	76.06	10.031	
10,700.0	9,195.0	9,944.8	8,439.2	44.3	34.5	6.87	-1,629.1	329.0	761.1	682.4	78.75	9.665	
10,800.0	9,195.0	10,040.9	8,439.0	45.3	36.1	5.98	-1,724.4	341.5	760.0	678.5	81.47	9.329	
10,900.0	9,195.0	10,137.7	8,438.7	46.4	37.8	5.32	-1,820.7	350.9	759.4	675.2	84.21	9.018	
11,000.0	9,195.0	10,235.0	8,438.4	47.5	39.4	4.90	-1,917.8	357.0	759.2	672.2	86.96	8.730	
11,004.3	9,195.0	10,239.2	8,438.4	47.6	39.5	4.88	-1,922.0	357.2	759.2	672.1	87.08	8.718	
11,100.0	9,195.0	10,333.3	8,438.1	48.7	41.1	4.71	-2,016.0	360.0	759.3	669.6	89.74	8.462	
11,200.0	9,195.0	10,433.3	8,437.7	49.9	42.7	4.59	-2,116.0	362.2	759.5	667.0	92.57	8.205	
11,300.0	9,195.0	10,533.3	8,437.4	51.1	44.4	4.47	-2,216.0	364.4	759.8	664.3	95.46	7.959	
11,400.0	9,195.0	10,633.2	8,437.0	52.3	46.1	4.35	-2,315.9	366.6	760.0	661.6	98.38	7.725	
11,500.0	9,195.0	10,733.2	8,436.7	53.6	47.8	4.23	-2,415.9	368.8	760.2	658.9	101.33	7.503	
11,600.0	9,195.0	10,833.2	8,436.3	54.8	49.5	4.11	-2,515.9	370.9	760.5	656.1	104.31	7.290	
11,700.0	9,195.0	10,933.2	8,436.0	56.1	51.2	3.99	-2,615.8	373.1	760.7	653.4	107.33	7.088	
11,800.0	9,195.0	11,033.2	8,435.6	57.4	52.9	3.87	-2,715.8	375.3	760.9	650.6	110.37	6.895	
11,900.0	9,195.0	11,133.2	8,435.3	58.8	54.6	3.75	-2,815.7	377.5	761.2	647.7	113.43	6.710	
12,000.0	9,195.0	11,233.2	8,434.9	60.1	56.4	3.63	-2,915.7	379.7	761.4	644.9	116.52	6.535	
12,100.0	9,195.0	11,333.1	8,434.6	61.5	58.1	3.51	-3,015.7	381.9	761.7	642.0	119.63	6.367	
12,200.0	9,195.0	11,433.1	8,434.2	62.9	59.9	3.39	-3,115.6	384.1	761.9	639.2	122.76	6.207	
12,300.0	9,195.0	11,533.1	8,433.9	64.3	61.6	3.27	-3,215.6	386.2	762.2	636.3	125.91	6.054	
12,400.0	9,195.0	11,633.1	8,433.5	65.7	63.4	3.15	-3,315.6	388.4	762.4	633.4	129.07	5.907	
12,500.0	9,195.0	11,733.1	8,433.2	67.1	65.1	3.03	-3,415.5	390.6	762.7	630.5	132.25	5.767	
12,600.0	9,195.0	11,833.1	8,432.8	68.5	66.9	2.91	-3,515.5	392.8	763.0	627.5	135.45	5.633	
12,700.0	9,195.0	11,933.1	8,432.5	70.0	68.7	2.79	-3,615.4	395.0	763.3	624.6	138.66	5.505	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - KING TUT FEDERAL #2H - OWB - PWP1												Offset Site Error:	0.0 usft
Survey Program: 0-GYD_DP_MS_7867-MWD												Offset Well Error:	3.0 usft
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)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
12,800.0	9,195.0	12,033.1	8,432.1	71.4	70.5	2.67	-3,715.4	397.2	763.5	621.6	141.88	5.381	
12,900.0	9,195.0	12,133.0	8,431.8	72.9	72.2	2.55	-3,815.4	399.4	763.8	618.7	145.12	5.263	
13,000.0	9,195.0	12,233.0	8,431.4	74.4	74.0	2.43	-3,915.3	401.6	764.1	615.7	148.36	5.150	
13,100.0	9,195.0	12,333.0	8,431.1	75.8	75.8	2.31	-4,015.3	403.7	764.4	612.8	151.62	5.041	
13,200.0	9,195.0	12,433.0	8,430.7	77.3	77.6	2.19	-4,115.3	405.9	764.7	609.8	154.89	4.937	
13,300.0	9,195.0	12,533.0	8,430.4	78.8	79.4	2.07	-4,215.2	408.1	765.0	606.8	158.17	4.836	
13,400.0	9,195.0	12,633.0	8,430.0	80.3	81.1	1.96	-4,315.2	410.3	765.2	603.8	161.45	4.740	
13,500.0	9,195.0	12,733.0	8,429.6	81.8	82.9	1.84	-4,415.1	412.5	765.5	600.8	164.75	4.647	
13,600.0	9,195.0	12,832.9	8,429.3	83.3	84.7	1.72	-4,515.1	414.7	765.8	597.8	168.05	4.557	
13,700.0	9,195.0	12,932.9	8,428.9	84.8	86.5	1.60	-4,615.1	416.9	766.2	594.8	171.36	4.471	
13,800.0	9,195.0	13,032.9	8,428.6	86.4	88.3	1.48	-4,715.0	419.0	766.5	591.8	174.68	4.388	
13,900.0	9,195.0	13,132.9	8,428.2	87.9	90.1	1.36	-4,815.0	421.2	766.8	588.8	178.00	4.308	
14,000.0	9,195.0	13,232.9	8,427.9	89.4	91.9	1.24	-4,915.0	423.4	767.1	585.8	181.33	4.230	
14,100.0	9,195.0	13,332.9	8,427.5	91.0	93.7	1.12	-5,014.9	425.6	767.4	582.7	184.67	4.156	
14,200.0	9,195.0	13,432.9	8,427.2	92.5	95.5	1.01	-5,114.9	427.8	767.7	579.7	188.01	4.083	
14,300.0	9,195.0	13,532.9	8,426.8	94.1	97.3	0.89	-5,214.8	430.0	768.1	576.7	191.36	4.014	
14,400.0	9,195.0	13,632.8	8,426.5	95.6	99.1	0.77	-5,314.8	432.2	768.4	573.7	194.71	3.946	
14,500.0	9,195.0	13,732.8	8,426.1	97.2	100.9	0.65	-5,414.8	434.3	768.7	570.6	198.07	3.881	
14,600.0	9,195.0	13,832.8	8,425.8	98.7	102.7	0.53	-5,514.7	436.5	769.0	567.6	201.43	3.818	
14,700.0	9,195.0	13,932.8	8,425.4	100.3	104.5	0.42	-5,614.7	438.7	769.4	564.6	204.80	3.757	
14,800.0	9,195.0	14,032.8	8,425.1	101.8	106.3	0.30	-5,714.7	440.9	769.7	561.6	208.17	3.698	
14,900.0	9,195.0	14,132.8	8,424.7	103.4	108.1	0.18	-5,814.6	443.1	770.1	558.5	211.55	3.640	
15,000.0	9,195.0	14,232.8	8,424.4	105.0	109.9	0.06	-5,914.6	445.3	770.4	555.5	214.92	3.585	
15,100.0	9,195.0	14,332.8	8,424.0	106.6	111.8	-0.05	-6,014.5	447.5	770.8	552.5	218.31	3.531	
15,200.0	9,195.0	14,432.7	8,423.7	108.1	113.6	-0.17	-6,114.5	449.7	771.1	549.4	221.69	3.478	
15,300.0	9,195.0	14,532.7	8,423.3	109.7	115.4	-0.29	-6,214.5	451.8	771.5	546.4	225.08	3.428	
15,400.0	9,195.0	14,632.7	8,423.0	111.3	117.2	-0.41	-6,314.4	454.0	771.8	543.4	228.48	3.378	
15,500.0	9,195.0	14,732.7	8,422.6	112.9	119.0	-0.52	-6,414.4	456.2	772.2	540.3	231.87	3.330	
15,600.0	9,195.0	14,832.7	8,422.3	114.5	120.8	-0.64	-6,514.3	458.4	772.6	537.3	235.27	3.284	
15,700.0	9,195.0	14,932.7	8,421.9	116.0	122.6	-0.76	-6,614.3	460.6	772.9	534.3	238.67	3.238	
15,800.0	9,195.0	15,032.7	8,421.6	117.6	124.4	-0.87	-6,714.3	462.8	773.3	531.2	242.08	3.194	
15,900.0	9,195.0	15,132.6	8,421.2	119.2	126.3	-0.99	-6,814.2	465.0	773.7	528.2	245.48	3.152	
16,000.0	9,195.0	15,232.6	8,420.9	120.8	128.1	-1.11	-6,914.2	467.1	774.1	525.2	248.89	3.110	
16,100.0	9,195.0	15,332.6	8,420.5	122.4	129.9	-1.22	-7,014.2	469.3	774.4	522.1	252.30	3.069	
16,200.0	9,195.0	15,432.6	8,420.2	124.0	131.7	-1.34	-7,114.1	471.5	774.8	519.1	255.72	3.030	
16,300.0	9,195.0	15,532.6	8,419.8	125.6	133.5	-1.45	-7,214.1	473.7	775.2	516.1	259.14	2.992	
16,400.0	9,195.0	15,632.6	8,419.5	127.2	135.3	-1.57	-7,314.0	475.9	775.6	513.1	262.55	2.954	
16,500.0	9,195.0	15,732.6	8,419.1	128.8	137.2	-1.69	-7,414.0	478.1	776.0	510.0	265.97	2.918	
16,600.0	9,195.0	15,832.6	8,418.8	130.4	139.0	-1.80	-7,514.0	480.3	776.4	507.0	269.40	2.882	
16,700.0	9,195.0	15,932.5	8,418.4	132.0	140.8	-1.92	-7,613.9	482.5	776.8	504.0	272.82	2.847	
16,800.0	9,195.0	16,032.5	8,418.1	133.6	142.6	-2.03	-7,713.9	484.6	777.2	501.0	276.25	2.813	
16,900.0	9,195.0	16,132.5	8,417.7	135.2	144.4	-2.15	-7,813.9	486.8	777.6	497.9	279.67	2.780	
17,000.0	9,195.0	16,232.5	8,417.4	136.9	146.2	-2.26	-7,913.8	489.0	778.0	494.9	283.10	2.748	
17,100.0	9,195.0	16,332.5	8,417.0	138.5	148.1	-2.38	-8,013.8	491.2	778.4	491.9	286.54	2.717	
17,200.0	9,195.0	16,432.5	8,416.7	140.1	149.9	-2.49	-8,113.7	493.4	778.9	488.9	289.97	2.686	
17,300.0	9,195.0	16,532.5	8,416.3	141.7	151.7	-2.61	-8,213.7	495.6	779.3	485.9	293.40	2.656	
17,400.0	9,195.0	16,632.5	8,416.0	143.3	153.5	-2.72	-8,313.7	497.8	779.7	482.9	296.84	2.627	
17,500.0	9,195.0	16,732.4	8,415.6	144.9	155.3	-2.84	-8,413.6	499.9	780.1	479.9	300.28	2.598	
17,600.0	9,195.0	16,832.4	8,415.3	146.5	157.2	-2.95	-8,513.6	502.1	780.6	476.8	303.71	2.570	
17,700.0	9,195.0	16,932.4	8,414.9	148.2	159.0	-3.07	-8,613.6	504.3	781.0	473.8	307.15	2.543	
17,800.0	9,195.0	17,032.4	8,414.6	149.8	160.8	-3.18	-8,713.5	506.5	781.4	470.8	310.60	2.516	
17,900.0	9,195.0	17,132.4	8,414.2	151.4	162.6	-3.29	-8,813.5	508.7	781.9	467.8	314.04	2.490	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - KING TUT FEDERAL #2H - OWB - PWP1													Offset Site Error:	0.0 usft
Survey Program: 0-GYD_DP_MS.7867-MWD													Offset Well Error:	3.0 usft
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	Warning	
18,000.0	9,195.0	17,232.4	8,413.9	153.0	164.5	-3.41	-8,913.4	510.9	782.3	464.8	317.48	2.464		
18,100.0	9,195.0	17,332.4	8,413.5	154.6	166.3	-3.52	-9,013.4	513.1	782.8	461.8	320.93	2.439		
18,200.0	9,195.0	17,432.3	8,413.2	156.3	168.1	-3.63	-9,113.4	515.2	783.2	458.8	324.37	2.415		
18,300.0	9,195.0	17,532.3	8,412.8	157.9	169.9	-3.75	-9,213.3	517.4	783.7	455.8	327.82	2.391		
18,400.0	9,195.0	17,632.3	8,412.5	159.5	171.7	-3.86	-9,313.3	519.6	784.1	452.8	331.27	2.367		
18,500.0	9,195.0	17,732.3	8,412.1	161.1	173.6	-3.97	-9,413.3	521.8	784.6	449.9	334.72	2.344		
18,600.0	9,195.0	17,832.3	8,411.8	162.8	175.4	-4.09	-9,513.2	524.0	785.0	446.9	338.17	2.321		
18,700.0	9,195.0	17,932.3	8,411.4	164.4	177.2	-4.20	-9,613.2	526.2	785.5	443.9	341.62	2.299		
18,800.0	9,195.0	18,032.3	8,411.1	166.0	179.0	-4.31	-9,713.1	528.4	786.0	440.9	345.07	2.278		
18,900.0	9,195.0	18,132.3	8,410.7	167.7	180.9	-4.43	-9,813.1	530.6	786.4	437.9	348.52	2.256		
19,000.0	9,195.0	18,232.2	8,410.4	169.3	182.7	-4.54	-9,913.1	532.7	786.9	434.9	351.98	2.236		
19,100.0	9,195.0	18,332.2	8,410.0	170.9	184.5	-4.65	-10,013.0	534.9	787.4	431.9	355.43	2.215 SF		
19,200.0	9,195.0	18,338.7	8,410.0	172.5	184.6	-4.66	-10,019.5	535.1	793.4	436.2	357.18	2.221		
19,232.7	9,195.0	18,338.7	8,410.0	173.1	184.6	-4.66	-10,019.5	535.1	798.1	440.3	357.71	2.231		

