

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

HOBBS OCD

FORM APPROVED
OMB NO. 1004-0135
Expires: July 31, 2010UNORTHodox
LOCATIONSUNDY NOTICES AND REPORTS ON WELL
Do not use this form for proposals to drill or to re-enter an
abandoned well. Use form 3160-3 (APD) for such proposalsCarlsbad Field Office
OCD Hobbs

SUBMIT IN TRIPLICATE - Other instructions on reverse side.

5. Lease Serial No.

N11111-39908

6. If Indian, Allottee or Tribe Name

7. If Unit or CA/Agreement, Name and/or No.

8. Well Name and No.
WINDWARD FEDERAL 5H9. API Well No.
30-025-4317410. Field and Pool, or Exploratory
WC-025 G-06 S253206M; BS11. County or Parish, and State
LEA COUNTY, NM

1. Type of Well

☒ Oil Well ☐ Gas Well ☐ Other

2. Name of Operator

COG PRODUCTION LLC

Contact: MAYTE X REYES

E-Mail: mreyes1@concho.com

3a. Address

2208 WEST MAIN STREET
ARTESIA, NM 88210

3b. Phone No. (include area code)

Ph: 575-748-6945

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)

Sec 30 T24S R32E NENE 210FNL 530FWL

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

TYPE OF SUBMISSION

☒ Notice of Intent☐ Subsequent Report☐ Final Abandonment Notice

TYPE OF ACTION

☐ Acidize☐ Alter Casing☐ Casing Repair☐ Change Plans☐ Convert to Injection☐ Deepen☐ Fracture Treat☐ New Construction☐ Plug and Abandon☐ Plug Back☐ Production (Start/Resume)☐ Reclamation☐ Recomplete☐ Temporarily Abandon☐ Water Disposal☐ Water Shut-Off☐ Well Integrity☒ Other
Change to Original A
PD

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 recompleat 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 shall be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompleat in a new interval, a Form 3160-4 shall be filed once testing has been completed. Final Abandonment Notices shall 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.

FTP: 330' FNL & 330' FWL
LTP: 100' FSL & 330' FWL

BHL Change

From: 330' FSL 330' FWL Section 31. T24S. R32E

To: 50' FSL 330' FWL Section 31. T24S. R32E

C102 Attached

Operator requests a sundry to reflect the new TD and casing design change.

Attached:

Directional Plan

SEE ATTACHED FOR
CONDITIONS OF APPROVAL

14. I hereby certify that the foregoing is true and correct.

Electronic Submission #351691 verified by the BLM Well Information System
For COG PRODUCTION LLC, sent to the Hobbs
Committed to AFMSS for processing by MUSTAFA HAQUE on 09/20/2016 ()

Name (Printed/Typed) MAYTE X REYES

Title REGULATORY ANALYST

Signature (Electronic Submission)

Date 09/19/2016

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By MUSTAFA HAQUE

Title PETROLEUM ENGINEER

Date 09/20/2016

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.

** OPERATOR-SUBMITTED ** OPERATOR-SUBMITTED ** OPERATOR-SUBMITTED **

Additional data for EC transaction #351691 that would not fit on the form

32. Additional remarks, continued

Anti-Collision
Wall Map

New TD is 19,450? MD
New production cement volumes are

740 sks 10.3 ppg (3.62 ft³/sk) lead.
NEOCEM TM 2 lbm/sk kol-seal

2350 sks 13.2 ppg (1.40 ft³/sk) tail
NEOCEM TM

**PECOS DISTRICT
CONDITIONS OF APPROVAL**

OPERATOR'S NAME:	COG Production LLC
LEASE NO.:	NMNM120908
WELL NAME & NO.:	5H – Windward Federal
SURFACE HOLE FOOTAGE:	210'/N & 530'/W
BOTTOM HOLE FOOTAGE	50'/S & 330'/W SEC. 31
LOCATION:	Section 30, T 24 S., R 32 E., NMPM
COUNTY:	Lea County, New Mexico

All previous COAs still apply. No additional COA is required.

MHH 09202016

COG PRODUCTION LLC

LEA COUNTY, NM

AVALON SHALE

WINDWARD FEDERAL #5H

Lateral

Plan: DWD Plan 1 - negative VS

Standard Survey Report

19 September, 2016

COG PRODUCTION LLC

Survey Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Site: AVALON SHALE
Well: WINDWARD FEDERAL #5H
Wellbore: Lateral
Design: DWD Plan 1 - negative VS

Local Co-ordinate Reference: Site AVALON SHALE
TVD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
MD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (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 AVALON SHALE

Site Position: **From:** Map **Northing:** 419,780.50 usft **Latitude:** 32° 9' 6.058 N
Easting: 741,734.30 usft **Longitude:** 103° 33' 8.114 W
Position Uncertainty: 0.0 usft **Slot Radius:** 13-3/16 " **Grid Convergence:** 0.42 °

Well WINDWARD FEDERAL #5H

Well Position **+N/-S** 15,384.8 usft **Northing:** 435,165.30 usf **Latitude:** 32° 11' 41.650 N
+E/-W -52,246.7 usft **Easting:** 689,487.60 usf **Longitude:** 103° 43' 14.802 W
Position Uncertainty 0.0 usft **Wellhead Elevation:** 0.0 usf **Ground Level:** 3,539.0 usf

Wellbore Lateral

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	WMM2015	6/23/2016	7.14	60.02	47,997

Design DWD Plan 1 - negative VS

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	15,384.8	-52,246.7	180.79

Survey Tool Program **Date** 9/15/2016

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	19,449.2	DWD Plan 1 - negative VS (Lateral)	MWD	OWSG MWD - Standard

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	15,384.8	-52,246.7	0.0	0.00	0.00	0.00
100.0	0.00	0.00	100.0	15,384.8	-52,246.7	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	15,384.8	-52,246.7	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	15,384.8	-52,246.7	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	15,384.8	-52,246.7	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	15,384.8	-52,246.7	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	15,384.8	-52,246.7	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	15,384.8	-52,246.7	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	15,384.8	-52,246.7	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	15,384.8	-52,246.7	0.0	0.00	0.00	0.00

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Planned Survey

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1,000.0	0.00	0.00	1,000.0	15,384.8	-52,246.7	0.0	0.00	0.00	0.00
1,096.6	1.93	307.76	1,096.6	15,385.8	-52,248.0	-1.0	2.00	2.00	0.00
1,100.0	1.93	307.76	1,100.0	15,385.9	-52,248.1	-1.0	0.00	0.00	0.00
1,200.0	1.93	307.76	1,199.9	15,387.9	-52,250.7	-3.1	0.00	0.00	0.00
1,300.0	1.93	307.76	1,299.9	15,390.0	-52,253.4	-5.1	0.00	0.00	0.00
1,400.0	1.93	307.76	1,399.8	15,392.1	-52,256.1	-7.1	0.00	0.00	0.00
1,500.0	1.93	307.76	1,499.8	15,394.1	-52,258.7	-9.2	0.00	0.00	0.00
1,600.0	1.93	307.76	1,599.7	15,396.2	-52,261.4	-11.2	0.00	0.00	0.00
1,700.0	1.93	307.76	1,699.6	15,398.3	-52,264.1	-13.2	0.00	0.00	0.00
1,800.0	1.93	307.76	1,799.6	15,400.3	-52,266.7	-15.2	0.00	0.00	0.00
1,900.0	1.93	307.76	1,899.5	15,402.4	-52,269.4	-17.3	0.00	0.00	0.00
2,000.0	1.93	307.76	1,999.5	15,404.4	-52,272.1	-19.3	0.00	0.00	0.00
2,100.0	1.93	307.76	2,099.4	15,406.5	-52,274.7	-21.3	0.00	0.00	0.00
2,200.0	1.93	307.76	2,199.4	15,408.6	-52,277.4	-23.3	0.00	0.00	0.00
2,300.0	1.93	307.76	2,299.3	15,410.6	-52,280.1	-25.4	0.00	0.00	0.00
2,400.0	1.93	307.76	2,399.2	15,412.7	-52,282.7	-27.4	0.00	0.00	0.00
2,500.0	1.93	307.76	2,499.2	15,414.8	-52,285.4	-29.4	0.00	0.00	0.00
2,600.0	1.93	307.76	2,599.1	15,416.8	-52,288.0	-31.5	0.00	0.00	0.00
2,700.0	1.93	307.76	2,699.1	15,418.9	-52,290.7	-33.5	0.00	0.00	0.00
2,800.0	1.93	307.76	2,799.0	15,421.0	-52,293.4	-35.5	0.00	0.00	0.00
2,900.0	1.93	307.76	2,899.0	15,423.0	-52,296.0	-37.5	0.00	0.00	0.00
3,000.0	1.93	307.76	2,998.9	15,425.1	-52,298.7	-39.6	0.00	0.00	0.00
3,100.0	1.93	307.76	3,098.8	15,427.1	-52,301.4	-41.6	0.00	0.00	0.00
3,200.0	1.93	307.76	3,198.8	15,429.2	-52,304.0	-43.6	0.00	0.00	0.00
3,300.0	1.93	307.76	3,298.7	15,431.3	-52,306.7	-45.6	0.00	0.00	0.00
3,400.0	1.93	307.76	3,398.7	15,433.3	-52,309.4	-47.7	0.00	0.00	0.00
3,500.0	1.93	307.76	3,498.6	15,435.4	-52,312.0	-49.7	0.00	0.00	0.00
3,600.0	1.93	307.76	3,598.6	15,437.5	-52,314.7	-51.7	0.00	0.00	0.00
3,700.0	1.93	307.76	3,698.5	15,439.5	-52,317.4	-53.8	0.00	0.00	0.00
3,800.0	1.93	307.76	3,798.4	15,441.6	-52,320.0	-55.8	0.00	0.00	0.00
3,900.0	1.93	307.76	3,898.4	15,443.7	-52,322.7	-57.8	0.00	0.00	0.00
4,000.0	1.93	307.76	3,998.3	15,445.7	-52,325.4	-59.8	0.00	0.00	0.00
4,100.0	1.93	307.76	4,098.3	15,447.8	-52,328.0	-61.9	0.00	0.00	0.00
4,200.0	1.93	307.76	4,198.2	15,449.9	-52,330.7	-63.9	0.00	0.00	0.00
4,300.0	1.93	307.76	4,298.2	15,451.9	-52,333.3	-65.9	0.00	0.00	0.00
4,400.0	1.93	307.76	4,398.1	15,454.0	-52,336.0	-67.9	0.00	0.00	0.00
4,500.0	1.93	307.76	4,498.0	15,456.0	-52,338.7	-70.0	0.00	0.00	0.00
4,600.0	1.93	307.76	4,598.0	15,458.1	-52,341.3	-72.0	0.00	0.00	0.00
4,700.0	1.93	307.76	4,697.9	15,460.2	-52,344.0	-74.0	0.00	0.00	0.00
4,800.0	1.93	307.76	4,797.9	15,462.2	-52,346.7	-76.1	0.00	0.00	0.00
4,900.0	1.93	307.76	4,897.8	15,464.3	-52,349.3	-78.1	0.00	0.00	0.00
5,000.0	1.93	307.76	4,997.8	15,466.4	-52,352.0	-80.1	0.00	0.00	0.00
5,100.0	1.93	307.76	5,097.7	15,468.4	-52,354.7	-82.1	0.00	0.00	0.00
5,200.0	1.93	307.76	5,197.6	15,470.5	-52,357.3	-84.2	0.00	0.00	0.00

COG PRODUCTION LLC

Survey Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Site: AVALON SHALE
Well: WINDWARD FEDERAL #5H
Wellbore: Lateral
Design: DWD Plan 1 - negative VS

Local Co-ordinate Reference: Site AVALON SHALE
TVD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
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Survey Calculation Method: Minimum Curvature
Database: EDM_Users

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,300.0	1.93	307.76	5,297.6	15,472.6	-52,360.0	-86.2	0.00	0.00	0.00
5,400.0	1.93	307.76	5,397.5	15,474.6	-52,362.7	-88.2	0.00	0.00	0.00
5,500.0	1.93	307.76	5,497.5	15,476.7	-52,365.3	-90.2	0.00	0.00	0.00
5,600.0	1.93	307.76	5,597.4	15,478.8	-52,368.0	-92.3	0.00	0.00	0.00
5,700.0	1.93	307.76	5,697.4	15,480.8	-52,370.7	-94.3	0.00	0.00	0.00
5,800.0	1.93	307.76	5,797.3	15,482.9	-52,373.3	-96.3	0.00	0.00	0.00
5,900.0	1.93	307.76	5,897.3	15,484.9	-52,376.0	-98.4	0.00	0.00	0.00
6,000.0	1.93	307.76	5,997.2	15,487.0	-52,378.7	-100.4	0.00	0.00	0.00
6,100.0	1.93	307.76	6,097.1	15,489.1	-52,381.3	-102.4	0.00	0.00	0.00
6,200.0	1.93	307.76	6,197.1	15,491.1	-52,384.0	-104.4	0.00	0.00	0.00
6,300.0	1.93	307.76	6,297.0	15,493.2	-52,386.6	-106.5	0.00	0.00	0.00
6,400.0	1.93	307.76	6,397.0	15,495.3	-52,389.3	-108.5	0.00	0.00	0.00
6,500.0	1.93	307.76	6,496.9	15,497.3	-52,392.0	-110.5	0.00	0.00	0.00
6,600.0	1.93	307.76	6,596.9	15,499.4	-52,394.6	-112.5	0.00	0.00	0.00
6,700.0	1.93	307.76	6,696.8	15,501.5	-52,397.3	-114.6	0.00	0.00	0.00
6,800.0	1.93	307.76	6,796.7	15,503.5	-52,400.0	-116.6	0.00	0.00	0.00
6,900.0	1.93	307.76	6,896.7	15,505.6	-52,402.6	-118.6	0.00	0.00	0.00
7,000.0	1.93	307.76	6,996.6	15,507.6	-52,405.3	-120.7	0.00	0.00	0.00
7,100.0	1.93	307.76	7,096.6	15,509.7	-52,408.0	-122.7	0.00	0.00	0.00
7,200.0	1.93	307.76	7,196.5	15,511.8	-52,410.6	-124.7	0.00	0.00	0.00
7,300.0	1.93	307.76	7,296.5	15,513.8	-52,413.3	-126.7	0.00	0.00	0.00
7,400.0	1.93	307.76	7,396.4	15,515.9	-52,416.0	-128.8	0.00	0.00	0.00
7,500.0	1.93	307.76	7,496.3	15,518.0	-52,418.6	-130.8	0.00	0.00	0.00
7,600.0	1.93	307.76	7,596.3	15,520.0	-52,421.3	-132.8	0.00	0.00	0.00
7,700.0	1.93	307.76	7,696.2	15,522.1	-52,424.0	-134.8	0.00	0.00	0.00
7,800.0	1.93	307.76	7,796.2	15,524.2	-52,426.6	-136.9	0.00	0.00	0.00
7,900.0	1.93	307.76	7,896.1	15,526.2	-52,429.3	-138.9	0.00	0.00	0.00
8,000.0	1.93	307.76	7,996.1	15,528.3	-52,431.9	-140.9	0.00	0.00	0.00
8,100.0	1.93	307.76	8,096.0	15,530.4	-52,434.6	-142.9	0.00	0.00	0.00
8,200.0	1.93	307.76	8,195.9	15,532.4	-52,437.3	-145.0	0.00	0.00	0.00
8,300.0	1.93	307.76	8,295.9	15,534.5	-52,439.9	-147.0	0.00	0.00	0.00
8,400.0	1.93	307.76	8,395.8	15,536.5	-52,442.6	-149.0	0.00	0.00	0.00
8,500.0	1.93	307.76	8,495.8	15,538.6	-52,445.3	-151.1	0.00	0.00	0.00
8,600.0	1.93	307.76	8,595.7	15,540.7	-52,447.9	-153.1	0.00	0.00	0.00
8,700.0	1.93	307.76	8,695.7	15,542.7	-52,450.6	-155.1	0.00	0.00	0.00
8,709.1	1.93	307.76	8,704.8	15,542.9	-52,450.8	-155.3	0.00	0.00	0.00
8,800.0	9.83	188.36	8,795.2	15,536.2	-52,453.2	-148.5	12.00	8.69	-131.35
8,900.0	21.76	183.37	8,891.3	15,509.1	-52,455.5	-121.4	12.00	11.93	-4.99
9,000.0	33.74	181.83	8,979.6	15,462.7	-52,457.5	-75.0	12.00	11.98	-1.53
9,100.0	45.73	181.04	9,056.4	15,398.9	-52,459.1	-11.2	12.00	11.99	-0.79
9,200.0	57.73	180.52	9,118.2	15,320.5	-52,460.1	67.2	12.00	11.99	-0.52
9,300.0	69.72	180.12	9,162.4	15,231.0	-52,460.6	156.7	12.00	11.99	-0.40
9,400.0	81.72	179.78	9,187.0	15,134.3	-52,460.5	253.4	12.00	12.00	-0.34

COG PRODUCTION LLC

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9,469.1	90.00	179.56	9,192.0	15,065.5	-52,460.1	322.2	12.00	12.00	-0.32
9,500.0	90.00	179.56	9,192.0	15,034.5	-52,459.9	353.2	0.00	0.00	0.00
9,600.0	90.00	179.56	9,192.0	14,934.5	-52,459.1	453.2	0.00	0.00	0.00
9,700.0	90.00	179.56	9,192.0	14,834.5	-52,458.3	553.1	0.00	0.00	0.00
9,800.0	90.00	179.56	9,192.0	14,734.5	-52,457.5	653.1	0.00	0.00	0.00
9,900.0	90.00	179.56	9,192.0	14,634.5	-52,456.8	753.1	0.00	0.00	0.00
10,000.0	90.00	179.56	9,192.0	14,534.5	-52,456.0	853.1	0.00	0.00	0.00
10,100.0	90.00	179.56	9,192.0	14,434.5	-52,455.2	953.0	0.00	0.00	0.00
10,200.0	90.00	179.56	9,192.0	14,334.6	-52,454.5	1,053.0	0.00	0.00	0.00
10,300.0	90.00	179.56	9,192.0	14,234.6	-52,453.7	1,153.0	0.00	0.00	0.00
10,400.0	90.00	179.56	9,192.0	14,134.6	-52,452.9	1,253.0	0.00	0.00	0.00
10,500.0	90.00	179.56	9,192.0	14,034.6	-52,452.2	1,352.9	0.00	0.00	0.00
10,600.0	90.00	179.56	9,192.0	13,934.6	-52,451.4	1,452.9	0.00	0.00	0.00
10,700.0	90.00	179.56	9,192.0	13,834.6	-52,450.6	1,552.9	0.00	0.00	0.00
10,800.0	90.00	179.56	9,192.0	13,734.6	-52,449.9	1,652.9	0.00	0.00	0.00
10,900.0	90.00	179.56	9,192.0	13,634.6	-52,449.1	1,752.9	0.00	0.00	0.00
11,000.0	90.00	179.56	9,192.0	13,534.6	-52,448.3	1,852.8	0.00	0.00	0.00
11,100.0	90.00	179.56	9,192.0	13,434.6	-52,447.6	1,952.8	0.00	0.00	0.00
11,200.0	90.00	179.56	9,192.0	13,334.6	-52,446.8	2,052.8	0.00	0.00	0.00
11,300.0	90.00	179.56	9,192.0	13,234.6	-52,446.0	2,152.8	0.00	0.00	0.00
11,400.0	90.00	179.56	9,192.0	13,134.6	-52,445.3	2,252.7	0.00	0.00	0.00
11,500.0	90.00	179.56	9,192.0	13,034.6	-52,444.5	2,352.7	0.00	0.00	0.00
11,600.0	90.00	179.56	9,192.0	12,934.6	-52,443.7	2,452.7	0.00	0.00	0.00
11,700.0	90.00	179.56	9,192.0	12,834.6	-52,443.0	2,552.7	0.00	0.00	0.00
11,800.0	90.00	179.56	9,192.0	12,734.6	-52,442.2	2,652.6	0.00	0.00	0.00
11,900.0	90.00	179.56	9,192.0	12,634.6	-52,441.4	2,752.6	0.00	0.00	0.00
12,000.0	90.00	179.56	9,192.0	12,534.6	-52,440.7	2,852.6	0.00	0.00	0.00
12,100.0	90.00	179.56	9,192.0	12,434.6	-52,439.9	2,952.6	0.00	0.00	0.00
12,200.0	90.00	179.56	9,192.0	12,334.6	-52,439.1	3,052.6	0.00	0.00	0.00
12,300.0	90.00	179.56	9,192.0	12,234.6	-52,438.3	3,152.5	0.00	0.00	0.00
12,400.0	90.00	179.56	9,192.0	12,134.6	-52,437.6	3,252.5	0.00	0.00	0.00
12,500.0	90.00	179.56	9,192.0	12,034.6	-52,436.8	3,352.5	0.00	0.00	0.00
12,600.0	90.00	179.56	9,192.0	11,934.6	-52,436.0	3,452.5	0.00	0.00	0.00
12,700.0	90.00	179.56	9,192.0	11,834.6	-52,435.3	3,552.4	0.00	0.00	0.00
12,800.0	90.00	179.56	9,192.0	11,734.6	-52,434.5	3,652.4	0.00	0.00	0.00
12,900.0	90.00	179.56	9,192.0	11,634.6	-52,433.7	3,752.4	0.00	0.00	0.00
13,000.0	90.00	179.56	9,192.0	11,534.6	-52,433.0	3,852.4	0.00	0.00	0.00
13,100.0	90.00	179.56	9,192.0	11,434.6	-52,432.2	3,952.3	0.00	0.00	0.00
13,200.0	90.00	179.56	9,192.0	11,334.6	-52,431.4	4,052.3	0.00	0.00	0.00
13,300.0	90.00	179.56	9,192.0	11,234.6	-52,430.7	4,152.3	0.00	0.00	0.00
13,400.0	90.00	179.56	9,192.0	11,134.6	-52,429.9	4,252.3	0.00	0.00	0.00
13,500.0	90.00	179.56	9,192.0	11,034.6	-52,429.1	4,352.3	0.00	0.00	0.00
13,600.0	90.00	179.56	9,192.0	10,934.7	-52,428.4	4,452.2	0.00	0.00	0.00

COG PRODUCTION LLC

Survey Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Site: AVALON SHALE
Well: WINDWARD FEDERAL #5H
Wellbore: Lateral
Design: DWD Plan 1 - negative VS

Local Co-ordinate Reference: Site AVALON SHALE
TVD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
MD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (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)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
13,700.0	90.00	179.56	9,192.0	10,834.7	-52,427.6	4,552.2	0.00	0.00	0.00
13,800.0	90.00	179.56	9,192.0	10,734.7	-52,426.8	4,652.2	0.00	0.00	0.00
13,900.0	90.00	179.56	9,192.0	10,634.7	-52,426.1	4,752.2	0.00	0.00	0.00
14,000.0	90.00	179.56	9,192.0	10,534.7	-52,425.3	4,852.1	0.00	0.00	0.00
14,100.0	90.00	179.56	9,192.0	10,434.7	-52,424.5	4,952.1	0.00	0.00	0.00
14,200.0	90.00	179.56	9,192.0	10,334.7	-52,423.8	5,052.1	0.00	0.00	0.00
14,300.0	90.00	179.56	9,192.0	10,234.7	-52,423.0	5,152.1	0.00	0.00	0.00
14,400.0	90.00	179.56	9,192.0	10,134.7	-52,422.2	5,252.0	0.00	0.00	0.00
14,500.0	90.00	179.56	9,192.0	10,034.7	-52,421.5	5,352.0	0.00	0.00	0.00
14,600.0	90.00	179.56	9,192.0	9,934.7	-52,420.7	5,452.0	0.00	0.00	0.00
14,700.0	90.00	179.56	9,192.0	9,834.7	-52,419.9	5,552.0	0.00	0.00	0.00
14,800.0	90.00	179.56	9,192.0	9,734.7	-52,419.2	5,652.0	0.00	0.00	0.00
14,900.0	90.00	179.56	9,192.0	9,634.7	-52,418.4	5,751.9	0.00	0.00	0.00
15,000.0	90.00	179.56	9,192.0	9,534.7	-52,417.6	5,851.9	0.00	0.00	0.00
15,100.0	90.00	179.56	9,192.0	9,434.7	-52,416.8	5,951.9	0.00	0.00	0.00
15,200.0	90.00	179.56	9,192.0	9,334.7	-52,416.1	6,051.9	0.00	0.00	0.00
15,300.0	90.00	179.56	9,192.0	9,234.7	-52,415.3	6,151.8	0.00	0.00	0.00
15,400.0	90.00	179.56	9,192.0	9,134.7	-52,414.5	6,251.8	0.00	0.00	0.00
15,500.0	90.00	179.56	9,192.0	9,034.7	-52,413.8	6,351.8	0.00	0.00	0.00
15,600.0	90.00	179.56	9,192.0	8,934.7	-52,413.0	6,451.8	0.00	0.00	0.00
15,700.0	90.00	179.56	9,192.0	8,834.7	-52,412.2	6,551.7	0.00	0.00	0.00
15,800.0	90.00	179.56	9,192.0	8,734.7	-52,411.5	6,651.7	0.00	0.00	0.00
15,900.0	90.00	179.56	9,192.0	8,634.7	-52,410.7	6,751.7	0.00	0.00	0.00
16,000.0	90.00	179.56	9,192.0	8,534.7	-52,409.9	6,851.7	0.00	0.00	0.00
16,100.0	90.00	179.56	9,192.0	8,434.7	-52,409.2	6,951.7	0.00	0.00	0.00
16,200.0	90.00	179.56	9,192.0	8,334.7	-52,408.4	7,051.6	0.00	0.00	0.00
16,300.0	90.00	179.56	9,192.0	8,234.7	-52,407.6	7,151.6	0.00	0.00	0.00
16,400.0	90.00	179.56	9,192.0	8,134.7	-52,406.9	7,251.6	0.00	0.00	0.00
16,500.0	90.00	179.56	9,192.0	8,034.7	-52,406.1	7,351.6	0.00	0.00	0.00
16,600.0	90.00	179.56	9,192.0	7,934.7	-52,405.3	7,451.5	0.00	0.00	0.00
16,700.0	90.00	179.56	9,192.0	7,834.7	-52,404.6	7,551.5	0.00	0.00	0.00
16,800.0	90.00	179.56	9,192.0	7,734.7	-52,403.8	7,651.5	0.00	0.00	0.00
16,900.0	90.00	179.56	9,192.0	7,634.8	-52,403.0	7,751.5	0.00	0.00	0.00
17,000.0	90.00	179.56	9,192.0	7,534.8	-52,402.3	7,851.4	0.00	0.00	0.00
17,100.0	90.00	179.56	9,192.0	7,434.8	-52,401.5	7,951.4	0.00	0.00	0.00
17,200.0	90.00	179.56	9,192.0	7,334.8	-52,400.7	8,051.4	0.00	0.00	0.00
17,300.0	90.00	179.56	9,192.0	7,234.8	-52,400.0	8,151.4	0.00	0.00	0.00
17,400.0	90.00	179.56	9,192.0	7,134.8	-52,399.2	8,251.4	0.00	0.00	0.00
17,500.0	90.00	179.56	9,192.0	7,034.8	-52,398.4	8,351.3	0.00	0.00	0.00
17,600.0	90.00	179.56	9,192.0	6,934.8	-52,397.6	8,451.3	0.00	0.00	0.00
17,700.0	90.00	179.56	9,192.0	6,834.8	-52,396.9	8,551.3	0.00	0.00	0.00
17,800.0	90.00	179.56	9,192.0	6,734.8	-52,396.1	8,651.3	0.00	0.00	0.00
17,900.0	90.00	179.56	9,192.0	6,634.8	-52,395.3	8,751.2	0.00	0.00	0.00
18,000.0	90.00	179.56	9,192.0	6,534.8	-52,394.6	8,851.2	0.00	0.00	0.00

COG PRODUCTION LLC

Survey Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Site: AVALON SHALE
Well: WINDWARD FEDERAL #5H
Wellbore: Lateral
Design: DWD Plan 1 - negative VS

Local Co-ordinate Reference: Site AVALON SHALE
TVD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
MD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (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)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
18,100.0	90.00	179.56	9,192.0	6,434.8	-52,393.8	8,951.2	0.00	0.00	0.00
18,200.0	90.00	179.56	9,192.0	6,334.8	-52,393.0	9,051.2	0.00	0.00	0.00
18,300.0	90.00	179.56	9,192.0	6,234.8	-52,392.3	9,151.1	0.00	0.00	0.00
18,400.0	90.00	179.56	9,192.0	6,134.8	-52,391.5	9,251.1	0.00	0.00	0.00
18,500.0	90.00	179.56	9,192.0	6,034.8	-52,390.7	9,351.1	0.00	0.00	0.00
18,600.0	90.00	179.56	9,192.0	5,934.8	-52,390.0	9,451.1	0.00	0.00	0.00
18,700.0	90.00	179.56	9,192.0	5,834.8	-52,389.2	9,551.1	0.00	0.00	0.00
18,800.0	90.00	179.56	9,192.0	5,734.8	-52,388.4	9,651.0	0.00	0.00	0.00
18,900.0	90.00	179.56	9,192.0	5,634.8	-52,387.7	9,751.0	0.00	0.00	0.00
19,000.0	90.00	179.56	9,192.0	5,534.8	-52,386.9	9,851.0	0.00	0.00	0.00
19,100.0	90.00	179.56	9,192.0	5,434.8	-52,386.1	9,951.0	0.00	0.00	0.00
19,200.0	90.00	179.56	9,192.0	5,334.8	-52,385.4	10,050.9	0.00	0.00	0.00
19,300.0	90.00	179.56	9,192.0	5,234.8	-52,384.6	10,150.9	0.00	0.00	0.00
19,400.0	90.00	179.56	9,192.0	5,134.8	-52,383.8	10,250.9	0.00	0.00	0.00
19,449.2	90.00	179.56	9,192.0	5,085.6	-52,383.4	10,300.1	0.00	0.00	0.00

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Winward Federal - plan hits target center - Point	0.00	0.00	0.0	15,384.8	-52,246.7	435,165.30	689,487.60	32° 11' 41.650 N	103° 43' 14.802 W
Winward Federal - plan hits target center - Point	0.00	0.00	9,192.0	5,365.6	-52,385.6	425,146.10	689,348.70	32° 10' 2.509 N	103° 43' 17.082 W
Winward Federal - plan hits target center - Point	0.00	0.00	9,192.0	15,065.5	-52,460.1	434,845.98	689,274.21	32° 11' 38.502 N	103° 43' 17.306 W
Winward Federal - plan misses target center by 0.5usft at 19449.2usft MD (9192.0 TVD, 5085.6 N, -52383.4 E) - Point	0.00	0.00	9,192.0	5,085.6	-52,383.9	424,866.10	689,350.40	32° 9' 59.738 N	103° 43' 17.080 W

Checked By: _____ Approved By: _____ Date: _____

COG PRODUCTION LLC

LEA COUNTY, NM

AVALON SHALE

WINDWARD FEDERAL #5H

Lateral

DWD Plan 1 - negative VS

Anticollision Report

19 September, 2016

COG PRODUCTION LLC

Anticollision Report

Company:	COG PRODUCTION LLC	Local Co-ordinate Reference:	Site AVALON SHALE
Project:	LEA COUNTY, NM	TVD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Reference Site:	AVALON SHALE	MD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	WINDWARD FEDERAL #5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Lateral	Database:	EDM_Users
Reference Design:	DWD Plan 1 - negative VS	Offset TVD Reference:	Offset Datum

Reference	DWD Plan 1 - negative VS		
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:	Circular Conic
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program	Date	9/15/2016		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	19,449.2	DWD Plan 1 - negative VS (Lateral)	MWD	OWSG MWD - Standard

Summary						
Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
AVALON SHALE						
WINDWARD FEDERAL #5H - Lateral - DWD Plan 2 - we	1,000.0	1,000.0	0.0	-6.7	0.000	Stop Drilling Now, CC, SF
WINDWARD FEDERAL #5H - Lateral - DWD Plan 2 - we	19,140.4	18,980.5	0.5	-338.8	0.001	Stop Drilling Now, ES
WINDWARD FEDERAL #5H - Lateral - DWD Plan 3 - for	1,000.0	1,000.0	0.0	-6.7	0.000	Stop Drilling Now, CC, SF
WINDWARD FEDERAL #5H - Lateral - DWD Plan 3 - for	19,140.4	18,881.2	0.5	-338.8	0.001	Stop Drilling Now, ES
WINDWARD FEDERAL #5H - Lateral - DWD Plan 4 - str	1,000.0	1,000.0	0.0	-6.7	0.000	Stop Drilling Now, CC, SF
WINDWARD FEDERAL #5H - Lateral - DWD Plan 4 - str	19,449.2	19,315.3	0.4	-347.7	0.001	Stop Drilling Now, ES
WINDWARD FEDERAL #6H - Wellbore #1 - DWD Plan 1	1,000.0	999.0	30.0	25.2	6.224	CC, ES
WINDWARD FEDERAL #6H - Wellbore #1 - DWD Plan 1	19,449.2	19,466.8	739.6	390.1	2.116	SF

