

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

RECEIVED

JUL 25 2013

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

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.

SUBMIT IN TRIPLICATE - Other instructions on page 2		5. Lease Serial No. NMNM 136672
1. Type of Well ☒ Oil Well ☐ Gas Well ☐ Other		6. If Indian, Allottee or Tribe Name
2. Name of Operator LOGOS Operating, LLC		7. If Unit of CA/Agreement, Name and/or No. CA NMNM 138467
3a. Address 2010 Afton Place Farmington, NM 87401		8. Well Name and No. Federal 2307 7P Com 2H
3b. Phone No. (include area code) (505) 787-2218		9. API Well No. 30-039-31367
4. Location of Well (Footage, Sec., T., R., M., or Survey Description) 1289 FSL & 327 FEL, SE/SE, P Sec 7 T23N R07W		10. Field and Pool or Exploratory Area Basin Mancos / Lybrook Gallup
		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	

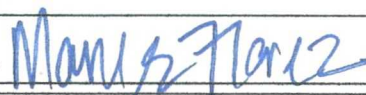
13. Describe Proposed or Completed Operation: Clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recompleat horizontally, give subsurface locations and measured and true vertical depths 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 determined 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.

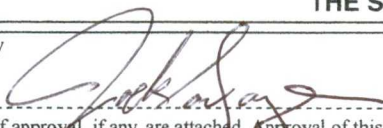
NMOCD

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 	Date 07/24/2018

THE SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by 	Title PE	Date 9/28/18
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 FFO	

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 

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

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

¹ API Number 30-039- 31367	² Pool Code 97232/42289	³ Pool Name BASIN MANCOS/LYBROOK GALLUP
⁴ Property Code 322SD1	⁵ Property Name FEDERAL 2307 7P COM	⁶ Well Number 2H
⁷ GRID No. 289408	⁸ Operator Name LOGOS OPERATING, LLC	⁹ Elevation 7267

¹⁰ Surface Location

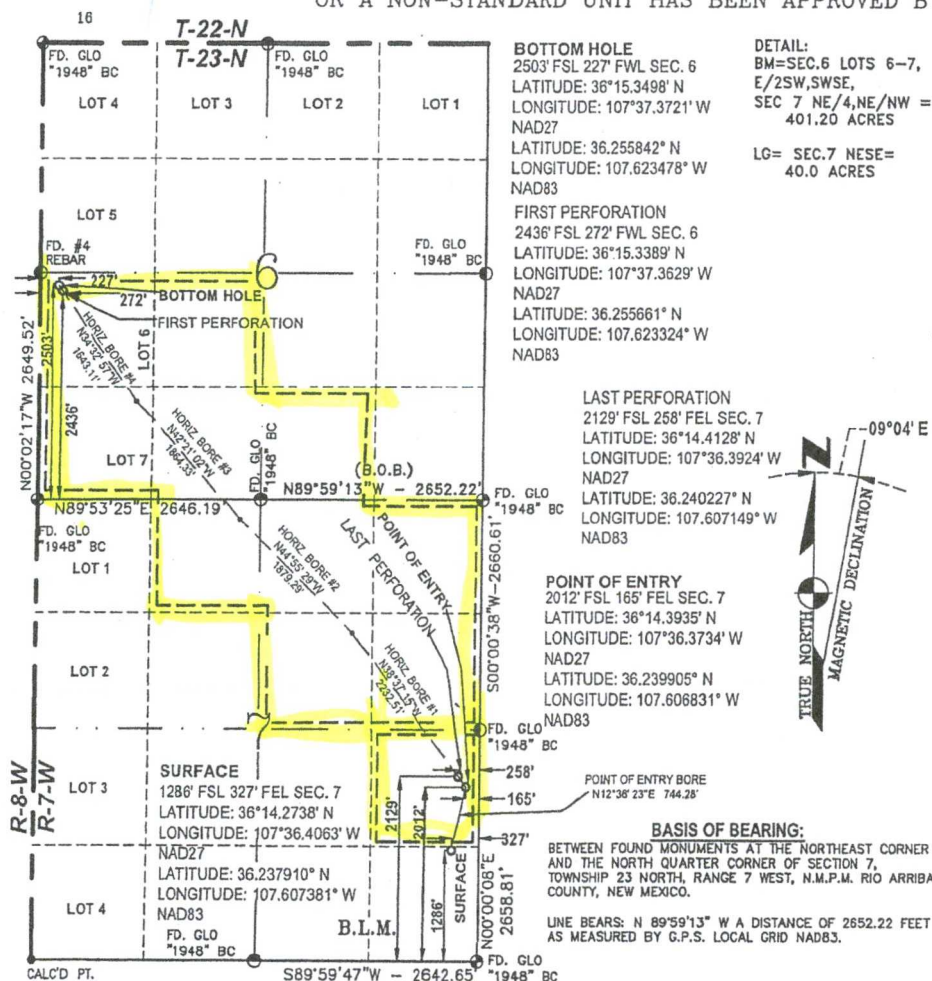
UL or lot no.	Section	Township	Range	Lot ldn	Feet from the	North/South line	Feet from the	East/West line	County
P	7	23-N	7-W		1286	SOUTH	327	EAST	RIO ARRIBA

¹¹ Bottom Hole Location If Different From Surface

UL or Lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
4	6	23-N	7-W	60	2503	SOUTH	227	WEST	RIO ARRIBA

15 Order No.

NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED
OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION



17 OPERATOR CERTIFICATION

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

Tan Senior 6/29/18
Signature Date

Printed Name _____
tsessions@logosresourcesllc.com
E-mail Address _____

18 SURVEYOR CERTIFICATION

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

JUNE 28, 2018

Date of Survey _____

Signature and Seal of Professional Surveyor:



GLEN W. RUSSELL

Certificate Number

15703

Sundry Drilling Plan

Federal 2307 7P Com 2H
Lease Serial # NMNM136672

LOGOS Operating, LLC

Revised: June 28, 2018

Surface Location: 1286 FSL, 327 FEL

Legal Description: Sec 7, T23N, R7W (36.237910° N, 107.607381° W – NAD83)
 Bottom Hole Location: 2503 FSL, 227 FWL

Legal Description: Sec 6, T23N, R7W (36.255842° N, 107.623478° W – NAD83)
 Rio Arriba County, NM

1. The elevation of the unprepared ground is 7,267 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 5,834' TVD/13,878' 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	1466	1466
Kirtland	1629	1629
Fruitland	1827	1827
Pictured Cliffs	2128	2128
Chacra	2970	2982
Cliff House	3637	3663
Menefee	3717	3745
Point Lookout	4489	4523
Mancos	4705	4754
Gallup	5668	5877

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	1827	Gas
Pictured Cliffs	2128	Gas
Cliff House	3637	Gas
Point Lookout	4489	Gas
Mancos	4705	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		x1000 lbs
		MD	TVD				Burst	Collapse	Tension
Surface	9-5/8"	0-320'	0-320'	J-55	36.00	STC	3520	2020	394
Intermediate	7"	0-6,260'	0-5,765'	J-55	23.00	LTC	4360	3270	313
Optional Intermediate	7"	0-6,260'	0-5,765'	P-110	26.00	LTC	9960	6230	693
Optional Intermediate	7"	0-6,260'	0-5,765'	L-80	26.00	LTC	7240	5410	511
Production	4-1/2"	6,110'-13,878'	5,750'-5,834'	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 6,260'. Cement will be circulated to surface in a single stage with 602 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 244 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 13,878' MD in a single stage using excess of approximately 30% for TOC at 6,110'. Base slurry to consist of 701 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 6110' 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' - 6,260'	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%
6,260' - 13,878'	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. Mud Logging: 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

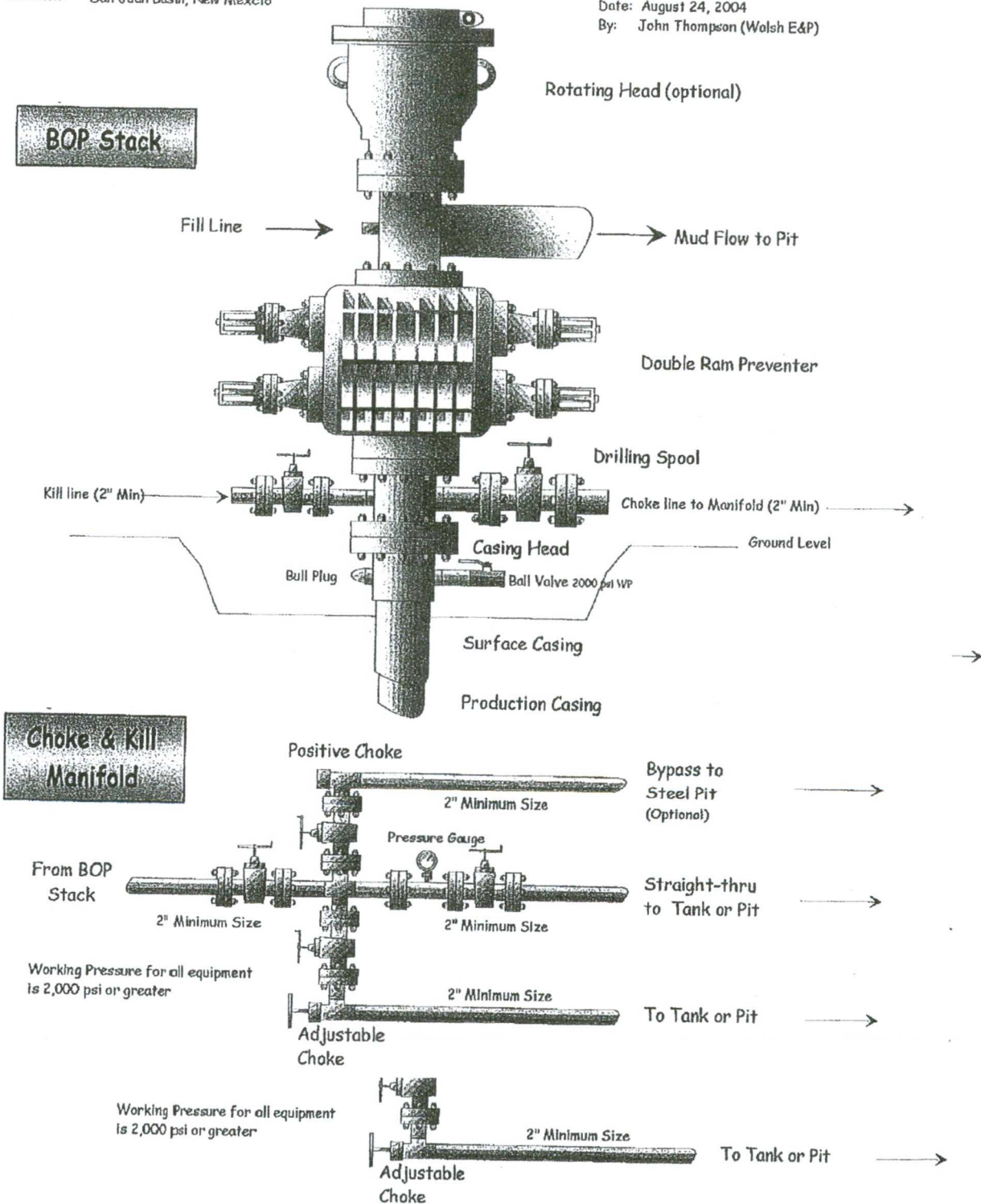
Attachment to Drilling Technical Program

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 2H
Wellbore: OH
Design: Plan #3

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

WELL DETAILS: Federal 2307-7P COM 2H

GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)

+N/-S	+E/-W	North	East	Latitude	Longitude
0.00	0.00	1905975.15	2789724.25	36.2379100	-107.6073810

Plan: Plan #3 (Federal 2307-7P COM 2H/OH)

Created By: Janie Collins Date: 17:28, June 20 2018

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	North	East	Latitude	Longitude
Fed 2H LP Rev	5765.00	726.23	162.19	1906701.75	2789884.75	36.2399050	-107.6088310
Fed 2H LPerf	5765.00	843.44	68.41	1906818.75	2789790.70	36.2402270	-107.6071490
Fed 2H T1	5785.00	2469.20	-1231.39	1908441.47	2788487.11	36.2446930	-107.6115570
Fed 2H T2	5799.00	3798.71	-2558.19	1909787.88	2787157.21	36.2483450	-107.6160570
Fed 2H T3	5815.00	5175.59	-3814.11	1911141.83	2785998.09	36.2521270	-107.6203170
Fed 2H FPerf	5834.00	6462.18	-4700.49	1912426.35	2785008.70	36.2550610	-107.6233240
Fed 2H BHL Rev	5834.00	6528.08	-4745.89	1912492.14	2784983.16	36.2558420	-107.6234780