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - KING TUT FEDERAL #2H - OWB - PWP2													Offset Site Error: 0.0 usft
Survey Program: 0-GYD_DP_MS_7867-MWD													Offset Well Error: 3.0 usft
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)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.0	0.0	0.2	-0.2	3.0	3.0	-85.84	18.2	-250.5	251.2				
100.0	100.0	100.2	99.8	3.0	3.0	-85.84	18.2	-250.5	251.2	245.2	6.00	41.832	
200.0	200.0	200.2	199.8	3.0	3.0	-85.84	18.2	-250.5	251.2	245.1	6.05	41.524	
300.0	300.0	300.2	299.8	3.1	3.0	-85.84	18.2	-250.5	251.2	245.0	6.13	40.942	
400.0	400.0	400.2	399.8	3.2	3.0	-85.84	18.2	-250.5	251.2	244.9	6.26	40.128	
500.0	500.0	500.2	499.8	3.4	3.0	-85.84	18.2	-250.5	251.2	244.7	6.42	39.134	
600.0	600.0	600.2	599.8	3.6	3.0	-85.84	18.2	-250.5	251.2	244.6	6.61	38.014	
700.0	700.0	700.2	699.8	3.8	3.1	-85.84	18.2	-250.5	251.2	244.3	6.82	36.816	
800.0	800.0	800.2	799.8	4.0	3.1	-85.84	18.2	-250.5	251.2	244.1	7.06	35.580	
900.0	900.0	900.2	899.8	4.2	3.1	-85.84	18.2	-250.5	251.2	243.8	7.31	34.338	
1,000.0	1,000.0	1,000.2	999.8	4.5	3.1	-85.84	18.2	-250.5	251.2	243.6	7.59	33.111	
1,100.0	1,100.0	1,100.2	1,099.8	4.8	3.1	-85.84	18.2	-250.5	251.2	243.3	7.87	31.916	
1,200.0	1,200.0	1,200.2	1,199.8	5.1	3.1	-85.84	18.2	-250.5	251.2	243.0	8.16	30.764	
1,300.0	1,300.0	1,300.2	1,299.8	5.4	3.1	-85.84	18.2	-250.5	251.2	242.7	8.47	29.659	
1,400.0	1,400.0	1,400.2	1,399.8	5.7	3.1	-85.84	18.2	-250.5	251.2	242.4	8.78	28.605	
1,500.0	1,500.0	1,500.2	1,499.8	6.0	3.1	-85.84	18.2	-250.5	251.2	242.1	9.10	27.602	
1,600.0	1,600.0	1,600.2	1,599.8	6.3	3.2	-85.84	18.2	-250.5	251.2	241.7	9.42	26.652	
1,700.0	1,700.0	1,700.2	1,699.8	6.6	3.2	-85.84	18.2	-250.5	251.2	241.4	9.75	25.751	
1,800.0	1,800.0	1,800.2	1,799.8	6.9	3.2	-85.84	18.2	-250.5	251.2	241.1	10.09	24.899	
1,900.0	1,900.0	1,900.2	1,899.8	7.2	3.2	-85.84	18.2	-250.5	251.2	240.7	10.42	24.092	
2,000.0	2,000.0	2,000.2	1,999.8	7.6	3.2	-85.84	18.2	-250.5	251.2	240.4	10.77	23.329	
2,100.0	2,100.0	2,100.2	2,099.8	7.9	3.2	-85.84	18.2	-250.5	251.2	240.1	11.11	22.607	
2,200.0	2,200.0	2,200.2	2,199.8	8.2	3.2	-85.84	18.2	-250.5	251.2	239.7	11.46	21.923	
2,300.0	2,300.0	2,300.2	2,299.8	8.6	3.2	-85.84	18.2	-250.5	251.2	239.4	11.81	21.275	
2,400.0	2,400.0	2,400.2	2,399.8	8.9	3.3	-85.84	18.2	-250.5	251.2	239.0	12.16	20.660	
2,500.0	2,500.0	2,500.2	2,499.8	9.2	3.3	-85.84	18.2	-250.5	251.2	238.7	12.51	20.077	
2,600.0	2,600.0	2,600.2	2,599.8	9.6	3.3	-85.84	18.2	-250.5	251.2	238.3	12.86	19.524	
2,700.0	2,700.0	2,700.2	2,699.8	9.9	3.3	-85.84	18.2	-250.5	251.2	237.9	13.22	18.997	
2,800.0	2,800.0	2,800.2	2,799.8	10.3	3.3	-85.84	18.2	-250.5	251.2	237.6	13.58	18.497	
2,900.0	2,900.0	2,900.2	2,899.8	10.6	3.3	-85.84	18.2	-250.5	251.2	237.2	13.94	18.020	
3,000.0	3,000.0	3,000.2	2,999.8	10.9	3.4	-85.84	18.2	-250.5	251.2	236.9	14.30	17.566	
3,100.0	3,100.0	3,100.2	3,099.8	11.3	3.4	-85.84	18.2	-250.5	251.2	236.5	14.66	17.133	
3,200.0	3,200.0	3,200.2	3,199.8	11.6	3.4	-85.84	18.2	-250.5	251.2	236.1	15.02	16.719	
3,300.0	3,300.0	3,300.2	3,299.8	12.0	3.4	-85.84	18.2	-250.5	251.2	235.8	15.39	16.324	
3,400.0	3,400.0	3,400.2	3,399.8	12.3	3.4	-85.84	18.2	-250.5	251.2	235.4	15.75	15.947	
3,500.0	3,500.0	3,500.2	3,499.8	12.7	3.4	-85.84	18.2	-250.5	251.2	235.0	16.12	15.585	
3,600.0	3,600.0	3,600.2	3,599.8	13.0	3.5	-85.84	18.2	-250.5	251.2	234.7	16.48	15.239	
3,700.0	3,700.0	3,700.2	3,699.8	13.4	3.5	-85.84	18.2	-250.5	251.2	234.3	16.85	14.907	
3,800.0	3,800.0	3,800.2	3,799.8	13.7	3.5	-85.84	18.2	-250.5	251.2	233.9	17.22	14.589	
3,900.0	3,900.0	3,900.2	3,899.8	14.1	3.5	-85.84	18.2	-250.5	251.2	233.6	17.58	14.284	
4,000.0	4,000.0	4,000.2	3,999.8	14.4	3.5	-85.84	18.2	-250.5	251.2	233.2	17.95	13.990	
4,100.0	4,100.0	4,100.2	4,099.8	14.8	3.5	-85.84	18.2	-250.5	251.2	232.8	18.32	13.708	
4,200.0	4,200.0	4,200.2	4,199.8	15.1	3.6	-85.84	18.2	-250.5	251.2	232.5	18.69	13.437	
4,300.0	4,300.0	4,300.2	4,299.8	15.5	3.6	-85.84	18.2	-250.5	251.2	232.1	19.06	13.175	
4,400.0	4,400.0	4,400.2	4,399.8	15.8	3.6	-85.84	18.2	-250.5	251.2	231.7	19.43	12.924	
4,500.0	4,500.0	4,500.2	4,499.8	16.2	3.6	-85.84	18.2	-250.5	251.2	231.4	19.81	12.681	
4,600.0	4,600.0	4,600.2	4,599.8	16.5	3.6	-85.84	18.2	-250.5	251.2	231.0	20.18	12.448	
4,700.0	4,700.0	4,700.2	4,699.8	16.9	3.7	-85.84	18.2	-250.5	251.2	230.6	20.55	12.222	
4,800.0	4,800.0	4,800.2	4,799.8	17.2	3.7	-85.84	18.2	-250.5	251.2	230.2	20.92	12.004	
4,900.0	4,900.0	4,900.2	4,899.8	17.6	3.7	-85.84	18.2	-250.5	251.2	229.9	21.30	11.794	
5,000.0	5,000.0	5,000.2	4,999.8	18.0	3.7	-85.84	18.2	-250.5	251.2	229.5	21.67	11.590	
5,100.0	5,100.0	5,100.2	5,099.8	18.3	3.7	-85.84	18.2	-250.5	251.2	229.1	22.04	11.394	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - KING TUT FEDERAL #2H - OWB - PWP2													Offset Site Error: 0.0 usft
Survey Program: 0-GYD_DP_MS, 7867-MWD													Offset Well Error: 3.0 usft
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)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,200.0	5,200.0	5,200.2	5,199.8	18.7	3.8	-85.84	18.2	-250.5	251.2	228.7	22.42	11.203	
5,300.0	5,300.0	5,300.2	5,299.8	19.0	3.8	-85.84	18.2	-250.5	251.2	228.4	22.79	11.019	
5,400.0	5,400.0	5,400.2	5,399.8	19.4	3.8	-85.84	18.2	-250.5	251.2	228.0	23.17	10.841	
5,500.0	5,500.0	5,500.2	5,499.8	19.7	3.8	-85.84	18.2	-250.5	251.2	227.6	23.54	10.668	
5,600.0	5,600.0	5,600.2	5,599.8	20.1	3.8	-85.84	18.2	-250.5	251.2	227.2	23.92	10.500	
5,700.0	5,700.0	5,700.2	5,699.8	20.4	3.9	-85.84	18.2	-250.5	251.2	226.9	24.30	10.338	
5,800.0	5,800.0	5,800.2	5,799.8	20.8	3.9	-85.84	18.2	-250.5	251.2	226.5	24.67	10.180	
5,900.0	5,900.0	5,900.2	5,899.8	21.1	3.9	-85.84	18.2	-250.5	251.2	226.1	25.05	10.027	
6,000.0	6,000.0	6,000.2	5,999.8	21.5	3.9	-85.84	18.2	-250.5	251.2	225.7	25.43	9.878	
6,100.0	6,100.0	6,100.2	6,099.8	21.8	4.0	-85.84	18.2	-250.5	251.2	225.4	25.80	9.734	
6,200.0	6,200.0	6,200.2	6,199.8	22.2	4.0	-85.84	18.2	-250.5	251.2	225.0	26.18	9.593	
6,300.0	6,300.0	6,300.2	6,299.8	22.6	4.0	-85.84	18.2	-250.5	251.2	224.6	26.56	9.457	
6,400.0	6,400.0	6,400.2	6,399.8	22.9	4.0	-85.84	18.2	-250.5	251.2	224.2	26.94	9.324	
6,500.0	6,500.0	6,500.2	6,499.8	23.3	4.0	-85.84	18.2	-250.5	251.2	223.8	27.32	9.195	
6,600.0	6,600.0	6,600.2	6,599.8	23.6	4.1	-85.84	18.2	-250.5	251.2	223.5	27.69	9.069	
6,700.0	6,700.0	6,700.2	6,699.8	24.0	4.1	-85.84	18.2	-250.5	251.2	223.1	28.07	8.947	
6,800.0	6,800.0	6,800.2	6,799.8	24.3	4.1	-85.84	18.2	-250.5	251.2	222.7	28.45	8.828	
6,900.0	6,900.0	6,900.2	6,899.8	24.7	4.1	-85.84	18.2	-250.5	251.2	222.3	28.83	8.712	
7,000.0	7,000.0	7,000.2	6,999.8	25.0	4.2	-85.84	18.2	-250.5	251.2	222.0	29.21	8.598	
7,100.0	7,100.0	7,100.2	7,099.8	25.4	4.2	-85.84	18.2	-250.5	251.2	221.6	29.59	8.488	
7,200.0	7,200.0	7,200.2	7,199.8	25.8	4.2	-85.84	18.2	-250.5	251.2	221.2	29.97	8.381	
7,300.0	7,300.0	7,300.2	7,299.8	26.1	4.2	-85.84	18.2	-250.5	251.2	220.8	30.35	8.276	
7,400.0	7,400.0	7,400.2	7,399.8	26.5	4.3	-85.84	18.2	-250.5	251.2	220.4	30.73	8.173	
7,500.0	7,500.0	7,500.2	7,499.8	26.8	4.3	-85.84	18.2	-250.5	251.2	220.1	31.11	8.073	
7,600.0	7,600.0	7,600.2	7,599.8	27.2	4.3	-85.84	18.2	-250.5	251.2	219.7	31.49	7.976	
7,700.0	7,700.0	7,700.2	7,699.8	27.5	4.3	-85.84	18.2	-250.5	251.2	219.3	31.87	7.881	
7,800.0	7,800.0	7,800.2	7,799.8	27.9	4.4	-85.84	18.2	-250.5	251.2	218.9	32.25	7.787	
7,900.0	7,900.0	7,900.6	7,908.6	28.3	4.4	-86.15	16.8	-249.9	250.6	217.9	32.63	7.679	
8,000.0	8,000.0	8,031.2	8,029.0	28.6	4.4	-90.71	-3.0	-240.6	242.4	209.4	33.05	7.335	
8,100.0	8,100.0	8,140.2	8,130.0	29.0	4.6	-100.08	-39.7	-223.5	229.0	195.5	33.53	6.830	
8,200.0	8,200.0	8,231.5	8,207.4	29.3	4.8	-112.31	-83.4	-203.1	219.7	185.6	34.08	6.447	
8,221.1	8,221.1	8,248.5	8,220.9	29.4	4.8	-115.00	-92.7	-198.8	219.3	185.1	34.20	6.413 CC, ES	
8,300.0	8,300.0	8,305.5	8,263.9	29.7	5.1	-124.67	-126.6	-183.0	225.4	190.6	34.74	6.487	
8,400.0	8,400.0	8,364.8	8,304.5	30.0	5.5	-135.18	-165.8	-164.7	252.4	216.8	35.58	7.092	
8,500.0	8,500.0	8,412.5	8,333.7	30.4	6.1	-143.33	-199.9	-148.8	299.4	263.0	36.48	8.209	
8,600.0	8,600.0	8,450.0	8,354.5	30.7	6.6	-149.28	-228.2	-135.6	361.4	324.1	37.32	9.684	
8,700.0	8,700.0	8,482.9	8,371.0	31.1	7.1	-154.05	-254.0	-123.6	433.5	395.3	38.16	11.359	
8,717.5	8,717.5	8,487.8	8,373.3	31.2	7.1	-154.73	-257.9	-121.7	446.9	408.6	38.30	11.668	
8,725.0	8,725.0	8,489.9	8,374.3	31.2	7.2	53.41	-259.6	-121.0	452.6	414.3	38.36	11.801	
8,750.0	8,750.0	8,500.0	8,378.9	31.3	7.3	49.40	-267.7	-117.2	471.8	433.2	38.59	12.227	
8,775.0	8,774.9	8,500.0	8,378.9	31.4	7.3	46.80	-267.7	-117.2	490.8	452.1	38.67	12.692	
8,800.0	8,799.6	8,512.6	8,384.4	31.4	7.5	43.23	-278.0	-112.4	509.4	470.5	38.95	13.078	
8,825.0	8,824.1	8,520.8	8,387.9	31.5	7.6	40.42	-284.7	-109.2	527.8	488.6	39.16	13.476	
8,850.0	8,848.3	8,529.2	8,391.3	31.6	7.8	37.88	-291.7	-106.0	545.8	506.4	39.38	13.860	
8,875.0	8,872.2	8,537.8	8,394.8	31.7	7.9	35.61	-298.9	-102.7	563.4	523.8	39.60	14.228	
8,900.0	8,895.6	8,550.0	8,399.4	31.7	8.1	33.42	-309.1	-97.9	580.6	540.7	39.87	14.559	
8,925.0	8,918.5	8,550.0	8,399.4	31.8	8.1	31.96	-309.1	-97.9	597.3	557.3	39.95	14.950	
8,950.0	8,940.9	8,564.9	8,404.7	31.9	8.4	30.11	-321.7	-92.0	613.3	573.1	40.29	15.225	
8,975.0	8,962.7	8,574.3	8,407.9	32.0	8.5	28.65	-329.7	-88.3	628.9	588.4	40.53	15.520	
9,000.0	8,983.8	8,583.9	8,411.0	32.1	8.7	27.34	-337.9	-84.5	644.0	603.2	40.77	15.796	
9,025.0	9,004.2	8,600.0	8,415.8	32.1	9.0	26.04	-351.8	-77.9	658.5	617.3	41.13	16.009	
9,050.0	9,023.8	8,600.0	8,415.8	32.2	9.0	25.19	-351.8	-77.9	672.2	631.0	41.21	16.313	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - KING TUT FEDERAL #2H - OWB - PWP2													Offset Site Error: 0.0 usft
Survey Program: O-GYD_DP_MS_7867-MWD													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis		Distance		Minimum Separation		Separation Factor		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	Warning
9,075.0	9,042.5	8,613.3	8,419.5	32.3	9.2	24.20	-363.4	-72.6	685.3	643.8	41.53	16.503	
9,100.0	9,060.4	8,623.3	8,422.1	32.4	9.4	23.37	-372.2	-68.5	697.8	656.0	41.79	16.697	
9,125.0	9,077.3	8,633.4	8,424.5	32.4	9.6	22.63	-381.1	-64.3	709.7	667.6	42.06	16.871	
9,150.0	9,093.2	8,650.0	8,428.1	32.5	9.9	21.91	-395.8	-57.5	720.8	678.4	42.46	16.979	
9,175.0	9,108.1	8,650.0	8,428.1	32.6	9.9	21.41	-395.8	-57.5	731.2	688.7	42.54	17.187	
9,200.0	9,122.0	8,664.3	8,430.8	32.7	10.2	20.87	-408.5	-51.5	740.9	698.0	42.91	17.267	
9,225.0	9,134.7	8,674.7	8,432.6	32.8	10.4	20.41	-417.8	-47.2	749.8	706.6	43.20	17.356	
9,250.0	9,146.3	8,685.2	8,434.2	32.9	10.6	20.02	-427.2	-42.8	758.0	714.5	43.51	17.424	
9,275.0	9,156.7	8,700.0	8,436.1	33.0	10.9	19.67	-440.5	-36.6	765.5	721.6	43.90	17.440	
9,300.0	9,165.9	8,700.0	8,436.1	33.1	10.9	19.39	-440.5	-36.6	772.3	728.3	44.01	17.549	
9,325.0	9,173.9	8,717.0	8,437.8	33.2	11.2	19.14	-455.8	-29.5	778.1	733.7	44.45	17.504	
9,350.0	9,180.6	8,727.6	8,438.6	33.4	11.4	18.94	-465.4	-25.0	783.3	738.5	44.79	17.490	
9,375.0	9,186.1	8,750.0	8,439.7	33.5	11.9	18.80	-485.6	-15.6	787.9	742.5	45.35	17.372	
9,400.0	9,190.2	8,750.0	8,439.7	33.6	11.9	18.67	-485.6	-15.6	791.2	745.8	45.48	17.396	
9,425.0	9,193.1	8,759.8	8,440.0	33.8	12.1	18.59	-494.5	-11.4	794.0	748.2	45.82	17.331	
9,450.0	9,194.7	8,772.8	8,440.0	33.9	12.3	18.56	-506.3	-5.9	796.0	749.8	46.22	17.224	
9,467.6	9,195.0	8,809.7	8,439.9	34.0	13.1	18.61	-522.2	1.5	796.8	749.8	47.06	16.933	
9,500.0	9,195.0	8,822.7	8,439.8	34.2	13.3	18.78	-551.6	15.2	797.6	750.1	47.52	16.786	
9,600.0	9,195.0	8,922.7	8,439.5	34.9	15.3	18.93	-642.2	57.4	798.4	748.2	50.21	15.902	
9,700.0	9,195.0	9,022.5	8,439.2	35.6	17.4	18.51	-732.6	99.6	797.0	744.0	53.00	15.039	
9,800.0	9,195.0	9,121.8	8,439.0	36.4	19.4	17.54	-822.6	141.6	793.5	737.7	55.84	14.211	
9,900.0	9,195.0	9,216.2	8,438.7	37.2	21.4	16.12	-908.3	181.1	788.3	729.7	58.56	13.460	
10,000.0	9,195.0	9,306.9	8,438.4	38.0	23.1	14.43	-991.7	216.7	782.5	721.3	61.13	12.801	
10,100.0	9,195.0	9,397.3	8,438.1	38.9	24.8	12.48	-1,076.0	249.7	776.4	712.7	63.68	12.193	
10,191.3	9,195.0	9,479.9	8,437.9	39.6	26.4	10.47	-1,153.7	277.3	771.0	705.0	65.98	11.685	
10,200.0	9,195.0	9,487.7	8,437.9	39.7	26.5	10.29	-1,161.1	279.9	770.5	704.3	66.20	11.639	
10,300.0	9,195.0	9,579.0	8,437.6	40.5	28.2	8.27	-1,248.1	307.6	765.8	697.0	68.74	11.140	
10,400.0	9,195.0	9,672.1	8,437.3	41.4	30.0	6.42	-1,337.6	333.1	762.6	691.2	71.35	10.688	
10,500.0	9,195.0	9,766.7	8,437.0	42.3	31.7	4.74	-1,429.5	355.9	760.5	686.5	74.01	10.276	
10,600.0	9,195.0	9,862.8	8,436.7	43.3	33.4	3.27	-1,523.4	376.1	759.4	682.7	76.71	9.899	
10,700.0	9,195.0	9,960.2	8,436.4	44.3	35.2	2.02	-1,619.2	393.2	758.9	679.4	79.45	9.552	
10,762.4	9,195.0	10,021.4	8,436.2	44.9	36.2	1.36	-1,679.8	402.3	758.8	677.7	81.17	9.348	
10,800.0	9,195.0	10,058.6	8,436.1	45.3	36.9	1.01	-1,716.6	407.2	758.8	676.6	82.21	9.231	
10,900.0	9,195.0	10,157.8	8,435.8	46.4	38.6	0.25	-1,815.2	418.0	759.1	674.1	84.99	8.931	
11,000.0	9,195.0	10,257.5	8,435.4	47.5	40.3	-0.26	-1,914.7	425.3	759.4	671.6	87.78	8.651	
11,100.0	9,195.0	10,357.7	8,435.1	48.7	41.9	-0.51	-2,014.8	429.2	759.7	669.1	90.58	8.388	
11,200.0	9,195.0	10,457.7	8,434.8	49.9	43.5	-0.57	-2,114.8	430.6	760.0	666.6	93.38	8.139	
11,300.0	9,195.0	10,557.7	8,434.5	51.1	45.1	-0.62	-2,214.8	431.9	760.3	664.1	96.21	7.903	
11,400.0	9,195.0	10,657.7	8,434.2	52.3	46.8	-0.68	-2,314.8	433.2	760.7	661.6	99.09	7.677	
11,500.0	9,195.0	10,757.7	8,433.9	53.6	48.4	-0.73	-2,414.8	434.6	761.0	659.0	102.00	7.461	
11,600.0	9,195.0	10,857.7	8,433.6	54.8	50.1	-0.78	-2,514.8	435.9	761.3	656.4	104.95	7.254	
11,700.0	9,195.0	10,957.7	8,433.2	56.1	51.8	-0.84	-2,614.8	437.2	761.6	653.7	107.92	7.057	
11,800.0	9,195.0	11,057.7	8,432.9	57.4	53.5	-0.89	-2,714.8	438.5	762.0	651.0	110.93	6.869	
11,900.0	9,195.0	11,157.7	8,432.6	58.8	55.2	-0.94	-2,814.8	439.8	762.3	648.3	113.96	6.689	
12,000.0	9,195.0	11,257.7	8,432.3	60.1	56.9	-1.00	-2,914.7	441.2	762.6	645.6	117.02	6.517	
12,100.0	9,195.0	11,357.7	8,432.0	61.5	58.6	-1.05	-3,014.7	442.5	762.9	642.8	120.10	6.353	
12,200.0	9,195.0	11,457.7	8,431.7	62.9	60.3	-1.10	-3,114.7	443.8	763.3	640.1	123.20	6.195	
12,300.0	9,195.0	11,557.7	8,431.4	64.3	62.0	-1.16	-3,214.7	445.1	763.6	637.3	126.32	6.045	
12,400.0	9,195.0	11,657.7	8,431.0	65.7	63.8	-1.21	-3,314.7	446.5	763.9	634.5	129.46	5.901	
12,500.0	9,195.0	11,757.7	8,430.7	67.1	65.5	-1.26	-3,414.7	447.8	764.3	631.6	132.62	5.763	
12,600.0	9,195.0	11,857.7	8,430.4	68.5	67.3	-1.32	-3,514.7	449.1	764.6	628.8	135.79	5.631	
12,700.0	9,195.0	11,957.7	8,430.1	70.0	69.0	-1.37	-3,614.7	450.4	764.9	625.9	138.98	5.504	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - KING TUT FEDERAL #2H - OWB - PWP2													Offset Site Error: 0.0 usft
Survey Program: 0-GYD_DP_MS_7867-MWD													Offset Well Error: 3.0 usft
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)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
12,800.0	9,195.0	12,057.7	8,429.8	71.4	70.8	-1.42	-3,714.6	451.7	765.2	623.1	142.18	5.382	
12,900.0	9,195.0	12,157.7	8,429.5	72.9	72.5	-1.47	-3,814.6	453.1	765.6	620.2	145.40	5.265	
13,000.0	9,195.0	12,257.7	8,429.2	74.4	74.3	-1.53	-3,914.6	454.4	765.9	617.3	148.63	5.153	
13,100.0	9,195.0	12,357.7	8,428.9	75.8	76.0	-1.58	-4,014.6	455.7	766.2	614.4	151.86	5.046	
13,200.0	9,195.0	12,457.7	8,428.5	77.3	77.8	-1.63	-4,114.6	457.0	766.6	611.5	155.11	4.942	
13,300.0	9,195.0	12,557.7	8,428.2	78.8	79.6	-1.69	-4,214.6	458.3	766.9	608.5	158.37	4.842	
13,400.0	9,195.0	12,657.7	8,427.9	80.3	81.3	-1.74	-4,314.6	459.7	767.2	605.6	161.64	4.747	
13,500.0	9,195.0	12,757.7	8,427.6	81.8	83.1	-1.79	-4,414.6	461.0	767.6	602.7	164.92	4.654	
13,600.0	9,195.0	12,857.7	8,427.3	83.3	84.9	-1.84	-4,514.5	462.3	767.9	599.7	168.21	4.565	
13,700.0	9,195.0	12,957.7	8,427.0	84.8	86.7	-1.90	-4,614.5	463.6	768.3	596.8	171.51	4.479	
13,800.0	9,195.0	13,057.7	8,426.7	86.4	88.4	-1.95	-4,714.5	465.0	768.6	593.8	174.81	4.397	
13,900.0	9,195.0	13,157.7	8,426.3	87.9	90.2	-2.00	-4,814.5	466.3	768.9	590.8	178.12	4.317	
14,000.0	9,195.0	13,257.6	8,426.0	89.4	92.0	-2.05	-4,914.5	467.6	769.3	587.8	181.44	4.240	
14,100.0	9,195.0	13,357.6	8,425.7	91.0	93.8	-2.10	-5,014.5	468.9	769.6	584.9	184.76	4.165	
14,200.0	9,195.0	13,457.6	8,425.4	92.5	95.6	-2.16	-5,114.5	470.2	770.0	581.9	188.09	4.094	
14,300.0	9,195.0	13,557.6	8,425.1	94.1	97.4	-2.21	-5,214.5	471.6	770.3	578.9	191.42	4.024	
14,400.0	9,195.0	13,657.6	8,424.8	95.6	99.2	-2.26	-5,314.4	472.9	770.6	575.9	194.77	3.957	
14,500.0	9,195.0	13,757.6	8,424.5	97.2	101.0	-2.31	-5,414.4	474.2	771.0	572.9	198.11	3.892	
14,600.0	9,195.0	13,857.6	8,424.1	98.7	102.7	-2.36	-5,514.4	475.5	771.3	569.9	201.46	3.829	
14,700.0	9,195.0	13,957.6	8,423.8	100.3	104.5	-2.42	-5,614.4	476.8	771.7	566.8	204.82	3.768	
14,800.0	9,195.0	14,057.6	8,423.5	101.8	106.3	-2.47	-5,714.4	478.2	772.0	563.8	208.18	3.708	
14,900.0	9,195.0	14,157.6	8,423.2	103.4	108.1	-2.52	-5,814.4	479.5	772.4	560.8	211.54	3.651	
15,000.0	9,195.0	14,257.6	8,422.9	105.0	109.9	-2.57	-5,914.4	480.8	772.7	557.8	214.91	3.595	
15,100.0	9,195.0	14,357.6	8,422.6	106.6	111.7	-2.62	-6,014.4	482.1	773.0	554.8	218.29	3.541	
15,200.0	9,195.0	14,457.6	8,422.3	108.1	113.5	-2.68	-6,114.4	483.5	773.4	551.7	221.66	3.489	
15,300.0	9,195.0	14,557.6	8,421.9	109.7	115.3	-2.73	-6,214.3	484.8	773.7	548.7	225.04	3.438	
15,400.0	9,195.0	14,657.6	8,421.6	111.3	117.1	-2.78	-6,314.3	486.1	774.1	545.7	228.43	3.389	
15,500.0	9,195.0	14,757.6	8,421.3	112.9	118.9	-2.83	-6,414.3	487.4	774.4	542.6	231.81	3.341	
15,600.0	9,195.0	14,857.6	8,421.0	114.5	120.7	-2.88	-6,514.3	488.7	774.8	539.6	235.20	3.294	
15,700.0	9,195.0	14,957.6	8,420.7	116.0	122.6	-2.93	-6,614.3	490.1	775.1	536.5	238.60	3.249	
15,800.0	9,195.0	15,057.6	8,420.4	117.6	124.4	-2.99	-6,714.3	491.4	775.5	533.5	241.99	3.205	
15,900.0	9,195.0	15,157.6	8,420.1	119.2	126.2	-3.04	-6,814.3	492.7	775.8	530.4	245.39	3.162	
16,000.0	9,195.0	15,257.6	8,419.7	120.8	128.0	-3.09	-6,914.3	494.0	776.2	527.4	248.79	3.120	
16,100.0	9,195.0	15,357.6	8,419.4	122.4	129.8	-3.14	-7,014.2	495.3	776.5	524.3	252.20	3.079	
16,200.0	9,195.0	15,457.6	8,419.1	124.0	131.6	-3.19	-7,114.2	496.7	776.9	521.3	255.60	3.039	
16,300.0	9,195.0	15,557.6	8,418.8	125.6	133.4	-3.24	-7,214.2	498.0	777.2	518.2	259.01	3.001	
16,400.0	9,195.0	15,657.6	8,418.5	127.2	135.2	-3.29	-7,314.2	499.3	777.6	515.2	262.42	2.963	
16,500.0	9,195.0	15,757.6	8,418.2	128.8	137.0	-3.34	-7,414.2	500.6	778.0	512.1	265.83	2.926	
16,600.0	9,195.0	15,857.6	8,417.9	130.4	138.8	-3.39	-7,514.2	502.0	778.3	509.1	269.25	2.891	
16,700.0	9,195.0	15,957.6	8,417.6	132.0	140.6	-3.45	-7,614.2	503.3	778.7	506.0	272.67	2.856	
16,800.0	9,195.0	16,057.6	8,417.2	133.6	142.4	-3.50	-7,714.2	504.6	779.0	502.9	276.09	2.822	
16,900.0	9,195.0	16,157.6	8,416.9	135.2	144.3	-3.55	-7,814.1	505.9	779.4	499.9	279.51	2.788	
17,000.0	9,195.0	16,257.6	8,416.6	136.9	146.1	-3.60	-7,914.1	507.2	779.7	496.8	282.93	2.756	
17,100.0	9,195.0	16,357.6	8,416.3	138.5	147.9	-3.65	-8,014.1	508.6	780.1	493.7	286.35	2.724	
17,200.0	9,195.0	16,457.6	8,416.0	140.1	149.7	-3.70	-8,114.1	509.9	780.5	490.7	289.78	2.693	
17,300.0	9,195.0	16,557.5	8,415.7	141.7	151.5	-3.75	-8,214.1	511.2	780.8	487.6	293.21	2.663	
17,400.0	9,195.0	16,657.5	8,415.4	143.3	153.3	-3.80	-8,314.1	512.5	781.2	484.5	296.64	2.633	
17,500.0	9,195.0	16,757.5	8,415.0	144.9	155.1	-3.85	-8,414.1	513.8	781.5	481.5	300.07	2.605	
17,600.0	9,195.0	16,857.5	8,414.7	146.5	157.0	-3.90	-8,514.1	515.2	781.9	478.4	303.50	2.576	
17,700.0	9,195.0	16,957.5	8,414.4	148.2	158.8	-3.95	-8,614.0	516.5	782.3	475.3	306.93	2.549	
17,800.0	9,195.0	17,057.5	8,414.1	149.8	160.6	-4.00	-8,714.0	517.8	782.6	472.2	310.37	2.522	
17,900.0	9,195.0	17,157.5	8,413.8	151.4	162.4	-4.05	-8,814.0	519.1	783.0	469.2	313.81	2.495	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - KING TUT FEDERAL #2H - OWB - PWP2												Offset Site Error:	0.0 usft
Survey Program: 0-GYD_DP_MS, 7867-MWD												Offset Well Error:	3.0 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)			
18,000.0	9,195.0	17,257.5	8,413.5	153.0	164.2	-4.10	-8,914.0	520.5	783.3	466.1	317.24	2.469	
18,100.0	9,195.0	17,357.5	8,413.2	154.6	166.0	-4.16	-9,014.0	521.8	783.7	463.0	320.68	2.444	
18,200.0	9,195.0	17,457.5	8,412.8	156.3	167.8	-4.21	-9,114.0	523.1	784.1	460.0	324.12	2.419	
18,300.0	9,195.0	17,557.5	8,412.5	157.9	169.7	-4.26	-9,214.0	524.4	784.4	456.9	327.56	2.395	
18,400.0	9,195.0	17,657.5	8,412.2	159.5	171.5	-4.31	-9,314.0	525.7	784.8	453.8	331.01	2.371	
18,500.0	9,195.0	17,757.5	8,411.9	161.1	173.3	-4.36	-9,413.9	527.1	785.2	450.7	334.45	2.348	
18,600.0	9,195.0	17,857.5	8,411.6	162.8	175.1	-4.41	-9,513.9	528.4	785.5	447.6	337.89	2.325	
18,700.0	9,195.0	17,957.5	8,411.3	164.4	176.9	-4.46	-9,613.9	529.7	785.9	444.6	341.34	2.302	
18,800.0	9,195.0	18,057.5	8,411.0	166.0	178.8	-4.51	-9,713.9	531.0	786.3	441.5	344.79	2.280	
18,900.0	9,195.0	18,157.5	8,410.6	167.7	180.6	-4.56	-9,813.9	532.3	786.6	438.4	348.23	2.259	
19,000.0	9,195.0	18,257.5	8,410.3	169.3	182.4	-4.61	-9,913.9	533.7	787.0	435.3	351.68	2.238	
19,100.0	9,195.0	18,357.5	8,410.0	170.9	184.2	-4.66	-10,013.9	535.0	787.4	432.3	355.13	2.217 SF	
19,200.0	9,195.0	18,363.1	8,410.0	172.5	184.3	-4.66	-10,019.5	535.1	793.4	436.5	356.86	2.223	
19,232.7	9,195.0	18,363.1	8,410.0	173.1	184.3	-4.66	-10,019.5	535.1	798.1	440.7	357.40	2.233	

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COG PRODUCTION LLC

Anticollision Report

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Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - REDHEAD 31 FEDERAL #1H - OWB - ACTUAL WELLPATH												Offset Site Error:	0.0 usft
Survey Program: 100- VES GyroFlex, 9674-MWD												Offset Well Error:	3.0 usft
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)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	3.0	3.0	-170.77	-5,403.9	-877.9	5,474.9				
100.0	100.0	61.2	61.2	3.0	3.0	-170.77	-5,403.9	-877.9	5,474.7	5,468.7	6.00	911.985	
200.0	200.0	151.5	151.5	3.0	3.0	-170.77	-5,403.9	-878.2	5,474.8	5,468.8	6.04	905.978	
300.0	300.0	255.8	255.8	3.1	3.0	-170.77	-5,404.1	-878.4	5,475.1	5,468.9	6.13	893.108	
400.0	400.0	372.3	372.3	3.2	3.0	-170.77	-5,404.0	-878.6	5,475.0	5,468.7	6.26	874.319	
500.0	500.0	487.0	487.0	3.4	3.0	-170.76	-5,403.6	-878.8	5,474.7	5,468.2	6.43	850.984	
600.0	600.0	594.1	594.1	3.6	3.1	-170.76	-5,403.0	-879.3	5,474.1	5,467.5	6.64	824.199	
700.0	700.0	704.4	704.4	3.8	3.1	-170.75	-5,402.1	-879.9	5,473.5	5,466.6	6.89	794.748	
800.0	800.0	794.1	794.1	4.0	3.2	-170.74	-5,401.4	-880.4	5,472.8	5,465.6	7.15	765.121	
900.0	900.0	907.8	907.8	4.2	3.2	-170.73	-5,400.4	-881.5	5,472.1	5,464.6	7.46	733.806	
1,000.0	1,000.0	993.5	993.5	4.5	3.3	-170.72	-5,399.7	-882.3	5,471.4	5,463.6	7.77	704.351	
1,100.0	1,100.0	1,088.3	1,088.3	4.8	3.3	-170.71	-5,399.0	-883.1	5,470.9	5,462.8	8.10	675.223	
1,200.0	1,200.0	1,178.4	1,178.4	5.1	3.4	-170.70	-5,398.5	-884.0	5,470.5	5,462.0	8.45	647.527	
1,300.0	1,300.0	1,284.3	1,284.3	5.4	3.5	-170.69	-5,398.0	-885.2	5,470.1	5,461.3	8.82	620.241	
1,400.0	1,400.0	1,394.6	1,394.5	5.7	3.6	-170.68	-5,397.3	-886.2	5,469.6	5,460.4	9.21	594.025	
1,500.0	1,500.0	1,486.2	1,486.1	6.0	3.6	-170.67	-5,396.7	-886.7	5,469.1	5,459.5	9.59	570.182	
1,600.0	1,600.0	1,583.1	1,583.1	6.3	3.7	-170.66	-5,396.2	-887.1	5,468.7	5,458.7	9.99	547.500	
1,700.0	1,700.0	1,687.7	1,687.7	6.6	3.8	-170.66	-5,395.7	-887.4	5,468.3	5,457.9	10.40	525.769	
1,800.0	1,800.0	1,774.3	1,774.2	6.9	3.9	-170.66	-5,395.3	-887.7	5,467.9	5,457.1	10.80	506.124	
1,900.0	1,900.0	1,865.1	1,865.0	7.2	4.0	-170.66	-5,395.2	-887.8	5,467.8	5,456.6	11.21	487.577	
2,000.0	2,000.0	1,979.1	1,979.0	7.6	4.1	-170.65	-5,395.0	-888.1	5,467.7	5,456.0	11.65	469.322	
2,100.0	2,100.0	2,068.0	2,068.0	7.9	4.1	-170.65	-5,394.8	-888.2	5,467.4	5,455.4	12.02	454.991	
2,200.0	2,200.0	2,169.7	2,169.6	8.2	4.2	-170.65	-5,394.7	-888.0	5,467.3	5,455.0	12.38	441.721	
2,292.1	2,292.1	2,254.0	2,253.9	8.5	4.2	-170.65	-5,394.6	-888.2	5,467.2	5,454.5	12.74	429.253	
2,300.0	2,300.0	2,260.5	2,260.4	8.6	4.2	-170.65	-5,394.6	-888.2	5,467.2	5,454.4	12.77	428.197	
2,400.0	2,400.0	2,353.3	2,353.3	8.9	4.2	-170.65	-5,394.7	-888.4	5,467.4	5,454.2	13.13	416.244	
2,500.0	2,500.0	2,461.0	2,460.9	9.2	4.2	-170.65	-5,394.8	-888.3	5,467.5	5,454.0	13.45	406.495	
2,600.0	2,600.0	2,569.1	2,569.0	9.6	4.2	-170.65	-5,394.8	-888.2	5,467.4	5,453.6	13.80	396.045	
2,683.2	2,683.2	2,645.0	2,645.0	9.9	4.3	-170.65	-5,394.6	-888.4	5,467.3	5,453.2	14.12	387.299	
2,700.0	2,700.0	2,659.1	2,659.0	9.9	4.3	-170.65	-5,394.6	-888.4	5,467.3	5,453.1	14.18	385.603	
2,800.0	2,800.0	2,759.4	2,759.3	10.3	4.3	-170.65	-5,394.8	-888.3	5,467.4	5,452.9	14.55	375.735	
2,900.0	2,900.0	2,877.2	2,877.1	10.6	4.3	-170.65	-5,394.7	-888.1	5,467.3	5,452.4	14.94	365.871	
3,000.0	3,000.0	2,971.3	2,971.3	10.9	4.3	-170.66	-5,394.5	-887.5	5,467.0	5,451.8	15.29	357.546	
3,100.0	3,100.0	3,074.2	3,074.1	11.3	4.3	-170.67	-5,394.5	-886.6	5,466.9	5,451.3	15.62	349.993	
3,200.0	3,200.0	3,218.8	3,218.7	11.6	4.3	-170.69	-5,394.0	-883.8	5,466.2	5,450.3	15.96	342.470	
3,300.0	3,300.0	3,311.8	3,311.6	12.0	4.3	-170.71	-5,393.5	-881.8	5,465.3	5,449.0	16.32	334.894	
3,400.0	3,400.0	3,425.2	3,425.0	12.3	4.4	-170.74	-5,392.6	-879.7	5,464.2	5,447.6	16.69	327.310	
3,500.0	3,500.0	3,535.1	3,534.9	12.7	4.4	-170.76	-5,391.6	-877.4	5,463.0	5,445.9	17.08	319.846	
3,600.0	3,600.0	3,633.1	3,632.9	13.0	4.4	-170.78	-5,390.6	-875.4	5,461.6	5,444.2	17.47	312.615	
3,700.0	3,700.0	3,723.6	3,723.4	13.4	4.5	-170.79	-5,389.7	-874.1	5,460.4	5,442.5	17.87	305.521	
3,800.0	3,800.0	3,813.1	3,812.9	13.7	4.6	-170.79	-5,388.8	-873.4	5,459.4	5,441.1	18.29	298.497	
3,900.0	3,900.0	3,890.2	3,889.9	14.1	4.6	-170.80	-5,388.3	-873.0	5,458.6	5,439.9	18.70	291.895	
4,000.0	4,000.0	3,976.6	3,976.3	14.4	4.7	-170.80	-5,388.0	-872.7	5,458.3	5,439.1	19.12	285.509	
4,063.6	4,063.6	4,025.6	4,025.4	14.7	4.7	-170.80	-5,388.0	-872.6	5,458.2	5,438.8	19.37	281.840	
4,100.0	4,100.0	4,050.9	4,050.7	14.8	4.7	-170.80	-5,388.0	-872.6	5,458.2	5,438.7	19.50	279.891	
4,200.0	4,200.0	4,117.6	4,117.4	15.1	4.7	-170.80	-5,388.3	-872.6	5,458.7	5,438.8	19.86	274.830	
4,300.0	4,300.0	4,177.7	4,177.5	15.5	4.7	-170.80	-5,389.0	-872.6	5,459.9	5,439.7	20.20	270.300	
4,400.0	4,400.0	4,254.3	4,254.1	15.8	4.7	-170.80	-5,390.5	-872.6	5,461.7	5,441.1	20.54	265.962	
4,500.0	4,500.0	4,342.9	4,342.6	16.2	4.7	-170.81	-5,392.3	-872.6	5,463.8	5,442.9	20.87	261.755	
4,600.0	4,600.0	4,454.6	4,454.3	16.5	4.7	-170.81	-5,394.8	-872.9	5,466.0	5,444.7	21.22	257.629	
4,700.0	4,700.0	4,578.9	4,578.6	16.9	4.7	-170.81	-5,396.8	-873.5	5,467.6	5,446.1	21.57	253.470	
4,800.0	4,800.0	4,684.7	4,684.4	17.2	4.7	-170.80	-5,398.2	-874.2	5,469.1	5,447.2	21.94	249.330	