Offset Design AVALON SHALE - WINDWARD FEDERAL #5H - Lateral - DWD Plan 2 - west stepout														Offset Site Error:	0.0 usft
Survey Program: 0-MWD														Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Semi Major Axis (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	15,384.8	-52,246.7	0.0					
100.0	100.0	100.0	100.0	0.1	0.1	0.00	0.00	15,384.8	-52,246.7	0.0	-0.3	0.27	0.000	Stop Drilling Now	
200.0	200.0	200.0	200.0	0.5	0.5	0.00	0.00	15,384.8	-52,246.7	0.0	-1.0	0.98	0.000	Stop Drilling Now	
300.0	300.0	300.0	300.0	0.8	0.8	0.00	0.00	15,384.8	-52,246.7	0.0	-1.7	1.70	0.000	Stop Drilling Now	
400.0	400.0	400.0	400.0	1.2	1.2	0.00	0.00	15,384.8	-52,246.7	0.0	-2.4	2.42	0.000	Stop Drilling Now	
500.0	500.0	500.0	500.0	1.6	1.6	0.00	0.00	15,384.8	-52,246.7	0.0	-3.1	3.13	0.000	Stop Drilling Now	
600.0	600.0	600.0	600.0	1.9	1.9	0.00	0.00	15,384.8	-52,246.7	0.0	-3.8	3.85	0.000	Stop Drilling Now	
700.0	700.0	700.0	700.0	2.3	2.3	0.00	0.00	15,384.8	-52,246.7	0.0	-4.6	4.57	0.000	Stop Drilling Now	
800.0	800.0	800.0	800.0	2.6	2.6	0.00	0.00	15,384.8	-52,246.7	0.0	-5.3	5.28	0.000	Stop Drilling Now	
900.0	900.0	900.0	900.0	3.0	3.0	0.00	0.00	15,384.8	-52,246.7	0.0	-6.0	6.00	0.000	Stop Drilling Now	
1,000.0	1,000.0	1,000.0	1,000.0	3.4	3.4	0.00	0.00	15,384.8	-52,246.7	0.0	-6.7	6.72	0.000	Stop Drilling Now, CC, SF	
1,055.5	1,055.5	1,055.5	1,055.5	3.6	3.6	-108.87		15,384.8	-52,247.2	0.3	-6.8	7.11	0.049	Stop Drilling Now	
1,096.6	1,096.6	1,096.6	1,096.6	3.7	3.7	-112.76		15,384.8	-52,248.3	1.0	-6.4	7.40	0.139	Stop Drilling Now	
1,100.0	1,100.0	1,100.0	1,100.0	3.7	3.7	-113.73		15,384.8	-52,248.3	1.1	-6.3	7.42	0.148	Stop Drilling Now	
1,200.0	1,199.9	1,200.0	1,199.9	4.1	4.1	-123.13		15,384.8	-52,251.0	3.1	-5.0	8.12	0.387	Stop Drilling Now	
1,300.0	1,299.9	1,299.9	1,299.9	4.4	4.4	-125.11		15,384.8	-52,253.6	5.2	-3.6	8.82	0.589	Stop Drilling Now	
1,400.0	1,399.8	1,399.9	1,399.8	4.8	4.7	-125.97		15,384.8	-52,256.3	7.3	-2.3	9.53	0.762	Stop Drilling Now	

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	Local Co-ordinate Reference:	Site AVALON SHALE
Project:	LEA COUNTY, NM	TVD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Reference Site:	AVALON SHALE	MD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	WINDWARD FEDERAL #5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Lateral	Database:	EDM_Users
Reference Design:	DWD Plan 1 - negative VS	Offset TVD Reference:	Offset Datum

Offset Design AVALON SHALE - WINDWARD FEDERAL #5H - Lateral - DWD Plan 2 - west stepout													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	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		
1,500.0	1,499.8	1,499.9	1,499.7	5.1	5.1	-126.44	15,384.8	-52,258.9	9.3	-0.9	10.23	0.911	Stop Drilling Now	
1,600.0	1,599.7	1,599.9	1,599.7	5.5	5.5	-126.75	15,384.8	-52,261.6	11.4	0.4	10.94	1.040	Shut in Produces	
1,700.0	1,699.6	1,699.9	1,699.6	5.9	5.8	-126.96	15,384.8	-52,264.3	13.4	1.8	11.65	1.154	Shut in Produces	
1,800.0	1,799.6	1,799.8	1,799.6	6.2	6.2	-127.11	15,384.8	-52,266.9	15.5	3.1	12.37	1.254	Shut in Produces	
1,900.0	1,899.5	1,899.8	1,899.5	6.6	6.5	-127.23	15,384.8	-52,269.6	17.6	4.5	13.08	1.343	Shut in Produces	
2,000.0	1,999.5	1,999.8	1,999.5	6.9	6.9	-127.33	15,384.8	-52,272.2	19.6	5.8	13.80	1.423	Shut in Produces	
2,100.0	2,099.4	2,099.8	2,099.4	7.3	7.2	-127.40	15,384.8	-52,274.9	21.7	7.2	14.51	1.495	Shut in Produces	
2,200.0	2,199.4	2,199.8	2,199.4	7.6	7.6	-127.46	15,384.8	-52,277.5	23.8	8.5	15.23	1.561	Advise and Monitor	
2,300.0	2,299.3	2,299.7	2,299.3	8.0	7.9	-127.52	15,384.8	-52,280.2	25.8	9.9	15.94	1.620	Advise and Monitor	
2,400.0	2,399.2	2,399.7	2,399.2	8.4	8.3	-127.56	15,384.8	-52,282.8	27.9	11.2	16.66	1.674	Advise and Monitor	
2,500.0	2,499.2	2,499.7	2,499.2	8.7	8.7	-127.60	15,384.8	-52,285.5	30.0	12.6	17.38	1.723	Advise and Monitor	
2,600.0	2,599.1	2,599.7	2,599.1	9.1	9.0	-127.63	15,384.8	-52,288.1	32.0	13.9	18.10	1.769	Advise and Monitor	
2,700.0	2,699.1	2,699.6	2,699.1	9.4	9.4	-127.66	15,384.8	-52,290.8	34.1	15.3	18.82	1.811	Advise and Monitor	
2,800.0	2,799.0	2,799.6	2,799.0	9.8	9.7	-127.69	15,384.8	-52,293.4	36.1	16.6	19.53	1.850	Advise and Monitor	
2,900.0	2,899.0	2,899.6	2,899.0	10.2	10.1	-127.71	15,384.8	-52,296.1	38.2	18.0	20.25	1.886	Advise and Monitor	
3,000.0	2,998.9	2,999.6	2,998.9	10.5	10.4	-127.73	15,384.8	-52,298.7	40.3	19.3	20.97	1.920	Advise and Monitor	
3,100.0	3,098.8	3,099.6	3,098.8	10.9	10.8	-127.75	15,384.8	-52,301.4	42.3	20.6	21.69	1.951	Advise and Monitor	
3,200.0	3,198.8	3,199.5	3,198.8	11.3	11.2	-127.77	15,384.8	-52,304.0	44.4	22.0	22.41	1.981	Advise and Monitor	
3,300.0	3,298.7	3,299.5	3,298.7	11.6	11.5	-127.79	15,384.8	-52,306.7	46.5	23.3	23.13	2.008		
3,400.0	3,398.7	3,399.5	3,398.7	12.0	11.9	-127.80	15,384.8	-52,309.3	48.5	24.7	23.85	2.034		
3,500.0	3,498.6	3,499.5	3,498.6	12.3	12.2	-127.81	15,384.8	-52,312.0	50.6	26.0	24.57	2.058		
3,600.0	3,598.6	3,599.5	3,598.6	12.7	12.6	-127.83	15,384.8	-52,314.6	52.6	27.4	25.29	2.081		
3,700.0	3,698.5	3,699.4	3,698.5	13.1	13.0	-127.84	15,384.8	-52,317.3	54.7	28.7	26.01	2.103		
3,800.0	3,798.4	3,799.4	3,798.4	13.4	13.3	-127.85	15,384.8	-52,319.9	56.8	30.0	26.74	2.124		
3,900.0	3,898.4	3,899.4	3,898.4	13.8	13.7	-127.86	15,384.8	-52,322.6	58.8	31.4	27.46	2.143		
4,000.0	3,998.3	3,999.4	3,998.3	14.1	14.0	-127.87	15,384.8	-52,325.2	60.9	32.7	28.18	2.161		
4,100.0	4,098.3	4,099.4	4,098.3	14.5	14.4	-127.87	15,384.8	-52,327.9	63.0	34.1	28.90	2.179		
4,200.0	4,198.2	4,199.3	4,198.2	14.9	14.8	-127.88	15,384.8	-52,330.5	65.0	35.4	29.62	2.195		
4,300.0	4,298.2	4,299.3	4,298.2	15.2	15.1	-127.89	15,384.8	-52,333.2	67.1	36.7	30.34	2.211		
4,400.0	4,398.1	4,399.3	4,398.1	15.6	15.5	-127.90	15,384.8	-52,335.8	69.2	38.1	31.06	2.226		
4,500.0	4,498.0	4,499.3	4,498.0	15.9	15.8	-127.90	15,384.8	-52,338.5	71.2	39.4	31.78	2.241		
4,600.0	4,598.0	4,599.2	4,598.0	16.3	16.2	-127.91	15,384.8	-52,341.1	73.3	40.8	32.51	2.254		
4,700.0	4,697.9	4,699.2	4,697.9	16.7	16.6	-127.92	15,384.8	-52,343.8	75.3	42.1	33.23	2.268		
4,800.0	4,797.9	4,799.2	4,797.9	17.0	16.9	-127.92	15,384.8	-52,346.4	77.4	43.5	33.95	2.280		
4,900.0	4,897.8	4,899.2	4,897.8	17.4	17.3	-127.93	15,384.8	-52,349.1	79.5	44.8	34.67	2.292		
5,000.0	4,997.8	4,999.2	4,997.8	17.8	17.6	-127.93	15,384.8	-52,351.7	81.5	46.1	35.39	2.304		
5,100.0	5,097.7	5,099.1	5,097.7	18.1	18.0	-127.94	15,384.8	-52,354.4	83.6	47.5	36.11	2.315		
5,200.0	5,197.6	5,199.1	5,197.7	18.5	18.4	-127.94	15,384.8	-52,357.0	85.7	48.8	36.84	2.325		
5,300.0	5,297.6	5,299.1	5,297.6	18.8	18.7	-127.94	15,384.8	-52,359.7	87.7	50.2	37.56	2.336		
5,400.0	5,397.5	5,399.1	5,397.5	19.2	19.1	-127.95	15,384.8	-52,362.3	89.8	51.5	38.28	2.346		
5,500.0	5,497.5	5,499.1	5,497.5	19.6	19.4	-127.95	15,384.8	-52,365.0	91.8	52.8	39.00	2.355		
5,600.0	5,597.4	5,599.0	5,597.4	19.9	19.8	-127.96	15,384.8	-52,367.6	93.9	54.2	39.72	2.364		
5,700.0	5,697.4	5,699.0	5,697.4	20.3	20.2	-127.96	15,384.8	-52,370.3	96.0	55.5	40.45	2.373		
5,800.0	5,797.3	5,799.0	5,797.3	20.6	20.5	-127.96	15,384.8	-52,372.9	98.0	56.9	41.17	2.381		
5,900.0	5,897.3	5,899.0	5,897.3	21.0	20.9	-127.97	15,384.8	-52,375.6	100.1	58.2	41.89	2.390		
6,000.0	5,997.2	5,998.9	5,997.2	21.4	21.2	-127.97	15,384.8	-52,378.2	102.2	59.6	42.61	2.398		
6,100.0	6,097.1	6,098.9	6,097.2	21.7	21.6	-127.97	15,384.8	-52,380.9	104.2	60.9	43.33	2.405		
6,200.0	6,197.1	6,198.9	6,197.1	22.1	22.0	-127.98	15,384.8	-52,383.6	106.3	62.2	44.06	2.413		
6,300.0	6,297.0	6,298.9	6,297.0	22.5	22.3	-127.98	15,384.8	-52,386.2	108.4	63.6	44.78	2.420		
6,400.0	6,397.0	6,398.9	6,397.0	22.8	22.7	-127.98	15,384.8	-52,388.9	110.4	64.9	45.50	2.427		
6,500.0	6,496.9	6,498.8	6,496.9	23.2	23.0	-127.98	15,384.8	-52,391.5	112.5	66.3	46.22	2.433		

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: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #5H
Well Error: 0.0 usft
Reference Wellbore: Lateral
Reference Design: DWD Plan 1 - negative VS

Local Co-ordinate Reference: Site AVALON SHALE
TVD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
MD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (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 AVALON SHALE - WINDWARD FEDERAL #5H - Lateral - DWD Plan 2 - west stepout													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	0.0 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		
6,600.0	6,596.9	6,598.8	6,596.9	23.5	23.4	-127.99	15,384.8	-52,394.2	114.5	67.6	46.94	2.440		
6,700.0	6,696.8	6,698.8	6,696.8	23.9	23.8	-127.99	15,384.8	-52,396.8	116.6	68.9	47.67	2.446		
6,800.0	6,796.7	6,798.8	6,796.8	24.3	24.1	-127.99	15,384.9	-52,399.5	118.7	70.3	48.39	2.452		
6,900.0	6,896.7	6,898.8	6,896.7	24.6	24.5	-127.99	15,384.9	-52,402.1	120.7	71.6	49.11	2.458		
7,000.0	6,996.6	6,998.7	6,996.6	25.0	24.8	-128.00	15,384.9	-52,404.8	122.8	73.0	49.83	2.464		
7,100.0	7,096.6	7,098.7	7,096.6	25.3	25.2	-128.00	15,384.9	-52,407.4	124.9	74.3	50.56	2.470		
7,200.0	7,196.5	7,198.7	7,196.5	25.7	25.6	-128.00	15,384.9	-52,410.1	126.9	75.6	51.28	2.475		
7,300.0	7,296.5	7,298.7	7,296.5	26.1	25.9	-128.00	15,384.9	-52,412.7	129.0	77.0	52.00	2.480		
7,400.0	7,396.4	7,398.6	7,396.4	26.4	26.3	-128.00	15,384.9	-52,415.4	131.1	78.3	52.72	2.486		
7,500.0	7,496.3	7,498.6	7,496.4	26.8	26.7	-128.01	15,384.9	-52,418.0	133.1	79.7	53.45	2.491		
7,600.0	7,596.3	7,598.6	7,596.3	27.2	27.0	-128.01	15,384.9	-52,420.7	135.2	81.0	54.17	2.495		
7,700.0	7,696.2	7,698.6	7,696.2	27.5	27.4	-128.01	15,384.9	-52,423.3	137.2	82.3	54.89	2.500		
7,800.0	7,796.2	7,798.6	7,796.2	27.9	27.7	-128.01	15,384.9	-52,426.0	139.3	83.7	55.61	2.505		
7,900.0	7,896.1	7,898.5	7,896.1	28.2	28.1	-128.01	15,384.9	-52,428.6	141.4	85.0	56.34	2.509		
8,000.0	7,996.1	7,998.5	7,996.1	28.6	28.5	-128.01	15,384.9	-52,431.3	143.4	86.4	57.06	2.514		
8,100.0	8,096.0	8,098.5	8,096.0	29.0	28.8	-128.02	15,384.9	-52,433.9	145.5	87.7	57.78	2.518		
8,200.0	8,195.9	8,198.5	8,196.0	29.3	29.2	-128.02	15,384.9	-52,436.6	147.6	89.1	58.50	2.522		
8,300.0	8,295.9	8,298.5	8,295.9	29.7	29.5	-128.02	15,384.9	-52,439.2	149.6	90.4	59.23	2.526		
8,400.0	8,395.8	8,398.4	8,395.9	30.1	29.9	-128.02	15,384.9	-52,441.9	151.7	91.7	59.95	2.530		
8,500.0	8,495.8	8,498.4	8,495.8	30.4	30.3	-128.02	15,384.9	-52,444.5	153.7	93.1	60.67	2.534		
8,600.0	8,595.7	8,598.4	8,595.7	30.8	30.6	-128.02	15,384.9	-52,447.2	155.8	94.4	61.39	2.538		
8,709.1	8,704.8	8,707.5	8,704.8	31.2	31.0	-128.02	15,384.9	-52,450.1	158.1	95.9	62.18	2.542		
8,725.0	8,720.6	8,721.9	8,719.2	31.2	31.1	-64.66	15,384.8	-52,450.5	158.2	95.9	62.29	2.539		
8,750.0	8,745.6	8,740.6	8,737.9	31.3	31.1	-22.09	15,384.3	-52,450.9	157.9	95.5	62.44	2.529		
8,775.0	8,770.5	8,759.4	8,756.7	31.4	31.2	-12.61	15,383.0	-52,451.4	157.3	94.8	62.59	2.514		
8,800.0	8,795.2	8,778.2	8,775.4	31.5	31.3	-8.76	15,381.0	-52,451.9	156.5	93.7	62.73	2.494		
8,825.0	8,819.7	8,800.0	8,796.9	31.5	31.3	-6.70	15,377.7	-52,452.5	155.3	92.4	62.88	2.469		
8,850.0	8,844.0	8,815.9	8,812.5	31.6	31.4	-5.42	15,374.7	-52,452.9	153.7	90.7	63.01	2.439		
8,875.0	8,867.8	8,834.8	8,830.9	31.7	31.5	-4.55	15,370.5	-52,453.3	151.8	88.7	63.15	2.405		
8,900.0	8,891.3	8,853.7	8,849.1	31.8	31.5	-3.93	15,365.5	-52,453.8	149.7	86.4	63.28	2.365		
8,925.0	8,914.3	8,875.0	8,869.4	31.8	31.6	-3.45	15,359.1	-52,454.2	147.2	83.8	63.42	2.321		
8,950.0	8,936.7	8,891.7	8,885.1	31.9	31.6	-3.08	15,353.4	-52,454.6	144.4	80.8	63.54	2.272		
8,975.0	8,958.5	8,910.8	8,902.8	32.0	31.7	-2.79	15,346.2	-52,455.0	141.3	77.6	63.66	2.219		
9,000.0	8,979.6	8,930.0	8,920.3	32.0	31.8	-2.55	15,338.3	-52,455.4	137.9	74.1	63.78	2.161		
9,025.0	9,000.0	8,950.0	8,938.1	32.1	31.8	-2.34	15,329.3	-52,455.8	134.1	70.2	63.90	2.099		
9,050.0	9,019.7	8,968.6	8,954.4	32.1	31.9	-2.17	15,320.3	-52,456.2	130.1	66.1	64.01	2.033		
9,075.0	9,038.5	8,988.0	8,970.9	32.2	32.0	-2.03	15,310.2	-52,456.6	125.8	61.7	64.12	1.962 Advise and Monitor		
9,100.0	9,056.4	9,007.5	8,987.2	32.2	32.0	-1.90	15,299.4	-52,456.9	121.2	57.0	64.22	1.888 Advise and Monitor		
9,125.0	9,073.4	9,025.0	9,001.4	32.3	32.1	-1.79	15,289.1	-52,457.2	116.4	52.1	64.32	1.810 Advise and Monitor		
9,150.0	9,089.3	9,046.9	9,018.6	32.3	32.1	-1.70	15,275.6	-52,457.6	111.2	46.8	64.43	1.726 Advise and Monitor		
9,175.0	9,104.3	9,066.8	9,033.6	32.3	32.2	-1.61	15,262.6	-52,457.9	105.8	41.3	64.54	1.640 Advise and Monitor		
9,200.0	9,118.2	9,086.8	9,048.2	32.4	32.3	-1.53	15,248.9	-52,458.1	100.2	35.5	64.65	1.549 Advise and Monitor		
9,225.0	9,131.0	9,107.0	9,062.4	32.5	32.3	-1.46	15,234.5	-52,458.4	94.3	29.5	64.77	1.455 Shut in Produces		
9,250.0	9,142.6	9,127.3	9,076.0	32.5	32.4	-1.39	15,219.4	-52,458.6	88.1	23.2	64.89	1.358 Shut in Produces		
9,275.0	9,153.1	9,147.9	9,089.0	32.6	32.4	-1.32	15,203.5	-52,458.9	81.7	16.7	65.02	1.257 Shut in Produces		
9,300.0	9,162.4	9,168.6	9,101.5	32.6	32.5	-1.26	15,187.0	-52,459.1	75.1	10.0	65.14	1.153 Shut in Produces		
9,325.0	9,170.4	9,189.5	9,113.4	32.7	32.6	-1.19	15,169.8	-52,459.3	68.3	3.0	65.28	1.046 Shut in Produces		
9,350.0	9,177.2	9,210.6	9,124.6	32.8	32.6	-1.12	15,151.9	-52,459.4	61.3	-4.1	65.41	0.937 Stop Drilling Now		
9,375.0	9,182.8	9,232.0	9,135.1	32.8	32.7	-1.05	15,133.3	-52,459.6	54.1	-11.5	65.55	0.825 Stop Drilling Now		
9,400.0	9,187.0	9,253.6	9,144.9	32.9	32.8	-0.95	15,114.1	-52,459.7	46.7	-19.0	65.70	0.711 Stop Drilling Now		

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	Local Co-ordinate Reference:	Site AVALON SHALE
Project:	LEA COUNTY, NM	TVD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Reference Site:	AVALON SHALE	MD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	WINDWARD FEDERAL #5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Lateral	Database:	EDM_Users
Reference Design:	DWD Plan 1 - negative VS	Offset TVD Reference:	Offset Datum

Offset Design AVALON SHALE - WINDWARD FEDERAL #5H - Lateral - DWD Plan 2 - west stepout													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	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		
9,425.0	9,190.0	9,275.0	9,153.8	33.0	32.9	-0.83	15,094.6	-52,459.8	39.2	-26.7	65.84	0.595	Stop Drilling Now	
9,450.0	9,191.6	9,297.6	9,162.1	33.1	32.9	-0.65	15,073.6	-52,459.8	31.5	-34.5	66.00	0.477	Stop Drilling Now	
9,469.1	9,192.0	9,314.7	9,167.8	33.1	33.0	-0.44	15,057.5	-52,459.8	25.5	-40.6	66.12	0.386	Stop Drilling Now	
9,500.0	9,192.0	9,343.1	9,175.9	33.2	33.1	0.10	15,030.2	-52,459.8	16.7	-49.7	66.32	0.251	Stop Drilling Now	
9,600.0	9,192.0	9,440.2	9,191.2	33.6	33.5	29.31	14,934.5	-52,459.5	0.9	-66.2	67.04	0.013	Stop Drilling Now	
9,638.5	9,192.0	9,478.7	9,192.0	33.7	33.6	90.00	14,896.0	-52,459.2	0.5	-66.9	67.36	0.007	Stop Drilling Now	
9,700.0	9,192.0	9,540.2	9,192.0	34.0	33.9	90.00	14,834.5	-52,458.8	0.5	-67.4	67.90	0.007	Stop Drilling Now	
9,781.4	9,192.0	9,621.6	9,192.0	34.4	34.3	90.00	14,753.1	-52,458.1	0.5	-68.2	68.70	0.007	Stop Drilling Now	
9,800.0	9,192.0	9,640.2	9,192.0	34.5	34.4	90.00	14,734.5	-52,458.0	0.5	-68.4	68.89	0.007	Stop Drilling Now	
9,878.9	9,192.0	9,719.1	9,192.0	34.9	34.8	90.00	14,655.7	-52,457.4	0.5	-69.3	69.77	0.007	Stop Drilling Now	
9,900.0	9,192.0	9,740.2	9,192.0	35.1	34.9	90.00	14,634.5	-52,457.2	0.5	-69.6	70.02	0.006	Stop Drilling Now	
9,972.9	9,192.0	9,813.0	9,192.0	35.5	35.4	90.00	14,561.7	-52,456.7	0.5	-70.5	70.93	0.006	Stop Drilling Now	
10,000.0	9,192.0	9,840.2	9,192.0	35.7	35.6	90.00	14,534.5	-52,456.5	0.5	-70.8	71.29	0.006	Stop Drilling Now	
10,078.9	9,192.0	9,919.1	9,192.0	36.3	36.1	90.00	14,455.7	-52,455.9	0.5	-71.9	72.38	0.006	Stop Drilling Now	
10,100.0	9,192.0	9,940.2	9,192.0	36.4	36.3	90.00	14,434.5	-52,455.7	0.5	-72.2	72.68	0.006	Stop Drilling Now	
10,181.4	9,192.0	10,021.6	9,192.0	37.0	36.9	90.00	14,353.1	-52,455.1	0.5	-73.5	73.91	0.006	Stop Drilling Now	
10,200.0	9,192.0	10,040.2	9,192.0	37.2	37.0	90.00	14,334.5	-52,454.9	0.5	-73.7	74.20	0.006	Stop Drilling Now	
10,272.9	9,192.0	10,113.0	9,192.0	37.8	37.6	90.00	14,261.7	-52,454.4	0.5	-74.9	75.38	0.006	Stop Drilling Now	
10,300.0	9,192.0	10,140.2	9,192.0	38.0	37.8	90.00	14,234.6	-52,454.2	0.5	-75.4	75.84	0.006	Stop Drilling Now	
10,378.9	9,192.0	10,219.1	9,192.0	38.7	38.5	90.00	14,155.7	-52,453.6	0.5	-76.8	77.21	0.006	Stop Drilling Now	
10,400.0	9,192.0	10,240.2	9,192.0	38.9	38.7	90.00	14,134.6	-52,453.4	0.5	-77.1	77.58	0.006	Stop Drilling Now	
10,481.4	9,192.0	10,321.6	9,192.0	39.6	39.4	90.00	14,053.1	-52,452.8	0.5	-78.6	79.08	0.006	Stop Drilling Now	
10,500.0	9,192.0	10,340.2	9,192.0	39.8	39.6	90.00	14,034.6	-52,452.6	0.5	-79.0	79.42	0.006	Stop Drilling Now	
10,578.9	9,192.0	10,419.1	9,192.0	40.6	40.4	90.00	13,955.7	-52,452.0	0.5	-80.5	80.95	0.006	Stop Drilling Now	
10,600.0	9,192.0	10,440.2	9,192.0	40.8	40.6	90.00	13,934.6	-52,451.9	0.5	-80.9	81.36	0.006	Stop Drilling Now	
10,672.9	9,192.0	10,513.0	9,192.0	41.5	41.3	90.00	13,861.7	-52,451.3	0.5	-82.4	82.83	0.005	Stop Drilling Now	
10,700.0	9,192.0	10,540.2	9,192.0	41.8	41.6	90.00	13,834.6	-52,451.1	0.5	-82.9	83.39	0.005	Stop Drilling Now	
10,778.9	9,192.0	10,619.1	9,192.0	42.6	42.4	90.00	13,755.7	-52,450.5	0.5	-84.6	85.05	0.005	Stop Drilling Now	
10,800.0	9,192.0	10,640.2	9,192.0	42.9	42.6	90.00	13,734.6	-52,450.3	0.5	-85.0	85.50	0.005	Stop Drilling Now	
10,881.4	9,192.0	10,721.6	9,192.0	43.8	43.5	90.00	13,653.1	-52,449.7	0.5	-86.8	87.27	0.005	Stop Drilling Now	
10,900.0	9,192.0	10,740.2	9,192.0	44.0	43.7	90.00	13,634.6	-52,449.6	0.5	-87.2	87.68	0.005	Stop Drilling Now	
10,978.9	9,192.0	10,819.1	9,192.0	44.9	44.6	90.00	13,555.7	-52,448.9	0.5	-89.0	89.45	0.005	Stop Drilling Now	
11,000.0	9,192.0	10,840.2	9,192.0	45.1	44.8	90.00	13,534.6	-52,448.8	0.5	-89.5	89.94	0.005	Stop Drilling Now	
11,072.9	9,192.0	10,913.0	9,192.0	45.9	45.7	90.00	13,461.7	-52,448.2	0.5	-91.2	91.62	0.005	Stop Drilling Now	
11,100.0	9,192.0	10,940.2	9,192.0	46.3	46.0	90.00	13,434.6	-52,448.0	0.5	-91.8	92.25	0.005	Stop Drilling Now	
11,178.9	9,192.0	11,019.1	9,192.0	47.2	46.9	90.00	13,355.7	-52,447.4	0.5	-93.7	94.13	0.005	Stop Drilling Now	
11,200.0	9,192.0	11,040.2	9,192.0	47.5	47.2	90.00	13,334.6	-52,447.3	0.5	-94.2	94.63	0.005	Stop Drilling Now	
11,281.4	9,192.0	11,121.6	9,192.0	48.5	48.2	90.00	13,253.2	-52,446.6	0.5	-96.2	96.61	0.005	Stop Drilling Now	
11,300.0	9,192.0	11,140.2	9,192.0	48.7	48.4	90.00	13,234.6	-52,446.5	0.5	-96.6	97.07	0.005	Stop Drilling Now	
11,372.9	9,192.0	11,213.0	9,192.0	49.6	49.3	90.00	13,161.7	-52,445.9	0.5	-98.4	98.88	0.005	Stop Drilling Now	
11,400.0	9,192.0	11,240.2	9,192.0	49.9	49.6	90.00	13,134.6	-52,445.7	0.5	-99.1	99.56	0.005	Stop Drilling Now	
11,478.9	9,192.0	11,319.1	9,192.0	50.9	50.6	90.00	13,055.7	-52,445.1	0.5	-101.1	101.55	0.004	Stop Drilling Now	
11,500.0	9,192.0	11,340.2	9,192.0	51.2	50.9	90.00	13,034.6	-52,444.9	0.5	-101.6	102.09	0.004	Stop Drilling Now	
11,581.4	9,192.0	11,421.6	9,192.0	52.2	51.9	90.00	12,953.2	-52,444.3	0.5	-103.7	104.19	0.004	Stop Drilling Now	
11,600.0	9,192.0	11,440.2	9,192.0	52.5	52.2	90.00	12,934.6	-52,444.2	0.5	-104.2	104.67	0.004	Stop Drilling Now	
11,678.9	9,192.0	11,519.1	9,192.0	53.5	53.2	90.00	12,855.7	-52,443.6	0.5	-106.3	106.74	0.004	Stop Drilling Now	
11,700.0	9,192.0	11,540.2	9,192.0	53.8	53.5	90.00	12,834.6	-52,443.4	0.5	-106.8	107.29	0.004	Stop Drilling Now	
11,772.9	9,192.0	11,613.0	9,192.0	54.8	54.5	90.00	12,761.7	-52,442.9	0.5	-108.8	109.23	0.004	Stop Drilling Now	
11,800.0	9,192.0	11,640.2	9,192.0	55.1	54.8	90.00	12,734.6	-52,442.6	0.5	-109.5	109.95	0.004	Stop Drilling Now	
11,878.9	9,192.0	11,719.1	9,192.0	56.2	55.9	90.00	12,655.7	-52,442.0	0.5	-111.6	112.08	0.004	Stop Drilling Now	
11,900.0	9,192.0	11,740.2	9,192.0	56.5	56.2	90.00	12,634.6	-52,441.9	0.5	-112.2	112.65	0.004	Stop Drilling Now	

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: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #5H
Well Error: 0.0 usft
Reference Wellbore: Lateral
Reference Design: DWD Plan 1 - negative VS