SECTION DETAILS

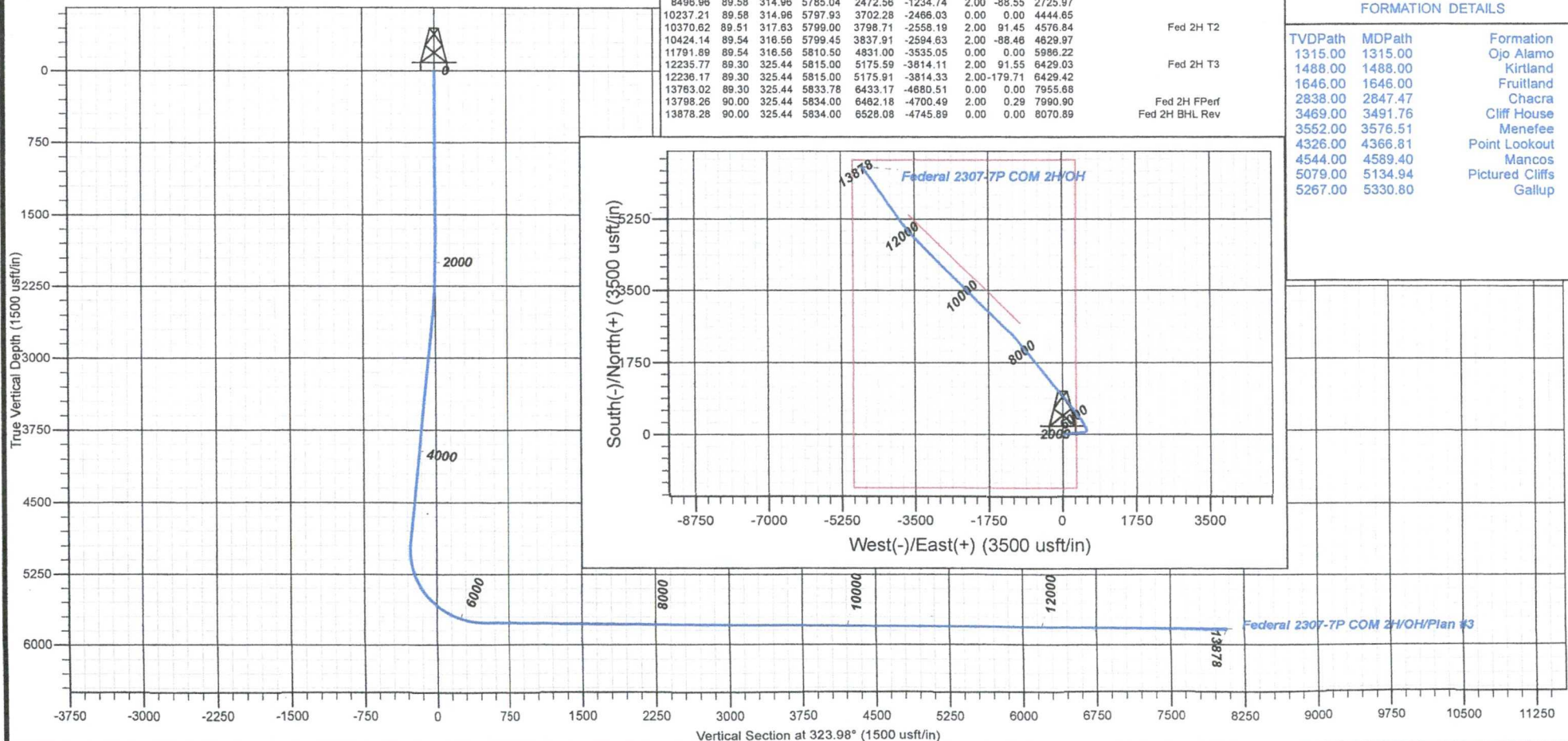
MD	Inc	Azi	TVD	+N/-S	+E/-W	Diep	TFace	VSeet	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2000.00	0.00	0.00	2000.00	0.00	0.00	0.00	0.00	0.00	
2582.84	11.66	83.60	2578.82	6.58	58.72	2.00	83.60	-29.20	
4980.45	11.66	83.60	4926.99	60.55	540.13	0.00	0.00	-268.64	
6259.80	89.47	319.71	5765.00	726.23	162.19	7.50	-123.43	492.03	Fed 2H LP Rev
6348.14	90.45	322.22	5765.05	794.84	106.56	3.05	68.67	580.24	
6360.27	90.45	322.22	5764.96	804.43	99.13	0.00	0.00	592.37	
6409.92	89.45	321.36	5765.00	843.44	68.41	2.67	-139.33	641.98	Fed 2H LPerf
6438.43	89.44	321.93	5765.28	865.80	50.72	2.00	91.09	670.47	
8148.70	89.44	321.93	5782.03	2212.11	-1003.88	0.00	0.00	2379.55	
8492.22	89.57	315.06	5785.00	2469.20	-1231.39	2.00	-88.91	2721.28	Fed 2H T1
8496.96	89.58	314.96	5785.04	2472.56	-1234.74	2.00	-88.55	2725.97	
10237.21	89.58	314.96	5797.93	3702.28	-2466.03	0.00	0.00	4444.65	
10370.62	89.51	317.63	5799.00	3798.71	-2558.19	2.00	91.45	4576.84	Fed 2H T2
10424.14	89.54	316.56	5799.45	3837.91	-2594.63	2.00	-88.46	4629.97	
11791.89	89.54	316.56	5810.50	4831.00	-3535.05	0.00	0.00	5986.22	
12235.77	89.30	325.44	5815.00	5175.59	-3814.11	2.00	91.55	6429.03	Fed 2H T3
12236.17	89.30	325.44	5815.00	5175.91	-3814.33	2.00	-179.71	6429.42	
13763.02	89.30	325.44	5833.78	6433.17	-4680.51	0.00	0.00	7955.68	
13798.26	90.00	325.44	5834.00	6462.18	-4700.49	2.00	0.29	7990.90	Fed 2H FPerf
13878.28	90.00	325.44	5834.00	6528.08	-4745.89	0.00	0.00	8070.89	Fed 2H BHL Rev

CASING DETAILS

No casing data is available

FORMATION DETAILS

TVDPath	MDPath	Formation
1315.00	1315.00	Ojo Alamo
1488.00	1488.00	Kirtland
1646.00	1646.00	Fruitland
2838.00	2847.47	Chacra
3469.00	3491.76	Cliff House
3552.00	3576.51	Menefee
4326.00	4366.81	Point Lookout
4544.00	4589.40	Mancos
5079.00	5134.94	Pictured Cliffs
5267.00	5330.80	Gallup





Logos Operating LLC

Rio Arriba, NM NAD83

Federal 2307-7P

Federal 2307-7P COM 2H - Slot 7P 2H

OH

Plan: Plan #3

Standard Planning Report

20 June, 2018



www.scientificdrilling.com



Scientific Drilling, Intl
Planning Report



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Federal 2307-7P COM 2H - Slot 7P 2H
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 2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #3		

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

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 2H - Slot 7P 2H					
Well Position	+N/-S	6.19 usft	Northing:	1,905,975.15 usft	Latitude:	36.2379100
	+E/-W	-28.90 usft	Easting:	2,789,724.25 usft	Longitude:	-107.6073810
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 #3			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	323.98



Scientific Drilling, Intl
Planning Report



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Federal 2307-7P COM 2H - Slot 7P 2H
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 2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #3		

Plan Sections

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,582.84	11.66	83.60	2,578.82	6.58	58.72	2.00	2.00	0.00	83.60	
4,980.45	11.66	83.60	4,926.99	60.55	540.13	0.00	0.00	0.00	0.00	
6,259.80	89.47	319.71	5,765.00	726.23	162.19	7.50	6.08	-9.68	-123.43	Fed 2H LP Rev
6,348.14	90.45	322.22	5,765.05	794.84	106.56	3.05	1.11	2.84	68.67	
6,360.27	90.45	322.22	5,764.96	804.43	99.13	0.00	0.00	0.00	0.00	
6,409.92	89.45	321.36	5,765.00	843.44	68.41	2.67	-2.02	-1.74	-139.33	Fed 2H LPerf
6,438.43	89.44	321.93	5,765.28	865.80	50.72	2.00	-0.04	2.00	91.09	
8,148.70	89.44	321.93	5,782.03	2,212.11	-1,003.88	0.00	0.00	0.00	0.00	
8,492.22	89.57	315.06	5,785.00	2,469.20	-1,231.39	2.00	0.04	-2.00	-88.91	Fed 2H T1
8,496.96	89.58	314.96	5,785.04	2,472.56	-1,234.74	2.00	0.05	-2.00	-88.55	
10,237.21	89.58	314.96	5,797.93	3,702.28	-2,466.03	0.00	0.00	0.00	0.00	
10,370.62	89.51	317.63	5,799.00	3,798.71	-2,558.19	2.00	-0.05	2.00	91.45	Fed 2H T2
10,424.14	89.54	316.56	5,799.45	3,837.91	-2,594.63	2.00	0.05	-2.00	-88.46	
11,791.89	89.54	316.56	5,810.50	4,831.00	-3,535.05	0.00	0.00	0.00	0.00	
12,235.77	89.30	325.44	5,815.00	5,175.59	-3,814.11	2.00	-0.05	2.00	91.55	Fed 2H T3
12,236.17	89.30	325.44	5,815.00	5,175.91	-3,814.33	2.00	-2.00	-0.01	-179.71	
13,763.02	89.30	325.44	5,833.78	6,433.17	-4,680.51	0.00	0.00	0.00	0.00	
13,798.26	90.00	325.44	5,834.00	6,462.18	-4,700.50	2.00	2.00	0.01	0.29	Fed 2H FPerf
13,878.28	90.00	325.44	5,834.00	6,528.08	-4,745.89	0.00	0.00	0.00	0.00	Fed 2H BHL Rev



Scientific Drilling, Intl
Planning Report



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Federal 2307-7P COM 2H - Slot 7P 2H
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 2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #3		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 2.00									
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00
1,315.00	0.00	0.00	1,315.00	0.00	0.00	0.00	0.00	0.00	0.00
Ojo Alamo									
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00
1,488.00	0.00	0.00	1,488.00	0.00	0.00	0.00	0.00	0.00	0.00
Kirtland									
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00
1,646.00	0.00	0.00	1,646.00	0.00	0.00	0.00	0.00	0.00	0.00
Fruitland									
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00	0.00	0.00
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	0.00
2,075.45	1.51	83.60	2,075.44	0.11	0.99	-0.49	2.00	2.00	0.00
Start 1720.37 hold at 2075.45 MD									
2,100.00	2.00	83.60	2,099.98	0.19	1.73	-0.86	2.00	2.00	0.00
2,200.00	4.00	83.60	2,199.84	0.78	6.94	-3.45	2.00	2.00	0.00
2,300.00	6.00	83.60	2,299.45	1.75	15.60	-7.76	2.00	2.00	0.00
2,400.00	8.00	83.60	2,398.70	3.11	27.71	-13.78	2.00	2.00	0.00
2,500.00	10.00	83.60	2,497.47	4.85	43.25	-21.51	2.00	2.00	0.00
2,582.84	11.66	83.60	2,578.82	6.58	58.72	-29.20	2.00	2.00	0.00
2,600.00	11.66	83.60	2,595.63	6.97	62.16	-30.92	0.00	0.00	0.00
2,700.00	11.66	83.60	2,693.57	9.22	82.24	-40.90	0.00	0.00	0.00
2,800.00	11.66	83.60	2,791.51	11.47	102.32	-50.89	0.00	0.00	0.00
2,847.47	11.66	83.60	2,838.00	12.54	111.85	-55.63	0.00	0.00	0.00
Chacra									
2,900.00	11.66	83.60	2,889.45	13.72	122.40	-60.88	0.00	0.00	0.00
3,000.00	11.66	83.60	2,987.38	15.97	142.48	-70.86	0.00	0.00	0.00
3,100.00	11.66	83.60	3,085.32	18.22	162.56	-80.85	0.00	0.00	0.00
3,200.00	11.66	83.60	3,183.26	20.47	182.64	-90.84	0.00	0.00	0.00
3,300.00	11.66	83.60	3,281.20	22.72	202.72	-100.82	0.00	0.00	0.00
3,400.00	11.66	83.60	3,379.13	24.97	222.80	-110.81	0.00	0.00	0.00
3,491.76	11.66	83.60	3,469.00	27.04	241.22	-119.97	0.00	0.00	0.00
Cliff House									
3,500.00	11.66	83.60	3,477.07	27.23	242.87	-120.79	0.00	0.00	0.00
3,576.51	11.66	83.60	3,552.00	28.95	258.24	-128.44	0.00	0.00	0.00