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Offset Design BULLDOG - REDHEAD 31 FEDERAL #1H - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft	
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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		
4,900.0	4,900.0	4,796.3	4,796.0	17.6	4.7	-170.80	-5,399.6	-875.0	5,470.4	5,448.1	22.31	245.188		
5,000.0	5,000.0	4,900.6	4,900.2	18.0	4.7	-170.79	-5,400.7	-875.8	5,471.6	5,448.9	22.70	241.088		
5,100.0	5,100.0	4,987.9	4,987.6	18.3	4.8	-170.78	-5,401.7	-876.6	5,472.8	5,449.7	23.08	237.128		
5,200.0	5,200.0	5,109.7	5,109.4	18.7	4.8	-170.77	-5,403.0	-877.6	5,474.0	5,450.5	23.48	233.096		
5,300.0	5,300.0	5,204.8	5,204.5	19.0	4.9	-170.77	-5,403.8	-878.6	5,475.1	5,451.2	23.89	229.204		
5,400.0	5,400.0	5,317.1	5,316.7	19.4	4.9	-170.75	-5,404.6	-879.7	5,476.0	5,451.7	24.31	225.260		
5,500.0	5,500.0	5,410.9	5,410.5	19.7	5.0	-170.75	-5,405.3	-880.7	5,476.8	5,452.1	24.72	221.514		
5,600.0	5,600.0	5,511.1	5,510.7	20.1	5.1	-170.74	-5,406.1	-881.8	5,477.8	5,452.6	25.15	217.817		
5,700.0	5,700.0	5,621.0	5,620.6	20.4	5.2	-170.72	-5,406.8	-883.1	5,478.6	5,453.0	25.59	214.109		
5,800.0	5,800.0	5,707.6	5,707.2	20.8	5.2	-170.72	-5,407.4	-884.0	5,479.5	5,453.5	26.01	210.668		
5,900.0	5,900.0	5,817.4	5,817.0	21.1	5.3	-170.71	-5,408.2	-885.1	5,480.4	5,453.9	26.45	207.181		
6,000.0	6,000.0	5,917.2	5,916.7	21.5	5.4	-170.69	-5,408.9	-886.3	5,481.2	5,454.3	26.89	203.804		
6,100.0	6,100.0	6,028.2	6,027.8	21.8	5.5	-170.68	-5,409.4	-888.0	5,481.9	5,454.5	27.36	200.393		
6,200.0	6,200.0	6,127.9	6,127.5	22.2	5.6	-170.66	-5,409.8	-889.6	5,482.5	5,454.7	27.81	197.138		
6,300.0	6,300.0	6,230.5	6,230.1	22.6	5.7	-170.65	-5,410.1	-890.8	5,483.1	5,454.8	28.27	193.952		
6,400.0	6,400.0	6,316.5	6,316.0	22.9	5.8	-170.64	-5,410.6	-892.0	5,483.8	5,455.1	28.71	190.983		
6,500.0	6,500.0	6,442.3	6,441.8	23.3	5.9	-170.62	-5,411.0	-893.5	5,484.3	5,455.1	29.20	187.800		
6,600.0	6,600.0	6,538.1	6,537.6	23.6	6.0	-170.62	-5,411.3	-894.3	5,484.7	5,455.0	29.66	184.945		
6,700.0	6,700.0	6,639.2	6,638.7	24.0	6.1	-170.61	-5,411.7	-894.6	5,485.2	5,455.1	30.10	182.212		
6,800.0	6,800.0	6,736.1	6,735.6	24.3	6.2	-170.61	-5,412.0	-895.0	5,485.6	5,455.0	30.55	179.564		
6,900.0	6,900.0	6,819.9	6,819.4	24.7	6.3	-170.61	-5,412.5	-895.4	5,486.2	5,455.2	30.99	177.058		
7,000.0	7,000.0	6,906.8	6,906.3	25.0	6.4	-170.60	-5,413.2	-895.7	5,487.1	5,455.7	31.41	174.665		
7,100.0	7,100.0	7,019.7	7,019.2	25.4	6.5	-170.60	-5,414.1	-896.2	5,488.0	5,456.1	31.87	172.201		
7,200.0	7,200.0	7,126.0	7,125.5	25.8	6.6	-170.60	-5,414.8	-896.6	5,488.7	5,456.3	32.32	169.801		
7,300.0	7,300.0	7,213.3	7,212.8	26.1	6.6	-170.60	-5,415.4	-896.8	5,489.4	5,456.7	32.76	167.584		
7,400.0	7,400.0	7,293.1	7,292.6	26.5	6.7	-170.59	-5,416.3	-897.2	5,490.5	5,457.3	33.19	165.449		
7,500.0	7,500.0	7,398.0	7,397.4	26.8	6.8	-170.59	-5,417.5	-897.7	5,491.7	5,458.1	33.64	163.267		
7,600.0	7,600.0	7,483.4	7,482.9	27.2	6.9	-170.59	-5,418.5	-898.1	5,493.0	5,459.0	34.07	161.229		
7,700.0	7,700.0	7,578.6	7,578.1	27.5	7.0	-170.59	-5,419.9	-898.6	5,494.5	5,460.0	34.51	159.206		
7,800.0	7,800.0	7,676.5	7,675.9	27.9	7.1	-170.59	-5,421.4	-898.8	5,496.1	5,461.1	34.96	157.229		
7,900.0	7,900.0	7,787.8	7,787.2	28.3	7.2	-170.58	-5,423.0	-899.2	5,497.6	5,462.2	35.41	155.234		
8,000.0	8,000.0	7,874.7	7,874.1	28.6	7.2	-170.58	-5,424.2	-899.5	5,499.0	5,463.2	35.85	153.380		
8,100.0	8,100.0	7,970.7	7,970.2	29.0	7.3	-170.58	-5,425.8	-900.0	5,500.7	5,464.4	36.31	151.508		
8,200.0	8,200.0	8,077.5	8,076.9	29.3	7.5	-170.58	-5,427.4	-900.8	5,502.3	5,465.5	36.78	149.602		
8,300.0	8,300.0	8,175.1	8,174.5	29.7	7.6	-170.57	-5,428.8	-901.5	5,503.8	5,466.6	37.24	147.778		
8,400.0	8,400.0	8,260.7	8,260.0	30.0	7.7	-170.57	-5,430.2	-902.0	5,505.5	5,467.8	37.70	146.053		
8,500.0	8,500.0	8,348.4	8,347.8	30.4	7.8	-170.56	-5,431.8	-902.9	5,507.5	5,469.4	38.15	144.355		
8,600.0	8,600.0	8,459.3	8,458.6	30.7	7.9	-170.55	-5,433.9	-904.3	5,509.6	5,470.9	38.64	142.573		
8,700.0	8,700.0	8,569.9	8,569.2	31.1	8.0	-170.53	-5,435.5	-906.3	5,511.3	5,472.2	39.14	140.803		
8,717.5	8,717.5	8,587.5	8,586.7	31.2	8.1	-170.53	-5,435.7	-906.7	5,511.6	5,472.4	39.23	140.505		
8,725.0	8,725.0	8,595.0	8,594.3	31.2	8.1	38.77	-5,435.8	-906.9	5,511.7	5,472.4	39.26	140.381		
8,750.0	8,750.0	8,655.7	8,654.9	31.3	8.1	38.83	-5,436.4	-908.2	5,511.2	5,471.8	39.42	139.807		
8,775.0	8,774.9	8,775.0	8,676.2	31.4	8.3	38.97	-5,436.5	-908.6	5,509.5	5,469.9	39.65	138.944		
8,800.0	8,799.6	8,722.5	8,721.8	31.4	8.2	39.22	-5,436.7	-909.5	5,506.9	5,467.2	39.67	138.830		
8,825.0	8,824.1	8,738.9	8,738.2	31.5	8.3	39.53	-5,436.8	-909.9	5,503.2	5,463.4	39.77	138.387		
8,850.0	8,848.3	8,755.1	8,754.3	31.6	8.3	39.92	-5,436.9	-910.3	5,498.6	5,458.7	39.87	137.926		
8,875.0	8,872.2	8,771.1	8,770.3	31.7	8.3	40.39	-5,437.0	-910.6	5,493.0	5,453.1	39.96	137.448		
8,900.0	8,895.6	8,786.7	8,786.0	31.7	8.3	40.96	-5,437.1	-911.0	5,486.6	5,446.5	40.10	136.837		
8,925.0	8,918.5	8,800.0	8,799.2	31.8	8.3	41.61	-5,437.2	-911.4	5,479.2	5,438.6	40.58	135.038		
8,950.0	8,940.9	8,800.0	8,799.2	31.9	8.3	42.31	-5,437.2	-911.4	5,470.9	5,429.9	41.06	133.258		
8,975.0	8,962.7	8,824.7	8,823.9	32.0	8.4	43.21	-5,437.5	-912.1	5,461.8	5,420.2	41.60	131.298		
9,000.0	8,983.8	8,835.7	8,834.9	32.1	8.4	44.16	-5,437.7	-912.4	5,451.8	5,409.7	42.13	129.417		

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - REDHEAD 31 FEDERAL #1H - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft	
Survey Program: 100- VES GyroFlex, 9674-MWD													Offset Well Error: 3.0 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		
9,025.0	9,004.2	8,846.4	8,845.6	32.1	8.4	45.22	-5,437.9	-912.7	5,441.1	5,398.4	42.66	127.551		
9,050.0	9,023.8	8,856.7	8,855.9	32.2	8.4	46.39	-5,438.0	-913.0	5,429.6	5,386.4	43.19	125.712		
9,075.0	9,042.5	8,866.5	8,865.7	32.3	8.4	47.69	-5,438.2	-913.3	5,417.3	5,373.6	43.72	123.913		
9,100.0	9,060.4	8,875.9	8,875.1	32.4	8.4	49.11	-5,438.4	-913.6	5,404.3	5,360.1	44.24	122.162		
9,125.0	9,077.3	8,900.0	8,899.2	32.4	8.5	50.79	-5,439.0	-914.4	5,390.7	5,345.9	44.80	120.337		
9,150.0	9,093.2	8,900.0	8,899.2	32.5	8.5	52.43	-5,439.0	-914.4	5,376.4	5,331.1	45.27	118.772		
9,175.0	9,108.1	8,902.4	8,901.5	32.6	8.5	54.24	-5,439.1	-914.4	5,361.5	5,315.8	45.73	117.248		
9,200.0	9,122.0	8,916.6	8,915.8	32.7	8.5	56.31	-5,439.4	-914.9	5,346.1	5,299.9	46.21	115.680		
9,225.0	9,134.7	8,929.7	8,928.9	32.8	8.5	58.55	-5,439.8	-915.3	5,330.1	5,283.4	46.68	114.184		
9,250.0	9,146.3	8,941.7	8,940.8	32.9	8.5	60.94	-5,440.1	-915.7	5,313.7	5,266.5	47.12	112.763		
9,275.0	9,156.7	8,952.5	8,951.7	33.0	8.5	63.50	-5,440.4	-916.0	5,296.8	5,249.2	47.54	111.419		
9,300.0	9,165.9	8,962.2	8,961.3	33.1	8.5	66.22	-5,440.6	-916.3	5,279.5	5,231.6	47.93	110.152		
9,325.0	9,173.9	8,970.5	8,969.7	33.2	8.6	69.08	-5,440.8	-916.5	5,261.9	5,213.6	48.29	108.964		
9,350.0	9,180.6	8,977.7	8,976.8	33.4	8.6	72.08	-5,441.0	-916.7	5,244.0	5,195.4	48.62	107.856		
9,375.0	9,186.1	8,983.5	8,982.6	33.5	8.6	75.19	-5,441.2	-916.8	5,225.9	5,177.0	48.92	106.827		
9,400.0	9,190.2	8,988.1	8,987.2	33.6	8.6	78.39	-5,441.3	-917.0	5,207.6	5,158.5	49.18	105.879		
9,425.0	9,193.1	8,991.3	8,990.4	33.8	8.6	81.66	-5,441.4	-917.0	5,189.2	5,139.8	49.42	105.012		
9,450.0	9,194.7	8,993.2	8,992.3	33.9	8.6	84.96	-5,441.4	-917.1	5,170.7	5,121.1	49.61	104.225		
9,467.6	9,195.0	8,993.7	8,992.8	34.0	8.6	87.29	-5,441.5	-917.1	5,157.7	5,108.0	49.73	103.721		
9,500.0	9,195.0	8,994.1	8,993.2	34.2	8.6	87.22	-5,441.5	-917.1	5,133.5	5,083.6	49.92	102.825		
9,600.0	9,195.0	8,995.4	8,994.5	34.9	8.6	87.00	-5,441.5	-917.1	5,056.4	5,005.8	50.60	99.936		
9,700.0	9,195.0	8,997.0	8,996.1	35.6	8.6	86.74	-5,441.5	-917.2	4,975.8	4,924.4	51.34	96.912		
9,800.0	9,195.0	8,998.8	8,997.9	36.4	8.6	86.41	-5,441.6	-917.2	4,891.8	4,839.7	52.14	93.823		
9,900.0	9,195.0	9,001.9	9,001.0	37.2	8.6	86.01	-5,441.7	-917.3	4,804.8	4,751.8	52.97	90.712		
10,000.0	9,195.0	9,006.5	9,005.6	38.0	8.6	85.54	-5,441.8	-917.4	4,715.0	4,661.2	53.81	87.617		
10,100.0	9,195.0	9,011.4	9,010.5	38.9	8.6	84.89	-5,441.9	-917.5	4,622.7	4,568.0	54.66	84.576		
10,191.3	9,195.0	9,016.0	9,015.1	39.6	8.6	84.05	-5,442.0	-917.7	4,536.4	4,481.0	55.42	81.861		
10,200.0	9,195.0	9,016.4	9,015.5	39.7	8.6	84.07	-5,442.1	-917.7	4,528.2	4,472.7	55.49	81.605		
10,300.0	9,195.0	9,021.4	9,020.5	40.5	8.6	84.28	-5,442.2	-917.8	4,432.9	4,376.6	56.34	78.684		
10,400.0	9,195.0	9,026.1	9,025.2	41.4	8.6	84.48	-5,442.3	-917.9	4,337.9	4,280.7	57.24	75.790		
10,500.0	9,195.0	9,030.7	9,029.7	42.3	8.6	84.67	-5,442.4	-918.0	4,243.1	4,185.0	58.18	72.930		
10,600.0	9,195.0	9,035.0	9,034.1	43.3	8.6	84.85	-5,442.5	-918.1	4,148.6	4,089.4	59.17	70.115		
10,700.0	9,195.0	9,039.2	9,038.3	44.3	8.6	85.03	-5,442.6	-918.2	4,054.3	3,994.1	60.20	67.350		
10,800.0	9,195.0	9,043.3	9,042.3	45.3	8.6	85.19	-5,442.7	-918.3	3,960.3	3,899.0	61.26	64.643		
10,900.0	9,195.0	9,047.1	9,046.2	46.4	8.7	85.36	-5,442.8	-918.4	3,866.6	3,804.2	62.37	61.998		
11,000.0	9,195.0	9,050.8	9,049.9	47.5	8.7	85.51	-5,442.9	-918.5	3,773.2	3,709.7	63.50	59.419		
11,100.0	9,195.0	9,054.4	9,053.5	48.7	8.7	85.66	-5,442.9	-918.6	3,680.2	3,615.5	64.67	56.909		
11,200.0	9,195.0	9,057.9	9,056.9	49.9	8.7	85.81	-5,443.0	-918.7	3,587.5	3,521.6	65.86	54.469		
11,300.0	9,195.0	9,061.2	9,060.3	51.1	8.7	85.95	-5,443.1	-918.8	3,495.2	3,428.2	67.08	52.102		
11,400.0	9,195.0	9,064.4	9,063.5	52.3	8.7	86.08	-5,443.1	-918.8	3,403.4	3,335.1	68.33	49.807		
11,500.0	9,195.0	9,067.5	9,066.6	53.6	8.7	86.21	-5,443.2	-918.9	3,312.1	3,242.5	69.60	47.586		
11,600.0	9,195.0	9,070.5	9,069.6	54.8	8.7	86.34	-5,443.2	-919.0	3,221.2	3,150.3	70.89	45.438		
11,700.0	9,195.0	9,073.4	9,072.4	56.1	8.7	86.46	-5,443.3	-919.0	3,130.9	3,058.7	72.20	43.362		
11,800.0	9,195.0	9,076.2	9,075.2	57.4	8.7	86.57	-5,443.4	-919.1	3,041.2	2,967.7	73.53	41.358		
11,900.0	9,195.0	9,078.9	9,078.0	58.8	8.7	86.69	-5,443.4	-919.2	2,952.2	2,877.3	74.88	39.425		
12,000.0	9,195.0	9,081.5	9,080.6	60.1	8.7	86.80	-5,443.5	-919.2	2,863.9	2,787.7	76.24	37.562		
12,100.0	9,195.0	9,084.1	9,083.1	61.5	8.7	86.90	-5,443.5	-919.3	2,776.4	2,698.8	77.62	35.768		
12,200.0	9,195.0	9,086.5	9,085.6	62.9	8.7	87.01	-5,443.5	-919.3	2,689.8	2,610.7	79.02	34.041		
12,300.0	9,195.0	9,088.9	9,088.0	64.3	8.7	87.11	-5,443.6	-919.4	2,604.1	2,523.6	80.42	32.380		
12,400.0	9,195.0	9,091.2	9,090.3	65.7	8.7	87.20	-5,443.6	-919.5	2,519.4	2,437.6	81.84	30.785		
12,500.0	9,195.0	9,093.5	9,092.5	67.1	8.7	87.30	-5,443.7	-919.5	2,436.0	2,352.7	83.27	29.254		
12,600.0	9,195.0	9,095.7	9,094.7	68.5	8.7	87.39	-5,443.7	-919.6	2,353.8	2,269.1	84.71	27.787		

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
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Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - REDHEAD 31 FEDERAL #1H - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 100- VES GyroFlex, 9674-MWD													Offset Well Error: 3.0 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	
12,700.0	9,195.0	9,097.8	9,096.8	70.0	8.7	87.48	-5,443.7	-919.6	2,273.0	2,186.9	86.16	26.381	
12,800.0	9,195.0	9,099.8	9,098.9	71.4	8.7	87.57	-5,443.8	-919.6	2,193.9	2,106.2	87.62	25.038	
12,900.0	9,195.0	9,101.8	9,100.9	72.9	8.7	87.65	-5,443.8	-919.7	2,116.5	2,027.4	89.09	23.757	
13,000.0	9,195.0	9,103.8	9,102.8	74.4	8.7	87.73	-5,443.8	-919.7	2,041.0	1,950.5	90.57	22.536	
13,100.0	9,195.0	9,105.7	9,104.7	75.8	8.7	87.81	-5,443.9	-919.8	1,967.8	1,875.7	92.05	21.377	
13,200.0	9,195.0	9,107.5	9,106.6	77.3	8.7	87.89	-5,443.9	-919.8	1,897.0	1,803.4	93.55	20.278	
13,300.0	9,195.0	9,109.3	9,108.3	78.8	8.7	87.96	-5,443.9	-919.9	1,828.9	1,733.8	95.05	19.242	
13,400.0	9,195.0	9,111.1	9,110.1	80.3	8.7	88.04	-5,443.9	-919.9	1,763.8	1,667.3	96.55	18.268	
13,500.0	9,195.0	9,112.8	9,111.8	81.8	8.7	88.11	-5,444.0	-919.9	1,702.2	1,604.1	98.07	17.358	
13,600.0	9,195.0	9,114.4	9,113.5	83.3	8.7	88.18	-5,444.0	-920.0	1,644.3	1,544.7	99.58	16.512	
13,700.0	9,195.0	9,116.0	9,115.1	84.8	8.7	88.25	-5,444.0	-920.0	1,590.6	1,489.5	101.11	15.732	
13,800.0	9,195.0	9,117.6	9,116.7	86.4	8.7	88.31	-5,444.0	-920.0	1,541.5	1,438.9	102.64	15.019	
13,900.0	9,195.0	9,115.9	9,114.9	87.9	8.7	88.24	-5,444.0	-920.0	1,497.6	1,393.4	104.16	14.378	
14,000.0	9,195.0	9,117.2	9,116.2	89.4	8.7	88.30	-5,444.0	-920.1	1,459.1	1,353.4	105.70	13.805	
14,100.0	9,195.0	9,118.5	9,117.6	91.0	8.7	88.35	-5,444.0	-920.1	1,426.7	1,319.4	107.24	13.303	
14,200.0	9,195.0	9,119.8	9,118.8	92.5	8.7	88.41	-5,444.1	-920.1	1,400.6	1,291.8	108.79	12.874	
14,300.0	9,195.0	9,121.1	9,120.1	94.1	8.8	88.46	-5,444.1	-920.1	1,381.3	1,270.9	110.34	12.518	
14,400.0	9,195.0	9,122.3	9,121.4	95.6	8.8	88.51	-5,444.1	-920.2	1,369.0	1,257.1	111.90	12.235	
14,500.0	9,195.0	9,123.6	9,122.6	97.2	8.8	88.56	-5,444.1	-920.2	1,364.0	1,250.6	113.46	12.022	
14,518.6	9,195.0	9,123.8	9,122.8	97.4	8.8	88.57	-5,444.1	-920.2	1,363.9	1,250.1	113.75	11.991 CC, ES	
14,600.0	9,195.0	9,124.8	9,123.8	98.7	8.8	88.61	-5,444.1	-920.2	1,366.3	1,251.3	115.02	11.879	
14,700.0	9,195.0	9,126.0	9,125.0	100.3	8.8	88.67	-5,444.1	-920.3	1,375.9	1,259.3	116.58	11.802	
14,800.0	9,195.0	9,127.2	9,126.2	101.8	8.8	88.71	-5,444.2	-920.3	1,392.6	1,274.5	118.15	11.786	
14,900.0	9,195.0	9,128.4	9,127.4	103.4	8.8	88.76	-5,444.2	-920.3	1,416.2	1,296.5	119.73	11.829	
15,000.0	9,195.0	9,129.5	9,128.5	105.0	8.8	88.81	-5,444.2	-920.4	1,446.4	1,325.0	121.30	11.923	
15,100.0	9,195.0	9,130.6	9,129.7	106.6	8.8	88.86	-5,444.2	-920.4	1,482.6	1,359.8	122.88	12.066	
15,200.0	9,195.0	9,131.8	9,130.8	108.1	8.8	88.91	-5,444.2	-920.4	1,524.6	1,400.2	124.46	12.250	
15,300.0	9,195.0	9,132.9	9,131.9	109.7	8.8	88.95	-5,444.2	-920.4	1,571.9	1,445.8	126.05	12.470	
15,400.0	9,195.0	9,134.0	9,133.0	111.3	8.8	89.00	-5,444.3	-920.5	1,623.9	1,496.3	127.63	12.723	
15,500.0	9,195.0	9,135.0	9,134.1	112.9	8.8	89.04	-5,444.3	-920.5	1,680.3	1,551.0	129.22	13.003	
15,600.0	9,195.0	9,136.1	9,135.1	114.5	8.8	89.09	-5,444.3	-920.5	1,740.6	1,609.7	130.81	13.306	
15,700.0	9,195.0	9,137.2	9,136.2	116.0	8.8	89.13	-5,444.3	-920.6	1,804.4	1,672.0	132.40	13.628	
15,800.0	9,195.0	9,138.2	9,137.2	117.6	8.8	89.18	-5,444.3	-920.6	1,871.4	1,737.4	134.00	13.965	
15,900.0	9,195.0	11,677.5	10,491.9	119.2	25.9	134.08	-6,890.8	-926.8	1,920.4	1,775.3	145.12	13.233	
16,000.0	9,195.0	11,767.9	10,488.6	120.8	27.3	134.03	-6,981.1	-925.0	1,916.8	1,768.7	148.12	12.941	
16,100.0	9,195.0	11,834.0	10,487.2	122.4	28.3	134.01	-7,047.2	-924.3	1,915.0	1,764.3	150.75	12.703	
16,200.0	9,195.0	11,944.0	10,485.6	124.0	30.1	133.97	-7,157.2	-923.5	1,914.0	1,759.9	154.08	12.422	
16,273.8	9,195.0	11,986.2	10,485.2	125.2	30.7	133.96	-7,199.4	-923.4	1,913.5	1,757.6	155.93	12.272	
16,300.0	9,195.0	12,003.8	10,485.2	125.6	31.0	133.96	-7,217.0	-923.4	1,913.6	1,757.0	156.63	12.218	
16,400.0	9,195.0	12,091.0	10,485.9	127.2	32.4	133.97	-7,304.2	-923.3	1,914.5	1,754.9	159.61	11.995	
16,500.0	9,195.0	12,208.2	10,488.3	128.8	34.3	134.04	-7,421.4	-921.6	1,915.4	1,752.3	163.09	11.745	
16,600.0	9,195.0	12,314.5	10,491.3	130.4	36.0	134.16	-7,527.5	-918.1	1,915.4	1,749.0	166.40	11.511	
16,700.0	9,195.0	12,419.5	10,493.0	132.0	37.7	134.24	-7,632.5	-915.5	1,915.2	1,745.5	169.71	11.285	
16,800.0	9,195.0	12,540.1	10,494.2	133.6	39.6	134.32	-7,753.1	-912.4	1,914.5	1,741.3	173.27	11.049	
16,900.0	9,195.0	12,640.6	10,494.3	135.2	41.3	134.38	-7,853.5	-909.0	1,912.6	1,736.1	176.52	10.835	
17,000.0	9,195.0	12,724.7	10,494.4	136.9	42.6	134.40	-7,937.5	-907.4	1,911.8	1,732.3	179.50	10.651	
17,100.0	9,195.0	12,828.8	10,495.2	138.5	44.3	134.46	-8,041.7	-904.9	1,911.0	1,728.2	182.81	10.454	
17,200.0	9,195.0	12,928.7	10,496.0	140.1	46.0	134.52	-8,141.5	-902.3	1,910.1	1,724.1	186.06	10.266	
17,300.0	9,195.0	13,024.9	10,496.3	141.7	47.5	134.55	-8,237.7	-900.4	1,909.4	1,720.1	189.24	10.090	
17,400.0	9,195.0	13,134.0	10,495.9	143.3	49.3	134.56	-8,346.8	-899.0	1,908.7	1,716.0	192.64	9.908	
17,500.0	9,195.0	13,243.0	10,494.3	144.9	51.1	134.54	-8,455.7	-897.7	1,907.2	1,711.2	196.04	9.729	
17,600.0	9,195.0	13,319.3	10,493.2	146.5	52.4	134.51	-8,532.1	-897.2	1,906.2	1,707.3	198.91	9.583	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - REDHEAD 31 FEDERAL #1H - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 100- VES GyroFlex, 9674-MWD													Offset Well Error: 3.0 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)			
17,623.1	9,195.0	13,335.9	10,493.0	146.9	52.6	134.51	-8,548.6	-897.2	1,906.1	1,706.6	199.55	9.552	
17,700.0	9,195.0	13,401.1	10,492.5	148.2	53.7	134.48	-8,613.9	-897.8	1,906.4	1,704.6	201.86	9.444	
17,800.0	9,195.0	13,493.1	10,491.9	149.8	55.2	134.43	-8,705.9	-898.8	1,907.3	1,702.3	204.98	9.305	
17,900.0	9,195.0	13,584.3	10,491.7	151.4	56.7	134.39	-8,797.0	-900.0	1,908.5	1,700.4	208.08	9.172	
18,000.0	9,195.0	13,703.4	10,491.5	153.0	58.6	134.33	-8,916.1	-901.8	1,910.0	1,698.3	211.64	9.024	
18,100.0	9,195.0	13,849.5	10,487.1	154.6	61.0	134.20	-9,062.1	-902.7	1,908.5	1,692.9	215.65	8.850	
18,189.3	9,195.0	13,902.2	10,485.6	156.1	61.9	134.15	-9,114.9	-903.1	1,907.7	1,689.7	217.97	8.752	
18,200.0	9,195.0	13,908.5	10,485.5	156.3	62.0	134.15	-9,121.2	-903.2	1,907.7	1,689.4	218.24	8.741	
18,300.0	9,195.0	14,006.7	10,483.9	157.9	63.6	134.07	-9,219.3	-904.9	1,908.2	1,686.7	221.47	8.616	
18,400.0	9,195.0	14,115.8	10,482.0	159.5	65.4	133.98	-9,328.3	-906.2	1,908.3	1,683.4	224.88	8.486	
18,500.0	9,195.0	14,238.0	10,479.8	161.1	67.4	133.92	-9,450.6	-906.2	1,907.4	1,678.9	228.51	8.347	
18,600.0	9,195.0	14,353.6	10,477.2	162.8	69.3	133.87	-9,566.1	-905.4	1,905.9	1,673.8	232.04	8.214	
18,700.0	9,195.0	14,464.4	10,473.5	164.4	71.1	133.79	-9,676.8	-904.4	1,903.3	1,667.8	235.50	8.082	
18,800.0	9,195.0	14,538.6	10,471.2	166.0	72.3	133.75	-9,751.0	-903.8	1,901.1	1,662.7	238.35	7.976	
18,900.0	9,195.0	14,614.5	10,470.0	167.7	73.6	133.71	-9,826.9	-904.0	1,900.6	1,659.4	241.22	7.879	
19,000.0	9,195.0	14,724.1	10,467.9	169.3	75.4	133.63	-9,936.5	-904.8	1,900.2	1,655.5	244.66	7.767	
19,041.5	9,195.0	14,765.7	10,466.9	170.0	76.1	133.59	-9,978.0	-905.2	1,899.9	1,653.9	246.01	7.723	
19,100.0	9,195.0	14,760.0	10,467.0	170.9	76.0	133.60	-9,972.4	-905.1	1,900.7	1,653.8	246.88	7.699	
19,200.0	9,195.0	14,760.0	10,467.0	172.5	76.0	133.60	-9,972.4	-905.1	1,906.1	1,657.6	248.51	7.670	
19,232.7	9,195.0	14,760.0	10,467.0	173.1	76.0	133.60	-9,972.4	-905.1	1,909.0	1,660.0	249.04	7.666 SF	