Local Co-ordinate Reference: Site AVALON SHALE
TVD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
MD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (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 AVALON SHALE - WINDWARD FEDERAL #5H - Lateral - DWD Plan 2 - west stepout													Offset Site Error: 0.0 usft
Survey Program: 0-MWD													Offset Well Error: 0.0 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)	Offset Wellbore Centre +E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
11,981.4	9,192.0	11,821.6	9,192.0	57.6	57.3	90.00	12,553.2	-52,441.3	0.5	-114.4	114.87	0.004	Stop Drilling Now
12,000.0	9,192.0	11,840.2	9,192.0	57.9	57.5	90.00	12,534.6	-52,441.1	0.5	-114.9	115.38	0.004	Stop Drilling Now
12,072.9	9,192.0	11,913.0	9,192.0	58.9	58.5	90.00	12,461.7	-52,440.5	0.5	-116.9	117.39	0.004	Stop Drilling Now
12,100.0	9,192.0	11,940.2	9,192.0	59.2	58.9	90.00	12,434.6	-52,440.3	0.5	-117.7	118.14	0.004	Stop Drilling Now
12,178.9	9,192.0	12,019.1	9,192.0	60.3	60.0	90.00	12,355.7	-52,439.7	0.5	-119.9	120.34	0.004	Stop Drilling Now
12,200.0	9,192.0	12,040.2	9,192.0	60.6	60.3	90.00	12,334.6	-52,439.6	0.5	-120.5	120.93	0.004	Stop Drilling Now
12,281.4	9,192.0	12,121.6	9,192.0	61.8	61.4	90.00	12,253.2	-52,438.9	0.5	-122.8	123.22	0.004	Stop Drilling Now
12,300.0	9,192.0	12,140.2	9,192.0	62.0	61.7	90.00	12,234.6	-52,438.8	0.5	-123.3	123.74	0.004	Stop Drilling Now
12,378.9	9,192.0	12,219.1	9,192.0	63.2	62.8	90.00	12,155.7	-52,438.2	0.5	-125.5	125.98	0.004	Stop Drilling Now
12,400.0	9,192.0	12,240.2	9,192.0	63.5	63.1	90.00	12,134.6	-52,438.0	0.5	-126.1	126.58	0.004	Stop Drilling Now
12,472.9	9,192.0	12,313.0	9,192.0	64.5	64.2	90.00	12,061.8	-52,437.5	0.5	-128.2	128.67	0.004	Stop Drilling Now
12,500.0	9,192.0	12,340.2	9,192.0	64.9	64.6	90.00	12,034.6	-52,437.3	0.5	-129.0	129.45	0.004	Stop Drilling Now
12,578.9	9,192.0	12,419.1	9,192.0	66.0	65.7	90.00	11,955.8	-52,436.7	0.5	-131.3	131.72	0.003	Stop Drilling Now
12,600.0	9,192.0	12,440.2	9,192.0	66.3	66.0	90.00	11,934.6	-52,436.5	0.5	-131.9	132.33	0.003	Stop Drilling Now
12,681.4	9,192.0	12,521.6	9,192.0	67.5	67.2	90.00	11,853.2	-52,435.9	0.5	-134.2	134.70	0.003	Stop Drilling Now
12,700.0	9,192.0	12,540.2	9,192.0	67.8	67.4	90.00	11,834.6	-52,435.7	0.5	-134.8	135.24	0.003	Stop Drilling Now
12,778.9	9,192.0	12,619.1	9,192.0	68.9	68.6	90.00	11,755.8	-52,435.1	0.5	-137.1	137.55	0.003	Stop Drilling Now
12,800.0	9,192.0	12,640.2	9,192.0	69.3	68.9	90.00	11,734.6	-52,435.0	0.5	-137.7	138.16	0.003	Stop Drilling Now
12,872.9	9,192.0	12,713.0	9,192.0	70.3	70.0	90.00	11,661.8	-52,434.4	0.5	-139.9	140.31	0.003	Stop Drilling Now
12,900.0	9,192.0	12,740.2	9,192.0	70.7	70.4	90.00	11,634.6	-52,434.2	0.5	-140.7	141.11	0.003	Stop Drilling Now
12,978.9	9,192.0	12,819.1	9,192.0	71.9	71.5	90.00	11,555.8	-52,433.6	0.5	-143.0	143.44	0.003	Stop Drilling Now
13,000.0	9,192.0	12,840.2	9,192.0	72.2	71.9	90.00	11,534.6	-52,433.4	0.5	-143.6	144.07	0.003	Stop Drilling Now
13,081.4	9,192.0	12,921.6	9,192.0	73.4	73.1	90.00	11,453.2	-52,432.8	0.5	-146.0	146.49	0.003	Stop Drilling Now
13,100.0	9,192.0	12,940.2	9,192.0	73.7	73.3	90.00	11,434.6	-52,432.7	0.5	-146.6	147.04	0.003	Stop Drilling Now
13,172.9	9,192.0	13,013.0	9,192.0	74.8	74.4	90.00	11,361.8	-52,432.1	0.5	-148.8	149.22	0.003	Stop Drilling Now
13,200.0	9,192.0	13,040.2	9,192.0	75.2	74.8	90.00	11,334.6	-52,431.9	0.5	-149.6	150.04	0.003	Stop Drilling Now
13,278.9	9,192.0	13,119.1	9,192.0	76.4	76.0	90.00	11,255.8	-52,431.3	0.5	-152.0	152.40	0.003	Stop Drilling Now
13,300.0	9,192.0	13,140.2	9,192.0	76.7	76.3	90.00	11,234.6	-52,431.1	0.5	-152.6	153.04	0.003	Stop Drilling Now
13,381.4	9,192.0	13,221.6	9,192.0	77.9	77.6	90.00	11,153.2	-52,430.5	0.5	-155.0	155.50	0.003	Stop Drilling Now
13,400.0	9,192.0	13,240.2	9,192.0	78.2	77.8	90.00	11,134.6	-52,430.4	0.5	-155.6	156.06	0.003	Stop Drilling Now
13,478.9	9,192.0	13,319.1	9,192.0	79.4	79.0	90.00	11,055.8	-52,429.8	0.5	-158.0	158.45	0.003	Stop Drilling Now
13,500.0	9,192.0	13,340.2	9,192.0	79.7	79.4	90.00	11,034.6	-52,429.6	0.5	-158.6	159.09	0.003	Stop Drilling Now
13,572.9	9,192.0	13,413.0	9,192.0	80.8	80.5	90.00	10,961.8	-52,429.0	0.5	-160.9	161.31	0.003	Stop Drilling Now
13,600.0	9,192.0	13,440.2	9,192.0	81.2	80.9	90.00	10,934.6	-52,428.8	0.5	-161.7	162.13	0.003	Stop Drilling Now
13,678.9	9,192.0	13,519.1	9,192.0	82.5	82.1	90.00	10,855.8	-52,428.2	0.5	-164.1	164.54	0.003	Stop Drilling Now
13,700.0	9,192.0	13,540.2	9,192.0	82.8	82.4	90.00	10,834.7	-52,428.1	0.5	-164.7	165.19	0.003	Stop Drilling Now
13,781.4	9,192.0	13,621.6	9,192.0	84.0	83.7	90.00	10,753.2	-52,427.4	0.5	-167.2	167.68	0.003	Stop Drilling Now
13,800.0	9,192.0	13,640.2	9,192.0	84.3	83.9	90.00	10,734.7	-52,427.3	0.5	-167.8	168.25	0.003	Stop Drilling Now
13,872.9	9,192.0	13,713.0	9,192.0	85.4	85.1	90.00	10,661.8	-52,426.7	0.5	-170.0	170.49	0.003	Stop Drilling Now
13,900.0	9,192.0	13,740.2	9,192.0	85.8	85.5	90.00	10,634.7	-52,426.5	0.5	-170.9	171.32	0.003	Stop Drilling Now
13,978.9	9,192.0	13,819.1	9,192.0	87.1	86.7	90.00	10,555.8	-52,425.9	0.5	-173.3	173.76	0.003	Stop Drilling Now
14,000.0	9,192.0	13,840.2	9,192.0	87.4	87.0	90.00	10,534.7	-52,425.7	0.5	-174.0	174.41	0.003	Stop Drilling Now
14,081.4	9,192.0	13,921.6	9,192.0	88.6	88.3	90.00	10,453.2	-52,425.1	0.5	-176.5	176.93	0.003	Stop Drilling Now
14,100.0	9,192.0	13,940.2	9,192.0	88.9	88.6	90.00	10,434.7	-52,425.0	0.5	-177.0	177.50	0.003	Stop Drilling Now
14,178.9	9,192.0	14,019.1	9,192.0	90.2	89.8	90.00	10,355.8	-52,424.4	0.5	-179.5	179.95	0.003	Stop Drilling Now
14,200.0	9,192.0	14,040.2	9,192.0	90.5	90.1	90.00	10,334.7	-52,424.2	0.5	-180.1	180.60	0.003	Stop Drilling Now
14,272.9	9,192.0	14,113.0	9,192.0	91.6	91.2	90.00	10,261.8	-52,423.7	0.5	-182.4	182.87	0.002	Stop Drilling Now
14,300.0	9,192.0	14,140.2	9,192.0	92.0	91.7	90.00	10,234.7	-52,423.4	0.5	-183.3	183.71	0.002	Stop Drilling Now
14,378.9	9,192.0	14,219.1	9,192.0	93.3	92.9	90.00	10,155.8	-52,422.8	0.5	-185.7	186.17	0.002	Stop Drilling Now
14,400.0	9,192.0	14,240.2	9,192.0	93.6	93.2	90.00	10,134.7	-52,422.7	0.5	-186.4	186.83	0.002	Stop Drilling Now

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	Local Co-ordinate Reference:	Site AVALON SHALE
Project:	LEA COUNTY, NM	TVD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Reference Site:	AVALON SHALE	MD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	WINDWARD FEDERAL #5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Lateral	Database:	EDM_Users
Reference Design:	DWD Plan 1 - negative VS	Offset TVD Reference:	Offset Datum

Offset Design AVALON SHALE - WINDWARD FEDERAL #5H - Lateral - DWD Plan 2 - west stepout													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	0.0 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)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
14,481.4	9,192.0	14,321.6	9,192.0	94.9	94.5	90.00	10,053.3	-52,422.1	0.5	-188.9	189.37	0.002	Stop Drilling Now	
14,500.0	9,192.0	14,340.2	9,192.0	95.2	94.8	90.00	10,034.7	-52,421.9	0.5	-189.5	189.95	0.002	Stop Drilling Now	
14,578.9	9,192.0	14,419.1	9,192.0	96.4	96.0	90.00	9,955.8	-52,421.3	0.5	-192.0	192.42	0.002	Stop Drilling Now	
14,600.0	9,192.0	14,440.2	9,192.0	96.7	96.4	90.00	9,934.7	-52,421.1	0.5	-192.6	193.08	0.002	Stop Drilling Now	
14,672.9	9,192.0	14,513.0	9,192.0	97.9	97.5	90.00	9,861.8	-52,420.6	0.5	-194.9	195.37	0.002	Stop Drilling Now	
14,700.0	9,192.0	14,540.2	9,192.0	98.3	97.9	90.00	9,834.7	-52,420.4	0.5	-195.8	196.22	0.002	Stop Drilling Now	
14,778.9	9,192.0	14,619.1	9,192.0	99.5	99.2	90.00	9,755.8	-52,419.8	0.5	-198.2	198.70	0.002	Stop Drilling Now	
14,800.0	9,192.0	14,640.2	9,192.0	99.9	99.5	90.00	9,734.7	-52,419.6	0.5	-198.9	199.37	0.002	Stop Drilling Now	
14,881.4	9,192.0	14,721.6	9,192.0	101.2	100.8	90.00	9,653.3	-52,419.0	0.5	-201.5	201.93	0.002	Stop Drilling Now	
14,900.0	9,192.0	14,740.2	9,192.0	101.4	101.1	90.00	9,634.7	-52,418.8	0.5	-202.1	202.52	0.002	Stop Drilling Now	
14,972.9	9,192.0	14,813.0	9,192.0	102.6	102.2	90.00	9,561.8	-52,418.3	0.5	-204.4	204.81	0.002	Stop Drilling Now	
15,000.0	9,192.0	14,840.2	9,192.0	103.0	102.6	90.00	9,534.7	-52,418.1	0.5	-205.2	205.67	0.002	Stop Drilling Now	
15,078.9	9,192.0	14,919.1	9,192.0	104.3	103.9	90.00	9,455.8	-52,417.5	0.5	-207.7	208.16	0.002	Stop Drilling Now	
15,100.0	9,192.0	14,940.2	9,192.0	104.6	104.2	90.00	9,434.7	-52,417.3	0.5	-208.4	208.83	0.002	Stop Drilling Now	
15,181.4	9,192.0	15,021.6	9,192.0	105.9	105.5	90.00	9,353.3	-52,416.7	0.5	-211.0	211.41	0.002	Stop Drilling Now	
15,200.0	9,192.0	15,040.2	9,192.0	106.2	105.8	90.00	9,334.7	-52,416.5	0.5	-211.5	212.00	0.002	Stop Drilling Now	
15,278.9	9,192.0	15,119.1	9,192.0	107.4	107.1	90.00	9,255.8	-52,415.9	0.5	-214.0	214.50	0.002	Stop Drilling Now	
15,300.0	9,192.0	15,140.2	9,192.0	107.8	107.4	90.00	9,234.7	-52,415.8	0.5	-214.7	215.17	0.002	Stop Drilling Now	
15,372.9	9,192.0	15,213.0	9,192.0	108.9	108.5	90.00	9,161.8	-52,415.2	0.5	-217.0	217.48	0.002	Stop Drilling Now	
15,400.0	9,192.0	15,240.2	9,192.0	109.4	109.0	90.00	9,134.7	-52,415.0	0.5	-217.9	218.35	0.002	Stop Drilling Now	
15,478.9	9,192.0	15,319.1	9,192.0	110.6	110.2	90.00	9,055.8	-52,414.4	0.5	-220.4	220.85	0.002	Stop Drilling Now	
15,500.0	9,192.0	15,340.2	9,192.0	111.0	110.6	90.00	9,034.7	-52,414.2	0.5	-221.1	221.53	0.002	Stop Drilling Now	
15,581.4	9,192.0	15,421.6	9,192.0	112.3	111.9	90.00	8,953.3	-52,413.6	0.5	-223.7	224.12	0.002	Stop Drilling Now	
15,600.0	9,192.0	15,440.2	9,192.0	112.5	112.2	90.00	8,934.7	-52,413.5	0.5	-224.3	224.71	0.002	Stop Drilling Now	
15,672.9	9,192.0	15,513.0	9,192.0	113.7	113.3	90.00	8,861.8	-52,412.9	0.5	-226.6	227.03	0.002	Stop Drilling Now	
15,700.0	9,192.0	15,540.2	9,192.0	114.1	113.8	90.00	8,834.7	-52,412.7	0.5	-227.4	227.90	0.002	Stop Drilling Now	
15,778.9	9,192.0	15,619.1	9,192.0	115.4	115.0	90.00	8,755.8	-52,412.1	0.5	-230.0	230.42	0.002	Stop Drilling Now	
15,800.0	9,192.0	15,640.2	9,192.0	115.7	115.4	90.00	8,734.7	-52,411.9	0.5	-230.6	231.09	0.002	Stop Drilling Now	
15,881.4	9,192.0	15,721.6	9,192.0	117.0	116.7	90.00	8,653.3	-52,411.3	0.5	-233.2	233.70	0.002	Stop Drilling Now	
15,900.0	9,192.0	15,740.2	9,192.0	117.3	117.0	90.00	8,634.7	-52,411.2	0.5	-233.8	234.29	0.002	Stop Drilling Now	
15,978.9	9,192.0	15,819.1	9,192.0	118.6	118.2	90.00	8,555.9	-52,410.6	0.5	-236.4	236.81	0.002	Stop Drilling Now	
16,000.0	9,192.0	15,840.2	9,192.0	118.9	118.6	90.00	8,534.7	-52,410.4	0.5	-237.0	237.49	0.002	Stop Drilling Now	
16,072.9	9,192.0	15,913.0	9,192.0	120.1	119.7	90.00	8,461.9	-52,409.8	0.5	-239.4	239.83	0.002	Stop Drilling Now	
16,100.0	9,192.0	15,940.2	9,192.0	120.5	120.2	90.00	8,434.7	-52,409.6	0.5	-240.2	240.69	0.002	Stop Drilling Now	
16,178.9	9,192.0	16,019.1	9,192.0	121.8	121.4	90.00	8,355.9	-52,409.0	0.5	-242.8	243.22	0.002	Stop Drilling Now	
16,200.0	9,192.0	16,040.2	9,192.0	122.1	121.8	90.00	8,334.7	-52,408.9	0.5	-243.4	243.90	0.002	Stop Drilling Now	
16,281.4	9,192.0	16,121.6	9,192.0	123.5	123.1	90.00	8,253.3	-52,408.2	0.5	-246.1	246.52	0.002	Stop Drilling Now	
16,300.0	9,192.0	16,140.2	9,192.0	123.8	123.4	90.00	8,234.7	-52,408.1	0.5	-246.7	247.11	0.002	Stop Drilling Now	
16,400.0	9,192.0	16,240.2	9,192.0	125.4	125.0	90.00	8,134.7	-52,407.3	0.5	-249.9	250.33	0.002	Stop Drilling Now	
16,415.0	9,192.0	16,255.2	9,192.0	125.6	125.2	90.00	8,119.7	-52,407.2	0.5	-250.4	250.81	0.002	Stop Drilling Now	
16,500.0	9,192.0	16,340.2	9,192.0	127.0	126.6	90.00	8,034.7	-52,406.6	0.5	-253.1	253.54	0.002	Stop Drilling Now	
16,520.8	9,192.0	16,361.0	9,192.0	127.3	126.9	90.00	8,013.9	-52,406.4	0.5	-253.8	254.22	0.002	Stop Drilling Now	
16,600.0	9,192.0	16,440.2	9,192.0	128.6	128.2	90.00	7,934.7	-52,405.8	0.5	-256.3	256.76	0.002	Stop Drilling Now	
16,622.6	9,192.0	16,462.8	9,192.0	128.9	128.6	90.00	7,912.2	-52,405.6	0.5	-257.0	257.49	0.002	Stop Drilling Now	
16,700.0	9,192.0	16,540.2	9,192.0	130.2	129.8	90.00	7,834.7	-52,405.0	0.5	-259.5	259.99	0.002	Stop Drilling Now	
16,715.0	9,192.0	16,555.2	9,192.0	130.4	130.0	90.00	7,819.7	-52,404.9	0.5	-260.0	260.47	0.002	Stop Drilling Now	
16,800.0	9,192.0	16,640.2	9,192.0	131.8	131.4	90.00	7,734.7	-52,404.2	0.5	-262.8	263.21	0.002	Stop Drilling Now	
16,820.8	9,192.0	16,661.0	9,192.0	132.1	131.7	90.00	7,713.9	-52,404.1	0.5	-263.4	263.89	0.002	Stop Drilling Now	
16,900.0	9,192.0	16,740.2	9,192.0	133.4	133.0	90.00	7,634.7	-52,403.5	0.5	-266.0	266.44	0.002	Stop Drilling Now	
16,922.6	9,192.0	16,762.8	9,192.0	133.8	133.4	90.00	7,612.2	-52,403.3	0.5	-266.7	267.17	0.002	Stop Drilling Now	
17,000.0	9,192.0	16,840.2	9,192.0	135.0	134.6	90.00	7,534.7	-52,402.7	0.5	-269.2	269.67	0.002	Stop Drilling Now	

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	Local Co-ordinate Reference:	Site AVALON SHALE
Project:	LEA COUNTY, NM	TVD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Reference Site:	AVALON SHALE	MD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	WINDWARD FEDERAL #5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Lateral	Database:	EDM_Users
Reference Design:	DWD Plan 1 - negative VS	Offset TVD Reference:	Offset Datum

Offset Design AVALON SHALE - WINDWARD FEDERAL #5H - Lateral - DWD Plan 2 - west stepout													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	0.0 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
17,021.1	9,192.0	16,861.3	9,192.0	135.4	135.0	90.00	7,513.6	-52,402.5	0.5	-269.9	270.35	0.002	Stop Drilling Now	
17,100.0	9,192.0	16,940.2	9,192.0	136.6	136.3	90.00	7,434.8	-52,401.9	0.5	-272.4	272.90	0.002	Stop Drilling Now	
17,115.0	9,192.0	16,955.2	9,192.0	136.9	136.5	90.00	7,419.7	-52,401.8	0.5	-272.9	273.39	0.002	Stop Drilling Now	
17,200.0	9,192.0	17,040.2	9,192.0	138.3	137.9	90.00	7,334.8	-52,401.2	0.5	-275.7	276.14	0.002	Stop Drilling Now	
17,220.8	9,192.0	17,061.0	9,192.0	138.6	138.2	90.00	7,313.9	-52,401.0	0.5	-276.4	276.81	0.002	Stop Drilling Now	
17,300.0	9,192.0	17,140.2	9,192.0	139.9	139.5	90.00	7,234.8	-52,400.4	0.5	-278.9	279.38	0.002	Stop Drilling Now	
17,322.6	9,192.0	17,162.8	9,192.0	140.3	139.9	90.00	7,212.2	-52,400.2	0.5	-279.7	280.11	0.002	Stop Drilling Now	
17,400.0	9,192.0	17,240.2	9,192.0	141.5	141.1	90.00	7,134.8	-52,399.6	0.5	-282.2	282.62	0.002	Stop Drilling Now	
17,415.0	9,192.0	17,255.2	9,192.0	141.7	141.4	90.00	7,119.7	-52,399.5	0.5	-282.7	283.10	0.002	Stop Drilling Now	
17,500.0	9,192.0	17,340.2	9,192.0	143.1	142.7	90.00	7,034.8	-52,398.9	0.5	-285.4	285.86	0.002	Stop Drilling Now	
17,520.8	9,192.0	17,361.0	9,192.0	143.5	143.1	90.00	7,013.9	-52,398.7	0.5	-286.1	286.53	0.002	Stop Drilling Now	
17,600.0	9,192.0	17,440.2	9,192.0	144.7	144.4	90.00	6,934.8	-52,398.1	0.5	-288.6	289.10	0.002	Stop Drilling Now	
17,622.6	9,192.0	17,462.8	9,192.0	145.1	144.7	90.00	6,912.2	-52,397.9	0.5	-289.4	289.84	0.002	Stop Drilling Now	
17,700.0	9,192.0	17,540.2	9,192.0	146.4	146.0	90.00	6,834.8	-52,397.3	0.5	-291.9	292.35	0.002	Stop Drilling Now	
17,721.1	9,192.0	17,561.3	9,192.0	146.7	146.3	90.00	6,813.6	-52,397.2	0.5	-292.6	293.03	0.002	Stop Drilling Now	
17,800.0	9,192.0	17,640.2	9,192.0	148.0	147.6	90.00	6,734.8	-52,396.6	0.5	-295.1	295.60	0.002	Stop Drilling Now	
17,815.0	9,192.0	17,655.2	9,192.0	148.2	147.8	90.00	6,719.7	-52,396.5	0.5	-295.6	296.09	0.002	Stop Drilling Now	
17,900.0	9,192.0	17,740.2	9,192.0	149.6	149.2	90.00	6,634.8	-52,395.8	0.5	-298.4	298.85	0.002	Stop Drilling Now	
17,920.8	9,192.0	17,761.0	9,192.0	150.0	149.6	90.00	6,613.9	-52,395.6	0.5	-299.1	299.52	0.002	Stop Drilling Now	
18,000.0	9,192.0	17,840.2	9,192.0	151.2	150.9	90.00	6,534.8	-52,395.0	0.5	-301.6	302.10	0.002	Stop Drilling Now	
18,022.6	9,192.0	17,862.8	9,192.0	151.6	151.2	90.00	6,512.2	-52,394.9	0.5	-302.4	302.83	0.002	Stop Drilling Now	
18,100.0	9,192.0	17,940.2	9,192.0	152.9	152.5	90.00	6,434.8	-52,394.3	0.5	-304.9	305.35	0.001	Stop Drilling Now	
18,121.1	9,192.0	17,961.3	9,192.0	153.2	152.8	90.00	6,413.7	-52,394.1	0.5	-305.6	306.04	0.001	Stop Drilling Now	
18,200.0	9,192.0	18,040.2	9,192.0	154.5	154.1	90.00	6,334.8	-52,393.5	0.5	-308.2	308.61	0.001	Stop Drilling Now	
18,215.0	9,192.0	18,055.2	9,192.0	154.7	154.3	90.00	6,319.7	-52,393.4	0.5	-308.6	309.10	0.001	Stop Drilling Now	
18,300.0	9,192.0	18,140.2	9,192.0	156.1	155.7	90.00	6,234.8	-52,392.7	0.5	-311.4	311.86	0.001	Stop Drilling Now	
18,322.6	9,192.0	18,162.8	9,192.0	156.5	156.1	90.00	6,212.2	-52,392.6	0.5	-312.1	312.60	0.001	Stop Drilling Now	
18,400.0	9,192.0	18,240.2	9,192.0	157.8	157.4	90.00	6,134.8	-52,392.0	0.5	-314.7	315.12	0.001	Stop Drilling Now	
18,421.1	9,192.0	18,261.3	9,192.0	158.1	157.7	90.00	6,113.7	-52,391.8	0.5	-315.4	315.81	0.001	Stop Drilling Now	
18,500.0	9,192.0	18,340.2	9,192.0	159.4	159.0	90.00	6,034.8	-52,391.2	0.5	-317.9	318.38	0.001	Stop Drilling Now	
18,515.0	9,192.0	18,355.2	9,192.0	159.6	159.2	90.00	6,019.7	-52,391.1	0.5	-318.4	318.87	0.001	Stop Drilling Now	
18,600.0	9,192.0	18,440.2	9,192.0	161.0	160.6	90.00	5,934.8	-52,390.4	0.5	-321.2	321.64	0.001	Stop Drilling Now	
18,620.8	9,192.0	18,461.0	9,192.0	161.4	161.0	90.00	5,914.0	-52,390.3	0.5	-321.9	322.32	0.001	Stop Drilling Now	
18,700.0	9,192.0	18,540.2	9,192.0	162.6	162.3	90.00	5,834.8	-52,389.7	0.5	-324.4	324.90	0.001	Stop Drilling Now	
18,722.6	9,192.0	18,562.8	9,192.0	163.0	162.6	90.00	5,812.2	-52,389.5	0.5	-325.2	325.64	0.001	Stop Drilling Now	
18,800.0	9,192.0	18,640.2	9,192.0	164.3	163.9	90.00	5,734.8	-52,388.9	0.5	-327.7	328.17	0.001	Stop Drilling Now	
18,821.1	9,192.0	18,661.3	9,192.0	164.6	164.2	90.00	5,713.7	-52,388.7	0.5	-328.4	328.86	0.001	Stop Drilling Now	
18,900.0	9,192.0	18,740.2	9,192.0	165.9	165.5	90.00	5,634.8	-52,388.1	0.5	-331.0	331.43	0.001	Stop Drilling Now	
18,915.0	9,192.0	18,755.2	9,192.0	166.2	165.8	90.00	5,619.8	-52,388.0	0.5	-331.5	331.92	0.001	Stop Drilling Now	
19,000.0	9,192.0	18,840.2	9,192.0	167.5	167.2	90.00	5,534.8	-52,387.4	0.5	-334.2	334.70	0.001	Stop Drilling Now	
19,020.8	9,192.0	18,861.0	9,192.0	167.9	167.5	90.00	5,514.0	-52,387.2	0.5	-334.9	335.38	0.001	Stop Drilling Now	
19,100.0	9,192.0	18,940.2	9,192.0	169.2	168.8	90.00	5,434.8	-52,386.6	0.5	-337.5	337.96	0.001	Stop Drilling Now	
19,140.4	9,192.0	18,980.5	9,192.0	169.8	169.4	90.00	5,394.5	-52,386.3	0.5	-338.8	339.28	0.001	Stop Drilling Now, ES	
19,200.0	9,192.0	19,009.4	9,192.0	170.8	169.9	90.00	5,365.6	-52,386.1	30.8	-309.9	340.73	0.090	Stop Drilling Now	
19,300.0	9,192.0	19,009.4	9,192.0	172.5	169.9	90.00	5,365.6	-52,386.1	130.8	-211.6	342.37	0.382	Stop Drilling Now	
19,400.0	9,192.0	19,009.4	9,192.0	174.1	169.9	90.00	5,365.6	-52,386.1	230.8	-113.2	344.00	0.671	Stop Drilling Now	
19,449.2	9,192.0	19,009.4	9,192.0	174.9	169.9	90.00	5,365.6	-52,386.1	280.0	-64.8	344.81	0.812	Stop Drilling Now	

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: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #5H
Well Error: 0.0 usft
Reference Wellbore: Lateral
Reference Design: DWD Plan 1 - negative VS

Local Co-ordinate Reference: Site AVALON SHALE
TVD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
MD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (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 AVALON SHALE - WINDWARD FEDERAL #5H - Lateral - DWD Plan 3 - forward VS													Offset Site Error: 0.0 usft
Survey Program: 0-MWD													Offset Well Error: 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
0.0	0.0	0.0	0.0	0.0	0.0	0.00	15,384.8	-52,246.7	0.0	-0.3	0.27	0.000	Stop Drilling Now
100.0	100.0	100.0	100.0	0.1	0.1	0.00	15,384.8	-52,246.7	0.0	-1.0	0.98	0.000	Stop Drilling Now
200.0	200.0	200.0	200.0	0.5	0.5	0.00	15,384.8	-52,246.7	0.0	-1.7	1.70	0.000	Stop Drilling Now
300.0	300.0	300.0	300.0	0.8	0.8	0.00	15,384.8	-52,246.7	0.0	-2.4	2.42	0.000	Stop Drilling Now
400.0	400.0	400.0	400.0	1.2	1.2	0.00	15,384.8	-52,246.7	0.0	-3.1	3.13	0.000	Stop Drilling Now
500.0	500.0	500.0	500.0	1.6	1.6	0.00	15,384.8	-52,246.7	0.0	-3.8	3.85	0.000	Stop Drilling Now
600.0	600.0	600.0	600.0	1.9	1.9	0.00	15,384.8	-52,246.7	0.0	-4.6	4.57	0.000	Stop Drilling Now
700.0	700.0	700.0	700.0	2.3	2.3	0.00	15,384.8	-52,246.7	0.0	-5.3	5.28	0.000	Stop Drilling Now
800.0	800.0	800.0	800.0	2.6	2.6	0.00	15,384.8	-52,246.7	0.0	-6.0	6.00	0.000	Stop Drilling Now
900.0	900.0	900.0	900.0	3.0	3.0	0.00	15,384.8	-52,246.7	0.0	-6.7	6.72	0.000	Stop Drilling Now, CC, SF
1,000.0	1,000.0	1,000.0	1,000.0	3.4	3.4	0.00	15,384.8	-52,246.7	0.0	-6.5	7.11	0.080	Stop Drilling Now
1,055.5	1,055.5	1,055.5	1,055.5	3.6	3.6	-121.98	15,384.6	-52,247.2	0.6	-5.7	7.39	0.231	Stop Drilling Now
1,096.6	1,096.6	1,096.6	1,096.5	3.7	3.7	-122.71	15,384.1	-52,248.1	1.7	-5.6	7.42	0.246	Stop Drilling Now
1,100.0	1,100.0	1,100.0	1,100.0	3.7	3.7	-123.05	15,384.0	-52,248.2	1.8	-2.9	8.11	0.640	Stop Drilling Now
1,200.0	1,199.9	1,199.9	1,199.9	4.1	4.0	-126.34	15,382.7	-52,250.9	5.2	-0.3	8.80	0.971	Stop Drilling Now
1,300.0	1,299.9	1,299.9	1,299.8	4.4	4.4	-127.04	15,381.4	-52,253.5	8.5	2.4	9.50	1.254	Shut in Produces
1,400.0	1,399.8	1,399.8	1,399.7	4.8	4.7	-127.35	15,380.1	-52,256.2	11.9	5.1	10.21	1.497	Shut in Produces
1,500.0	1,499.8	1,499.7	1,499.6	5.1	5.1	-127.52	15,378.8	-52,258.8	15.3	7.7	10.91	1.708	Advise and Monitor
1,600.0	1,599.7	1,599.7	1,599.5	5.5	5.4	-127.63	15,377.5	-52,261.4	18.6	10.4	11.62	1.894	Advise and Monitor
1,700.0	1,699.6	1,699.6	1,699.4	5.9	5.8	-127.70	15,376.2	-52,264.1	22.0	13.0	12.33	2.058	
1,800.0	1,799.6	1,799.6	1,799.3	6.2	6.1	-127.76	15,374.9	-52,266.7	25.4	15.7	13.04	2.203	
1,900.0	1,899.5	1,899.5	1,899.2	6.6	6.5	-127.80	15,373.6	-52,269.4	28.7	18.3	13.76	2.334	
2,000.0	1,999.5	1,999.5	1,999.1	6.9	6.8	-127.84	15,372.3	-52,272.0	32.1	21.0	14.47	2.451	
2,100.0	2,099.4	2,099.4	2,099.0	7.3	7.2	-127.86	15,371.0	-52,274.6	35.5	23.6	15.19	2.557	
2,200.0	2,199.4	2,199.3	2,198.9	7.6	7.5	-127.89	15,369.7	-52,277.3	38.8	26.3	15.90	2.654	
2,300.0	2,299.3	2,299.3	2,298.8	8.0	7.9	-127.90	15,368.4	-52,279.9	42.2	28.9	16.62	2.742	
2,400.0	2,399.2	2,399.2	2,398.7	8.4	8.3	-127.92	15,367.1	-52,282.6	45.6	31.6	17.33	2.823	
2,500.0	2,499.2	2,499.2	2,498.6	8.7	8.6	-127.94	15,365.8	-52,285.2	48.9	34.2	18.05	2.897	
2,600.0	2,599.1	2,599.1	2,598.5	9.1	9.0	-127.95	15,364.5	-52,287.8	52.3	36.9	18.77	2.965	
2,700.0	2,699.1	2,699.1	2,698.4	9.4	9.3	-127.96	15,363.2	-52,290.5	55.7	39.5	19.49	3.029	
2,800.0	2,799.0	2,799.0	2,798.3	9.8	9.7	-127.97	15,361.9	-52,293.1	59.0	42.2	20.21	3.087	
2,900.0	2,899.0	2,899.0	2,898.2	10.2	10.0	-127.98	15,360.6	-52,295.8	62.4	44.8	20.93	3.142	
3,000.0	2,998.9	2,998.9	2,998.1	10.5	10.4	-127.98	15,359.3	-52,298.4	65.8	47.5	21.65	3.193	
3,100.0	3,098.8	3,098.8	3,098.0	10.9	10.8	-127.99	15,358.0	-52,301.1	69.1	50.1	22.37	3.241	
3,200.0	3,198.8	3,198.8	3,197.9	11.3	11.1	-128.00	15,356.7	-52,303.7	72.5	52.8	23.09	3.286	
3,300.0	3,298.7	3,298.7	3,297.8	11.6	11.5	-128.00	15,355.4	-52,306.3	75.8	55.4	23.81	3.328	
3,400.0	3,398.7	3,398.7	3,397.7	12.0	11.8	-128.01	15,354.1	-52,309.0	79.2	58.1	24.53	3.367	
3,500.0	3,498.6	3,498.6	3,497.6	12.3	12.2	-128.01	15,352.8	-52,311.6	82.6	60.7	25.25	3.404	
3,600.0	3,598.6	3,598.6	3,597.5	12.7	12.6	-128.02	15,351.5	-52,314.3	85.9	63.3	25.97	3.439	
3,700.0	3,698.5	3,698.5	3,697.4	13.1	12.9	-128.02	15,350.2	-52,316.9	89.3	66.0	26.69	3.472	
3,800.0	3,798.4	3,798.4	3,797.3	13.4	13.3	-128.02	15,348.9	-52,319.5	92.7	68.6	27.41	3.504	
3,900.0	3,898.4	3,898.4	3,897.2	13.8	13.6	-128.03	15,347.6	-52,322.2	96.0	71.3	28.13	3.534	
4,000.0	3,998.3	3,998.3	3,997.1	14.1	14.0	-128.03	15,346.3	-52,324.8	99.4	73.9	28.85	3.562	
4,100.0	4,098.3	4,098.3	4,097.0	14.5	14.4	-128.03	15,345.0	-52,327.5	102.8	76.6	29.57	3.589	
4,200.0	4,198.2	4,198.2	4,196.9	14.9	14.7	-128.04	15,343.7	-52,330.1	106.1	79.2	30.30	3.614	
4,300.0	4,298.2	4,298.2	4,296.8	15.2	15.1	-128.04	15,342.4	-52,332.7	109.5	81.8	31.02	3.639	
4,400.0	4,398.1	4,398.1	4,396.7	15.6	15.4	-128.04	15,341.1	-52,335.4	112.9	84.5	31.74	3.662	
4,500.0	4,498.0	4,498.0	4,496.6	15.9	15.8	-128.04	15,339.8	-52,338.0	116.2	87.1	32.46	3.684	
4,600.0	4,598.0	4,598.0	4,596.5	16.3	16.2	-128.05	15,338.5	-52,340.7	119.6	89.8	33.18	3.706	
4,700.0	4,697.9	4,697.9	4,696.4	16.7	16.5	-128.05	15,337.2	-52,343.3	123.0	92.4	33.90	3.726	
4,800.0	4,797.9	4,797.9	4,796.3	17.0	16.9	-128.05	15,335.9	-52,346.0	126.3				

