

RECEIVED

Form 3160-5
(June 2015)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

JUL 25 2018

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.

Farmington Field Office
Bureau of Land Management

5. Lease Serial No. NMNM 136672

6. If Indian, Allottee or Tribe Name

SUBMIT IN TRIPLICATE - Other instructions on page 2

1. Type of Well
 Oil Well Gas Well Other

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

8. Well Name and No. Federal 2307 7P Com 3H

2. Name of Operator LOGOS Operating, LLC

9. API Well No. 30-039-31368

3a. Address 2010 Afton Place
Farmington, NM 87401

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

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

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)
1292 FSL & 356 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			
<input checked="" type="checkbox"/> Notice of Intent	<input type="checkbox"/> Acidize	<input type="checkbox"/> Deepen	<input type="checkbox"/> Production (Start/Resume)	<input type="checkbox"/> Water Shut-Off
<input type="checkbox"/> Subsequent Report	<input type="checkbox"/> Alter Casing	<input type="checkbox"/> Hydraulic Fracturing	<input type="checkbox"/> Reclamation	<input type="checkbox"/> Well Integrity
<input type="checkbox"/> Final Abandonment Notice	<input type="checkbox"/> Casing Repair	<input type="checkbox"/> New Construction	<input type="checkbox"/> Recomplete	<input type="checkbox"/> Other
	<input checked="" type="checkbox"/> Change Plans	<input type="checkbox"/> Plug and Abandon	<input type="checkbox"/> Temporarily Abandon	
	<input type="checkbox"/> Convert to Injection	<input type="checkbox"/> Plug Back	<input type="checkbox"/> Water Disposal	

APD

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

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

Regulatory Specialist
Title

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 FFD

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 PV

25

DISTRICT I
1825 N. French Dr., Hobbs, N.M. 88240
Phone: (575) 393-8161 Fax: (575) 393-0720

DISTRICT II
811 S. First St., Artesia, N.M. 88210
Phone: (575) 748-1283 Fax: (575) 748-9720

DISTRICT III
1000 Rio Brazos Rd., Aztec, N.M. 87410
Phone: (505) 334-6178 Fax: (505) 334-6170

DISTRICT IV
1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3480 Fax: (505) 476-3462

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

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

AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

¹ API Number 30-039-31368	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 3H
⁷ GRID No. 289408	⁸ Operator Name LOGOS OPERATING, LLC	⁹ Elevation 7268

¹⁰ Surface Location

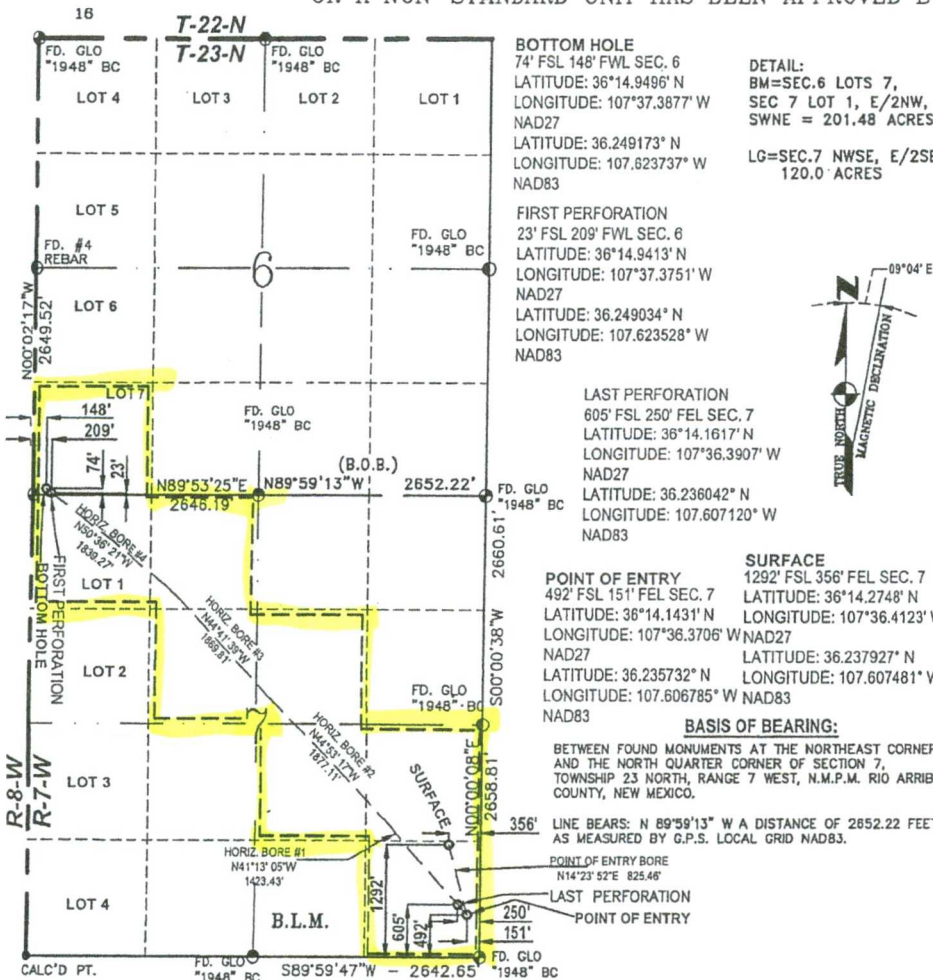
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
P	7	23-N	7-W		1292	SOUTH	356	EAST	RIO ARRIBA