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - TURQUOIS 30 FEDERAL #1 - OWB - ACTUAL WELLPATH												Offset Site Error:	0.0 usft
Survey Program: 400-INC-ONLY												Offset Well Error:	3.0 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)			
0.0	0.0	34.2	-34.2	3.0	3.0	177.02	-1,716.6	89.4	1,718.9				
100.0	100.0	65.8	65.8	3.0	3.1	177.02	-1,716.6	89.4	1,718.9	1,712.9	6.06	283.695	
200.0	200.0	165.8	165.8	3.0	3.3	177.02	-1,716.6	89.4	1,718.9	1,712.5	6.38	269.414	
300.0	300.0	265.8	265.8	3.1	3.8	177.02	-1,716.6	89.4	1,718.9	1,712.0	6.93	247.980	
400.0	400.0	365.8	365.8	3.2	4.4	177.02	-1,716.6	89.4	1,718.9	1,711.3	7.65	224.694	
500.0	500.0	465.8	465.8	3.4	5.6	177.02	-1,716.6	89.4	1,718.9	1,709.9	9.03	190.399	
547.0	547.0	512.8	512.8	3.5	6.4	177.02	-1,716.5	89.4	1,718.8	1,708.9	9.88	174.054	
600.0	600.0	564.1	564.1	3.6	7.3	177.02	-1,716.5	89.4	1,718.8	1,708.0	10.84	158.572	
700.0	700.0	665.8	665.8	3.8	9.2	177.02	-1,716.6	89.4	1,718.9	1,706.0	12.93	132.952	
800.0	800.0	765.8	765.8	4.0	11.2	177.02	-1,716.6	89.4	1,718.9	1,703.7	15.22	112.950	
900.0	900.0	865.8	865.8	4.2	13.3	177.02	-1,716.6	89.4	1,718.9	1,701.4	17.56	97.905	
939.9	939.9	904.0	904.0	4.3	14.1	177.02	-1,715.5	89.4	1,717.9	1,699.4	18.46	93.037	
1,000.0	1,000.0	960.7	960.7	4.5	15.3	177.02	-1,715.6	89.4	1,718.0	1,698.2	19.82	86.676	
1,100.0	1,100.0	1,055.1	1,055.0	4.8	17.3	177.02	-1,716.1	89.4	1,718.4	1,696.3	22.10	77.769	
1,200.0	1,200.0	1,165.8	1,165.8	5.1	19.7	177.02	-1,716.6	89.4	1,718.9	1,694.1	24.79	69.334	
1,300.0	1,300.0	1,265.8	1,265.8	5.4	22.0	177.02	-1,716.6	89.4	1,718.9	1,691.6	27.35	62.854	
1,396.2	1,396.2	1,362.0	1,362.0	5.6	24.2	177.02	-1,715.3	89.4	1,717.6	1,687.8	29.82	57.603	
1,400.0	1,400.0	1,365.5	1,365.5	5.7	24.3	177.02	-1,715.3	89.4	1,717.6	1,687.7	29.91	57.428	
1,500.0	1,500.0	1,458.3	1,458.2	6.0	26.4	177.02	-1,715.5	89.4	1,717.9	1,685.5	32.32	53.150	
1,600.0	1,600.0	1,551.0	1,550.9	6.3	28.5	177.02	-1,716.1	89.4	1,718.5	1,683.8	34.74	49.466	
1,700.0	1,700.0	1,665.9	1,665.8	6.6	31.2	177.02	-1,716.6	89.4	1,718.9	1,681.2	37.74	45.543	
1,800.0	1,800.0	1,765.9	1,765.8	6.9	33.5	177.02	-1,716.6	89.4	1,718.9	1,678.5	40.45	42.499	
1,883.6	1,883.6	1,849.4	1,849.4	7.2	35.5	177.02	-1,715.2	89.4	1,717.6	1,674.9	42.71	40.214	
1,900.0	1,900.0	1,864.7	1,864.6	7.2	35.9	177.02	-1,715.2	89.4	1,717.6	1,674.4	43.13	39.825	
2,000.0	2,000.0	1,957.8	1,957.7	7.6	38.1	177.02	-1,715.5	89.4	1,717.8	1,672.2	45.67	37.610	
2,100.0	2,100.0	2,050.8	2,050.7	7.9	40.3	177.02	-1,716.1	89.4	1,718.5	1,670.3	48.23	35.635	
2,200.0	2,200.0	2,165.9	2,165.8	8.2	43.3	177.02	-1,716.6	89.4	1,718.9	1,667.4	51.51	33.374	
2,300.0	2,300.0	2,265.9	2,265.8	8.6	46.0	177.02	-1,716.6	89.4	1,718.9	1,664.4	54.53	31.524	
2,372.8	2,372.8	2,338.5	2,338.3	8.8	47.9	177.02	-1,715.1	89.4	1,717.4	1,660.7	56.72	30.277	
2,400.0	2,400.0	2,363.3	2,363.1	8.9	48.6	177.02	-1,715.1	89.4	1,717.4	1,659.9	57.48	29.878	
2,500.0	2,500.0	2,454.6	2,454.5	9.2	51.0	177.02	-1,715.4	89.4	1,717.8	1,657.5	60.27	28.500	
2,600.0	2,600.0	2,546.0	2,545.9	9.6	53.5	177.02	-1,716.3	89.4	1,718.7	1,655.6	63.07	27.250	
2,700.0	2,700.0	2,666.0	2,665.8	9.9	56.9	177.02	-1,716.6	89.4	1,718.9	1,652.1	66.85	25.712	
2,800.0	2,800.0	2,766.0	2,765.8	10.3	59.9	177.02	-1,716.6	89.4	1,718.9	1,648.8	70.12	24.516	
2,854.3	2,854.3	2,820.2	2,820.0	10.4	61.4	177.01	-1,714.4	89.4	1,716.8	1,644.9	71.89	23.882	
2,900.0	2,900.0	2,861.0	2,860.8	10.6	62.6	177.02	-1,714.5	89.4	1,716.8	1,643.6	73.23	23.443	
3,000.0	3,000.0	2,950.3	2,950.1	10.9	65.2	177.02	-1,715.0	89.4	1,717.4	1,641.2	76.19	22.542	
3,100.0	3,100.0	3,039.6	3,039.4	11.3	67.8	177.02	-1,716.1	89.4	1,718.7	1,639.5	79.14	21.717	
3,200.0	3,200.0	3,166.1	3,165.8	11.6	71.6	177.02	-1,716.6	89.4	1,718.9	1,635.7	83.20	20.659	
3,300.0	3,300.0	3,266.1	3,265.8	12.0	74.5	177.02	-1,716.6	89.4	1,718.9	1,632.4	86.50	19.872	
3,352.2	3,352.2	3,318.2	3,317.9	12.2	76.1	177.01	-1,714.4	89.4	1,716.7	1,628.5	88.22	19.461	
3,400.0	3,400.0	3,360.9	3,360.6	12.3	77.3	177.02	-1,714.5	89.4	1,716.8	1,627.2	89.64	19.152	
3,500.0	3,500.0	3,450.3	3,450.0	12.7	79.9	177.02	-1,715.0	89.4	1,717.4	1,624.8	92.62	18.542	
3,600.0	3,600.0	3,539.7	3,539.4	13.0	82.6	177.02	-1,716.1	89.4	1,718.7	1,623.1	95.61	17.976	
3,700.0	3,700.0	3,647.2	3,646.8	13.4	86.2	177.02	-1,716.3	89.4	1,718.8	1,619.2	99.56	17.263	
3,746.1	3,746.1	3,712.1	3,711.7	13.5	88.9	177.02	-1,715.9	89.4	1,718.3	1,615.8	102.47	16.768	
3,800.0	3,800.0	3,738.6	3,738.2	13.7	90.1	177.02	-1,716.1	89.4	1,718.7	1,614.8	103.85	16.549	
3,882.4	3,882.4	3,848.6	3,848.1	14.0	95.3	177.02	-1,716.2	89.4	1,718.5	1,609.2	109.34	15.717	
3,900.0	3,900.0	3,854.5	3,854.0	14.1	95.6	177.02	-1,716.2	89.4	1,718.6	1,608.9	109.67	15.671	
4,000.0	4,000.0	3,963.3	3,962.7	14.4	100.6	177.02	-1,716.3	89.4	1,718.7	1,603.6	115.07	14.935	
4,100.0	4,100.0	4,066.4	4,065.8	14.8	104.9	177.02	-1,716.6	89.4	1,718.9	1,599.3	119.68	14.363	
4,200.0	4,200.0	4,166.5	4,165.8	15.1	109.0	177.02	-1,716.6	89.4	1,718.9	1,594.7	124.18	13.843	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - TURQUOIS 30 FEDERAL #1 - OWB - ACTUAL WELLPATH													Offset Site Error:
Survey Program: 400-INC-ONLY													0.0 usft
Reference		Offset		Semi Major Axis		Distance		Minimum Separation		Separation Factor		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	Warning
4,233.6	4,233.6	4,196.7	4,196.0	15.2	110.2	177.02	-1,716.2	89.4	1,718.5	1,593.0	125.48	13.695	
4,300.0	4,300.0	4,260.8	4,260.0	15.5	112.4	177.02	-1,716.2	89.4	1,718.6	1,590.7	127.91	13.436	
4,400.0	4,400.0	4,366.6	4,365.8	15.8	114.8	177.02	-1,716.6	89.4	1,718.9	1,588.3	130.65	13.156	
4,446.4	4,446.4	4,412.6	4,411.8	16.0	115.7	177.02	-1,716.4	89.4	1,718.7	1,587.0	131.71	13.050	
4,500.0	4,500.0	4,457.7	4,456.9	16.2	116.6	177.02	-1,716.5	89.4	1,718.9	1,586.1	132.76	12.947	
4,600.0	4,600.0	4,566.6	4,565.8	16.5	118.7	177.02	-1,716.6	89.4	1,718.9	1,583.7	135.23	12.711	
4,700.0	4,700.0	4,666.6	4,665.8	16.9	120.6	177.02	-1,716.6	89.4	1,718.9	1,581.4	137.53	12.499	
4,752.0	4,752.0	4,718.5	4,717.7	17.1	121.6	177.02	-1,715.5	89.4	1,717.8	1,579.1	138.72	12.384	
4,800.0	4,800.0	4,763.8	4,763.0	17.2	122.5	177.02	-1,715.6	89.4	1,717.9	1,578.1	139.77	12.291	
4,900.0	4,900.0	4,858.1	4,857.3	17.6	124.4	177.02	-1,715.9	89.4	1,718.2	1,576.3	141.95	12.104	
5,000.0	5,000.0	4,952.4	4,951.6	18.0	126.2	177.02	-1,716.5	89.4	1,718.9	1,574.7	144.14	11.925	
5,100.0	5,100.0	5,066.6	5,065.8	18.3	128.5	177.02	-1,716.6	89.4	1,718.9	1,572.1	146.84	11.706	
5,200.0	5,200.0	5,166.6	5,165.8	18.7	130.6	177.02	-1,716.6	89.4	1,718.9	1,569.7	149.26	11.516	
5,251.9	5,251.9	5,218.3	5,217.5	18.8	131.7	177.02	-1,715.8	89.4	1,718.1	1,567.6	150.52	11.415	
5,300.0	5,300.0	5,264.4	5,263.6	19.0	132.6	177.02	-1,715.8	89.4	1,718.1	1,566.5	151.64	11.331	
5,400.0	5,400.0	5,360.1	5,359.3	19.4	134.6	177.02	-1,716.1	89.4	1,718.4	1,564.4	153.97	11.160	
5,500.0	5,500.0	5,455.8	5,455.0	19.7	136.6	177.02	-1,716.5	89.4	1,718.9	1,562.6	156.31	10.997	
5,600.0	5,600.0	5,566.6	5,565.8	20.1	139.1	177.02	-1,716.6	89.4	1,718.9	1,559.7	159.19	10.798	
5,700.0	5,700.0	5,666.6	5,665.8	20.4	141.4	177.02	-1,716.6	89.4	1,718.9	1,557.1	161.85	10.621	
5,752.0	5,752.0	5,718.3	5,717.5	20.6	142.6	177.02	-1,715.2	89.4	1,717.6	1,554.3	163.22	10.523	
5,800.0	5,800.0	5,763.0	5,762.2	20.8	143.6	177.02	-1,715.3	89.4	1,717.6	1,553.2	164.42	10.447	
5,900.0	5,900.0	5,856.1	5,855.3	21.1	145.8	177.02	-1,715.7	89.4	1,718.0	1,551.1	166.92	10.293	
6,000.0	6,000.0	5,949.2	5,948.3	21.5	147.9	177.02	-1,716.4	89.4	1,718.8	1,549.4	169.41	10.146	
6,100.0	6,100.0	6,066.6	6,065.8	21.8	150.9	177.02	-1,716.6	89.4	1,718.9	1,546.2	172.70	9.953	
6,200.0	6,200.0	6,166.6	6,165.8	22.2	153.4	177.02	-1,716.6	89.4	1,718.9	1,543.3	175.58	9.790	
6,240.9	6,240.9	6,207.1	6,206.2	22.3	154.4	177.02	-1,715.3	89.4	1,717.6	1,540.9	176.75	9.718	
6,300.0	6,300.0	6,261.8	6,261.0	22.6	155.8	177.02	-1,715.4	89.4	1,717.7	1,539.4	178.34	9.632	
6,400.0	6,400.0	6,354.5	6,353.6	22.9	158.1	177.02	-1,715.9	89.4	1,718.2	1,537.2	181.04	9.491	
6,500.0	6,500.0	6,466.7	6,465.8	23.3	161.1	177.02	-1,716.6	89.4	1,718.9	1,534.6	184.32	9.326	
6,600.0	6,600.0	6,566.7	6,565.8	23.6	163.9	177.02	-1,716.6	89.4	1,718.9	1,531.4	187.54	9.166	
6,700.0	6,700.0	6,666.7	6,665.8	24.0	166.8	177.02	-1,716.6	89.4	1,718.9	1,528.2	190.76	9.011	
6,740.7	6,740.7	6,705.5	6,704.6	24.1	167.9	177.02	-1,714.7	89.4	1,717.0	1,525.0	192.02	8.942	
6,800.0	6,800.0	6,759.2	6,758.3	24.3	169.4	177.02	-1,714.8	89.4	1,717.2	1,523.4	193.76	8.862	
6,900.0	6,900.0	6,849.8	6,848.9	24.7	172.0	177.02	-1,715.5	89.4	1,717.9	1,521.2	196.71	8.733	
7,000.0	7,000.0	6,966.8	6,965.8	25.0	175.3	177.02	-1,716.6	89.4	1,718.9	1,518.5	200.38	8.578	
7,100.0	7,100.0	7,066.8	7,065.8	25.4	178.1	177.02	-1,716.6	89.4	1,718.9	1,515.4	203.49	8.447	
7,200.0	7,200.0	7,166.8	7,165.8	25.8	180.8	177.02	-1,716.6	89.4	1,718.9	1,512.3	206.60	8.320	
7,240.7	7,240.7	7,205.4	7,204.4	25.9	181.9	177.01	-1,714.4	89.4	1,716.8	1,509.0	207.80	8.262	
7,300.0	7,300.0	7,258.3	7,257.3	26.1	183.4	177.02	-1,714.6	89.4	1,716.9	1,507.5	209.47	8.197	
7,400.0	7,400.0	7,347.7	7,346.6	26.5	185.8	177.02	-1,715.3	89.4	1,717.8	1,505.5	212.28	8.092	
7,500.0	7,500.0	7,466.9	7,465.8	26.8	189.1	177.02	-1,716.6	89.4	1,718.9	1,503.0	215.89	7.962	
7,600.0	7,600.0	7,566.9	7,565.8	27.2	191.7	177.02	-1,716.6	89.4	1,718.9	1,500.0	218.88	7.853	
7,700.0	7,700.0	7,666.9	7,665.8	27.5	194.3	177.02	-1,716.6	89.4	1,718.9	1,497.1	221.88	7.747	
7,739.5	7,739.5	7,703.6	7,702.5	27.7	195.3	177.02	-1,715.1	89.4	1,717.4	1,494.4	222.99	7.702	
7,800.0	7,800.0	7,758.9	7,757.8	27.9	196.8	177.02	-1,715.2	89.4	1,717.6	1,492.9	224.66	7.645	
7,900.0	7,900.0	7,850.3	7,849.2	28.3	199.2	177.02	-1,715.9	89.4	1,718.3	1,490.9	227.43	7.555	
8,000.0	8,000.0	7,966.9	7,965.8	28.6	202.3	177.02	-1,716.6	89.4	1,718.9	1,488.1	230.86	7.446	
8,100.0	8,100.0	8,066.9	8,065.8	29.0	204.9	177.02	-1,716.6	89.4	1,718.9	1,485.1	233.86	7.350	
8,195.2	8,195.2	8,162.1	8,160.9	29.3	207.4	177.02	-1,714.7	89.4	1,717.0	1,480.3	236.71	7.254	
8,200.0	8,200.0	8,166.4	8,165.3	29.3	207.5	177.02	-1,714.7	89.4	1,717.0	1,480.2	236.84	7.250	
8,300.0	8,300.0	8,257.0	8,255.9	29.7	209.9	177.02	-1,715.0	89.4	1,717.3	1,477.7	239.58	7.168	
8,400.0	8,400.0	8,347.6	8,346.4	30.0	212.3	177.02	-1,715.7	89.4	1,718.2	1,475.8	242.33	7.090	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - TURQUOIS 30 FEDERAL #1 - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 400-INC-ONLY													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	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)					
8,500.0	8,500.0	8,467.0	8,465.8	30.4	215.4	177.02	-1,716.6	89.4	1,718.9	1,473.1	245.84	6.992	
8,600.0	8,600.0	8,567.0	8,565.8	30.7	218.1	177.02	-1,716.6	89.4	1,718.9	1,470.1	248.83	6.908	
8,700.0	8,700.0	8,667.0	8,665.8	31.1	220.7	177.02	-1,716.6	89.4	1,718.9	1,467.1	251.83	6.826	
8,717.5	8,717.5	8,684.5	8,683.3	31.2	221.2	177.02	-1,716.6	89.4	1,718.9	1,466.6	252.35	6.812	
8,725.0	8,725.0	8,692.0	8,690.8	31.2	221.4	26.32	-1,716.6	89.4	1,718.9	1,466.3	252.58	6.805	
8,750.0	8,750.0	8,717.0	8,715.8	31.3	222.0	26.39	-1,716.6	89.4	1,717.9	1,464.6	253.31	6.782	
8,775.0	8,774.9	8,741.9	8,740.7	31.4	222.7	26.54	-1,716.6	89.4	1,715.8	1,461.8	254.05	6.754	
8,800.0	8,799.6	8,766.6	8,765.4	31.4	223.3	26.77	-1,716.6	89.4	1,712.6	1,457.8	254.79	6.722	
8,825.0	8,824.1	8,750.0	8,748.8	31.5	222.9	26.94	-1,716.6	89.4	1,708.6	1,454.2	254.43	6.716	
8,850.0	8,848.3	8,750.0	8,748.8	31.6	222.9	27.21	-1,716.6	89.4	1,703.8	1,449.3	254.51	6.695	
8,875.0	8,872.2	8,750.0	8,748.8	31.7	222.9	27.53	-1,716.6	89.4	1,698.2	1,443.7	254.58	6.671	
8,900.0	8,895.6	8,750.0	8,748.8	31.7	222.9	27.90	-1,716.6	89.4	1,691.9	1,437.2	254.66	6.644	
8,925.0	8,918.5	8,750.0	8,748.8	31.8	222.9	28.32	-1,716.6	89.4	1,684.7	1,430.0	254.74	6.614	
8,950.0	8,940.9	8,750.0	8,748.8	31.9	222.9	28.80	-1,716.6	89.4	1,676.8	1,422.0	254.81	6.581	
8,975.0	8,962.7	8,750.0	8,748.8	32.0	222.9	29.33	-1,716.6	89.4	1,668.2	1,413.3	254.89	6.545	
9,000.0	8,983.8	8,750.0	8,748.8	32.1	222.9	29.93	-1,716.6	89.4	1,658.8	1,403.8	254.97	6.506	
9,025.0	9,004.2	8,750.0	8,748.8	32.1	222.9	30.60	-1,716.6	89.4	1,648.7	1,393.6	255.04	6.464	
9,050.0	9,023.8	8,750.0	8,748.8	32.2	222.9	31.35	-1,716.6	89.4	1,637.8	1,382.7	255.12	6.420	
9,075.0	9,042.5	8,750.0	8,748.8	32.3	222.9	32.17	-1,716.6	89.4	1,626.3	1,371.1	255.20	6.373	
9,100.0	9,060.4	8,750.0	8,748.8	32.4	222.9	33.07	-1,716.6	89.4	1,614.1	1,358.8	255.28	6.323	
9,125.0	9,077.3	8,750.0	8,748.8	32.4	222.9	34.06	-1,716.6	89.4	1,601.3	1,345.9	255.36	6.271	
9,150.0	9,093.2	8,750.0	8,748.8	32.5	222.9	35.16	-1,716.6	89.4	1,587.8	1,332.3	255.45	6.216	
9,175.0	9,108.1	8,750.0	8,748.8	32.6	222.9	36.36	-1,716.6	89.4	1,573.6	1,318.1	255.53	6.158	
9,200.0	9,122.0	8,750.0	8,748.8	32.7	222.9	37.67	-1,716.6	89.4	1,558.9	1,303.3	255.63	6.098	
9,225.0	9,134.7	8,750.0	8,748.8	32.8	222.9	39.11	-1,716.6	89.4	1,543.7	1,287.9	255.72	6.036	
9,250.0	9,146.3	8,750.0	8,748.8	32.9	222.9	40.68	-1,716.6	89.4	1,527.8	1,272.0	255.82	5.972	
9,275.0	9,156.7	8,750.0	8,748.8	33.0	222.9	42.40	-1,716.6	89.4	1,511.5	1,255.5	255.93	5.906	
9,300.0	9,165.9	8,750.0	8,748.8	33.1	222.9	44.28	-1,716.6	89.4	1,494.6	1,238.6	256.04	5.837	
9,325.0	9,173.9	8,750.0	8,748.8	33.2	222.9	46.32	-1,716.6	89.4	1,477.3	1,221.2	256.16	5.767	
9,350.0	9,180.6	8,750.0	8,748.8	33.4	222.9	48.55	-1,716.6	89.4	1,459.6	1,203.3	256.28	5.695	
9,375.0	9,186.1	8,750.0	8,748.8	33.5	222.9	50.96	-1,716.6	89.4	1,441.5	1,185.1	256.40	5.622	
9,400.0	9,190.2	8,750.0	8,748.8	33.6	222.9	53.56	-1,716.6	89.4	1,423.0	1,166.4	256.54	5.547	
9,425.0	9,193.1	8,750.0	8,748.8	33.8	222.9	56.37	-1,716.6	89.4	1,404.2	1,147.5	256.67	5.471	
9,450.0	9,194.7	8,750.0	8,748.8	33.9	222.9	59.38	-1,716.6	89.4	1,385.1	1,128.3	256.81	5.393	
9,467.6	9,195.0	8,750.0	8,748.8	34.0	222.9	61.60	-1,716.6	89.4	1,371.5	1,114.6	256.92	5.338	
9,500.0	9,195.0	8,750.0	8,748.8	34.2	222.9	60.83	-1,716.6	89.4	1,346.3	1,089.2	257.11	5.236	
9,600.0	9,195.0	8,750.0	8,748.8	34.9	222.9	58.29	-1,716.6	89.4	1,268.1	1,010.3	257.78	4.919	
9,700.0	9,195.0	8,750.0	8,748.8	35.6	222.9	55.48	-1,716.6	89.4	1,189.2	930.7	258.52	4.600	
9,800.0	9,195.0	8,750.0	8,748.8	36.4	222.9	52.43	-1,716.6	89.4	1,109.9	850.6	259.31	4.280	
9,900.0	9,195.0	8,750.0	8,748.8	37.2	222.9	49.14	-1,716.6	89.4	1,030.6	770.5	260.12	3.962	
10,000.0	9,195.0	8,750.0	8,748.8	38.0	222.9	45.66	-1,716.6	89.4	951.8	690.8	260.95	3.647	
10,100.0	9,195.0	8,750.0	8,748.8	38.9	222.9	42.08	-1,716.6	89.4	873.8	612.1	261.77	3.338	
10,191.3	9,195.0	8,750.0	8,748.8	39.6	222.9	38.79	-1,716.6	89.4	804.1	541.6	262.51	3.063	
10,200.0	9,195.0	8,750.0	8,748.8	39.7	222.9	38.79	-1,716.6	89.4	797.6	535.0	262.58	3.038	
10,300.0	9,195.0	8,750.0	8,748.8	40.5	222.9	38.79	-1,716.6	89.4	725.8	462.3	263.41	2.755	
10,400.0	9,195.0	8,750.0	8,748.8	41.4	222.9	38.79	-1,716.6	89.4	661.3	397.0	264.28	2.502	
10,500.0	9,195.0	8,750.0	8,748.8	42.3	222.9	38.79	-1,716.6	89.4	606.5	341.3	265.21	2.287	
10,600.0	9,195.0	8,750.0	8,748.8	43.3	222.9	38.79	-1,716.6	89.4	564.2	298.1	266.18	2.120	
10,700.0	9,195.0	8,750.0	8,748.8	44.3	222.9	38.79	-1,716.6	89.4	537.5	270.3	267.19	2.012	
10,797.2	9,195.0	8,750.0	8,748.8	45.3	222.9	38.79	-1,716.6	89.4	528.6	260.4	268.21	1.971 Advise and Monitor, CC	
10,800.0	9,195.0	8,750.0	8,748.8	45.3	222.9	38.79	-1,716.6	89.4	528.6	260.4	268.24	1.971 Advise and Monitor, ES, SF	
10,900.0	9,195.0	8,750.0	8,748.8	46.4	222.9	38.79	-1,716.6	89.4	538.5	269.2	269.32	2.000 Advise and Monitor	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - TURQUOIS 30 FEDERAL #1 - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 400-INC-ONLY													Offset Well Error: 3.0 usft
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)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
11,000.0	9,195.0	8,750.0	8,748.8	47.5	222.9	38.79	-1,716.6	89.4	566.2	295.7	270.44	2.094	
11,100.0	9,195.0	8,750.0	8,748.8	48.7	222.9	38.79	-1,716.6	89.4	609.2	337.6	271.59	2.243	
11,200.0	9,195.0	8,750.0	8,748.8	49.9	222.9	38.79	-1,716.6	89.4	664.6	391.8	272.77	2.436	
11,300.0	9,195.0	8,750.0	8,748.8	51.1	222.9	38.79	-1,716.6	89.4	729.5	455.6	273.98	2.663	
11,400.0	9,195.0	8,750.0	8,748.8	52.3	222.9	38.79	-1,716.6	89.4	801.7	526.5	275.21	2.913	
11,500.0	9,195.0	8,750.0	8,748.8	53.6	222.9	38.79	-1,716.6	89.4	879.4	602.9	276.46	3.181	
11,600.0	9,195.0	8,750.0	8,748.8	54.8	222.9	38.79	-1,716.6	89.4	961.2	683.4	277.74	3.461	
11,700.0	9,195.0	8,750.0	8,748.8	56.1	222.9	38.79	-1,716.6	89.4	1,046.1	767.1	279.04	3.749	
11,800.0	9,195.0	8,750.0	8,748.8	57.4	222.9	38.79	-1,716.6	89.4	1,133.6	853.2	280.36	4.043	
11,900.0	9,195.0	8,750.0	8,748.8	58.8	222.9	38.79	-1,716.6	89.4	1,222.9	941.2	281.69	4.341	
12,000.0	9,195.0	8,750.0	8,748.8	60.1	222.9	38.79	-1,716.6	89.4	1,313.8	1,030.8	283.05	4.642	
12,100.0	9,195.0	8,750.0	8,748.8	61.5	222.9	38.79	-1,716.6	89.4	1,405.9	1,121.5	284.41	4.943	
12,200.0	9,195.0	8,750.0	8,748.8	62.9	222.9	38.79	-1,716.6	89.4	1,499.1	1,213.3	285.79	5.245	
12,300.0	9,195.0	8,750.0	8,748.8	64.3	222.9	38.79	-1,716.6	89.4	1,593.0	1,305.8	287.19	5.547	
12,400.0	9,195.0	8,750.0	8,748.8	65.7	222.9	38.79	-1,716.6	89.4	1,687.7	1,399.1	288.60	5.848	
12,500.0	9,195.0	8,750.0	8,748.8	67.1	222.9	38.79	-1,716.6	89.4	1,782.9	1,492.9	290.02	6.148	
12,600.0	9,195.0	8,750.0	8,748.8	68.5	222.9	38.79	-1,716.6	89.4	1,878.7	1,587.2	291.45	6.446	
12,700.0	9,195.0	8,750.0	8,748.8	70.0	222.9	38.79	-1,716.6	89.4	1,974.8	1,681.9	292.89	6.743	
12,800.0	9,195.0	8,750.0	8,748.8	71.4	222.9	38.79	-1,716.6	89.4	2,071.3	1,777.0	294.34	7.037	
12,900.0	9,195.0	8,750.0	8,748.8	72.9	222.9	38.79	-1,716.6	89.4	2,168.2	1,872.4	295.80	7.330	
13,000.0	9,195.0	8,750.0	8,748.8	74.4	222.9	38.79	-1,716.6	89.4	2,265.3	1,968.0	297.27	7.620	
13,100.0	9,195.0	8,750.0	8,748.8	75.8	222.9	38.79	-1,716.6	89.4	2,362.7	2,063.9	298.75	7.909	
13,200.0	9,195.0	8,750.0	8,748.8	77.3	222.9	38.79	-1,716.6	89.4	2,460.2	2,160.0	300.23	8.194	
13,300.0	9,195.0	8,750.0	8,748.8	78.8	222.9	38.79	-1,716.6	89.4	2,558.0	2,256.2	301.72	8.478	
13,400.0	9,195.0	8,750.0	8,748.8	80.3	222.9	38.79	-1,716.6	89.4	2,655.9	2,352.7	303.22	8.759	
13,500.0	9,195.0	8,750.0	8,748.8	81.8	222.9	38.79	-1,716.6	89.4	2,754.0	2,449.2	304.73	9.037	
13,600.0	9,195.0	8,750.0	8,748.8	83.3	222.9	38.79	-1,716.6	89.4	2,852.2	2,545.9	306.24	9.314	
13,700.0	9,195.0	8,750.0	8,748.8	84.8	222.9	38.79	-1,716.6	89.4	2,950.5	2,642.7	307.76	9.587	
13,800.0	9,195.0	8,750.0	8,748.8	86.4	222.9	38.79	-1,716.6	89.4	3,048.9	2,739.6	309.28	9.858	
13,900.0	9,195.0	8,750.0	8,748.8	87.9	222.9	38.79	-1,716.6	89.4	3,147.5	2,836.7	310.81	10.127	
14,000.0	9,195.0	8,750.0	8,748.8	89.4	222.9	38.79	-1,716.6	89.4	3,246.1	2,933.7	312.34	10.393	
14,100.0	9,195.0	8,750.0	8,748.8	91.0	222.9	38.79	-1,716.6	89.4	3,344.8	3,030.9	313.88	10.656	
14,200.0	9,195.0	8,750.0	8,748.8	92.5	222.9	38.79	-1,716.6	89.4	3,443.6	3,128.1	315.42	10.917	
14,300.0	9,195.0	8,750.0	8,748.8	94.1	222.9	38.79	-1,716.6	89.4	3,542.4	3,225.5	316.97	11.176	
14,400.0	9,195.0	8,750.0	8,748.8	95.6	222.9	38.79	-1,716.6	89.4	3,641.3	3,322.8	318.52	11.432	
14,500.0	9,195.0	8,750.0	8,748.8	97.2	222.9	38.79	-1,716.6	89.4	3,740.3	3,420.2	320.07	11.686	
14,600.0	9,195.0	8,750.0	8,748.8	98.7	222.9	38.79	-1,716.6	89.4	3,839.3	3,517.7	321.63	11.937	
14,700.0	9,195.0	8,750.0	8,748.8	100.3	222.9	38.79	-1,716.6	89.4	3,938.4	3,615.2	323.19	12.186	
14,800.0	9,195.0	8,750.0	8,748.8	101.8	222.9	38.79	-1,716.6	89.4	4,037.5	3,712.8	324.75	12.433	
14,900.0	9,195.0	8,750.0	8,748.8	103.4	222.9	38.79	-1,716.6	89.4	4,136.7	3,810.3	326.32	12.677	
15,000.0	9,195.0	8,750.0	8,748.8	105.0	222.9	38.79	-1,716.6	89.4	4,235.9	3,908.0	327.89	12.919	
15,100.0	9,195.0	8,750.0	8,748.8	106.6	222.9	38.79	-1,716.6	89.4	4,335.1	4,005.6	329.46	13.158	
15,200.0	9,195.0	8,750.0	8,748.8	108.1	222.9	38.79	-1,716.6	89.4	4,434.4	4,103.3	331.04	13.395	
15,300.0	9,195.0	8,750.0	8,748.8	109.7	222.9	38.79	-1,716.6	89.4	4,533.7	4,201.1	332.62	13.630	
15,400.0	9,195.0	8,750.0	8,748.8	111.3	222.9	38.79	-1,716.6	89.4	4,633.0	4,298.8	334.20	13.863	
15,500.0	9,195.0	8,750.0	8,748.8	112.9	222.9	38.79	-1,716.6	89.4	4,732.4	4,396.6	335.78	14.094	
15,600.0	9,195.0	8,750.0	8,748.8	114.5	222.9	38.79	-1,716.6	89.4	4,831.8	4,494.4	337.37	14.322	
15,700.0	9,195.0	8,750.0	8,748.8	116.0	222.9	38.79	-1,716.6	89.4	4,931.2	4,592.2	338.96	14.548	
15,800.0	9,195.0	8,750.0	8,748.8	117.6	222.9	38.79	-1,716.6	89.4	5,030.6	4,690.1	340.55	14.772	
15,900.0	9,195.0	8,750.0	8,748.8	119.2	222.9	38.79	-1,716.6	89.4	5,130.1	4,787.9	342.14	14.994	
16,000.0	9,195.0	8,750.0	8,748.8	120.8	222.9	38.79	-1,716.6	89.4	5,229.5	4,885.8	343.73	15.214	
16,100.0	9,195.0	8,750.0	8,748.8	122.4	222.9	38.79	-1,716.6	89.4	5,329.0	4,983.7	345.33	15.432	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - TURQUOIS 30 FEDERAL #1 - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 400-INC-ONLY													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	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)					
16,200.0	9,195.0	8,750.0	8,748.8	124.0	222.9	38.79	-1,716.6	89.4	5,428.6	5,081.6	346.93	15.647	
16,300.0	9,195.0	8,750.0	8,748.8	125.6	222.9	38.79	-1,716.6	89.4	5,528.1	5,179.6	348.53	15.861	
16,400.0	9,195.0	8,750.0	8,748.8	127.2	222.9	38.79	-1,716.6	89.4	5,627.6	5,277.5	350.13	16.073	
16,500.0	9,195.0	8,750.0	8,748.8	128.8	222.9	38.79	-1,716.6	89.4	5,727.2	5,375.5	351.73	16.283	
16,600.0	9,195.0	8,750.0	8,748.8	130.4	222.9	38.79	-1,716.6	89.4	5,826.8	5,473.4	353.34	16.491	
16,700.0	9,195.0	8,750.0	8,748.8	132.0	222.9	38.79	-1,716.6	89.4	5,926.4	5,571.4	354.94	16.697	
16,800.0	9,195.0	8,750.0	8,748.8	133.6	222.9	38.79	-1,716.6	89.4	6,026.0	5,669.4	356.55	16.901	
16,900.0	9,195.0	8,750.0	8,748.8	135.2	222.9	38.79	-1,716.6	89.4	6,125.6	5,767.4	358.16	17.103	
17,000.0	9,195.0	8,750.0	8,748.8	136.9	222.9	38.79	-1,716.6	89.4	6,225.2	5,865.5	359.77	17.303	
17,100.0	9,195.0	8,750.0	8,748.8	138.5	222.9	38.79	-1,716.6	89.4	6,324.9	5,963.5	361.38	17.502	
17,200.0	9,195.0	8,750.0	8,748.8	140.1	222.9	38.79	-1,716.6	89.4	6,424.5	6,061.5	363.00	17.699	
17,300.0	9,195.0	8,750.0	8,748.8	141.7	222.9	38.79	-1,716.6	89.4	6,524.2	6,159.6	364.61	17.894	
17,400.0	9,195.0	8,750.0	8,748.8	143.3	222.9	38.79	-1,716.6	89.4	6,623.9	6,257.7	366.22	18.087	
17,500.0	9,195.0	8,750.0	8,748.8	144.9	222.9	38.79	-1,716.6	89.4	6,723.6	6,355.7	367.84	18.278	
17,600.0	9,195.0	8,750.0	8,748.8	146.5	222.9	38.79	-1,716.6	89.4	6,823.3	6,453.8	369.46	18.468	
17,700.0	9,195.0	8,750.0	8,748.8	148.2	222.9	38.79	-1,716.6	89.4	6,923.0	6,551.9	371.08	18.656	
17,800.0	9,195.0	8,750.0	8,748.8	149.8	222.9	38.79	-1,716.6	89.4	7,022.7	6,650.0	372.70	18.843	
17,900.0	9,195.0	8,750.0	8,748.8	151.4	222.9	38.79	-1,716.6	89.4	7,122.4	6,748.1	374.32	19.028	
18,000.0	9,195.0	8,750.0	8,748.8	153.0	222.9	38.79	-1,716.6	89.4	7,222.1	6,846.2	375.94	19.211	
18,100.0	9,195.0	8,750.0	8,748.8	154.6	222.9	38.79	-1,716.6	89.4	7,321.9	6,944.3	377.56	19.393	
18,200.0	9,195.0	8,750.0	8,748.8	156.3	222.9	38.79	-1,716.6	89.4	7,421.6	7,042.4	379.18	19.573	
18,300.0	9,195.0	8,750.0	8,748.8	157.9	222.9	38.79	-1,716.6	89.4	7,521.4	7,140.5	380.81	19.751	
18,400.0	9,195.0	8,750.0	8,748.8	159.5	222.9	38.79	-1,716.6	89.4	7,621.1	7,238.7	382.43	19.928	
18,500.0	9,195.0	8,750.0	8,748.8	161.1	222.9	38.79	-1,716.6	89.4	7,720.9	7,336.8	384.06	20.103	
18,600.0	9,195.0	8,750.0	8,748.8	162.8	222.9	38.79	-1,716.6	89.4	7,820.6	7,435.0	385.69	20.277	
18,700.0	9,195.0	8,750.0	8,748.8	164.4	222.9	38.79	-1,716.6	89.4	7,920.4	7,533.1	387.31	20.450	
18,800.0	9,195.0	8,750.0	8,748.8	166.0	222.9	38.79	-1,716.6	89.4	8,020.2	7,631.3	388.94	20.621	
18,900.0	9,195.0	8,750.0	8,748.8	167.7	222.9	38.79	-1,716.6	89.4	8,120.0	7,729.4	390.57	20.790	
19,000.0	9,195.0	8,750.0	8,748.8	169.3	222.9	38.79	-1,716.6	89.4	8,219.8	7,827.6	392.20	20.958	
19,100.0	9,195.0	8,750.0	8,748.8	170.9	222.9	38.79	-1,716.6	89.4	8,319.6	7,925.7	393.83	21.125	
19,200.0	9,195.0	8,750.0	8,748.8	172.5	222.9	38.79	-1,716.6	89.4	8,419.4	8,023.9	395.46	21.290	
19,232.7	9,195.0	8,750.0	8,748.8	173.1	222.9	38.79	-1,716.6	89.4	8,452.0	8,056.0	395.99	21.344	



