

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SUNDRY NOTICES AND REPORTS ON WELLS
**Do not use this form for proposals to drill or to re-enter an
abandoned well. Use Form 3160-3 (APD) for such proposals.**

FORM APPROVED
OMB No. 1004-0137
Expires: January 31, 2018

RECEIVED

JUL 25 2018

5. Lease Serial No. NMNM 136672

6. If Indian, Allottee or Tribe Name
Farmington Field Office
Bureau of Land Management

SUBMIT IN TRIPLICATE - Other instructions on page 2

1. Type of Well

☒ Oil Well ☐ Gas Well ☐ Other

2. Name of Operator LOGOS Operating, LLC

3a. Address 2010 Afton Place
Farmington, NM 87401

3b. Phone No. (include area code)
(505) 787-2218

7. If Unit of CA/Agreement, Name and/or No.
CA NMNM 138467

8. Well Name and No. Federal 2307 7P Com 1H

9. API Well No. 30-039-31366

10. Field and Pool or Exploratory Area
Basin Mancos / Lybrook Gallup

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)
1279 FSL & 298 FEL, SE/SE, P Sec 7 T23N R07W

11. Country or Parish, State
Rio Arriba County, NM

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

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

13. Describe Proposed or Completed Operation: Clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or 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 must 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 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed and the operator has detennined that the site is ready for final inspection.)

LOGOS Operating LLC, request a change in plans to the Point of Entry (POE), Bottom-hole Location (BHL) and Total Depth(TD), per the attached C102 Plat, the Drilling and Directional Drill Plan.

NMOCD

OCT 01 2018

DISTRICT III

14. I hereby certify that the foregoing is true and correct. Name (Printed/Typed)

Marie E. Florez

Title Regulatory Specialist

Signature

Marie E. Florez

Date

07/24/2018

THE SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by

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.

Title *RE*

Date

9/28/18

Office *FO*

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

(Instructions on page 2)

NMOCD

25

DISTRICT IV
1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 478-3480 Fax: (505) 478-3482

1220 South St. Francis Dr.
Santa Fe, NM 87505

☐ AMENDED REPORT

¹ API Number 30-039-31366	² Pool Code 97232/42289	³ Pool Name BASIN MANCOS/LYBROOK GALLUP
⁴ Property Code 322501	⁵ Property Name FEDERAL 2307 7P COM	⁶ Well Number 1H
⁷ GRID No. 289408	⁸ Operator Name LOGOS OPERATING, LLC	⁹ Elevation 7265

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
P	7	23-N	7-W		1279	SOUTH	298	EAST	RIO ARRIBA

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
L	6	23-N	7-W	18	2503	SOUTH	1278	WEST	RIO ARRIBA

¹² Dedicated Acres PROJECT AREA 441.20 ACRES SEE DETAIL BELOW	¹³ Joint or Infill INFILL	¹⁴ Consolidation Code CA - NMNM138467	¹⁵ Order No.
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T-23-N

R-7-W

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LOT 2

LOT 3

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I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or a working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature Tan Fossier Date 6/29/18

Tamra Sessions
Printed Name
tsessions@logosresourcesllc.com
E-mail Address

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

JUNE 27, 2018
Date of Survey

Signature and Seal of Professional Surveyor



GLEN W. RUSSELL
Certificate Number 15703

**Sundry Drilling Plan
LOGOS Operating, LLC**

Revised: June 28, 2018

**Federal 2307 7P Com 1H
Lease Serial # NMNM136672**

Surface Location: 1279 FSL, 298 FEL

Legal Description: Sec 7, T23N, R7W (36.237893° N, 107.607283° W – NAD83)
Bottom Hole Location: 2503 FSL, 1278 FWL
Legal Description: Sec 6, T23N, R7W (36.255850° N, 107.619912° W – NAD83)
Rio Arriba County, NM

1. The elevation of the unprepared ground is 7,265 feet above sea level.
2. The geological name of the surface formation is the Nacimiento.
3. A rotary rig will be used to drill the well to a Proposed Total Depth of 5,840' TVD/12,410' MD.
4. Estimated top of important geological markers:

<u>Formation</u>	<u>Depth (TVD)(ft)</u>	<u>Depth (MD)(ft)</u>
Nacimiento	Surface	Surface
Ojo Alamo	1461	1506
Kirtland	1626	1693
Fruitland	1841	1937
Pictured Cliffs	2142	2278
Chacra	2989	3237
Cliff House	3653	3990
Menefee	3733	4080
Point Lookout	4516	4967
Mancos	4732	5207
Gallup	5698	6372

5. Estimated depth at which anticipated water, oil, gas or other mineral bearing formations are expected to be encountered:

<u>Formation</u>	<u>Depth (TVD)(ft)</u>	<u>Water/HydroCarbon</u>
Fruitland	1841	Gas
Pictured Cliffs	2142	Gas
Cliff House	3653	Gas
Point Lookout	4516	Gas
Mancos	4732	Oil/Gas

6. All proposed casing is new and the program is as follows:
*(Note: Combination of varied Grade and/or Weight for the 7" Intermediate Casing may be utilized)

Casing	Size	Depth		Grade	Weight	Connection	PSI		
		MD	TVD				Burst	Collapse	Tension
Surface	9-5/8"	0-320'	0-320'	J-55	36.00	STC	3520	2020	394
Intermediate	7"	0-6,756'	0-5,796'	J-55	23.00	LTC	4360	3270	313
Optional Intermediate	7"	0-6,756'	0-5,796'	P-110	26.00	LTC	9960	6230	693
Optional Intermediate	7"	0-6,756'	0-5,796'	L-80	26.00	LTC	7240	5410	511
Production	4-1/2"	6,606'-12,410'	5,780'-5,840'	P-110	11.60	LTC	10690	7560	279

7. Cementing Program: (Note: Volumes may be adjusted onsite due to actual conditions)

- a. 12-1/4" hole x 9-5/8" casing at 320' will have cement circulated to surface with **100 sks** (100% excess true hole) Class H Cement with 1.0 % CaCl₂, 1/2 #/sk Poly-E-Flake 15.8 ppg, 1.17 ft³/sk. Note: CEMENT MUST BE CIRCULATED TO SURFACE. STANDARD BOW SPRING CENTRALIZERS SHALL BE PLACED ON THE FIRST 3 (BOTTOM 3) JOINTS OF CASING (1 PER JOINT) AND 1 EVERY 3RD JOINT TO SURFACE. 20 BBLs OF WATER FOLLOWED BY 20 BBLs OF MUDFLUSH AHEAD OF CEMENT AS SPACER. Test Surface Casing to 1500psi.

OR

12-1/4" hole x 9-5/8" casing at 320' will have cement circulated to surface with 5 bbl Fresh Water Spacer, 100 sks (160 cu.ft.) of 14.5 ppg Type I-II (Neat G) + 20% Fly Ash cement w/7.41 gal/sack mix water ratio @ 1.61 cu ft/sks yield. Calculated @ volume + 100% excess. WOC 12 hours. Test csg to 1500psi. Total Volume: (160 cu-ft/100 sks/ Bbls). TOC at Surface.

- b. 8-3/4" hole x 7" casing at 6,756'. Cement will be circulated to surface in a single stage with **610 sks** (60% excess true hole) of HALCEM with 1.0 % CaCl₂, 1/4 #/sk Poly-E-Flake, 5 #/sk Kol-Seal (Gilsonite) - 12.3 ppg, 1.95 ft³/sk followed by **325 sks** (60% excess true hole) VARICEM with 0.15% Versaset, 0.30% HALAD-9, 1/4 #/sk Poly-E-Flake, 5 #/sk Kol-Seal - 13.5 ppg, 1.3 ft³/sk. ONE CENTRALIZER PER JOINT FOR THE FIRST 3 JOINTS, THEN EVERY OTHER JOINT TO KOP, THEN ONE EVERY 3RD JOINT TO SURFACE. 20 BBLs OF WATER FOLLOWED BY 30 BBLs OF MUDFLUSH AHEAD OF CEMENT AS SPACER. Test Intermediate Casing to 1500 psi. Cement additives subject to change based on wellbore conditions and cement design criteria.
- c. 6-1/8" hole x 4-1/2" liner at 12,410' MD in a single stage using excess of approximately 30% for TOC at 6,606'. Base slurry to consist of **524 sks** EXTENDACEM - 13.3 ppg, 1.36 ft³/sk. CENTRALIZERS TO BE USED AT DISCRETION IN LATERAL TO ACHIEVE 70% STAND OFF. CENTRALIZERS TO BE USED TO TIE BACK DEPTH OF 6606 TO ACHIEVE 70% STAND OFF. PACKOFF SEAL ASSEMBLY TO BE USED FOR LINER TOP ISOLATION. Cement additives subject to change based on wellbore conditions and cement design criteria. Liner to be pressure tested during completion operations.

8. BOP Pressure Testing:

For the BOP testing while drill pipe in use, the pipe and blind rams will be function tested once each trip. The BOPE will be tested to 2,000psi (High) for 10 minutes and annular test will be conducted to 1,500psi for 30 minutes. Surface and Intermediate casing pressure test will be tested to 1,500psi for 30 minutes. Will utilize a BOPE testing unit with a recording chart and appropriate test plug for testing. All tests and inspections will be recorded and logged with time and results.

9. Mud Program:

0' - 320'	Fresh water/Spud Mud. Paper for losses and seepage. 8.4 to 8.8 ppg, 32 to 44 vis, PV <8, YP 2 to 13, FLNC, LGS < 3%
320' - 6,756'	KCL WBM. As needed LCM for losses and seepage. 9.0 to 9.5 ppg, pH 9.0-9.5, 38 to 45 vis, PV 8-14, YP 8-14, FL < 20cc/30min, LGS < 6%
6,756' - 12,410'	LSND WBM. As needed LCM for losses and seepage. 8.8 to 9.0 ppg, PH 9.0-9.5, 34 to 38 vis, PV 4-8, YP 6-8, FL < 8cc/30min, LGS < 4%

****During drilling operations, all necessary products will be sufficiently stored on location for abnormal situations. The characteristics, use, testing of drilling mud and the implementation of related drilling procedures shall be designed to prevent the loss of well control. Sufficient quantities of mud materials shall be maintained or readily accessible for the purpose of assuring well control.**

****A pH of 10 or above in the fresh water base mud system shall be maintained to control the effects corrosion has on metallurgy of equipment used.**

Operating and Maintenance:

LOGOS Operating, LLC will be using all above ground steel pits for fluid and cuttings while drilling. If any tank develops a leak we will have immediate visual discovery, we would then transfer the fluid to another tank then remove any contaminated soil and dispose of it in the cuttings bins for transportation. Any leaks, spills or other undesirable events will be reported in accordance with BLM NTL 3A. Rig crews will monitor the tanks at all times. A trip/surge tank will be used to monitor returns for any "kicks" of formation fluids.

Equipment:

1- Drying Shaker

2- Centrifuges with stands and pumps

2- Cuttings Drive in Bins

2-Roll off bins

1-400 bbl Diffuser/Cement tank

1-Flock Tank

Electronic or Visual monitoring system to indicate lost returns and gas detection sensors

10. Testing, Logging and Coring Program:

- a. Testing Program: No drillstem tests are anticipated
- b. Electric Logging Program: None
- c. LWD Program: TBD
- d. Coring Program: None anticipated
- e. CBLs and/or Temperature Surveys Will Be Performed as Needed or Required
- f. MudLogging: On location from 4500' TVD to TD