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	Local Co-ordinate Reference:	Site AVALON SHALE
Project:	LEA COUNTY, NM	TVD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Reference Site:	AVALON SHALE	MD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	WINDWARD FEDERAL #5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Lateral	Database:	EDM_Users
Reference Design:	DWD Plan 1 - negative VS	Offset TVD Reference:	Offset Datum

Offset Design AVALON SHALE - WINDWARD FEDERAL #5H - Lateral - DWD Plan 3 - forward VS													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	0.0 usft
Reference	Offset		Semi Major Axis		Distance		Minimum		Separation		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	4,897.8	4,897.8	4,896.2	17.4	17.2	-128.05	15,334.6	-52,348.6	129.7	95.1	34.63	3.745		
5,000.0	4,997.8	4,997.8	4,996.1	17.8	17.6	-128.05	15,333.3	-52,351.2	133.1	97.7	35.35	3.764		
5,100.0	5,097.7	5,097.7	5,096.0	18.1	18.0	-128.06	15,332.0	-52,353.9	136.4	100.3	36.07	3.782		
5,200.0	5,197.6	5,197.6	5,195.9	18.5	18.3	-128.06	15,330.7	-52,356.5	139.8	103.0	36.79	3.799		
5,300.0	5,297.6	5,297.6	5,295.8	18.8	18.7	-128.06	15,329.4	-52,359.2	143.1	105.6	37.52	3.816		
5,400.0	5,397.5	5,397.5	5,395.7	19.2	19.0	-128.06	15,328.1	-52,361.8	146.5	108.3	38.24	3.832		
5,500.0	5,497.5	5,497.5	5,495.6	19.6	19.4	-128.06	15,326.8	-52,364.4	149.9	110.9	38.96	3.847		
5,600.0	5,597.4	5,597.4	5,595.5	19.9	19.8	-128.06	15,325.5	-52,367.1	153.2	113.6	39.68	3.862		
5,700.0	5,697.4	5,697.4	5,695.4	20.3	20.1	-128.07	15,324.2	-52,369.7	156.6	116.2	40.41	3.876		
5,800.0	5,797.3	5,797.3	5,795.3	20.6	20.5	-128.07	15,322.9	-52,372.4	160.0	118.8	41.13	3.890		
5,900.0	5,897.3	5,897.3	5,895.2	21.0	20.8	-128.07	15,321.6	-52,375.0	163.3	121.5	41.85	3.903		
6,000.0	5,997.2	5,997.2	5,995.1	21.4	21.2	-128.07	15,320.3	-52,377.7	166.7	124.1	42.57	3.916		
6,100.0	6,097.1	6,097.1	6,095.0	21.7	21.6	-128.07	15,319.0	-52,380.3	170.1	126.8	43.30	3.928		
6,200.0	6,197.1	6,197.1	6,194.9	22.1	21.9	-128.07	15,317.7	-52,382.9	173.4	129.4	44.02	3.940		
6,300.0	6,297.0	6,297.0	6,294.8	22.5	22.3	-128.07	15,316.4	-52,385.6	176.8	132.1	44.74	3.952		
6,400.0	6,397.0	6,397.0	6,394.7	22.8	22.6	-128.07	15,315.1	-52,388.2	180.2	134.7	45.46	3.963		
6,500.0	6,496.9	6,496.9	6,494.6	23.2	23.0	-128.07	15,313.8	-52,390.9	183.5	137.3	46.19	3.974		
6,600.0	6,596.9	6,596.9	6,594.5	23.5	23.4	-128.07	15,312.5	-52,393.5	186.9	140.0	46.91	3.984		
6,700.0	6,696.8	6,696.8	6,694.4	23.9	23.7	-128.08	15,311.2	-52,396.1	190.3	142.6	47.63	3.994		
6,800.0	6,796.7	6,796.7	6,794.3	24.3	24.1	-128.08	15,309.9	-52,398.8	193.6	145.3	48.36	4.004		
6,900.0	6,896.7	6,896.7	6,894.2	24.6	24.5	-128.08	15,308.6	-52,401.4	197.0	147.9	49.08	4.014		
7,000.0	6,996.6	6,996.6	6,994.1	25.0	24.8	-128.08	15,307.3	-52,404.1	200.4	150.6	49.80	4.023		
7,100.0	7,096.6	7,096.6	7,094.0	25.3	25.2	-128.08	15,306.0	-52,406.7	203.7	153.2	50.52	4.032		
7,200.0	7,196.5	7,196.5	7,193.9	25.7	25.5	-128.08	15,304.7	-52,409.3	207.1	155.8	51.25	4.041		
7,300.0	7,296.5	7,296.5	7,293.8	26.1	25.9	-128.08	15,303.4	-52,412.0	210.4	158.5	51.97	4.049		
7,400.0	7,396.4	7,396.4	7,393.7	26.4	26.3	-128.08	15,302.1	-52,414.6	213.8	161.1	52.69	4.058		
7,500.0	7,496.3	7,496.3	7,493.6	26.8	26.6	-128.08	15,300.8	-52,417.3	217.2	163.8	53.42	4.066		
7,600.0	7,596.3	7,596.3	7,593.5	27.2	27.0	-128.08	15,299.5	-52,419.9	220.5	166.4	54.14	4.074		
7,700.0	7,696.2	7,696.2	7,693.4	27.5	27.3	-128.08	15,298.2	-52,422.6	223.9	169.0	54.86	4.081		
7,800.0	7,796.2	7,796.2	7,793.3	27.9	27.7	-128.08	15,296.9	-52,425.2	227.3	171.7	55.59	4.089		
7,900.0	7,896.1	7,896.1	7,893.2	28.2	28.1	-128.08	15,295.6	-52,427.8	230.6	174.3	56.31	4.096		
8,000.0	7,996.1	7,996.1	7,993.1	28.6	28.4	-128.08	15,294.3	-52,430.5	234.0	177.0	57.03	4.103		
8,100.0	8,096.0	8,096.0	8,093.0	29.0	28.8	-128.09	15,293.0	-52,433.1	237.4	179.6	57.76	4.110		
8,200.0	8,195.9	8,196.0	8,192.9	29.3	29.2	-128.09	15,291.7	-52,435.8	240.7	182.3	58.48	4.117		
8,300.0	8,295.9	8,295.9	8,292.8	29.7	29.5	-128.09	15,290.4	-52,438.4	244.1	184.9	59.20	4.123		
8,400.0	8,395.8	8,395.8	8,392.7	30.1	29.9	-128.09	15,289.1	-52,441.0	247.5	187.5	59.93	4.129		
8,500.0	8,495.8	8,495.8	8,492.6	30.4	30.2	-128.09	15,287.8	-52,443.7	250.8	190.2	60.65	4.136		
8,600.0	8,595.7	8,595.7	8,592.5	30.8	30.6	-128.09	15,286.5	-52,446.3	254.2	192.8	61.37	4.142		
8,709.1	8,704.8	8,704.8	8,701.4	31.2	31.0	-128.09	15,285.1	-52,449.2	257.9	195.7	62.16	4.148		
8,725.0	8,720.6	8,720.7	8,717.3	31.2	31.0	-64.73	15,284.9	-52,449.6	258.1	195.9	62.27	4.145		
8,750.0	8,745.6	8,738.1	8,734.8	31.3	31.1	-22.16	15,284.5	-52,450.1	257.8	195.4	62.42	4.130		
8,775.0	8,770.5	8,750.0	8,746.6	31.4	31.2	-12.68	15,283.8	-52,450.4	257.1	194.5	62.55	4.110		
8,800.0	8,795.2	8,770.6	8,767.1	31.5	31.2	-8.83	15,282.0	-52,450.9	255.7	193.0	62.70	4.079		
8,825.0	8,819.7	8,786.8	8,783.3	31.5	31.3	-6.77	15,279.9	-52,451.3	254.0	191.2	62.84	4.043		
8,850.0	8,844.0	8,800.0	8,796.2	31.6	31.3	-5.49	15,277.8	-52,451.7	251.9	188.9	62.96	4.001		
8,875.0	8,867.8	8,819.4	8,815.3	31.7	31.4	-4.62	15,274.1	-52,452.1	249.2	186.1	63.10	3.950		
8,900.0	8,891.3	8,835.8	8,831.2	31.8	31.5	-3.99	15,270.4	-52,452.5	246.2	182.9	63.23	3.893		
8,925.0	8,914.3	8,850.0	8,845.0	31.8	31.5	-3.52	15,266.7	-52,452.9	242.7	179.3	63.35	3.830		
8,950.0	8,936.7	8,868.5	8,862.7	31.9	31.6	-3.15	15,261.3	-52,453.3	238.7	175.2	63.48	3.760		
8,975.0	8,958.5	8,885.0	8,878.2	32.0	31.6	-2.86	15,255.9	-52,453.7	234.3	170.7	63.60	3.683		

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: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #5H
Well Error: 0.0 usft
Reference Wellbore: Lateral
Reference Design: DWD Plan 1 - negative VS

Local Co-ordinate Reference: Site AVALON SHALE
TVD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
MD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (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 AVALON SHALE - WINDWARD FEDERAL #5H - Lateral - DWD Plan 3 - forward VS													Offset Site Error: 0.0 usft
Survey Program: O-MWD													Offset Well Error: 0.0 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)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
9,000.0	8,979.6	8,900.0	8,892.2	32.0	31.7	-2.62	15,250.6	-52,454.0	229.4	165.7	63.71	3.601	
9,025.0	9,000.0	8,918.1	8,908.9	32.1	31.8	-2.42	15,243.5	-52,454.4	224.1	160.3	63.83	3.511	
9,050.0	9,019.7	8,934.7	8,923.9	32.1	31.8	-2.26	15,236.5	-52,454.7	218.4	154.5	63.95	3.416	
9,075.0	9,038.5	8,950.0	8,937.6	32.2	31.9	-2.11	15,229.6	-52,455.0	212.3	148.2	64.05	3.314	
9,100.0	9,056.4	8,968.2	8,953.5	32.2	32.0	-1.99	15,220.8	-52,455.4	205.7	141.6	64.16	3.206	
9,125.0	9,073.4	8,985.1	8,967.9	32.3	32.0	-1.89	15,212.1	-52,455.7	198.7	134.5	64.27	3.092	
9,150.0	9,089.3	9,000.0	8,980.5	32.3	32.1	-1.79	15,204.0	-52,456.0	191.4	127.0	64.37	2.973	
9,175.0	9,104.3	9,019.1	8,996.1	32.3	32.1	-1.71	15,193.0	-52,456.3	183.6	119.1	64.49	2.847	
9,200.0	9,118.2	9,036.2	9,009.8	32.4	32.2	-1.64	15,182.6	-52,456.6	175.4	110.8	64.60	2.716	
9,225.0	9,131.0	9,053.5	9,023.2	32.5	32.3	-1.58	15,171.7	-52,456.9	166.9	102.2	64.72	2.579	
9,250.0	9,142.6	9,071.0	9,036.2	32.5	32.3	-1.52	15,160.2	-52,457.1	158.0	93.1	64.84	2.436	
9,275.0	9,153.1	9,088.5	9,049.0	32.6	32.4	-1.47	15,148.1	-52,457.4	148.7	83.7	64.97	2.288	
9,300.0	9,162.4	9,106.3	9,061.4	32.6	32.5	-1.42	15,135.5	-52,457.6	139.0	73.9	65.10	2.136	
9,325.0	9,170.4	9,125.0	9,074.0	32.7	32.5	-1.37	15,121.6	-52,457.8	129.1	63.8	65.24	1.978 Advise and Monitor	
9,350.0	9,177.2	9,142.2	9,085.1	32.8	32.6	-1.33	15,108.4	-52,458.0	118.7	53.3	65.37	1.816 Advise and Monitor	
9,375.0	9,182.8	9,160.5	9,096.4	32.8	32.7	-1.28	15,094.0	-52,458.2	108.1	42.6	65.51	1.650 Advise and Monitor	
9,400.0	9,187.0	9,179.0	9,107.2	32.9	32.7	-1.24	15,079.0	-52,458.4	97.1	31.5	65.66	1.479 Shut in Produces	
9,425.0	9,190.0	9,197.7	9,117.5	33.0	32.8	-1.19	15,063.4	-52,458.5	85.8	20.0	65.80	1.305 Shut in Produces	
9,450.0	9,191.6	9,216.7	9,127.4	33.1	32.9	-1.13	15,047.2	-52,458.7	74.3	8.3	65.95	1.126 Shut in Produces	
9,469.1	9,192.0	9,231.4	9,134.6	33.1	33.0	-1.07	15,034.4	-52,458.8	65.3	-0.8	66.07	0.989 Stop Drilling Now	
9,500.0	9,192.0	9,256.0	9,145.7	33.2	33.1	-0.96	15,012.5	-52,458.9	51.3	-15.0	66.27	0.774 Stop Drilling Now	
9,600.0	9,192.0	9,343.7	9,175.9	33.6	33.4	0.09	14,930.2	-52,459.1	16.6	-50.4	67.01	0.248 Stop Drilling Now	
9,700.0	9,192.0	9,440.9	9,191.2	34.0	33.9	29.20	14,834.5	-52,458.7	0.9	-67.0	67.88	0.013 Stop Drilling Now	
9,740.5	9,192.0	9,481.3	9,192.0	34.2	34.1	90.00	14,794.0	-52,458.5	0.5	-67.8	68.28	0.007 Stop Drilling Now	
9,800.0	9,192.0	9,540.8	9,192.0	34.5	34.4	90.00	14,734.5	-52,458.0	0.5	-68.4	68.89	0.007 Stop Drilling Now	
9,815.5	9,192.0	9,556.3	9,192.0	34.6	34.5	90.00	14,719.0	-52,457.9	0.5	-68.6	69.06	0.007 Stop Drilling Now	
9,900.0	9,192.0	9,640.8	9,192.0	35.1	34.9	90.00	14,634.5	-52,457.2	0.5	-69.6	70.02	0.006 Stop Drilling Now	
9,921.1	9,192.0	9,662.0	9,192.0	35.2	35.1	90.00	14,613.4	-52,457.1	0.5	-69.8	70.28	0.006 Stop Drilling Now	
10,000.0	9,192.0	9,740.8	9,192.0	35.7	35.6	90.00	14,534.5	-52,456.5	0.5	-70.8	71.29	0.006 Stop Drilling Now	
10,021.1	9,192.0	9,762.0	9,192.0	35.9	35.7	90.00	14,513.4	-52,456.3	0.5	-71.1	71.58	0.006 Stop Drilling Now	
10,100.0	9,192.0	9,840.8	9,192.0	36.4	36.3	90.00	14,434.5	-52,455.7	0.5	-72.2	72.69	0.006 Stop Drilling Now	
10,121.9	9,192.0	9,862.7	9,192.0	36.6	36.4	90.00	14,412.7	-52,455.5	0.5	-72.6	73.01	0.006 Stop Drilling Now	
10,200.0	9,192.0	9,940.8	9,192.0	37.2	37.0	90.00	14,334.5	-52,454.9	0.5	-73.8	74.21	0.006 Stop Drilling Now	
10,215.5	9,192.0	9,956.3	9,192.0	37.3	37.1	90.00	14,319.0	-52,454.8	0.5	-74.0	74.46	0.006 Stop Drilling Now	
10,300.0	9,192.0	10,040.8	9,192.0	38.0	37.8	90.00	14,234.6	-52,454.2	0.5	-75.4	75.84	0.006 Stop Drilling Now	
10,321.1	9,192.0	10,062.0	9,192.0	38.2	38.0	90.00	14,213.4	-52,454.0	0.5	-75.8	76.20	0.006 Stop Drilling Now	
10,400.0	9,192.0	10,140.8	9,192.0	38.9	38.7	90.00	14,134.6	-52,453.4	0.5	-77.1	77.58	0.006 Stop Drilling Now	
10,421.9	9,192.0	10,162.7	9,192.0	39.1	38.9	90.00	14,112.7	-52,453.2	0.5	-77.5	77.98	0.006 Stop Drilling Now	
10,500.0	9,192.0	10,240.8	9,192.0	39.8	39.6	90.00	14,034.6	-52,452.6	0.5	-79.0	79.43	0.006 Stop Drilling Now	
10,515.5	9,192.0	10,256.3	9,192.0	40.0	39.8	90.00	14,019.1	-52,452.5	0.5	-79.3	79.73	0.006 Stop Drilling Now	
10,600.0	9,192.0	10,340.8	9,192.0	40.8	40.6	90.00	13,934.6	-52,451.9	0.5	-80.9	81.37	0.006 Stop Drilling Now	
10,621.1	9,192.0	10,362.0	9,192.0	41.0	40.8	90.00	13,913.4	-52,451.7	0.5	-81.3	81.79	0.006 Stop Drilling Now	
10,700.0	9,192.0	10,440.8	9,192.0	41.8	41.6	90.00	13,834.6	-52,451.1	0.5	-82.9	83.39	0.005 Stop Drilling Now	
10,721.1	9,192.0	10,462.0	9,192.0	42.0	41.8	90.00	13,813.4	-52,450.9	0.5	-83.4	83.84	0.005 Stop Drilling Now	
10,800.0	9,192.0	10,540.8	9,192.0	42.9	42.6	90.00	13,734.6	-52,450.3	0.5	-85.0	85.50	0.005 Stop Drilling Now	
10,821.9	9,192.0	10,562.7	9,192.0	43.1	42.9	90.00	13,712.7	-52,450.2	0.5	-85.5	85.98	0.005 Stop Drilling Now	
10,900.0	9,192.0	10,640.8	9,192.0	44.0	43.7	90.00	13,634.6	-52,449.6	0.5	-87.2	87.69	0.005 Stop Drilling Now	
10,915.5	9,192.0	10,656.3	9,192.0	44.1	43.9	90.00	13,619.1	-52,449.4	0.5	-87.6	88.03	0.005 Stop Drilling Now	
11,000.0	9,192.0	10,740.8	9,192.0	45.1	44.8	90.00	13,534.6	-52,448.8	0.5	-89.5	89.94	0.005 Stop Drilling Now	
11,021.1	9,192.0	10,762.0	9,192.0	45.3	45.1	90.00	13,513.4	-52,448.6	0.5	-90.0	90.43	0.005 Stop Drilling Now	
11,100.0	9,192.0	10,840.8	9,192.0	46.3	46.0	90.00	13,434.6	-52,448.0	0.5	-91.8	92.26	0.005 Stop Drilling Now	

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	Local Co-ordinate Reference:	Site AVALON SHALE
Project:	LEA COUNTY, NM	TVD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Reference Site:	AVALON SHALE	MD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	WINDWARD FEDERAL #5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Lateral	Database:	EDM_Users
Reference Design:	DWD Plan 1 - negative VS	Offset TVD Reference:	Offset Datum

Offset Design AVALON SHALE - WINDWARD FEDERAL #5H - Lateral - DWD Plan 3 - forward VS														Offset Site Error:	0.0 usft
Survey Program: 0-MWD														Offset Well Error:	0.0 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Semi Major Axis (usft)	Highside Toolface (")	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
11,121.1	9,192.0	10,862.0	9,192.0	46.5	46.2	90.00	90.00	13,413.4	-52,447.9	0.5	-92.3	92.76	0.005	Stop Drilling Now	
11,200.0	9,192.0	10,940.8	9,192.0	47.5	47.2	90.00	90.00	13,334.6	-52,447.2	0.5	-94.2	94.64	0.005	Stop Drilling Now	
11,221.9	9,192.0	10,962.7	9,192.0	47.7	47.4	90.00	90.00	13,312.7	-52,447.1	0.5	-94.7	95.17	0.005	Stop Drilling Now	
11,300.0	9,192.0	11,040.8	9,192.0	48.7	48.4	90.00	90.00	13,234.6	-52,446.5	0.5	-96.6	97.07	0.005	Stop Drilling Now	
11,315.5	9,192.0	11,056.3	9,192.0	48.9	48.6	90.00	90.00	13,219.1	-52,446.4	0.5	-97.0	97.46	0.005	Stop Drilling Now	
11,400.0	9,192.0	11,140.8	9,192.0	49.9	49.6	90.00	90.00	13,134.6	-52,445.7	0.5	-99.1	99.56	0.005	Stop Drilling Now	
11,421.1	9,192.0	11,162.0	9,192.0	50.2	49.9	90.00	90.00	13,113.5	-52,445.6	0.5	-99.6	100.10	0.005	Stop Drilling Now	
11,500.0	9,192.0	11,240.8	9,192.0	51.2	50.9	90.00	90.00	13,034.6	-52,444.9	0.5	-101.6	102.10	0.004	Stop Drilling Now	
11,521.9	9,192.0	11,262.7	9,192.0	51.5	51.2	90.00	90.00	13,012.7	-52,444.8	0.5	-102.2	102.66	0.004	Stop Drilling Now	
11,600.0	9,192.0	11,340.8	9,192.0	52.5	52.2	90.00	90.00	12,934.6	-52,444.2	0.5	-104.2	104.68	0.004	Stop Drilling Now	
11,615.5	9,192.0	11,356.3	9,192.0	52.7	52.4	90.00	90.00	12,919.1	-52,444.1	0.5	-104.6	105.08	0.004	Stop Drilling Now	
11,700.0	9,192.0	11,440.8	9,192.0	53.8	53.5	90.00	90.00	12,834.6	-52,443.4	0.5	-106.8	107.30	0.004	Stop Drilling Now	
11,721.1	9,192.0	11,462.0	9,192.0	54.1	53.8	90.00	90.00	12,813.5	-52,443.2	0.5	-107.4	107.86	0.004	Stop Drilling Now	
11,800.0	9,192.0	11,540.8	9,192.0	55.1	54.8	90.00	90.00	12,734.6	-52,442.6	0.5	-109.5	109.96	0.004	Stop Drilling Now	
11,821.1	9,192.0	11,562.0	9,192.0	55.4	55.1	90.00	90.00	12,713.5	-52,442.5	0.5	-110.1	110.53	0.004	Stop Drilling Now	
11,900.0	9,192.0	11,640.8	9,192.0	56.5	56.2	90.00	90.00	12,634.6	-52,441.9	0.5	-112.2	112.66	0.004	Stop Drilling Now	
11,921.9	9,192.0	11,662.7	9,192.0	56.8	56.5	90.00	90.00	12,612.7	-52,441.7	0.5	-112.8	113.25	0.004	Stop Drilling Now	
12,000.0	9,192.0	11,740.8	9,192.0	57.9	57.5	90.00	90.00	12,534.6	-52,441.1	0.5	-114.9	115.38	0.004	Stop Drilling Now	
12,015.5	9,192.0	11,756.3	9,192.0	58.1	57.7	90.00	90.00	12,519.1	-52,441.0	0.5	-115.4	115.81	0.004	Stop Drilling Now	
12,100.0	9,192.0	11,840.8	9,192.0	59.2	58.9	90.00	90.00	12,434.6	-52,440.3	0.5	-117.7	118.14	0.004	Stop Drilling Now	
12,121.1	9,192.0	11,862.0	9,192.0	59.5	59.2	90.00	90.00	12,413.5	-52,440.2	0.5	-118.3	118.73	0.004	Stop Drilling Now	
12,200.0	9,192.0	11,940.8	9,192.0	60.6	60.3	90.00	90.00	12,334.6	-52,439.6	0.5	-120.5	120.93	0.004	Stop Drilling Now	
12,221.9	9,192.0	11,962.7	9,192.0	60.9	60.6	90.00	90.00	12,312.7	-52,439.4	0.5	-121.1	121.55	0.004	Stop Drilling Now	
12,300.0	9,192.0	12,040.8	9,192.0	62.0	61.7	90.00	90.00	12,234.6	-52,438.8	0.5	-123.3	123.75	0.004	Stop Drilling Now	
12,315.5	9,192.0	12,056.3	9,192.0	62.3	61.9	90.00	90.00	12,219.1	-52,438.7	0.5	-123.7	124.19	0.004	Stop Drilling Now	
12,400.0	9,192.0	12,140.8	9,192.0	63.5	63.1	90.00	90.00	12,134.6	-52,438.0	0.5	-126.1	126.59	0.004	Stop Drilling Now	
12,421.1	9,192.0	12,162.0	9,192.0	63.8	63.4	90.00	90.00	12,113.5	-52,437.9	0.5	-126.7	127.19	0.004	Stop Drilling Now	
12,500.0	9,192.0	12,240.8	9,192.0	64.9	64.6	90.00	90.00	12,034.6	-52,437.3	0.5	-129.0	129.45	0.003	Stop Drilling Now	
12,521.1	9,192.0	12,262.0	9,192.0	65.2	64.9	90.00	90.00	12,013.5	-52,437.1	0.5	-129.6	130.06	0.003	Stop Drilling Now	
12,600.0	9,192.0	12,340.8	9,192.0	66.3	66.0	90.00	90.00	11,934.6	-52,436.5	0.5	-131.9	132.34	0.003	Stop Drilling Now	
12,621.9	9,192.0	12,362.7	9,192.0	66.7	66.3	90.00	90.00	11,912.8	-52,436.3	0.5	-132.5	132.97	0.003	Stop Drilling Now	
12,700.0	9,192.0	12,440.8	9,192.0	67.8	67.5	90.00	90.00	11,834.6	-52,435.7	0.5	-134.8	135.24	0.003	Stop Drilling Now	
12,715.5	9,192.0	12,456.3	9,192.0	68.0	67.7	90.00	90.00	11,819.1	-52,435.6	0.5	-135.2	135.70	0.003	Stop Drilling Now	
12,800.0	9,192.0	12,540.8	9,192.0	69.3	68.9	90.00	90.00	11,734.6	-52,435.0	0.5	-137.7	138.17	0.003	Stop Drilling Now	
12,821.1	9,192.0	12,562.0	9,192.0	69.6	69.2	90.00	90.00	11,713.5	-52,434.8	0.5	-138.3	138.79	0.003	Stop Drilling Now	
12,900.0	9,192.0	12,640.8	9,192.0	70.7	70.4	90.00	90.00	11,634.6	-52,434.2	0.5	-140.7	141.11	0.003	Stop Drilling Now	
12,921.1	9,192.0	12,662.0	9,192.0	71.0	70.7	90.00	90.00	11,613.5	-52,434.0	0.5	-141.3	141.74	0.003	Stop Drilling Now	
13,000.0	9,192.0	12,740.8	9,192.0	72.2	71.9	90.00	90.00	11,534.6	-52,433.4	0.5	-143.6	144.07	0.003	Stop Drilling Now	
13,021.1	9,192.0	12,762.0	9,192.0	72.5	72.2	90.00	90.00	11,513.5	-52,433.3	0.5	-144.2	144.70	0.003	Stop Drilling Now	
13,100.0	9,192.0	12,840.8	9,192.0	73.7	73.3	90.00	90.00	11,434.6	-52,432.7	0.5	-146.6	147.05	0.003	Stop Drilling Now	
13,121.1	9,192.0	12,862.0	9,192.0	74.0	73.7	90.00	90.00	11,413.5	-52,432.5	0.5	-147.2	147.68	0.003	Stop Drilling Now	
13,200.0	9,192.0	12,940.8	9,192.0	75.2	74.8	90.00	90.00	11,334.6	-52,431.9	0.5	-149.6	150.04	0.003	Stop Drilling Now	
13,221.1	9,192.0	12,962.0	9,192.0	75.5	75.2	90.00	90.00	11,313.5	-52,431.7	0.5	-150.2	150.67	0.003	Stop Drilling Now	
13,300.0	9,192.0	13,040.8	9,192.0	76.7	76.3	90.00	90.00	11,234.6	-52,431.1	0.5	-152.6	153.05	0.003	Stop Drilling Now	
13,321.9	9,192.0	13,062.7	9,192.0	77.0	76.7	90.00	90.00	11,212.8	-52,431.0	0.5	-153.3	153.70	0.003	Stop Drilling Now	
13,400.0	9,192.0	13,140.8	9,192.0	78.2	77.9	90.00	90.00	11,134.6	-52,430.4	0.5	-155.6	156.06	0.003	Stop Drilling Now	
13,415.5	9,192.0	13,156.3	9,192.0	78.4	78.1	90.00	90.00	11,119.1	-52,430.2	0.5	-156.1	156.53	0.003	Stop Drilling Now	
13,500.0	9,192.0	13,240.8	9,192.0	79.7	79.4	90.00	90.00	11,034.6	-52,429.6	0.5	-158.6	159.09	0.003	Stop Drilling Now	
13,521.1	9,192.0	13,262.0	9,192.0	80.0	79.7	90.00	90.00	11,013.5	-52,429.4	0.5	-159.3	159.74	0.003	Stop Drilling Now	
13,600.0	9,192.0	13,340.8	9,192.0	81.2	80.9	90.00	90.00	10,934.6	-52,428.8	0.5	-161.7	162.14	0.003	Stop Drilling Now	

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: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #5H
Well Error: 0.0 usft
Reference Wellbore: Lateral
Reference Design: DWD Plan 1 - negative VS