Scientific Drilling, Intl
Planning Report



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Federal 2307-7P COM 2H - Slot 7P 2H
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 2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #3		

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)
Menefee									
3,600.00	11.66	83.60	3,575.01	29.48	262.95	-130.78	0.00	0.00	0.00
3,700.00	11.66	83.60	3,672.95	31.73	283.03	-140.77	0.00	0.00	0.00
3,795.82	11.66	83.60	3,766.79	33.88	302.27	-150.34	0.00	0.00	0.00
Start Drop -2.00									
3,800.00	11.66	83.60	3,770.88	33.98	303.11	-150.75	0.00	0.00	0.00
3,900.00	11.66	83.60	3,868.82	36.23	323.19	-160.74	0.00	0.00	0.00
4,000.00	11.66	83.60	3,966.76	38.48	343.27	-170.73	0.00	0.00	0.00
4,100.00	11.66	83.60	4,064.70	40.73	363.35	-180.71	0.00	0.00	0.00
4,200.00	11.66	83.60	4,162.63	42.98	383.43	-190.70	0.00	0.00	0.00
4,300.00	11.66	83.60	4,260.57	45.23	403.51	-200.69	0.00	0.00	0.00
4,366.81	11.66	83.60	4,326.00	46.74	416.92	-207.36	0.00	0.00	0.00
Point Lookout									
4,400.00	11.66	83.60	4,358.51	47.48	423.59	-210.67	0.00	0.00	0.00
4,500.00	11.66	83.60	4,456.45	49.73	443.66	-220.66	0.00	0.00	0.00
4,589.40	11.66	83.60	4,544.00	51.75	461.61	-229.59	0.00	0.00	0.00
Mancos									
4,600.00	11.66	83.60	4,554.38	51.98	463.74	-230.65	0.00	0.00	0.00
4,700.00	11.66	83.60	4,652.32	54.24	483.82	-240.63	0.00	0.00	0.00
4,800.00	11.66	83.60	4,750.26	56.49	503.90	-250.62	0.00	0.00	0.00
4,900.00	11.66	83.60	4,848.20	58.74	523.98	-260.60	0.00	0.00	0.00
4,971.26	11.66	83.60	4,917.99	60.34	538.29	-267.72	0.00	0.00	0.00
Start Build 7.50									
4,980.45	11.66	83.60	4,926.99	60.55	540.13	-268.64	0.00	0.00	0.00
5,000.00	10.92	77.13	4,946.16	61.18	543.90	-270.34	7.50	-3.79	-33.12
5,100.00	10.02	35.20	5,044.63	70.41	558.17	-271.27	7.50	-0.90	-41.92
5,134.94	10.96	21.72	5,079.00	75.98	561.15	-268.52	7.50	2.69	-38.60
Pictured Cliffs									
5,200.00	13.89	3.39	5,142.55	89.52	563.90	-259.18	7.50	4.51	-28.17
5,300.00	19.92	347.78	5,238.23	118.20	561.00	-234.28	7.50	6.03	-15.61
5,330.80	21.96	344.73	5,267.00	128.88	558.37	-224.09	7.50	6.61	-9.93
Gallup									
5,400.00	26.69	339.52	5,330.04	155.94	549.52	-197.00	7.50	6.84	-7.53
5,500.00	33.75	334.46	5,416.42	202.10	529.65	-147.98	7.50	7.06	-5.06
5,600.00	40.95	330.99	5,495.87	255.90	501.74	-88.05	7.50	7.20	-3.47
5,700.00	48.23	328.41	5,567.04	316.41	466.27	-18.25	7.50	7.28	-2.58
5,771.26	53.45	326.91	5,612.03	363.06	436.69	36.87	7.50	7.32	-2.11
Start 60.00 hold at 5771.26 MD									
5,800.00	55.55	326.36	5,628.72	382.60	423.83	60.24	7.50	7.34	-1.91
5,831.26	57.85	325.79	5,645.88	404.28	409.24	86.35	7.50	7.35	-1.81
Start DLS 7.50 TFO -2.90									
5,900.00	62.91	324.64	5,679.84	453.33	375.15	146.07	7.50	7.36	-1.68
6,000.00	70.28	323.14	5,719.54	527.40	321.08	237.78	7.50	7.37	-1.50
6,100.00	77.66	321.76	5,747.13	603.53	262.53	333.79	7.50	7.38	-1.37
6,200.00	85.05	320.47	5,762.15	680.43	200.50	432.46	7.50	7.39	-1.30
6,232.22	87.44	320.06	5,764.26	705.14	179.95	464.53	7.50	7.39	-1.27
Start 170.08 hold at 6232.22 MD									
6,259.80	89.47	319.71	5,765.00	726.23	162.19	492.03	7.50	7.39	-1.27
Fed 2H LP Rev									
6,300.00	89.92	320.85	5,765.21	757.15	136.50	532.15	3.05	1.11	2.84
6,348.14	90.45	322.22	5,765.05	794.84	106.56	580.24	3.05	1.11	2.84



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 2H
Wellbore: OH
Design: Plan #3

Local Co-ordinate Reference: Well Federal 2307-7P COM 2H - Slot 7P 2H
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)
6,360.27	90.45	322.22	5,764.96	804.43	99.13	592.37	0.00	0.00	0.00
6,400.00	89.65	321.53	5,764.92	835.68	74.60	632.07	2.67	-2.02	-1.74
6,402.29	89.60	321.49	5,764.94	837.48	73.17	634.36	2.67	-2.02	-1.74
Landing Point @ 6402' MD									
6,409.92	89.45	321.36	5,765.00	843.44	68.41	641.98	2.67	-2.02	-1.74
Fed 2H LPerf									
6,438.43	89.44	321.93	5,765.28	865.80	50.72	670.47	2.00	-0.04	2.00
6,479.93	89.44	321.93	5,765.68	898.47	25.13	711.94	0.00	0.00	0.00
Start 6714.91 hold at 6479.93 MD									
6,500.00	89.44	321.93	5,765.88	914.26	12.76	731.99	0.00	0.00	0.00
6,552.00	89.44	321.93	5,766.39	955.20	-19.31	783.96	0.00	0.00	0.00
36.2425898, -107.6073894 - Last Perf @ 6552' MD									
6,600.00	89.44	321.93	5,766.86	992.98	-48.90	831.92	0.00	0.00	0.00
6,700.00	89.44	321.93	5,767.84	1,071.70	-110.57	931.85	0.00	0.00	0.00
6,800.00	89.44	321.93	5,768.82	1,150.42	-172.23	1,031.79	0.00	0.00	0.00
6,900.00	89.44	321.93	5,769.80	1,229.14	-233.89	1,131.72	0.00	0.00	0.00
6,979.97	89.44	321.93	5,770.58	1,292.09	-283.20	1,211.63	0.00	0.00	0.00
Fed 2H LP									
7,000.00	89.44	321.93	5,770.78	1,307.86	-295.55	1,231.65	0.00	0.00	0.00
7,100.00	89.44	321.93	5,771.76	1,386.58	-357.22	1,331.58	0.00	0.00	0.00
7,200.00	89.44	321.93	5,772.74	1,465.30	-418.88	1,431.51	0.00	0.00	0.00
7,300.00	89.44	321.93	5,773.72	1,544.02	-480.54	1,531.44	0.00	0.00	0.00
7,400.00	89.44	321.93	5,774.70	1,622.74	-542.21	1,631.37	0.00	0.00	0.00
7,500.00	89.44	321.93	5,775.68	1,701.46	-603.87	1,731.30	0.00	0.00	0.00
7,600.00	89.44	321.93	5,776.66	1,780.18	-665.53	1,831.23	0.00	0.00	0.00
7,700.00	89.44	321.93	5,777.64	1,858.90	-727.19	1,931.16	0.00	0.00	0.00
7,800.00	89.44	321.93	5,778.62	1,937.62	-788.86	2,031.09	0.00	0.00	0.00
7,900.00	89.44	321.93	5,779.60	2,016.34	-850.52	2,131.03	0.00	0.00	0.00
8,000.00	89.44	321.93	5,780.58	2,095.06	-912.18	2,230.96	0.00	0.00	0.00
8,100.00	89.44	321.93	5,781.56	2,173.77	-973.85	2,330.89	0.00	0.00	0.00
8,148.70	89.44	321.93	5,782.03	2,212.11	-1,003.88	2,379.55	0.00	0.00	0.00
8,200.00	89.46	320.90	5,782.53	2,252.21	-1,035.87	2,430.80	2.00	0.04	-2.00
8,300.00	89.50	318.90	5,783.44	2,328.70	-1,100.27	2,530.54	2.00	0.04	-2.00
8,400.00	89.54	316.90	5,784.28	2,402.89	-1,167.31	2,629.96	2.00	0.04	-2.00
8,492.22	89.57	315.06	5,785.00	2,469.20	-1,231.39	2,721.28	2.00	0.04	-2.00
Fed 2H T1									
8,496.96	89.58	314.96	5,785.04	2,472.56	-1,234.74	2,725.97	2.00	0.05	-2.00
8,500.00	89.58	314.96	5,785.06	2,474.70	-1,236.89	2,728.96	0.00	0.00	0.00
8,600.00	89.58	314.96	5,785.80	2,545.36	-1,307.64	2,827.72	0.00	0.00	0.00
8,700.00	89.58	314.96	5,786.54	2,616.03	-1,378.39	2,926.49	0.00	0.00	0.00
8,800.00	89.58	314.96	5,787.28	2,686.69	-1,449.15	3,025.25	0.00	0.00	0.00
8,900.00	89.58	314.96	5,788.02	2,757.35	-1,519.90	3,124.01	0.00	0.00	0.00
9,000.00	89.58	314.96	5,788.76	2,828.02	-1,590.66	3,222.77	0.00	0.00	0.00
9,100.00	89.58	314.96	5,789.50	2,898.68	-1,661.41	3,321.53	0.00	0.00	0.00
9,200.00	89.58	314.96	5,790.25	2,969.35	-1,732.16	3,420.29	0.00	0.00	0.00
9,300.00	89.58	314.96	5,790.99	3,040.01	-1,802.92	3,519.05	0.00	0.00	0.00
9,400.00	89.58	314.96	5,791.73	3,110.67	-1,873.67	3,617.81	0.00	0.00	0.00
9,500.00	89.58	314.96	5,792.47	3,181.34	-1,944.43	3,716.57	0.00	0.00	0.00
9,600.00	89.58	314.96	5,793.21	3,252.00	-2,015.18	3,815.33	0.00	0.00	0.00
9,700.00	89.58	314.96	5,793.95	3,322.66	-2,085.93	3,914.09	0.00	0.00	0.00
9,800.00	89.58	314.96	5,794.69	3,393.33	-2,156.69	4,012.85	0.00	0.00	0.00



Scientific Drilling, Intl
Planning Report



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Federal 2307-7P COM 2H - Slot 7P 2H
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 2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #3		