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
M	6	23-N	7-W	7	74'	SOUTH	148	WEST	RIO ARRIBA

¹² Dedicated Acres PROJECT AREA 321.48 ACRES SEE DETAIL BELOW	¹³ Joint or Infill	¹⁴ Consolidation Code CA - NMNM138467	¹⁵ Order No.
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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.

Tamra Sessions 6/29/18
Signature Date
Tamra Sessions
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 29, 2018
Date of Survey
Signature and Seal of Professional Surveyor



GLEN W. RUSSELL
Certificate Number 15703

**Sundry Drilling Plan
LOGOS Operating, LLC**

Revised: June 24, 2018

**Federal 2307 7P Com 3H
Lease Serial # NMNM136672**

Surface Location: 1292 FSL, 356 FEL

Legal Description: Sec 7, T23N, R7W (36.237927° N, 107.607481° W – NAD83)

Bottom Hole Location: 857 FSL, 280 FWL

Legal Description: Sec 6, T23N, R7W (36.251329° N, 107.623294° W – NAD83)
Rio Arriba County, NM

1. The elevation of the unprepared ground is 7,268 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 5,793' TVD/13,462' 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	1462	1481
Kirtland	1622	1653
Fruitland	1813	1858
Pictured Cliffs	2122	2192
Chacra	2952	3087
Cliff House	3625	3812
Menefee	3705	3899
Point Lookout	4473	4727
Mancos	4689	4960
Gallup	5640	6063

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	1813	Gas
Pictured Cliffs	2122	Gas
Cliff House	3625	Gas
Point Lookout	4473	Gas
Mancos	4689	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 Tension
		MD	TVD				Burst	Collapse	
Surface	9-5/8"	0-320'	0-320'	J-55	36.00	STC	3520	2020	394
Intermediate	7"	0-6,454'	0-5,742'	J-55	23.00	LTC	4360	3270	313
Optional Intermediate	7"	0-6,454'	0-5,742'	P-110	26.00	LTC	9960	6230	693
Optional Intermediate	7"	0-6,454'	0-5,742'	L-80	26.00	LTC	7240	5410	511
Production	4-1/2"	6,304'-13,462'	5,726'-5,793'	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 **6,454'**. Cement will be circulated to surface in a single stage with **601 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 **281 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 **13,462'** MD in a single stage using excess of approximately 30% for TOC at **6,304'**. Base slurry to consist of **645 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 6304' 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' - 6,454'	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%
6,454' - 13,462'	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