Local Co-ordinate Reference: Site AVALON SHALE
TVD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
MD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (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 AVALON SHALE - WINDWARD FEDERAL #5H - Lateral - DWD Plan 3 - forward VS												Offset Site Error:	0.0 usft
Survey Program: 0-MWD												Offset Well Error:	0.0 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)					
13,621.1	9,192.0	13,362.0	9,192.0	81.6	81.2	90.00	10,913.5	-52,428.7	0.5	-162.3	162.78	0.003	Stop Drilling Now
13,700.0	9,192.0	13,440.8	9,192.0	82.8	82.4	90.00	10,834.7	-52,428.1	0.5	-164.7	165.19	0.003	Stop Drilling Now
13,721.9	9,192.0	13,462.7	9,192.0	83.1	82.7	90.00	10,812.8	-52,427.9	0.5	-165.4	165.86	0.003	Stop Drilling Now
13,800.0	9,192.0	13,540.8	9,192.0	84.3	83.9	90.00	10,734.7	-52,427.3	0.5	-167.8	168.25	0.003	Stop Drilling Now
13,815.5	9,192.0	13,556.3	9,192.0	84.5	84.2	90.00	10,719.1	-52,427.2	0.5	-168.3	168.73	0.003	Stop Drilling Now
13,900.0	9,192.0	13,640.8	9,192.0	85.8	85.5	90.00	10,634.7	-52,426.5	0.5	-170.9	171.33	0.003	Stop Drilling Now
13,921.1	9,192.0	13,662.0	9,192.0	86.2	85.8	90.00	10,613.5	-52,426.4	0.5	-171.5	171.98	0.003	Stop Drilling Now
14,000.0	9,192.0	13,740.8	9,192.0	87.4	87.0	90.00	10,534.7	-52,425.7	0.5	-174.0	174.41	0.003	Stop Drilling Now
14,021.9	9,192.0	13,762.7	9,192.0	87.7	87.4	90.00	10,512.8	-52,425.6	0.5	-174.6	175.09	0.003	Stop Drilling Now
14,100.0	9,192.0	13,840.8	9,192.0	88.9	88.6	90.00	10,434.7	-52,425.0	0.5	-177.1	177.51	0.003	Stop Drilling Now
14,115.5	9,192.0	13,856.3	9,192.0	89.2	88.8	90.00	10,419.2	-52,424.9	0.5	-177.5	177.99	0.003	Stop Drilling Now
14,200.0	9,192.0	13,940.8	9,192.0	90.5	90.1	90.00	10,334.7	-52,424.2	0.5	-180.2	180.61	0.003	Stop Drilling Now
14,221.1	9,192.0	13,962.0	9,192.0	90.8	90.4	90.00	10,313.5	-52,424.0	0.5	-180.8	181.26	0.002	Stop Drilling Now
14,300.0	9,192.0	14,040.8	9,192.0	92.0	91.7	90.00	10,234.7	-52,423.4	0.5	-183.3	183.72	0.002	Stop Drilling Now
14,321.1	9,192.0	14,062.0	9,192.0	92.4	92.0	90.00	10,213.5	-52,423.3	0.5	-183.9	184.37	0.002	Stop Drilling Now
14,400.0	9,192.0	14,140.8	9,192.0	93.6	93.2	90.00	10,134.7	-52,422.7	0.5	-186.4	186.83	0.002	Stop Drilling Now
14,421.9	9,192.0	14,162.7	9,192.0	93.9	93.6	90.00	10,112.8	-52,422.5	0.5	-187.1	187.52	0.002	Stop Drilling Now
14,500.0	9,192.0	14,240.8	9,192.0	95.2	94.8	90.00	10,034.7	-52,421.9	0.5	-189.5	189.96	0.002	Stop Drilling Now
14,515.5	9,192.0	14,256.3	9,192.0	95.4	95.0	90.00	10,019.2	-52,421.8	0.5	-190.0	190.44	0.002	Stop Drilling Now
14,600.0	9,192.0	14,340.8	9,192.0	96.7	96.4	90.00	9,934.7	-52,421.1	0.5	-192.6	193.09	0.002	Stop Drilling Now
14,621.1	9,192.0	14,362.0	9,192.0	97.1	96.7	90.00	9,913.5	-52,421.0	0.5	-193.3	193.75	0.002	Stop Drilling Now
14,700.0	9,192.0	14,440.8	9,192.0	98.3	97.9	90.00	9,834.7	-52,420.4	0.5	-195.8	196.22	0.002	Stop Drilling Now
14,721.1	9,192.0	14,462.0	9,192.0	98.6	98.3	90.00	9,813.5	-52,420.2	0.5	-196.4	196.89	0.002	Stop Drilling Now
14,800.0	9,192.0	14,540.8	9,192.0	99.9	99.5	90.00	9,734.7	-52,419.6	0.5	-198.9	199.37	0.002	Stop Drilling Now
14,821.1	9,192.0	14,562.0	9,192.0	100.2	99.8	90.00	9,713.6	-52,419.4	0.5	-199.6	200.03	0.002	Stop Drilling Now
14,900.0	9,192.0	14,640.8	9,192.0	101.4	101.1	90.00	9,634.7	-52,418.8	0.5	-202.1	202.52	0.002	Stop Drilling Now
14,921.1	9,192.0	14,662.0	9,192.0	101.8	101.4	90.00	9,613.6	-52,418.7	0.5	-202.7	203.19	0.002	Stop Drilling Now
15,000.0	9,192.0	14,740.8	9,192.0	103.0	102.6	90.00	9,534.7	-52,418.1	0.5	-205.2	205.67	0.002	Stop Drilling Now
15,021.1	9,192.0	14,762.0	9,192.0	103.4	103.0	90.00	9,513.6	-52,417.9	0.5	-205.9	206.34	0.002	Stop Drilling Now
15,100.0	9,192.0	14,840.8	9,192.0	104.6	104.2	90.00	9,434.7	-52,417.3	0.5	-208.4	208.84	0.002	Stop Drilling Now
15,121.9	9,192.0	14,862.7	9,192.0	105.0	104.6	90.00	9,412.8	-52,417.1	0.5	-209.1	209.53	0.002	Stop Drilling Now
15,200.0	9,192.0	14,940.8	9,192.0	106.2	105.8	90.00	9,334.7	-52,416.5	0.5	-211.5	212.00	0.002	Stop Drilling Now
15,215.5	9,192.0	14,956.3	9,192.0	106.4	106.1	90.00	9,319.2	-52,416.4	0.5	-212.0	212.49	0.002	Stop Drilling Now
15,300.0	9,192.0	15,040.8	9,192.0	107.8	107.4	90.00	9,234.7	-52,415.8	0.5	-214.7	215.17	0.002	Stop Drilling Now
15,321.1	9,192.0	15,062.0	9,192.0	108.1	107.7	90.00	9,213.6	-52,415.6	0.5	-215.4	215.84	0.002	Stop Drilling Now
15,400.0	9,192.0	15,140.8	9,192.0	109.4	109.0	90.00	9,134.7	-52,415.0	0.5	-217.9	218.35	0.002	Stop Drilling Now
15,421.1	9,192.0	15,162.0	9,192.0	109.7	109.3	90.00	9,113.6	-52,414.8	0.5	-218.6	219.02	0.002	Stop Drilling Now
15,500.0	9,192.0	15,240.8	9,192.0	111.0	110.6	90.00	9,034.7	-52,414.2	0.5	-221.1	221.53	0.002	Stop Drilling Now
15,521.9	9,192.0	15,262.7	9,192.0	111.3	110.9	90.00	9,012.8	-52,414.1	0.5	-221.8	222.23	0.002	Stop Drilling Now
15,600.0	9,192.0	15,340.8	9,192.0	112.5	112.2	90.00	8,934.7	-52,413.5	0.5	-224.3	224.71	0.002	Stop Drilling Now
15,615.5	9,192.0	15,356.3	9,192.0	112.8	112.4	90.00	8,919.2	-52,413.3	0.5	-224.8	225.21	0.002	Stop Drilling Now
15,700.0	9,192.0	15,440.8	9,192.0	114.1	113.8	90.00	8,834.7	-52,412.7	0.5	-227.5	227.90	0.002	Stop Drilling Now
15,721.1	9,192.0	15,462.0	9,192.0	114.5	114.1	90.00	8,813.6	-52,412.5	0.5	-228.1	228.58	0.002	Stop Drilling Now
15,800.0	9,192.0	15,540.8	9,192.0	115.7	115.4	90.00	8,734.7	-52,411.9	0.5	-230.6	231.10	0.002	Stop Drilling Now
15,821.9	9,192.0	15,562.7	9,192.0	116.1	115.7	90.00	8,712.8	-52,411.8	0.5	-231.3	231.80	0.002	Stop Drilling Now
15,900.0	9,192.0	15,640.8	9,192.0	117.3	117.0	90.00	8,634.7	-52,411.2	0.5	-233.8	234.29	0.002	Stop Drilling Now
15,915.5	9,192.0	15,656.3	9,192.0	117.6	117.2	90.00	8,619.2	-52,411.0	0.5	-234.3	234.79	0.002	Stop Drilling Now
16,000.0	9,192.0	15,740.8	9,192.0	118.9	118.6	90.00	8,534.7	-52,410.4	0.5	-237.0	237.49	0.002	Stop Drilling Now
16,021.1	9,192.0	15,762.0	9,192.0	119.3	118.9	90.00	8,513.6	-52,410.2	0.5	-237.7	238.17	0.002	Stop Drilling Now
16,100.0	9,192.0	15,840.8	9,192.0	120.5	120.2	90.00	8,434.7	-52,409.6	0.5	-240.2	240.70	0.002	Stop Drilling Now
16,121.1	9,192.0	15,862.0	9,192.0	120.9	120.5	90.00	8,413.6	-52,409.5	0.5	-240.9	241.38	0.002	Stop Drilling Now

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	Local Co-ordinate Reference:	Site AVALON SHALE
Project:	LEA COUNTY, NM	TVD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Reference Site:	AVALON SHALE	MD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	WINDWARD FEDERAL #5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Lateral	Database:	EDM_Users
Reference Design:	DWD Plan 1 - negative VS	Offset TVD Reference:	Offset Datum

Offset Design AVALON SHALE - WINDWARD FEDERAL #5H - Lateral - DWD Plan 3 - forward VS													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	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		
16,200.0	9,192.0	15,940.8	9,192.0	122.1	121.8	90.00	8,334.7	-52,408.9	0.5	-243.5	243.91	0.002	Stop Drilling Now	
16,221.9	9,192.0	15,962.7	9,192.0	122.5	122.1	90.00	8,312.9	-52,408.7	0.5	-244.2	244.61	0.002	Stop Drilling Now	
16,300.0	9,192.0	16,040.8	9,192.0	123.8	123.4	90.00	8,234.7	-52,408.1	0.5	-246.7	247.12	0.002	Stop Drilling Now	
16,332.3	9,192.0	16,073.2	9,192.0	124.3	123.9	90.00	8,202.4	-52,407.8	0.5	-247.7	248.16	0.002	Stop Drilling Now	
16,400.0	9,192.0	16,140.8	9,192.0	125.4	125.0	90.00	8,134.7	-52,407.3	0.5	-249.9	250.33	0.002	Stop Drilling Now	
16,478.9	9,192.0	16,219.7	9,192.0	126.6	126.2	90.00	8,055.9	-52,406.7	0.5	-252.4	252.87	0.002	Stop Drilling Now	
16,500.0	9,192.0	16,240.8	9,192.0	127.0	126.6	90.00	8,034.7	-52,406.5	0.5	-253.1	253.55	0.002	Stop Drilling Now	
16,578.9	9,192.0	16,319.7	9,192.0	128.2	127.8	90.00	7,955.9	-52,405.9	0.5	-255.6	256.09	0.002	Stop Drilling Now	
16,600.0	9,192.0	16,340.8	9,192.0	128.6	128.2	90.00	7,934.7	-52,405.8	0.5	-256.3	256.77	0.002	Stop Drilling Now	
16,678.9	9,192.0	16,419.7	9,192.0	129.8	129.5	90.00	7,855.9	-52,405.2	0.5	-258.9	259.31	0.002	Stop Drilling Now	
16,700.0	9,192.0	16,440.8	9,192.0	130.2	129.8	90.00	7,834.7	-52,405.0	0.5	-259.5	259.99	0.002	Stop Drilling Now	
16,778.9	9,192.0	16,519.7	9,192.0	131.5	131.1	90.00	7,755.9	-52,404.4	0.5	-262.1	262.53	0.002	Stop Drilling Now	
16,800.0	9,192.0	16,540.8	9,192.0	131.8	131.4	90.00	7,734.7	-52,404.2	0.5	-262.8	263.22	0.002	Stop Drilling Now	
16,878.9	9,192.0	16,619.7	9,192.0	133.1	132.7	90.00	7,655.9	-52,403.6	0.5	-265.3	265.76	0.002	Stop Drilling Now	
16,900.0	9,192.0	16,640.8	9,192.0	133.4	133.0	90.00	7,634.7	-52,403.5	0.5	-266.0	266.44	0.002	Stop Drilling Now	
16,984.9	9,192.0	16,725.7	9,192.0	134.8	134.4	90.00	7,549.9	-52,402.8	0.5	-268.7	269.19	0.002	Stop Drilling Now	
17,000.0	9,192.0	16,740.8	9,192.0	135.0	134.6	90.00	7,534.7	-52,402.7	0.5	-269.2	269.67	0.002	Stop Drilling Now	
17,100.0	9,192.0	16,840.8	9,192.0	136.6	136.3	90.00	7,434.8	-52,401.9	0.5	-272.5	272.91	0.002	Stop Drilling Now	
17,178.9	9,192.0	16,919.7	9,192.0	137.9	137.5	90.00	7,355.9	-52,401.3	0.5	-275.0	275.46	0.002	Stop Drilling Now	
17,200.0	9,192.0	16,940.8	9,192.0	138.3	137.9	90.00	7,334.8	-52,401.2	0.5	-275.7	276.14	0.002	Stop Drilling Now	
17,278.9	9,192.0	17,019.7	9,192.0	139.5	139.2	90.00	7,255.9	-52,400.6	0.5	-278.2	278.70	0.002	Stop Drilling Now	
17,300.0	9,192.0	17,040.8	9,192.0	139.9	139.5	90.00	7,234.8	-52,400.4	0.5	-278.9	279.38	0.002	Stop Drilling Now	
17,384.9	9,192.0	17,125.7	9,192.0	141.3	140.9	90.00	7,149.9	-52,399.8	0.5	-281.7	282.13	0.002	Stop Drilling Now	
17,400.0	9,192.0	17,140.8	9,192.0	141.5	141.1	90.00	7,134.8	-52,399.6	0.5	-282.2	282.62	0.002	Stop Drilling Now	
17,500.0	9,192.0	17,240.8	9,192.0	143.1	142.7	90.00	7,034.8	-52,398.9	0.5	-285.4	285.86	0.002	Stop Drilling Now	
17,578.9	9,192.0	17,319.7	9,192.0	144.4	144.0	90.00	6,955.9	-52,398.3	0.5	-288.0	288.42	0.002	Stop Drilling Now	
17,600.0	9,192.0	17,340.8	9,192.0	144.7	144.4	90.00	6,934.8	-52,398.1	0.5	-288.7	289.11	0.002	Stop Drilling Now	
17,684.9	9,192.0	17,425.7	9,192.0	146.1	145.7	90.00	6,849.9	-52,397.4	0.5	-291.4	291.86	0.002	Stop Drilling Now	
17,700.0	9,192.0	17,440.8	9,192.0	146.4	146.0	90.00	6,834.8	-52,397.3	0.5	-291.9	292.35	0.002	Stop Drilling Now	
17,800.0	9,192.0	17,540.8	9,192.0	148.0	147.6	90.00	6,734.8	-52,396.6	0.5	-295.1	295.60	0.002	Stop Drilling Now	
17,878.9	9,192.0	17,619.7	9,192.0	149.3	148.9	90.00	6,655.9	-52,396.0	0.5	-297.7	298.16	0.002	Stop Drilling Now	
17,900.0	9,192.0	17,640.8	9,192.0	149.6	149.2	90.00	6,634.8	-52,395.8	0.5	-298.4	298.85	0.002	Stop Drilling Now	
17,978.9	9,192.0	17,719.7	9,192.0	150.9	150.5	90.00	6,555.9	-52,395.2	0.5	-301.0	301.41	0.002	Stop Drilling Now	
18,000.0	9,192.0	17,740.8	9,192.0	151.2	150.9	90.00	6,534.8	-52,395.0	0.5	-301.6	302.10	0.001	Stop Drilling Now	
18,084.9	9,192.0	17,825.7	9,192.0	152.6	152.2	90.00	6,449.9	-52,394.4	0.5	-304.4	304.86	0.001	Stop Drilling Now	
18,100.0	9,192.0	17,840.8	9,192.0	152.9	152.5	90.00	6,434.8	-52,394.3	0.5	-304.9	305.35	0.001	Stop Drilling Now	
18,200.0	9,192.0	17,940.8	9,192.0	154.5	154.1	90.00	6,334.8	-52,393.5	0.5	-308.2	308.61	0.001	Stop Drilling Now	
18,278.9	9,192.0	18,019.7	9,192.0	155.8	155.4	90.00	6,255.9	-52,392.9	0.5	-310.7	311.18	0.001	Stop Drilling Now	
18,300.0	9,192.0	18,040.8	9,192.0	156.1	155.7	90.00	6,234.8	-52,392.7	0.5	-311.4	311.86	0.001	Stop Drilling Now	
18,384.9	9,192.0	18,125.7	9,192.0	157.5	157.1	90.00	6,149.9	-52,392.1	0.5	-314.2	314.63	0.001	Stop Drilling Now	
18,400.0	9,192.0	18,140.8	9,192.0	157.8	157.4	90.00	6,134.8	-52,392.0	0.5	-314.7	315.12	0.001	Stop Drilling Now	
18,500.0	9,192.0	18,240.8	9,192.0	159.4	159.0	90.00	6,034.8	-52,391.2	0.5	-317.9	318.38	0.001	Stop Drilling Now	
18,578.9	9,192.0	18,319.7	9,192.0	160.7	160.3	90.00	5,955.9	-52,390.6	0.5	-320.5	320.95	0.001	Stop Drilling Now	
18,600.0	9,192.0	18,340.8	9,192.0	161.0	160.6	90.00	5,934.8	-52,390.4	0.5	-321.2	321.64	0.001	Stop Drilling Now	
18,678.9	9,192.0	18,419.7	9,192.0	162.3	161.9	90.00	5,855.9	-52,389.8	0.5	-323.8	324.22	0.001	Stop Drilling Now	
18,700.0	9,192.0	18,440.8	9,192.0	162.6	162.3	90.00	5,834.8	-52,389.7	0.5	-324.5	324.90	0.001	Stop Drilling Now	
18,784.9	9,192.0	18,525.7	9,192.0	164.0	163.6	90.00	5,749.9	-52,389.0	0.5	-327.2	327.68	0.001	Stop Drilling Now	
18,800.0	9,192.0	18,540.8	9,192.0	164.3	163.9	90.00	5,734.8	-52,388.9	0.5	-327.7	328.17	0.001	Stop Drilling Now	
18,900.0	9,192.0	18,640.8	9,192.0	165.9	165.5	90.00	5,634.8	-52,388.1	0.5	-331.0	331.43	0.001	Stop Drilling Now	
18,978.9	9,192.0	18,719.7	9,192.0	167.2	166.8	90.00	5,555.9	-52,387.5	0.5	-333.6	334.01	0.001	Stop Drilling Now	

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: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #5H
Well Error: 0.0 usft
Reference Wellbore: Lateral
Reference Design: DWD Plan 1 - negative VS

Local Co-ordinate Reference: Site AVALON SHALE
TVD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
MD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (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 AVALON SHALE - WINDWARD FEDERAL #5H - Lateral - DWD Plan 3 - forward VS													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	0.0 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)						
19,000.0	9,192.0	18,740.8	9,192.0	167.5	167.2	90.00	5,534.8	-52,387.3	0.5	-334.2	334.70	0.001	Stop Drilling Now	
19,078.9	9,192.0	18,819.7	9,192.0	168.8	168.4	90.00	5,455.9	-52,386.7	0.5	-336.8	337.28	0.001	Stop Drilling Now	
19,100.0	9,192.0	18,840.8	9,192.0	169.2	168.8	90.00	5,434.8	-52,386.6	0.5	-337.5	337.97	0.001	Stop Drilling Now	
19,140.4	9,192.0	18,881.2	9,192.0	169.8	169.4	90.00	5,394.5	-52,386.3	0.5	-338.8	339.29	0.001	Stop Drilling Now, ES	
19,200.0	9,192.0	18,910.0	9,192.0	170.8	169.9	90.00	5,365.6	-52,386.1	30.8	-309.9	340.73	0.090	Stop Drilling Now	
19,300.0	9,192.0	18,910.0	9,192.0	172.5	169.9	90.00	5,365.6	-52,386.1	130.8	-211.6	342.37	0.382	Stop Drilling Now	
19,400.0	9,192.0	18,910.0	9,192.0	174.1	169.9	90.00	5,365.6	-52,386.1	230.8	-113.2	344.00	0.671	Stop Drilling Now	
19,449.2	9,192.0	18,910.0	9,192.0	174.9	169.9	90.00	5,365.6	-52,386.1	280.0	-64.8	344.81	0.812	Stop Drilling Now	

COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #5H
Well Error: 0.0 usft
Reference Wellbore: Lateral
Reference Design: DWD Plan 1 - negative VS

Local Co-ordinate Reference: Site AVALON SHALE
TVD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
MD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (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 AVALON SHALE - WINDWARD FEDERAL #5H - Lateral - DWD Plan 4 - straight down land and turn													Offset Site Error: 0.0 usft
Survey Program: 0-MWD													Offset Well Error: 0.0 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 +N/-S (usft)	Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
0.0	0.0	0.0	0.0	0.0	0.0	0.00	15,384.8	-52,246.7	0.0				
100.0	100.0	100.0	100.0	0.1	0.1	0.00	15,384.8	-52,246.7	0.0	-0.3	0.27	0.000	Stop Drilling Now
200.0	200.0	200.0	200.0	0.5	0.5	0.00	15,384.8	-52,246.7	0.0	-1.0	0.98	0.000	Stop Drilling Now
300.0	300.0	300.0	300.0	0.8	0.8	0.00	15,384.8	-52,246.7	0.0	-1.7	1.70	0.000	Stop Drilling Now
400.0	400.0	400.0	400.0	1.2	1.2	0.00	15,384.8	-52,246.7	0.0	-2.4	2.42	0.000	Stop Drilling Now
500.0	500.0	500.0	500.0	1.6	1.6	0.00	15,384.8	-52,246.7	0.0	-3.1	3.13	0.000	Stop Drilling Now
600.0	600.0	600.0	600.0	1.9	1.9	0.00	15,384.8	-52,246.7	0.0	-3.8	3.85	0.000	Stop Drilling Now
700.0	700.0	700.0	700.0	2.3	2.3	0.00	15,384.8	-52,246.7	0.0	-4.6	4.57	0.000	Stop Drilling Now
800.0	800.0	800.0	800.0	2.6	2.6	0.00	15,384.8	-52,246.7	0.0	-5.3	5.28	0.000	Stop Drilling Now
900.0	900.0	900.0	900.0	3.0	3.0	0.00	15,384.8	-52,246.7	0.0	-6.0	6.00	0.000	Stop Drilling Now
1,000.0	1,000.0	1,000.0	1,000.0	3.4	3.4	0.00	15,384.8	-52,246.7	0.0	-6.7	6.72	0.000	Stop Drilling Now, CC, SF
1,055.7	1,055.7	1,055.7	1,055.7	3.6	3.6	180.00	15,384.8	-52,246.7	0.5	-6.6	7.12	0.076	Stop Drilling Now
1,096.6	1,096.6	1,096.6	1,096.6	3.7	3.7	-180.00	15,384.8	-52,246.7	1.6	-5.8	7.41	0.220	Stop Drilling Now
1,100.0	1,100.0	1,100.0	1,100.0	3.7	3.7	-180.00	15,384.8	-52,246.7	1.7	-5.7	7.43	0.235	Stop Drilling Now
1,200.0	1,199.9	1,199.9	1,199.9	4.1	4.1	-180.00	15,384.8	-52,246.7	5.1	-3.0	8.14	0.628	Stop Drilling Now
1,300.0	1,299.9	1,299.9	1,299.9	4.4	4.4	-180.00	15,384.8	-52,246.7	8.5	-0.4	8.86	0.958	Stop Drilling Now
1,400.0	1,399.8	1,399.8	1,399.8	4.8	4.8	-180.00	15,384.8	-52,246.7	11.9	2.3	9.57	1.239	Shut in Produces
1,500.0	1,499.8	1,499.8	1,499.8	5.1	5.2	-180.00	15,384.8	-52,246.7	15.2	4.9	10.29	1.480	Shut in Produces
1,600.0	1,599.7	1,599.7	1,599.7	5.5	5.5	-180.00	15,384.8	-52,246.7	18.6	7.6	11.00	1.690	Advise and Monitor
1,700.0	1,699.6	1,699.6	1,699.6	5.9	5.9	-180.00	15,384.8	-52,246.7	22.0	10.2	11.72	1.875	Advise and Monitor
1,800.0	1,799.6	1,799.6	1,799.6	6.2	6.2	-180.00	15,384.8	-52,246.7	25.3	12.9	12.43	2.038	
1,900.0	1,899.5	1,899.5	1,899.5	6.6	6.6	-180.00	15,384.8	-52,246.7	28.7	15.6	13.15	2.183	
2,000.0	1,999.5	1,999.5	1,999.5	6.9	6.9	-180.00	15,384.8	-52,246.7	32.1	18.2	13.87	2.313	
2,100.0	2,099.4	2,099.4	2,099.4	7.3	7.3	-180.00	15,384.8	-52,246.7	35.4	20.9	14.59	2.430	
2,200.0	2,199.4	2,199.4	2,199.4	7.6	7.7	-180.00	15,384.8	-52,246.7	38.8	23.5	15.30	2.537	
2,300.0	2,299.3	2,299.3	2,299.3	8.0	8.0	-180.00	15,384.8	-52,246.7	42.2	26.2	16.02	2.633	
2,400.0	2,399.2	2,399.2	2,399.2	8.4	8.4	-180.00	15,384.8	-52,246.7	45.6	28.8	16.74	2.722	
2,500.0	2,499.2	2,499.2	2,499.2	8.7	8.7	-180.00	15,384.8	-52,246.7	48.9	31.5	17.46	2.803	
2,600.0	2,599.1	2,599.1	2,599.1	9.1	9.1	-180.00	15,384.8	-52,246.7	52.3	34.1	18.18	2.877	
2,700.0	2,699.1	2,699.1	2,699.1	9.4	9.4	-180.00	15,384.8	-52,246.7	55.7	36.8	18.90	2.946	
2,800.0	2,799.0	2,799.0	2,799.0	9.8	9.8	-180.00	15,384.8	-52,246.7	59.0	39.4	19.62	3.010	
2,900.0	2,899.0	2,899.0	2,899.0	10.2	10.2	-180.00	15,384.8	-52,246.7	62.4	42.1	20.33	3.069	
3,000.0	2,998.9	2,998.9	2,998.9	10.5	10.5	-180.00	15,384.8	-52,246.7	65.8	44.7	21.05	3.125	
3,100.0	3,098.8	3,098.8	3,098.8	10.9	10.9	-180.00	15,384.8	-52,246.7	69.2	47.4	21.77	3.176	
3,200.0	3,198.8	3,198.8	3,198.8	11.3	11.2	-180.00	15,384.8	-52,246.7	72.5	50.0	22.49	3.225	
3,300.0	3,298.7	3,298.7	3,298.7	11.6	11.6	-180.00	15,384.8	-52,246.7	75.9	52.7	23.21	3.270	
3,400.0	3,398.7	3,398.7	3,398.7	12.0	12.0	-180.00	15,384.8	-52,246.7	79.3	55.3	23.93	3.313	
3,500.0	3,498.6	3,498.6	3,498.6	12.3	12.3	180.00	15,384.8	-52,246.7	82.6	58.0	24.65	3.353	
3,600.0	3,598.6	3,598.6	3,598.6	12.7	12.7	-180.00	15,384.8	-52,246.7	86.0	60.6	25.37	3.390	
3,700.0	3,698.5	3,698.5	3,698.5	13.1	13.0	-180.00	15,384.8	-52,246.7	89.4	63.3	26.09	3.426	
3,800.0	3,798.4	3,798.4	3,798.4	13.4	13.4	-180.00	15,384.8	-52,246.7	92.8	65.9	26.81	3.460	
3,900.0	3,898.4	3,898.4	3,898.4	13.8	13.7	-180.00	15,384.8	-52,246.7	96.1	68.6	27.53	3.492	
4,000.0	3,998.3	3,998.3	3,998.3	14.1	14.1	-180.00	15,384.8	-52,246.7	99.5	71.2	28.25	3.522	
4,100.0	4,098.3	4,098.3	4,098.3	14.5	14.5	-180.00	15,384.8	-52,246.7	102.9	73.9	28.97	3.551	
4,200.0	4,198.2	4,198.2	4,198.2	14.9	14.8	-180.00	15,384.8	-52,246.7	106.2	76.5	29.69	3.579	
4,300.0	4,298.2	4,298.2	4,298.2	15.2	15.2	-180.00	15,384.8	-52,246.7	109.6	79.2	30.41	3.605	
4,400.0	4,398.1	4,398.1	4,398.1	15.6	15.5	-180.00	15,384.8	-52,246.7	113.0	81.9	31.12	3.630	
4,500.0	4,498.0	4,498.0	4,498.0	15.9	15.9	-180.00	15,384.8	-52,246.7	116.3	84.5	31.84	3.654	
4,600.0	4,598.0	4,598.0	4,598.0	16.3	16.3	-180.00	15,384.8	-52,246.7	119.7	87.2	32.56	3.676	
4,700.0	4,697.9	4,697.9	4,697.9	16.7	16.6	-180.00	15,384.8	-52,246.7	123.1	89.8	33.28	3.698	
4,800.0	4,797.9	4,797.9	4,797.9	17.0	17.0	-180.00	15,384.8	-52,246.7	126.5	92.5	34.00	3.719	

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: AVALON SHALE
 Site Error: 0.0 usft
 Reference Well: WINDWARD FEDERAL #5H
 Well Error: 0.0 usft
 Reference Wellbore: Lateral
 Reference Design: DWD Plan 1 - negative VS