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)
9,900.00	89.58	314.96	5,795.43	3,463.99	-2,227.44	4,111.61	0.00	0.00	0.00
10,000.00	89.58	314.96	5,796.17	3,534.65	-2,298.20	4,210.38	0.00	0.00	0.00
10,100.00	89.58	314.96	5,796.92	3,605.32	-2,368.95	4,309.14	0.00	0.00	0.00
10,200.00	89.58	314.96	5,797.66	3,675.98	-2,439.70	4,407.90	0.00	0.00	0.00
10,237.21	89.58	314.96	5,797.93	3,702.28	-2,466.03	4,444.65	0.00	0.00	0.00
10,300.00	89.54	316.22	5,798.42	3,747.13	-2,509.97	4,506.76	2.00	-0.05	2.00
10,370.62	89.51	317.63	5,799.00	3,798.71	-2,558.19	4,576.84	2.00	-0.05	2.00
Fed 2H T2									
10,400.00	89.52	317.04	5,799.25	3,820.31	-2,578.11	4,606.02	2.00	0.05	-2.00
10,424.14	89.54	316.56	5,799.45	3,837.91	-2,594.63	4,629.98	2.00	0.05	-2.00
10,500.00	89.54	316.56	5,800.06	3,892.99	-2,646.79	4,705.19	0.00	0.00	0.00
10,600.00	89.54	316.56	5,800.87	3,965.60	-2,715.54	4,804.35	0.00	0.00	0.00
10,700.00	89.54	316.56	5,801.68	4,038.21	-2,784.30	4,903.51	0.00	0.00	0.00
10,800.00	89.54	316.56	5,802.48	4,110.81	-2,853.06	5,002.67	0.00	0.00	0.00
10,900.00	89.54	316.56	5,803.29	4,183.42	-2,921.81	5,101.83	0.00	0.00	0.00
11,000.00	89.54	316.56	5,804.10	4,256.03	-2,990.57	5,200.99	0.00	0.00	0.00
11,100.00	89.54	316.56	5,804.91	4,328.64	-3,059.33	5,300.15	0.00	0.00	0.00
11,200.00	89.54	316.56	5,805.72	4,401.24	-3,128.08	5,399.31	0.00	0.00	0.00
11,300.00	89.54	316.56	5,806.52	4,473.85	-3,196.84	5,498.46	0.00	0.00	0.00
11,400.00	89.54	316.56	5,807.33	4,546.46	-3,265.60	5,597.62	0.00	0.00	0.00
11,500.00	89.54	316.56	5,808.14	4,619.07	-3,334.35	5,696.78	0.00	0.00	0.00
11,600.00	89.54	316.56	5,808.95	4,691.67	-3,403.11	5,795.94	0.00	0.00	0.00
11,700.00	89.54	316.56	5,809.76	4,764.28	-3,471.87	5,895.10	0.00	0.00	0.00
11,791.89	89.54	316.56	5,810.50	4,831.00	-3,535.05	5,986.22	0.00	0.00	0.00
11,800.00	89.53	316.72	5,810.56	4,836.90	-3,540.62	5,994.26	2.00	-0.05	2.00
11,900.00	89.48	318.72	5,811.43	4,910.88	-3,607.88	6,093.65	2.00	-0.05	2.00
12,000.00	89.43	320.72	5,812.38	4,987.16	-3,672.53	6,193.37	2.00	-0.05	2.00
12,100.00	89.37	322.72	5,813.43	5,065.66	-3,734.47	6,293.28	2.00	-0.05	2.00
12,200.00	89.32	324.72	5,814.57	5,146.26	-3,793.63	6,393.27	2.00	-0.05	2.00
12,235.77	89.30	325.44	5,815.00	5,175.59	-3,814.11	6,429.03	2.00	-0.05	2.00
Fed 2H T3									
12,236.17	89.30	325.44	5,815.00	5,175.91	-3,814.33	6,429.42	2.00	-2.00	-0.01
12,300.00	89.30	325.44	5,815.79	5,228.48	-3,850.55	6,493.23	0.00	0.00	0.00
12,400.00	89.30	325.44	5,817.02	5,310.82	-3,907.28	6,593.19	0.00	0.00	0.00
12,500.00	89.30	325.44	5,818.25	5,393.16	-3,964.00	6,693.15	0.00	0.00	0.00
12,600.00	89.30	325.44	5,819.48	5,475.50	-4,020.73	6,793.11	0.00	0.00	0.00
12,700.00	89.30	325.44	5,820.71	5,557.85	-4,077.46	6,893.07	0.00	0.00	0.00
12,800.00	89.30	325.44	5,821.94	5,640.19	-4,134.19	6,993.03	0.00	0.00	0.00
12,900.00	89.30	325.44	5,823.17	5,722.53	-4,190.92	7,092.99	0.00	0.00	0.00
13,000.00	89.30	325.44	5,824.40	5,804.87	-4,247.65	7,192.96	0.00	0.00	0.00
13,100.00	89.30	325.44	5,825.63	5,887.22	-4,304.38	7,292.92	0.00	0.00	0.00
13,114.00	89.30	325.44	5,825.80	5,898.75	-4,312.32	7,306.91	0.00	0.00	0.00
36.2553370, -107.6231251 - First Perf @ 13,114' MD									
13,194.84	89.30	325.44	5,826.80	5,965.31	-4,358.18	7,387.72	0.00	0.00	0.00
TD at 13194.84									
13,200.00	89.30	325.44	5,826.86	5,969.56	-4,361.11	7,392.88	0.00	0.00	0.00
13,300.00	89.30	325.44	5,828.09	6,051.90	-4,417.84	7,492.84	0.00	0.00	0.00
13,400.00	89.30	325.44	5,829.32	6,134.24	-4,474.57	7,592.80	0.00	0.00	0.00
13,500.00	89.30	325.44	5,830.55	6,216.59	-4,531.30	7,692.76	0.00	0.00	0.00
13,600.00	89.30	325.44	5,831.78	6,298.93	-4,588.02	7,792.72	0.00	0.00	0.00
13,700.00	89.30	325.44	5,833.01	6,381.27	-4,644.75	7,892.68	0.00	0.00	0.00



Scientific Drilling, Intl
Planning Report



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Federal 2307-7P COM 2H - Slot 7P 2H
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 2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #3		

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)
13,744.21	89.30	325.44	5,833.55	6,417.67	-4,669.83	7,936.87	0.00	0.00	0.00
Fed 2H BHL									
13,763.02	89.30	325.44	5,833.78	6,433.17	-4,680.51	7,955.68	0.00	0.00	0.00
13,798.26	90.00	325.44	5,834.00	6,462.18	-4,700.50	7,990.90	2.00	2.00	0.01
Fed 2H FPerf									
13,800.00	90.00	325.44	5,834.00	6,463.62	-4,701.48	7,992.64	0.00	0.00	0.00
13,878.28	90.00	325.44	5,834.00	6,528.08	-4,745.89	8,070.89	0.00	0.00	0.00
Fed 2H BHL Rev									

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
Fed 2H LPerf - plan hits target center - Point	0.00	0.00	5,765.00	843.44	68.41	1,906,818.75	2,789,790.70	36.2402270	-107.6071490
Fed 2H LP Rev - plan hits target center - Point	0.00	0.00	5,765.00	726.23	162.19	1,906,701.76	2,789,884.75	36.2399050	-107.6068310
Fed 2H T1 - plan hits target center - Point	0.00	0.00	5,785.00	2,469.20	-1,231.39	1,908,441.48	2,788,487.11	36.2446930	-107.6115570
Fed 2H T2 - plan hits target center - Point	0.00	0.00	5,799.00	3,798.71	-2,558.19	1,909,767.88	2,787,157.21	36.2483450	-107.6160570
Fed 2H T3 - plan hits target center - Point	0.00	0.00	5,815.00	5,175.59	-3,814.11	1,911,141.83	2,785,898.09	36.2521270	-107.6203170
Fed 2H BHL Rev - plan hits target center - Point	0.00	0.00	5,834.00	6,528.08	-4,745.89	1,912,492.15	2,784,963.16	36.2558420	-107.6234780
Fed 2H FPerf - plan hits target center - Point	0.00	0.00	5,834.00	6,462.18	-4,700.50	1,912,426.36	2,785,008.70	36.2556610	-107.6233240



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 2H
Wellbore: OH
Design: Plan #3

Local Co-ordinate Reference: Well Federal 2307-7P COM 2H - Slot 7P 2H
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

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,315.00	1,315.00	Ojo Alamo	Empty	0.00	0.00
1,488.00	1,488.00	Kirtland	Empty	0.00	0.00
1,646.00	1,646.00	Fruitland	Empty	0.00	0.00
2,847.47	2,838.00	Chacra	Empty	0.00	0.00
3,491.76	3,469.00	Cliff House	Empty	0.00	0.00
3,576.51	3,552.00	Menefee	Empty	0.00	0.00
4,366.81	4,326.00	Point Lookout	Empty	0.00	0.00
4,589.40	4,544.00	Mancos	Empty	0.00	0.00
5,134.94	5,079.00	Pictured Cliffs	Empty	0.00	0.00
5,330.80	5,267.00	Gallup	Empty	0.00	0.00

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
900.00	900.00	0.00	0.00	Start Build 2.00
2,075.45	2,075.44	0.11	0.99	Start 1720.37 hold at 2075.45 MD
3,795.82	3,766.79	33.88	302.27	Start Drop -2.00
4,971.26	4,917.99	60.34	538.29	Start Build 7.50
5,771.26	5,612.03	363.06	436.69	Start 60.00 hold at 5771.26 MD
5,831.26	5,645.88	404.28	409.24	Start DLS 7.50 TFO -2.90
6,232.22	5,764.26	705.14	179.95	Start 170.08 hold at 6232.22 MD
6,402.29	5,764.94	837.48	73.17	Landing Point @ 6402' MD
6,479.93	5,765.68	898.47	25.13	Start 6714.91 hold at 6479.93 MD
6,552.00	5,766.39	955.20	-19.31	36.2425898, -107.6073894
6,552.00	5,766.39	955.20	-19.31	Last Perf @ 6552' MD
13,114.00	5,825.80	5,898.75	-4,312.32	36.2553370, -107.6231251
13,114.00	5,825.80	5,898.75	-4,312.32	First Perf @ 13,114' MD
13,194.84	5,826.80	5,965.31	-4,358.18	TD at 13194.84



Logos Operating LLC

Rio Arriba, NM NAD83

Federal 2307-7P

Federal 2307-7P COM 2H

OH

Plan #3

Anticollision Report

20 June, 2018



Scientific Drilling

www.scientificdrilling.com





Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Federal 2307-7P COM 2H - Slot 7P 2H
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 2H	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 #3	Offset TVD Reference:	Offset Datum

Reference	Plan #3		
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	13,878.28	Plan #3 (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 1H - OH - Plan #2	500.00	500.00	29.55	26.42	9.422	CC, ES
Federal 2307-7P COM 1H - OH - Plan #2	13,284.88	12,410.80	867.39	510.12	2.428	SF
Federal 2307-7P COM 3H - OH - Plan #3	838.36	839.15	22.50	16.98	4.079	CC, ES
Federal 2307-7P COM 3H - OH - Plan #3	900.00	900.20	23.85	17.86	3.981	SF

Offset Design		Federal 2307-7P - Federal 2307-7P COM 1H - OH - Plan #2											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	102.09	-6.19	28.90	29.55					
100.00	100.00	100.00	100.00	0.13	0.13	102.09	-6.19	28.90	29.55	29.29	0.27	109.929		
200.00	200.00	200.00	200.00	0.49	0.49	102.09	-6.19	28.90	29.55	28.57	0.99	29.981		
300.00	300.00	300.00	300.00	0.85	0.85	102.09	-6.19	28.90	29.55	27.85	1.70	17.357		
400.00	400.00	400.00	400.00	1.21	1.21	102.09	-6.19	28.90	29.55	27.14	2.42	12.214		
500.00	500.00	500.00	500.00	1.57	1.57	102.09	-6.19	28.90	29.55	26.42	3.14	9.422 CC, ES		
600.00	600.00	599.53	599.48	1.93	1.93	97.33	-3.87	30.05	30.30	26.45	3.86	7.853		
700.00	700.00	698.52	698.16	2.29	2.29	84.80	3.05	33.48	33.67	29.04	4.63	7.267		
800.00	800.00	796.45	795.26	2.64	2.65	69.81	14.38	39.11	41.93	36.41	5.52	7.596		
900.00	900.00	892.84	890.08	3.00	3.01	57.44	29.88	46.79	56.40	49.92	6.47	8.710		
1,000.00	1,000.00	987.24	981.97	3.36	3.39	48.90	49.19	56.38	76.96	69.54	7.41	10.379		
1,100.00	1,100.00	1,079.27	1,070.43	3.72	3.80	43.25	71.90	67.65	103.06	94.75	8.31	12.407		
1,200.00	1,200.00	1,168.61	1,155.04	4.08	4.22	39.48	97.58	80.39	134.19	125.04	9.15	14.667		
1,300.00	1,300.00	1,255.00	1,235.49	4.44	4.67	36.89	125.76	94.37	169.95	160.01	9.94	17.097		
1,400.00	1,400.00	1,338.25	1,311.59	4.79	5.14	35.04	155.97	109.36	210.00	199.32	10.68	19.659		
1,500.00	1,500.00	1,418.22	1,383.26	5.15	5.62	33.68	187.76	125.14	254.05	242.68	11.37	22.337		
1,600.00	1,600.00	1,504.40	1,459.36	5.51	6.18	32.58	223.98	143.11	300.71	288.76	11.95	25.157		
1,700.00	1,700.00	1,592.67	1,537.28	5.87	6.77	31.74	261.13	161.54	347.51	334.98	12.53	27.738		
1,800.00	1,800.00	1,680.95	1,615.21	6.23	7.37	31.11	298.28	179.98	394.35	381.23	13.12	30.056		
1,900.00	1,900.00	1,769.22	1,693.13	6.59	7.98	30.60	335.43	198.41	441.22	427.50	13.73	32.141		
2,000.00	2,000.00	1,857.50	1,771.06	6.95	8.61	30.20	372.59	216.85	488.12	473.77	14.35	34.018		

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 2H - Slot 7P 2H
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 2H	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 #3	Offset TVD Reference:	Offset Datum