1. 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

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

3. Bottom Hole Temperature expected to be 160 deg F

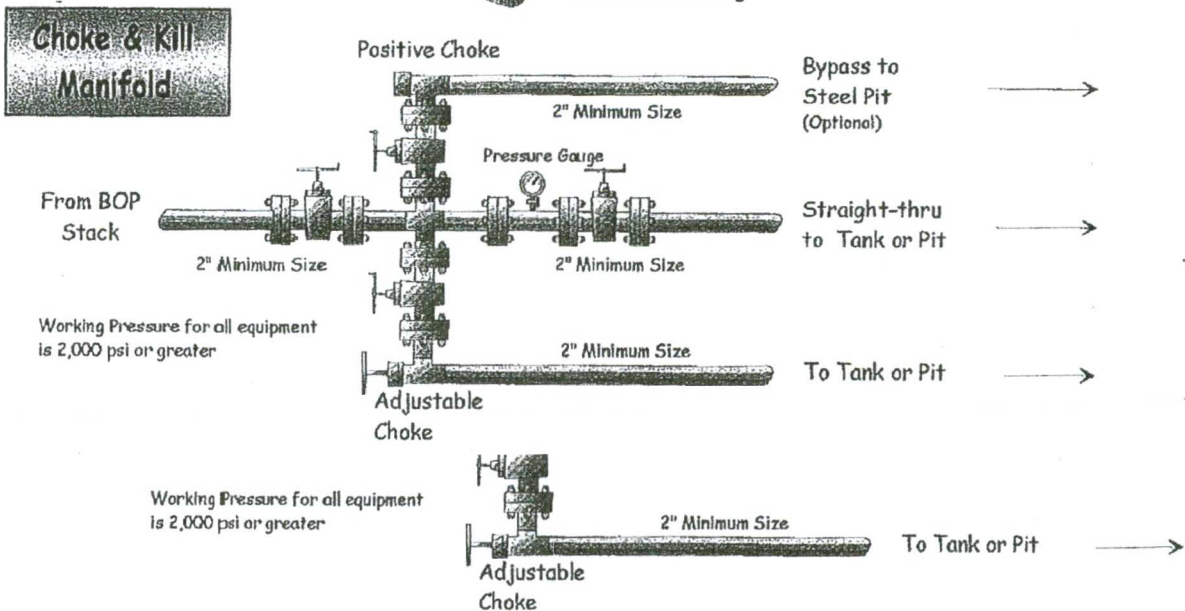
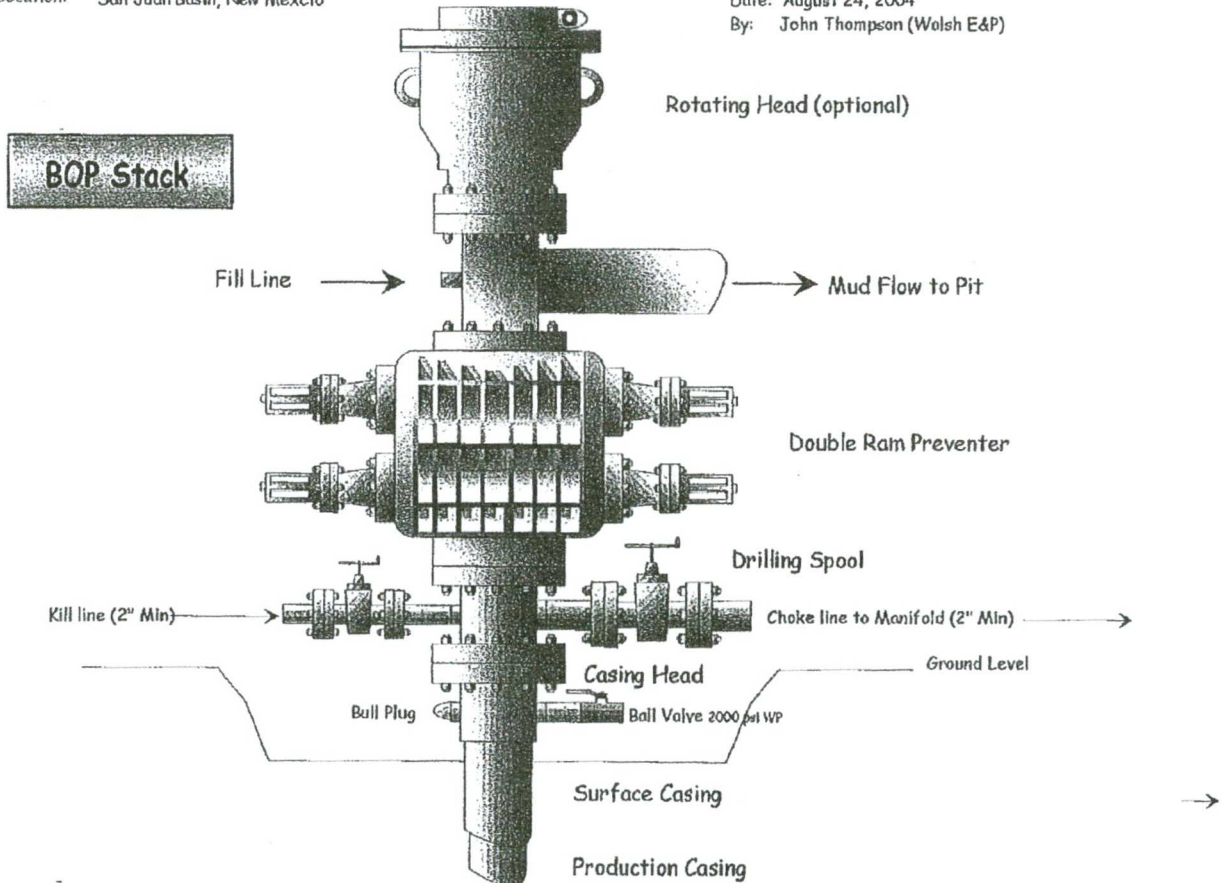
Well Control Equipment Schematic for 2M Service

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 3H
 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: 49534.1snT
 Dip Angle: 62.85°
 Date: 5/17/2018
 Model: HDGM

WELL DETAILS: Federal 2307-7P COM 3H

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

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.00	0.00	1905981.27	2789694.75	36.2379270	-107.6074810 7P 3H