11. Bottom Hole Pressure expected to be 2,500 +/- psi

12. Bottom Hole Temperature expected to be 160 deg F

Well Control Equipment Schematic for 2M Service

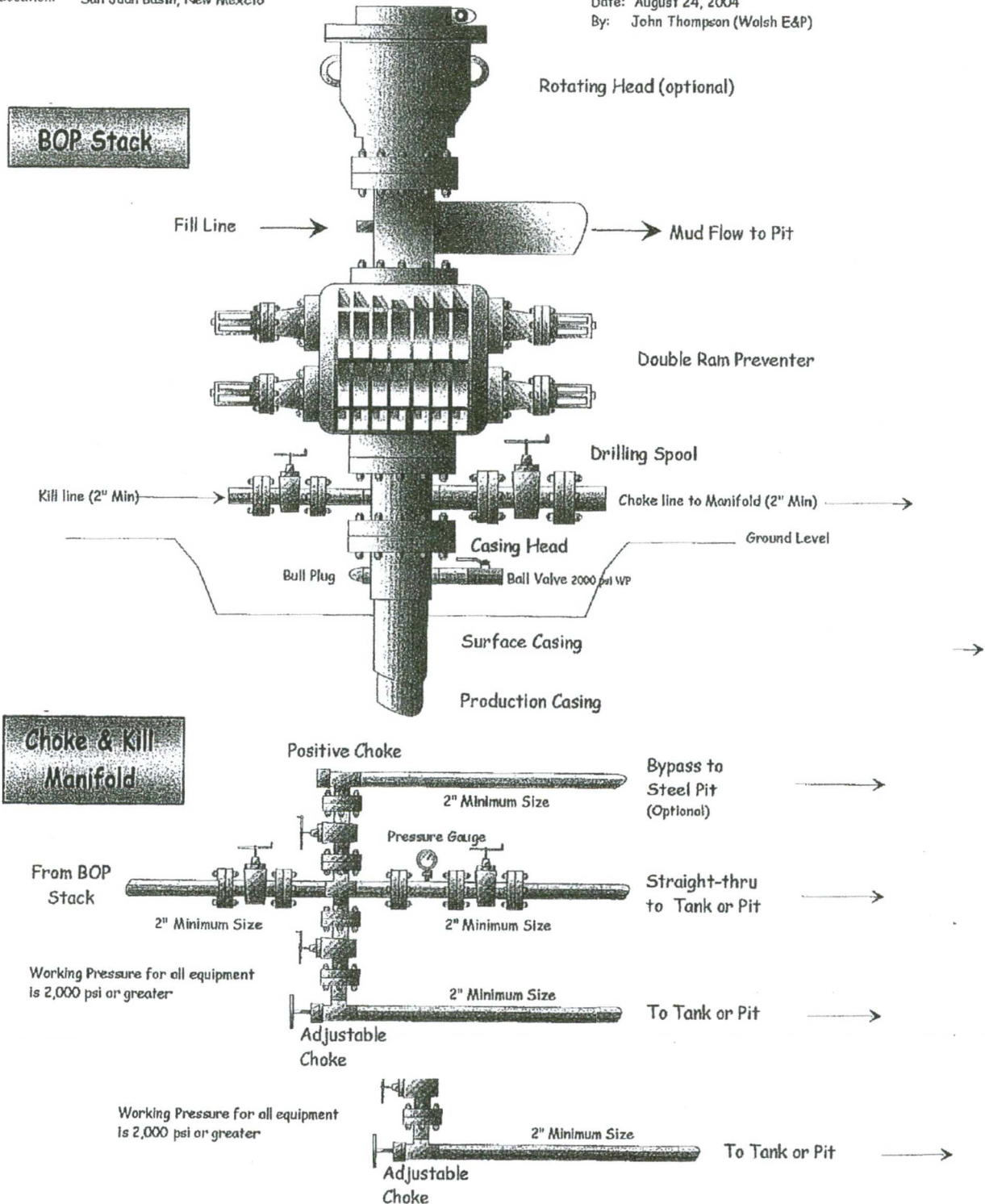
Attachment to Drilling Technical Program

Exhibit #1 Typical BOP setup

Location: San Juan Basin, New Mexico

Date: August 24, 2004

By: John Thompson (Walsh E&P)





Company: Logos Operating LLC
Project: Rio Arriba, NM NAD83
Site: Federal 2307-7P
Well: Federal 2307-7P COM 1H
Wellbore: OH
Design: Plan #2

PROJECT DETAILS: Rio Arriba, NM NAD83
Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: New Mexico Western Zone
System Datum: Mean Sea Level
Local North: True



Azimuths to True North
Magnetic North: 8.83°

Magnetic Field
Strength: 49534.1snT
Dip Angle: 62.85°
Date: 5/17/2018
Model: HDGM

WELL DETAILS: Federal 2307-7P COM 1H

GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
+N/-S +E/-W Northing Easting Latitude Longitude
0.00 0.00 1905969.03 2789753.16 36.2378930 -107.6072830 7P 1H

Plan: Plan #2 (Federal 2307-7P COM 1H/OH)

Created By: Janie Collins Date: 17:08, June 20 2018

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Fed 7P 1H LP Rev	5798.00	2463.72	182.23	1908433.18	2789929.65	36.2448610	-107.6066650
Fed 7P 1H T1	5807.00	3805.17	-1261.70	1909771.25	2788482.59	36.2483460	-107.6115620
Fed 7P 1H T2	5822.00	5127.40	-2587.27	1911090.38	2787153.95	36.2519780	-107.6160580
Fed 7P 1H BHL Rev	5840.00	6537.03	-3723.42	1912407.35	2786014.51	36.2558500	-107.6199120
Fed 7P 1H FPerf	5840.00	6475.14	-3873.30	1912435.58	2786064.77	36.2556800	-107.6197420
Fed 7P 1H LPerf	5798.00	2565.64	72.24	1908534.83	2789819.42	36.2449410	-107.6070380

SECTION DETAILS

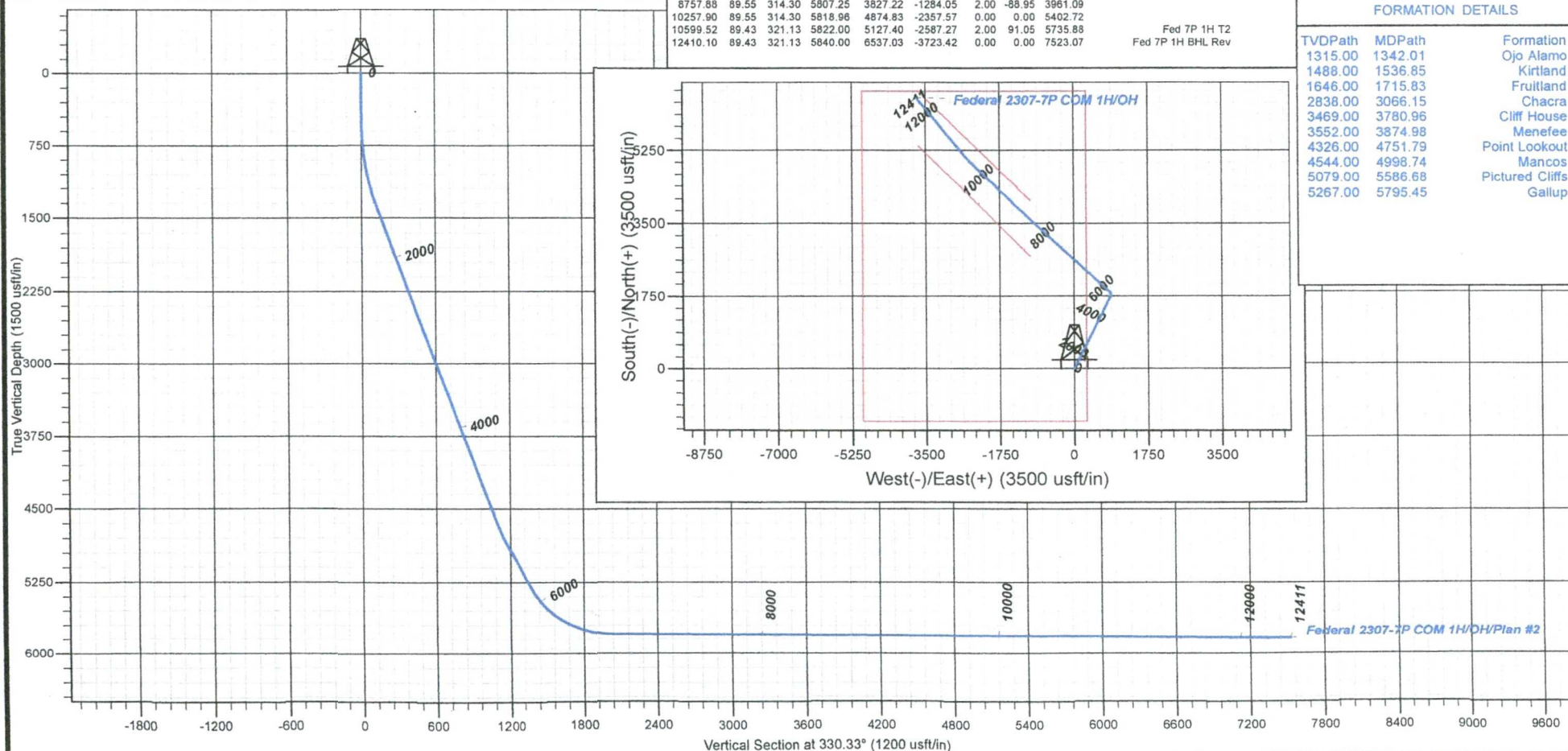
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	
1434.12	28.02	26.39	1397.32	200.59	99.53	3.00	26.39	125.03	
5038.73	28.02	26.39	4579.30	1717.67	852.31	0.00	0.00	1070.67	
5039.52	28.00	26.39	4580.00	1718.00	852.48	3.00	180.00	1070.88	
5463.37	25.77	311.99	4967.96	1872.76	827.57	7.50	-127.34	1217.68	
5903.41	25.77	311.99	5364.22	2000.76	685.35	0.00	0.00	1399.30	Fed 7P 1H LP Rev
6755.53	89.68	312.89	5796.00	2463.72	182.23	7.50	1.01	2050.59	
6758.32	89.68	312.84	5796.02	2465.61	180.19	2.00	-86.08	2053.24	
8621.73	89.68	312.84	5806.29	3732.56	-1186.20	0.00	0.00	3830.42	
8726.49	89.54	314.93	5807.00	3805.17	-1261.70	2.00	93.92	3930.68	Fed 7P 1H T1
8757.88	89.55	314.30	5807.25	3827.22	-1284.05	2.00	-88.95	3961.09	
10257.90	89.55	314.30	5818.96	4874.83	-2357.57	0.00	0.00	5402.72	
10599.52	89.43	321.13	5822.00	5127.40	-2587.27	2.00	91.05	5735.88	Fed 7P 1H T2
12410.10	89.43	321.13	5840.00	6537.03	-3723.42	0.00	0.00	7523.07	Fed 7P 1H BHL Rev

CASING DETAILS

No casing data is available

FORMATION DETAILS

TVDPath	MDPath	Formation
1315.00	1342.01	Ojo Alamo
1488.00	1536.85	Kirtland
1646.00	1715.83	Fruitland
2838.00	3066.15	Chacra
3469.00	3780.96	Cliff House
3552.00	3874.98	Menefee
4326.00	4751.79	Point Lookout
4544.00	4998.74	Mancos
5079.00	5586.68	Pictured Cliffs
5267.00	5795.45	Gallup





Logos Operating LLC

Rio Arriba, NM NAD83

Federal 2307-7P

Federal 2307-7P COM 1H - Slot 7P 1H

OH

Plan: Plan #2

Standard Planning Report

20 June, 2018



Scientific Drilling

www.scientificdrilling.com





Scientific Drilling, Intl
Planning Report



Database: Grand Junction District
Company: Logos Operating LLC
Project: Rio Arriba, NM NAD83
Site: Federal 2307-7P
Well: Federal 2307-7P COM 1H
Wellbore: OH
Design: Plan #2

Local Co-ordinate Reference: Well Federal 2307-7P COM 1H - Slot 7P 1H
TVD Reference: GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
MD Reference: GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
North Reference: True
Survey Calculation Method: Minimum Curvature

Project: Rio Arriba, NM NAD83
Map System: US State Plane 1983
Geo Datum: North American Datum 1983
Map Zone: New Mexico Western Zone
System Datum: Mean Sea Level

Site: Federal 2307-7P
Site Position: Northing: 1,905,969.03 usft Latitude: 36.2378930
From: Lat/Long Easting: 2,789,753.17 usft Longitude: -107.6072830
Position Uncertainty: 0.00 usft Slot Radius: 13.20 in Grid Convergence: 0.13 "

Well: Federal 2307-7P COM 1H - Slot 7P 1H
Well Position: +N/-S 0.00 usft Northing: 1,905,969.03 usft Latitude: 36.2378930
+E/-W 0.00 usft Easting: 2,789,753.17 usft Longitude: -107.6072830
Position Uncertainty: 0.00 usft Wellhead Elevation: 0.00 usft Ground Level: 7,267.00 usft

Wellbore: OH
Magnetics: Model Name Sample Date Declination Dip Angle Field Strength
(°) (°) (nT)
HDGM 5/17/2018 8.83 62.85 49,534

Design: Plan #2
Audit Notes:
Version: Phase: PLAN Tie On Depth: 0.00
Vertical Section: Depth From (TVD) +N/-S +E/-W Direction
(usft) (usft) (usft) (°)
0.00 0.00 0.00 330.33

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,434.12	28.02	26.39	1,397.32	200.59	99.53	3.00	3.00	0.00	26.39	
5,038.73	28.02	26.39	4,579.30	1,717.67	852.31	0.00	0.00	0.00	0.00	
5,039.52	28.00	26.39	4,580.00	1,718.00	852.48	3.00	-3.00	0.00	180.00	
5,463.37	25.77	311.99	4,967.96	1,872.76	827.57	7.50	-0.53	-17.55	-127.34	
5,903.41	25.77	311.99	5,364.22	2,000.76	685.35	0.00	0.00	0.00	0.00	
6,755.53	89.68	312.89	5,796.00	2,463.72	182.23	7.50	7.50	0.11	1.01	Fed 7P 1H LP Rev
6,758.32	89.68	312.84	5,796.02	2,465.61	180.19	2.00	0.14	-2.00	-86.08	
8,621.73	89.68	312.84	5,806.29	3,732.56	-1,186.20	0.00	0.00	0.00	0.00	
8,726.49	89.54	314.93	5,807.00	3,805.17	-1,261.70	2.00	-0.14	2.00	93.92	Fed 7P 1H T1
8,757.88	89.55	314.30	5,807.25	3,827.22	-1,284.05	2.00	0.04	-2.00	-88.95	
10,257.90	89.55	314.30	5,818.96	4,874.83	-2,357.57	0.00	0.00	0.00	0.00	
10,599.52	89.43	321.13	5,822.00	5,127.40	-2,587.27	2.00	-0.04	2.00	91.05	Fed 7P 1H T2
12,410.10	89.43	321.13	5,840.00	6,537.03	-3,723.42	0.00	0.00	0.00	0.00	Fed 7P 1H BHL Rev