Offset Design Federal 2307-7P - Federal 2307-7P COM 1H - OH - Plan #2														Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM														Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)					
2,100.00	2,099.98	1,946.20	1,849.36	7.30	9.24	-53.08	409.92	235.37	534.11	519.13	14.98	35.665			
2,200.00	2,199.84	2,035.68	1,928.35	7.64	9.88	-53.02	447.58	254.06	578.28	562.67	15.61	37.041			
2,300.00	2,299.45	2,125.84	2,007.93	7.99	10.53	-53.19	485.52	272.89	620.66	604.39	16.27	38.156			
2,400.00	2,398.70	2,216.55	2,088.01	8.34	11.19	-53.53	523.70	291.83	661.29	644.36	16.94	39.039			
2,500.00	2,497.47	2,307.71	2,168.49	8.70	11.86	-54.04	562.07	310.87	700.24	682.61	17.63	39.716			
2,600.00	2,595.63	2,399.21	2,249.26	9.07	12.53	-54.78	600.58	329.98	737.81	719.27	18.34	40.211			
2,700.00	2,693.57	2,490.81	2,330.11	9.45	13.20	-56.02	639.13	349.11	774.66	755.58	19.08	40.601			
2,800.00	2,791.51	2,582.40	2,410.97	9.84	13.88	-57.15	677.68	368.24	812.01	792.18	19.83	40.947			
2,900.00	2,889.45	2,674.00	2,491.83	10.23	14.55	-58.18	716.23	387.37	849.60	829.01	20.59	41.254			
3,000.00	2,987.38	2,765.59	2,572.68	10.63	15.23	-59.13	754.78	406.49	887.42	866.05	21.37	41.526			
3,100.00	3,085.32	2,857.19	2,653.54	11.03	15.91	-60.00	793.33	425.62	925.43	903.28	22.16	41.766			
3,200.00	3,183.26	2,948.78	2,734.39	11.44	16.59	-60.80	831.88	444.75	963.62	940.66	22.95	41.979			
3,300.00	3,281.20	3,040.38	2,815.25	11.86	17.28	-61.54	870.43	463.88	1,001.96	978.19	23.76	42.167			
3,400.00	3,379.13	3,131.97	2,896.11	12.27	17.96	-62.23	908.98	483.01	1,040.43	1,015.85	24.58	42.334			
3,500.00	3,477.07	3,223.57	2,976.96	12.70	18.64	-62.87	947.53	502.14	1,079.02	1,053.62	25.40	42.482			
3,600.00	3,575.01	3,315.17	3,057.82	13.12	19.33	-63.47	986.08	521.27	1,117.72	1,091.49	26.23	42.614			
3,700.00	3,672.95	3,406.76	3,138.67	13.55	20.01	-64.02	1,024.63	540.39	1,156.52	1,129.45	27.07	42.731			
3,800.00	3,770.88	3,498.36	3,219.53	13.98	20.70	-64.55	1,063.18	559.52	1,195.40	1,167.50	27.91	42.834			
3,900.00	3,868.82	3,589.95	3,300.39	14.41	21.39	-65.03	1,101.73	578.65	1,234.37	1,205.61	28.76	42.927			
4,000.00	3,966.76	3,681.55	3,381.24	14.84	22.07	-65.49	1,140.28	597.78	1,273.41	1,243.80	29.61	43.009			
4,100.00	4,064.70	3,773.14	3,462.10	15.28	22.76	-65.93	1,178.83	616.91	1,312.51	1,282.05	30.47	43.082			
4,200.00	4,162.63	3,864.74	3,542.95	15.71	23.45	-66.33	1,217.38	636.04	1,351.67	1,320.35	31.33	43.148			
4,300.00	4,260.57	3,956.33	3,623.81	16.15	24.14	-66.72	1,255.93	655.17	1,390.89	1,358.70	32.19	43.207			
4,400.00	4,358.51	4,047.93	3,704.67	16.59	24.82	-67.08	1,294.48	674.29	1,430.16	1,397.10	33.06	43.259			
4,500.00	4,456.45	4,139.52	3,785.52	17.04	25.51	-67.42	1,333.03	693.42	1,469.48	1,435.54	33.93	43.306			
4,600.00	4,554.38	4,231.12	3,866.38	17.48	26.20	-67.75	1,371.58	712.55	1,508.84	1,474.03	34.81	43.348			
4,700.00	4,652.32	4,322.71	3,947.23	17.92	26.89	-68.06	1,410.13	731.68	1,548.23	1,512.55	35.69	43.385			
4,800.00	4,750.26	4,414.31	4,028.09	18.37	27.58	-68.36	1,448.68	750.81	1,587.67	1,551.10	36.57	43.419			
4,900.00	4,848.20	4,505.90	4,108.95	18.82	28.27	-68.64	1,487.23	769.94	1,627.14	1,589.69	37.45	43.449			
5,000.00	4,946.16	4,597.57	4,189.86	19.26	28.96	-68.95	1,525.81	789.08	1,666.50	1,626.17	38.33	43.474			
5,100.00	5,044.63	4,691.36	4,272.66	19.67	29.67	-23.95	1,565.28	808.67	1,700.98	1,661.81	39.17	43.429			
5,200.00	5,142.55	4,787.04	4,357.12	20.03	30.39	5.96	1,605.55	828.65	1,727.81	1,687.88	39.93	43.271			
5,300.00	5,238.23	4,882.96	4,441.80	20.34	31.11	20.49	1,645.92	848.68	1,746.71	1,706.09	40.63	42.996			
5,400.00	5,330.05	4,977.50	4,525.25	20.60	31.82	28.41	1,685.71	868.42	1,757.72	1,716.46	41.23	42.601			
5,500.00	5,416.42	5,068.65	4,609.73	20.83	32.46	36.23	1,723.93	888.29	1,754.35	1,709.60	41.75	39.203			
5,600.00	5,495.87	5,158.87	4,691.36	21.03	33.10	44.06	1,761.92	907.20	1,727.43	1,682.15	42.28	38.152			
5,700.00	5,567.04	5,243.03	4,768.03	21.20	33.75	51.82	1,799.02	925.09	1,693.54	1,647.75	42.79	36.983			
5,800.00	5,628.72	5,328.23	4,841.31	21.37	34.40	59.58	1,835.76	942.48	1,653.49	1,607.18	43.29	35.699			
5,900.00	5,679.84	5,408.88	4,915.12	21.50	35.05	67.33	1,871.72	959.47	1,608.44	1,561.55	43.79	34.304			
6,000.00	5,719.54	5,493.41	5,000.22	21.64	35.70	75.07	1,907.58	974.25	1,559.95	1,512.47	44.29	32.850			
6,100.00	5,747.13	5,580.00	5,085.54	21.79	36.35	82.81	2,000.00	998.27	1,510.59	1,462.33	44.79	31.297			
6,200.00	5,762.15	5,668.25	5,171.63	21.94	37.00	90.55	2,019.27	1,017.92	1,462.31	1,413.04	45.29	29.683			
6,300.00	5,765.21	5,761.41	5,265.85	22.09	37.65	98.30	2,030.58	1,034.45	1,416.15	1,365.60	45.79	28.012			
6,400.00	5,764.92	5,856.00	5,360.33	22.24	38.30	106.04	2,045.59	1,051.94	1,371.17	1,319.04	46.29	26.302			
6,500.00	5,765.88	5,951.38	5,455.62	22.39	38.95	113.78	2,059.43	1,069.47	1,330.76	1,276.74	46.79	24.633			
6,600.00	5,766.86	6,046.76	5,551.00	22.54	39.60	121.52	2,078.80	1,087.90	1,294.62	1,238.41	47.29	23.033			
6,700.00	5,767.84	6,142.14	5,646.38	22.69	40.25	129.26	2,102.43	1,106.33	1,262.86	1,204.22	47.79	21.536			
6,800.00	5,768.82	6,237.52	5,741.76	22.84	40.90	137.00	2,131.26	1,125.76	1,235.27	1,174.00	48.29	20.160			
6,900.00	5,769.80	6,332.90	5,837.14	22.99	41.55	144.74	2,166.77	1,145.19	1,211.45	1,147.40	48.79	18.913			
7,000.00	5,770.78	6,428.28	5,932.52	23.14	42.20	152.48	2,208.36	1,164.62	1,190.81	1,123.83	49.29	17.778			
7,100.00	5,771.76	6,523.66	6,027.90	23.29	42.85	160.22	2,258.10	1,184.05	1,172.60	1,102.58	49.79	16.747			

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 2H - Slot 7P 2H
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 2H	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 #3	Offset TVD Reference:	Offset Datum

Offset Design Federal 2307-7P - Federal 2307-7P COM 1H - OH - Plan #2													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		
7,200.00	5,772.74	6,543.47	5,765.59	42.81	37.99	89.55	2,315.32	364.53	1,155.99	1,082.77	73.22	15.788		
7,300.00	5,773.72	6,639.31	5,786.53	44.94	38.80	90.56	2,378.81	295.96	1,140.17	1,063.54	76.63	14.878		
7,400.00	5,774.70	6,738.87	5,795.73	47.09	39.38	91.00	2,446.19	223.33	1,124.53	1,044.23	80.30	14.004		
7,500.00	5,775.68	6,838.98	5,796.46	49.28	40.35	91.00	2,514.26	149.94	1,108.74	1,024.66	84.08	13.186		
7,600.00	5,776.66	6,937.72	5,797.01	51.48	41.51	90.99	2,581.40	77.53	1,092.94	1,004.82	88.12	12.403		
7,700.00	5,777.64	7,036.47	5,797.55	53.71	42.85	90.98	2,648.54	5.13	1,077.14	984.91	92.23	11.679		
7,800.00	5,778.62	7,135.21	5,798.09	55.95	44.37	90.98	2,715.67	-67.28	1,061.33	964.91	96.43	11.006		
7,900.00	5,779.60	7,233.95	5,798.64	58.20	46.05	90.97	2,782.81	-139.68	1,045.53	944.83	100.70	10.382		
8,000.00	5,780.58	7,332.70	5,799.18	60.47	47.85	90.96	2,849.95	-212.09	1,029.73	924.68	105.05	9.803		
8,100.00	5,781.56	7,431.44	5,799.73	62.75	49.75	90.95	2,917.08	-284.50	1,013.92	904.47	109.45	9.264		
8,200.00	5,782.53	7,530.25	5,800.27	65.04	51.75	90.95	2,984.27	-356.95	998.57	884.66	113.92	8.766		
8,300.00	5,783.44	7,629.49	5,800.82	67.39	53.82	90.96	3,051.74	-429.72	986.27	867.78	118.49	8.324		
8,400.00	5,784.28	7,729.09	5,801.37	69.78	55.97	90.97	3,119.46	-502.76	977.44	854.27	123.17	7.936		
8,500.00	5,785.06	7,828.94	5,801.92	72.21	58.17	90.98	3,187.35	-575.97	972.09	844.15	127.94	7.598		
8,600.00	5,785.80	7,928.87	5,802.47	74.67	60.41	90.97	3,255.29	-649.25	968.38	835.61	132.76	7.294		
8,700.00	5,786.54	8,028.81	5,803.02	77.13	62.70	90.96	3,323.24	-722.53	964.67	827.04	137.62	7.010		
8,800.00	5,787.28	8,128.74	5,803.57	79.60	65.02	90.96	3,391.18	-795.81	960.95	818.45	142.51	6.743		
8,900.00	5,788.02	8,228.67	5,804.12	82.08	67.36	90.95	3,459.13	-869.08	957.24	809.83	147.42	6.493		
9,000.00	5,788.76	8,328.60	5,804.68	84.57	69.73	90.94	3,527.07	-942.36	953.53	801.18	152.35	6.259		
9,100.00	5,789.50	8,428.53	5,805.23	87.06	72.12	90.93	3,595.01	-1,015.64	949.82	792.52	157.30	6.038		
9,200.00	5,790.25	8,528.46	5,805.78	89.56	74.53	90.93	3,662.96	-1,088.91	946.10	783.84	162.27	5.831		
9,300.00	5,790.99	8,621.73	5,806.29	92.06	76.79	90.92	3,726.37	-1,157.31	942.42	775.18	167.24	5.635		
9,400.00	5,791.73	8,700.00	5,806.80	94.57	78.70	90.92	3,780.37	-1,213.97	940.17	768.05	172.13	5.462		
9,500.00	5,792.47	8,804.30	5,807.61	97.08	81.23	90.92	3,853.45	-1,288.37	939.35	762.21	177.13	5.303		
9,600.00	5,793.21	8,904.29	5,808.39	99.59	83.68	90.92	3,923.29	-1,359.94	938.19	756.06	182.13	5.151		
9,700.00	5,793.95	9,004.29	5,809.17	102.11	86.14	90.93	3,993.12	-1,431.50	937.03	749.90	187.14	5.007		
9,800.00	5,794.69	9,104.28	5,809.95	104.64	88.60	90.93	4,062.95	-1,503.06	935.88	743.72	192.15	4.870		
9,900.00	5,795.43	9,204.27	5,810.74	107.16	91.08	90.93	4,132.79	-1,574.62	934.72	737.54	197.18	4.740		
10,000.00	5,796.17	9,304.27	5,811.52	109.69	93.56	90.94	4,202.62	-1,646.18	933.56	731.35	202.22	4.617		
10,100.00	5,796.92	9,404.26	5,812.30	112.22	96.05	90.94	4,272.46	-1,717.75	932.41	725.14	207.26	4.499		
10,200.00	5,797.66	9,504.25	5,813.08	114.76	98.54	90.94	4,342.29	-1,789.31	931.25	718.94	212.31	4.386		
10,300.00	5,798.42	9,604.23	5,813.86	117.29	101.04	90.94	4,412.12	-1,860.86	929.40	712.04	217.36	4.276		
10,400.00	5,799.25	9,704.12	5,814.64	119.79	103.55	90.93	4,481.88	-1,932.35	924.61	702.24	222.37	4.158		
10,500.00	5,800.06	9,804.03	5,815.42	122.30	106.06	90.94	4,551.66	-2,003.85	920.57	693.16	227.40	4.048		
10,600.00	5,800.87	9,903.96	5,816.20	124.81	108.57	90.94	4,621.44	-2,075.37	916.62	684.18	232.44	3.943		
10,700.00	5,801.68	10,003.88	5,816.98	127.32	111.09	90.94	4,691.23	-2,146.88	912.68	675.19	237.48	3.843		
10,800.00	5,802.48	10,103.80	5,817.76	129.84	113.61	90.95	4,761.01	-2,218.39	908.73	666.20	242.53	3.747		
10,900.00	5,803.29	10,203.72	5,818.54	132.36	116.14	90.95	4,830.80	-2,289.90	904.79	657.21	247.58	3.654		
11,000.00	5,804.10	10,292.70	5,819.24	134.87	118.39	90.95	4,893.09	-2,353.43	901.12	648.56	252.57	3.568		
11,100.00	5,804.91	10,368.78	5,819.87	137.39	120.29	90.95	4,947.59	-2,406.51	899.72	642.39	257.33	3.486		
11,102.82	5,804.93	10,370.93	5,819.89	137.47	120.35	90.95	4,949.15	-2,407.98	899.72	642.25	257.47	3.495		
11,200.00	5,805.72	10,444.86	5,820.54	139.92	122.18	90.95	5,003.48	-2,458.12	900.97	639.07	261.91	3.440		
11,300.00	5,806.52	10,520.84	5,821.24	142.44	124.04	90.96	5,060.64	-2,508.17	904.88	638.60	266.28	3.398		
11,400.00	5,807.33	10,599.52	5,822.00	144.96	125.94	90.96	5,121.21	-2,558.37	911.44	640.89	270.54	3.369		
11,500.00	5,808.14	10,695.37	5,822.95	147.49	128.24	90.96	5,195.84	-2,618.52	919.40	644.08	275.32	3.339		
11,600.00	5,808.95	10,795.05	5,823.94	150.01	130.63	90.97	5,273.44	-2,681.07	927.37	647.14	280.23	3.309		
11,700.00	5,809.76	10,894.73	5,824.94	152.54	133.02	90.97	5,351.05	-2,743.62	935.34	650.20	285.14	3.280		
11,800.00	5,810.56	10,994.42	5,825.93	155.07	135.42	90.97	5,428.66	-2,806.17	943.30	653.24	290.06	3.252		
11,900.00	5,811.43	11,094.24	5,826.92	157.57	137.82	90.96	5,506.37	-2,868.81	949.25	654.29	294.96	3.218		
12,000.00	5,812.38	11,194.20	5,827.91	160.03	140.22	90.94	5,584.20	-2,931.54	951.71	651.89	299.82	3.174		