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

Created By: Janie Collins Date: 17:24, June 20 2018

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Fed 7P 3H LP REV	5742.00	-799.03	205.25	1905182.72	2789901.86	36.2357320	-107.6067850
Fed 7P 3H T1	5752.00	270.84	-732.52	1906250.40	2788981.80	36.2386710	-107.6099650
Fed 7P 3H T2	5765.00	1599.96	-2057.09	1907576.43	2787833.93	36.2423220	-107.6144570
Fed 7P 3H T3	5780.00	2928.05	-3372.11	1908901.45	2786315.83	36.2459700	-107.6189170
Fed 7P 3H BHL REV	5793.00	4094.22	-4793.17	1910064.30	2784892.05	36.2491730	-107.6237370
Fed 7P 3H FPerf	5793.00	4043.61	-4731.55	1910013.84	2784953.78	36.2490340	-107.6235280
Fed 7P 3H LPerf	5742.00	-886.18	106.46	1905295.33	2789802.81	36.2380420	-107.6071200

SECTION DETAILS

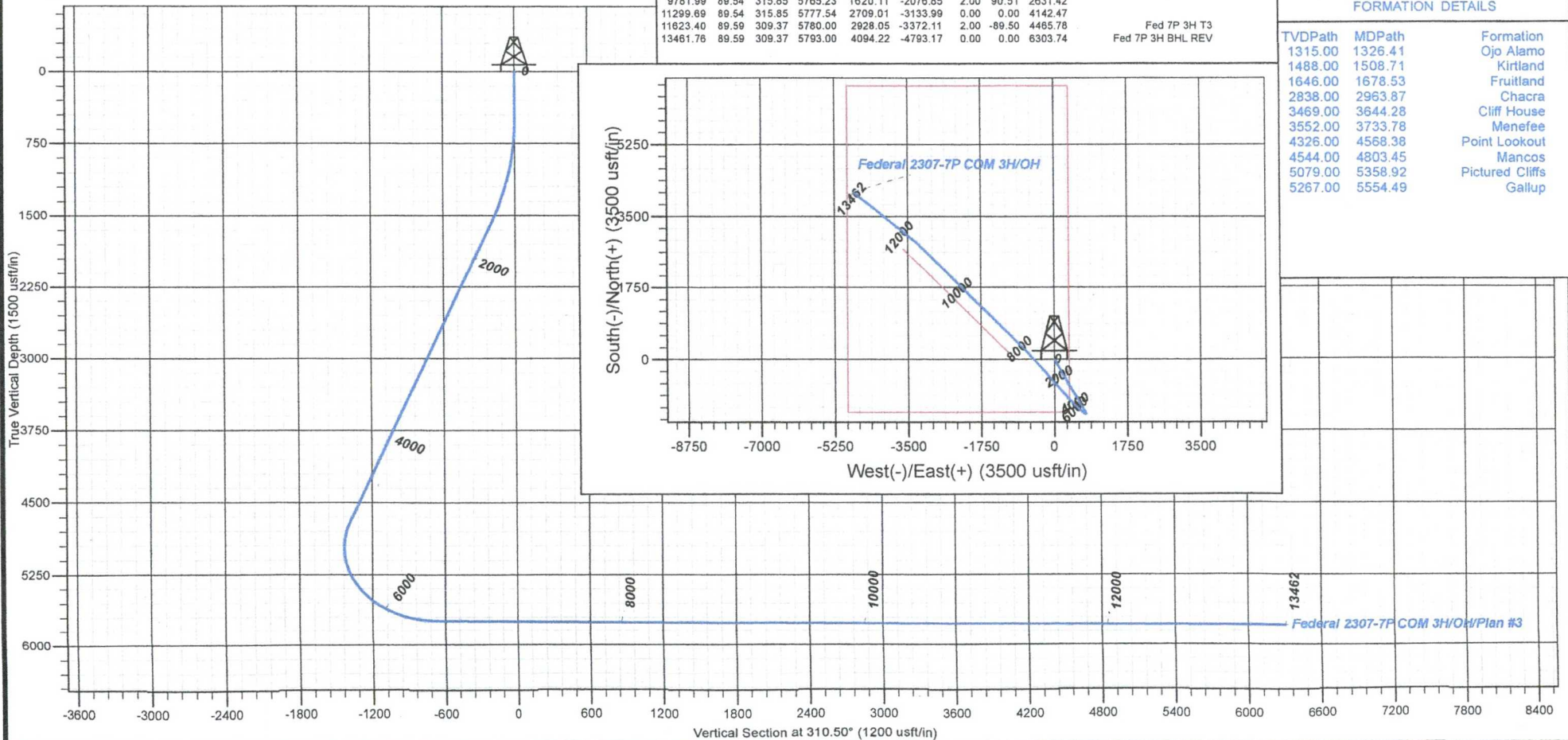
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	
1598.46	21.97	150.14	1571.74	-180.42	103.56	2.00	150.14	-195.92	
4972.89	21.97	150.14	4701.14	-1275.27	732.02	0.00	0.00	-1384.68	
6454.41	89.60	318.76	5742.00	-799.03	205.25	7.50	167.79	-675.03	Fed 7P 3H LP REV
6468.12	89.60	319.04	5742.10	-788.71	196.25	2.00	90.08	-661.48	
7680.26	89.60	319.04	5750.62	126.62	-598.35	0.00	0.00	537.21	
7877.28	89.60	315.10	5752.00	270.84	-732.52	2.00	-89.92	732.90	Fed 7P 3H T1
7877.31	89.60	315.10	5752.00	270.86	-732.54	2.00	-71.25	732.92	
9743.96	89.60	315.10	5764.93	1593.00	-2050.18	0.00	0.00	2593.53	
9753.77	89.54	315.28	5765.00	1599.96	-2057.09	2.00	108.75	2603.31	Fed 7P 3H T2
9781.99	89.54	315.85	5765.23	1620.11	-2076.85	2.00	90.51	2631.42	
11299.69	89.54	315.85	5777.54	2709.01	-3133.99	0.00	0.00	4142.47	
11623.40	89.59	309.37	5780.00	2928.05	-3372.11	2.00	-89.50	4465.78	Fed 7P 3H T3
13461.76	89.59	309.37	5793.00	4094.22	-4793.17	0.00	0.00	6303.74	Fed 7P 3H BHL REV