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - WINDWARD FEDERAL #2H - LATERAL 01 - AWP-LATERAL													Offset Site Error: 0.0 usft
Survey Program: 100- VES GyroFlex, 9743-MWD													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	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)	+E/-W (usft)					
0.0	0.0	4.7	4.7	3.0	3.0	-82.81	19.0	-150.5	151.7				
100.0	100.0	104.2	104.2	3.0	3.0	-83.07	18.3	-150.8	151.9	145.9	6.00	25.295	
200.0	200.0	203.5	203.5	3.0	3.0	-83.54	17.1	-151.5	152.4	146.4	6.05	25.207	
300.0	300.0	303.9	303.9	3.1	3.0	-83.99	16.0	-152.3	153.1	147.0	6.14	24.933	
400.0	400.0	403.8	403.8	3.2	3.0	-84.41	15.0	-152.9	153.7	147.4	6.28	24.470	
500.0	500.0	504.0	503.9	3.4	3.1	-84.81	13.9	-153.6	154.2	147.7	6.46	23.867	
600.0	600.0	604.1	604.1	3.6	3.1	-85.17	13.0	-154.1	154.7	148.0	6.68	23.155	
700.0	700.0	703.6	703.6	3.8	3.2	-85.50	12.2	-154.8	155.2	148.3	6.93	22.402	
800.0	800.0	802.5	802.4	4.0	3.2	-85.89	11.2	-156.0	156.4	149.2	7.21	21.695	
900.0	900.0	904.1	904.0	4.2	3.3	-86.53	9.5	-157.0	157.3	149.8	7.51	20.946	
1,000.0	1,000.0	1,005.5	1,005.4	4.5	3.3	-87.30	7.4	-157.1	157.3	149.5	7.83	20.093	
1,100.0	1,100.0	1,106.1	1,105.9	4.8	3.4	-88.01	5.4	-156.6	156.7	148.6	8.16	19.217	
1,200.0	1,200.0	1,207.9	1,207.8	5.1	3.4	-88.66	3.6	-155.3	155.3	146.9	8.49	18.307	
1,300.0	1,300.0	1,306.8	1,306.6	5.4	3.5	-89.43	1.5	-153.8	153.9	145.0	8.83	17.431	
1,400.0	1,400.0	1,407.4	1,407.2	5.7	3.5	-90.05	-0.1	-152.4	152.4	143.2	9.18	16.607	
1,500.0	1,500.0	1,507.9	1,507.7	6.0	3.6	-90.50	-1.3	-150.6	150.6	141.1	9.53	15.810	
1,600.0	1,600.0	1,607.9	1,607.7	6.3	3.6	-90.91	-2.4	-148.6	148.7	138.8	9.88	15.040	
1,700.0	1,700.0	1,707.5	1,707.2	6.6	3.6	-91.17	-3.0	-146.7	146.8	136.6	10.24	14.336	
1,800.0	1,800.0	1,807.0	1,806.7	6.9	3.7	-91.30	-3.3	-145.2	145.3	134.7	10.60	13.705	
1,900.0	1,900.0	1,906.3	1,906.0	7.2	3.7	-91.23	-3.1	-144.1	144.1	133.2	10.94	13.178	
2,000.0	2,000.0	2,006.9	2,006.6	7.6	3.7	-90.90	-2.2	-143.0	143.0	131.8	11.26	12.698	
2,100.0	2,100.0	2,106.6	2,106.3	7.9	3.7	-90.38	-0.9	-141.8	141.8	130.3	11.59	12.243	
2,200.0	2,200.0	2,207.0	2,206.7	8.2	3.7	-89.69	0.8	-140.6	140.6	128.7	11.91	11.803	
2,300.0	2,300.0	2,308.5	2,308.1	8.6	3.7	-88.78	2.9	-138.6	138.7	126.4	12.25	11.318	
2,400.0	2,400.0	2,408.3	2,407.9	8.9	3.7	-87.84	5.1	-136.2	136.3	123.7	12.61	10.814	
2,500.0	2,500.0	2,508.5	2,508.1	9.2	3.7	-87.08	6.8	-133.7	133.9	120.9	12.98	10.320	
2,600.0	2,600.0	2,608.3	2,607.8	9.6	3.8	-86.46	8.1	-131.2	131.5	118.1	13.36	9.844	
2,700.0	2,700.0	2,707.6	2,707.1	9.9	3.8	-85.86	9.4	-129.1	129.5	115.7	13.75	9.418	
2,800.0	2,800.0	2,808.5	2,807.9	10.3	3.9	-85.27	10.5	-126.8	127.3	113.1	14.14	8.999	
2,900.0	2,900.0	2,906.5	2,905.9	10.6	3.9	-84.75	11.5	-125.1	125.7	111.1	14.54	8.641	
2,955.4	2,955.4	2,960.7	2,960.1	10.8	3.9	-84.46	12.1	-124.8	125.4	110.7	14.74	8.507 CC	
3,000.0	3,000.0	3,004.5	3,003.8	10.9	4.0	-84.23	12.6	-124.9	125.6	110.7	14.90	8.426	
3,100.0	3,100.0	3,103.9	3,103.3	11.3	3.9	-83.62	14.1	-125.7	126.5	111.2	15.24	8.298	
3,200.0	3,200.0	3,203.5	3,202.8	11.6	3.9	-82.91	15.8	-126.8	127.8	112.2	15.58	8.199	
3,300.0	3,300.0	3,304.3	3,303.7	12.0	4.0	-82.18	17.5	-127.7	128.9	113.0	15.94	8.089	
3,400.0	3,400.0	3,403.6	3,402.9	12.3	4.0	-81.39	19.5	-128.6	130.0	113.7	16.30	7.979	
3,500.0	3,500.0	3,504.0	3,503.2	12.7	4.0	-80.54	21.6	-129.5	131.3	114.6	16.67	7.877	
3,600.0	3,600.0	3,604.1	3,603.4	13.0	4.0	-79.68	23.7	-130.2	132.3	115.3	17.04	7.765	
3,700.0	3,700.0	3,703.8	3,703.0	13.4	4.0	-78.79	25.9	-130.9	133.5	116.0	17.43	7.659	
3,800.0	3,800.0	3,803.8	3,803.0	13.7	4.1	-77.78	28.5	-131.7	134.7	116.9	17.82	7.562	
3,900.0	3,900.0	3,904.2	3,903.3	14.1	4.1	-76.75	31.1	-132.3	135.9	117.7	18.22	7.459	
4,000.0	4,000.0	4,005.7	4,004.9	14.4	4.2	-76.06	32.8	-132.3	136.3	117.7	18.63	7.318	
4,100.0	4,100.0	4,105.9	4,105.0	14.8	4.3	-75.65	33.7	-131.9	136.2	117.1	19.06	7.147	
4,200.0	4,200.0	4,206.4	4,205.5	15.1	4.4	-75.26	34.5	-131.3	135.8	116.3	19.49	6.966	
4,300.0	4,300.0	4,307.0	4,306.1	15.5	4.4	-75.11	34.7	-130.4	135.0	115.0	19.92	6.775	
4,400.0	4,400.0	4,407.8	4,406.9	15.8	4.5	-75.30	33.9	-129.2	133.6	113.3	20.34	6.568	
4,500.0	4,500.0	4,506.8	4,505.9	16.2	4.6	-75.58	33.0	-128.2	132.4	111.6	20.76	6.378	
4,600.0	4,600.0	4,606.5	4,605.6	16.5	4.6	-75.78	32.3	-127.5	131.6	110.4	21.18	6.213	
4,700.0	4,700.0	4,706.1	4,705.2	16.9	4.7	-75.91	31.9	-127.1	131.0	109.4	21.60	6.066	
4,800.0	4,800.0	4,806.2	4,805.3	17.2	4.8	-76.16	31.2	-126.8	130.6	108.6	22.01	5.932	
4,900.0	4,900.0	4,905.9	4,905.0	17.6	4.8	-76.57	30.3	-126.7	130.2	107.8	22.42	5.810	
4,953.1	4,953.1	4,958.7	4,957.8	17.8	4.8	-76.77	29.8	-126.7	130.2	107.6	22.62	5.755	

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



COG PRODUCTION LLC

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Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - WINDWARD FEDERAL #2H - LATERAL 01 - AWP-LATERAL												Offset Site Error: 0.0 usft	
Survey Program: 100- VES GyroFlex, 9743-MWD												Offset Well Error: 3.0 usft	
Reference		Offset		Semi Major Axis		Highside Toolface (")	Distance		Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Between Centres (usft)	Between Ellipses (usft)					
5,000.0	5,000.0	5,005.3	5,004.4	18.0	4.9	-76.93	29.4	-126.9	130.2	107.4	22.80	5.711 ES	
5,100.0	5,100.0	5,104.9	5,104.0	18.3	4.9	-77.28	28.8	-127.4	130.6	107.4	23.18	5.635	
5,200.0	5,200.0	5,205.1	5,204.1	18.7	4.9	-77.57	28.2	-128.0	131.1	107.6	23.55	5.567	
5,300.0	5,300.0	5,304.4	5,303.5	19.0	4.9	-77.82	27.8	-128.8	131.8	107.9	23.93	5.509	
5,400.0	5,400.0	5,404.7	5,403.8	19.4	4.9	-78.07	27.4	-129.7	132.6	108.3	24.30	5.457	
5,500.0	5,500.0	5,504.4	5,503.5	19.7	5.0	-78.46	26.7	-130.7	133.5	108.8	24.69	5.405	
5,600.0	5,600.0	5,604.8	5,603.9	20.1	5.0	-79.00	25.6	-131.8	134.2	109.1	25.09	5.350	
5,700.0	5,700.0	5,703.8	5,702.9	20.4	5.1	-79.53	24.6	-133.0	135.2	109.8	25.49	5.307	
5,800.0	5,800.0	5,804.1	5,803.2	20.8	5.1	-79.90	23.9	-134.3	136.5	110.6	25.88	5.273	
5,900.0	5,900.0	5,904.3	5,903.3	21.1	5.1	-80.24	23.3	-135.5	137.5	111.2	26.28	5.233	
6,000.0	6,000.0	6,003.5	6,002.5	21.5	5.2	-80.62	22.6	-137.0	138.8	112.1	26.69	5.202	
6,100.0	6,100.0	6,103.0	6,102.0	21.8	5.2	-81.01	22.0	-138.8	140.6	113.5	27.09	5.189	
6,200.0	6,200.0	6,202.9	6,201.8	22.2	5.3	-81.38	21.4	-140.9	142.6	115.1	27.50	5.185	
6,300.0	6,300.0	6,303.6	6,302.6	22.6	5.4	-81.50	21.3	-142.7	144.3	116.4	27.91	5.171	
6,400.0	6,400.0	6,404.8	6,403.8	22.9	5.4	-81.72	20.9	-143.9	145.4	117.1	28.33	5.132	
6,500.0	6,500.0	6,504.0	6,502.9	23.3	5.5	-82.12	20.1	-145.0	146.4	117.6	28.76	5.090	
6,600.0	6,600.0	6,604.3	6,603.2	23.6	5.6	-82.45	19.4	-146.2	147.5	118.3	29.18	5.053	
6,700.0	6,700.0	6,703.1	6,702.0	24.0	5.6	-82.56	19.3	-147.6	148.9	119.3	29.61	5.030	
6,800.0	6,800.0	6,802.8	6,801.7	24.3	5.7	-82.54	19.6	-149.5	150.8	120.8	30.03	5.023	
6,900.0	6,900.0	6,903.7	6,902.5	24.7	5.8	-82.53	19.8	-151.2	152.5	122.1	30.45	5.010	
7,000.0	7,000.0	7,003.0	7,001.9	25.0	5.8	-82.50	20.1	-152.9	154.2	123.3	30.88	4.994	
7,100.0	7,100.0	7,103.4	7,102.3	25.4	5.9	-82.46	20.5	-154.5	155.9	124.6	31.31	4.980	
7,200.0	7,200.0	7,203.5	7,202.4	25.8	6.0	-82.38	20.9	-156.0	157.4	125.7	31.74	4.961	
7,300.0	7,300.0	7,304.1	7,302.9	26.1	6.0	-82.23	21.5	-157.3	158.8	126.6	32.17	4.936	
7,400.0	7,400.0	7,406.5	7,405.3	26.5	6.1	-81.86	22.5	-157.5	159.1	126.6	32.57	4.885	
7,500.0	7,500.0	7,506.5	7,505.3	26.8	6.1	-81.37	23.8	-157.0	158.8	125.8	32.96	4.817	
7,600.0	7,600.0	7,606.9	7,605.7	27.2	6.2	-80.93	24.9	-156.3	158.3	124.9	33.36	4.745	
7,700.0	7,700.0	7,707.9	7,706.7	27.5	6.2	-80.56	25.8	-155.2	157.3	123.6	33.75	4.661	
7,800.0	7,800.0	7,809.0	7,807.7	27.9	6.2	-80.39	26.0	-153.5	155.7	121.6	34.15	4.560	
7,900.0	7,900.0	7,908.7	7,907.5	28.3	6.3	-80.35	25.8	-151.7	153.9	119.3	34.55	4.454	
8,000.0	8,000.0	8,007.7	8,006.5	28.6	6.3	-80.52	25.1	-150.3	152.4	117.4	34.96	4.360	
8,100.0	8,100.0	8,106.8	8,105.5	29.0	6.4	-80.74	24.4	-149.6	151.6	116.2	35.37	4.284	
8,200.0	8,200.0	8,206.4	8,205.1	29.3	6.5	-80.93	23.8	-149.2	151.1	115.3	35.80	4.222	
8,262.0	8,262.0	8,268.0	8,266.7	29.5	6.5	-81.14	23.3	-149.3	151.1	115.0	36.06	4.189	
8,300.0	8,300.0	8,305.8	8,304.6	29.7	6.5	-81.30	22.9	-149.3	151.1	114.9	36.23	4.170	
8,400.0	8,400.0	8,407.2	8,405.9	30.0	6.6	-81.78	21.6	-149.2	150.7	114.1	36.66	4.111	
8,466.7	8,466.7	8,472.7	8,471.4	30.3	6.7	-82.16	20.5	-149.1	150.5	113.5	36.95	4.073	
8,500.0	8,500.0	8,505.5	8,504.2	30.4	6.7	-82.40	19.9	-149.2	150.6	113.5	37.10	4.058	
8,600.0	8,600.0	8,604.0	8,602.6	30.7	6.8	-83.15	18.1	-150.3	151.4	113.9	37.54	4.034	
8,700.0	8,700.0	8,704.2	8,702.9	31.1	6.9	-83.97	16.1	-151.9	152.7	114.7	37.99	4.020	
8,717.5	8,717.5	8,721.2	8,719.8	31.2	6.9	-84.11	15.7	-152.1	153.0	114.9	38.06	4.019	
8,725.0	8,725.0	8,728.5	8,727.2	31.2	6.9	125.14	15.6	-152.3	153.1	115.0	38.10	4.019	
8,750.0	8,750.0	8,752.9	8,751.5	31.3	6.9	125.15	15.1	-152.8	154.2	116.0	38.22	4.034	
8,775.0	8,774.9	8,777.2	8,775.8	31.4	6.9	125.47	14.6	-153.4	156.1	117.7	38.41	4.064	
8,800.0	8,799.6	8,801.4	8,800.0	31.4	7.0	126.07	14.2	-154.0	158.9	120.2	38.68	4.108	
8,825.0	8,824.1	8,825.8	8,824.4	31.5	7.0	126.93	13.8	-154.8	162.5	123.5	39.01	4.167	
8,850.0	8,848.3	8,849.9	8,848.5	31.6	7.0	128.00	13.4	-155.5	167.1	127.7	39.40	4.240	
8,875.0	8,872.2	8,873.7	8,872.2	31.7	7.0	129.21	13.0	-156.2	172.6	132.7	39.84	4.331	
8,900.0	8,895.6	8,897.0	8,895.5	31.7	7.0	130.52	12.6	-156.9	179.0	138.7	40.32	4.440	
8,925.0	8,918.5	8,919.7	8,918.2	31.8	7.1	131.87	12.3	-157.7	186.6	145.7	40.84	4.568	
8,950.0	8,940.9	8,941.8	8,940.4	31.9	7.1	133.21	11.9	-158.4	195.2	153.8	41.37	4.717	
8,975.0	8,962.7	8,963.3	8,961.8	32.0	7.1	134.51	11.6	-159.1	204.9	163.0	41.93	4.888	