Local Co-ordinate Reference: Site AVALON SHALE
 TVD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
 MD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (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 AVALON SHALE - WINDWARD FEDERAL #5H - Lateral - DWD Plan 4 - straight down land and turn													Offset Site Error: 0.0 usft
Survey Program: 0-MWD													Offset Well Error: 0.0 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)					
4,900.0	4,897.8	4,897.8	4,897.8	17.4	17.3	-180.00	15,384.8	-52,246.7	129.8	95.1	34.72	3.739	
5,000.0	4,997.8	4,997.8	4,997.8	17.8	17.7	-180.00	15,384.8	-52,246.7	133.2	97.8	35.44	3.758	
5,100.0	5,097.7	5,097.7	5,097.7	18.1	18.0	-180.00	15,384.8	-52,246.7	136.6	100.4	36.16	3.776	
5,200.0	5,197.6	5,197.6	5,197.6	18.5	18.4	-180.00	15,384.8	-52,246.7	139.9	103.1	36.88	3.794	
5,300.0	5,297.6	5,297.6	5,297.6	18.8	18.8	-180.00	15,384.8	-52,246.7	143.3	105.7	37.60	3.811	
5,400.0	5,397.5	5,397.5	5,397.5	19.2	19.1	-180.00	15,384.8	-52,246.7	146.7	108.4	38.32	3.828	
5,500.0	5,497.5	5,497.5	5,497.5	19.6	19.5	-180.00	15,384.8	-52,246.7	150.1	111.0	39.04	3.843	
5,600.0	5,597.4	5,597.4	5,597.4	19.9	19.8	-180.00	15,384.8	-52,246.7	153.4	113.7	39.76	3.859	
5,700.0	5,697.4	5,697.4	5,697.4	20.3	20.2	-180.00	15,384.8	-52,246.7	156.8	116.3	40.48	3.873	
5,800.0	5,797.3	5,797.3	5,797.3	20.6	20.6	-180.00	15,384.8	-52,246.7	160.2	119.0	41.20	3.887	
5,900.0	5,897.3	5,897.3	5,897.3	21.0	20.9	-180.00	15,384.8	-52,246.7	163.5	121.6	41.92	3.901	
6,000.0	5,997.2	5,997.2	5,997.2	21.4	21.3	-180.00	15,384.8	-52,246.7	166.9	124.3	42.64	3.914	
6,100.0	6,097.1	6,097.1	6,097.1	21.7	21.6	-180.00	15,384.8	-52,246.7	170.3	126.9	43.36	3.927	
6,200.0	6,197.1	6,197.1	6,197.1	22.1	22.0	-180.00	15,384.8	-52,246.7	173.6	129.6	44.08	3.939	
6,300.0	6,297.0	6,297.0	6,297.0	22.5	22.3	-180.00	15,384.8	-52,246.7	177.0	132.2	44.80	3.951	
6,400.0	6,397.0	6,397.0	6,397.0	22.8	22.7	-180.00	15,384.8	-52,246.7	180.4	134.9	45.52	3.963	
6,500.0	6,496.9	6,496.9	6,496.9	23.2	23.1	-180.00	15,384.8	-52,246.7	183.8	137.5	46.24	3.974	
6,600.0	6,596.9	6,596.9	6,596.9	23.5	23.4	-180.00	15,384.8	-52,246.7	187.1	140.2	46.96	3.985	
6,700.0	6,696.8	6,696.8	6,696.8	23.9	23.8	-180.00	15,384.8	-52,246.7	190.5	142.8	47.68	3.995	
6,800.0	6,796.7	6,796.7	6,796.7	24.3	24.1	-180.00	15,384.8	-52,246.7	193.9	145.5	48.40	4.005	
6,900.0	6,896.7	6,896.7	6,896.7	24.6	24.5	-180.00	15,384.8	-52,246.7	197.2	148.1	49.12	4.015	
7,000.0	6,996.6	6,996.6	6,996.6	25.0	24.9	-180.00	15,384.8	-52,246.7	200.6	150.8	49.84	4.025	
7,100.0	7,096.6	7,096.6	7,096.6	25.3	25.2	-180.00	15,384.8	-52,246.7	204.0	153.4	50.56	4.034	
7,200.0	7,196.5	7,196.5	7,196.5	25.7	25.6	-180.00	15,384.8	-52,246.7	207.4	156.1	51.28	4.043	
7,300.0	7,296.5	7,296.5	7,296.5	26.1	25.9	-180.00	15,384.8	-52,246.7	210.7	158.7	52.00	4.052	
7,400.0	7,396.4	7,396.4	7,396.4	26.4	26.3	-180.00	15,384.8	-52,246.7	214.1	161.4	52.72	4.061	
7,500.0	7,496.3	7,496.3	7,496.3	26.8	26.6	-180.00	15,384.8	-52,246.7	217.5	164.0	53.44	4.069	
7,600.0	7,596.3	7,596.3	7,596.3	27.2	27.0	-180.00	15,384.8	-52,246.7	220.8	166.7	54.16	4.077	
7,700.0	7,696.2	7,696.2	7,696.2	27.5	27.4	-180.00	15,384.8	-52,246.7	224.2	169.3	54.88	4.085	
7,800.0	7,796.2	7,796.2	7,796.2	27.9	27.7	-180.00	15,384.8	-52,246.7	227.6	172.0	55.60	4.093	
7,900.0	7,896.1	7,896.1	7,896.1	28.2	28.1	-180.00	15,384.8	-52,246.7	230.9	174.6	56.32	4.101	
8,000.0	7,996.1	7,996.1	7,996.1	28.6	28.4	-180.00	15,384.8	-52,246.7	234.3	177.3	57.04	4.108	
8,100.0	8,096.0	8,096.0	8,096.0	29.0	28.8	-180.00	15,384.8	-52,246.7	237.7	179.9	57.76	4.115	
8,200.0	8,195.9	8,195.9	8,195.9	29.3	29.2	-180.00	15,384.8	-52,246.7	241.1	182.6	58.48	4.122	
8,300.0	8,295.9	8,295.9	8,295.9	29.7	29.5	-180.00	15,384.8	-52,246.7	244.4	185.2	59.20	4.129	
8,400.0	8,395.8	8,395.8	8,395.8	30.1	29.9	-180.00	15,384.8	-52,246.7	247.8	187.9	59.92	4.135	
8,500.0	8,495.8	8,495.8	8,495.8	30.4	30.2	-180.00	15,384.8	-52,246.7	251.2	190.5	60.64	4.142	
8,600.0	8,595.7	8,595.7	8,595.7	30.8	30.6	-180.00	15,384.8	-52,246.7	254.5	193.2	61.36	4.148	
8,709.1	8,704.8	8,704.8	8,704.8	31.2	31.0	-180.00	15,384.8	-52,246.7	258.2	196.1	62.15	4.155	
8,725.0	8,720.6	8,719.7	8,719.7	31.2	31.0	-116.64	15,384.8	-52,246.7	258.6	196.3	62.26	4.154	
8,750.0	8,745.6	8,740.7	8,740.7	31.3	31.1	-74.12	15,384.1	-52,246.9	258.8	196.4	62.41	4.147	
8,775.0	8,770.5	8,761.8	8,761.7	31.4	31.2	-64.74	15,382.6	-52,247.4	258.6	196.0	62.56	4.134	
8,800.0	8,795.2	8,782.9	8,782.6	31.5	31.2	-61.02	15,380.1	-52,248.2	257.9	195.2	62.71	4.114	
8,825.0	8,819.7	8,804.0	8,803.5	31.5	31.3	-59.14	15,376.8	-52,249.2	256.9	194.0	62.85	4.087	
8,850.0	8,844.0	8,825.0	8,824.0	31.6	31.4	-58.07	15,372.7	-52,250.5	255.4	192.4	62.99	4.054	
8,875.0	8,867.8	8,846.2	8,844.5	31.7	31.4	-57.46	15,367.6	-52,252.1	253.5	190.3	63.13	4.015	
8,900.0	8,891.3	8,867.3	8,864.7	31.8	31.5	-57.14	15,361.7	-52,254.0	251.1	187.9	63.26	3.970	
8,925.0	8,914.3	8,888.5	8,884.6	31.8	31.6	-57.01	15,354.9	-52,256.1	248.4	185.0	63.39	3.918	
8,950.0	8,936.7	8,909.6	8,904.2	31.9	31.6	-57.04	15,347.3	-52,258.5	245.2	181.7	63.52	3.861	
8,975.0	8,958.5	8,930.8	8,923.4	32.0	31.7	-57.19	15,338.9	-52,261.2	241.7	178.0	63.64	3.797	

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	Local Co-ordinate Reference:	Site AVALON SHALE
Project:	LEA COUNTY, NM	TVD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Reference Site:	AVALON SHALE	MD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	WINDWARD FEDERAL #5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Lateral	Database:	EDM_Users
Reference Design:	DWD Plan 1 - negative VS	Offset TVD Reference:	Offset Datum

Offset Design AVALON SHALE - WINDWARD FEDERAL #5H - Lateral - DWD Plan 4 - straight down land and turn													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	0.0 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (")	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
9,000.0	8,979.6	8,951.9	8,942.3	32.0	31.8	-57.44	15,329.6	-52,264.1	237.7	174.0	63.76	3.728		
9,025.0	9,000.0	8,973.1	8,960.7	32.1	31.8	-57.79	15,319.6	-52,267.2	233.4	169.5	63.88	3.654		
9,050.0	9,019.7	8,994.3	8,978.6	32.1	31.9	-58.23	15,308.8	-52,270.6	228.7	164.7	63.99	3.574		
9,075.0	9,038.5	9,015.5	8,996.0	32.2	31.9	-58.75	15,297.2	-52,274.3	223.6	159.5	64.10	3.489		
9,100.0	9,056.4	9,036.8	9,012.9	32.2	32.0	-59.35	15,284.9	-52,278.1	218.2	154.0	64.21	3.398		
9,125.0	9,073.4	9,058.0	9,029.2	32.3	32.1	-60.05	15,271.9	-52,282.2	212.4	148.1	64.32	3.303		
9,150.0	9,089.3	9,079.3	9,044.9	32.3	32.1	-60.83	15,258.2	-52,286.5	206.3	141.9	64.42	3.203		
9,175.0	9,104.3	9,100.0	9,059.5	32.3	32.2	-61.69	15,244.2	-52,290.9	199.9	135.4	64.53	3.098		
9,200.0	9,118.2	9,122.1	9,074.3	32.4	32.3	-62.67	15,228.7	-52,295.8	193.2	128.6	64.65	2.989		
9,225.0	9,131.0	9,143.5	9,088.1	32.5	32.3	-63.75	15,213.0	-52,300.8	186.2	121.5	64.77	2.875		
9,250.0	9,142.6	9,165.0	9,101.1	32.5	32.4	-64.94	15,196.7	-52,305.9	179.0	114.1	64.89	2.758		
9,275.0	9,153.1	9,186.5	9,113.3	32.6	32.4	-66.26	15,179.8	-52,311.2	171.5	106.5	65.02	2.638		
9,300.0	9,162.4	9,208.2	9,124.8	32.6	32.5	-67.72	15,162.3	-52,316.7	163.8	98.6	65.15	2.514		
9,325.0	9,170.4	9,229.9	9,135.5	32.7	32.6	-69.35	15,144.2	-52,322.4	155.9	90.6	65.29	2.388		
9,350.0	9,177.2	9,251.7	9,145.3	32.8	32.7	-71.15	15,125.7	-52,328.3	147.8	82.4	65.43	2.260		
9,375.0	9,182.8	9,273.7	9,154.3	32.8	32.7	-73.16	15,106.6	-52,334.3	139.6	74.1	65.57	2.130		
9,400.0	9,187.0	9,295.7	9,162.5	32.9	32.8	-75.42	15,087.0	-52,340.4	131.4	65.6	65.71	1.999 Advise and Monitor		
9,425.0	9,190.0	9,318.0	9,169.7	33.0	32.9	-77.96	15,067.0	-52,346.7	123.0	57.2	65.86	1.868 Advise and Monitor		
9,450.0	9,191.6	9,340.3	9,175.9	33.1	33.0	-80.83	15,046.5	-52,353.2	114.7	48.7	66.01	1.737 Advise and Monitor		
9,469.1	9,192.0	9,357.5	9,180.0	33.1	33.0	-83.28	15,030.6	-52,358.2	108.4	42.3	66.13	1.639 Advise and Monitor		
9,500.0	9,192.0	9,385.9	9,185.5	33.2	33.1	-86.01	15,004.0	-52,366.5	98.4	32.1	66.33	1.483 Shut in Produces		
9,600.0	9,192.0	9,479.6	9,192.0	33.6	33.5	-89.97	14,915.0	-52,394.5	67.5	0.5	67.03	1.007 Shut in Produces		
9,700.0	9,192.0	9,572.5	9,192.0	34.0	33.9	-89.95	14,825.2	-52,418.5	40.8	-27.0	67.86	0.602 Stop Drilling Now		
9,800.0	9,192.0	9,668.4	9,192.0	34.5	34.3	-89.90	14,731.2	-52,437.2	20.6	-48.2	68.83	0.299 Stop Drilling Now		
9,900.0	9,192.0	9,766.5	9,192.0	35.1	34.9	-89.71	14,633.9	-52,449.8	7.0	-62.9	69.92	0.101 Stop Drilling Now		
10,000.0	9,192.0	9,866.1	9,192.0	35.7	35.4	-84.04	14,534.5	-52,455.7	0.3	-70.8	71.14	0.005 Stop Drilling Now		
10,026.4	9,192.0	9,892.4	9,192.0	35.9	35.6	82.60	14,508.2	-52,456.1	0.3	-71.2	71.49	0.004 Stop Drilling Now		
10,100.0	9,192.0	9,966.0	9,192.0	36.4	36.1	85.07	14,434.5	-52,455.7	0.4	-72.1	72.48	0.006 Stop Drilling Now		
10,121.1	9,192.0	9,987.2	9,192.0	36.6	36.2	85.07	14,413.4	-52,455.5	0.4	-72.4	72.78	0.006 Stop Drilling Now		
10,200.0	9,192.0	10,066.0	9,192.0	37.2	36.7	85.07	14,334.5	-52,454.9	0.4	-73.5	73.93	0.006 Stop Drilling Now		
10,217.1	9,192.0	10,083.2	9,192.0	37.3	36.9	85.07	14,317.4	-52,454.8	0.4	-73.8	74.20	0.006 Stop Drilling Now		
10,300.0	9,192.0	10,166.0	9,192.0	38.0	37.5	85.07	14,234.6	-52,454.1	0.4	-75.1	75.51	0.005 Stop Drilling Now		
10,317.1	9,192.0	10,183.2	9,192.0	38.2	37.6	85.07	14,217.4	-52,454.0	0.4	-75.4	75.79	0.005 Stop Drilling Now		
10,400.0	9,192.0	10,266.0	9,192.0	38.9	38.3	85.07	14,134.6	-52,453.3	0.4	-76.8	77.19	0.005 Stop Drilling Now		
10,500.0	9,192.0	10,366.0	9,192.0	39.8	39.2	85.07	14,034.6	-52,452.6	0.4	-78.6	78.98	0.005 Stop Drilling Now		
10,511.6	9,192.0	10,377.7	9,192.0	39.9	39.3	85.07	14,022.9	-52,452.5	0.4	-78.8	79.20	0.005 Stop Drilling Now		
10,600.0	9,192.0	10,466.0	9,192.0	40.8	40.1	85.07	13,934.6	-52,451.8	0.4	-80.5	80.87	0.005 Stop Drilling Now		
10,617.1	9,192.0	10,483.2	9,192.0	41.0	40.2	85.07	13,917.4	-52,451.7	0.4	-80.8	81.21	0.005 Stop Drilling Now		
10,700.0	9,192.0	10,566.0	9,192.0	41.8	41.0	85.07	13,834.6	-52,451.0	0.4	-82.4	82.85	0.005 Stop Drilling Now		
10,717.1	9,192.0	10,583.2	9,192.0	42.0	41.2	85.07	13,817.4	-52,450.9	0.4	-82.8	83.20	0.005 Stop Drilling Now		
10,800.0	9,192.0	10,666.0	9,192.0	42.9	42.0	85.07	13,734.6	-52,450.3	0.4	-84.5	84.91	0.005 Stop Drilling Now		
10,821.1	9,192.0	10,687.2	9,192.0	43.1	42.3	85.07	13,713.4	-52,450.1	0.4	-85.0	85.36	0.005 Stop Drilling Now		
10,900.0	9,192.0	10,766.0	9,192.0	44.0	43.1	85.07	13,634.6	-52,449.5	0.4	-86.6	87.06	0.005 Stop Drilling Now		
10,919.8	9,192.0	10,785.9	9,192.0	44.2	43.3	85.07	13,614.7	-52,449.4	0.4	-87.1	87.49	0.005 Stop Drilling Now		
11,000.0	9,192.0	10,866.0	9,192.0	45.1	44.2	85.07	13,534.6	-52,448.7	0.4	-88.9	89.27	0.005 Stop Drilling Now		
11,017.1	9,192.0	10,883.2	9,192.0	45.3	44.4	85.07	13,517.4	-52,448.6	0.4	-89.2	89.66	0.005 Stop Drilling Now		
11,100.0	9,192.0	10,966.0	9,192.0	46.3	45.3	85.07	13,434.6	-52,448.0	0.4	-91.1	91.55	0.004 Stop Drilling Now		
11,101.9	9,192.0	10,968.0	9,192.0	46.3	45.3	85.07	13,432.7	-52,448.0	0.4	-91.2	91.60	0.004 Stop Drilling Now		
11,200.0	9,192.0	11,066.0	9,192.0	47.5	46.4	85.07	13,334.6	-52,447.2	0.4	-93.5	93.90	0.004 Stop Drilling Now		
11,300.0	9,192.0	11,166.0	9,192.0	48.7	47.6	85.07	13,234.6	-52,446.4	0.4	-95.9	96.30	0.004 Stop Drilling Now		
11,317.1	9,192.0	11,183.2	9,192.0	48.9	47.8	85.07	13,217.4	-52,446.3	0.4	-96.3	96.72	0.004 Stop Drilling Now		

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	Local Co-ordinate Reference:	Site AVALON SHALE
Project:	LEA COUNTY, NM	TVD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Reference Site:	AVALON SHALE	MD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	WINDWARD FEDERAL #5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Lateral	Database:	EDM_Users
Reference Design:	DWD Plan 1 - negative VS	Offset TVD Reference:	Offset Datum

Offset Design AVALON SHALE - WINDWARD FEDERAL #5H - Lateral - DWD Plan 4 - straight down land and turn													Offset Site Error:	0.0 usft
Survey Program: 0-MWD													Offset Well Error:	0.0 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	
11,400.0	9,192.0	11,266.0	9,192.0	49.9	48.8	85.07	13,134.6	-52,445.7	0.4	-98.4	98.76	0.004	Stop Drilling Now	
11,417.1	9,192.0	11,283.2	9,192.0	50.1	49.0	85.07	13,117.5	-52,445.5	0.4	-98.8	99.19	0.004	Stop Drilling Now	
11,500.0	9,192.0	11,366.0	9,192.0	51.2	50.1	85.07	13,034.6	-52,444.9	0.4	-100.9	101.27	0.004	Stop Drilling Now	
11,521.1	9,192.0	11,387.2	9,192.0	51.5	50.3	85.07	13,013.5	-52,444.7	0.4	-101.4	101.81	0.004	Stop Drilling Now	
11,600.0	9,192.0	11,466.0	9,192.0	52.5	51.3	85.07	12,934.6	-52,444.1	0.4	-103.4	103.82	0.004	Stop Drilling Now	
11,617.1	9,192.0	11,483.2	9,192.0	52.7	51.6	85.07	12,917.5	-52,444.0	0.4	-103.9	104.27	0.004	Stop Drilling Now	
11,700.0	9,192.0	11,566.0	9,192.0	53.8	52.6	85.07	12,834.6	-52,443.4	0.4	-106.0	106.42	0.004	Stop Drilling Now	
11,717.1	9,192.0	11,583.2	9,192.0	54.0	52.8	85.07	12,817.5	-52,443.2	0.4	-106.5	106.87	0.004	Stop Drilling Now	
11,800.0	9,192.0	11,666.0	9,192.0	55.1	53.9	85.07	12,734.6	-52,442.6	0.4	-108.6	109.06	0.004	Stop Drilling Now	
11,802.2	9,192.0	11,668.2	9,192.0	55.2	54.0	85.07	12,732.4	-52,442.6	0.4	-108.7	109.12	0.004	Stop Drilling Now	
11,900.0	9,192.0	11,766.0	9,192.0	56.5	55.2	85.07	12,634.6	-52,441.8	0.4	-111.3	111.73	0.004	Stop Drilling Now	
12,000.0	9,192.0	11,866.0	9,192.0	57.9	56.6	85.07	12,534.6	-52,441.1	0.4	-114.0	114.44	0.004	Stop Drilling Now	
12,017.1	9,192.0	11,883.2	9,192.0	58.1	56.8	85.07	12,517.5	-52,440.9	0.4	-114.5	114.91	0.004	Stop Drilling Now	
12,100.0	9,192.0	11,966.0	9,192.0	59.2	57.9	85.07	12,434.6	-52,440.3	0.4	-116.8	117.18	0.003	Stop Drilling Now	
12,117.1	9,192.0	11,983.2	9,192.0	59.5	58.2	85.07	12,417.5	-52,440.2	0.4	-117.2	117.65	0.003	Stop Drilling Now	
12,200.0	9,192.0	12,066.0	9,192.0	60.6	59.3	85.07	12,334.6	-52,439.5	0.4	-119.5	119.95	0.003	Stop Drilling Now	
12,221.1	9,192.0	12,087.2	9,192.0	60.9	59.6	85.07	12,313.5	-52,439.4	0.4	-120.1	120.54	0.003	Stop Drilling Now	
12,300.0	9,192.0	12,166.0	9,192.0	62.0	60.7	85.07	12,234.6	-52,438.8	0.4	-122.3	122.75	0.003	Stop Drilling Now	
12,317.1	9,192.0	12,183.2	9,192.0	62.3	61.0	85.07	12,217.5	-52,438.6	0.4	-122.8	123.23	0.003	Stop Drilling Now	
12,400.0	9,192.0	12,266.0	9,192.0	63.5	62.1	85.07	12,134.6	-52,438.0	0.4	-125.2	125.58	0.003	Stop Drilling Now	
12,417.1	9,192.0	12,283.2	9,192.0	63.7	62.4	85.07	12,117.5	-52,437.9	0.4	-125.7	126.06	0.003	Stop Drilling Now	
12,500.0	9,192.0	12,366.0	9,192.0	64.9	63.5	85.07	12,034.6	-52,437.2	0.4	-128.0	128.43	0.003	Stop Drilling Now	
12,502.2	9,192.0	12,368.2	9,192.0	64.9	63.6	85.07	12,032.5	-52,437.2	0.4	-128.1	128.49	0.003	Stop Drilling Now	
12,600.0	9,192.0	12,466.0	9,192.0	66.3	65.0	85.07	11,934.6	-52,436.5	0.4	-130.9	131.30	0.003	Stop Drilling Now	
12,700.0	9,192.0	12,566.0	9,192.0	67.8	66.4	85.07	11,834.6	-52,435.7	0.4	-133.8	134.19	0.003	Stop Drilling Now	
12,717.1	9,192.0	12,583.2	9,192.0	68.0	66.6	85.07	11,817.5	-52,435.6	0.4	-134.3	134.69	0.003	Stop Drilling Now	
12,800.0	9,192.0	12,666.0	9,192.0	69.3	67.8	85.07	11,734.6	-52,434.9	0.4	-136.7	137.10	0.003	Stop Drilling Now	
12,802.2	9,192.0	12,668.2	9,192.0	69.3	67.9	85.07	11,732.5	-52,434.9	0.4	-136.8	137.17	0.003	Stop Drilling Now	
12,900.0	9,192.0	12,766.0	9,192.0	70.7	69.3	85.07	11,634.6	-52,434.1	0.4	-139.6	140.03	0.003	Stop Drilling Now	
12,974.9	9,192.0	12,840.9	9,192.0	71.8	70.4	85.07	11,559.8	-52,433.6	0.4	-141.8	142.24	0.003	Stop Drilling Now	
13,000.0	9,192.0	12,866.0	9,192.0	72.2	70.8	85.07	11,534.6	-52,433.4	0.4	-142.6	142.98	0.003	Stop Drilling Now	
13,100.0	9,192.0	12,966.0	9,192.0	73.7	72.2	85.07	11,434.6	-52,432.6	0.4	-145.5	145.95	0.003	Stop Drilling Now	
13,117.1	9,192.0	12,983.2	9,192.0	74.0	72.5	85.07	11,417.5	-52,432.5	0.4	-146.0	146.46	0.003	Stop Drilling Now	
13,200.0	9,192.0	13,066.0	9,192.0	75.2	73.7	85.07	11,334.6	-52,431.8	0.4	-148.5	148.93	0.003	Stop Drilling Now	
13,202.2	9,192.0	13,068.2	9,192.0	75.2	73.8	85.07	11,332.5	-52,431.8	0.4	-148.6	149.00	0.003	Stop Drilling Now	
13,300.0	9,192.0	13,166.0	9,192.0	76.7	75.2	85.07	11,234.6	-52,431.1	0.4	-151.5	151.93	0.003	Stop Drilling Now	
13,400.0	9,192.0	13,266.0	9,192.0	78.2	76.7	85.07	11,134.6	-52,430.3	0.4	-154.5	154.94	0.003	Stop Drilling Now	
13,417.1	9,192.0	13,283.2	9,192.0	78.5	77.0	85.07	11,117.5	-52,430.2	0.4	-155.0	155.45	0.003	Stop Drilling Now	
13,500.0	9,192.0	13,366.0	9,192.0	79.7	78.2	85.07	11,034.6	-52,429.5	0.4	-157.5	157.96	0.003	Stop Drilling Now	
13,502.2	9,192.0	13,368.2	9,192.0	79.8	78.3	85.07	11,032.5	-52,429.5	0.4	-157.6	158.02	0.003	Stop Drilling Now	
13,600.0	9,192.0	13,466.0	9,192.0	81.2	79.7	85.07	10,934.6	-52,428.8	0.4	-160.6	160.99	0.003	Stop Drilling Now	
13,674.9	9,192.0	13,540.9	9,192.0	82.4	80.9	85.07	10,859.8	-52,428.2	0.4	-162.9	163.27	0.003	Stop Drilling Now	
13,700.0	9,192.0	13,566.0	9,192.0	82.8	81.3	85.07	10,834.7	-52,428.0	0.4	-163.6	164.04	0.002	Stop Drilling Now	
13,800.0	9,192.0	13,666.0	9,192.0	84.3	82.8	85.07	10,734.7	-52,427.2	0.4	-166.7	167.10	0.002	Stop Drilling Now	
13,802.2	9,192.0	13,668.2	9,192.0	84.3	82.8	85.07	10,732.5	-52,427.2	0.4	-166.8	167.16	0.002	Stop Drilling Now	
13,900.0	9,192.0	13,766.0	9,192.0	85.8	84.3	85.07	10,634.7	-52,426.5	0.4	-169.8	170.16	0.002	Stop Drilling Now	
13,974.2	9,192.0	13,840.3	9,192.0	87.0	85.5	85.07	10,560.4	-52,425.9	0.4	-172.0	172.45	0.002	Stop Drilling Now	
14,000.0	9,192.0	13,866.0	9,192.0	87.4	85.8	85.07	10,534.7	-52,425.7	0.4	-172.8	173.24	0.002	Stop Drilling Now	
14,100.0	9,192.0	13,966.0	9,192.0	88.9	87.4	85.07	10,434.7	-52,424.9	0.4	-175.9	176.33	0.002	Stop Drilling Now	
14,117.1	9,192.0	13,983.2	9,192.0	89.2	87.7	85.07	10,417.5	-52,424.8	0.4	-176.4	176.86	0.002	Stop Drilling Now	

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: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #5H
Well Error: 0.0 usft
Reference Wellbore: Lateral
Reference Design: DWD Plan 1 - negative VS

Local Co-ordinate Reference: Site AVALON SHALE
TVD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
MD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (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 AVALON SHALE - WINDWARD FEDERAL #5H - Lateral - DWD Plan 4 - straight down land and turn														Offset Site Error: 0.0 usft
Survey Program: 0-MWD														Offset Well Error: 0.0 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		
14,200.0	9,192.0	14,066.0	9,192.0	90.5	88.9	85.07	10,334.7	-52,424.2	0.4	-179.0	179.42	0.002	Stop Drilling Now	
14,202.2	9,192.0	14,068.2	9,192.0	90.5	89.0	85.07	10,332.5	-52,424.2	0.4	-179.1	179.49	0.002	Stop Drilling Now	
14,300.0	9,192.0	14,166.0	9,192.0	92.0	90.5	85.07	10,234.7	-52,423.4	0.4	-182.1	182.52	0.002	Stop Drilling Now	
14,374.9	9,192.0	14,240.9	9,192.0	93.2	91.6	85.07	10,159.8	-52,422.8	0.4	-184.4	184.85	0.002	Stop Drilling Now	
14,400.0	9,192.0	14,266.0	9,192.0	93.6	92.0	85.07	10,134.7	-52,422.6	0.4	-185.2	185.64	0.002	Stop Drilling Now	
14,500.0	9,192.0	14,366.0	9,192.0	95.2	93.6	85.07	10,034.7	-52,421.9	0.4	-188.3	188.75	0.002	Stop Drilling Now	
14,502.2	9,192.0	14,368.2	9,192.0	95.2	93.6	85.07	10,032.5	-52,421.8	0.4	-188.4	188.82	0.002	Stop Drilling Now	
14,600.0	9,192.0	14,466.0	9,192.0	96.7	95.1	85.07	9,934.7	-52,421.1	0.4	-191.5	191.88	0.002	Stop Drilling Now	
14,674.9	9,192.0	14,540.9	9,192.0	97.9	96.3	85.07	9,859.8	-52,420.5	0.4	-193.8	194.23	0.002	Stop Drilling Now	
14,700.0	9,192.0	14,566.0	9,192.0	98.3	96.7	85.07	9,834.7	-52,420.3	0.4	-194.6	195.01	0.002	Stop Drilling Now	
14,774.9	9,192.0	14,640.9	9,192.0	99.5	97.9	85.07	9,759.8	-52,419.8	0.4	-197.0	197.36	0.002	Stop Drilling Now	
14,800.0	9,192.0	14,666.0	9,192.0	99.9	98.3	85.07	9,734.7	-52,419.6	0.4	-197.7	198.15	0.002	Stop Drilling Now	
14,900.0	9,192.0	14,766.0	9,192.0	101.4	99.9	85.07	9,634.7	-52,418.8	0.4	-200.9	201.30	0.002	Stop Drilling Now	
14,902.2	9,192.0	14,768.2	9,192.0	101.5	99.9	85.07	9,632.5	-52,418.8	0.4	-201.0	201.37	0.002	Stop Drilling Now	
15,000.0	9,192.0	14,866.0	9,192.0	103.0	101.4	85.07	9,534.7	-52,418.0	0.4	-204.0	204.45	0.002	Stop Drilling Now	
15,074.9	9,192.0	14,940.9	9,192.0	104.2	102.6	85.07	9,459.8	-52,417.4	0.4	-206.4	206.81	0.002	Stop Drilling Now	
15,100.0	9,192.0	14,966.0	9,192.0	104.6	103.0	85.07	9,434.7	-52,417.3	0.4	-207.2	207.61	0.002	Stop Drilling Now	
15,200.0	9,192.0	15,066.0	9,192.0	106.2	104.6	85.07	9,334.7	-52,416.5	0.4	-210.4	210.77	0.002	Stop Drilling Now	
15,202.2	9,192.0	15,068.2	9,192.0	106.2	104.6	85.07	9,332.5	-52,416.5	0.4	-210.4	210.84	0.002	Stop Drilling Now	
15,300.0	9,192.0	15,166.0	9,192.0	107.8	106.2	85.07	9,234.7	-52,415.7	0.4	-213.5	213.94	0.002	Stop Drilling Now	
15,374.9	9,192.0	15,240.9	9,192.0	109.0	107.3	85.07	9,159.8	-52,415.1	0.4	-215.9	216.31	0.002	Stop Drilling Now	
15,400.0	9,192.0	15,266.0	9,192.0	109.4	107.7	85.07	9,134.7	-52,415.0	0.4	-216.7	217.11	0.002	Stop Drilling Now	
15,474.9	9,192.0	15,340.9	9,192.0	110.6	108.9	85.07	9,059.8	-52,414.4	0.4	-219.1	219.49	0.002	Stop Drilling Now	
15,500.0	9,192.0	15,366.0	9,192.0	111.0	109.3	85.07	9,034.7	-52,414.2	0.4	-219.9	220.28	0.002	Stop Drilling Now	
15,574.5	9,192.0	15,440.5	9,192.0	112.1	110.5	85.07	8,960.2	-52,413.6	0.4	-222.2	222.65	0.002	Stop Drilling Now	
15,600.0	9,192.0	15,466.0	9,192.0	112.5	110.9	85.07	8,934.7	-52,413.4	0.4	-223.1	223.47	0.002	Stop Drilling Now	
15,674.9	9,192.0	15,540.9	9,192.0	113.7	112.1	85.07	8,859.8	-52,412.8	0.4	-225.4	225.85	0.002	Stop Drilling Now	
15,700.0	9,192.0	15,566.0	9,192.0	114.1	112.5	85.07	8,834.7	-52,412.6	0.4	-226.2	226.65	0.002	Stop Drilling Now	
15,774.9	9,192.0	15,640.9	9,192.0	115.3	113.7	85.07	8,759.8	-52,412.1	0.4	-228.6	229.04	0.002	Stop Drilling Now	
15,800.0	9,192.0	15,666.0	9,192.0	115.7	114.1	85.07	8,734.7	-52,411.9	0.4	-229.4	229.84	0.002	Stop Drilling Now	
15,900.0	9,192.0	15,766.0	9,192.0	117.3	115.7	85.07	8,634.7	-52,411.1	0.4	-232.6	233.04	0.002	Stop Drilling Now	
15,902.2	9,192.0	15,768.2	9,192.0	117.4	115.7	85.07	8,632.6	-52,411.1	0.4	-232.7	233.10	0.002	Stop Drilling Now	
16,000.0	9,192.0	15,866.0	9,192.0	118.9	117.3	85.07	8,534.7	-52,410.3	0.4	-235.8	236.23	0.002	Stop Drilling Now	
16,074.9	9,192.0	15,940.9	9,192.0	120.1	118.5	85.07	8,459.9	-52,409.8	0.4	-238.2	238.63	0.002	Stop Drilling Now	
16,100.0	9,192.0	15,966.0	9,192.0	120.5	118.9	85.07	8,434.7	-52,409.6	0.4	-239.0	239.43	0.002	Stop Drilling Now	
16,174.9	9,192.0	16,040.9	9,192.0	121.7	120.1	85.07	8,359.9	-52,409.0	0.4	-241.4	241.83	0.002	Stop Drilling Now	
16,200.0	9,192.0	16,066.0	9,192.0	122.1	120.5	85.07	8,334.7	-52,408.8	0.4	-242.2	242.64	0.002	Stop Drilling Now	
16,278.9	9,192.0	16,144.9	9,192.0	123.4	121.8	85.07	8,255.9	-52,408.2	0.4	-244.8	245.17	0.002	Stop Drilling Now	
16,300.0	9,192.0	16,166.0	9,192.0	123.8	122.1	85.07	8,234.7	-52,408.0	0.4	-245.4	245.85	0.002	Stop Drilling Now	
16,374.9	9,192.0	16,240.9	9,192.0	125.0	123.3	85.07	8,159.9	-52,407.5	0.4	-247.8	248.25	0.002	Stop Drilling Now	
16,400.0	9,192.0	16,266.0	9,192.0	125.4	123.7	85.07	8,134.7	-52,407.3	0.4	-248.6	249.06	0.002	Stop Drilling Now	
16,474.9	9,192.0	16,340.9	9,192.0	126.6	124.9	85.07	8,059.9	-52,406.7	0.4	-251.1	251.47	0.002	Stop Drilling Now	
16,500.0	9,192.0	16,366.0	9,192.0	127.0	125.3	85.07	8,034.7	-52,406.5	0.4	-251.9	252.27	0.002	Stop Drilling Now	
16,600.0	9,192.0	16,466.0	9,192.0	128.6	126.9	85.07	7,934.7	-52,405.7	0.4	-255.1	255.49	0.002	Stop Drilling Now	
16,690.8	9,192.0	16,556.8	9,192.0	130.0	128.4	85.07	7,844.0	-52,405.0	0.4	-258.0	258.41	0.002	Stop Drilling Now	
16,700.0	9,192.0	16,566.0	9,192.0	130.2	128.5	85.07	7,834.7	-52,405.0	0.4	-258.3	258.71	0.002	Stop Drilling Now	
16,778.9	9,192.0	16,644.9	9,192.0	131.5	129.8	85.07	7,755.9	-52,404.4	0.4	-260.8	261.25	0.002	Stop Drilling Now	
16,800.0	9,192.0	16,666.0	9,192.0	131.8	130.1	85.07	7,734.7	-52,404.2	0.4	-261.5	261.93	0.002	Stop Drilling Now	
16,874.9	9,192.0	16,740.9	9,192.0	133.0	131.3	85.07	7,659.9	-52,403.6	0.4	-263.9	264.35	0.002	Stop Drilling Now	
16,900.0	9,192.0	16,766.0	9,192.0	133.4	131.7	85.07	7,634.7	-52,403.4	0.4	-264.8	265.16	0.002	Stop Drilling Now	
16,979.2	9,192.0	16,845.3	9,192.0	134.7	133.0	85.07	7,555.5	-52,402.8	0.4	-267.3	267.72	0.002	Stop Drilling Now	