CASING DETAILS

No casing data is available

FORMATION DETAILS

TVDPath	MDPath	Formation
1315.00	1326.41	Ojo Alamo
1488.00	1508.71	Kirtland
1646.00	1678.53	Fruitland
2838.00	2963.87	Chacra
3469.00	3644.28	Cliff House
3552.00	3733.78	Menefee
4326.00	4568.38	Point Lookout
4544.00	4803.45	Mancos
5079.00	5358.92	Pictured Cliffs
5267.00	5554.49	Gallup





Logos Operating LLC

Rio Arriba, NM NAD83

Federal 2307-7P

Federal 2307-7P COM 3H - Slot 7P 3H

OH

Plan: Plan #3

Standard Planning Report

20 June, 2018



www.scientificdrilling.com



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Federal 2307-7P COM 3H - Slot 7P 3H
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 3H	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 3H - Slot 7P 3H					
Well Position	+N/-S	12.38 usft	Northing:	1,905,981.27 usft	Latitude:	36.2379270
	+E/-W	-58.39 usft	Easting:	2,789,694.75 usft	Longitude:	-107.6074810
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	310.50

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	
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,598.46	21.97	150.14	1,571.74	-180.42	103.56	2.00	2.00	0.00	150.14	
4,972.89	21.97	150.14	4,701.14	-1,275.27	732.02	0.00	0.00	0.00	0.00	
6,454.41	89.60	318.76	5,742.00	-799.03	205.25	7.50	4.56	11.38	167.79	Fed 7P 3H LP REV
6,468.12	89.60	319.04	5,742.10	-788.71	196.25	2.00	0.00	2.00	90.08	
7,680.26	89.60	319.04	5,750.62	126.62	-598.35	0.00	0.00	0.00	0.00	
7,877.28	89.60	315.10	5,752.00	270.84	-732.52	2.00	0.00	-2.00	-89.92	Fed 7P 3H T1
7,877.31	89.60	315.10	5,752.00	270.86	-732.54	2.00	0.64	-1.89	-71.25	
9,743.96	89.60	315.10	5,764.93	1,593.00	-2,050.18	0.00	0.00	0.00	0.00	
9,753.77	89.54	315.28	5,765.00	1,599.96	-2,057.09	2.00	-0.64	1.89	108.75	Fed 7P 3H T2
9,781.99	89.54	315.85	5,765.23	1,620.11	-2,076.85	2.00	-0.02	2.00	90.51	
11,299.69	89.54	315.85	5,777.54	2,709.01	-3,133.99	0.00	0.00	0.00	0.00	
11,623.40	89.59	309.37	5,780.00	2,928.05	-3,372.11	2.00	0.02	-2.00	-89.50	Fed 7P 3H T3
13,461.76	89.59	309.37	5,793.00	4,094.22	-4,793.17	0.00	0.00	0.00	0.00	Fed 7P 3H BHL REV