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Offset Design BULLDOG - WINDWARD FEDERAL #2H - LATERAL 01 - AWP-LATERAL													Offset Site Error: 0.0 usft
Survey Program: 100- VES GyroFlex, 9743-MWD													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	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)	+E/-W (usft)					
9,000.0	8,983.8	8,984.1	8,982.6	32.1	7.1	135.72	11.4	-159.8	215.9	173.4	42.50	5.080	
9,025.0	9,004.2	9,004.1	9,002.6	32.1	7.1	136.81	11.2	-160.5	228.0	184.9	43.07	5.293	
9,050.0	9,023.8	9,023.6	9,022.1	32.2	7.2	137.79	11.0	-161.2	241.2	197.5	43.65	5.526	
9,075.0	9,042.5	9,042.2	9,040.7	32.3	7.2	138.60	10.8	-161.8	255.5	211.3	44.22	5.778	
9,100.0	9,060.4	9,059.9	9,058.4	32.4	7.2	139.21	10.7	-162.4	270.9	226.1	44.79	6.049	
9,125.0	9,077.3	9,076.6	9,075.1	32.4	7.2	139.60	10.6	-162.9	287.4	242.0	45.35	6.337	
9,150.0	9,093.2	9,092.3	9,090.8	32.5	7.2	139.75	10.6	-163.4	304.8	258.9	45.89	6.643	
9,175.0	9,108.1	9,107.1	9,105.5	32.6	7.2	139.63	10.5	-163.9	323.2	276.8	46.41	6.964	
9,200.0	9,122.0	9,120.8	9,119.2	32.7	7.2	139.22	10.5	-164.3	342.4	295.5	46.91	7.299	
9,225.0	9,134.7	9,133.4	9,131.8	32.8	7.3	138.46	10.4	-164.7	362.5	315.1	47.39	7.649	
9,250.0	9,146.3	9,144.9	9,143.3	32.9	7.3	137.27	10.4	-165.0	383.3	335.4	47.85	8.010	
9,275.0	9,156.7	9,155.2	9,153.6	33.0	7.3	135.59	10.3	-165.3	404.8	356.5	48.28	8.384	
9,300.0	9,165.9	9,164.3	9,162.7	33.1	7.3	133.28	10.3	-165.6	426.8	378.1	48.67	8.769	
9,325.0	9,173.9	9,172.1	9,170.5	33.2	7.3	130.20	10.3	-165.8	449.4	400.4	49.04	9.164	
9,350.0	9,180.6	9,178.7	9,177.1	33.4	7.3	126.14	10.2	-166.0	472.5	423.1	49.37	9.569	
9,375.0	9,186.1	9,184.0	9,182.4	33.5	7.3	120.82	10.2	-166.1	495.9	446.2	49.67	9.984	
9,400.0	9,190.2	9,188.0	9,186.4	33.6	7.3	113.94	10.2	-166.2	519.7	469.7	49.94	10.407	
9,425.0	9,193.1	9,190.7	9,189.1	33.8	7.3	105.22	10.2	-166.3	543.7	493.5	50.16	10.838	
9,450.0	9,194.7	9,192.1	9,190.5	33.9	7.3	94.63	10.2	-166.3	567.8	517.5	50.35	11.277	
9,467.6	9,195.0	9,192.3	9,190.6	34.0	7.3	86.30	10.2	-166.3	584.9	534.4	50.46	11.590	
9,500.0	9,195.0	9,192.0	9,190.3	34.2	7.3	86.51	10.2	-166.3	616.3	565.7	50.66	12.166	
9,600.0	9,195.0	9,191.2	9,189.6	34.9	7.3	87.07	10.2	-166.3	712.8	661.5	51.32	13.888	
9,700.0	9,195.0	9,190.6	9,189.0	35.6	7.3	87.53	10.2	-166.3	808.4	756.3	52.06	15.528	
9,800.0	9,195.0	9,190.2	9,188.6	36.4	7.3	87.91	10.2	-166.3	903.0	850.2	52.85	17.088	
9,900.0	9,195.0	9,190.0	9,188.4	37.2	7.3	88.23	10.2	-166.3	996.6	942.9	53.66	18.572	
10,000.0	9,195.0	9,190.0	9,188.4	38.0	7.3	88.51	10.2	-166.3	1,088.9	1,034.4	54.49	19.985	
10,100.0	9,195.0	9,190.2	9,188.6	38.9	7.3	88.75	10.2	-166.3	1,179.9	1,124.6	55.31	21.333	
10,191.3	9,195.0	9,190.6	9,189.0	39.6	7.3	88.94	10.2	-166.3	1,261.8	1,205.7	56.05	22.512	
10,200.0	9,195.0	9,190.7	9,189.0	39.7	7.3	88.94	10.2	-166.3	1,269.5	1,213.4	56.12	22.621	
10,300.0	9,195.0	9,191.2	9,189.6	40.5	7.3	88.99	10.2	-166.3	1,359.3	1,302.4	56.95	23.869	
10,400.0	9,195.0	11,749.2	10,603.1	41.4	25.8	166.31	-1,361.0	76.5	1,445.0	1,377.8	67.19	21.507	
10,500.0	9,195.0	11,903.7	10,596.8	42.3	28.2	166.47	-1,515.1	83.2	1,440.1	1,369.6	70.53	20.418	
10,600.0	9,195.0	11,979.9	10,592.8	43.3	29.4	166.52	-1,591.2	85.9	1,434.3	1,361.6	72.70	19.728	
10,700.0	9,195.0	12,043.6	10,590.7	44.3	30.4	166.57	-1,654.8	88.2	1,430.5	1,355.8	74.72	19.145	
10,800.0	9,195.0	12,125.3	10,590.2	45.3	31.8	166.68	-1,736.5	91.4	1,429.1	1,352.0	77.07	18.542	
10,900.0	9,195.0	12,223.5	10,589.7	46.4	33.3	166.80	-1,834.5	95.3	1,427.8	1,348.1	79.73	17.907	
11,000.0	9,195.0	12,326.6	10,589.5	47.5	35.0	166.93	-1,937.6	99.2	1,426.9	1,344.3	82.51	17.293	
11,100.0	9,195.0	12,427.7	10,588.8	48.7	36.6	167.06	-2,038.6	103.5	1,425.4	1,340.1	85.30	16.710	
11,200.0	9,195.0	12,543.1	10,587.6	49.9	38.5	167.21	-2,153.9	108.1	1,423.7	1,335.4	88.35	16.114	
11,300.0	9,195.0	12,637.8	10,585.9	51.1	40.0	167.28	-2,248.6	110.8	1,421.4	1,330.3	91.09	15.604	
11,400.0	9,195.0	12,731.8	10,584.5	52.3	41.5	167.34	-2,342.5	113.3	1,419.5	1,325.7	93.84	15.126	
11,500.0	9,195.0	12,866.2	10,581.2	53.6	43.7	167.40	-2,476.9	116.4	1,416.7	1,319.5	97.28	14.564	
11,600.0	9,195.0	12,962.7	10,577.1	54.8	45.3	167.43	-2,573.2	118.6	1,412.3	1,312.2	100.12	14.105	
11,700.0	9,195.0	13,045.7	10,575.1	56.1	46.7	167.49	-2,656.2	121.3	1,409.3	1,306.5	102.78	13.712	
11,800.0	9,195.0	13,151.5	10,572.8	57.4	48.4	167.62	-2,761.8	125.4	1,406.5	1,300.6	105.84	13.289	
11,900.0	9,195.0	13,238.4	10,571.0	58.8	49.8	167.75	-2,848.6	129.6	1,403.6	1,295.0	108.61	12.923	
12,000.0	9,195.0	13,313.3	10,571.0	60.1	51.1	167.89	-2,923.4	133.7	1,402.5	1,291.3	111.21	12.612	
12,100.0	9,195.0	13,417.8	10,572.0	61.5	52.8	168.13	-3,027.7	140.1	1,402.3	1,288.0	114.32	12.267	
12,200.0	9,195.0	13,547.0	10,570.8	62.9	55.0	168.37	-3,156.7	147.3	1,400.3	1,282.4	117.85	11.882	
12,300.0	9,195.0	13,658.6	10,568.4	64.3	56.8	168.58	-3,268.1	153.5	1,397.2	1,276.1	121.11	11.537	
12,400.0	9,195.0	13,750.6	10,566.0	65.7	58.4	168.72	-3,359.9	158.0	1,393.9	1,269.8	124.05	11.237	
12,500.0	9,195.0	13,835.5	10,564.5	67.1	59.8	168.82	-3,444.7	161.5	1,391.4	1,264.6	126.88	10.967	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - WINDWARD FEDERAL #2H - LATERAL 01 - AWP-LATERAL													Offset Site Error: 0.0 usft
Survey Program: 100- VES GyroFlex, 9743-MWD													Offset Well Error: 3.0 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	
12,600.0	9,195.0	13,942.2	10,563.2	68.5	61.5	168.94	-3,551.4	165.2	1,389.6	1,259.6	130.07	10.684	
12,700.0	9,195.0	14,062.7	10,559.9	70.0	63.5	169.01	-3,671.8	168.4	1,386.6	1,253.1	133.50	10.386	
12,800.0	9,195.0	14,158.6	10,556.6	71.4	65.1	169.05	-3,767.6	170.5	1,383.0	1,246.4	136.53	10.129	
12,900.0	9,195.0	14,251.7	10,553.8	72.9	66.6	169.09	-3,860.7	172.7	1,379.7	1,240.1	139.53	9.888	
13,000.0	9,195.0	14,341.7	10,551.7	74.4	68.1	169.14	-3,950.6	174.8	1,377.0	1,234.5	142.48	9.665	
13,100.0	9,195.0	14,419.8	10,550.7	75.8	69.4	169.18	-4,028.7	176.4	1,375.5	1,230.3	145.24	9.470	
13,200.0	9,195.0	14,509.4	10,550.7	77.3	70.9	169.23	-4,118.3	178.1	1,375.2	1,227.0	148.21	9.279	
13,239.6	9,195.0	14,557.1	10,550.8	77.9	71.7	169.25	-4,165.9	178.9	1,375.2	1,225.6	149.58	9.194	
13,300.0	9,195.0	14,634.2	10,549.8	78.8	72.9	169.28	-4,243.0	180.3	1,374.3	1,222.6	151.76	9.056	
13,382.2	9,195.0	14,692.2	10,549.4	80.0	73.9	169.31	-4,301.0	181.5	1,373.6	1,219.6	153.95	8.923	
13,400.0	9,195.0	14,704.8	10,549.5	80.3	74.1	169.32	-4,313.6	181.7	1,373.6	1,219.2	154.42	8.895	
13,500.0	9,195.0	14,831.6	10,549.1	81.8	76.2	169.37	-4,440.4	183.9	1,373.1	1,215.1	158.02	8.689	
13,600.0	9,195.0	14,920.5	10,548.0	83.3	77.7	169.38	-4,529.3	184.9	1,371.8	1,210.8	160.99	8.521	
13,640.6	9,195.0	14,950.6	10,547.9	83.9	78.2	169.38	-4,559.4	185.2	1,371.7	1,209.6	162.10	8.462	
13,700.0	9,195.0	14,994.7	10,548.1	84.8	78.9	169.38	-4,603.5	185.3	1,372.0	1,208.3	163.73	8.380	
13,800.0	9,195.0	15,066.8	10,549.6	86.4	80.1	169.36	-4,675.6	185.1	1,374.1	1,207.7	166.43	8.256	
13,900.0	9,195.0	15,147.3	10,552.6	87.9	81.4	169.33	-4,756.0	184.3	1,378.1	1,208.8	169.28	8.141	
14,000.0	9,195.0	15,234.5	10,557.0	89.4	82.8	169.36	-4,843.1	184.5	1,383.1	1,210.9	172.24	8.030	
14,100.0	9,195.0	15,478.7	10,558.4	91.0	86.9	169.60	-5,086.9	191.8	1,383.0	1,205.2	177.83	7.777	
14,200.0	9,195.0	15,584.4	10,553.8	92.5	88.6	169.78	-5,192.4	197.6	1,377.9	1,196.8	181.15	7.606	
14,300.0	9,195.0	15,684.7	10,549.3	94.1	90.3	169.99	-5,292.4	204.1	1,372.4	1,188.0	184.39	7.443	
14,400.0	9,195.0	15,766.1	10,546.2	95.6	91.7	170.15	-5,373.6	209.1	1,367.7	1,180.4	187.31	7.302	
14,500.0	9,195.0	15,841.4	10,544.4	97.2	93.0	170.29	-5,448.7	213.2	1,364.6	1,174.5	190.13	7.177	
14,600.0	9,195.0	15,976.5	10,540.5	98.7	95.2	170.48	-5,583.6	219.3	1,361.1	1,167.1	193.95	7.017	
14,700.0	9,195.0	16,081.2	10,535.9	100.3	97.0	170.61	-5,688.2	223.7	1,356.2	1,158.9	197.27	6.875	
14,800.0	9,195.0	16,176.7	10,531.5	101.8	98.6	170.73	-5,783.5	227.9	1,350.9	1,150.5	200.43	6.740	
14,900.0	9,195.0	16,272.4	10,527.8	103.4	100.2	170.83	-5,879.0	231.6	1,346.6	1,143.0	203.60	6.614	
15,000.0	9,195.0	16,375.0	10,523.3	105.0	101.9	170.95	-5,981.4	235.8	1,341.7	1,134.9	206.88	6.485	
15,100.0	9,195.0	16,471.0	10,519.8	106.6	103.5	171.13	-6,077.2	241.0	1,337.4	1,127.3	210.07	6.366	
15,200.0	9,195.0	16,577.6	10,515.6	108.1	105.3	171.33	-6,183.5	247.0	1,332.7	1,119.3	213.44	6.244	
15,300.0	9,195.0	16,680.6	10,511.3	109.7	107.1	171.57	-6,286.3	254.0	1,327.7	1,110.9	216.76	6.125	
15,400.0	9,195.0	16,755.4	10,508.7	111.3	108.3	171.76	-6,360.8	259.4	1,323.3	1,103.7	219.61	6.026	
15,500.0	9,195.0	16,840.5	10,507.6	112.9	109.8	171.98	-6,445.7	265.1	1,321.1	1,098.4	222.63	5.934	
15,600.0	9,195.0	16,940.7	10,506.0	114.5	111.5	172.20	-6,545.7	271.0	1,318.8	1,092.9	225.91	5.838	
15,700.0	9,195.0	17,035.2	10,505.0	116.0	113.0	172.41	-6,640.1	276.6	1,317.0	1,087.9	229.10	5.749	
15,800.0	9,195.0	17,128.0	10,504.3	117.6	114.6	172.62	-6,732.6	282.1	1,315.6	1,083.3	232.25	5.664	
15,900.0	9,195.0	17,228.3	10,504.0	119.2	116.3	172.84	-6,832.8	287.8	1,314.7	1,079.2	235.54	5.582	
16,000.0	9,195.0	17,338.7	10,503.0	120.8	118.2	173.05	-6,943.1	293.5	1,313.2	1,074.2	238.99	5.495	
16,100.0	9,195.0	17,449.9	10,501.0	122.4	120.0	173.25	-7,054.1	298.9	1,310.9	1,068.4	242.46	5.407	
16,200.0	9,195.0	17,582.2	10,496.0	124.0	122.3	173.46	-7,186.1	305.2	1,306.5	1,060.2	246.28	5.305	
16,300.0	9,195.0	17,674.0	10,491.8	125.6	123.8	173.62	-7,277.7	309.9	1,301.5	1,052.1	249.42	5.218	
16,400.0	9,195.0	17,760.5	10,488.9	127.2	125.3	173.82	-7,364.0	315.4	1,297.6	1,045.1	252.48	5.139	
16,500.0	9,195.0	17,859.8	10,485.8	128.8	126.9	174.06	-7,463.1	321.7	1,293.9	1,038.1	255.77	5.059	
16,600.0	9,195.0	17,952.8	10,483.7	130.4	128.5	174.28	-7,555.9	327.6	1,291.0	1,032.1	258.94	4.986	
16,700.0	9,195.0	18,074.5	10,479.4	132.0	130.6	174.63	-7,677.2	336.6	1,286.7	1,024.1	262.62	4.900	
16,800.0	9,195.0	18,164.7	10,476.2	133.6	132.1	174.94	-7,767.0	344.3	1,282.4	1,016.6	265.76	4.825	
16,900.0	9,195.0	18,259.3	10,473.7	135.2	133.7	175.31	-7,861.1	353.4	1,279.0	1,010.0	268.99	4.755	
17,000.0	9,195.0	18,348.5	10,471.4	136.9	135.3	175.68	-7,949.8	362.5	1,275.7	1,003.6	272.13	4.688	
17,100.0	9,195.0	18,424.5	10,470.8	138.5	136.6	176.01	-8,025.4	370.3	1,274.2	999.2	275.05	4.633	
17,135.8	9,195.0	18,452.8	10,470.9	139.0	137.1	176.13	-8,053.6	373.2	1,274.1	998.0	276.11	4.614	
17,200.0	9,195.0	18,503.6	10,471.5	140.1	137.9	176.35	-8,104.1	378.4	1,274.4	996.4	278.02	4.584	
17,300.0	9,195.0	18,584.8	10,473.4	141.7	139.3	176.67	-8,184.9	385.9	1,276.3	995.2	281.02	4.542	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - WINDWARD FEDERAL #2H - LATERAL 01 - AWP-LATERAL													Offset Site Error: 0.0 usft
Survey Program: 100- VES GyroFlex, 9743-MWD													Offset Well Error: 3.0 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)			
17,400.0	9,195.0	18,676.2	10,476.5	143.3	140.9	176.98	-8,276.0	393.1	1,279.2	995.0	284.19	4.501	
17,500.0	9,195.0	18,797.5	10,479.8	144.9	142.9	177.32	-8,397.0	401.3	1,281.6	993.8	287.87	4.452	
17,600.0	9,195.0	18,910.7	10,481.5	146.5	144.8	177.56	-8,509.9	407.2	1,283.0	991.6	291.39	4.403	
17,700.0	9,195.0	19,047.9	10,480.6	148.2	147.2	177.84	-8,647.0	414.3	1,282.1	986.8	295.32	4.341	
17,800.0	9,195.0	19,174.5	10,476.2	149.8	149.3	178.08	-8,773.3	420.7	1,278.4	979.3	299.07	4.275	
17,900.0	9,195.0	19,258.1	10,473.3	151.4	150.7	178.23	-8,856.8	424.6	1,274.8	972.7	302.10	4.220	
18,000.0	9,195.0	19,397.7	10,466.6	153.0	153.0	178.49	-8,996.0	431.4	1,269.8	963.7	306.06	4.149	
18,100.0	9,195.0	19,489.3	10,461.0	154.6	154.6	178.64	-9,087.4	435.5	1,263.6	954.3	309.22	4.086	
18,200.0	9,195.0	19,566.5	10,457.5	156.3	155.9	178.79	-9,164.4	439.4	1,258.9	946.8	312.14	4.033	
18,300.0	9,195.0	19,659.1	10,454.8	157.9	157.4	178.98	-9,256.9	444.1	1,255.9	940.6	315.33	3.983	
18,400.0	9,195.0	19,765.4	10,450.6	159.5	159.2	179.14	-9,363.0	448.3	1,251.8	933.1	318.73	3.928	
18,500.0	9,195.0	19,860.9	10,447.8	161.1	160.8	179.28	-9,458.4	452.1	1,248.9	927.0	321.96	3.879	
18,600.0	9,195.0	19,961.7	10,444.0	162.8	162.5	179.43	-9,559.1	455.9	1,245.0	919.8	325.27	3.828	
18,700.0	9,195.0	20,042.8	10,441.9	164.4	163.9	179.53	-9,640.1	458.7	1,242.5	914.2	328.26	3.785	
18,800.0	9,195.0	20,130.4	10,440.9	166.0	165.3	179.68	-9,727.6	462.3	1,241.3	909.9	331.36	3.746	
18,900.0	9,195.0	20,220.6	10,440.3	167.7	166.8	179.83	-9,817.7	466.1	1,240.6	906.1	334.50	3.709	
18,902.2	9,195.0	20,222.3	10,440.3	167.7	166.9	179.83	-9,819.4	466.2	1,240.6	906.1	334.57	3.708	
19,000.0	9,195.0	20,299.8	10,441.1	169.3	168.2	179.93	-9,896.8	468.9	1,241.5	904.1	337.46	3.679	
19,100.0	9,195.0	20,396.3	10,442.8	170.9	169.8	-179.96	-9,993.3	471.7	1,243.4	902.7	340.70	3.649	
19,200.0	9,195.0	20,401.0	10,442.9	172.5	169.9	-179.96	-9,998.0	471.9	1,248.9	906.5	342.41	3.647 SF	
19,232.7	9,195.0	20,401.0	10,442.9	173.1	169.9	-179.96	-9,998.0	471.9	1,252.5	909.5	342.94	3.652	



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - WINDWARD FEDERAL #2H - OWB-PILOT HOLE - AWP-PH													Offset Site Error: 0.0 usft
Survey Program: 100- VES GyroFlex													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (usft)	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)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)				
0.0	0.0	4.7	4.7	3.0	3.0	-82.81	19.0	-150.5	151.7				
100.0	100.0	104.2	104.2	3.0	3.0	-83.07	18.3	-150.8	151.9	145.9	6.00	25.295	
200.0	200.0	203.5	203.5	3.0	3.0	-83.54	17.1	-151.5	152.4	146.4	6.05	25.207	
300.0	300.0	303.9	303.9	3.1	3.0	-83.99	16.0	-152.3	153.1	147.0	6.14	24.933	
400.0	400.0	403.8	403.8	3.2	3.0	-84.41	15.0	-152.9	153.7	147.4	6.28	24.470	
500.0	500.0	504.0	503.9	3.4	3.1	-84.81	13.9	-153.6	154.2	147.7	6.46	23.867	
600.0	600.0	604.1	604.1	3.6	3.1	-85.17	13.0	-154.1	154.7	148.0	6.68	23.155	
700.0	700.0	703.6	703.6	3.8	3.2	-85.50	12.2	-154.8	155.2	148.3	6.93	22.402	
800.0	800.0	802.5	802.4	4.0	3.2	-85.89	11.2	-156.0	156.4	149.2	7.21	21.695	
900.0	900.0	904.1	904.0	4.2	3.3	-86.53	9.5	-157.0	157.3	149.8	7.51	20.946	
1,000.0	1,000.0	1,005.5	1,005.4	4.5	3.3	-87.30	7.4	-157.1	157.3	149.5	7.83	20.093	
1,100.0	1,100.0	1,106.1	1,105.9	4.8	3.4	-88.01	5.4	-156.6	156.7	148.6	8.16	19.217	
1,200.0	1,200.0	1,207.9	1,207.8	5.1	3.4	-88.66	3.6	-155.3	155.3	146.9	8.49	18.307	
1,300.0	1,300.0	1,306.8	1,306.6	5.4	3.5	-89.43	1.5	-153.8	153.9	145.0	8.83	17.431	
1,400.0	1,400.0	1,407.4	1,407.2	5.7	3.5	-90.05	-0.1	-152.4	152.4	143.2	9.18	16.607	
1,500.0	1,500.0	1,507.9	1,507.7	6.0	3.6	-90.50	-1.3	-150.6	150.6	141.1	9.53	15.810	
1,600.0	1,600.0	1,607.9	1,607.7	6.3	3.6	-90.91	-2.4	-148.6	148.7	138.8	9.88	15.040	
1,700.0	1,700.0	1,707.5	1,707.2	6.6	3.6	-91.17	-3.0	-146.7	146.8	136.6	10.24	14.336	
1,800.0	1,800.0	1,807.0	1,806.7	6.9	3.7	-91.30	-3.3	-145.2	145.3	134.7	10.60	13.705	
1,900.0	1,900.0	1,906.3	1,906.0	7.2	3.7	-91.23	-3.1	-144.1	144.1	133.2	10.94	13.178	
2,000.0	2,000.0	2,006.9	2,006.6	7.6	3.7	-90.90	-2.2	-143.0	143.0	131.8	11.26	12.698	
2,100.0	2,100.0	2,106.6	2,106.3	7.9	3.7	-90.38	-0.9	-141.8	141.8	130.3	11.59	12.243	
2,200.0	2,200.0	2,207.0	2,206.7	8.2	3.7	-89.69	0.8	-140.6	140.6	128.7	11.91	11.803	
2,300.0	2,300.0	2,308.5	2,308.1	8.6	3.7	-88.78	2.9	-138.6	138.7	126.4	12.25	11.318	
2,400.0	2,400.0	2,408.3	2,407.9	8.9	3.7	-87.84	5.1	-136.2	136.3	123.7	12.61	10.814	
2,500.0	2,500.0	2,508.5	2,508.1	9.2	3.7	-87.08	6.8	-133.7	133.9	120.9	12.98	10.320	
2,600.0	2,600.0	2,608.3	2,607.8	9.6	3.8	-86.46	8.1	-131.2	131.5	118.1	13.36	9.844	
2,700.0	2,700.0	2,707.6	2,707.1	9.9	3.8	-85.86	9.4	-129.1	129.5	115.7	13.75	9.418	
2,800.0	2,800.0	2,808.5	2,807.9	10.3	3.9	-85.27	10.5	-126.8	127.3	113.1	14.14	8.999	
2,900.0	2,900.0	2,906.5	2,905.9	10.6	3.9	-84.75	11.5	-125.1	125.7	111.1	14.54	8.641	
2,955.4	2,955.4	2,960.7	2,960.1	10.8	3.9	-84.46	12.1	-124.8	125.4	110.7	14.74	8.507 CC	
3,000.0	3,000.0	3,004.5	3,003.8	10.9	4.0	-84.23	12.6	-124.9	125.6	110.7	14.90	8.426	
3,100.0	3,100.0	3,103.9	3,103.3	11.3	3.9	-83.62	14.1	-125.7	126.5	111.2	15.24	8.298	
3,200.0	3,200.0	3,203.5	3,202.8	11.6	3.9	-82.91	15.8	-126.8	127.8	112.2	15.58	8.199	
3,300.0	3,300.0	3,304.3	3,303.7	12.0	4.0	-82.18	17.5	-127.7	128.9	113.0	15.94	8.089	
3,400.0	3,400.0	3,403.6	3,402.9	12.3	4.0	-81.39	19.5	-128.6	130.0	113.7	16.30	7.979	
3,500.0	3,500.0	3,504.0	3,503.2	12.7	4.0	-80.54	21.6	-129.5	131.3	114.6	16.67	7.877	
3,600.0	3,600.0	3,604.1	3,603.4	13.0	4.0	-79.68	23.7	-130.2	132.3	115.3	17.04	7.765	
3,700.0	3,700.0	3,703.8	3,703.0	13.4	4.0	-78.79	25.9	-130.9	133.5	116.0	17.43	7.659	
3,800.0	3,800.0	3,803.8	3,803.0	13.7	4.1	-77.78	28.5	-131.7	134.7	116.9	17.82	7.562	
3,900.0	3,900.0	3,904.2	3,903.3	14.1	4.1	-76.75	31.1	-132.3	135.9	117.7	18.22	7.459	
4,000.0	4,000.0	4,005.7	4,004.9	14.4	4.2	-76.06	32.8	-132.3	136.3	117.7	18.63	7.318	
4,100.0	4,100.0	4,105.9	4,105.0	14.8	4.3	-75.65	33.7	-131.9	136.2	117.1	19.06	7.147	
4,200.0	4,200.0	4,206.4	4,205.5	15.1	4.4	-75.26	34.5	-131.3	135.8	116.3	19.49	6.966	
4,300.0	4,300.0	4,307.0	4,306.1	15.5	4.4	-75.11	34.7	-130.4	135.0	115.0	19.92	6.775	
4,400.0	4,400.0	4,407.8	4,406.9	15.8	4.5	-75.30	33.9	-129.2	133.6	113.3	20.34	6.568	
4,500.0	4,500.0	4,506.8	4,505.9	16.2	4.6	-75.58	33.0	-128.2	132.4	111.6	20.76	6.378	
4,600.0	4,600.0	4,606.5	4,605.6	16.5	4.6	-75.78	32.3	-127.5	131.6	110.4	21.18	6.213	
4,700.0	4,700.0	4,706.1	4,705.2	16.9	4.7	-75.91	31.9	-127.1	131.0	109.4	21.60	6.066	
4,800.0	4,800.0	4,806.2	4,805.3	17.2	4.8	-76.16	31.2	-126.8	130.6	108.6	22.01	5.932	
4,900.0	4,900.0	4,905.9	4,905.0	17.6	4.8	-76.57	30.3	-126.7	130.2	107.8	22.42	5.810	
4,953.1	4,953.1	4,958.7	4,957.8	17.8	4.8	-76.77	29.8	-126.7	130.2	107.6	22.62	5.755	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - WINDWARD FEDERAL #2H - OWB-PILOT HOLE - AWP-PH													Offset Site Error: 0.0 usft
Survey Program: 100- VES GyroFlex													Offset Well Error: 3.0 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)			
5,000.0	5,000.0	5,005.3	5,004.4	18.0	4.9	-76.93	29.4	-126.9	130.2	107.4	22.80	5.711 ES	
5,100.0	5,100.0	5,104.9	5,104.0	18.3	4.9	-77.28	28.8	-127.4	130.6	107.4	23.18	5.635	
5,200.0	5,200.0	5,205.1	5,204.1	18.7	4.9	-77.57	28.2	-128.0	131.1	107.6	23.55	5.567	
5,300.0	5,300.0	5,304.4	5,303.5	19.0	4.9	-77.82	27.8	-128.8	131.8	107.9	23.93	5.509	
5,400.0	5,400.0	5,404.7	5,403.8	19.4	4.9	-78.07	27.4	-129.7	132.6	108.3	24.30	5.457	
5,500.0	5,500.0	5,504.4	5,503.5	19.7	5.0	-78.46	26.7	-130.7	133.5	108.8	24.69	5.405	
5,600.0	5,600.0	5,604.8	5,603.9	20.1	5.0	-79.00	25.6	-131.8	134.2	109.1	25.09	5.350	
5,700.0	5,700.0	5,703.8	5,702.9	20.4	5.1	-79.53	24.6	-133.0	135.2	109.8	25.49	5.307	
5,800.0	5,800.0	5,804.1	5,803.2	20.8	5.1	-79.90	23.9	-134.3	136.5	110.6	25.88	5.273	
5,900.0	5,900.0	5,904.3	5,903.3	21.1	5.1	-80.24	23.3	-135.5	137.5	111.2	26.28	5.233	
6,000.0	6,000.0	6,003.5	6,002.5	21.5	5.2	-80.62	22.6	-137.0	138.8	112.1	26.69	5.202	
6,100.0	6,100.0	6,103.0	6,102.0	21.8	5.2	-81.01	22.0	-138.8	140.6	113.5	27.09	5.189	
6,200.0	6,200.0	6,202.9	6,201.8	22.2	5.3	-81.38	21.4	-140.9	142.6	115.1	27.50	5.185	
6,300.0	6,300.0	6,303.6	6,302.6	22.6	5.4	-81.50	21.3	-142.7	144.3	116.4	27.91	5.171	
6,400.0	6,400.0	6,404.8	6,403.8	22.9	5.4	-81.72	20.9	-143.9	145.4	117.1	28.33	5.132	
6,500.0	6,500.0	6,504.0	6,502.9	23.3	5.5	-82.12	20.1	-145.0	146.4	117.6	28.76	5.090	
6,600.0	6,600.0	6,604.3	6,603.2	23.6	5.6	-82.45	19.4	-146.2	147.5	118.3	29.18	5.053	
6,700.0	6,700.0	6,703.1	6,702.0	24.0	5.6	-82.56	19.3	-147.6	148.9	119.3	29.61	5.030	
6,800.0	6,800.0	6,802.8	6,801.7	24.3	5.7	-82.54	19.6	-149.5	150.8	120.8	30.03	5.023	
6,900.0	6,900.0	6,903.7	6,902.5	24.7	5.8	-82.53	19.8	-151.2	152.5	122.1	30.45	5.010	
7,000.0	7,000.0	7,003.0	7,001.9	25.0	5.8	-82.50	20.1	-152.9	154.2	123.3	30.88	4.994	
7,100.0	7,100.0	7,103.4	7,102.3	25.4	5.9	-82.46	20.5	-154.5	155.9	124.6	31.31	4.980	
7,200.0	7,200.0	7,203.5	7,202.4	25.8	6.0	-82.38	20.9	-156.0	157.4	125.7	31.74	4.961	
7,300.0	7,300.0	7,304.1	7,302.9	26.1	6.0	-82.23	21.5	-157.3	158.8	126.6	32.17	4.936	
7,400.0	7,400.0	7,406.5	7,405.3	26.5	6.1	-81.86	22.5	-157.5	159.1	126.6	32.57	4.885	
7,500.0	7,500.0	7,506.5	7,505.3	26.8	6.1	-81.37	23.8	-157.0	158.8	125.8	32.96	4.817	
7,600.0	7,600.0	7,606.9	7,605.7	27.2	6.2	-80.93	24.9	-156.3	158.3	124.9	33.36	4.745	
7,700.0	7,700.0	7,707.9	7,706.7	27.5	6.2	-80.56	25.8	-155.2	157.3	123.6	33.75	4.661	
7,800.0	7,800.0	7,809.0	7,807.7	27.9	6.2	-80.39	26.0	-153.5	155.7	121.6	34.15	4.560	
7,900.0	7,900.0	7,908.7	7,907.5	28.3	6.3	-80.35	25.8	-151.7	153.9	119.3	34.55	4.454	
8,000.0	8,000.0	8,007.7	8,006.5	28.6	6.3	-80.52	25.1	-150.3	152.4	117.4	34.96	4.360	
8,100.0	8,100.0	8,106.8	8,105.5	29.0	6.4	-80.74	24.4	-149.6	151.6	116.2	35.37	4.284	
8,200.0	8,200.0	8,206.4	8,205.1	29.3	6.5	-80.93	23.8	-149.2	151.1	115.3	35.80	4.222	
8,262.0	8,262.0	8,268.0	8,266.7	29.5	6.5	-81.14	23.3	-149.3	151.1	115.0	36.06	4.189	
8,300.0	8,300.0	8,305.8	8,304.6	29.7	6.5	-81.30	22.9	-149.3	151.1	114.9	36.23	4.170	
8,400.0	8,400.0	8,407.2	8,405.9	30.0	6.6	-81.78	21.6	-149.2	150.7	114.1	36.66	4.111	
8,466.7	8,466.7	8,472.7	8,471.4	30.3	6.7	-82.16	20.5	-149.1	150.5	113.5	36.95	4.073	
8,500.0	8,500.0	8,505.5	8,504.2	30.4	6.7	-82.40	19.9	-149.2	150.6	113.5	37.10	4.058	
8,600.0	8,600.0	8,604.0	8,602.6	30.7	6.8	-83.15	18.1	-150.3	151.4	113.9	37.54	4.034	
8,700.0	8,700.0	8,704.2	8,702.9	31.1	6.9	-83.97	16.1	-151.9	152.7	114.7	37.99	4.020	
8,717.5	8,717.5	8,721.2	8,719.8	31.2	6.9	-84.11	15.7	-152.1	153.0	114.9	38.06	4.019 SF	
8,725.0	8,725.0	8,728.5	8,727.2	31.2	6.9	125.14	15.6	-152.3	153.1	115.0	38.10	4.019	
8,750.0	8,750.0	8,752.9	8,751.5	31.3	6.9	125.15	15.1	-152.8	154.2	116.0	38.22	4.034	
8,775.0	8,774.9	8,777.2	8,775.8	31.4	6.9	125.47	14.6	-153.4	156.1	117.7	38.41	4.064	
8,800.0	8,799.6	8,801.4	8,800.0	31.4	7.0	126.07	14.2	-154.0	158.9	120.2	38.68	4.108	
8,825.0	8,824.1	8,825.8	8,824.4	31.5	7.0	126.93	13.8	-154.8	162.5	123.5	39.01	4.167	
8,850.0	8,848.3	8,849.9	8,848.5	31.6	7.0	128.00	13.4	-155.5	167.1	127.7	39.40	4.240	
8,875.0	8,872.2	8,873.7	8,872.2	31.7	7.0	129.21	13.0	-156.2	172.6	132.7	39.84	4.331	
8,900.0	8,895.6	8,897.0	8,895.5	31.7	7.0	130.52	12.6	-156.9	179.0	138.7	40.32	4.440	
8,925.0	8,918.5	8,919.7	8,918.2	31.8	7.1	131.87	12.3	-157.7	186.6	145.7	40.84	4.568	
8,950.0	8,940.9	8,941.8	8,940.4	31.9	7.1	133.21	11.9	-158.4	195.2	153.8	41.37	4.717	
8,975.0	8,962.7	8,963.3	8,961.8	32.0	7.1	134.51	11.6	-159.1	204.9	163.0	41.93	4.888	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - WINDWARD FEDERAL #2H - OWB-PILOT HOLE - AWP-PH													Offset Site Error: 0.0 usft
Survey Program: 100- VES GyrFlex													Offset Well Error: 3.0 usft
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)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
9,000.0	8,983.8	8,984.1	8,982.6	32.1	7.1	135.72	11.4	-159.8	215.9	173.4	42.50	5.080	
9,025.0	9,004.2	9,004.1	9,002.6	32.1	7.1	136.81	11.2	-160.5	228.0	184.9	43.07	5.293	
9,050.0	9,023.8	9,023.6	9,022.1	32.2	7.2	137.79	11.0	-161.2	241.2	197.5	43.65	5.526	
9,075.0	9,042.5	9,042.2	9,040.7	32.3	7.2	138.60	10.8	-161.8	255.5	211.3	44.22	5.778	
9,100.0	9,060.4	9,059.9	9,058.4	32.4	7.2	139.21	10.7	-162.4	270.9	226.1	44.79	6.049	
9,125.0	9,077.3	9,076.6	9,075.1	32.4	7.2	139.60	10.6	-162.9	287.4	242.0	45.35	6.337	
9,150.0	9,093.2	9,092.3	9,090.8	32.5	7.2	139.75	10.6	-163.4	304.8	258.9	45.89	6.643	
9,175.0	9,108.1	9,107.1	9,105.5	32.6	7.2	139.63	10.5	-163.9	323.2	276.8	46.41	6.964	
9,200.0	9,122.0	9,120.8	9,119.2	32.7	7.2	139.22	10.5	-164.3	342.4	295.5	46.91	7.299	
9,225.0	9,134.7	9,133.4	9,131.8	32.8	7.3	138.46	10.4	-164.7	362.5	315.1	47.39	7.649	
9,250.0	9,146.3	9,144.9	9,143.3	32.9	7.3	137.27	10.4	-165.0	383.3	335.4	47.85	8.010	
9,275.0	9,156.7	9,155.2	9,153.6	33.0	7.3	135.59	10.3	-165.3	404.8	356.5	48.28	8.384	
9,300.0	9,165.9	9,164.3	9,162.7	33.1	7.3	133.28	10.3	-165.6	426.8	378.1	48.67	8.769	
9,325.0	9,173.9	9,172.1	9,170.5	33.2	7.3	130.20	10.3	-165.8	449.4	400.4	49.04	9.164	
9,350.0	9,180.6	9,178.7	9,177.1	33.4	7.3	126.14	10.2	-166.0	472.5	423.1	49.37	9.569	
9,375.0	9,186.1	9,184.0	9,182.4	33.5	7.3	120.82	10.2	-166.1	495.9	446.2	49.67	9.984	
9,400.0	9,190.2	9,188.0	9,186.4	33.6	7.3	113.94	10.2	-166.2	519.7	469.7	49.94	10.407	
9,425.0	9,193.1	9,190.7	9,189.1	33.8	7.3	105.22	10.2	-166.3	543.7	493.5	50.16	10.838	
9,450.0	9,194.7	9,192.1	9,190.5	33.9	7.3	94.63	10.2	-166.3	567.8	517.5	50.35	11.277	
9,467.6	9,195.0	9,192.3	9,190.6	34.0	7.3	86.30	10.2	-166.3	584.9	534.4	50.46	11.590	
9,500.0	9,195.0	9,192.0	9,190.3	34.2	7.3	86.51	10.2	-166.3	616.3	565.7	50.66	12.166	
9,600.0	9,195.0	9,191.2	9,189.6	34.9	7.3	87.07	10.2	-166.3	712.8	661.5	51.32	13.888	
9,700.0	9,195.0	9,190.6	9,189.0	35.6	7.3	87.53	10.2	-166.3	808.4	756.3	52.06	15.528	
9,800.0	9,195.0	9,190.2	9,188.6	36.4	7.3	87.91	10.2	-166.3	903.0	850.2	52.85	17.088	
9,900.0	9,195.0	9,190.0	9,188.4	37.2	7.3	88.23	10.2	-166.3	996.6	942.9	53.66	18.572	
10,000.0	9,195.0	9,190.0	9,188.4	38.0	7.3	88.51	10.2	-166.3	1,088.9	1,034.4	54.49	19.985	
10,100.0	9,195.0	9,190.2	9,188.6	38.9	7.3	88.75	10.2	-166.3	1,179.9	1,124.6	55.31	21.333	
10,191.3	9,195.0	9,190.6	9,189.0	39.6	7.3	88.94	10.2	-166.3	1,261.8	1,205.7	56.05	22.512	
10,200.0	9,195.0	9,190.7	9,189.0	39.7	7.3	88.94	10.2	-166.3	1,269.5	1,213.4	56.12	22.621	
10,300.0	9,195.0	9,191.2	9,189.6	40.5	7.3	88.99	10.2	-166.3	1,359.3	1,302.4	56.95	23.869	
10,400.0	9,195.0	9,191.7	9,190.1	41.4	7.3	89.04	10.2	-166.3	1,450.5	1,392.7	57.83	25.083	
10,500.0	9,195.0	9,192.2	9,190.6	42.3	7.3	89.10	10.2	-166.3	1,542.8	1,484.0	58.76	26.258	
10,600.0	9,195.0	9,192.7	9,191.1	43.3	7.3	89.15	10.2	-166.4	1,636.0	1,576.3	59.73	27.391	
10,700.0	9,195.0	9,193.3	9,191.6	44.3	7.3	89.20	10.2	-166.4	1,729.9	1,669.2	60.74	28.481	
10,800.0	9,195.0	9,193.8	9,192.2	45.3	7.3	89.25	10.2	-166.4	1,824.5	1,762.7	61.79	29.528	
10,900.0	9,195.0	9,194.3	9,192.7	46.4	7.3	89.31	10.1	-166.4	1,919.6	1,856.8	62.88	30.530	
11,000.0	9,195.0	9,194.9	9,193.2	47.5	7.3	89.36	10.1	-166.4	2,015.3	1,951.3	64.00	31.489	
11,100.0	9,195.0	9,195.4	9,193.8	48.7	7.3	89.41	10.1	-166.4	2,111.3	2,046.1	65.15	32.405	
11,200.0	9,195.0	9,195.9	9,194.3	49.9	7.3	89.47	10.1	-166.5	2,207.6	2,141.3	66.33	33.281	
11,300.0	9,195.0	9,196.5	9,194.9	51.1	7.3	89.52	10.1	-166.5	2,304.3	2,236.8	67.54	34.116	
11,400.0	9,195.0	9,197.0	9,195.4	52.3	7.3	89.57	10.1	-166.5	2,401.3	2,332.5	68.78	34.913	
11,500.0	9,195.0	9,197.6	9,196.0	53.6	7.3	89.63	10.1	-166.5	2,498.5	2,428.4	70.04	35.673	
11,600.0	9,195.0	9,198.1	9,196.5	54.8	7.3	89.68	10.1	-166.5	2,595.9	2,524.5	71.32	36.399	
11,700.0	9,195.0	9,198.7	9,197.1	56.1	7.3	89.74	10.1	-166.5	2,693.4	2,620.8	72.62	37.091	
11,800.0	9,195.0	9,199.2	9,197.6	57.4	7.3	89.79	10.1	-166.5	2,791.2	2,717.3	73.94	37.751	
11,900.0	9,195.0	9,199.8	9,198.2	58.8	7.3	89.85	10.1	-166.6	2,889.1	2,813.9	75.28	38.381	
12,000.0	9,195.0	9,200.4	9,198.7	60.1	7.3	89.90	10.1	-166.6	2,987.2	2,910.6	76.63	38.982	
12,100.0	9,195.0	9,200.9	9,199.3	61.5	7.3	89.96	10.1	-166.6	3,085.4	3,007.4	78.00	39.556	
12,200.0	9,195.0	9,201.5	9,199.9	62.9	7.3	90.02	10.1	-166.6	3,183.7	3,104.3	79.38	40.105	
12,300.0	9,195.0	9,202.1	9,200.4	64.3	7.3	90.07	10.1	-166.6	3,282.0	3,201.3	80.78	40.629	
12,400.0	9,195.0	9,202.6	9,201.0	65.7	7.3	90.13	10.1	-166.6	3,380.5	3,298.3	82.19	41.130	
12,500.0	9,195.0	9,203.2	9,201.6	67.1	7.3	90.19	10.1	-166.7	3,479.1	3,395.5	83.61	41.609	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - WINDWARD FEDERAL #2H - OWB-PILOT HOLE - AWP-PH													Offset Site Error: 0.0 usft
Survey Program: 100- VES GyroFlex													Offset Well Error: 3.0 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	
12,600.0	9,195.0	9,203.8	9,202.2	68.5	7.3	90.24	10.1	-166.7	3,577.8	3,492.7	85.05	42.068	
12,700.0	9,195.0	9,204.4	9,202.7	70.0	7.3	90.30	10.1	-166.7	3,676.5	3,590.0	86.49	42.507	
12,800.0	9,195.0	9,204.9	9,203.3	71.4	7.3	90.36	10.1	-166.7	3,775.3	3,687.3	87.95	42.928	
12,900.0	9,195.0	9,205.5	9,203.9	72.9	7.3	90.42	10.1	-166.7	3,874.1	3,784.7	89.41	43.331	
13,000.0	9,195.0	9,206.1	9,204.5	74.4	7.3	90.48	10.1	-166.7	3,973.1	3,882.2	90.88	43.718	
13,100.0	9,195.0	9,206.7	9,205.1	75.8	7.3	90.54	10.1	-166.8	4,072.0	3,979.7	92.36	44.089	
13,200.0	9,195.0	9,207.3	9,205.7	77.3	7.3	90.60	10.1	-166.8	4,171.0	4,077.2	93.85	44.445	
13,300.0	9,195.0	9,207.9	9,206.3	78.8	7.3	90.66	10.1	-166.8	4,270.1	4,174.8	95.34	44.787	
13,400.0	9,195.0	9,208.5	9,206.9	80.3	7.3	90.72	10.1	-166.8	4,369.2	4,272.4	96.84	45.116	
13,500.0	9,195.0	9,209.1	9,207.5	81.8	7.3	90.78	10.1	-166.8	4,468.4	4,370.0	98.35	45.432	
13,600.0	9,195.0	9,209.7	9,208.1	83.3	7.3	90.84	10.1	-166.8	4,567.5	4,467.7	99.87	45.737	
13,700.0	9,195.0	9,210.3	9,208.7	84.8	7.3	90.90	10.1	-166.9	4,666.7	4,565.4	101.39	46.030	
13,800.0	9,195.0	9,211.0	9,209.3	86.4	7.3	90.96	10.1	-166.9	4,766.0	4,663.1	102.91	46.312	
13,900.0	9,195.0	9,211.6	9,210.0	87.9	7.3	91.02	10.1	-166.9	4,865.3	4,760.8	104.44	46.584	
14,000.0	9,195.0	9,212.2	9,210.6	89.4	7.3	91.08	10.1	-166.9	4,964.6	4,858.6	105.98	46.846	
14,100.0	9,195.0	9,212.8	9,211.2	91.0	7.3	91.14	10.0	-166.9	5,063.9	4,956.4	107.52	47.099	
14,200.0	9,195.0	9,213.5	9,211.8	92.5	7.3	91.21	10.0	-166.9	5,163.3	5,054.2	109.06	47.343	
14,300.0	9,195.0	9,214.1	9,212.5	94.1	7.3	91.27	10.0	-167.0	5,262.7	5,152.1	110.61	47.578	
14,400.0	9,195.0	9,214.7	9,213.1	95.6	7.3	91.33	10.0	-167.0	5,362.1	5,249.9	112.16	47.806	
14,500.0	9,195.0	9,215.4	9,213.7	97.2	7.3	91.39	10.0	-167.0	5,461.5	5,347.8	113.72	48.026	
14,600.0	9,195.0	9,216.0	9,214.4	98.7	7.3	91.46	10.0	-167.0	5,561.0	5,445.7	115.28	48.238	
14,700.0	9,195.0	9,216.7	9,215.0	100.3	7.3	91.52	10.0	-167.0	5,660.4	5,543.6	116.85	48.444	
14,800.0	9,195.0	9,217.3	9,215.7	101.8	7.3	91.59	10.0	-167.0	5,759.9	5,641.5	118.41	48.643	
14,900.0	9,195.0	9,218.0	9,216.3	103.4	7.3	91.65	10.0	-167.1	5,859.4	5,739.4	119.98	48.835	
15,000.0	9,195.0	9,218.6	9,217.0	105.0	7.3	91.72	10.0	-167.1	5,958.9	5,837.4	121.56	49.022	
15,100.0	9,195.0	9,219.3	9,217.6	106.6	7.3	91.78	10.0	-167.1	6,058.5	5,935.3	123.13	49.203	
15,200.0	9,195.0	9,219.9	9,218.3	108.1	7.3	91.85	10.0	-167.1	6,158.0	6,033.3	124.71	49.378	
15,300.0	9,195.0	9,220.6	9,219.0	109.7	7.3	91.91	10.0	-167.1	6,257.6	6,131.3	126.29	49.548	
15,400.0	9,195.0	9,221.1	9,219.5	111.3	7.3	91.96	10.0	-167.1	6,357.2	6,229.3	127.86	49.720	
15,500.0	9,195.0	9,221.6	9,220.0	112.9	7.3	92.02	10.0	-167.1	6,456.8	6,327.3	129.45	49.880	
15,600.0	9,195.0	9,222.1	9,220.5	114.5	7.3	92.08	10.0	-167.1	6,556.4	6,425.3	131.03	50.036	
15,700.0	9,195.0	9,222.6	9,221.0	116.0	7.3	92.14	10.0	-167.1	6,656.0	6,523.4	132.62	50.187	
15,800.0	9,195.0	9,223.1	9,221.5	117.6	7.3	92.20	10.0	-167.1	6,755.6	6,621.4	134.22	50.334	
15,900.0	9,195.0	9,223.6	9,222.0	119.2	7.3	92.26	10.0	-167.1	6,855.3	6,719.4	135.81	50.476	
16,000.0	9,195.0	9,224.1	9,222.5	120.8	7.3	92.32	10.0	-167.2	6,954.9	6,817.5	137.41	50.615	
16,100.0	9,195.0	9,224.6	9,223.0	122.4	7.3	92.38	10.0	-167.2	7,054.6	6,915.6	139.01	50.750	
16,200.0	9,195.0	9,225.1	9,223.5	124.0	7.3	92.44	10.0	-167.2	7,154.2	7,013.6	140.61	50.881	
16,300.0	9,195.0	9,225.6	9,224.0	125.6	7.3	92.50	10.0	-167.2	7,253.9	7,111.7	142.21	51.009	
16,400.0	9,195.0	9,226.1	9,224.5	127.2	7.3	92.56	10.0	-167.2	7,353.6	7,209.8	143.81	51.133	
16,500.0	9,195.0	9,226.6	9,225.0	128.8	7.3	92.62	10.0	-167.2	7,453.3	7,307.9	145.42	51.254	
16,600.0	9,195.0	9,227.1	9,225.5	130.4	7.3	92.68	10.0	-167.3	7,553.0	7,406.0	147.03	51.372	
16,700.0	9,195.0	9,227.6	9,226.0	132.0	7.3	92.74	10.0	-167.3	7,652.7	7,504.1	148.63	51.487	
16,800.0	9,195.0	9,228.1	9,226.5	133.6	7.3	92.80	10.0	-167.3	7,752.4	7,602.2	150.24	51.599	
16,900.0	9,195.0	9,228.6	9,227.0	135.2	7.3	92.86	10.0	-167.3	7,852.2	7,700.3	151.86	51.708	
17,000.0	9,195.0	9,229.1	9,227.5	136.8	7.3	92.92	10.0	-167.3	7,951.9	7,798.4	153.47	51.815	
17,100.0	9,195.0	9,229.6	9,228.0	138.4	7.3	92.98	10.0	-167.3	8,051.6	7,896.5	155.08	51.919	
17,200.0	9,195.0	9,230.1	9,228.5	140.0	7.3	93.04	10.0	-167.4	8,151.4	7,994.7	156.70	52.020	
17,300.0	9,195.0	9,230.6	9,229.0	141.6	7.3	93.10	10.0	-167.4	8,251.1	8,092.8	158.31	52.119	
17,400.0	9,195.0	9,231.1	9,229.5	143.2	7.3	93.16	10.0	-167.4	8,350.9	8,191.0	159.93	52.216	
17,500.0	9,195.0	9,231.6	9,229.9	144.8	7.3	93.22	10.0	-167.4	8,450.6	8,289.1	161.55	52.310	
17,600.0	9,195.0	9,232.1	9,230.4	146.4	7.3	93.28	10.0	-167.4	8,550.4	8,387.2	163.17	52.402	
17,700.0	9,195.0	9,232.6	9,230.9	148.0	7.3	93.34	10.0	-167.4	8,650.2	8,485.4	164.79	52.492	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - WINDWARD FEDERAL #2H - OWB-PILOT HOLE - AWP-PH													Offset Site Error: 0.0 usft
Survey Program: 100- VES GyroFlex													Offset Well Error: 3.0 usft
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)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
17,800.0	9,195.0	9,229.4	9,227.8	149.8	7.3	92.78	10.0	-167.5	8,750.0	8,583.6	166.41	52.580	
17,900.0	9,195.0	9,229.9	9,228.3	151.4	7.3	92.83	10.0	-167.5	8,849.7	8,681.7	168.04	52.666	
18,000.0	9,195.0	9,230.4	9,228.8	153.0	7.3	92.88	10.0	-167.5	8,949.5	8,779.9	169.66	52.750	
18,100.0	9,195.0	9,231.0	9,229.3	154.6	7.3	92.94	10.0	-167.5	9,049.3	8,878.0	171.28	52.832	
18,200.0	9,195.0	9,231.5	9,229.8	156.3	7.3	92.99	9.9	-167.5	9,149.1	8,976.2	172.91	52.913	
18,300.0	9,195.0	9,232.0	9,230.4	157.9	7.3	93.04	9.9	-167.5	9,248.9	9,074.4	174.54	52.992	
18,400.0	9,195.0	9,232.5	9,230.9	159.5	7.3	93.09	9.9	-167.6	9,348.7	9,172.6	176.16	53.069	
18,500.0	9,195.0	9,233.1	9,231.4	161.1	7.3	93.14	9.9	-167.6	9,448.5	9,270.8	177.79	53.144	
18,600.0	9,195.0	9,233.6	9,231.9	162.8	7.3	93.20	9.9	-167.6	9,548.4	9,368.9	179.42	53.218	
18,700.0	9,195.0	9,234.1	9,232.5	164.4	7.3	93.25	9.9	-167.6	9,648.2	9,467.1	181.05	53.290	
18,800.0	9,195.0	9,234.6	9,233.0	166.0	7.3	93.30	9.9	-167.6	9,748.0	9,565.3	182.68	53.361	
18,900.0	9,195.0	9,235.2	9,233.5	167.7	7.3	93.35	9.9	-167.6	9,847.8	9,663.5	184.31	53.430	
19,000.0	9,195.0	9,235.7	9,234.1	169.3	7.3	93.40	9.9	-167.7	9,947.7	9,761.7	185.94	53.498	