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 2H - Slot 7P 2H
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 2H	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 #3	Offset TVD Reference:	Offset Datum

Offset Design Federal 2307-7P - Federal 2307-7P COM 1H - OH - Plan #2													Offset Site Error: 0.00 usft
Survey Program: O-MWD+HDGM													Offset Well Error: 0.00 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	
12,100.00	5,813.43	11,294.19	5,828.91	162.43	142.62	90.92	5,662.04	-2,994.28	950.68	646.04	304.64	3.121	
12,200.00	5,814.57	11,394.08	5,829.90	164.78	145.03	90.89	5,739.82	-3,056.97	946.16	636.76	309.40	3.058	
12,300.00	5,815.79	11,493.82	5,830.89	167.08	147.43	90.87	5,817.46	-3,119.55	938.88	624.76	314.12	2.989	
12,400.00	5,817.02	11,593.53	5,831.88	169.38	149.83	90.86	5,895.10	-3,182.12	931.37	612.54	318.83	2.921	
12,500.00	5,818.25	11,693.25	5,832.87	171.68	152.24	90.86	5,972.73	-3,244.70	923.86	600.32	323.54	2.855	
12,600.00	5,819.48	11,792.97	5,833.87	173.98	154.64	90.85	6,050.37	-3,307.27	916.36	588.10	328.26	2.792	
12,700.00	5,820.71	11,892.69	5,834.86	176.29	157.05	90.84	6,128.00	-3,369.84	908.85	575.87	332.98	2.729	
12,800.00	5,821.94	11,992.40	5,835.85	178.59	159.46	90.83	6,205.64	-3,432.42	901.34	563.65	337.69	2.669	
12,900.00	5,823.17	12,092.12	5,836.84	180.89	161.86	90.83	6,283.27	-3,494.99	893.83	551.42	342.41	2.610	
13,000.00	5,824.40	12,191.84	5,837.83	183.20	164.27	90.82	6,360.91	-3,557.56	886.33	539.19	347.14	2.553	
13,100.00	5,825.63	12,291.56	5,838.82	185.50	166.68	90.81	6,438.54	-3,620.14	878.82	526.96	351.86	2.498	
13,200.00	5,826.86	12,391.28	5,839.81	187.81	169.09	90.80	6,516.18	-3,682.71	871.31	514.73	356.58	2.444	
13,284.88	5,827.90	12,410.80	5,840.01	189.77	169.56	90.80	6,531.38	-3,694.96	867.39	510.12	357.27	2.428 SF	
13,300.00	5,828.09	12,410.80	5,840.01	190.12	169.56	90.80	6,531.38	-3,694.96	867.52	510.59	356.93	2.431	
13,400.00	5,829.32	12,410.80	5,840.01	192.42	169.56	90.80	6,531.38	-3,694.96	874.99	522.88	352.12	2.485	
13,500.00	5,830.55	12,410.80	5,840.01	194.73	169.56	90.80	6,531.38	-3,694.96	893.67	550.49	343.17	2.604	
13,600.00	5,831.78	12,410.80	5,840.01	197.04	169.56	90.80	6,531.38	-3,694.96	922.86	591.93	330.92	2.789	
13,700.00	5,833.01	12,410.80	5,840.01	199.35	169.56	90.80	6,531.38	-3,694.96	961.61	645.22	316.39	3.039	
13,800.00	5,834.00	12,410.80	5,840.01	201.66	169.56	90.40	6,531.38	-3,694.96	1,008.82	708.24	300.58	3.356	
13,878.28	5,834.00	12,410.80	5,840.01	203.47	169.56	90.40	6,531.38	-3,694.96	1,050.95	763.09	287.86	3.651	

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 2H - Slot 7P 2H
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 2H	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 #3	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
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	-78.15	6.19	-29.49	30.13					
100.00	100.00	100.00	100.00	0.13	0.13	-78.15	6.19	-29.49	30.13	29.86	0.27	112.075		
200.00	200.00	200.00	200.00	0.49	0.49	-78.15	6.19	-29.49	30.13	29.15	0.99	30.566		
300.00	300.00	300.00	300.00	0.85	0.85	-78.15	6.19	-29.49	30.13	28.43	1.70	17.696		
400.00	400.00	400.00	400.00	1.21	1.21	-78.15	6.19	-29.49	30.13	27.71	2.42	12.453		
500.00	500.00	500.00	500.00	1.57	1.57	-78.15	6.19	-29.49	30.13	27.00	3.14	9.606		
600.00	600.00	600.66	600.64	1.93	1.91	-80.76	4.65	-28.61	28.99	25.14	3.85	7.522		
700.00	700.00	701.08	700.91	2.29	2.25	-89.85	0.07	-25.98	25.99	21.43	4.56	5.695		
800.00	800.00	801.00	800.45	2.64	2.60	-109.16	-7.51	-21.82	22.90	17.65	5.25	4.363		
838.36	838.36	839.15	838.36	2.78	2.73	-119.87	-11.20	-19.51	22.50	16.98	5.52	4.079 CC, ES		
900.00	900.00	900.20	898.89	3.00	2.96	-139.12	-18.02	-15.60	23.85	17.86	5.99	3.981 SF		
1,000.00	1,000.00	998.43	995.92	3.36	3.33	-165.74	-31.32	-7.96	32.57	25.69	6.88	4.734		
1,100.00	1,100.00	1,095.50	1,091.22	3.72	3.71	178.53	-47.30	1.21	48.12	40.37	7.75	6.209		
1,200.00	1,200.00	1,191.20	1,184.51	4.08	4.12	169.81	-65.78	11.82	68.60	60.04	8.57	8.008		
1,300.00	1,300.00	1,285.35	1,275.55	4.44	4.54	164.65	-86.59	23.77	93.06	83.72	9.34	9.960		
1,400.00	1,400.00	1,377.80	1,364.13	4.79	4.99	161.37	-109.54	36.94	121.03	110.94	10.09	11.994		
1,500.00	1,500.00	1,468.39	1,450.06	5.15	5.46	159.14	-134.42	51.22	152.27	141.46	10.81	14.083		
1,600.00	1,600.00	1,557.02	1,533.20	5.51	5.94	157.56	-161.02	66.49	186.58	175.07	11.51	16.213		
1,700.00	1,700.00	1,647.08	1,616.83	5.87	6.47	156.37	-190.00	83.13	223.45	211.29	12.16	18.378		
1,800.00	1,800.00	1,739.82	1,702.84	6.23	7.03	155.48	-220.09	100.40	260.70	247.90	12.79	20.377		
1,900.00	1,900.00	1,832.56	1,788.84	6.59	7.60	154.81	-250.18	117.67	297.98	284.54	13.44	22.171		
2,000.00	2,000.00	1,925.30	1,874.84	6.95	8.18	154.29	-280.27	134.94	335.30	321.20	14.10	23.786		
2,100.00	2,099.98	2,018.28	1,961.07	7.30	8.77	69.80	-310.44	152.26	372.08	357.33	14.76	25.216		
2,200.00	2,199.84	2,111.66	2,047.68	7.64	9.37	69.46	-340.74	169.65	407.75	392.33	15.42	26.442		
2,300.00	2,299.45	2,205.34	2,134.55	7.99	9.98	69.53	-371.13	187.10	442.32	426.22	16.10	27.474		
2,400.00	2,398.70	2,299.20	2,221.59	8.34	10.59	69.94	-401.59	204.58	475.84	459.05	16.79	28.334		
2,500.00	2,497.47	2,393.12	2,308.70	8.70	11.20	70.61	-432.06	222.07	508.43	490.92	17.51	29.042		
2,600.00	2,595.63	2,486.99	2,395.75	9.07	11.82	71.60	-462.52	239.55	540.22	521.98	18.24	29.618		
2,700.00	2,693.57	2,580.83	2,482.77	9.45	12.44	73.06	-492.96	257.03	571.99	553.00	18.99	30.113		
2,800.00	2,791.51	2,674.66	2,569.80	9.84	13.06	74.38	-523.41	274.51	604.07	584.30	19.76	30.563		
2,900.00	2,889.45	2,768.50	2,656.82	10.23	13.69	75.56	-553.85	291.98	636.41	615.86	20.55	30.971		
3,000.00	2,987.38	2,862.33	2,743.84	10.63	14.31	76.63	-584.30	309.46	668.97	647.63	21.34	31.342		
3,100.00	3,085.32	2,956.17	2,830.86	11.03	14.94	77.60	-614.75	326.93	701.73	679.57	22.15	31.679		
3,200.00	3,183.26	3,050.00	2,917.88	11.44	15.57	78.48	-645.19	344.41	734.65	711.68	22.97	31.987		
3,300.00	3,281.20	3,143.84	3,004.90	11.86	16.19	79.30	-675.64	361.89	767.71	743.92	23.79	32.267		
3,400.00	3,379.13	3,237.67	3,091.92	12.27	16.83	80.04	-706.08	379.36	800.90	776.28	24.63	32.524		
3,500.00	3,477.07	3,331.51	3,178.94	12.70	17.46	80.72	-736.53	396.84	834.21	808.74	25.47	32.759		
3,600.00	3,575.01	3,425.34	3,265.97	13.12	18.09	81.36	-766.97	414.31	867.61	841.30	26.31	32.974		
3,700.00	3,672.95	3,519.18	3,352.99	13.55	18.72	81.94	-797.42	431.79	901.10	873.94	27.16	33.173		
3,800.00	3,770.88	3,613.01	3,440.01	13.98	19.35	82.49	-827.86	449.27	934.67	906.65	28.02	33.356		
3,900.00	3,868.82	3,706.85	3,527.03	14.41	19.99	83.00	-858.31	466.74	968.31	939.43	28.88	33.525		
4,000.00	3,966.76	3,800.68	3,614.05	14.84	20.62	83.47	-888.75	484.22	1,002.01	972.26	29.75	33.681		
4,100.00	4,064.70	3,894.52	3,701.07	15.28	21.26	83.91	-919.20	501.69	1,035.77	1,005.15	30.62	33.827		
4,200.00	4,162.63	3,988.36	3,788.09	15.71	21.89	84.33	-949.64	519.17	1,069.59	1,038.09	31.49	33.962		
4,300.00	4,260.57	4,082.19	3,875.11	16.15	22.53	84.72	-980.09	536.65	1,103.44	1,071.07	32.37	34.087		
4,400.00	4,358.51	4,176.03	3,962.14	16.59	23.16	85.08	-1,010.54	554.12	1,137.35	1,104.09	33.25	34.205		
4,500.00	4,456.45	4,269.86	4,049.16	17.04	23.80	85.43	-1,040.98	571.60	1,171.29	1,137.15	34.13	34.314		
4,600.00	4,554.38	4,363.70	4,136.18	17.48	24.44	85.75	-1,071.43	589.07	1,205.26	1,170.24	35.02	34.417		
4,700.00	4,652.32	4,457.53	4,223.20	17.92	25.07	86.06	-1,101.87	606.55	1,239.27	1,203.36	35.91	34.513		
4,800.00	4,750.26	4,551.37	4,310.22	18.37	25.71	86.35	-1,132.32	624.03	1,273.31	1,236.51	36.80	34.603		
4,900.00	4,848.20	4,645.22	4,397.24	18.82	26.34	86.63	-1,162.76	641.51	1,307.34	1,270.54	37.70	34.688		