Scientific Drilling, Intl
Planning Report



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Federal 2307-7P COM 1H - Slot 7P 1H
Company:	Logos Operating LLC	TVD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Site:	Federal 2307-7P	North Reference:	True
Well:	Federal 2307-7P COM 1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 3.00									
600.00	3.00	26.39	599.95	2.34	1.16	1.46	3.00	3.00	0.00
700.00	6.00	26.39	699.63	9.37	4.65	5.84	3.00	3.00	0.00
800.00	9.00	26.39	798.77	21.06	10.45	13.13	3.00	3.00	0.00
900.00	12.00	26.39	897.08	37.39	18.55	23.30	3.00	3.00	0.00
1,000.00	15.00	26.39	994.31	58.29	28.93	36.34	3.00	3.00	0.00
1,100.00	18.00	26.39	1,090.18	83.73	41.55	52.19	3.00	3.00	0.00
1,200.00	21.00	26.39	1,184.43	113.63	56.38	70.83	3.00	3.00	0.00
1,300.00	24.00	26.39	1,276.81	147.91	73.39	92.20	3.00	3.00	0.00
1,342.01	25.26	26.39	1,315.00	163.59	81.18	101.97	3.00	3.00	0.00
Ojo Alamo									
1,400.00	27.00	26.39	1,367.06	186.47	92.53	116.23	3.00	3.00	0.00
1,434.12	28.02	26.39	1,397.32	200.59	99.53	125.03	3.00	3.00	0.00
1,500.00	28.02	26.39	1,455.47	228.31	113.29	142.31	0.00	0.00	0.00
1,536.85	28.02	26.39	1,488.00	243.82	120.98	151.98	0.00	0.00	0.00
Kirtland									
1,600.00	28.02	26.39	1,543.75	270.40	134.17	168.55	0.00	0.00	0.00
1,696.96	28.02	26.39	1,629.34	311.21	154.42	193.99	0.00	0.00	0.00
Start 2497.44 hold at 1696.96 MD									
1,700.00	28.02	26.39	1,632.03	312.49	155.06	194.78	0.00	0.00	0.00
1,715.83	28.02	26.39	1,646.00	319.15	158.36	198.94	0.00	0.00	0.00
Fruitland									
1,800.00	28.02	26.39	1,720.30	354.58	175.94	221.02	0.00	0.00	0.00
1,900.00	28.02	26.39	1,808.58	396.66	196.83	247.25	0.00	0.00	0.00
2,000.00	28.02	26.39	1,896.85	438.75	217.71	273.49	0.00	0.00	0.00
2,100.00	28.02	26.39	1,985.13	480.84	238.59	299.72	0.00	0.00	0.00
2,200.00	28.02	26.39	2,073.40	522.92	259.48	325.95	0.00	0.00	0.00
2,300.00	28.02	26.39	2,161.68	565.01	280.36	352.19	0.00	0.00	0.00
2,400.00	28.02	26.39	2,249.95	607.10	301.24	378.42	0.00	0.00	0.00
2,500.00	28.02	26.39	2,338.23	649.19	322.13	404.66	0.00	0.00	0.00
2,600.00	28.02	26.39	2,426.50	691.27	343.01	430.89	0.00	0.00	0.00
2,700.00	28.02	26.39	2,514.78	733.36	363.90	457.12	0.00	0.00	0.00
2,800.00	28.02	26.39	2,603.05	775.45	384.78	483.36	0.00	0.00	0.00
2,900.00	28.02	26.39	2,691.33	817.53	405.66	509.59	0.00	0.00	0.00
3,000.00	28.02	26.39	2,779.60	859.62	426.55	535.83	0.00	0.00	0.00
3,066.15	28.02	26.39	2,838.00	887.46	440.36	553.18	0.00	0.00	0.00
Chacra									
3,100.00	28.02	26.39	2,867.88	901.71	447.43	562.06	0.00	0.00	0.00
3,200.00	28.02	26.39	2,956.16	943.80	468.32	588.30	0.00	0.00	0.00
3,300.00	28.02	26.39	3,044.43	985.88	489.20	614.53	0.00	0.00	0.00
3,400.00	28.02	26.39	3,132.71	1,027.97	510.08	640.76	0.00	0.00	0.00
3,500.00	28.02	26.39	3,220.98	1,070.06	530.97	667.00	0.00	0.00	0.00
3,600.00	28.02	26.39	3,309.26	1,112.15	551.85	693.23	0.00	0.00	0.00
3,700.00	28.02	26.39	3,397.53	1,154.23	572.74	719.47	0.00	0.00	0.00
3,780.96	28.02	26.39	3,469.00	1,188.31	589.64	740.71	0.00	0.00	0.00



Scientific Drilling, Intl
Planning Report



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Federal 2307-7P COM 1H - Slot 7P 1H
Company:	Logos Operating LLC	TVD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Site:	Federal 2307-7P	North Reference:	True
Well:	Federal 2307-7P COM 1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

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)
Cliff House									
3,800.00	28.02	26.39	3,485.81	1,196.32	593.62	745.70	0.00	0.00	0.00
3,874.98	28.02	26.39	3,552.00	1,227.88	609.28	765.37	0.00	0.00	0.00
Menefee									
3,900.00	28.02	26.39	3,574.08	1,238.41	614.50	771.94	0.00	0.00	0.00
4,000.00	28.02	26.39	3,662.36	1,280.49	635.39	798.17	0.00	0.00	0.00
4,100.00	28.02	26.39	3,750.63	1,322.58	656.27	824.40	0.00	0.00	0.00
4,194.40	28.02	26.39	3,833.97	1,362.31	675.99	849.17	0.00	0.00	0.00
Start Drop -3.00									
4,200.00	28.02	26.39	3,838.91	1,364.67	677.15	850.64	0.00	0.00	0.00
4,300.00	28.02	26.39	3,927.18	1,406.76	698.04	876.87	0.00	0.00	0.00
4,400.00	28.02	26.39	4,015.46	1,448.84	718.92	903.11	0.00	0.00	0.00
4,500.00	28.02	26.39	4,103.73	1,490.93	739.81	929.34	0.00	0.00	0.00
4,600.00	28.02	26.39	4,192.01	1,533.02	760.69	955.57	0.00	0.00	0.00
4,700.00	28.02	26.39	4,280.29	1,575.10	781.57	981.81	0.00	0.00	0.00
4,751.79	28.02	26.39	4,326.00	1,596.90	792.39	995.39	0.00	0.00	0.00
Point Lookout									
4,800.00	28.02	26.39	4,368.56	1,617.19	802.46	1,008.04	0.00	0.00	0.00
4,900.00	28.02	26.39	4,456.84	1,659.28	823.34	1,034.28	0.00	0.00	0.00
4,998.74	28.02	26.39	4,544.00	1,700.84	843.96	1,060.18	0.00	0.00	0.00
Mancos									
5,000.00	28.02	26.39	4,545.11	1,701.37	844.23	1,060.51	0.00	0.00	0.00
5,038.73	28.02	26.39	4,579.30	1,717.67	852.31	1,070.67	0.00	0.00	0.00
5,039.52	28.00	26.39	4,580.00	1,718.00	852.48	1,070.88	3.00	-3.00	0.00
5,100.00	25.48	17.99	4,634.02	1,743.10	862.81	1,087.58	7.50	-4.16	-13.89
5,200.00	22.64	0.88	4,725.44	1,782.87	869.76	1,118.69	7.50	-2.84	-17.10
5,300.00	21.98	341.12	4,818.08	1,819.87	864.00	1,153.70	7.50	-0.67	-19.76
5,391.36	23.43	323.71	4,902.46	1,850.73	847.69	1,188.58	7.50	1.60	-19.06
Start Build 7.50									
5,400.00	23.67	322.19	4,910.37	1,853.48	845.61	1,192.00	7.50	2.68	-17.54
5,463.37	25.77	311.99	4,967.96	1,872.76	827.57	1,217.68	7.50	3.33	-16.10
5,500.00	25.77	311.99	5,000.95	1,883.42	815.73	1,232.80	0.00	0.00	0.00
5,586.68	25.77	311.99	5,079.00	1,908.63	787.72	1,268.58	0.00	0.00	0.00
Pictured Cliffs									
5,600.00	25.77	311.99	5,091.00	1,912.51	783.41	1,274.08	0.00	0.00	0.00
5,700.00	25.77	311.99	5,181.05	1,941.59	751.09	1,315.35	0.00	0.00	0.00
5,795.45	25.77	311.99	5,267.00	1,969.36	720.24	1,354.74	0.00	0.00	0.00
Gallup									
5,800.00	25.77	311.99	5,271.10	1,970.68	718.77	1,356.62	0.00	0.00	0.00
5,900.00	25.77	311.99	5,361.15	1,999.77	686.45	1,397.89	0.00	0.00	0.00
5,903.41	25.77	311.99	5,364.22	2,000.76	685.35	1,399.30	0.00	0.00	0.00
6,000.00	33.02	312.22	5,448.32	2,032.54	650.21	1,444.31	7.50	7.50	0.24
6,100.00	40.52	312.38	5,528.37	2,072.80	605.97	1,501.18	7.50	7.50	0.16
6,191.36	47.37	312.49	5,594.12	2,115.56	559.21	1,561.48	7.50	7.50	0.12
Start 60.00 hold at 6191.36 MD									
6,200.00	48.02	312.50	5,599.93	2,119.88	554.50	1,567.56	7.50	7.50	0.10
6,251.36	51.87	312.55	5,632.98	2,146.45	525.54	1,604.98	7.50	7.50	0.10
Start DLS 7.50 TFO -0.11									
6,300.00	55.52	312.59	5,661.77	2,172.96	496.68	1,642.31	7.50	7.50	0.09
6,400.00	63.02	312.67	5,712.84	2,231.14	433.49	1,724.13	7.50	7.50	0.08