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Federal 2307-7P COM 3H - Slot 7P 3H
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 3H	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	2.00	150.14	599.98	-1.51	0.87	-1.64	2.00	2.00	0.00
700.00	4.00	150.14	699.84	-6.05	3.47	-6.57	2.00	2.00	0.00
800.00	6.00	150.14	799.45	-13.61	7.81	-14.78	2.00	2.00	0.00
Start Build 3.00									
900.00	8.00	150.14	898.70	-24.18	13.88	-26.26	2.00	2.00	0.00
1,000.00	10.00	150.14	997.47	-37.75	21.67	-40.99	2.00	2.00	0.00
1,100.00	12.00	150.14	1,095.62	-54.29	31.17	-58.96	2.00	2.00	0.00
1,200.00	14.00	150.14	1,193.06	-73.80	42.36	-80.15	2.00	2.00	0.00
1,300.00	16.00	150.14	1,289.64	-96.25	55.25	-104.52	2.00	2.00	0.00
1,326.41	16.53	150.14	1,315.00	-102.66	58.93	-111.49	2.00	2.00	0.00
Ojo Alamo									
1,400.00	18.00	150.14	1,385.27	-121.60	69.80	-132.06	2.00	2.00	0.00
1,500.00	20.00	150.14	1,479.82	-149.84	86.01	-162.72	2.00	2.00	0.00
1,508.71	20.17	150.14	1,488.00	-152.43	87.50	-165.54	2.00	2.00	0.00
Kirtland									
1,598.46	21.97	150.14	1,571.74	-180.42	103.56	-195.92	2.00	2.00	0.00
1,600.00	21.97	150.14	1,573.17	-180.92	103.85	-196.47	0.00	0.00	0.00
1,609.52	21.97	150.14	1,582.00	-184.01	105.62	-199.82	0.00	0.00	0.00
Start 2624.30 hold at 1609.52 MD									
1,678.53	21.97	150.14	1,646.00	-206.40	118.47	-224.14	0.00	0.00	0.00
Fruitland									
1,700.00	21.97	150.14	1,665.91	-213.36	122.47	-231.70	0.00	0.00	0.00
1,800.00	21.97	150.14	1,758.65	-245.81	141.10	-266.94	0.00	0.00	0.00
1,900.00	21.97	150.14	1,851.38	-278.25	159.72	-302.17	0.00	0.00	0.00
2,000.00	21.97	150.14	1,944.12	-310.70	178.35	-337.40	0.00	0.00	0.00
2,100.00	21.97	150.14	2,036.86	-343.14	196.97	-372.64	0.00	0.00	0.00
2,200.00	21.97	150.14	2,129.60	-375.59	215.59	-407.87	0.00	0.00	0.00
2,300.00	21.97	150.14	2,222.34	-408.03	234.22	-443.11	0.00	0.00	0.00
2,400.00	21.97	150.14	2,315.08	-440.48	252.84	-478.34	0.00	0.00	0.00
2,500.00	21.97	150.14	2,407.82	-472.93	271.47	-513.58	0.00	0.00	0.00
2,600.00	21.97	150.14	2,500.55	-505.37	290.09	-548.81	0.00	0.00	0.00
2,700.00	21.97	150.14	2,593.29	-537.82	308.71	-584.04	0.00	0.00	0.00
2,800.00	21.97	150.14	2,686.03	-570.26	327.34	-619.28	0.00	0.00	0.00
2,900.00	21.97	150.14	2,778.77	-602.71	345.96	-654.51	0.00	0.00	0.00
2,963.87	21.97	150.14	2,838.00	-623.43	357.86	-677.02	0.00	0.00	0.00
Chacra									
3,000.00	21.97	150.14	2,871.51	-635.15	364.59	-689.75	0.00	0.00	0.00
3,100.00	21.97	150.14	2,964.25	-667.60	383.21	-724.98	0.00	0.00	0.00
3,200.00	21.97	150.14	3,056.98	-700.05	401.84	-760.22	0.00	0.00	0.00
3,300.00	21.97	150.14	3,149.72	-732.49	420.46	-795.45	0.00	0.00	0.00
3,400.00	21.97	150.14	3,242.46	-764.94	439.08	-830.69	0.00	0.00	0.00
3,500.00	21.97	150.14	3,335.20	-797.38	457.71	-865.92	0.00	0.00	0.00
3,600.00	21.97	150.14	3,427.94	-829.83	476.33	-901.15	0.00	0.00	0.00
3,644.28	21.97	150.14	3,469.00	-844.19	484.58	-916.76	0.00	0.00	0.00
Cliff House									