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - WINDWARD FEDERAL #7H - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 100-Standard Keeper 104, 8608-MWD													Offset Well Error: 3.0 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)			
0.0	0.0	0.0	0.0	3.0	3.0	-90.46	-0.4	-50.0	50.0				
100.0	100.0	98.6	98.6	3.0	3.0	-91.05	-0.9	-50.9	51.0	45.0	6.00	8.488	
200.0	200.0	198.4	198.4	3.0	3.0	-92.33	-2.2	-53.1	53.1	47.1	6.05	8.785	
300.0	300.0	298.3	298.2	3.1	3.0	-93.41	-3.3	-55.3	55.5	49.3	6.13	9.041	
400.0	400.0	398.3	398.2	3.2	3.0	-94.34	-4.4	-57.8	57.9	51.7	6.27	9.247	
500.0	500.0	498.3	498.2	3.4	3.1	-95.10	-5.4	-60.1	60.4	54.0	6.44	9.382	
600.0	600.0	598.2	598.1	3.6	3.1	-95.95	-6.5	-62.5	62.8	56.2	6.64	9.454	
700.0	700.0	698.1	697.9	3.8	3.1	-96.88	-7.8	-64.7	65.2	58.3	6.88	9.476	
800.0	800.0	798.1	797.9	4.0	3.1	-97.84	-9.2	-67.1	67.7	60.6	7.15	9.477	
900.0	900.0	898.2	897.9	4.2	3.2	-98.75	-10.7	-69.3	70.1	62.7	7.43	9.436	
1,000.0	1,000.0	998.5	998.2	4.5	3.2	-99.43	-11.8	-71.4	72.4	64.6	7.74	9.347	
1,100.0	1,100.0	1,098.5	1,098.2	4.8	3.3	-99.93	-12.8	-73.1	74.2	66.2	8.07	9.203	
1,200.0	1,200.0	1,198.5	1,198.2	5.1	3.3	-100.39	-13.7	-74.8	76.0	67.6	8.41	9.047	
1,300.0	1,300.0	1,299.8	1,299.4	5.4	3.4	-100.94	-14.7	-76.1	77.5	68.7	8.76	8.849	
1,400.0	1,400.0	1,401.0	1,400.6	5.7	3.4	-101.03	-14.7	-75.2	76.6	67.5	9.05	8.465	
1,500.0	1,500.0	1,500.9	1,500.5	6.0	3.4	-101.14	-14.6	-74.0	75.4	66.1	9.34	8.073	
1,600.0	1,600.0	1,600.8	1,600.5	6.3	3.4	-101.00	-14.2	-72.9	74.3	64.7	9.64	7.711	
1,700.0	1,700.0	1,701.0	1,700.7	6.6	3.4	-100.82	-13.7	-71.7	73.0	63.0	9.94	7.338	
1,800.0	1,800.0	1,801.1	1,800.7	6.9	3.3	-100.44	-13.0	-70.3	71.5	61.2	10.26	6.969	
1,900.0	1,900.0	1,901.1	1,900.7	7.2	3.3	-99.96	-12.1	-68.8	69.9	59.3	10.58	6.601	
2,000.0	2,000.0	2,001.4	2,001.0	7.6	3.4	-99.16	-10.8	-67.2	68.0	57.1	10.92	6.233	
2,100.0	2,100.0	2,101.7	2,101.2	7.9	3.4	-98.16	-9.3	-65.1	65.8	54.5	11.26	5.841	
2,200.0	2,200.0	2,201.6	2,201.1	8.2	3.4	-96.96	-7.7	-62.8	63.3	51.7	11.60	5.457	
2,300.0	2,300.0	2,301.8	2,301.3	8.6	3.4	-95.64	-6.0	-60.3	60.6	48.7	11.96	5.071	
2,400.0	2,400.0	2,401.4	2,400.8	8.9	3.4	-94.60	-4.7	-58.4	58.6	46.3	12.32	4.757	
2,500.0	2,500.0	2,501.4	2,500.8	9.2	3.5	-93.44	-3.4	-56.5	56.6	43.9	12.69	4.460	
2,600.0	2,600.0	2,600.9	2,600.3	9.6	3.5	-92.16	-2.1	-54.5	54.6	41.5	13.06	4.178	
2,700.0	2,700.0	2,700.8	2,700.2	9.9	3.5	-91.39	-1.3	-53.6	53.6	40.2	13.44	3.989	
2,800.0	2,800.0	2,801.0	2,800.4	10.3	3.6	-90.39	-0.4	-52.4	52.4	38.6	13.82	3.793	
2,900.0	2,900.0	2,901.2	2,900.5	10.6	3.6	-89.22	0.7	-50.6	50.7	36.4	14.22	3.563	
3,000.0	3,000.0	3,000.3	2,999.6	10.9	3.7	-88.40	1.4	-49.3	49.3	34.7	14.61	3.377	
3,003.9	3,003.9	3,004.2	3,003.5	11.0	3.7	-88.39	1.4	-49.3	49.3	34.7	14.62	3.374	
3,100.0	3,100.0	3,099.8	3,099.1	11.3	3.7	-88.31	1.5	-50.0	50.0	35.0	14.99	3.339	
3,200.0	3,200.0	3,199.9	3,199.2	11.6	3.7	-88.17	1.6	-50.8	50.9	35.5	15.37	3.310	
3,300.0	3,300.0	3,299.9	3,299.2	12.0	3.8	-87.95	1.8	-51.6	51.6	35.8	15.75	3.275	
3,400.0	3,400.0	3,400.0	3,399.3	12.3	3.8	-87.66	2.1	-52.2	52.3	36.1	16.15	3.238	
3,500.0	3,500.0	3,500.0	3,499.2	12.7	3.9	-87.27	2.5	-52.9	53.0	36.4	16.55	3.201	
3,600.0	3,600.0	3,600.0	3,599.3	13.0	3.9	-86.67	3.1	-53.4	53.4	36.5	16.95	3.153	
3,700.0	3,700.0	3,700.1	3,699.4	13.4	4.0	-85.92	3.8	-53.7	53.8	36.4	17.36	3.099	
3,800.0	3,800.0	3,800.3	3,799.6	13.7	4.0	-85.11	4.6	-53.8	54.0	36.2	17.77	3.038	
3,900.0	3,900.0	3,900.5	3,899.8	14.1	4.1	-84.09	5.5	-53.6	53.9	35.7	18.19	2.963	
4,000.0	4,000.0	4,000.7	3,999.9	14.4	4.2	-83.07	6.4	-52.9	53.3	34.7	18.60	2.867	
4,100.0	4,100.0	4,100.9	4,100.1	14.8	4.2	-81.99	7.3	-51.8	52.3	33.3	19.01	2.753	
4,200.0	4,200.0	4,201.0	4,200.3	15.1	4.3	-80.89	8.1	-50.4	51.0	31.6	19.42	2.627	
4,300.0	4,300.0	4,301.2	4,300.5	15.5	4.3	-80.26	8.4	-48.7	49.4	29.6	19.82	2.493	
4,400.0	4,400.0	4,400.7	4,399.9	15.8	4.4	-80.21	8.2	-47.2	47.9	27.7	20.22	2.370	
4,424.8	4,424.8	4,425.2	4,424.4	15.9	4.4	-80.40	8.0	-47.2	47.9	27.5	20.32	2.356 CC	
4,500.0	4,500.0	4,500.3	4,499.6	16.2	4.4	-81.24	7.3	-47.4	47.9	27.3	20.60	2.327	
4,600.0	4,600.0	4,600.2	4,599.4	16.5	4.4	-82.34	6.4	-47.8	48.2	27.2	20.98	2.298	
4,700.0	4,700.0	4,700.2	4,699.4	16.9	4.5	-83.30	5.6	-48.1	48.4	27.0	21.36	2.265	
4,800.0	4,800.0	4,800.3	4,799.5	17.2	4.5	-84.28	4.8	-48.3	48.6	26.8	21.75	2.234	
4,900.0	4,900.0	4,900.3	4,899.5	17.6	4.5	-85.14	4.1	-48.6	48.8	26.7	22.14	2.205	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - WINDWARD FEDERAL #7H - OWB - ACTUAL WELLPATH														Offset Site Error: 0.0 usft
Survey Program: 100-Standard Keeper 104, 8608-MWD														Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (")	Distance		Minimum Separation (usft)	Separation Factor	Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Between Centres (usft)	Between Ellipses (usft)				Offset +N/-S (usft)	Offset +E/-W (usft)	
5,000.0	5,000.0	5,000.3	4,999.5	18.0	4.6	-86.11	3.3	-48.9	49.0	26.5	2.175			
5,100.0	5,100.0	5,100.3	5,099.5	18.3	4.6	-86.94	2.6	-49.2	49.3	26.3	2.147			
5,200.0	5,200.0	5,200.3	5,199.5	18.7	4.7	-87.96	1.8	-49.5	49.5	26.2	2.122			
5,300.0	5,300.0	5,300.2	5,299.4	19.0	4.7	-89.17	0.7	-49.9	49.9	26.2	2.102			
5,400.0	5,400.0	5,400.1	5,399.3	19.4	4.8	-90.50	-0.4	-50.3	50.3	26.1	2.082 ES			
5,500.0	5,500.0	5,500.0	5,499.2	19.7	4.8	-91.88	-1.7	-51.1	51.1	26.5	2.081 SF			
5,600.0	5,600.0	5,599.9	5,599.0	20.1	4.9	-93.32	-3.0	-52.1	52.2	27.2	2.088			
5,700.0	5,700.0	5,699.9	5,699.0	20.4	5.0	-94.57	-4.2	-53.2	53.4	28.0	2.101			
5,800.0	5,800.0	5,799.8	5,798.9	20.8	5.0	-95.78	-5.5	-54.3	54.6	28.7	2.113			
5,900.0	5,900.0	5,899.9	5,899.0	21.1	5.1	-96.76	-6.6	-55.4	55.8	29.5	2.126			
6,000.0	6,000.0	5,999.8	5,998.9	21.5	5.2	-97.65	-7.6	-56.4	56.9	30.3	2.136			
6,100.0	6,100.0	6,099.8	6,098.9	21.8	5.2	-98.48	-8.6	-57.6	58.2	31.2	2.150			
6,200.0	6,200.0	6,199.7	6,198.8	22.2	5.3	-99.33	-9.7	-58.8	59.6	32.0	2.164			
6,300.0	6,300.0	6,299.5	6,298.5	22.6	5.4	-99.99	-10.6	-60.2	61.1	33.1	2.185			
6,400.0	6,400.0	6,399.3	6,398.3	22.9	5.5	-100.55	-11.5	-61.8	62.9	34.5	2.214			
6,500.0	6,500.0	6,499.3	6,498.4	23.3	5.6	-101.06	-12.4	-63.6	64.8	35.9	2.247			
6,600.0	6,600.0	6,599.2	6,598.2	23.6	5.6	-101.47	-13.3	-65.4	66.7	37.5	2.280			
6,700.0	6,700.0	6,699.2	6,698.2	24.0	5.7	-101.76	-14.0	-67.3	68.8	39.1	2.316			
6,800.0	6,800.0	6,798.8	6,797.7	24.3	5.8	-101.79	-14.5	-69.7	71.2	41.0	2.362			
6,900.0	6,900.0	6,898.5	6,897.4	24.7	5.9	-101.31	-14.5	-72.5	74.0	43.4	2.420			
7,000.0	7,000.0	7,000.3	6,999.2	25.0	6.0	-100.77	-14.1	-74.2	75.5	44.5	2.434			
7,100.0	7,100.0	7,100.4	7,099.3	25.4	6.0	-100.37	-13.7	-74.7	76.0	44.5	2.417			
7,200.0	7,200.0	7,200.3	7,199.2	25.8	6.1	-99.93	-13.2	-75.3	76.5	44.6	2.400			
7,300.0	7,300.0	7,299.9	7,298.8	26.1	6.2	-99.60	-12.9	-76.1	77.2	44.9	2.389			
7,400.0	7,400.0	7,399.6	7,398.5	26.5	6.3	-99.68	-13.2	-77.2	78.3	45.6	2.392			
7,500.0	7,500.0	7,499.6	7,498.4	26.8	6.4	-99.97	-13.8	-78.6	79.8	46.6	2.405			
7,600.0	7,600.0	7,601.3	7,600.2	27.2	6.4	-100.82	-15.0	-78.5	79.9	46.3	2.378			
7,700.0	7,700.0	7,701.3	7,700.2	27.5	6.5	-102.33	-16.9	-77.3	79.2	45.1	2.326			
7,800.0	7,800.0	7,801.3	7,800.1	27.9	6.6	-104.23	-19.3	-76.2	78.6	44.2	2.283			
7,900.0	7,900.0	7,901.3	7,900.0	28.3	6.6	-106.33	-22.0	-74.9	78.1	43.2	2.239			
8,000.0	8,000.0	8,001.0	7,999.7	28.6	6.7	-108.68	-24.9	-73.6	77.7	42.4	2.202			
8,100.0	8,100.0	8,101.0	8,099.7	29.0	6.7	-110.32	-27.0	-72.8	77.6	41.9	2.174			
8,200.0	8,200.0	8,201.0	8,199.6	29.3	6.8	-110.09	-26.6	-72.8	77.5	41.4	2.147			
8,205.4	8,205.4	8,206.3	8,205.0	29.3	6.8	-110.08	-26.6	-72.8	77.5	41.4	2.145			
8,300.0	8,300.0	8,300.4	8,299.0	29.7	6.9	-110.14	-26.8	-73.0	77.8	41.2	2.129			
8,400.0	8,400.0	8,400.0	8,398.7	30.0	7.0	-110.63	-27.7	-73.6	78.7	41.7	2.127			
8,500.0	8,500.0	8,499.3	8,497.9	30.4	7.0	-111.32	-29.2	-74.7	80.2	42.8	2.143			
8,600.0	8,600.0	8,598.0	8,596.6	30.7	7.1	-111.93	-31.0	-77.1	83.2	45.3	2.195			
8,700.0	8,700.0	8,695.7	8,694.2	31.1	7.2	-112.84	-33.9	-80.5	87.5	49.3	2.287			
8,717.5	8,717.5	8,711.6	8,710.0	31.2	7.2	-113.23	-34.9	-81.3	88.8	50.4	2.315			
8,725.0	8,725.0	8,718.4	8,716.8	31.2	7.2	95.82	-35.4	-81.7	89.4	51.0	2.330			
8,750.0	8,750.0	8,741.2	8,739.5	31.3	7.2	95.21	-37.6	-83.2	92.0	53.5	2.392			
8,775.0	8,774.9	8,764.3	8,762.4	31.4	7.2	94.99	-40.5	-84.9	95.2	56.6	2.469			
8,800.0	8,799.6	8,786.9	8,784.6	31.4	7.2	95.11	-43.9	-86.8	98.9	60.3	2.560			
8,825.0	8,824.1	8,808.9	8,806.1	31.5	7.2	95.47	-47.8	-89.0	103.4	64.5	2.658			
8,850.0	8,848.3	8,830.1	8,826.7	31.6	7.2	96.00	-52.2	-91.4	108.8	69.5	2.766			
8,875.0	8,872.2	8,851.0	8,846.8	31.7	7.3	96.67	-57.0	-94.2	115.0	75.2	2.891			
8,900.0	8,895.6	8,871.4	8,866.3	31.7	7.3	97.41	-62.3	-97.4	122.1	81.9	3.033			
8,925.0	8,918.5	8,891.8	8,885.5	31.8	7.3	98.15	-68.1	-100.8	130.2	89.4	3.190			
8,950.0	8,940.9	8,911.7	8,904.1	31.9	7.3	98.81	-74.5	-104.5	139.1	97.7	3.362			
8,975.0	8,962.7	8,931.2	8,921.9	32.0	7.3	99.35	-81.2	-108.3	148.8	106.9	3.549			
9,000.0	8,983.8	8,950.2	8,939.1	32.1	7.4	99.80	-88.3	-112.3	159.3	116.8	3.749			