Scientific Drilling, Intl
Planning Report



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Federal 2307-7P COM 1H - Slot 7P 1H
Company:	Logos Operating LLC	TVD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Site:	Federal 2307-7P	North Reference:	True
Well:	Federal 2307-7P COM 1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
6,500.00	70.52	312.74	5,752.26	2,293.42	366.01	1,811.65	7.50	7.50	0.07
6,600.00	78.02	312.80	5,779.36	2,358.73	295.41	1,903.35	7.50	7.50	0.06
6,651.37	81.87	312.83	5,788.33	2,393.11	258.31	1,951.57	7.50	7.50	0.06
Start 385.91 hold at 6651.37 MD									
6,700.00	85.52	312.86	5,793.67	2,425.97	222.88	1,997.67	7.50	7.50	0.06
6,755.53	89.68	312.89	5,796.00	2,463.72	182.23	2,050.59	7.50	7.50	0.06
Fed 7P 1H LP Rev									
6,758.32	89.68	312.84	5,796.02	2,465.61	180.19	2,053.24	2.00	0.14	-2.00
6,800.00	89.68	312.84	5,796.25	2,493.95	149.63	2,093.00	0.00	0.00	0.00
6,900.00	89.68	312.84	5,796.80	2,561.94	76.30	2,188.37	0.00	0.00	0.00
6,905.49	89.68	312.84	5,796.83	2,565.67	72.28	2,193.60	0.00	0.00	0.00
Fed 7P 1H LPerf									
7,000.00	89.68	312.84	5,797.35	2,629.93	2.97	2,283.74	0.00	0.00	0.00
7,037.28	89.68	312.84	5,797.55	2,655.28	-24.36	2,319.29	0.00	0.00	0.00
Landing Point @ 7037' MD									
7,050.09	89.68	312.84	5,797.62	2,663.99	-33.76	2,331.51	0.00	0.00	0.00
Start 4600.49 hold at 7050.09 MD									
7,100.00	89.68	312.84	5,797.90	2,697.92	-70.36	2,379.11	0.00	0.00	0.00
7,154.39	89.68	312.84	5,798.20	2,734.90	-110.24	2,430.98	0.00	0.00	0.00
Fed 7P 1H LP									
7,187.00	89.68	312.84	5,798.38	2,757.08	-134.15	2,462.09	0.00	0.00	0.00
36.2462419, -107.6073944 - Last Perf @ 7187' MD									
7,200.00	89.68	312.84	5,798.45	2,765.91	-143.68	2,474.48	0.00	0.00	0.00
7,300.00	89.68	312.84	5,799.00	2,833.91	-217.01	2,569.86	0.00	0.00	0.00
7,400.00	89.68	312.84	5,799.55	2,901.90	-290.34	2,665.23	0.00	0.00	0.00
7,500.00	89.68	312.84	5,800.11	2,969.89	-363.67	2,760.60	0.00	0.00	0.00
7,600.00	89.68	312.84	5,800.66	3,037.88	-436.99	2,855.97	0.00	0.00	0.00
7,700.00	89.68	312.84	5,801.21	3,105.87	-510.32	2,951.35	0.00	0.00	0.00
7,800.00	89.68	312.84	5,801.76	3,173.86	-583.65	3,046.72	0.00	0.00	0.00
7,900.00	89.68	312.84	5,802.31	3,241.85	-656.98	3,142.09	0.00	0.00	0.00
8,000.00	89.68	312.84	5,802.86	3,309.84	-730.30	3,237.46	0.00	0.00	0.00
8,100.00	89.68	312.84	5,803.41	3,377.83	-803.63	3,332.83	0.00	0.00	0.00
8,200.00	89.68	312.84	5,803.97	3,445.82	-876.96	3,428.21	0.00	0.00	0.00
8,300.00	89.68	312.84	5,804.52	3,513.82	-950.29	3,523.58	0.00	0.00	0.00
8,400.00	89.68	312.84	5,805.07	3,581.81	-1,023.61	3,618.95	0.00	0.00	0.00
8,500.00	89.68	312.84	5,805.62	3,649.80	-1,096.94	3,714.32	0.00	0.00	0.00
8,600.00	89.68	312.84	5,806.17	3,717.79	-1,170.27	3,809.69	0.00	0.00	0.00
8,621.73	89.68	312.84	5,806.29	3,732.56	-1,186.20	3,830.42	0.00	0.00	0.00
8,700.00	89.58	314.40	5,806.80	3,786.56	-1,242.86	3,905.38	2.00	-0.14	2.00
8,726.49	89.54	314.93	5,807.00	3,805.17	-1,261.70	3,930.88	2.00	-0.14	2.00
Fed 7P 1H T1									
8,757.88	89.55	314.30	5,807.25	3,827.22	-1,284.05	3,961.09	2.00	0.04	-2.00
8,800.00	89.55	314.30	5,807.58	3,856.64	-1,314.19	4,001.58	0.00	0.00	0.00
8,900.00	89.55	314.30	5,808.36	3,926.48	-1,385.76	4,097.68	0.00	0.00	0.00
9,000.00	89.55	314.30	5,809.14	3,996.32	-1,457.33	4,193.79	0.00	0.00	0.00
9,100.00	89.55	314.30	5,809.92	4,066.16	-1,528.89	4,289.90	0.00	0.00	0.00
9,200.00	89.55	314.30	5,810.70	4,135.99	-1,600.46	4,386.01	0.00	0.00	0.00
9,300.00	89.55	314.30	5,811.48	4,205.83	-1,672.03	4,482.11	0.00	0.00	0.00
9,400.00	89.55	314.30	5,812.26	4,275.67	-1,743.59	4,578.22	0.00	0.00	0.00
9,500.00	89.55	314.30	5,813.04	4,345.51	-1,815.16	4,674.33	0.00	0.00	0.00
9,600.00	89.55	314.30	5,813.83	4,415.35	-1,886.73	4,770.43	0.00	0.00	0.00



Scientific Drilling, Intl
Planning Report



Database: Grand Junction District
Company: Logos Operating LLC
Project: Rio Arriba, NM NAD83
Site: Federal 2307-7P
Well: Federal 2307-7P COM 1H
Wellbore: OH
Design: Plan #2

Local Co-ordinate Reference: Well Federal 2307-7P COM 1H - Slot 7P 1H
TVD Reference: GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
MD Reference: GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
North Reference: True
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
9,700.00	89.55	314.30	5,814.61	4,485.19	-1,958.29	4,866.54	0.00	0.00	0.00
9,800.00	89.55	314.30	5,815.39	4,555.03	-2,029.86	4,962.65	0.00	0.00	0.00
9,900.00	89.55	314.30	5,816.17	4,624.87	-2,101.43	5,058.75	0.00	0.00	0.00
10,000.00	89.55	314.30	5,816.95	4,694.71	-2,173.00	5,154.86	0.00	0.00	0.00
10,100.00	89.55	314.30	5,817.73	4,764.55	-2,244.56	5,250.97	0.00	0.00	0.00
10,200.00	89.55	314.30	5,818.51	4,834.39	-2,316.13	5,347.07	0.00	0.00	0.00
10,257.90	89.55	314.30	5,818.96	4,874.83	-2,357.57	5,402.72	0.00	0.00	0.00
10,300.00	89.54	315.14	5,819.30	4,904.45	-2,387.48	5,443.27	2.00	-0.04	2.00
10,400.00	89.50	317.14	5,820.14	4,976.55	-2,456.76	5,540.21	2.00	-0.04	2.00
10,500.00	89.47	319.14	5,821.04	5,051.02	-2,523.49	5,637.94	2.00	-0.04	2.00
10,599.52	89.43	321.13	5,822.00	5,127.40	-2,587.27	5,735.88	2.00	-0.03	2.00
Fed 7P 1H T2									
10,600.00	89.43	321.13	5,822.00	5,127.78	-2,587.57	5,736.35	0.00	0.00	0.00
10,700.00	89.43	321.13	5,823.00	5,205.63	-2,650.32	5,835.06	0.00	0.00	0.00
10,800.00	89.43	321.13	5,823.99	5,283.49	-2,713.07	5,933.77	0.00	0.00	0.00
10,900.00	89.43	321.13	5,824.99	5,361.34	-2,775.82	6,032.48	0.00	0.00	0.00
11,000.00	89.43	321.13	5,825.98	5,439.20	-2,838.57	6,131.19	0.00	0.00	0.00
11,100.00	89.43	321.13	5,826.98	5,517.05	-2,901.32	6,229.89	0.00	0.00	0.00
11,200.00	89.43	321.13	5,827.97	5,594.91	-2,964.07	6,328.60	0.00	0.00	0.00
11,300.00	89.43	321.13	5,828.96	5,672.76	-3,026.82	6,427.31	0.00	0.00	0.00
11,400.00	89.43	321.13	5,829.96	5,750.61	-3,089.57	6,526.02	0.00	0.00	0.00
11,500.00	89.43	321.13	5,830.95	5,828.47	-3,152.32	6,624.73	0.00	0.00	0.00
11,570.00	89.43	321.13	5,831.65	5,882.97	-3,196.25	6,693.82	0.00	0.00	0.00
First Perf @ 11,570' MD - 36.2553427, -107.6171270									
11,600.00	89.43	321.13	5,831.95	5,906.32	-3,215.07	6,723.43	0.00	0.00	0.00
11,650.58	89.43	321.13	5,832.45	5,945.70	-3,246.81	6,773.36	0.00	0.00	0.00
TD at 11650.58									
11,700.00	89.43	321.13	5,832.94	5,984.18	-3,277.82	6,822.14	0.00	0.00	0.00
11,800.00	89.43	321.13	5,833.93	6,062.03	-3,340.57	6,920.85	0.00	0.00	0.00
11,828.94	89.43	321.13	5,834.22	6,084.56	-3,358.73	6,949.41	0.00	0.00	0.00
Fed 7P 1H BHL									
11,900.00	89.43	321.13	5,834.93	6,139.89	-3,403.33	7,019.56	0.00	0.00	0.00
12,000.00	89.43	321.13	5,835.92	6,217.74	-3,466.08	7,118.27	0.00	0.00	0.00
12,100.00	89.43	321.13	5,836.92	6,295.60	-3,528.83	7,216.97	0.00	0.00	0.00
12,200.00	89.43	321.13	5,837.91	6,373.45	-3,591.58	7,315.68	0.00	0.00	0.00
12,300.00	89.43	321.13	5,838.91	6,451.31	-3,654.33	7,414.39	0.00	0.00	0.00
12,330.47	89.43	321.13	5,839.21	6,475.03	-3,673.45	7,444.47	0.00	0.00	0.00
Fed 7P 1H FPerf									
12,400.00	89.43	321.13	5,839.90	6,529.16	-3,717.08	7,513.10	0.00	0.00	0.00
12,410.10	89.43	321.13	5,840.00	6,537.03	-3,723.42	7,523.07	0.00	0.00	0.00
Fed 7P 1H BHL Rev									



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Federal 2307-7P COM 1H - Slot 7P 1H
Company:	Logos Operating LLC	TVD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Site:	Federal 2307-7P	North Reference:	True
Well:	Federal 2307-7P COM 1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
Fed 7P 1H LPerf	0.00	0.00	5,796.00	2,565.64	72.24	1,908,534.83	2,789,819.43	36.2449410	-107.6070380
- plan misses target center by 0.83usft at 6905.49usft MD (5796.83 TVD, 2565.67 N, 72.28 E)									
- Point									
Fed 7P 1H LP Rev	0.00	0.00	5,796.00	2,463.72	182.23	1,908,433.16	2,789,929.65	36.2446610	-107.6066650
- plan hits target center									
- Point									
Fed 7P 1H T1	0.00	0.00	5,807.00	3,805.17	-1,261.70	1,909,771.25	2,788,482.59	36.2483460	-107.6115620
- plan hits target center									
- Point									
Fed 7P 1H T2	0.00	0.00	5,822.00	5,127.40	-2,587.27	1,911,090.38	2,787,153.95	36.2519780	-107.6160580
- plan hits target center									
- Point									
Fed 7P 1H FPerf	0.00	0.00	5,840.00	6,475.14	-3,673.30	1,912,435.58	2,786,064.77	36.2556800	-107.6197420
- plan misses target center by 0.81usft at 12330.47usft MD (5839.21 TVD, 6475.03 N, -3673.45 E)									
- Point									
Fed 7P 1H BHL Rev	0.00	0.00	5,840.00	6,537.03	-3,723.42	1,912,497.36	2,786,014.51	36.2558500	-107.6199120
- plan hits target center									
- Point									

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
1,342.01	1,315.00	Ojo Alamo	Empty	0.00	0.00	
1,536.85	1,488.00	Kirtland	Empty	0.00	0.00	
1,715.83	1,646.00	Fruitland	Empty	0.00	0.00	
3,066.15	2,838.00	Chacra	Empty	0.00	0.00	
3,780.96	3,469.00	Cliff House	Empty	0.00	0.00	
3,874.98	3,552.00	Menefee	Empty	0.00	0.00	
4,751.79	4,326.00	Point Lookout	Empty	0.00	0.00	
4,998.74	4,544.00	Mancos	Empty	0.00	0.00	
5,586.68	5,079.00	Pictured Cliffs	Empty	0.00	0.00	
5,795.45	5,267.00	Gallup	Empty	0.00	0.00	



Scientific Drilling, Intl
Planning Report



Database: Grand Junction District
Company: Logos Operating LLC
Project: Rio Arriba, NM NAD83
Site: Federal 2307-7P
Well: Federal 2307-7P COM 1H
Wellbore: OH
Design: Plan #2

Local Co-ordinate Reference: Well Federal 2307-7P COM 1H - Slot 7P 1H
TVD Reference: GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
MD Reference: GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
North Reference: True
Survey Calculation Method: Minimum Curvature

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
500.00	500.00	0.00	0.00	Start Build 3.00
1,696.96	1,629.34	311.21	154.42	Start 2497.44 hold at 1696.96 MD
4,194.40	3,833.97	1,362.31	675.99	Start Drop -3.00
5,391.36	4,902.46	1,850.73	847.69	Start Build 7.50
6,191.36	5,594.12	2,115.56	559.21	Start 60.00 hold at 6191.36 MD
6,251.36	5,632.98	2,146.45	525.54	Start DLS 7.50 TFO -0.11
6,651.37	5,788.33	2,393.11	258.31	Start 385.91 hold at 6651.37 MD
7,037.28	5,797.55	2,655.28	-24.36	Landing Point @ 7037' MD
7,050.09	5,797.62	2,663.99	-33.76	Start 4600.49 hold at 7050.09 MD
7,187.00	5,798.38	2,757.08	-134.15	36.2462419, -107.6073944
7,187.00	5,798.38	2,757.08	-134.15	Last Perf @ 7187' MD
11,570.00	5,831.65	5,882.97	-3,196.25	First Perf @ 11,570' MD
11,570.00	5,831.65	5,882.97	-3,196.25	36.2553427, -107.6171270
11,650.58	5,832.45	5,945.70	-3,246.81	TD at 11650.58



Logos Operating LLC

Rio Arriba, NM NAD83

Federal 2307-7P

Federal 2307-7P COM 1H

OH

Plan #2

Anticollision Report

20 June, 2018



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Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Federal 2307-7P COM 1H - Slot 7P 1H
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Reference Site:	Federal 2307-7P	MD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Federal 2307-7P COM 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Reference	Plan #2		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD Interval 100.00usft	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 15,000.00 usft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program	Date 6/20/2018			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	12,410.10	Plan #2 (OH)	MWD+HDGM	OWSG MWD + HDGM