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Federal 2307-7P COM 3H - Slot 7P 3H
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 3H	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)
3,700.00	21.97	150.14	3,520.68	-862.27	494.96	-936.39	0.00	0.00	0.00
3,733.78	21.97	150.14	3,552.00	-873.23	501.25	-948.29	0.00	0.00	0.00
Menefee									
3,800.00	21.97	150.14	3,613.42	-894.72	513.58	-971.62	0.00	0.00	0.00
3,900.00	21.97	150.14	3,706.15	-927.16	532.21	-1,006.86	0.00	0.00	0.00
4,000.00	21.97	150.14	3,798.89	-959.61	550.83	-1,042.09	0.00	0.00	0.00
4,100.00	21.97	150.14	3,891.63	-992.06	569.45	-1,077.33	0.00	0.00	0.00
4,200.00	21.97	150.14	3,984.37	-1,024.50	588.08	-1,112.56	0.00	0.00	0.00
4,233.82	21.97	150.14	4,015.73	-1,035.47	594.38	-1,124.48	0.00	0.00	0.00
Start Drop -3.00									
4,300.00	21.97	150.14	4,077.11	-1,056.95	606.70	-1,147.80	0.00	0.00	0.00
4,400.00	21.97	150.14	4,169.85	-1,089.39	625.33	-1,183.03	0.00	0.00	0.00
4,500.00	21.97	150.14	4,262.58	-1,121.84	643.95	-1,218.26	0.00	0.00	0.00
4,568.38	21.97	150.14	4,326.00	-1,144.02	656.69	-1,242.36	0.00	0.00	0.00
Point Lookout									
4,600.00	21.97	150.14	4,355.32	-1,154.28	662.58	-1,253.50	0.00	0.00	0.00
4,700.00	21.97	150.14	4,448.06	-1,186.73	681.20	-1,288.73	0.00	0.00	0.00
4,800.00	21.97	150.14	4,540.80	-1,219.17	699.82	-1,323.97	0.00	0.00	0.00
4,803.45	21.97	150.14	4,544.00	-1,220.29	700.47	-1,325.18	0.00	0.00	0.00
Mancos									
4,900.00	21.97	150.14	4,633.54	-1,251.62	718.45	-1,359.20	0.00	0.00	0.00
4,972.89	21.97	150.14	4,701.14	-1,275.27	732.02	-1,384.88	0.00	0.00	0.00
5,000.00	19.99	151.40	4,726.45	-1,283.74	736.77	-1,393.99	7.50	-7.31	4.64
5,043.34	16.84	154.00	4,767.56	-1,295.89	743.07	-1,406.67	7.50	-7.26	5.99
Start Build 7.50									
5,100.00	12.80	159.24	4,822.33	-1,309.14	748.89	-1,419.71	7.50	-7.12	9.25
5,200.00	6.38	184.04	4,920.92	-1,325.06	752.43	-1,432.74	7.50	-6.43	24.81
5,300.00	5.45	262.45	5,020.52	-1,331.23	747.33	-1,432.87	7.50	-0.93	78.40
5,358.92	8.70	287.56	5,079.00	-1,330.26	740.30	-1,426.89	7.50	5.53	42.63
Pictured Cliffs									
5,400.00	11.44	295.71	5,119.45	-1,327.55	733.67	-1,420.09	7.50	6.67	19.83
5,500.00	18.56	305.12	5,215.99	-1,314.07	711.68	-1,394.62	7.50	7.12	9.41
5,554.49	22.54	307.77	5,267.00	-1,302.68	696.33	-1,375.55	7.50	7.31	4.86
Gallup									
5,600.00	25.89	309.38	5,308.50	-1,291.03	681.75	-1,356.89	7.50	7.36	3.54
5,700.00	33.29	311.85	5,395.41	-1,258.82	644.38	-1,307.56	7.50	7.40	2.47
5,800.00	40.72	313.51	5,475.21	-1,217.99	600.22	-1,247.46	7.50	7.43	1.65
5,843.34	43.95	314.07	5,507.24	-1,197.79	579.15	-1,218.32	7.50	7.45	1.31
Start 60.00 hold at 5843.34 MD									
5,900.00	48.18	314.72	5,546.54	-1,169.25	550.01	-1,177.63	7.50	7.45	1.15
5,903.34	48.43	314.76	5,548.77	-1,167.49	548.24	-1,175.14	7.50	7.46	1.06
Start DLS 7.50 TFO -4.96									
6,000.00	55.64	315.69	5,608.20	-1,113.41	494.62	-1,099.25	7.50	7.46	0.96
6,100.00	63.11	316.49	5,659.11	-1,051.45	435.00	-1,013.67	7.50	7.47	0.80
6,200.00	70.58	317.19	5,698.40	-984.42	372.17	-922.36	7.50	7.47	0.70
6,300.00	78.05	317.83	5,725.42	-913.47	307.20	-826.87	7.50	7.47	0.64
6,305.71	78.48	317.87	5,726.58	-909.33	303.45	-821.33	7.50	7.48	0.62
Start 228.57 hold at 6305.71 MD									
6,400.00	85.53	318.44	5,739.69	-839.80	241.20	-728.84	7.50	7.48	0.61
6,454.41	89.60	318.76	5,742.00	-799.03	205.25	-675.03	7.50	7.48	0.59
Fed 7P 3H LP REV									