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: AVALON SHALE
 Site Error: 0.0 usft
 Reference Well: WINDWARD FEDERAL #5H
 Well Error: 0.0 usft
 Reference Wellbore: Lateral
 Reference Design: DWD Plan 1 - negative VS

Local Co-ordinate Reference: Site AVALON SHALE
 TVD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
 MD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (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 AVALON SHALE - WINDWARD FEDERAL #5H - Lateral - DWD Plan 4 - straight down land and turn														Offset Site Error: 0.0 usft
Survey Program: 0-MWD														Offset Well Error: 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		
17,000.0	9,192.0	16,866.0	9,192.0	135.0	133.4	85.07	7,534.7	-52,402.7	0.4	-268.0	268.39	0.002	Stop Drilling Now	
17,078.9	9,192.0	16,944.9	9,192.0	136.3	134.6	85.07	7,455.9	-52,402.1	0.4	-270.5	270.94	0.002	Stop Drilling Now	
17,100.0	9,192.0	16,966.0	9,192.0	136.6	135.0	85.07	7,434.8	-52,401.9	0.4	-271.2	271.62	0.002	Stop Drilling Now	
17,174.9	9,192.0	17,040.9	9,192.0	137.9	136.2	85.07	7,359.9	-52,401.3	0.4	-273.6	274.04	0.001	Stop Drilling Now	
17,200.0	9,192.0	17,066.0	9,192.0	138.3	136.6	85.07	7,334.8	-52,401.1	0.4	-274.4	274.85	0.001	Stop Drilling Now	
17,300.0	9,192.0	17,166.0	9,192.0	139.9	138.2	85.07	7,234.8	-52,400.4	0.4	-277.7	278.09	0.001	Stop Drilling Now	
17,390.8	9,192.0	17,256.8	9,192.0	141.4	139.7	85.07	7,144.0	-52,399.7	0.4	-280.6	281.03	0.001	Stop Drilling Now	
17,400.0	9,192.0	17,266.0	9,192.0	141.5	139.8	85.07	7,134.8	-52,399.6	0.4	-280.9	281.33	0.001	Stop Drilling Now	
17,478.9	9,192.0	17,344.9	9,192.0	142.8	141.1	85.07	7,055.9	-52,399.0	0.4	-283.5	283.88	0.001	Stop Drilling Now	
17,500.0	9,192.0	17,366.0	9,192.0	143.1	141.4	85.07	7,034.8	-52,398.8	0.4	-284.2	284.57	0.001	Stop Drilling Now	
17,574.9	9,192.0	17,440.9	9,192.0	144.3	142.7	85.07	6,959.9	-52,398.2	0.4	-286.6	286.99	0.001	Stop Drilling Now	
17,600.0	9,192.0	17,466.0	9,192.0	144.7	143.1	85.07	6,934.8	-52,398.1	0.4	-287.4	287.81	0.001	Stop Drilling Now	
17,678.9	9,192.0	17,544.9	9,192.0	146.0	144.3	85.07	6,855.9	-52,397.5	0.4	-290.0	290.37	0.001	Stop Drilling Now	
17,700.0	9,192.0	17,566.0	9,192.0	146.4	144.7	85.07	6,834.8	-52,397.3	0.4	-290.6	291.05	0.001	Stop Drilling Now	
17,774.5	9,192.0	17,640.5	9,192.0	147.6	145.9	85.07	6,760.3	-52,396.7	0.4	-293.1	293.47	0.001	Stop Drilling Now	
17,800.0	9,192.0	17,666.0	9,192.0	148.0	146.3	85.07	6,734.8	-52,396.5	0.4	-293.9	294.30	0.001	Stop Drilling Now	
17,874.9	9,192.0	17,740.9	9,192.0	149.2	147.5	85.07	6,659.9	-52,395.9	0.4	-296.3	296.73	0.001	Stop Drilling Now	
17,900.0	9,192.0	17,766.0	9,192.0	149.6	147.9	85.07	6,634.8	-52,395.8	0.4	-297.1	297.55	0.001	Stop Drilling Now	
18,000.0	9,192.0	17,866.0	9,192.0	151.2	149.6	85.07	6,534.8	-52,395.0	0.4	-300.4	300.80	0.001	Stop Drilling Now	
18,090.8	9,192.0	17,956.8	9,192.0	152.7	151.0	85.07	6,444.0	-52,394.3	0.4	-303.3	303.75	0.001	Stop Drilling Now	
18,100.0	9,192.0	17,966.0	9,192.0	152.9	151.2	85.07	6,434.8	-52,394.2	0.4	-303.6	304.05	0.001	Stop Drilling Now	
18,174.9	9,192.0	18,040.9	9,192.0	154.1	152.4	85.07	6,359.9	-52,393.6	0.4	-306.1	306.48	0.001	Stop Drilling Now	
18,200.0	9,192.0	18,066.0	9,192.0	154.5	152.8	85.07	6,334.8	-52,393.4	0.4	-306.9	307.30	0.001	Stop Drilling Now	
18,300.0	9,192.0	18,166.0	9,192.0	156.1	154.4	85.07	6,234.8	-52,392.7	0.4	-310.1	310.56	0.001	Stop Drilling Now	
18,390.8	9,192.0	18,256.8	9,192.0	157.6	155.9	85.07	6,144.0	-52,392.0	0.4	-313.1	313.51	0.001	Stop Drilling Now	
18,400.0	9,192.0	18,266.0	9,192.0	157.8	156.1	85.07	6,134.8	-52,391.9	0.4	-313.4	313.81	0.001	Stop Drilling Now	
18,478.9	9,192.0	18,344.9	9,192.0	159.0	157.3	85.07	6,059.9	-52,391.3	0.4	-316.0	316.38	0.001	Stop Drilling Now	
18,500.0	9,192.0	18,366.0	9,192.0	159.4	157.7	85.07	6,034.8	-52,391.1	0.4	-316.7	317.07	0.001	Stop Drilling Now	
18,574.9	9,192.0	18,440.9	9,192.0	160.6	158.9	85.07	5,959.9	-52,390.6	0.4	-319.1	319.51	0.001	Stop Drilling Now	
18,600.0	9,192.0	18,466.0	9,192.0	161.0	159.3	85.07	5,934.8	-52,390.4	0.4	-319.9	320.33	0.001	Stop Drilling Now	
18,700.0	9,192.0	18,566.0	9,192.0	162.6	160.9	85.07	5,834.8	-52,389.6	0.4	-323.2	323.59	0.001	Stop Drilling Now	
18,790.8	9,192.0	18,656.8	9,192.0	164.1	162.4	85.07	5,744.0	-52,388.9	0.4	-326.1	326.55	0.001	Stop Drilling Now	
18,800.0	9,192.0	18,666.0	9,192.0	164.3	162.6	85.07	5,734.8	-52,388.8	0.4	-326.4	326.85	0.001	Stop Drilling Now	
18,874.9	9,192.0	18,740.9	9,192.0	165.5	163.8	85.07	5,659.9	-52,388.3	0.4	-328.9	329.30	0.001	Stop Drilling Now	
18,900.0	9,192.0	18,766.0	9,192.0	165.9	164.2	85.07	5,634.8	-52,388.1	0.4	-329.7	330.12	0.001	Stop Drilling Now	
19,000.0	9,192.0	18,866.0	9,192.0	167.5	165.8	85.07	5,534.8	-52,387.3	0.4	-333.0	333.38	0.001	Stop Drilling Now	
19,078.9	9,192.0	18,944.9	9,192.0	168.8	167.1	85.07	5,455.9	-52,386.7	0.4	-335.5	335.96	0.001	Stop Drilling Now	
19,100.0	9,192.0	18,966.0	9,192.0	169.2	167.5	85.07	5,434.8	-52,386.5	0.4	-336.2	336.65	0.001	Stop Drilling Now	
19,190.8	9,192.0	19,056.8	9,192.0	170.7	168.9	85.07	5,344.1	-52,385.8	0.4	-339.2	339.61	0.001	Stop Drilling Now	
19,200.0	9,192.0	19,066.0	9,192.0	170.8	169.1	85.07	5,334.8	-52,385.8	0.4	-339.5	339.92	0.001	Stop Drilling Now	
19,300.0	9,192.0	19,166.0	9,192.0	172.5	170.7	85.07	5,234.8	-52,385.0	0.4	-342.8	343.18	0.001	Stop Drilling Now	
19,378.9	9,192.0	19,244.9	9,192.0	173.7	172.0	85.07	5,156.0	-52,384.4	0.4	-345.4	345.76	0.001	Stop Drilling Now	
19,400.0	9,192.0	19,266.0	9,192.0	174.1	172.4	85.07	5,134.8	-52,384.2	0.4	-346.0	346.46	0.001	Stop Drilling Now	
19,427.8	9,192.0	19,293.9	9,192.0	174.5	172.8	85.07	5,107.0	-52,384.0	0.4	-347.0	347.36	0.001	Stop Drilling Now	
19,449.2	9,192.0	19,315.3	9,192.0	174.9	173.2	85.07	5,085.6	-52,383.9	0.4	-347.7	348.07	0.001	Stop Drilling Now, ES	

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: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #5H
Well Error: 0.0 usft
Reference Wellbore: Lateral
Reference Design: DWD Plan 1 - negative VS

Local Co-ordinate Reference: Site AVALON SHALE
TVD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
MD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (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 AVALON SHALE - WINDWARD FEDERAL #6H - Wellbore #1 - DWD Plan 1												Offset Site Error: 0.0 usft
Survey Program: 0- VES GyroFlex, 8600-MWD												Offset Well Error: 0.0 usft
Reference	Offset	Semi Major Axis		Distance		Minimum Separation		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	0.0	0.0	0.0	0.0	89.62	15,385.0	-52,216.7	30.0			
100.0	100.0	99.0	99.0	0.1	0.1	89.62	15,385.0	-52,216.7	30.0	29.8	0.19	158.051
200.0	200.0	199.0	199.0	0.5	0.2	89.62	15,385.0	-52,216.7	30.0	29.3	0.70	42.650
300.0	300.0	299.0	299.0	0.8	0.4	89.62	15,385.0	-52,216.7	30.0	28.8	1.22	24.631
400.0	400.0	399.0	399.0	1.2	0.5	89.62	15,385.0	-52,216.7	30.0	28.3	1.73	17.316
500.0	500.0	499.0	499.0	1.6	0.7	89.62	15,385.0	-52,216.7	30.0	27.8	2.25	13.351
600.0	600.0	599.0	599.0	1.9	0.8	89.62	15,385.0	-52,216.7	30.0	27.2	2.76	10.863
700.0	700.0	699.0	699.0	2.3	1.0	89.62	15,385.0	-52,216.7	30.0	26.7	3.28	9.157
800.0	800.0	799.0	799.0	2.6	1.1	89.62	15,385.0	-52,216.7	30.0	26.2	3.79	7.914
900.0	900.0	899.0	899.0	3.0	1.3	89.62	15,385.0	-52,216.7	30.0	25.7	4.31	6.968
1,000.0	1,000.0	999.0	999.0	3.4	1.5	89.62	15,385.0	-52,216.7	30.0	25.2	4.82	6.224 CC, ES
1,096.6	1,096.6	1,094.6	1,094.5	3.7	1.6	142.67	15,385.5	-52,215.2	32.8	27.5	5.27	6.213
1,100.0	1,100.0	1,097.9	1,097.9	3.7	1.6	142.72	15,385.6	-52,215.1	33.0	27.7	5.29	6.231
1,200.0	1,199.9	1,196.6	1,196.5	4.1	1.7	143.13	15,387.2	-52,210.4	40.5	34.7	5.73	7.062
1,300.0	1,299.9	1,296.3	1,295.9	4.4	1.8	142.87	15,389.4	-52,204.3	49.2	43.0	6.18	7.960
1,400.0	1,399.8	1,395.9	1,395.3	4.8	1.9	142.69	15,391.5	-52,198.3	57.9	51.3	6.64	8.725
1,500.0	1,499.8	1,495.5	1,494.7	5.1	2.0	142.56	15,393.7	-52,192.2	66.6	59.5	7.10	9.380
1,600.0	1,599.7	1,595.1	1,594.1	5.5	2.1	142.46	15,395.8	-52,186.2	75.3	67.8	7.57	9.947
1,700.0	1,699.6	1,694.7	1,693.5	5.9	2.2	142.37	15,397.9	-52,180.2	84.1	76.0	8.05	10.439
1,800.0	1,799.6	1,794.4	1,793.0	6.2	2.3	142.31	15,400.1	-52,174.1	92.8	84.2	8.53	10.871
1,900.0	1,899.5	1,894.0	1,892.4	6.6	2.5	142.25	15,402.2	-52,168.1	101.5	92.5	9.02	11.251
2,000.0	1,999.5	1,993.6	1,991.8	6.9	2.6	142.21	15,404.3	-52,162.0	110.2	100.7	9.51	11.589
2,100.0	2,099.4	2,093.2	2,091.2	7.3	2.7	142.17	15,406.5	-52,156.0	118.9	108.9	10.00	11.890
2,200.0	2,199.4	2,192.8	2,190.6	7.6	2.9	142.13	15,408.6	-52,150.0	127.7	117.2	10.50	12.159
2,300.0	2,299.3	2,292.4	2,290.0	8.0	3.0	142.11	15,410.7	-52,143.9	136.4	125.4	11.00	12.403
2,400.0	2,399.2	2,392.1	2,389.4	8.4	3.1	142.08	15,412.9	-52,137.9	145.1	133.6	11.50	12.622
2,500.0	2,499.2	2,491.7	2,488.9	8.7	3.3	142.06	15,415.0	-52,131.8	153.8	141.8	12.00	12.822
2,600.0	2,599.1	2,591.3	2,588.3	9.1	3.4	142.04	15,417.2	-52,125.8	162.5	150.0	12.50	13.005
2,700.0	2,699.1	2,690.9	2,687.7	9.4	3.6	142.02	15,419.3	-52,119.8	171.3	158.3	13.00	13.172
2,800.0	2,799.0	2,790.5	2,787.1	9.8	3.7	142.00	15,421.4	-52,113.7	180.0	166.5	13.51	13.325
2,900.0	2,899.0	2,890.2	2,886.5	10.2	3.8	141.98	15,423.6	-52,107.7	188.7	174.7	14.01	13.466
3,000.0	2,998.9	2,989.8	2,985.9	10.5	4.0	141.97	15,425.7	-52,101.6	197.4	182.9	14.52	13.597
3,100.0	3,098.8	3,089.4	3,085.3	10.9	4.1	141.96	15,427.8	-52,095.6	206.1	191.1	15.03	13.718
3,200.0	3,198.8	3,189.0	3,184.7	11.3	4.3	141.95	15,430.0	-52,089.6	214.9	199.3	15.54	13.831
3,300.0	3,298.7	3,288.6	3,284.2	11.6	4.4	141.94	15,432.1	-52,083.5	223.6	207.5	16.04	13.936
3,400.0	3,398.7	3,388.3	3,383.6	12.0	4.6	141.93	15,434.3	-52,077.5	232.3	215.8	16.55	14.034
3,500.0	3,498.6	3,487.9	3,483.0	12.3	4.7	141.92	15,436.4	-52,071.5	241.0	224.0	17.06	14.126
3,600.0	3,598.6	3,587.5	3,582.4	12.7	4.9	141.91	15,438.5	-52,065.4	249.7	232.2	17.57	14.212
3,700.0	3,698.5	3,687.1	3,681.8	13.1	5.0	141.90	15,440.7	-52,059.4	258.5	240.4	18.08	14.292
3,800.0	3,798.4	3,786.7	3,781.2	13.4	5.2	141.89	15,442.8	-52,053.3	267.2	248.6	18.60	14.368
3,900.0	3,898.4	3,886.4	3,880.6	13.8	5.3	141.89	15,444.9	-52,047.3	275.9	256.8	19.11	14.440
4,000.0	3,998.3	3,986.0	3,980.0	14.1	5.5	141.88	15,447.1	-52,041.3	284.6	265.0	19.62	14.508
4,100.0	4,098.3	4,085.6	4,079.5	14.5	5.6	141.87	15,449.2	-52,035.2	293.4	273.2	20.13	14.572
4,200.0	4,198.2	4,185.2	4,178.9	14.9	5.8	141.87	15,451.3	-52,029.2	302.1	281.4	20.64	14.632
4,300.0	4,298.2	4,284.8	4,278.3	15.2	5.9	141.86	15,453.5	-52,023.1	310.8	289.6	21.16	14.690
4,400.0	4,398.1	4,384.4	4,377.7	15.6	6.1	141.86	15,455.6	-52,017.1	319.5	297.8	21.67	14.744
4,500.0	4,498.0	4,484.1	4,477.1	15.9	6.2	141.85	15,457.8	-52,011.1	328.2	306.1	22.18	14.796
4,600.0	4,598.0	4,583.7	4,576.5	16.3	6.4	141.85	15,459.9	-52,005.0	337.0	314.3	22.70	14.845
4,700.0	4,697.9	4,683.3	4,675.9	16.7	6.5	141.84	15,462.0	-51,999.0	345.7	322.5	23.21	14.893
4,800.0	4,797.9	4,782.9	4,775.3	17.0	6.7	141.84	15,464.2	-51,992.9	354.4	330.7	23.73	14.937
4,900.0	4,897.8	4,882.5	4,874.8	17.4	6.8	141.83	15,466.3	-51,986.9	363.1	338.9	24.24	14.980

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: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #5H
Well Error: 0.0 usft
Reference Wellbore: Lateral
Reference Design: DWD Plan 1 - negative VS

Local Co-ordinate Reference: Site AVALON SHALE
TVD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
MD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (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 AVALON SHALE - WINDWARD FEDERAL #6H - Wellbore #1 - DWD Plan 1														Offset Site Error: 0.0 usft
Survey Program: 0- VES GyroFlex, 8600-MWD														Offset Well Error: 0.0 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		
5,000.0	4,997.8	4,982.2	4,974.2	17.8	7.0	141.83	15,468.4	-51,980.9	371.8	347.1	24.75	15.021		
5,100.0	5,097.7	5,081.8	5,073.6	18.1	7.2	141.83	15,470.6	-51,974.8	380.6	355.3	25.27	15.061		
5,200.0	5,197.6	5,181.4	5,173.0	18.5	7.3	141.82	15,472.7	-51,968.8	389.3	363.5	25.78	15.098		
5,300.0	5,297.6	5,281.0	5,272.4	18.8	7.5	141.82	15,474.9	-51,962.7	398.0	371.7	26.30	15.134		
5,400.0	5,397.5	5,380.6	5,371.8	19.2	7.6	141.82	15,477.0	-51,956.7	406.7	379.9	26.81	15.169		
5,500.0	5,497.5	5,480.3	5,471.2	19.6	7.8	141.81	15,479.1	-51,950.7	415.4	388.1	27.33	15.202		
5,600.0	5,597.4	5,579.9	5,570.6	19.9	7.9	141.81	15,481.3	-51,944.6	424.2	396.3	27.84	15.234		
5,700.0	5,697.4	5,679.5	5,670.1	20.3	8.1	141.81	15,483.4	-51,938.6	432.9	404.5	28.36	15.264		
5,800.0	5,797.3	5,779.1	5,769.5	20.6	8.2	141.81	15,485.5	-51,932.5	441.6	412.7	28.87	15.294		
5,900.0	5,897.3	5,878.7	5,868.9	21.0	8.4	141.80	15,487.7	-51,926.5	450.3	420.9	29.39	15.322		
6,000.0	5,997.2	5,978.3	5,968.3	21.4	8.5	141.80	15,489.8	-51,920.5	459.0	429.1	29.91	15.350		
6,100.0	6,097.1	6,078.0	6,067.7	21.7	8.7	141.80	15,491.9	-51,914.4	467.8	437.3	30.42	15.376		
6,200.0	6,197.1	6,177.6	6,167.1	22.1	8.8	141.80	15,494.1	-51,908.4	476.5	445.6	30.94	15.401		
6,300.0	6,297.0	6,277.2	6,266.5	22.5	9.0	141.79	15,496.2	-51,902.3	485.2	453.8	31.45	15.426		
6,400.0	6,397.0	6,376.8	6,365.9	22.8	9.2	141.79	15,498.4	-51,896.3	493.9	462.0	31.97	15.450		
6,500.0	6,496.9	6,476.4	6,465.4	23.2	9.3	141.79	15,500.5	-51,890.3	502.7	470.2	32.49	15.472		
6,600.0	6,596.9	6,576.1	6,564.8	23.5	9.5	141.79	15,502.6	-51,884.2	511.4	478.4	33.00	15.495		
6,700.0	6,696.8	6,675.7	6,664.2	23.9	9.6	141.79	15,504.8	-51,878.2	520.1	486.6	33.52	15.516		
6,800.0	6,796.7	6,775.3	6,763.6	24.3	9.8	141.78	15,506.9	-51,872.1	528.8	494.8	34.04	15.537		
6,900.0	6,896.7	6,874.9	6,863.0	24.6	9.9	141.78	15,509.0	-51,866.1	537.5	503.0	34.55	15.557		
7,000.0	6,996.6	6,974.5	6,962.4	25.0	10.1	141.78	15,511.2	-51,860.1	546.3	511.2	35.07	15.576		
7,100.0	7,096.6	7,074.2	7,061.8	25.3	10.2	141.78	15,513.3	-51,854.0	555.0	519.4	35.59	15.595		
7,200.0	7,196.5	7,173.8	7,161.3	25.7	10.4	141.78	15,515.4	-51,848.0	563.7	527.6	36.10	15.613		
7,300.0	7,296.5	7,273.4	7,260.7	26.1	10.5	141.77	15,517.6	-51,841.9	572.4	535.8	36.62	15.631		
7,400.0	7,396.4	7,373.0	7,360.1	26.4	10.7	141.77	15,519.7	-51,835.9	581.1	544.0	37.14	15.648		
7,500.0	7,496.3	7,472.6	7,459.5	26.8	10.9	141.77	15,521.9	-51,829.9	589.9	552.2	37.65	15.665		
7,600.0	7,596.3	7,572.3	7,558.9	27.2	11.0	141.77	15,524.0	-51,823.8	598.6	560.4	38.17	15.681		
7,700.0	7,696.2	7,671.9	7,658.3	27.5	11.2	141.77	15,526.1	-51,817.8	607.3	568.6	38.69	15.697		
7,800.0	7,796.2	7,771.5	7,757.7	27.9	11.3	141.77	15,528.3	-51,811.7	616.0	576.8	39.21	15.712		
7,900.0	7,896.1	7,871.1	7,857.1	28.2	11.5	141.77	15,530.4	-51,805.7	624.7	585.0	39.73	15.726		
8,000.0	7,996.1	7,970.7	7,956.6	28.6	11.6	141.76	15,532.5	-51,799.7	633.5	593.2	40.24	15.741		
8,100.0	8,096.0	8,070.3	8,056.0	29.0	11.8	141.76	15,534.7	-51,793.6	642.2	601.4	40.76	15.755		
8,200.0	8,195.9	8,170.0	8,155.4	29.3	11.9	141.76	15,536.8	-51,787.6	650.9	609.6	41.28	15.768		
8,300.0	8,295.9	8,269.6	8,254.8	29.7	12.1	141.76	15,539.0	-51,781.5	659.6	617.8	41.80	15.781		
8,400.0	8,395.8	8,369.2	8,354.2	30.1	12.3	141.76	15,541.1	-51,775.5	668.3	626.0	42.32	15.794		
8,500.0	8,495.8	8,468.8	8,453.6	30.4	12.4	141.76	15,543.2	-51,769.5	677.1	634.2	42.84	15.806		
8,600.0	8,595.7	8,568.4	8,553.0	30.8	12.5	141.76	15,545.4	-51,763.4	685.8	642.5	43.36	15.818		
8,709.1	8,704.8	8,677.1	8,661.5	31.2	12.5	141.76	15,547.7	-51,756.8	695.3	651.6	43.70	15.911		
8,725.0	8,720.6	8,693.0	8,677.3	31.2	12.5	-154.74	15,548.0	-51,755.9	696.7	652.9	43.76	15.922		
8,750.0	8,745.6	8,717.8	8,702.1	31.3	12.5	-112.03	15,548.6	-51,754.4	698.9	655.0	43.85	15.939		
8,775.0	8,770.5	8,742.7	8,726.9	31.4	12.5	-102.49	15,548.8	-51,752.9	701.1	657.1	43.93	15.958		
8,800.0	8,795.2	8,767.7	8,751.9	31.5	12.5	-98.59	15,547.8	-51,751.3	703.2	659.2	44.02	15.977		
8,825.0	8,819.7	8,792.9	8,776.9	31.5	12.6	-96.48	15,545.5	-51,749.8	705.4	661.3	44.10	15.996		
8,850.0	8,844.0	8,818.2	8,801.9	31.6	12.6	-95.16	15,541.9	-51,748.2	707.5	663.4	44.18	16.015		
8,875.0	8,867.8	8,843.7	8,826.8	31.7	12.6	-94.24	15,536.9	-51,746.7	709.7	665.4	44.26	16.034		
8,900.0	8,891.3	8,869.3	8,851.6	31.8	12.6	-93.57	15,530.5	-51,745.1	711.8	667.4	44.34	16.053		
8,925.0	8,914.3	8,895.0	8,876.1	31.8	12.6	-93.06	15,522.7	-51,743.6	713.8	669.4	44.42	16.070		
8,950.0	8,936.7	8,920.9	8,900.3	31.9	12.6	-92.65	15,513.6	-51,742.0	715.9	671.4	44.50	16.087		
8,975.0	8,958.5	8,947.0	8,924.1	32.0	12.6	-92.32	15,503.2	-51,740.5	717.8	673.3	44.58	16.103		
9,000.0	8,979.6	8,973.2	8,947.4	32.0	12.6	-92.04	15,491.3	-51,739.0	719.8	675.1	44.66	16.117		

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	Local Co-ordinate Reference:	Site AVALON SHALE
Project:	LEA COUNTY, NM	TVD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Reference Site:	AVALON SHALE	MD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	WINDWARD FEDERAL #5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Lateral	Database:	EDM_Users
Reference Design:	DWD Plan 1 - negative VS	Offset TVD Reference:	Offset Datum

Offset Design AVALON SHALE - WINDWARD FEDERAL #6H - Wellbore #1 - DWD Plan 1														Offset Site Error:	0.0 usft
Survey Program: 0- VES GyroFlex, 8600-MWD														Offset Well Error:	0.0 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Semi Major Axis (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
9,025.0	9,000.0	8,999.5	8,970.2	32.1	12.7	-91.81		15,478.2	-51,737.5	721.6	676.9	44.74	16.129		
9,050.0	9,019.7	9,026.0	8,992.3	32.1	12.7	-91.61		15,463.7	-51,736.0	723.4	678.6	44.83	16.139		
9,075.0	9,038.5	9,052.7	9,013.7	32.2	12.8	-91.44		15,447.9	-51,734.6	725.2	680.3	44.92	16.145		
9,100.0	9,056.4	9,079.4	9,034.3	32.2	12.8	-91.30		15,430.8	-51,733.2	726.8	681.8	45.01	16.148		
9,125.0	9,073.4	9,106.4	9,054.0	32.3	12.9	-91.17		15,412.6	-51,731.9	728.4	683.3	45.11	16.146		
9,150.0	9,089.3	9,133.4	9,072.7	32.3	12.9	-91.05		15,393.1	-51,730.6	729.9	684.7	45.23	16.139		
9,175.0	9,104.3	9,160.6	9,090.4	32.3	13.0	-90.95		15,372.5	-51,729.4	731.3	685.9	45.35	16.125		
9,200.0	9,118.2	9,187.8	9,107.0	32.4	13.1	-90.87		15,350.9	-51,728.2	732.6	687.1	45.49	16.104		
9,225.0	9,131.0	9,215.2	9,122.3	32.5	13.2	-90.79		15,328.2	-51,727.1	733.8	688.2	45.65	16.075		
9,250.0	9,142.6	9,242.7	9,136.4	32.5	13.3	-90.73		15,304.6	-51,726.0	734.9	689.1	45.82	16.039		
9,275.0	9,153.1	9,270.3	9,149.1	32.6	13.4	-90.67		15,280.2	-51,725.1	735.9	689.9	46.01	15.995		
9,300.0	9,162.4	9,298.0	9,160.5	32.6	13.6	-90.62		15,254.9	-51,724.2	736.8	690.6	46.21	15.944		
9,325.0	9,170.4	9,325.8	9,170.4	32.7	13.7	-90.58		15,229.0	-51,723.4	737.5	691.1	46.43	15.886		
9,350.0	9,177.2	9,353.6	9,178.8	32.8	13.9	-90.54		15,202.5	-51,722.7	738.2	691.5	46.66	15.820		
9,375.0	9,182.8	9,381.5	9,185.6	32.8	14.1	-90.52		15,175.5	-51,722.1	738.7	691.8	46.91	15.748		
9,400.0	9,187.0	9,409.4	9,190.9	32.9	14.3	-90.49		15,148.0	-51,721.5	739.1	691.9	47.17	15.669		
9,425.0	9,190.0	9,437.4	9,194.5	33.0	14.5	-90.48		15,120.3	-51,721.1	739.4	691.9	47.45	15.583		
9,450.0	9,191.6	9,465.4	9,196.5	33.1	14.7	-90.47		15,092.4	-51,720.7	739.5	691.8	47.74	15.492		
9,469.1	9,192.0	9,486.6	9,197.0	33.1	14.9	-90.46		15,071.2	-51,720.6	739.6	691.6	47.96	15.420		
9,500.0	9,192.0	9,517.6	9,197.0	33.2	15.1	-90.46		15,040.2	-51,720.3	739.6	691.3	48.32	15.304		
9,600.0	9,192.0	9,617.6	9,197.0	33.6	16.0	-90.46		14,940.2	-51,719.6	739.6	690.0	49.60	14.910		
9,628.7	9,192.0	9,646.3	9,197.0	33.7	16.3	-90.46		14,911.5	-51,719.3	739.6	689.6	50.02	14.786		
9,700.0	9,192.0	9,717.6	9,197.0	34.0	17.1	-90.46		14,840.2	-51,718.8	739.6	688.5	51.08	14.479		
9,800.0	9,192.0	9,817.6	9,197.0	34.5	18.2	-90.46		14,740.2	-51,718.0	739.6	686.9	52.73	14.027		
9,900.0	9,192.0	9,917.6	9,197.0	35.1	19.5	-90.46		14,640.2	-51,717.2	739.6	685.1	54.53	13.564		
9,928.7	9,192.0	9,946.3	9,197.0	35.3	19.8	-90.46		14,611.6	-51,717.0	739.6	684.5	55.08	13.428		
10,000.0	9,192.0	10,017.6	9,197.0	35.7	20.7	-90.46		14,540.2	-51,716.5	739.6	683.1	56.46	13.099		
10,073.9	9,192.0	10,091.5	9,197.0	36.2	21.7	-90.46		14,466.4	-51,715.9	739.6	681.6	57.97	12.758		
10,100.0	9,192.0	10,117.6	9,197.0	36.4	22.1	-90.46		14,440.2	-51,715.7	739.6	681.1	58.51	12.640		
10,200.0	9,192.0	10,217.6	9,197.0	37.2	23.5	-90.46		14,340.2	-51,714.9	739.6	678.9	60.67	12.190		
10,300.0	9,192.0	10,317.6	9,197.0	38.0	24.9	-90.46		14,240.2	-51,714.2	739.6	676.7	62.92	11.754		
10,328.7	9,192.0	10,346.3	9,197.0	38.3	25.3	-90.46		14,211.6	-51,714.0	739.6	676.0	63.59	11.630		
10,400.0	9,192.0	10,417.6	9,197.0	38.9	26.4	-90.46		14,140.2	-51,713.4	739.6	674.3	65.26	11.333		
10,500.0	9,192.0	10,517.6	9,197.0	39.8	27.9	-90.46		14,040.2	-51,712.6	739.6	671.9	67.67	10.929		
10,600.0	9,192.0	10,617.6	9,197.0	40.8	29.4	-90.46		13,940.2	-51,711.9	739.6	669.4	70.15	10.543		
10,628.7	9,192.0	10,646.3	9,197.0	41.1	29.8	-90.46		13,911.6	-51,711.7	739.6	668.7	70.87	10.435		
10,700.0	9,192.0	10,717.6	9,197.0	41.8	30.9	-90.46		13,840.2	-51,711.1	739.6	666.9	72.69	10.175		
10,773.9	9,192.0	10,791.5	9,197.0	42.6	32.0	-90.46		13,766.4	-51,710.5	739.6	665.0	74.60	9.914		
10,800.0	9,192.0	10,817.6	9,197.0	42.9	32.4	-90.46		13,740.2	-51,710.3	739.6	664.3	75.28	9.824		
10,900.0	9,192.0	10,917.6	9,197.0	44.0	34.0	-90.46		13,640.3	-51,709.6	739.6	661.7	77.93	9.491		
11,000.0	9,192.0	11,017.6	9,197.0	45.1	35.5	-90.46		13,540.3	-51,708.8	739.6	659.0	80.62	9.174		
11,028.7	9,192.0	11,046.3	9,197.0	45.4	36.0	-90.46		13,511.6	-51,708.6	739.6	658.2	81.40	9.086		
11,100.0	9,192.0	11,117.6	9,197.0	46.3	37.1	-90.46		13,440.3	-51,708.0	739.6	656.2	83.35	8.873		
11,173.9	9,192.0	11,191.5	9,197.0	47.1	38.3	-90.46		13,366.4	-51,707.5	739.6	654.2	85.40	8.660		
11,200.0	9,192.0	11,217.6	9,197.0	47.5	38.7	-90.46		13,340.3	-51,707.3	739.6	653.5	86.12	8.588		
11,300.0	9,192.0	11,317.6	9,197.0	48.7	40.3	-90.46		13,240.3	-51,706.5	739.6	650.7	88.93	8.317		
11,400.0	9,192.0	11,417.6	9,197.0	49.9	41.8	-90.46		13,140.3	-51,705.7	739.6	647.8	91.77	8.059		
11,428.7	9,192.0	11,446.3	9,197.0	50.3	42.3	-90.46		13,111.6	-51,705.5	739.6	647.0	92.59	7.988		
11,500.0	9,192.0	11,517.6	9,197.0	51.2	43.4	-90.46		13,040.3	-51,705.0	739.6	644.9	94.64	7.815		
11,600.0	9,192.0	11,617.6	9,197.0	52.5	45.0	-90.46		12,940.3	-51,704.2	739.6	642.0	97.53	7.583		
11,700.0	9,192.0	11,717.6	9,197.0	53.8	46.6	-90.46		12,840.3	-51,703.4	739.6	639.1	100.45	7.363		