Summary						
Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Federal 2307-7P						
Federal 2307-7P COM 2H - OH - Plan #3	500.00	500.00	29.55	26.42	9.422 CC, ES	
Federal 2307-7P COM 2H - OH - Plan #3	12,410.80	13,284.88	867.39	510.12	2.428 SF	
Federal 2307-7P COM 3H - OH - Plan #3	643.60	645.20	59.14	54.98	14.199 CC, ES	
Federal 2307-7P COM 3H - OH - Plan #3	11,700.00	13,436.60	2,450.08	2,100.79	7.015 SF	

Offset Design Federal 2307-7P - Federal 2307-7P COM 2H - OH - Plan #3														Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM														Offset Well Error:	0.00 usft
Reference	Offset			Semi Major Axis			Distance								
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning		
0.00	0.00	0.00	0.00	0.00	0.00	-77.91	6.19	-28.90	29.55						
100.00	100.00	100.00	100.00	0.13	0.13	-77.91	6.19	-28.90	29.55	29.29	0.27	109.929			
200.00	200.00	200.00	200.00	0.49	0.49	-77.91	6.19	-28.90	29.55	28.57	0.99	29.981			
300.00	300.00	300.00	300.00	0.85	0.85	-77.91	6.19	-28.90	29.55	27.85	1.70	17.357			
400.00	400.00	400.00	400.00	1.21	1.21	-77.91	6.19	-28.90	29.55	27.14	2.42	12.214			
500.00	500.00	500.00	500.00	1.57	1.57	-77.91	6.19	-28.90	29.55	26.42	3.14	9.422 CC, ES			
600.00	599.95	599.95	599.95	1.93	1.93	-109.08	6.19	-28.90	30.31	26.46	3.85	7.868			
700.00	699.63	699.63	699.63	2.29	2.28	-121.67	6.19	-28.90	33.70	29.13	4.57	7.376			
800.00	798.77	798.77	798.77	2.66	2.64	-136.74	6.19	-28.90	42.07	36.78	5.29	7.948			
900.00	897.08	897.08	897.08	3.04	2.99	-149.16	6.19	-28.90	56.79	50.77	6.02	9.431			
1,000.00	994.31	994.31	994.31	3.45	3.34	-157.72	6.19	-28.90	77.84	71.09	6.75	11.535			
1,100.00	1,090.18	1,090.18	1,090.18	3.89	3.68	-163.36	6.19	-28.90	104.77	97.30	7.47	14.022			
1,200.00	1,184.43	1,184.43	1,184.43	4.38	4.02	-167.12	6.19	-28.90	137.18	128.98	8.19	16.745			
1,300.00	1,276.81	1,276.81	1,276.81	4.91	4.35	-169.70	6.19	-28.90	174.78	165.87	8.91	19.618			
1,400.00	1,367.06	1,367.06	1,367.06	5.51	4.68	-171.52	6.19	-28.90	217.36	207.74	9.82	22.591			
1,500.00	1,455.47	1,455.47	1,455.47	6.15	4.99	-172.95	6.19	-28.90	263.74	253.41	10.33	25.538			
1,600.00	1,543.75	1,543.75	1,543.75	6.82	5.31	-174.01	6.19	-28.90	310.49	299.46	11.02	28.169			
1,700.00	1,632.03	1,632.03	1,632.03	7.50	5.63	-174.80	6.19	-28.90	357.30	345.57	11.72	30.475			
1,800.00	1,720.30	1,720.30	1,720.30	8.20	5.94	-175.40	6.19	-28.90	404.15	391.71	12.43	32.507			
1,900.00	1,808.58	1,808.58	1,808.58	8.91	6.26	-175.88	6.19	-28.90	451.02	437.88	13.15	34.309			
2,000.00	1,896.85	1,896.85	1,896.85	9.62	6.58	-176.27	6.19	-28.90	497.92	484.06	13.86	35.915			

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



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Federal 2307-7P COM 1H - Slot 7P 1H
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Reference Site:	Federal 2307-7P	MD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Federal 2307-7P COM 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design Federal 2307-7P - Federal 2307-7P COM 2H - OH - Plan #3													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
2,100.00	1,985.13	1,985.13	1,985.13	10.34	6.89	-176.59	6.19	-28.90	544.83	530.25	14.59	37.355		
2,200.00	2,073.40	2,083.40	2,083.39	11.07	7.24	-176.99	6.32	-27.69	591.14	575.75	15.38	38.426		
2,300.00	2,161.68	2,185.37	2,185.24	11.80	7.59	-177.64	6.86	-22.94	635.68	619.47	16.21	39.225		
2,400.00	2,249.95	2,288.95	2,288.46	12.53	7.95	-178.47	7.81	-14.43	678.44	661.40	17.04	39.810		
2,500.00	2,338.23	2,393.91	2,392.67	13.27	8.32	-179.49	9.20	-2.03	719.46	701.57	17.89	40.212		
2,600.00	2,426.50	2,499.99	2,497.45	14.01	8.70	-179.35	11.04	14.35	758.80	740.04	18.76	40.457		
2,700.00	2,514.78	2,603.41	2,598.97	14.75	9.09	-178.10	13.23	33.95	796.58	776.97	19.61	40.616		
2,800.00	2,603.05	2,695.01	2,688.68	15.49	9.43	-177.03	15.30	52.34	834.07	813.68	20.40	40.893		
2,900.00	2,691.33	2,786.60	2,778.39	16.23	9.79	-176.05	17.36	70.73	871.80	850.61	21.19	41.139		
3,000.00	2,779.60	2,878.20	2,868.09	16.98	10.15	-175.15	19.42	89.12	909.74	887.74	22.00	41.359		
3,100.00	2,867.88	2,969.79	2,957.80	17.72	10.51	-174.32	21.48	107.51	947.86	925.05	22.81	41.556		
3,200.00	2,956.16	3,061.39	3,047.51	18.47	10.88	-173.55	23.54	125.91	986.13	962.50	23.63	41.732		
3,300.00	3,044.43	3,152.98	3,137.21	19.22	11.25	-172.84	25.60	144.30	1,024.55	1,000.09	24.46	41.889		
3,400.00	3,132.71	3,244.58	3,226.92	19.96	11.63	-172.18	27.66	162.69	1,063.10	1,037.80	25.29	42.030		
3,500.00	3,220.98	3,336.17	3,316.62	20.71	12.01	-171.57	29.73	181.08	1,101.75	1,075.62	26.13	42.157		
3,600.00	3,309.26	3,427.77	3,406.33	21.46	12.39	-170.99	31.79	199.47	1,140.51	1,113.53	26.98	42.270		
3,700.00	3,397.53	3,519.36	3,496.04	22.21	12.78	-170.46	33.85	217.86	1,179.36	1,151.53	27.83	42.373		
3,800.00	3,485.81	3,610.96	3,585.74	22.96	13.17	-169.96	35.91	236.25	1,218.30	1,189.61	28.69	42.465		
3,900.00	3,574.08	3,702.55	3,675.45	23.71	13.56	-169.49	37.97	254.65	1,257.30	1,227.75	29.55	42.548		
4,000.00	3,662.36	3,794.15	3,765.15	24.46	13.95	-169.04	40.03	273.04	1,296.38	1,265.97	30.42	42.622		
4,100.00	3,750.63	3,885.74	3,854.86	25.22	14.35	-168.63	42.10	291.43	1,335.52	1,304.24	31.28	42.690		
4,200.00	3,838.91	3,977.34	3,944.57	25.97	14.74	-168.23	44.16	309.82	1,374.72	1,342.56	32.16	42.751		
4,300.00	3,927.18	4,068.94	4,034.27	26.72	15.14	-167.86	46.22	328.21	1,413.97	1,380.93	33.03	42.807		
4,400.00	4,015.46	4,160.53	4,123.98	27.47	15.54	-167.51	48.28	346.60	1,453.26	1,419.35	33.91	42.857		
4,500.00	4,103.73	4,252.13	4,213.69	28.23	15.94	-167.17	50.34	364.99	1,492.60	1,457.81	34.79	42.903		
4,600.00	4,192.01	4,343.72	4,303.39	28.98	16.35	-166.86	52.40	383.39	1,531.99	1,496.31	35.67	42.944		
4,700.00	4,280.29	4,435.32	4,393.10	29.73	16.75	-166.56	54.47	401.78	1,571.41	1,534.85	36.56	42.982		
4,800.00	4,368.56	4,526.91	4,482.80	30.49	17.16	-166.27	56.53	420.17	1,610.86	1,573.41	37.45	43.017		
4,900.00	4,456.84	4,618.51	4,572.51	31.24	17.56	-166.00	58.59	438.56	1,650.35	1,612.01	38.34	43.049		
5,000.00	4,545.11	4,710.11	4,662.59	31.99	17.97	-165.73	60.65	457.00	1,689.84	1,650.48	39.23	43.079		
5,100.00	4,633.38	4,801.71	4,752.81	32.74	18.38	-165.46	62.71	475.44	1,729.33	1,691.01	40.12	43.108		
5,200.00	4,721.65	4,893.31	4,843.41	33.49	18.79	-165.19	64.77	493.88	1,768.82	1,731.59	41.01	43.136		
5,300.00	4,809.92	4,984.91	4,934.51	34.24	19.20	-164.92	66.83	512.32	1,808.31	1,771.08	41.90	43.163		
5,400.00	4,898.19	5,076.51	5,025.11	34.99	19.61	-164.65	68.89	530.76	1,847.80	1,810.57	42.79	43.189		
5,500.00	4,986.46	5,168.11	5,116.71	35.74	20.02	-164.38	70.95	549.20	1,887.29	1,850.06	43.68	43.215		
5,600.00	5,074.73	5,259.71	5,207.31	36.49	20.43	-164.11	73.01	567.64	1,926.78	1,889.55	44.57	43.241		
5,700.00	5,162.99	5,351.31	5,298.91	37.24	20.84	-163.84	75.07	586.08	1,966.27	1,929.04	45.46	43.267		
5,800.00	5,251.26	5,442.91	5,389.51	37.99	21.25	-163.57	77.13	604.52	2,005.76	1,971.53	46.35	43.292		
5,900.00	5,339.53	5,534.51	5,480.11	38.74	21.66	-163.30	79.19	622.96	2,045.25	2,011.02	47.24	43.318		
6,000.00	5,427.80	5,626.11	5,571.71	39.49	22.07	-163.03	81.25	641.40	2,084.74	2,050.51	48.13	43.343		
6,100.00	5,516.07	5,717.71	5,660.31	40.24	22.48	-162.76	83.31	659.84	2,124.23	2,090.00	49.02	43.368		
6,200.00	5,604.34	5,809.31	5,750.91	40.99	22.89	-162.49	85.37	678.28	2,163.72	2,129.49	49.91	43.393		
6,300.00	5,692.61	5,900.91	5,842.51	41.74	23.30	-162.22	87.43	696.72	2,203.21	2,168.98	50.80	43.418		
6,400.00	5,780.88	5,992.51	5,934.11	42.49	23.71	-161.95	89.49	715.16	2,242.70	2,208.47	51.69	43.443		
6,500.00	5,869.15	6,084.11	6,025.71	43.24	24.12	-161.68	91.55	733.60	2,282.19	2,247.96	52.58	43.468		
6,600.00	5,957.42	6,175.71	6,117.31	43.99	24.53	-161.41	93.61	752.04	2,321.68	2,287.45	53.47	43.493		
6,700.00	6,045.69	6,267.31	6,208.91	44.74	24.94	-161.14	95.67	770.48	2,361.17	2,326.94	54.36	43.518		
6,800.00	6,133.96	6,358.91	6,300.51	45.49	25.35	-160.87	97.73	788.92	2,400.66	2,366.43	55.25	43.543		
6,900.00	6,222.23	6,450.51	6,392.11	46.24	25.76	-160.60	99.79	807.36	2,440.15	2,405.92	56.14	43.568		
7,000.00	6,310.50	6,542.11	6,483.71	46.99	26.17	-160.33	101.85	825.80	2,479.64	2,445.41	57.03	43.593		
7,100.00	6,398.77	6,633.71	6,575.31	47.74	26.58	-160.06	103.91	844.24	2,519.13	2,484.90	57.92	43.618		