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 2H - Slot 7P 2H
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 2H	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 #3	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		
5,000.00	4,946.16	6,852.39	5,744.80	19.26	40.16	155.45	-492.34	-85.15	1,157.55	1,113.38	44.17	26.207		
5,100.00	5,044.63	6,850.70	5,744.79	19.67	40.14	-168.01	-493.61	-84.04	1,104.88	1,057.88	47.00	23.509		
5,200.00	5,142.55	6,862.07	5,744.87	20.03	40.32	-139.99	-485.03	-91.49	1,059.45	1,009.46	49.99	21.192		
5,300.00	5,238.23	6,886.29	5,745.04	20.34	40.70	-126.61	-466.74	-107.37	1,022.61	969.57	53.03	19.282		
5,400.00	5,330.05	6,922.97	5,745.30	20.60	41.31	-119.13	-439.05	-131.41	995.04	939.03	56.02	17.764		
5,500.00	5,416.42	6,971.46	5,745.64	20.83	42.12	-113.65	-402.43	-163.20	976.67	917.83	58.84	16.598		
5,600.00	5,495.87	7,030.94	5,746.06	21.03	43.15	-108.83	-357.51	-202.19	966.64	905.15	61.49	15.720		
5,700.00	5,567.04	7,100.39	5,746.54	21.20	44.37	-104.26	-305.07	-247.72	963.45	899.47	63.98	15.058		
5,707.88	5,572.26	7,106.25	5,746.59	21.21	44.48	-103.91	-300.64	-251.56	963.43	899.24	64.19	15.008		
5,800.00	5,628.72	7,178.62	5,747.10	21.37	45.80	-99.98	-245.99	-299.00	965.21	898.78	66.42	14.531		
5,900.00	5,679.84	7,264.30	5,747.70	21.70	47.41	-96.14	-181.29	-355.17	969.91	900.98	68.92	14.072		
6,000.00	5,719.54	7,355.96	5,748.34	22.42	49.17	-92.98	-112.08	-415.25	975.67	904.09	71.59	13.629		
6,100.00	5,747.13	7,452.02	5,749.02	23.44	51.07	-90.69	-39.54	-478.23	980.94	906.45	74.50	13.168		
6,200.00	5,762.15	7,550.86	5,749.71	24.67	53.06	-89.40	35.09	-543.01	984.59	906.91	77.68	12.675		
6,300.00	5,765.21	7,650.77	5,750.42	26.07	55.11	-89.14	110.54	-608.51	986.59	905.49	81.10	12.165		
6,400.00	5,764.92	7,732.55	5,750.99	27.58	56.82	-89.22	171.98	-662.48	991.96	907.68	84.28	11.770		
6,500.00	5,765.88	7,800.00	5,751.46	29.21	58.27	-89.23	221.57	-708.20	999.91	912.71	87.20	11.467		
6,600.00	5,766.86	7,881.12	5,752.03	30.95	60.05	-89.22	279.75	-764.72	1,010.60	920.01	90.58	11.156		
6,700.00	5,767.84	7,980.41	5,752.71	32.78	62.28	-89.21	350.08	-834.80	1,022.49	927.88	94.61	10.807		
6,800.00	5,768.82	8,079.70	5,753.40	34.68	64.53	-89.21	420.40	-904.89	1,034.39	935.65	98.74	10.476		
6,900.00	5,769.80	8,178.99	5,754.09	36.64	66.80	-89.20	490.73	-974.98	1,046.28	943.34	102.95	10.163		
7,000.00	5,770.78	8,278.28	5,754.78	38.65	69.10	-89.19	561.06	-1,045.07	1,058.18	950.95	107.23	9.868		
7,100.00	5,771.76	8,377.57	5,755.46	40.71	71.41	-89.19	631.38	-1,115.15	1,070.07	958.49	111.58	9.590		
7,200.00	5,772.74	8,476.86	5,756.15	42.81	73.74	-89.18	701.71	-1,185.24	1,081.97	965.98	115.99	9.328		
7,300.00	5,773.72	8,576.15	5,756.84	44.94	76.09	-89.18	772.04	-1,255.33	1,093.86	973.42	120.44	9.082		
7,400.00	5,774.70	8,675.44	5,757.53	47.09	78.45	-89.17	842.36	-1,325.41	1,105.76	980.81	124.94	8.850		
7,500.00	5,775.68	8,774.73	5,758.21	49.28	80.82	-89.17	912.69	-1,395.50	1,117.65	988.17	129.48	8.632		
7,600.00	5,776.66	8,874.02	5,758.90	51.48	83.21	-89.16	983.02	-1,465.59	1,129.55	995.50	134.05	8.426		
7,700.00	5,777.64	8,973.31	5,759.59	53.71	85.60	-89.15	1,053.34	-1,535.68	1,141.44	1,002.79	138.65	8.232		
7,800.00	5,778.62	9,072.60	5,760.28	55.95	88.01	-89.15	1,123.67	-1,605.76	1,153.34	1,010.06	143.28	8.050		
7,900.00	5,779.60	9,171.89	5,760.97	58.20	90.42	-89.14	1,194.00	-1,675.85	1,165.23	1,017.30	147.93	7.877		
8,000.00	5,780.58	9,271.18	5,761.65	60.47	92.85	-89.14	1,264.32	-1,745.94	1,177.13	1,024.52	152.60	7.714		
8,100.00	5,781.56	9,370.47	5,762.34	62.75	95.28	-89.13	1,334.65	-1,816.03	1,189.02	1,031.73	157.29	7.559		
8,200.00	5,782.53	9,469.81	5,763.03	65.04	97.72	-89.12	1,405.01	-1,886.15	1,200.46	1,038.45	162.01	7.410		
8,300.00	5,783.44	9,569.45	5,763.72	67.39	100.17	-89.10	1,475.59	-1,956.49	1,208.84	1,042.03	166.80	7.247		
8,400.00	5,784.28	9,669.33	5,764.41	69.78	102.63	-89.08	1,546.33	-2,026.99	1,213.73	1,042.07	171.66	7.070		
8,500.00	5,785.06	9,769.24	5,765.25	72.21	105.50	-89.06	1,628.63	-2,108.60	1,214.95	1,037.82	177.13	6.859		
8,600.00	5,785.80	9,869.23	5,766.07	74.67	107.96	-89.06	1,700.37	-2,178.25	1,213.41	1,031.34	182.07	6.665		
8,700.00	5,786.54	9,969.22	5,766.88	77.13	110.43	-89.06	1,772.11	-2,247.89	1,211.86	1,024.84	187.02	6.480		
8,800.00	5,787.28	10,069.21	5,767.69	79.60	112.91	-89.07	1,843.85	-2,317.54	1,210.32	1,018.33	191.99	6.304		
8,900.00	5,788.02	10,169.19	5,768.50	82.08	115.38	-89.07	1,915.59	-2,387.19	1,208.77	1,011.81	196.96	6.137		
9,000.00	5,788.76	10,269.18	5,769.31	84.57	117.86	-89.07	1,987.32	-2,456.83	1,207.23	1,005.28	201.95	5.978		
9,100.00	5,789.50	10,369.17	5,770.12	87.06	120.35	-89.07	2,059.06	-2,526.48	1,205.69	998.74	206.94	5.826		
9,200.00	5,790.25	10,469.16	5,770.93	89.56	122.84	-89.07	2,130.80	-2,596.12	1,204.14	992.20	211.94	5.681		
9,300.00	5,790.99	10,569.15	5,771.74	92.06	125.33	-89.08	2,202.54	-2,665.77	1,202.60	985.64	216.95	5.543		
9,400.00	5,791.73	10,669.13	5,772.55	94.57	127.83	-89.08	2,274.28	-2,735.42	1,201.05	979.08	221.97	5.411		
9,500.00	5,792.47	10,769.12	5,773.37	97.08	130.32	-89.08	2,346.01	-2,805.06	1,199.51	972.52	226.99	5.284		
9,600.00	5,793.21	10,869.11	5,774.18	99.59	132.82	-89.08	2,417.75	-2,874.71	1,197.96	965.94	232.02	5.163		
9,700.00	5,793.95	10,969.10	5,774.99	102.11	135.33	-89.09	2,489.49	-2,944.35	1,196.42	959.36	237.05	5.047		
9,800.00	5,794.69	11,069.09	5,775.80	104.64	137.83	-89.09	2,561.23	-3,014.00	1,194.87	952.78	242.09	4.936		