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	Local Co-ordinate Reference:	Site AVALON SHALE
Project:	LEA COUNTY, NM	TVD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Reference Site:	AVALON SHALE	MD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	WINDWARD FEDERAL #5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Lateral	Database:	EDM_Users
Reference Design:	DWD Plan 1 - negative VS	Offset TVD Reference:	Offset Datum

Offset Design AVALON SHALE - WINDWARD FEDERAL #6H - Wellbore #1 - DWD Plan 1													Offset Site Error:	0.0 usft
Survey Program: 0- VES GyroFlex, 8600-MWD													Offset Well Error:	0.0 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (")	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
11,728.7	9,192.0	11,746.3	9,197.0	54.2	47.1	-90.46	12,811.6	-51,703.2	739.6	638.3	101.29	7.301		
11,800.0	9,192.0	11,817.6	9,197.0	55.1	48.3	-90.46	12,740.3	-51,702.7	739.6	636.2	103.39	7.153		
11,873.9	9,192.0	11,891.5	9,197.0	56.1	49.5	-90.46	12,666.4	-51,702.1	739.6	634.0	105.58	7.005		
11,900.0	9,192.0	11,917.6	9,197.0	56.5	49.9	-90.46	12,640.3	-51,701.9	739.6	633.2	106.36	6.954		
12,000.0	9,192.0	12,017.6	9,197.0	57.9	51.5	-90.46	12,540.3	-51,701.1	739.6	630.2	109.34	6.764		
12,100.0	9,192.0	12,117.6	9,197.0	59.2	53.1	-90.46	12,440.3	-51,700.4	739.6	627.2	112.35	6.583		
12,128.7	9,192.0	12,146.3	9,197.0	59.6	53.6	-90.46	12,411.6	-51,700.1	739.6	626.4	113.21	6.533		
12,200.0	9,192.0	12,217.6	9,197.0	60.6	54.7	-90.46	12,340.3	-51,699.6	739.6	624.2	115.37	6.411		
12,300.0	9,192.0	12,317.6	9,197.0	62.0	56.4	-90.46	12,240.3	-51,698.8	739.6	621.2	118.40	6.246		
12,400.0	9,192.0	12,417.6	9,197.0	63.5	58.0	-90.46	12,140.3	-51,698.0	739.6	618.1	121.45	6.089		
12,428.7	9,192.0	12,446.3	9,197.0	63.9	58.5	-90.46	12,111.6	-51,697.8	739.6	617.2	122.33	6.046		
12,500.0	9,192.0	12,517.6	9,197.0	64.9	59.6	-90.46	12,040.3	-51,697.3	739.6	615.1	124.52	5.940		
12,573.9	9,192.0	12,591.5	9,197.0	66.0	60.8	-90.46	11,966.4	-51,696.7	739.6	612.8	126.79	5.833		
12,600.0	9,192.0	12,617.6	9,197.0	66.3	61.3	-90.46	11,940.3	-51,696.5	739.6	612.0	127.59	5.796		
12,700.0	9,192.0	12,717.6	9,197.0	67.8	62.9	-90.46	11,840.3	-51,695.7	739.6	608.9	130.68	5.659		
12,800.0	9,192.0	12,817.6	9,197.0	69.3	64.5	-90.46	11,740.3	-51,695.0	739.6	605.8	133.78	5.528		
12,828.7	9,192.0	12,846.3	9,197.0	69.7	65.0	-90.46	11,711.6	-51,694.8	739.6	604.9	134.67	5.492		
12,900.0	9,192.0	12,917.6	9,197.0	70.7	66.2	-90.46	11,640.3	-51,694.2	739.6	602.7	136.89	5.403		
12,973.9	9,192.0	12,991.5	9,197.0	71.8	67.4	-90.46	11,566.4	-51,693.6	739.6	600.4	139.20	5.313		
13,000.0	9,192.0	13,017.6	9,197.0	72.2	67.8	-90.46	11,540.3	-51,693.4	739.6	599.6	140.01	5.282		
13,100.0	9,192.0	13,117.6	9,197.0	73.7	69.4	-90.46	11,440.3	-51,692.7	739.6	596.4	143.14	5.167		
13,200.0	9,192.0	13,217.6	9,197.0	75.2	71.1	-90.46	11,340.3	-51,691.9	739.6	593.3	146.28	5.056		
13,228.7	9,192.0	13,246.3	9,197.0	75.6	71.6	-90.46	11,311.7	-51,691.7	739.6	592.4	147.18	5.025		
13,300.0	9,192.0	13,317.6	9,197.0	76.7	72.7	-90.46	11,240.3	-51,691.1	739.6	590.2	149.43	4.949		
13,400.0	9,192.0	13,417.6	9,197.0	78.2	74.4	-90.46	11,140.3	-51,690.4	739.6	587.0	152.58	4.847		
13,500.0	9,192.0	13,517.6	9,197.0	79.7	76.0	-90.46	11,040.3	-51,689.6	739.6	583.8	155.74	4.749		
13,528.7	9,192.0	13,546.3	9,197.0	80.2	76.5	-90.46	11,011.7	-51,689.4	739.6	582.9	156.65	4.721		
13,600.0	9,192.0	13,617.6	9,197.0	81.2	77.7	-90.46	10,940.3	-51,688.8	739.6	580.7	158.91	4.654		
13,673.9	9,192.0	13,691.5	9,197.0	82.4	78.9	-90.46	10,866.5	-51,688.3	739.6	578.3	161.25	4.586		
13,700.0	9,192.0	13,717.6	9,197.0	82.8	79.3	-90.46	10,840.3	-51,688.1	739.6	577.5	162.08	4.563		
13,800.0	9,192.0	13,817.6	9,197.0	84.3	81.0	-90.46	10,740.3	-51,687.3	739.6	574.3	165.26	4.475		
13,900.0	9,192.0	13,917.6	9,197.0	85.8	82.6	-90.46	10,640.3	-51,686.5	739.6	571.1	168.45	4.391		
13,928.7	9,192.0	13,946.3	9,197.0	86.3	83.1	-90.46	10,611.7	-51,686.3	739.6	570.2	169.36	4.367		
14,000.0	9,192.0	14,017.6	9,197.0	87.4	84.2	-90.46	10,540.3	-51,685.8	739.6	567.9	171.64	4.309		
14,100.0	9,192.0	14,117.6	9,197.0	88.9	85.9	-90.46	10,440.3	-51,685.0	739.6	564.7	174.83	4.230		
14,200.0	9,192.0	14,217.6	9,197.0	90.5	87.5	-90.46	10,340.3	-51,684.2	739.6	561.5	178.03	4.154		
14,228.7	9,192.0	14,246.3	9,197.0	90.9	88.0	-90.46	10,311.7	-51,684.0	739.6	560.6	178.95	4.133		
14,300.0	9,192.0	14,317.6	9,197.0	92.0	89.2	-90.46	10,240.4	-51,683.5	739.6	558.3	181.24	4.081		
14,373.9	9,192.0	14,391.5	9,197.0	93.2	90.4	-90.46	10,166.5	-51,682.9	739.6	556.0	183.61	4.028		
14,400.0	9,192.0	14,417.6	9,197.0	93.6	90.8	-90.46	10,140.4	-51,682.7	739.6	555.1	184.45	4.010		
14,500.0	9,192.0	14,517.6	9,197.0	95.2	92.5	-90.46	10,040.4	-51,681.9	739.6	551.9	187.66	3.941		
14,600.0	9,192.0	14,617.6	9,197.0	96.7	94.2	-90.46	9,940.4	-51,681.2	739.6	548.7	190.88	3.875		
14,628.7	9,192.0	14,646.3	9,197.0	97.2	94.6	-90.46	9,911.7	-51,680.9	739.6	547.8	191.81	3.856		
14,700.0	9,192.0	14,717.6	9,197.0	98.3	95.8	-90.46	9,840.4	-51,680.4	739.6	545.5	194.10	3.810		
14,773.9	9,192.0	14,791.5	9,197.0	99.5	97.0	-90.46	9,766.5	-51,679.8	739.6	543.1	196.49	3.764		
14,800.0	9,192.0	14,817.6	9,197.0	99.9	97.5	-90.46	9,740.4	-51,679.6	739.6	542.3	197.33	3.748		
14,900.0	9,192.0	14,917.6	9,197.0	101.4	99.1	-90.46	9,640.4	-51,678.8	739.6	539.0	200.56	3.688		
15,000.0	9,192.0	15,017.6	9,197.0	103.0	100.8	-90.46	9,540.4	-51,678.1	739.6	535.8	203.79	3.629		
15,028.7	9,192.0	15,046.3	9,197.0	103.5	101.2	-90.46	9,511.7	-51,677.9	739.6	534.9	204.72	3.613		
15,100.0	9,192.0	15,117.6	9,197.0	104.6	102.4	-90.46	9,440.4	-51,677.3	739.6	532.6	207.02	3.572		

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: AVALON SHALE
 Site Error: 0.0 usft
 Reference Well: WINDWARD FEDERAL #5H
 Well Error: 0.0 usft
 Reference Wellbore: Lateral
 Reference Design: DWD Plan 1 - negative VS

Local Co-ordinate Reference: Site AVALON SHALE
 TVD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
 MD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (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 AVALON SHALE - WINDWARD FEDERAL #6H - Wellbore #1 - DWD Plan 1													Offset Site Error:	0.0 usft
Survey Program: 0- VES GyroFlex, 8600-MWD													Offset Well Error:	0.0 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		
15,200.0	9,192.0	15,217.6	9,197.0	106.2	104.1	-90.46	9,340.4	-51,676.5	739.6	529.3	210.26	3.517		
15,300.0	9,192.0	15,317.6	9,197.0	107.8	105.7	-90.46	9,240.4	-51,675.8	739.6	526.1	213.50	3.464		
15,328.7	9,192.0	15,346.3	9,197.0	108.2	106.2	-90.46	9,211.7	-51,675.6	739.6	525.1	214.43	3.449		
15,400.0	9,192.0	15,417.6	9,197.0	109.4	107.4	-90.46	9,140.4	-51,675.0	739.6	522.8	216.75	3.412		
15,473.9	9,192.0	15,491.5	9,197.0	110.5	108.6	-90.46	9,066.5	-51,674.4	739.6	520.4	219.14	3.375		
15,500.0	9,192.0	15,517.6	9,197.0	111.0	109.0	-90.46	9,040.4	-51,674.2	739.6	519.6	219.99	3.362		
15,600.0	9,192.0	15,617.6	9,197.0	112.5	110.7	-90.46	8,940.4	-51,673.5	739.6	516.3	223.24	3.313		
15,700.0	9,192.0	15,717.6	9,197.0	114.1	112.3	-90.46	8,840.4	-51,672.7	739.6	513.1	226.49	3.265		
15,728.7	9,192.0	15,746.3	9,197.0	114.6	112.8	-90.46	8,811.7	-51,672.5	739.6	512.2	227.43	3.252		
15,800.0	9,192.0	15,817.6	9,197.0	115.7	114.0	-90.46	8,740.4	-51,671.9	739.6	509.8	229.75	3.219		
15,900.0	9,192.0	15,917.6	9,197.0	117.3	115.7	-90.46	8,640.4	-51,671.2	739.6	506.6	233.00	3.174		
16,000.0	9,192.0	16,017.6	9,197.0	118.9	117.3	-90.46	8,540.4	-51,670.4	739.6	503.3	236.26	3.130		
16,028.7	9,192.0	16,046.3	9,197.0	119.4	117.8	-90.46	8,511.7	-51,670.2	739.6	502.4	237.19	3.118		
16,100.0	9,192.0	16,117.6	9,197.0	120.5	119.0	-90.46	8,440.4	-51,669.6	739.6	500.1	239.52	3.088		
16,173.9	9,192.0	16,191.5	9,197.0	121.7	120.2	-90.46	8,366.5	-51,669.1	739.6	497.7	241.93	3.057		
16,200.0	9,192.0	16,217.6	9,197.0	122.1	120.6	-90.46	8,340.4	-51,668.9	739.6	496.8	242.78	3.046		
16,300.0	9,192.0	16,317.6	9,197.0	123.8	122.3	-90.46	8,240.4	-51,668.1	739.6	493.5	246.04	3.006		
16,400.0	9,192.0	16,417.6	9,197.0	125.4	123.9	-90.46	8,140.4	-51,667.3	739.6	490.3	249.31	2.967		
16,434.1	9,192.0	16,451.7	9,197.0	125.9	124.5	-90.46	8,106.4	-51,667.1	739.6	489.2	250.42	2.953		
16,500.0	9,192.0	16,517.6	9,197.0	127.0	125.6	-90.46	8,040.4	-51,666.6	739.6	487.0	252.57	2.928		
16,573.9	9,192.0	16,591.5	9,197.0	128.2	126.8	-90.46	7,966.6	-51,666.0	739.6	484.6	254.99	2.900		
16,600.0	9,192.0	16,617.6	9,197.0	128.6	127.3	-90.46	7,940.4	-51,665.8	739.6	483.7	255.84	2.891		
16,700.0	9,192.0	16,717.6	9,197.0	130.2	128.9	-90.46	7,840.4	-51,665.0	739.6	480.5	259.11	2.854		
16,800.0	9,192.0	16,817.6	9,197.0	131.8	130.6	-90.46	7,740.4	-51,664.3	739.6	477.2	262.38	2.819		
16,834.1	9,192.0	16,851.7	9,197.0	132.4	131.1	-90.46	7,706.4	-51,664.0	739.6	476.1	263.50	2.807		
16,900.0	9,192.0	16,917.6	9,197.0	133.4	132.2	-90.46	7,640.4	-51,663.5	739.6	473.9	265.66	2.784		
17,000.0	9,192.0	17,017.6	9,197.0	135.0	133.9	-90.46	7,540.4	-51,662.7	739.6	470.6	268.93	2.750		
17,100.0	9,192.0	17,117.6	9,197.0	136.6	135.6	-90.46	7,440.4	-51,662.0	739.6	467.4	272.21	2.717		
17,134.1	9,192.0	17,151.7	9,197.0	137.2	136.1	-90.46	7,406.4	-51,661.7	739.6	466.3	273.32	2.706		
17,200.0	9,192.0	17,217.6	9,197.0	138.3	137.2	-90.46	7,340.4	-51,661.2	739.6	464.1	275.48	2.685		
17,273.9	9,192.0	17,291.5	9,197.0	139.5	138.4	-90.46	7,266.6	-51,660.6	739.6	461.7	277.91	2.661		
17,300.0	9,192.0	17,317.6	9,197.0	139.9	138.9	-90.46	7,240.4	-51,660.4	739.6	460.8	278.76	2.653		
17,400.0	9,192.0	17,417.6	9,197.0	141.5	140.5	-90.46	7,140.4	-51,659.7	739.6	457.5	282.04	2.622		
17,500.0	9,192.0	17,517.6	9,197.0	143.1	142.2	-90.46	7,040.4	-51,658.9	739.6	454.3	285.32	2.592		
17,534.1	9,192.0	17,551.7	9,197.0	143.7	142.8	-90.46	7,006.4	-51,658.6	739.6	453.1	286.44	2.582		
17,600.0	9,192.0	17,617.6	9,197.0	144.7	143.9	-90.46	6,940.4	-51,658.1	739.6	451.0	288.61	2.563		
17,700.0	9,192.0	17,717.6	9,197.0	146.4	145.5	-90.46	6,840.5	-51,657.3	739.6	447.7	291.89	2.534		
17,800.0	9,192.0	17,817.6	9,197.0	148.0	147.2	-90.46	6,740.5	-51,656.6	739.6	444.4	295.17	2.506		
17,834.1	9,192.0	17,851.7	9,197.0	148.5	147.7	-90.46	6,706.4	-51,656.3	739.6	443.3	296.29	2.496		
17,900.0	9,192.0	17,917.6	9,197.0	149.6	148.8	-90.46	6,640.5	-51,655.8	739.6	441.1	298.46	2.478		
17,973.9	9,192.0	17,991.5	9,197.0	150.8	150.1	-90.46	6,566.6	-51,655.2	739.6	438.7	300.89	2.458		
18,000.0	9,192.0	18,017.6	9,197.0	151.2	150.5	-90.46	6,540.5	-51,655.0	739.6	437.8	301.74	2.451		
18,100.0	9,192.0	18,117.6	9,197.0	152.9	152.2	-90.46	6,440.5	-51,654.3	739.6	434.5	305.03	2.425		
18,200.0	9,192.0	18,217.6	9,197.0	154.5	153.8	-90.46	6,340.5	-51,653.5	739.6	431.3	308.32	2.399		
18,234.1	9,192.0	18,251.7	9,197.0	155.1	154.4	-90.46	6,306.4	-51,653.2	739.6	430.1	309.44	2.390		
18,300.0	9,192.0	18,317.6	9,197.0	156.1	155.5	-90.46	6,240.5	-51,652.7	739.6	428.0	311.61	2.373		
18,400.0	9,192.0	18,417.6	9,197.0	157.8	157.1	-90.46	6,140.5	-51,652.0	739.6	424.7	314.90	2.349		
18,500.0	9,192.0	18,517.6	9,197.0	159.4	158.8	-90.46	6,040.5	-51,651.2	739.6	421.4	318.19	2.324		
18,534.1	9,192.0	18,551.7	9,197.0	159.9	159.4	-90.46	6,006.4	-51,650.9	739.6	420.3	319.31	2.316		
18,600.0	9,192.0	18,617.6	9,197.0	161.0	160.5	-90.46	5,940.5	-51,650.4	739.6	418.1	321.48	2.301		
18,673.9	9,192.0	18,691.5	9,197.0	162.2	161.7	-90.46	5,866.6	-51,649.9	739.6	415.7	323.91	2.283		

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	Local Co-ordinate Reference:	Site AVALON SHALE
Project:	LEA COUNTY, NM	TVD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Reference Site:	AVALON SHALE	MD Reference:	3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	WINDWARD FEDERAL #5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	Lateral	Database:	EDM_Users
Reference Design:	DWD Plan 1 - negative VS	Offset TVD Reference:	Offset Datum

Offset Design AVALON SHALE - WINDWARD FEDERAL #6H - Wellbore #1 - DWD Plan 1													Offset Site Error:	0.0 usft
Survey Program: 0- VES GyroFlex, 8600-MWD													Offset Well Error:	0.0 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		
18,700.0	9,192.0	18,717.6	9,197.0	162.6	162.1	-90.46	5,840.5	-51,649.7	739.6	414.8	324.77	2.277		
18,800.0	9,192.0	18,817.6	9,197.0	164.3	163.8	-90.46	5,740.5	-51,648.9	739.6	411.5	328.07	2.254		
18,900.0	9,192.0	18,917.6	9,197.0	165.9	165.4	-90.46	5,640.5	-51,648.1	739.6	408.2	331.36	2.232		
18,934.1	9,192.0	18,951.7	9,197.0	166.5	166.0	-90.46	5,606.4	-51,647.9	739.6	407.1	332.48	2.224		
19,000.0	9,192.0	19,017.6	9,197.0	167.5	167.1	-90.46	5,540.5	-51,647.4	739.6	404.9	334.65	2.210		
19,073.9	9,192.0	19,091.5	9,197.0	168.8	168.3	-90.46	5,466.6	-51,646.8	739.6	402.5	337.09	2.194		
19,100.0	9,192.0	19,117.6	9,197.0	169.2	168.8	-90.46	5,440.5	-51,646.6	739.6	401.6	337.95	2.188		
19,200.0	9,192.0	19,217.6	9,197.0	170.8	170.4	-90.46	5,340.5	-51,645.8	739.6	398.3	341.25	2.167		
19,300.0	9,192.0	19,317.6	9,197.0	172.5	172.1	-90.46	5,240.5	-51,645.1	739.6	395.0	344.54	2.147		
19,340.4	9,192.0	19,358.0	9,197.0	173.1	172.8	-90.46	5,200.1	-51,644.7	739.6	393.7	345.87	2.138		
19,400.0	9,192.0	19,417.6	9,197.0	174.1	173.8	-90.46	5,140.5	-51,644.3	739.6	391.7	347.84	2.126		
19,435.8	9,192.0	19,453.4	9,197.0	174.7	174.3	-90.46	5,104.7	-51,644.0	739.6	390.6	349.02	2.119		
19,449.2	9,192.0	19,466.8	9,197.0	174.9	174.6	-90.46	5,091.3	-51,643.9	739.6	390.1	349.46	2.116 SF		

COG PRODUCTION LLC

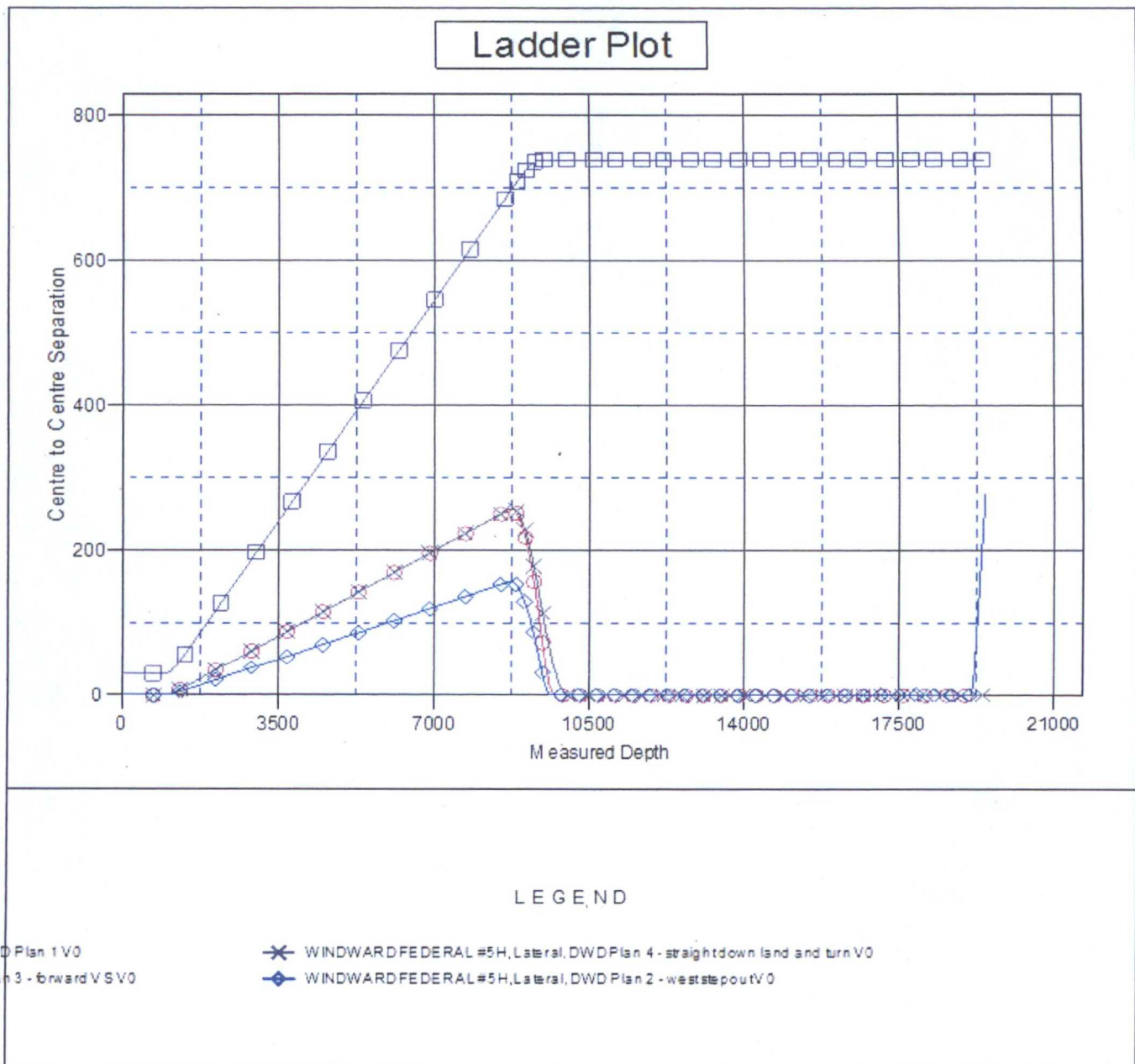
Anticollision Report

Company: COG PRODUCTION LLC
Project: LEA COUNTY, NM
Reference Site: AVALON SHALE
Site Error: 0.0 usft
Reference Well: WINDWARD FEDERAL #5H
Well Error: 0.0 usft
Reference Wellbore: Lateral
Reference Design: DWD Plan 1 - negative VS

Local Co-ordinate Reference: Site AVALON SHALE
TVD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
MD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (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 3539 + 26 = 3565' RKB @ 3565.0usft
 Offset Depths are relative to Offset Datum
 Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: AVALON SHALE
 Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
 Grid Convergence at Surface is: 0.33°



COG PRODUCTION LLC

Anticollision Report

Company: COG PRODUCTION LLC
 Project: LEA COUNTY, NM
 Reference Site: AVALON SHALE
 Site Error: 0.0 usft
 Reference Well: WINDWARD FEDERAL #5H
 Well Error: 0.0 usft
 Reference Wellbore: Lateral
 Reference Design: DWD Plan 1 - negative VS

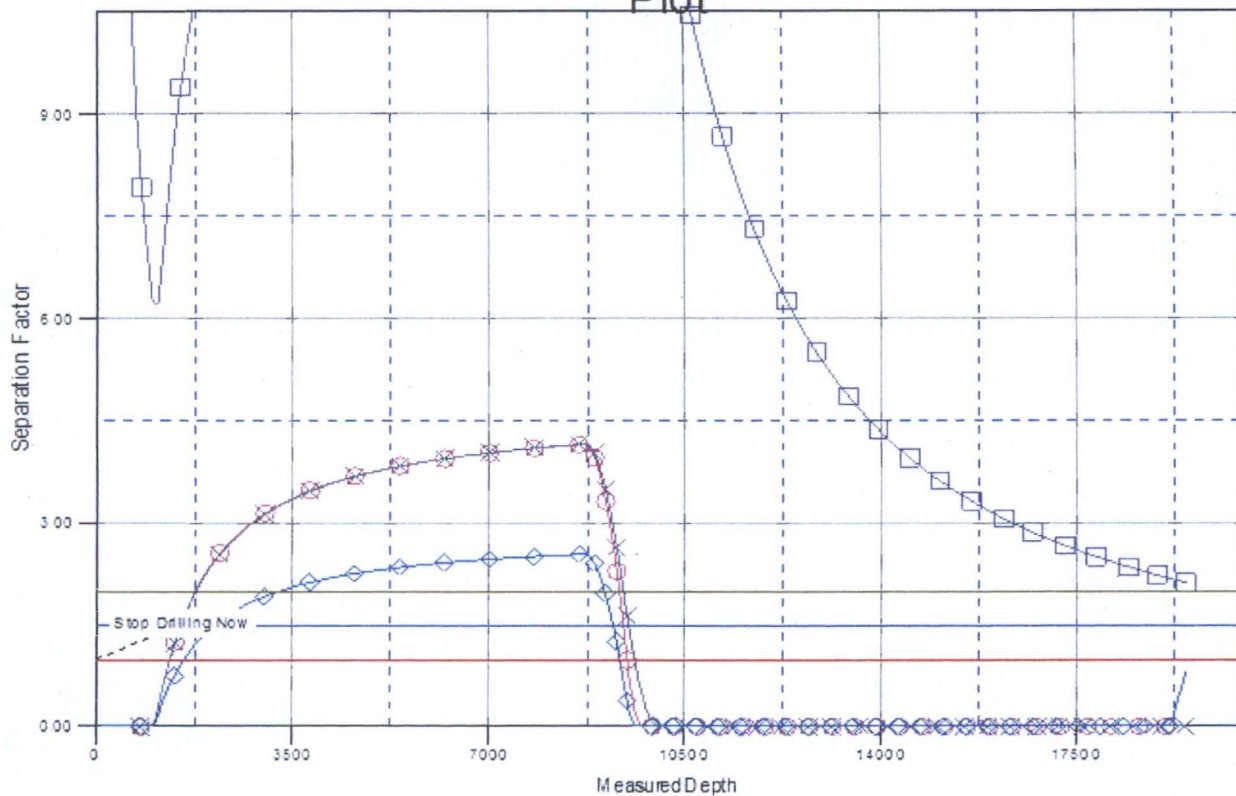
Local Co-ordinate Reference: Site AVALON SHALE
 TVD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
 MD Reference: 3539 + 26 = 3565' RKB @ 3565.0usft (MCVAY 8)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature
 Output errors are at: 2.00 sigma
 Database: EDM_Users
 Offset TVD Reference: Offset Datum

Reference Depths are relative to 3539 + 26 = 3565' RKB @ 3565.0usft
 Offset Depths are relative to Offset Datum
 Central Meridian is 104° 20' 0.000 W

Coordinates are relative to: AVALON SHALE
 Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
 Grid Convergence at Surface is: 0.33°

Separation Factor

Plot



LEGEND

WD Plan 1 V0

WD Plan 3 - forward V S V0

✕ WINDWARD FEDERAL #5H, Lateral, DWD Plan 4 - straightdown land and turn V0
 ◆ WINDWARD FEDERAL #5H, Lateral, DWD Plan 2 - weststepout V0



WELL DETAILS: **WINDWARD FEDERAL #5H**

+N/-S +E/-W
15384.8 -52246.7

Northing
435165.30

Ground Level: 3539.0

Easting
689487.60

Latitude
32° 11' 41.650 N

Longitude
103° 43' 14.802 W

Slot

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Annotation
1	0.0	0.00	0.00	0.0	15384.8	-52246.7	0.00	0.00	0.0	
2	1000.0	0.00	0.00	1000.0	15384.8	-52246.7	0.00	0.00	0.0	
3	1096.6	1.93	307.76	1096.6	15385.8	-52248.0	2.00	307.76	-1.0	
4	8709.1	1.93	307.76	8704.8	15542.9	-52450.8	0.00	0.00	-155.3	
5	9469.1	90.00	179.56	9192.0	15065.5	-52460.1	12.00	-128.19	322.2	
6	19449.2	90.00	179.56	9192.0	5085.6	-52383.4	0.00	0.00	10300.1	

LEGEND

- WINDWARD FEDERAL #6H, Wellbore #1, DWD Plan 1 V0
- WINDWARD FEDERAL #5H, Lateral, DWD Plan 3 - forward VS V0
- WINDWARD FEDERAL #5H, Lateral, DWD Plan 4 - straight down land and turn V0
- WINDWARD FEDERAL #5H, Lateral, DWD Plan 2 - west stepout V0
- DWD Plan 1 - negative VS