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



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Federal 2307-7P COM 1H - Slot 7P 1H
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Reference Site:	Federal 2307-7P	MD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Federal 2307-7P COM 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design Federal 2307-7P - Federal 2307-7P COM 2H - OH - Plan #3													Offset Site Error:	0.00 usft
Survey Program: D-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E/W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
7,200.00	5,798.45	8,031.70	5,780.89	45.45	61.19	-88.97	2,126.20	-960.63	1,037.76	932.49	105.27	9.858		
7,300.00	5,799.00	8,130.45	5,781.85	47.24	63.45	-88.98	2,203.93	-1,021.52	1,021.95	912.36	109.60	9.325		
7,400.00	5,799.55	8,200.00	5,782.53	49.13	65.04	-88.98	2,258.40	-1,064.77	1,007.03	893.98	113.05	8.908		
7,500.00	5,800.11	8,281.79	5,783.28	51.13	66.96	-88.99	2,321.13	-1,117.25	994.51	877.54	116.97	8.502		
7,600.00	5,800.66	8,355.76	5,783.92	53.20	68.72	-88.99	2,376.54	-1,166.23	984.59	863.95	120.65	8.161		
7,700.00	5,801.21	8,430.05	5,784.52	55.33	70.51	-89.00	2,430.91	-1,216.85	977.25	852.91	124.35	7.859		
7,800.00	5,801.76	8,507.16	5,785.11	57.52	72.39	-89.01	2,485.95	-1,270.85	972.49	844.33	128.16	7.588		
7,900.00	5,802.31	8,607.10	5,785.85	59.76	74.84	-89.01	2,556.57	-1,341.56	968.78	835.80	132.98	7.285		
8,000.00	5,802.86	8,707.03	5,786.59	62.04	77.30	-89.02	2,627.18	-1,412.26	965.07	827.24	137.83	7.002		
8,100.00	5,803.41	8,806.96	5,787.33	64.35	79.77	-89.03	2,697.80	-1,482.97	961.36	818.65	142.71	6.736		
8,200.00	5,803.97	8,906.89	5,788.07	66.68	82.25	-89.04	2,768.41	-1,553.67	957.65	810.03	147.61	6.488		
8,300.00	5,804.52	9,006.82	5,788.81	69.05	84.74	-89.04	2,839.03	-1,624.38	953.93	801.39	152.54	6.254		
8,400.00	5,805.07	9,106.75	5,789.55	71.43	87.23	-89.05	2,909.64	-1,695.08	950.22	792.74	157.48	6.034		
8,500.00	5,805.62	9,206.68	5,790.30	73.84	89.72	-89.06	2,980.26	-1,765.79	946.51	784.06	162.45	5.827		
8,600.00	5,806.17	9,306.61	5,791.04	76.26	92.23	-89.07	3,050.87	-1,836.49	942.80	775.37	167.43	5.631		
8,700.00	5,806.80	9,406.57	5,791.78	78.70	94.73	-89.08	3,121.51	-1,907.22	940.15	767.74	172.41	5.453		
8,800.00	5,807.58	9,506.57	5,792.52	81.13	97.24	-89.08	3,192.17	-1,977.97	939.33	761.94	177.39	5.295		
8,900.00	5,808.36	9,606.56	5,793.26	83.58	99.76	-89.07	3,262.83	-2,048.72	938.18	755.79	182.39	5.144		
9,000.00	5,809.14	9,706.56	5,794.00	86.03	102.28	-89.07	3,333.49	-2,119.47	937.02	749.62	187.40	5.000		
9,100.00	5,809.92	9,806.55	5,794.74	88.50	104.80	-89.07	3,404.14	-2,190.22	935.86	743.45	192.41	4.864		
9,200.00	5,810.70	9,906.54	5,795.48	90.97	107.33	-89.06	3,474.80	-2,260.97	934.71	737.27	197.44	4.734		
9,300.00	5,811.48	10,006.54	5,796.22	93.45	109.86	-89.06	3,545.46	-2,331.72	933.55	731.07	202.47	4.611		
9,400.00	5,812.26	10,106.53	5,796.96	95.94	112.39	-89.05	3,616.12	-2,402.47	932.39	724.87	207.52	4.493		
9,500.00	5,813.04	10,206.52	5,797.71	98.44	114.92	-89.05	3,686.78	-2,473.21	931.24	718.67	212.57	4.381		
9,600.00	5,813.83	10,306.51	5,798.45	100.94	117.45	-89.05	3,757.44	-2,543.96	930.09	712.47	217.62	4.273		
9,700.00	5,814.61	10,406.50	5,799.19	103.44	120.00	-89.05	3,828.10	-2,614.71	928.94	706.27	222.67	4.171		
9,800.00	5,815.39	10,506.49	5,800.00	105.96	122.55	-89.04	3,898.76	-2,685.46	927.79	700.07	227.72	4.073		
9,900.00	5,816.17	10,606.48	5,800.74	108.47	125.10	-89.04	3,969.42	-2,756.21	926.64	693.87	232.77	3.979		
10,000.00	5,816.95	10,706.47	5,801.48	110.99	127.65	-89.04	4,040.08	-2,826.96	925.49	687.67	237.82	3.887		
10,100.00	5,817.73	10,806.46	5,802.22	113.52	130.20	-89.04	4,110.74	-2,897.71	924.34	681.47	242.87	3.795		
10,200.00	5,818.51	10,906.45	5,802.96	116.04	132.75	-89.03	4,181.40	-2,968.46	923.19	675.27	247.92	3.707		
10,300.00	5,819.29	11,006.44	5,803.70	118.57	135.30	-89.04	4,252.06	-3,039.21	922.04	669.07	252.97	3.619		
10,400.00	5,820.07	11,106.43	5,804.44	121.09	137.85	-89.05	4,322.72	-3,109.96	920.89	662.87	258.02	3.531		
10,500.00	5,820.85	11,206.42	5,805.18	123.62	140.40	-89.05	4,393.38	-3,180.71	919.74	656.67	263.07	3.443		
10,600.00	5,821.63	11,306.41	5,805.92	126.15	142.95	-89.07	4,464.04	-3,251.46	918.59	650.47	268.12	3.355		
10,700.00	5,822.41	11,406.40	5,806.66	128.68	145.50	-89.08	4,534.70	-3,322.21	917.44	644.27	273.17	3.267		
10,800.00	5,823.19	11,506.39	5,807.40	131.20	148.05	-89.08	4,605.36	-3,392.96	916.29	638.07	278.22	3.179		
10,900.00	5,823.97	11,606.38	5,808.14	133.73	150.60	-89.07	4,676.02	-3,463.71	915.14	631.87	283.27	3.091		
11,000.00	5,824.75	11,706.37	5,808.88	136.26	153.15	-89.07	4,746.68	-3,534.46	913.99	625.67	288.32	3.003		
11,100.00	5,825.53	11,806.36	5,809.62	138.79	155.70	-89.08	4,817.34	-3,605.21	912.84	619.47	293.37	2.915		
11,200.00	5,826.31	11,906.35	5,810.36	141.32	158.25	-89.07	4,888.00	-3,675.96	911.69	613.27	298.42	2.827		
11,300.00	5,827.09	12,006.34	5,811.10	143.85	160.80	-89.07	4,958.66	-3,746.71	910.54	607.07	303.47	2.739		
11,400.00	5,827.87	12,106.33	5,811.84	146.38	163.35	-89.07	5,029.32	-3,817.46	909.39	600.87	308.52	2.651		
11,500.00	5,828.65	12,206.32	5,812.58	148.91	165.90	-89.08	5,100.00	-3,888.21	908.24	594.67	313.57	2.563		
11,600.00	5,829.43	12,306.31	5,813.32	151.44	168.45	-89.08	5,170.66	-3,958.96	907.09	588.47	318.62	2.475		
11,700.00	5,830.21	12,406.30	5,814.06	153.97	171.00	-89.09	5,241.32	-4,029.71	905.94	582.27	323.67	2.387		
11,800.00	5,830.99	12,506.29	5,814.80	156.50	173.55	-89.10	5,312.00	-4,100.46	904.79	576.07	328.72	2.299		
11,900.00	5,831.77	12,606.28	5,815.54	159.03	176.10	-89.11	5,382.66	-4,171.21	903.64	569.87	333.77	2.211		
12,000.00	5,832.55	12,706.27	5,816.28	161.56	178.65	-89.12	5,453.32	-4,241.96	902.49	563.67	338.82	2.123		

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



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Federal 2307-7P COM 1H - Slot 7P 1H
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Reference Site:	Federal 2307-7P	MD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Federal 2307-7P COM 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design Federal 2307-7P - Federal 2307-7P COM 2H - OH - Plan #3													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
12,100.00	5,836.92	12,974.96	5,824.09	162.05	182.62	-89.13	5,790.45	-4,262.34	890.72	548.13	342.59	2.600		
12,200.00	5,837.91	13,074.68	5,825.32	164.47	184.92	-89.14	5,872.56	-4,318.91	883.21	535.90	347.31	2.543		
12,300.00	5,838.91	13,174.39	5,826.54	166.89	187.22	-89.15	5,954.67	-4,375.47	875.71	523.67	352.03	2.488		
12,400.00	5,839.90	13,274.11	5,827.77	169.30	189.52	-89.15	6,036.78	-4,432.04	868.20	511.44	356.76	2.434		
12,410.80	5,840.01	13,284.88	5,827.90	169.56	189.77	-89.16	6,045.64	-4,438.15	867.39	510.12	357.27	2.428 SF		



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Federal 2307-7P COM 1H - Slot 7P 1H
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Reference Site:	Federal 2307-7P	MD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Federal 2307-7P COM 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design Federal 2307-7P - Federal 2307-7P COM 3H - OH - Plan #3														Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM														Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance							Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor			
0.00	0.00	0.00	0.00	0.00	0.00	-78.03	12.38	-58.39	59.69						
100.00	100.00	100.00	100.00	0.13	0.13	-78.03	12.38	-58.39	59.69	59.42	0.27	222.003			
200.00	200.00	200.00	200.00	0.49	0.49	-78.03	12.38	-58.39	59.69	58.70	0.99	60.546			
300.00	300.00	300.00	300.00	0.85	0.85	-78.03	12.38	-58.39	59.69	57.98	1.70	35.053			
400.00	400.00	400.00	400.00	1.21	1.21	-78.03	12.38	-58.39	59.69	57.27	2.42	24.667			
500.00	500.00	500.00	500.00	1.57	1.57	-78.03	12.38	-58.39	59.69	56.55	3.14	19.029			
600.00	599.95	601.27	601.25	1.93	1.92	-108.20	10.82	-57.50	59.29	55.43	3.85	15.382			
643.60	643.46	645.20	645.14	2.09	2.06	-112.23	9.19	-56.56	59.14	54.98	4.16	14.199 CC, ES			
700.00	699.63	701.70	701.53	2.29	2.26	-119.45	6.22	-54.86	59.62	55.06	4.56	13.077			
800.00	798.77	800.48	799.93	2.66	2.60	-136.26	-1.28	-50.55	64.98	59.72	5.25	12.368			
900.00	897.08	896.84	895.57	3.04	2.94	-153.43	-11.42	-44.73	79.93	73.95	5.98	13.366			
1,000.00	994.31	990.10	987.71	3.45	3.30	-166.77	-23.89	-37.57	105.93	99.18	6.75	15.696			
1,100.00	1,090.18	1,079.65	1,075.70	3.89	3.65	-175.93	-38.31	-29.30	141.86	134.33	7.52	18.861			
1,200.00	1,184.43	1,164.97	1,159.02	4.38	4.01	-177.87	-54.26	-20.14	186.25	177.97	8.27	22.509			
1,300.00	1,276.81	1,245.67	1,237.28	4.91	4.36	-173.52	-71.31	-10.35	237.98	228.98	9.00	26.450			
1,400.00	1,367.06	1,321.42	1,310.21	5.51	4.71	-170.30	-89.06	-0.17	296.21	286.52	9.69	30.580			
1,500.00	1,455.47	1,392.63	1,378.26	6.15	5.06	-168.08	-107.26	10.28	359.42	349.08	10.34	34.755			
1,600.00	1,543.75	1,461.35	1,443.41	6.82	5.42	-166.42	-126.21	21.16	424.43	413.46	10.97	38.703			
1,700.00	1,632.03	1,527.78	1,505.87	7.50	5.78	-165.04	-145.81	32.41	490.91	479.33	11.58	42.395			
1,800.00	1,720.30	1,591.96	1,565.71	8.20	6.14	-163.85	-165.94	43.97	558.79	546.61	12.18	45.875			
1,900.00	1,808.58	1,663.12	1,631.71	8.91	6.56	-162.72	-189.02	57.21	627.53	614.71	12.83	48.925			
2,000.00	1,896.85	1,735.22	1,698.57	9.62	7.00	-161.79	-212.41	70.64	696.39	682.90	13.49	51.623			
2,100.00	1,985.13	1,807.32	1,765.43	10.34	7.44	-161.03	-235.81	84.07	765.32	751.16	14.16	54.032			
2,200.00	2,073.40	1,879.42	1,832.30	11.07	7.89	-160.40	-259.20	97.50	834.32	819.47	14.85	56.186			
2,300.00	2,161.68	1,951.52	1,899.16	11.80	8.35	-159.86	-282.59	110.93	903.36	887.81	15.54	58.118			
2,400.00	2,249.95	2,023.62	1,966.02	12.53	8.81	-159.40	-305.98	124.35	972.43	956.19	16.25	59.859			
2,500.00	2,338.23	2,095.72	2,032.89	13.27	9.27	-158.99	-329.38	137.78	1,041.54	1,024.58	16.95	61.432			
2,600.00	2,426.50	2,167.81	2,099.75	14.01	9.73	-158.64	-352.77	151.21	1,110.67	1,093.00	17.67	62.855			
2,700.00	2,514.78	2,239.91	2,166.62	14.75	10.20	-158.33	-376.16	164.64	1,179.82	1,161.42	18.39	64.150			
2,800.00	2,603.05	2,312.01	2,233.48	15.49	10.67	-158.05	-399.56	178.07	1,248.98	1,229.86	19.12	65.331			
2,900.00	2,691.33	2,384.11	2,300.34	16.23	11.14	-157.81	-422.95	191.49	1,318.16	1,298.31	19.85	66.410			
3,000.00	2,779.60	2,456.21	2,367.21	16.98	11.62	-157.58	-446.34	204.92	1,387.35	1,366.76	20.58	67.400			
3,100.00	2,867.88	2,528.31	2,434.07	17.72	12.09	-157.38	-469.74	218.35	1,456.55	1,435.23	21.32	68.310			
3,200.00	2,956.16	2,600.41	2,500.93	18.47	12.57	-157.20	-493.13	231.78	1,525.76	1,503.69	22.06	69.150			
3,300.00	3,044.43	2,672.51	2,567.80	19.22	13.05	-157.03	-516.52	245.20	1,594.97	1,572.16	22.81	69.925			
3,400.00	3,132.71	2,744.61	2,634.66	19.96	13.53	-156.88	-539.91	258.63	1,664.19	1,640.64	23.56	70.644			
3,500.00	3,220.98	2,816.71	2,701.52	20.71	14.01	-156.73	-563.31	272.06	1,733.42	1,709.11	24.31	71.312			
3,600.00	3,309.26	2,888.81	2,768.39	21.46	14.49	-156.60	-586.70	285.49	1,802.66	1,777.60	25.06	71.933			
3,700.00	3,397.53	2,960.91	2,835.25	22.21	14.97	-156.48	-610.09	298.92	1,871.89	1,846.08	25.81	72.512			
3,800.00	3,485.81	3,033.00	2,902.12	22.96	15.45	-156.37	-633.49	312.34	1,941.13	1,914.56	26.57	73.054			
3,900.00	3,574.08	3,105.10	2,968.98	23.71	15.93	-156.26	-656.88	325.77	2,010.38	1,983.05	27.33	73.561			
4,000.00	3,662.36	3,177.20	3,035.84	24.46	16.42	-156.17	-680.27	339.20	2,079.63	2,051.54	28.09	74.036			
4,100.00	3,750.63	3,249.30	3,102.71	25.22	16.90	-156.08	-703.67	352.63	2,148.88	2,120.03	28.85	74.483			
4,200.00	3,838.91	3,321.40	3,169.57	25.97	17.39	-155.99	-727.06	366.06	2,218.13	2,188.52	29.61	74.903			
4,300.00	3,927.18	3,393.50	3,236.43	26.72	17.87	-155.91	-750.45	379.48	2,287.39	2,257.01	30.38	75.300			
4,400.00	4,015.46	3,465.60	3,303.30	27.47	18.36	-155.83	-773.85	392.91	2,356.65	2,325.51	31.14	75.673			
4,500.00	4,103.73	3,537.70	3,370.16	28.23	18.85	-155.76	-797.24	406.34	2,425.91	2,394.00	31.91	76.027			
4,600.00	4,192.01	3,609.80	3,437.02	28.98	19.33	-155.69	-820.63	419.77	2,495.17	2,462.50	32.68	76.361			
4,700.00	4,280.29	3,681.91	3,503.88	29.73	19.81	-155.62	-844.02	433.20	2,564.43	2,530.77	33.45	76.687			
4,800.00	4,368.56	3,754.02	3,571.73	30.49	20.29	-155.55	-867.41	446.63	2,633.69	2,600.00	34.22	77.000			
4,900.00	4,456.84	3,826.12	3,639.58	31.24	20.77	-155.48	-890.80	460.24	2,702.95	2,668.25	35.00	77.300			