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 2H - Slot 7P 2H
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 2H	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 #3	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			
9,900.00	5,795.43	11,185.07	5,776.61	107.16	140.34	-89.09	2,632.97	-3,083.65	1,193.33	946.19	247.14	4.829			
10,000.00	5,796.17	11,285.06	5,777.42	109.69	142.85	-89.09	2,704.71	-3,153.29	1,191.79	939.60	252.19	4.726			
10,077.27	5,796.75	11,343.93	5,777.90	111.65	144.34	-89.09	2,746.70	-3,194.54	1,191.08	935.61	255.46	4.662			
10,100.00	5,796.92	11,359.99	5,778.02	112.22	144.75	-89.09	2,758.02	-3,205.93	1,191.14	934.77	256.37	4.646			
10,200.00	5,797.66	11,430.59	5,778.58	114.76	146.55	-89.10	2,807.00	-3,256.78	1,192.93	932.66	260.27	4.583			
10,300.00	5,798.42	11,500.00	5,779.10	117.29	148.34	-89.11	2,853.92	-3,307.92	1,197.87	933.90	263.97	4.538			
10,400.00	5,799.25	11,571.12	5,779.63	119.79	150.19	-89.12	2,900.70	-3,361.48	1,208.20	940.60	267.60	4.515			
10,500.00	5,800.06	11,648.27	5,780.18	122.30	152.22	-89.12	2,950.01	-3,420.81	1,220.13	948.67	271.46	4.495			
10,600.00	5,800.87	11,747.48	5,780.88	124.81	154.83	-89.12	3,012.95	-3,497.51	1,232.64	956.05	276.59	4.456			
10,700.00	5,801.68	11,846.70	5,781.58	127.32	157.45	-89.13	3,075.88	-3,574.20	1,245.15	963.43	281.73	4.420			
10,800.00	5,802.48	11,945.91	5,782.28	129.84	160.07	-89.13	3,138.82	-3,650.89	1,257.66	970.80	286.86	4.384			
10,900.00	5,803.29	12,045.13	5,782.98	132.36	162.69	-89.13	3,201.76	-3,727.59	1,270.17	978.17	292.00	4.350			
11,000.00	5,804.10	12,144.34	5,783.68	134.87	165.32	-89.14	3,264.70	-3,804.28	1,282.68	985.54	297.14	4.317			
11,100.00	5,804.91	12,243.55	5,784.39	137.39	167.94	-89.14	3,327.63	-3,880.97	1,295.20	992.91	302.29	4.285			
11,200.00	5,805.72	12,342.77	5,785.09	139.92	170.57	-89.15	3,390.57	-3,957.67	1,307.71	1,000.27	307.44	4.254			
11,300.00	5,806.52	12,441.98	5,785.79	142.44	173.20	-89.15	3,453.51	-4,034.36	1,320.22	1,007.63	312.58	4.224			
11,400.00	5,807.33	12,541.20	5,786.49	144.96	175.83	-89.16	3,516.44	-4,111.05	1,332.73	1,014.99	317.74	4.194			
11,500.00	5,808.14	12,640.41	5,787.19	147.49	178.46	-89.16	3,579.38	-4,187.75	1,345.24	1,022.35	322.89	4.166			
11,600.00	5,808.95	12,739.63	5,787.89	150.01	181.10	-89.16	3,642.32	-4,264.44	1,357.75	1,029.70	328.05	4.139			
11,700.00	5,809.76	12,838.84	5,788.60	152.54	183.73	-89.17	3,705.26	-4,341.13	1,370.26	1,037.06	333.20	4.112			
11,800.00	5,810.56	12,938.05	5,789.30	155.07	186.37	-89.17	3,768.19	-4,417.83	1,382.78	1,044.42	338.36	4.087			
11,900.00	5,811.43	13,036.99	5,790.00	157.57	189.00	-89.20	3,830.95	-4,494.30	1,397.30	1,053.82	343.48	4.068			
12,000.00	5,812.38	13,135.36	5,790.69	160.03	191.62	-89.22	3,893.35	-4,570.34	1,415.26	1,066.74	348.53	4.061			
12,100.00	5,813.43	13,233.04	5,791.38	162.43	194.22	-89.24	3,955.32	-4,645.85	1,436.65	1,083.16	353.49	4.064			
12,200.00	5,814.57	13,329.91	5,792.07	164.78	196.80	-89.27	4,016.77	-4,720.74	1,461.43	1,103.07	358.36	4.078			
12,300.00	5,815.79	13,426.07	5,792.75	167.08	199.36	-89.28	4,077.77	-4,795.07	1,488.88	1,125.72	363.16	4.100			
12,400.00	5,817.02	13,461.76	5,793.00	169.38	200.31	-89.28	4,100.41	-4,822.66	1,517.76	1,153.56	364.20	4.167			
12,500.00	5,818.25	13,461.76	5,793.00	171.68	200.31	-89.28	4,100.41	-4,822.66	1,552.14	1,190.18	361.95	4.288			
12,600.00	5,819.48	13,461.76	5,793.00	173.96	200.31	-89.28	4,100.41	-4,822.66	1,592.06	1,233.49	358.57	4.440			
12,700.00	5,820.71	13,461.76	5,793.00	176.29	200.31	-89.28	4,100.41	-4,822.66	1,637.13	1,282.87	354.26	4.621			
12,800.00	5,821.94	13,461.76	5,793.00	178.59	200.31	-89.28	4,100.41	-4,822.66	1,686.93	1,337.71	349.22	4.831			
12,900.00	5,823.17	13,461.76	5,793.00	180.89	200.31	-89.28	4,100.41	-4,822.66	1,741.06	1,397.43	343.63	5.067			
13,000.00	5,824.40	13,461.76	5,793.00	183.20	200.31	-89.28	4,100.41	-4,822.66	1,799.12	1,461.46	337.65	5.328			
13,100.00	5,825.63	13,461.76	5,793.00	185.50	200.31	-89.28	4,100.41	-4,822.66	1,860.74	1,529.31	331.43	5.614			
13,200.00	5,826.86	13,461.76	5,793.00	187.81	200.31	-89.28	4,100.41	-4,822.66	1,925.59	1,600.52	325.07	5.924			
13,300.00	5,828.09	13,461.76	5,793.00	190.12	200.31	-89.28	4,100.41	-4,822.66	1,993.35	1,674.67	318.68	6.255			
13,400.00	5,829.32	13,461.76	5,793.00	192.42	200.31	-89.28	4,100.41	-4,822.66	2,063.73	1,751.41	312.32	6.608			
13,500.00	5,830.55	13,461.76	5,793.00	194.73	200.31	-89.28	4,100.41	-4,822.66	2,136.47	1,830.42	306.05	6.981			
13,600.00	5,831.78	13,461.76	5,793.00	197.04	200.31	-89.28	4,100.41	-4,822.66	2,211.34	1,911.43	299.92	7.373			
13,700.00	5,833.01	13,461.76	5,793.00	199.35	200.31	-89.28	4,100.41	-4,822.66	2,288.14	1,994.19	293.95	7.784			
13,800.00	5,834.00	13,461.76	5,793.00	201.66	200.31	-88.37	4,100.41	-4,822.66	2,366.67	2,078.50	288.17	8.213			
13,878.28	5,834.00	13,461.76	5,793.00	203.47	200.31	-88.37	4,100.41	-4,822.66	2,429.23	2,145.44	283.79	8.560			

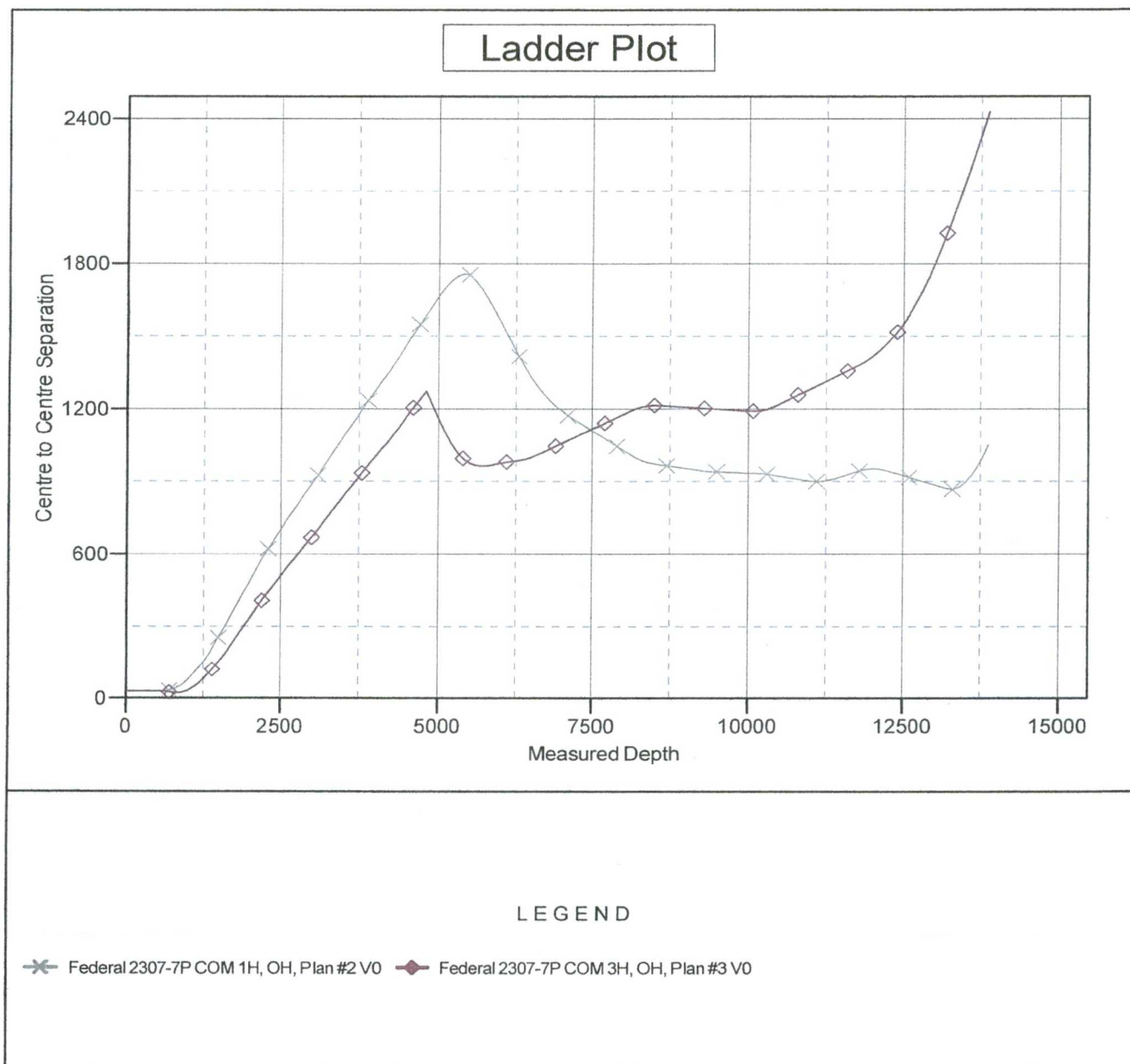
CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation

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 2H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan #3

Local Co-ordinate Reference: Well Federal 2307-7P COM 2H - Slot 7P 2H
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 2H - Slot 7P 2H
Coordinate System is US State Plane 1983, New Mexico Western Zone
Grid Convergence at Surface is: 0.13°



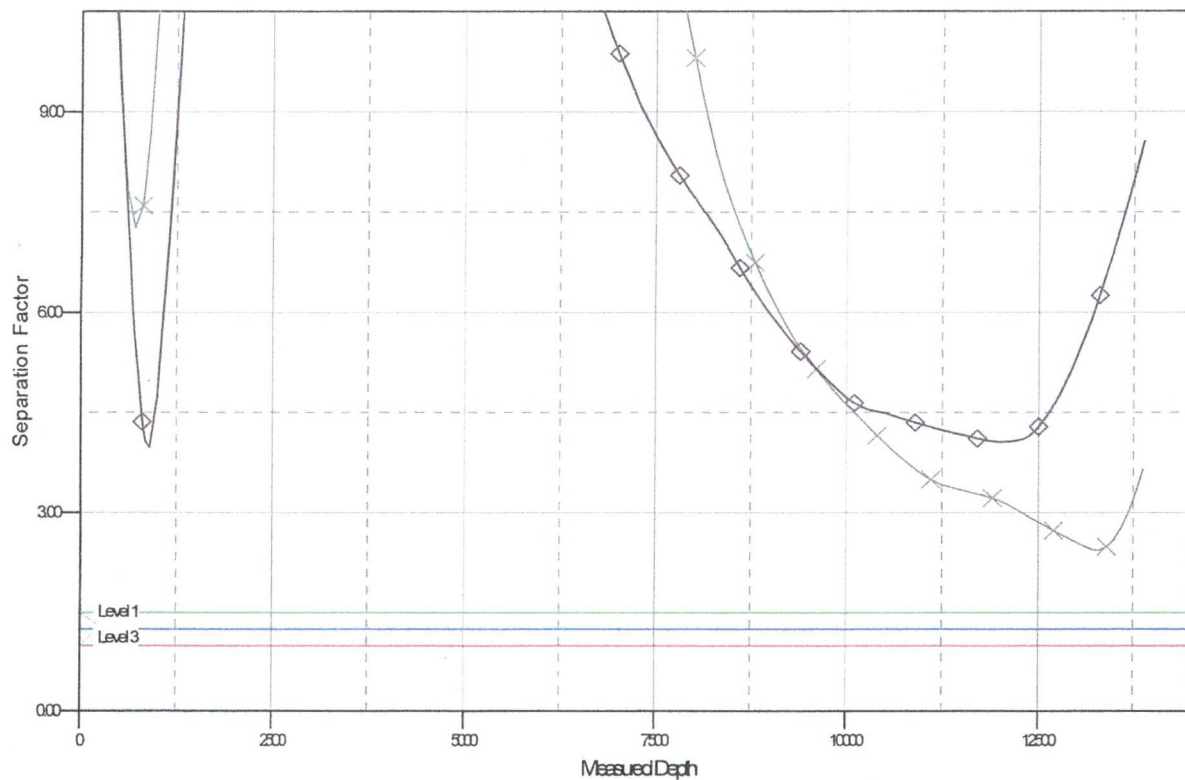
Company: Logos Operating LLC
Project: Rio Arriba, NM NAD83
Reference Site: Federal 2307-7P
Site Error: 0.00 usft
Reference Well: Federal 2307-7P COM 2H
Well Error: 0.00 usft
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Reference Depths are relative to GL 7267' & RKB 25' @ 7292.00usft (A)
Offset Depths are relative to Offset Datum
Central Meridian is -107.8333334

Coordinates are relative to: Federal 2307-7P COM 2H - Slot 7P 2H
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 1H, OH, Plan #2 V0 ◆ Federal 2307-7P COM 3H, OH, Plan #3 V0