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - WINDWARD FEDERAL #7H - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 100-Standard Keeper 104, 8608-MWD													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (")	Distance		Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Between Centres (usft)	Between Ellipses (usft)					
9,025.0	9,004.2	8,968.6	8,955.5	32.1	7.4	100.12	-95.5	-116.4	170.7	127.6	43.07	3.963	
9,050.0	9,023.8	8,985.9	8,970.7	32.2	7.4	100.23	-102.7	-120.6	182.8	139.2	43.64	4.190	
9,075.0	9,042.5	9,002.8	8,985.2	32.3	7.4	100.15	-110.2	-124.9	195.8	151.6	44.21	4.430	
9,100.0	9,060.4	9,019.0	8,998.9	32.4	7.5	99.88	-117.8	-129.2	209.6	164.8	44.76	4.683	
9,125.0	9,077.3	9,034.8	9,011.8	32.4	7.5	99.43	-125.5	-133.7	224.1	178.8	45.30	4.946	
9,150.0	9,093.2	9,049.8	9,024.0	32.5	7.5	98.77	-133.2	-138.1	239.2	193.4	45.82	5.221	
9,175.0	9,108.1	9,064.4	9,035.4	32.6	7.6	97.92	-141.1	-142.6	255.0	208.7	46.33	5.505	
9,200.0	9,122.0	9,078.7	9,046.4	32.7	7.6	96.92	-149.0	-147.1	271.4	224.5	46.81	5.797	
9,225.0	9,134.7	9,092.5	9,056.8	32.8	7.6	95.76	-156.9	-151.7	288.2	241.0	47.28	6.097	
9,250.0	9,146.3	9,107.2	9,067.6	32.9	7.7	94.59	-165.6	-156.6	305.5	257.8	47.72	6.403	
9,275.0	9,156.7	9,121.9	9,078.0	33.0	7.7	93.30	-174.7	-161.6	323.2	275.1	48.14	6.714	
9,300.0	9,165.9	9,135.8	9,087.5	33.1	7.8	91.82	-183.5	-166.4	341.2	292.6	48.53	7.030	
9,325.0	9,173.9	9,149.1	9,096.4	33.2	7.8	90.19	-192.3	-171.1	359.4	310.5	48.89	7.352	
9,350.0	9,180.6	9,162.9	9,105.3	33.4	7.9	88.52	-201.6	-176.0	377.9	328.7	49.23	7.678	
9,375.0	9,186.1	9,176.8	9,114.0	33.5	8.0	86.82	-211.4	-180.9	396.6	347.1	49.53	8.007	
9,400.0	9,190.2	9,190.7	9,122.3	33.6	8.1	85.05	-221.3	-185.9	415.5	365.7	49.81	8.341	
9,425.0	9,193.1	9,204.7	9,130.3	33.8	8.1	83.25	-231.6	-190.9	434.5	384.4	50.07	8.678	
9,450.0	9,194.7	9,218.8	9,138.0	33.9	8.2	81.43	-242.3	-196.0	453.5	403.3	50.29	9.019	
9,467.6	9,195.0	9,229.1	9,143.3	34.0	8.3	80.20	-250.3	-199.7	467.0	416.5	50.42	9.261	
9,500.0	9,195.0	9,249.5	9,153.4	34.2	8.5	82.65	-266.4	-207.0	491.6	441.0	50.65	9.707	
9,600.0	9,195.0	9,332.5	9,187.4	34.9	9.3	88.97	-336.3	-236.1	565.2	513.7	51.43	10.990	
9,700.0	9,195.0	9,454.3	9,207.7	35.6	10.8	91.48	-448.8	-276.2	632.6	580.3	52.32	12.091	
9,800.0	9,195.0	9,652.8	9,206.8	36.4	13.3	91.11	-642.9	-316.5	682.7	629.2	53.44	12.776	
9,900.0	9,195.0	9,793.6	9,201.4	37.2	15.1	90.56	-783.1	-328.5	715.1	660.5	54.56	13.106	
10,000.0	9,195.0	9,917.1	9,199.3	38.0	16.8	90.37	-906.5	-332.9	736.0	680.3	55.72	13.209	
10,100.0	9,195.0	10,047.8	9,198.3	38.9	18.6	90.28	-1,037.2	-332.2	745.9	688.4	57.46	12.982	
10,191.3	9,195.0	10,149.9	9,195.8	39.6	20.0	90.09	-1,139.2	-328.4	746.0	686.3	59.63	12.509	
10,200.0	9,195.0	10,157.3	9,195.5	39.7	20.1	90.07	-1,146.5	-328.1	745.7	685.9	59.81	12.467	
10,300.0	9,195.0	10,243.5	9,193.2	40.5	21.4	89.89	-1,232.6	-325.7	743.4	681.5	61.89	12.012	
10,400.0	9,195.0	10,338.6	9,191.9	41.4	22.8	89.79	-1,327.7	-324.2	742.4	678.2	64.17	11.569	
10,500.0	9,195.0	10,476.1	9,189.0	42.3	24.9	89.56	-1,465.1	-320.2	740.5	673.4	67.16	11.025	
10,600.0	9,195.0	10,587.0	9,185.6	43.3	26.5	89.29	-1,575.6	-311.2	732.9	663.1	69.81	10.498	
10,700.0	9,195.0	10,680.5	9,183.1	44.3	28.0	89.09	-1,668.8	-304.1	726.0	653.8	72.26	10.047	
10,800.0	9,195.0	10,775.2	9,181.7	45.3	29.5	88.97	-1,763.3	-297.7	719.9	645.1	74.78	9.626	
10,900.0	9,195.0	10,874.3	9,181.5	46.4	31.0	88.95	-1,862.2	-291.5	714.2	636.8	77.43	9.225	
11,000.0	9,195.0	10,974.3	9,182.0	47.5	32.6	88.98	-1,961.9	-285.2	708.5	628.4	80.13	8.842	
11,100.0	9,195.0	11,086.4	9,182.2	48.7	34.4	88.99	-2,073.8	-277.2	702.0	619.0	83.07	8.451	
11,200.0	9,195.0	11,181.0	9,182.3	49.9	35.9	88.99	-2,168.1	-270.1	695.1	609.4	85.77	8.105	
11,300.0	9,195.0	11,278.0	9,183.5	51.1	37.5	89.08	-2,264.8	-263.1	688.5	600.0	88.54	7.776	
11,400.0	9,195.0	11,369.7	9,185.4	52.3	39.0	89.23	-2,356.4	-257.6	683.0	591.8	91.26	7.484	
11,500.0	9,195.0	11,462.7	9,186.4	53.6	40.8	89.30	-2,469.1	-249.8	676.7	582.4	94.36	7.172	
11,600.0	9,195.0	11,581.0	9,183.1	54.8	42.4	89.01	-2,567.1	-242.2	669.6	572.3	97.24	6.886	
11,700.0	9,195.0	11,673.9	9,179.8	56.1	43.9	88.72	-2,659.6	-235.8	663.4	563.3	100.06	6.630	
11,800.0	9,195.0	11,763.9	9,177.7	57.4	45.4	88.53	-2,749.5	-230.4	658.0	555.2	102.85	6.398	
11,900.0	9,195.0	11,847.5	9,177.2	58.8	46.8	88.47	-2,833.1	-227.6	655.3	549.7	105.56	6.208	
12,000.0	9,195.0	11,949.0	9,176.8	60.1	48.4	88.44	-2,934.5	-224.8	653.2	544.6	108.58	6.016	
12,100.0	9,195.0	12,040.6	9,176.6	61.5	50.0	88.42	-3,026.1	-223.0	651.8	540.3	111.45	5.848	
12,146.3	9,195.0	12,082.1	9,177.2	62.1	50.6	88.47	-3,067.5	-222.6	651.6	538.8	112.77	5.778	
12,200.0	9,195.0	12,132.0	9,178.5	62.9	51.5	88.58	-3,117.5	-222.5	651.8	537.5	114.34	5.701	
12,300.0	9,195.0	12,230.8	9,179.9	64.3	53.1	88.71	-3,216.3	-222.6	652.5	535.2	117.35	5.560	
12,400.0	9,195.0	12,328.4	9,179.8	65.7	54.7	88.70	-3,313.8	-222.8	653.3	533.0	120.36	5.428	
12,500.0	9,195.0	12,421.1	9,178.7	67.1	56.2	88.61	-3,406.5	-223.9	655.1	531.8	123.31	5.313	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - WINDWARD FEDERAL #7H - OWB - ACTUAL WELLPATH													Offset Site Error: 0.0 usft
Survey Program: 100-Standard Keeper 104, 8608-MWD													Offset Well Error: 3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	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)	+E/-W (usft)					
12,600.0	9,195.0	12,516.4	9,178.4	68.5	57.8	88.59	-3,501.8	-225.8	657.8	531.5	126.30	5.208	
12,700.0	9,195.0	12,614.2	9,179.8	70.0	59.4	88.72	-3,599.6	-228.3	660.9	531.5	129.34	5.109	
12,800.0	9,195.0	12,720.2	9,181.8	71.4	61.1	88.90	-3,705.4	-231.1	664.1	531.6	132.53	5.011	
12,900.0	9,195.0	12,829.7	9,183.2	72.9	62.9	89.02	-3,815.0	-231.9	665.4	529.6	135.79	4.900	
13,000.0	9,195.0	12,930.4	9,182.5	74.4	64.6	88.96	-3,915.6	-232.2	666.3	527.4	138.92	4.796	
13,100.0	9,195.0	13,038.3	9,181.4	75.8	66.3	88.86	-4,023.6	-232.0	666.7	524.6	142.18	4.689	
13,200.0	9,195.0	13,143.6	9,181.4	77.3	68.1	88.86	-4,128.8	-230.5	665.9	520.5	145.40	4.580	
13,275.2	9,195.0	13,211.3	9,181.7	78.4	69.2	88.89	-4,196.6	-229.7	665.5	517.8	147.65	4.507	
13,300.0	9,195.0	13,233.3	9,181.5	78.8	69.6	88.87	-4,218.6	-229.6	665.5	517.1	148.38	4.485	
13,400.0	9,195.0	13,330.1	9,181.2	80.3	71.2	88.85	-4,315.4	-229.7	666.3	514.8	151.48	4.398	
13,500.0	9,195.0	13,427.1	9,180.7	81.8	72.8	88.80	-4,412.4	-230.2	667.4	512.8	154.58	4.317	
13,600.0	9,195.0	13,528.7	9,179.0	83.3	74.4	88.66	-4,513.9	-230.8	668.6	510.9	157.77	4.238	
13,700.0	9,195.0	13,641.0	9,178.4	84.8	76.3	88.61	-4,626.2	-230.1	668.6	507.5	161.14	4.149	
13,800.0	9,195.0	13,741.9	9,176.9	86.4	78.0	88.49	-4,727.0	-228.8	668.0	503.6	164.34	4.065	
13,900.0	9,195.0	13,846.5	9,173.7	87.9	79.7	88.20	-4,831.6	-226.7	666.6	499.0	167.60	3.977	
14,000.0	9,195.0	13,951.1	9,169.9	89.4	81.4	87.87	-4,936.1	-224.1	664.9	494.1	170.87	3.892	
14,100.0	9,195.0	14,059.5	9,168.5	91.0	83.2	87.74	-5,044.4	-220.3	662.0	487.8	174.21	3.800	
14,152.6	9,195.0	14,089.0	9,168.7	91.8	83.7	87.75	-5,073.9	-219.0	660.6	485.0	175.51	3.764	
14,200.0	9,195.0	14,089.0	9,168.7	92.5	83.7	87.75	-5,073.9	-219.0	662.3	486.0	176.24	3.758	
14,300.0	9,195.0	14,089.0	9,168.7	94.1	83.7	87.75	-5,073.9	-219.0	676.8	499.0	177.79	3.807	
14,400.0	9,195.0	14,089.0	9,168.7	95.6	83.7	87.75	-5,073.9	-219.0	705.4	526.0	179.34	3.933	
14,500.0	9,195.0	14,089.0	9,168.7	97.2	83.7	87.75	-5,073.9	-219.0	746.3	565.4	180.89	4.126	
14,600.0	9,195.0	14,089.0	9,168.7	98.7	83.7	87.75	-5,073.9	-219.0	797.8	615.4	182.45	4.373	
14,700.0	9,195.0	14,089.0	9,168.7	100.3	83.7	87.75	-5,073.9	-219.0	857.9	673.9	184.01	4.662	
14,800.0	9,195.0	14,089.0	9,168.7	101.8	83.7	87.75	-5,073.9	-219.0	924.9	739.3	185.57	4.984	
14,900.0	9,195.0	14,089.0	9,168.7	103.4	83.7	87.75	-5,073.9	-219.0	997.5	810.3	187.14	5.330	
15,000.0	9,195.0	14,089.0	9,168.7	105.0	83.7	87.75	-5,073.9	-219.0	1,074.4	885.7	188.71	5.694	
15,100.0	9,195.0	14,089.0	9,168.7	106.6	83.7	87.75	-5,073.9	-219.0	1,154.9	964.7	190.29	6.070	
15,200.0	9,195.0	14,089.0	9,168.7	108.1	83.7	87.75	-5,073.9	-219.0	1,238.3	1,046.4	191.86	6.454	
15,300.0	9,195.0	14,089.0	9,168.7	109.7	83.7	87.75	-5,073.9	-219.0	1,324.0	1,130.5	193.44	6.844	
15,400.0	9,195.0	14,089.0	9,168.7	111.3	83.7	87.75	-5,073.9	-219.0	1,411.5	1,216.5	195.02	7.238	
15,500.0	9,195.0	14,089.0	9,168.7	112.9	83.7	87.75	-5,073.9	-219.0	1,500.6	1,304.0	196.61	7.633	
15,600.0	9,195.0	14,089.0	9,168.7	114.5	83.7	87.75	-5,073.9	-219.0	1,591.0	1,392.8	198.19	8.028	
15,700.0	9,195.0	14,089.0	9,168.7	116.0	83.7	87.75	-5,073.9	-219.0	1,682.5	1,482.7	199.78	8.422	
15,800.0	9,195.0	14,089.0	9,168.7	117.6	83.7	87.75	-5,073.9	-219.0	1,774.9	1,573.5	201.37	8.814	
15,900.0	9,195.0	14,089.0	9,168.7	119.2	83.7	87.75	-5,073.9	-219.0	1,868.1	1,665.1	202.96	9.204	
16,000.0	9,195.0	14,089.0	9,168.7	120.8	83.7	87.75	-5,073.9	-219.0	1,961.9	1,757.4	204.56	9.591	
16,100.0	9,195.0	14,089.0	9,168.7	122.4	83.7	87.75	-5,073.9	-219.0	2,056.4	1,850.2	206.15	9.975	
16,200.0	9,195.0	14,089.0	9,168.7	124.0	83.7	87.75	-5,073.9	-219.0	2,151.3	1,943.6	207.75	10.355	
16,300.0	9,195.0	14,089.0	9,168.7	125.6	83.7	87.75	-5,073.9	-219.0	2,246.7	2,037.4	209.35	10.732	
16,400.0	9,195.0	14,089.0	9,168.7	127.2	83.7	87.75	-5,073.9	-219.0	2,342.5	2,131.5	210.95	11.104	
16,500.0	9,195.0	14,089.0	9,168.7	128.8	83.7	87.75	-5,073.9	-219.0	2,438.6	2,226.0	212.56	11.473	
16,600.0	9,195.0	14,089.0	9,168.7	130.4	83.7	87.75	-5,073.9	-219.0	2,535.0	2,320.8	214.16	11.837	
16,700.0	9,195.0	14,089.0	9,168.7	132.0	83.7	87.75	-5,073.9	-219.0	2,631.7	2,415.9	215.77	12.197	
16,800.0	9,195.0	14,089.0	9,168.7	133.6	83.7	87.75	-5,073.9	-219.0	2,728.6	2,511.2	217.37	12.552	
16,900.0	9,195.0	14,089.0	9,168.7	135.2	83.7	87.75	-5,073.9	-219.0	2,825.7	2,606.7	218.98	12.904	
17,000.0	9,195.0	14,089.0	9,168.7	136.9	83.7	87.75	-5,073.9	-219.0	2,923.0	2,702.4	220.59	13.251	
17,100.0	9,195.0	14,089.0	9,168.7	138.5	83.7	87.75	-5,073.9	-219.0	3,020.5	2,798.3	222.20	13.593	
17,200.0	9,195.0	14,089.0	9,168.7	140.1	83.7	87.75	-5,073.9	-219.0	3,118.2	2,894.4	223.82	13.932	
17,300.0	9,195.0	14,089.0	9,168.7	141.7	83.7	87.75	-5,073.9	-219.0	3,216.0	2,990.5	225.43	14.266	
17,400.0	9,195.0	14,089.0	9,168.7	143.3	83.7	87.75	-5,073.9	-219.0	3,313.9	3,086.9	227.05	14.596	
17,500.0	9,195.0	14,089.0	9,168.7	144.9	83.7	87.75	-5,073.9	-219.0	3,412.0	3,183.3	228.66	14.921	

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



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Offset Design BULLDOG - WINDWARD FEDERAL #7H - OWB - ACTUAL WELLPATH												Offset Site Error:	0.0 usft
Survey Program: 100-Standard Keeper 104, 8608-MWD												Offset Well Error:	3.0 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (usft)	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)	+E/-W (usft)					
17,600.0	9,195.0	14,089.0	9,168.7	146.5	83.7	87.75	-5,073.9	-219.0	3,510.1	3,279.8	230.28	15.243	
17,700.0	9,195.0	14,089.0	9,168.7	148.2	83.7	87.75	-5,073.9	-219.0	3,608.4	3,376.5	231.90	15.560	
17,800.0	9,195.0	14,089.0	9,168.7	149.8	83.7	87.75	-5,073.9	-219.0	3,706.7	3,473.2	233.52	15.873	
17,900.0	9,195.0	14,089.0	9,168.7	151.4	83.7	87.75	-5,073.9	-219.0	3,805.2	3,570.0	235.14	16.183	
18,000.0	9,195.0	14,089.0	9,168.7	153.0	83.7	87.75	-5,073.9	-219.0	3,903.7	3,666.9	236.76	16.488	
18,100.0	9,195.0	14,089.0	9,168.7	154.6	83.7	87.75	-5,073.9	-219.0	4,002.3	3,763.9	238.38	16.789	
18,200.0	9,195.0	14,089.0	9,168.7	156.3	83.7	87.75	-5,073.9	-219.0	4,101.0	3,860.9	240.01	17.087	
18,300.0	9,195.0	14,089.0	9,168.7	157.9	83.7	87.75	-5,073.9	-219.0	4,199.7	3,958.0	241.63	17.381	
18,400.0	9,195.0	14,089.0	9,168.7	159.5	83.7	87.75	-5,073.9	-219.0	4,298.5	4,055.2	243.25	17.671	
18,500.0	9,195.0	14,089.0	9,168.7	161.1	83.7	87.75	-5,073.9	-219.0	4,397.3	4,152.4	244.88	17.957	
18,600.0	9,195.0	14,089.0	9,168.7	162.8	83.7	87.75	-5,073.9	-219.0	4,496.2	4,249.7	246.51	18.240	
18,700.0	9,195.0	14,089.0	9,168.7	164.4	83.7	87.75	-5,073.9	-219.0	4,595.1	4,347.0	248.13	18.519	
18,800.0	9,195.0	14,089.0	9,168.7	166.0	83.7	87.75	-5,073.9	-219.0	4,694.1	4,444.4	249.76	18.794	
18,900.0	9,195.0	14,089.0	9,168.7	167.7	83.7	87.75	-5,073.9	-219.0	4,793.1	4,541.7	251.39	19.066	
19,000.0	9,195.0	14,089.0	9,168.7	169.3	83.7	87.75	-5,073.9	-219.0	4,892.2	4,639.2	253.02	19.335	
19,100.0	9,195.0	14,089.0	9,168.7	170.9	83.7	87.75	-5,073.9	-219.0	4,991.3	4,736.7	254.65	19.601	
19,200.0	9,195.0	14,089.0	9,168.7	172.5	83.7	87.75	-5,073.9	-219.0	5,090.4	4,834.2	256.28	19.863	
19,232.7	9,195.0	14,089.0	9,168.7	173.1	83.7	87.75	-5,073.9	-219.0	5,122.9	4,866.1	256.82	19.948	

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

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: BULLDOG
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #8H
Well Error: 3.0 usft
Reference Wellbore: OWB
Reference Design: PWP1

Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at 2.00 sigma
Database: EDM_Users
Offset TVD Reference: Offset Datum

Reference Depths are relative to RKB=3543.2+26 @ 3569.2usft (MCVA

Offset Depths are relative to Offset Datum

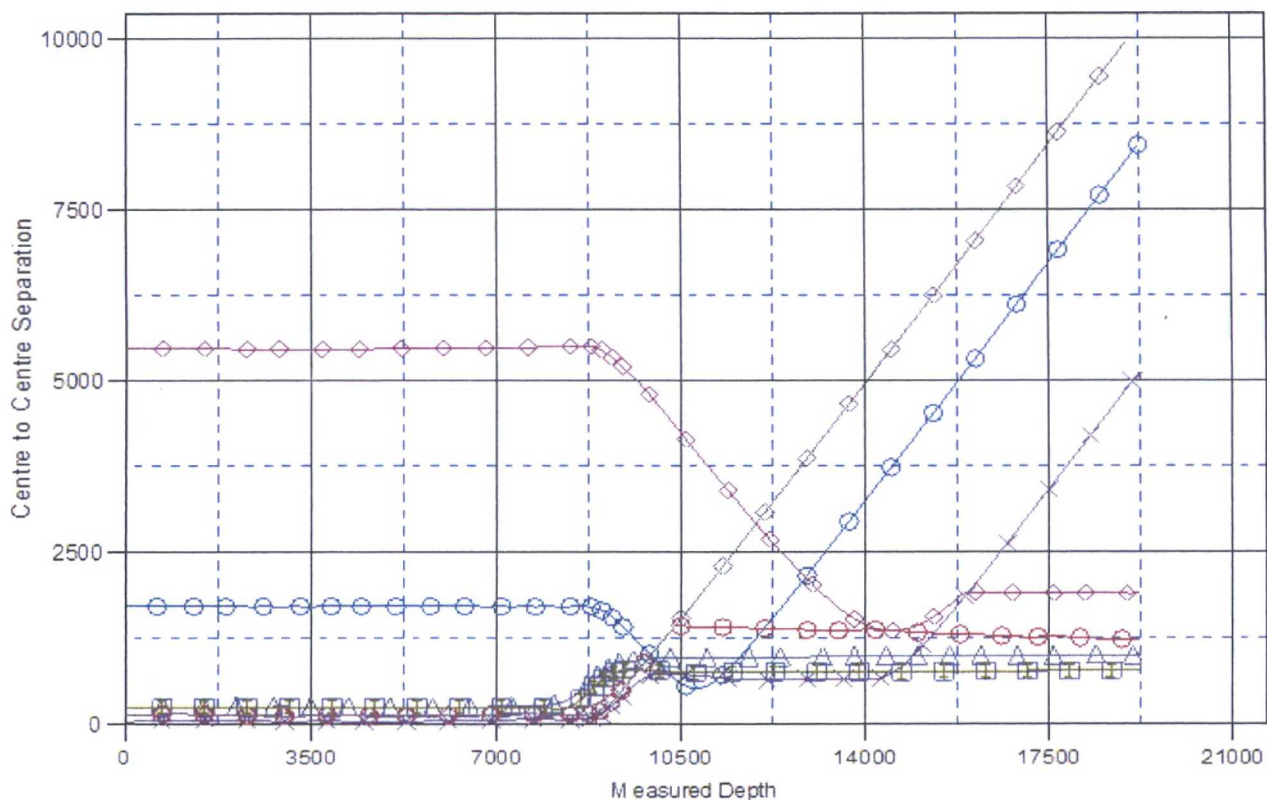
Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: WINDWARD FEDERAL #8H

Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30

Grid Convergence at Surface is: 0.33°

Ladder Plot



LEGEND

KING TUT FEDERAL #8H-OWB ACTUAL WELL PATH-VC
 KING TUT FEDERAL #8H-OWB PWP-VC
 KING TUT FEDERAL #8H-OWB PWP-VC
 THROUGH 30 DEGREE TURN-OWB ACTUAL WELL PATH-VC
 THROUGH 30 DEGREE TURN-OWB PWP-VC
 WINDWARD FEDERAL #8H-OWB PWP-VC
 WINDWARD FEDERAL #8H-OWB ACTUAL WELL PATH-VC
 WINDWARD FEDERAL #8H-OWB ACTUAL WELL PATH-VC

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

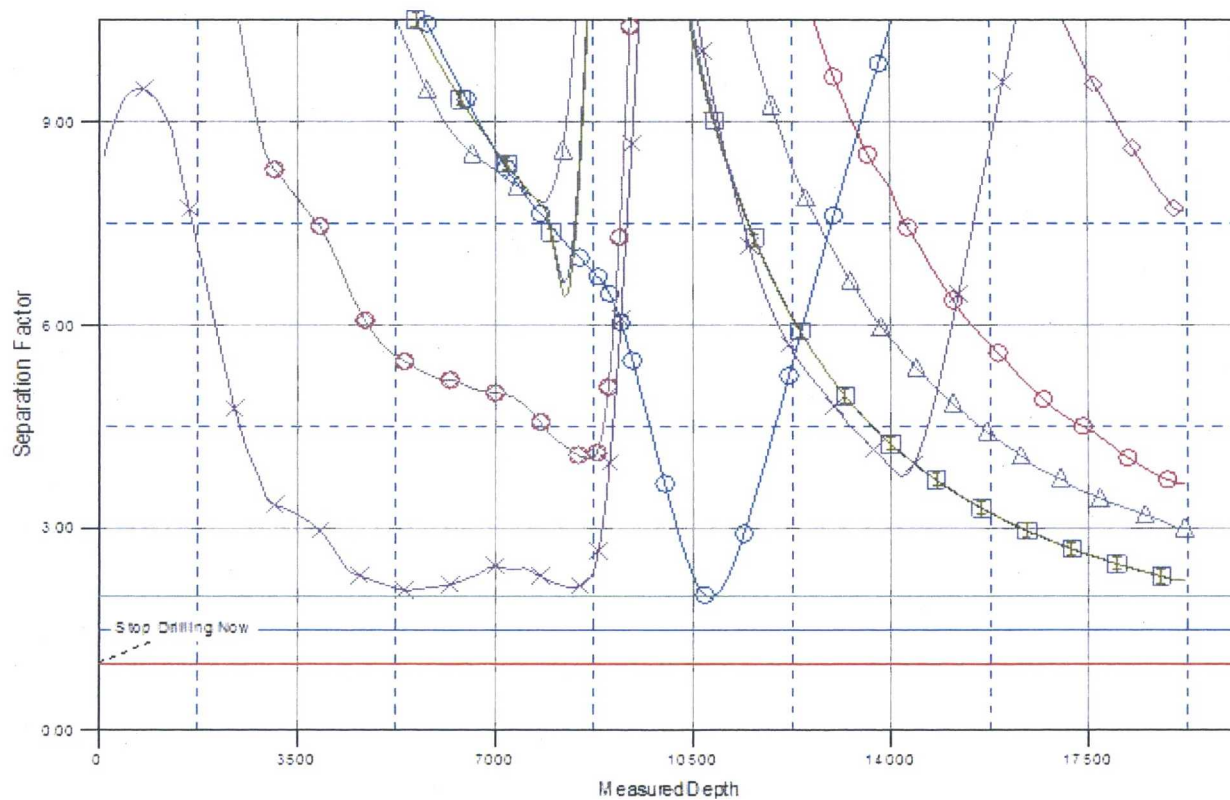
Company: COG PRODUCTION LLC
 Project: LEA COUNTY, NM
 Reference Site: BULLDOG
 Site Error: 0.0 usft
 Reference Well: WINDWARD FEDERAL #8H
 Well Error: 3.0 usft
 Reference Wellbore: OWB
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Local Co-ordinate Reference: Well WINDWARD FEDERAL #8H
 TVD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
 MD Reference: RKB=3543.2+26 @ 3569.2usft (MCVAY 8)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at: 2.00 sigma
 Database: EDM_Users
 Offset TVD Reference: Offset Datum

Reference Depths are relative to RKB=3543.2+26 @ 3569.2usft (MCVA
 Offset Depths are relative to Offset Datum
 Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: WINDWARD FEDERAL #8H
 Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
 Grid Convergence at Surface is: 0.33°

Separation Factor Plot



LEGEND

KING TUBESHALE-OBS ACTUAL WELLDEPTH VS
 KING TUBESHALE-OBS SWR-VC
 KING TUBESHALE-OBS SWR-VC
 TUBESHALE-OBS ACTUAL WELLDEPTH VS
 TUBESHALE-OBS ACTUAL WELLDEPTH VS
 WINDWARD FEDERAL-OBS ACTUAL WELLDEPTH VS
 WINDWARD FEDERAL-OBS ACTUAL WELLDEPTH VS
 WINDWARD FEDERAL-OBS ACTUAL WELLDEPTH VS
 WINDWARD FEDERAL-OBS ACTUAL WELLDEPTH VS



Project: LEA COUNTY, NM
 Site: BULLDOG
 Well: **WINDWARD FEDERAL #8H**
 Wellbore: OWB
 Design: **PWP1**

WELL DETAILS-WINDWARD FEDERAL #8H
 Ground Level: 3543.2
 Northing 435175.10 Easting 690857.60 Latitude 32° 11' 41.670 N Longitude 103° 42' 58.859 W

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Annotation
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	8717.5	0.00	0.00	8717.5	0.0	0.0	0.00	0.00	0.0	
3	9467.6	90.00	150.70	9195.0	-416.4	233.7	12.00	150.70	426.8	
4	10191.3	90.00	179.65	9195.0	-1108.7	416.9	4.00	90.00	1126.9	
5	19232.7	90.00	179.65	9195.0	-10149.9	471.9	0.00	0.00	10160.9	

LEGEND

- △ KING TUT FEDERAL #2H, OWB, ACTUAL WELLPATH V0
- TURQUOIS 30 FEDERAL #1, OWB, ACTUAL WELLPATH V0
- ◇ REDHEAD 31 FEDERAL #1H, OWB, ACTUAL WELLPATH V0
- WINDWARD FEDERAL #2H, LATERAL 01, AWP-LATERAL V0
- WINDWARD FEDERAL #2H, OWB-PILOT HOLE, AWP-PH V0
- × WINDWARD FEDERAL #7H, OWB, ACTUAL WELLPATH V0
- PWP1