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



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Federal 2307-7P COM 1H - Slot 7P 1H
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Reference Site:	Federal 2307-7P	MD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Federal 2307-7P COM 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design Federal 2307-7P - Federal 2307-7P COM 3H - OH - Plan #3														Offset Site Error:	0.00 usft
Survey Program: O-MWD+HDGM														Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance							Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor			
5,000.00	4,545.11	7,800.00	5,751.46	31.99	58.27	-162.06	227.75	-737.10	2,475.36	2,401.19	74.17	33.373			
5,100.00	4,634.02	7,800.00	5,751.46	32.72	58.27	-154.69	227.75	-737.10	2,470.77	2,395.08	75.69	32.644			
5,200.00	4,725.44	7,800.00	5,751.46	33.34	58.27	-139.50	227.75	-737.10	2,460.31	2,383.27	77.04	31.934			
5,300.00	4,818.08	7,829.04	5,751.67	33.83	58.90	-121.29	248.77	-757.15	2,442.96	2,364.00	78.96	30.940			
5,400.00	4,910.37	7,850.04	5,751.81	34.21	59.37	-104.44	263.83	-771.77	2,418.87	2,338.37	80.50	30.049			
5,500.00	5,000.95	7,877.28	5,752.00	34.49	59.96	-95.43	283.22	-790.91	2,388.72	2,306.69	82.03	29.119			
5,600.00	5,091.00	7,915.43	5,752.26	34.74	60.82	-94.58	310.24	-817.84	2,359.77	2,275.97	83.80	28.159			
5,700.00	5,181.05	7,959.47	5,752.57	35.01	61.81	-93.58	341.44	-848.93	2,333.92	2,248.23	85.69	27.236			
5,800.00	5,271.10	8,003.51	5,752.87	35.28	62.80	-92.59	372.63	-880.01	2,311.27	2,223.75	87.53	26.406			
5,900.00	5,361.15	8,047.56	5,753.18	35.56	63.80	-91.59	403.83	-911.10	2,291.92	2,202.62	89.31	25.664			
6,000.00	5,448.32	8,096.95	5,753.52	35.86	64.92	-91.86	438.81	-945.97	2,276.16	2,185.00	91.16	24.970			
6,100.00	5,528.37	8,157.25	5,753.94	36.18	66.30	-91.70	481.52	-988.53	2,263.96	2,170.69	93.27	24.274			
6,200.00	5,599.93	8,227.42	5,754.42	36.52	67.92	-91.21	531.22	-1,038.06	2,254.77	2,159.12	95.65	23.574			
6,300.00	5,661.77	8,306.26	5,754.97	36.88	69.75	-90.55	587.07	-1,093.72	2,247.91	2,149.59	98.33	22.862			
6,400.00	5,712.84	8,392.43	5,755.57	37.29	71.76	-89.88	648.10	-1,154.54	2,242.69	2,141.37	101.32	22.134			
6,500.00	5,752.26	8,484.44	5,756.20	37.76	73.92	-89.31	713.27	-1,219.49	2,238.46	2,133.81	104.65	21.390			
6,600.00	5,779.36	8,580.73	5,756.87	38.33	76.20	-88.96	781.47	-1,287.46	2,234.67	2,126.39	108.28	20.638			
6,700.00	5,793.67	8,679.65	5,757.56	39.05	78.55	-88.90	851.54	-1,357.29	2,230.94	2,118.76	112.18	19.888			
6,800.00	5,796.25	8,779.53	5,758.25	39.95	80.94	-89.01	922.28	-1,427.79	2,227.07	2,110.80	116.27	19.155			
6,900.00	5,796.80	8,879.45	5,758.94	41.04	83.34	-89.01	993.05	-1,498.32	2,223.12	2,102.64	120.48	18.452			
7,000.00	5,797.35	8,979.37	5,759.63	42.34	85.75	-89.01	1,063.83	-1,568.86	2,219.18	2,094.38	124.80	17.782			
7,100.00	5,797.90	9,079.29	5,760.32	43.81	88.17	-89.01	1,134.60	-1,639.39	2,215.23	2,086.02	129.21	17.145			
7,200.00	5,798.45	9,179.22	5,761.02	45.45	90.60	-89.02	1,205.38	-1,709.92	2,211.29	2,077.59	133.70	16.540			
7,300.00	5,799.00	9,279.14	5,761.71	47.24	93.04	-89.02	1,276.15	-1,780.45	2,207.34	2,069.09	138.25	15.966			
7,400.00	5,799.55	9,379.06	5,762.40	49.13	95.49	-89.02	1,346.92	-1,850.99	2,203.39	2,060.53	142.87	15.423			
7,500.00	5,800.11	9,478.98	5,763.09	51.13	97.94	-89.02	1,417.70	-1,921.52	2,199.45	2,051.92	147.53	14.908			
7,600.00	5,800.66	9,578.90	5,763.78	53.20	100.40	-89.02	1,488.47	-1,992.05	2,195.50	2,043.26	152.25	14.421			
7,700.00	5,801.21	9,678.83	5,764.48	55.33	102.87	-89.03	1,559.25	-2,062.59	2,191.56	2,034.56	157.00	13.959			
7,800.00	5,801.76	9,778.75	5,765.13	57.52	106.05	-89.03	1,630.74	-2,132.95	2,187.22	2,024.58	162.63	13.449			
7,900.00	5,802.31	9,878.67	5,765.82	59.76	108.51	-89.03	1,702.39	-2,202.51	2,181.96	2,014.53	167.44	13.032			
8,000.00	5,802.86	9,978.59	5,766.51	62.04	110.97	-89.04	1,774.03	-2,272.07	2,176.71	2,004.44	172.27	12.636			
8,100.00	5,803.41	10,078.51	5,767.20	64.35	113.44	-89.04	1,845.68	-2,341.62	2,171.45	1,994.33	177.12	12.260			
8,200.00	5,803.97	10,178.43	5,767.89	66.68	115.92	-89.05	1,917.33	-2,411.18	2,166.20	1,984.20	182.00	11.902			
8,300.00	5,804.52	10,278.35	5,768.58	69.05	118.40	-89.05	2,008.98	-2,500.74	2,160.94	1,974.04	186.90	11.562			
8,400.00	5,805.07	10,378.27	5,769.27	71.43	120.88	-89.06	2,080.62	-2,570.30	2,155.69	1,963.87	191.82	11.238			
8,500.00	5,805.62	10,478.19	5,770.00	73.84	123.37	-89.06	2,152.27	-2,639.86	2,150.43	1,953.68	196.76	10.929			
8,600.00	5,806.17	10,578.11	5,770.73	76.26	125.86	-89.07	2,223.92	-2,709.41	2,145.18	1,943.47	201.71	10.635			
8,700.00	5,806.80	10,678.03	5,771.46	78.70	128.35	-89.08	2,295.60	-2,779.00	2,140.99	1,934.33	206.66	10.360			
8,800.00	5,807.43	10,777.95	5,772.19	81.13	130.85	-89.08	2,367.33	-2,848.64	2,138.63	1,927.01	211.62	10.106			
8,900.00	5,808.06	10,877.87	5,772.92	83.58	133.35	-89.08	2,439.05	-2,918.27	2,135.93	1,919.34	216.58	9.862			
9,000.00	5,809.14	11,006.12	5,775.16	86.03	135.85	-89.07	2,510.77	-2,987.90	2,133.23	1,911.66	221.56	9.628			
9,100.00	5,809.92	11,106.09	5,775.97	88.50	138.36	-89.07	2,582.49	-3,057.53	2,130.53	1,903.97	226.55	9.404			
9,200.00	5,810.70	11,206.05	5,776.78	90.97	140.87	-89.07	2,654.21	-3,127.15	2,127.82	1,896.28	231.55	9.190			
9,300.00	5,811.48	11,299.89	5,777.54	93.45	143.22	-89.07	2,721.39	-3,192.38	2,125.13	1,888.76	236.37	8.991			
9,400.00	5,812.26	11,360.73	5,778.03	95.94	144.77	-89.07	2,764.73	-3,235.36	2,123.55	1,883.31	240.25	8.839			
9,427.69	5,812.48	11,376.64	5,778.16	96.63	145.17	-89.07	2,775.87	-3,246.71	2,123.47	1,882.20	241.28	8.801			
9,500.00	5,813.04	11,400.00	5,778.34	98.44	145.76	-89.07	2,792.12	-3,263.49	2,124.12	1,880.79	243.33	8.729			
9,600.00	5,813.83	11,475.56	5,778.92	100.94	147.71	-89.07	2,843.73	-3,318.67	2,126.42	1,878.85	247.57	8.589			
9,700.00	5,814.61	11,532.87	5,779.35	103.44	149.19	-89.07	2,881.90	-3,361.43	2,130.86	1,879.74	251.12	8.466			
9,800.00	5,815.39	11,600.00	5,779.83	105.96	150.95	-89.08	2,925.51	-3,412.46	2,137.33	1,882.35	254.98	8.382			

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



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Federal 2307-7P COM 1H - Slot 7P 1H
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Reference Site:	Federal 2307-7P	MD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Federal 2307-7P COM 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design Federal 2307-7P - Federal 2307-7P COM 3H - OH - Plan #3													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)						
9,900.00	5,816.17	11,664.83	5,780.29	108.47	152.65	-89.08	2,966.70	-3,462.51	2,145.54	1,886.83	258.71	8.293		
10,000.00	5,816.95	11,764.46	5,781.00	110.99	155.28	-89.08	3,029.91	-3,539.52	2,154.13	1,890.25	263.88	8.163		
10,100.00	5,817.73	11,864.09	5,781.70	113.52	157.91	-89.08	3,093.11	-3,616.54	2,162.71	1,893.66	269.05	8.038		
10,200.00	5,818.51	11,963.72	5,782.41	116.04	160.54	-89.08	3,156.31	-3,693.55	2,171.30	1,897.07	274.23	7.918		
10,300.00	5,819.30	12,063.32	5,783.11	118.57	163.17	-89.09	3,219.49	-3,770.55	2,180.20	1,900.79	279.40	7.803		
10,400.00	5,820.14	12,162.62	5,783.81	121.07	165.80	-89.11	3,282.48	-3,847.31	2,191.98	1,907.45	284.54	7.704		
10,500.00	5,821.04	12,261.44	5,784.51	123.54	168.41	-89.13	3,345.17	-3,923.70	2,207.23	1,917.62	289.60	7.622		
10,600.00	5,822.00	12,359.68	5,785.21	125.95	171.02	-89.15	3,407.49	-3,999.63	2,225.91	1,931.31	294.60	7.556		
10,700.00	5,823.00	12,457.58	5,785.90	128.35	173.61	-89.15	3,469.59	-4,075.31	2,246.29	1,946.73	299.56	7.499		
10,800.00	5,823.99	12,555.48	5,786.59	130.75	176.21	-89.15	3,531.70	-4,150.99	2,266.67	1,962.14	304.52	7.443		
10,900.00	5,824.99	12,653.38	5,787.28	133.15	178.81	-89.15	3,593.80	-4,226.67	2,287.04	1,977.56	309.49	7.390		
11,000.00	5,825.98	12,751.28	5,787.98	135.55	181.41	-89.15	3,655.91	-4,302.35	2,307.42	1,992.97	314.45	7.338		
11,100.00	5,826.98	12,849.19	5,788.67	137.95	184.01	-89.16	3,718.01	-4,378.03	2,327.80	2,008.38	319.42	7.288		
11,200.00	5,827.97	12,947.09	5,789.36	140.36	186.61	-89.16	3,780.12	-4,453.71	2,348.18	2,023.79	324.39	7.239		
11,300.00	5,828.96	13,044.99	5,790.05	142.76	189.21	-89.16	3,842.22	-4,529.38	2,368.56	2,039.19	329.37	7.191		
11,400.00	5,829.96	13,142.89	5,790.75	145.17	191.82	-89.16	3,904.33	-4,605.06	2,388.94	2,054.59	334.35	7.145		
11,500.00	5,830.95	13,240.79	5,791.44	147.58	194.42	-89.16	3,966.43	-4,680.74	2,409.32	2,069.99	339.32	7.100		
11,600.00	5,831.95	13,338.69	5,792.13	149.99	197.03	-89.16	4,028.54	-4,756.42	2,429.70	2,085.39	344.30	7.057		
11,700.00	5,832.94	13,436.60	5,792.82	152.40	199.64	-89.16	4,090.64	-4,832.10	2,450.08	2,100.79	349.29	7.015 SF		
11,800.00	5,833.93	13,461.76	5,793.00	154.81	200.31	-89.16	4,106.60	-4,851.55	2,471.53	2,120.57	350.96	7.042		
11,900.00	5,834.93	13,461.76	5,793.00	157.22	200.31	-89.16	4,106.60	-4,851.55	2,496.67	2,145.64	351.03	7.112		
12,000.00	5,835.92	13,461.76	5,793.00	159.84	200.31	-89.16	4,106.60	-4,851.55	2,525.53	2,174.93	350.60	7.204		
12,100.00	5,836.92	13,461.76	5,793.00	162.05	200.31	-89.16	4,106.60	-4,851.55	2,557.97	2,208.28	349.70	7.315		
12,200.00	5,837.91	13,461.76	5,793.00	164.47	200.31	-89.16	4,106.60	-4,851.55	2,593.87	2,245.50	348.37	7.446		
12,300.00	5,838.91	13,461.76	5,793.00	166.89	200.31	-89.16	4,106.60	-4,851.55	2,633.08	2,286.42	346.66	7.596		
12,400.00	5,839.90	13,461.76	5,793.00	169.30	200.31	-89.16	4,106.60	-4,851.55	2,675.45	2,330.84	344.60	7.764		
12,410.80	5,840.01	13,461.76	5,793.00	169.56	200.31	-89.16	4,106.60	-4,851.55	2,680.21	2,335.84	344.36	7.783		

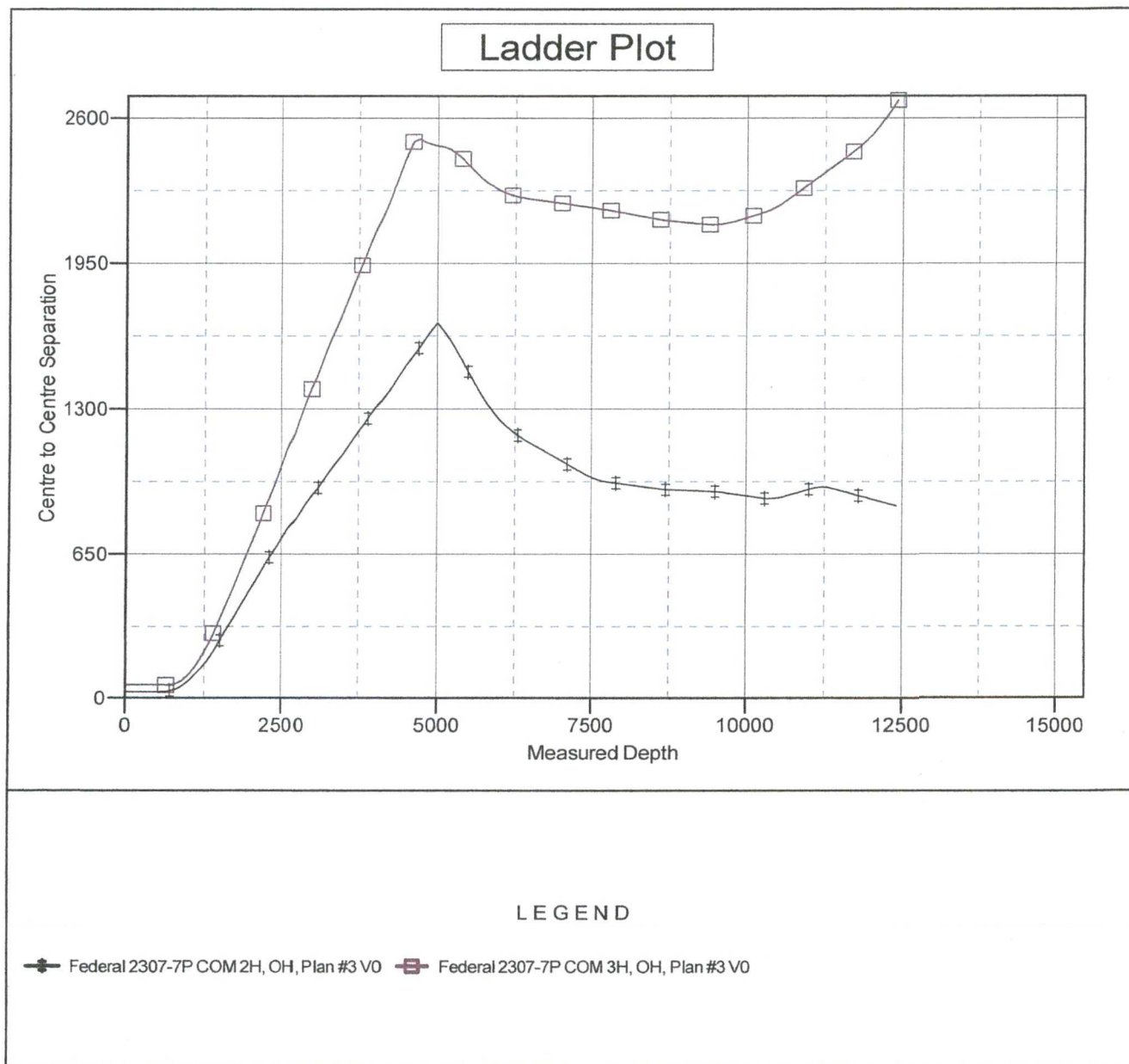
CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation

Company: Logos Operating LLC
Project: Rio Arriba, NM NAD83
Reference Site: Federal 2307-7P
Site Error: 0.00 usft
Reference Well: Federal 2307-7P COM 1H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan #2

Local Co-ordinate Reference: Well Federal 2307-7P COM 1H - Slot 7P 1H
TVD Reference: GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
MD Reference: GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
North Reference: True
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: Grand Junction District
Offset TVD Reference: Offset Datum

Reference Depths are relative to GL 7267' & RKB 25' @ 7292.00usft (A)
Offset Depths are relative to Offset Datum
Central Meridian is -107.8333334

Coordinates are relative to: Federal 2307-7P COM 1H - Slot 7P 1H
Coordinate System is US State Plane 1983, New Mexico Western Zone
Grid Convergence at Surface is: 0.13°

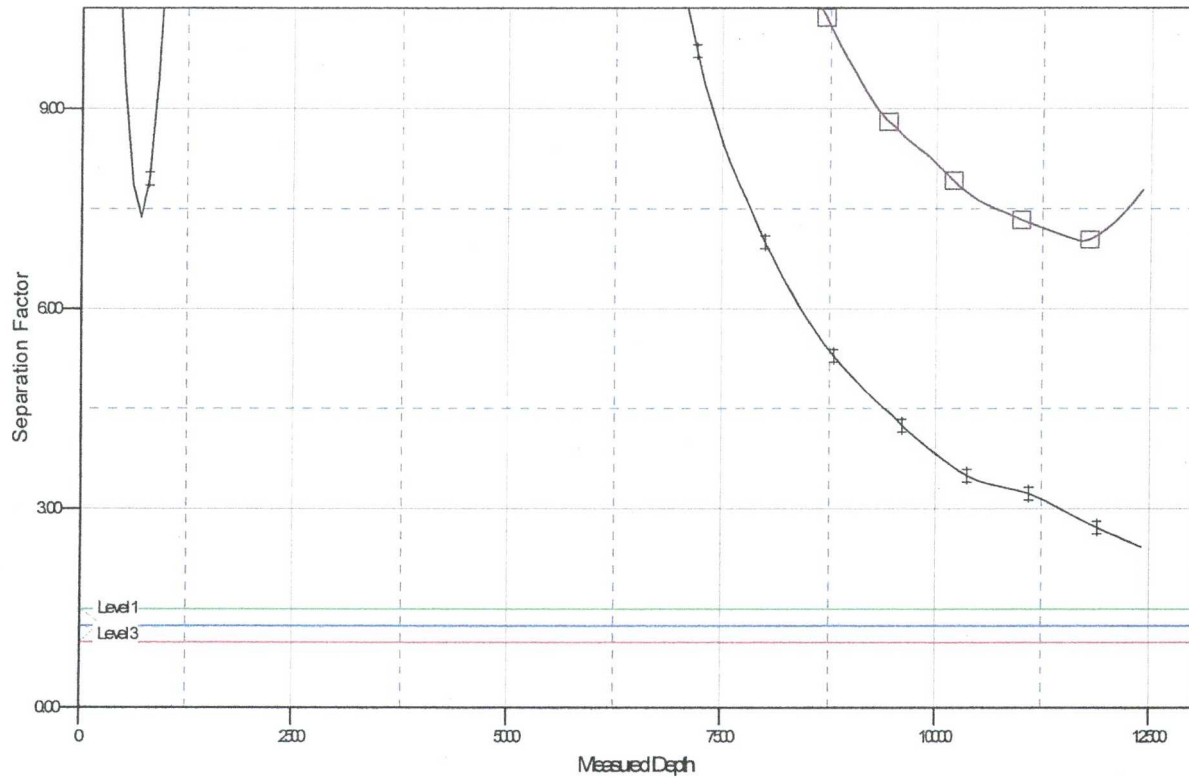


Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Federal 2307-7P COM 1H - Slot 7P 1H
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Reference Site:	Federal 2307-7P	MD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Federal 2307-7P COM 1H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Reference Depths are relative to GL 7267' & RKB 25' @ 7292.00usft (A)
Offset Depths are relative to Offset Datum
Central Meridian is -107.833334

Coordinates are relative to: Federal 2307-7P COM 1H - Slot 7P 1H
Coordinate System is US State Plane 1983, New Mexico Western Zone
Grid Convergence at Surface is: 0.13°

Separation Factor Plot



LEGEND

 Federal 2307-7P COM 2H, OH, Plan #3 V0
  Federal 2307-7P COM 3H, OH, Plan #3 V0