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Federal 2307-7P COM 3H - Slot 7P 3H
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 3H	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)	
6,468.12	89.60	319.04	5,742.10	-788.71	196.25	-661.48	2.00	0.00	2.00	
6,500.00	89.60	319.04	5,742.32	-764.63	175.35	-629.95	0.00	0.00	0.00	
6,534.27	89.60	319.04	5,742.56	-738.75	152.88	-596.06	0.00	0.00	0.00	
Landing Point @ 6534' MD										
6,600.00	89.60	319.04	5,743.02	-689.12	109.79	-531.06	0.00	0.00	0.00	
6,604.39	89.60	319.04	5,743.06	-685.80	106.91	-526.72	0.00	0.00	0.00	
Fed 7P 3H LPerf										
6,661.98	89.60	319.04	5,743.46	-642.31	69.16	-469.77	0.00	0.00	0.00	
Start 4195.79 hold at 6661.98 MD										
6,684.00	89.60	319.04	5,743.62	-625.69	54.73	-447.99	0.00	0.00	0.00	
Last Perf @ 6684' MD - 36.2425894, -107.6141318										
6,700.00	89.60	319.04	5,743.73	-613.60	44.24	-432.17	0.00	0.00	0.00	
6,800.00	89.60	319.04	5,744.43	-538.09	-21.31	-333.28	0.00	0.00	0.00	
6,900.00	89.60	319.04	5,745.13	-462.58	-86.87	-234.39	0.00	0.00	0.00	
7,000.00	89.60	319.04	5,745.84	-387.06	-152.42	-135.50	0.00	0.00	0.00	
7,100.00	89.60	319.04	5,746.54	-311.55	-217.97	-36.61	0.00	0.00	0.00	
7,200.00	89.60	319.04	5,747.25	-236.04	-283.53	62.28	0.00	0.00	0.00	
7,300.00	89.60	319.04	5,747.95	-160.52	-349.08	161.17	0.00	0.00	0.00	
7,400.00	89.60	319.04	5,748.65	-85.01	-414.63	260.06	0.00	0.00	0.00	
7,500.00	89.60	319.04	5,749.36	-9.50	-480.19	358.95	0.00	0.00	0.00	
7,600.00	89.60	319.04	5,750.06	66.02	-545.74	457.84	0.00	0.00	0.00	
7,680.26	89.60	319.04	5,750.62	126.62	-598.35	537.21	0.00	0.00	0.00	
7,700.00	89.60	318.64	5,750.76	141.49	-611.34	556.74	2.00	0.00	-2.00	
7,800.00	89.60	316.64	5,751.46	215.38	-678.71	655.96	2.00	0.00	-2.00	
7,877.28	89.60	315.10	5,752.00	270.84	-732.52	732.90	2.00	0.00	-2.00	
Fed 7P 3H T1										
7,877.31	89.60	315.10	5,752.00	270.86	-732.54	732.92	2.00	0.64	-1.89	
7,900.00	89.60	315.10	5,752.16	286.94	-748.56	755.54	0.00	0.00	0.00	
8,000.00	89.60	315.10	5,752.85	357.77	-819.14	855.22	0.00	0.00	0.00	
8,100.00	89.60	315.10	5,753.54	428.59	-889.73	954.89	0.00	0.00	0.00	
8,200.00	89.60	315.10	5,754.23	499.42	-960.32	1,054.57	0.00	0.00	0.00	
8,300.00	89.60	315.10	5,754.93	570.25	-1,030.91	1,154.25	0.00	0.00	0.00	
8,400.00	89.60	315.10	5,755.62	641.08	-1,101.50	1,253.92	0.00	0.00	0.00	
8,500.00	89.60	315.10	5,756.31	711.91	-1,172.09	1,353.60	0.00	0.00	0.00	
8,600.00	89.60	315.10	5,757.00	782.74	-1,242.68	1,453.28	0.00	0.00	0.00	
8,700.00	89.60	315.10	5,757.70	853.57	-1,313.26	1,552.95	0.00	0.00	0.00	
8,800.00	89.60	315.10	5,758.39	924.40	-1,383.85	1,652.63	0.00	0.00	0.00	
8,900.00	89.60	315.10	5,759.08	995.23	-1,454.44	1,752.30	0.00	0.00	0.00	
9,000.00	89.60	315.10	5,759.77	1,066.06	-1,525.03	1,851.98	0.00	0.00	0.00	
9,100.00	89.60	315.10	5,760.47	1,136.89	-1,595.62	1,951.66	0.00	0.00	0.00	
9,200.00	89.60	315.10	5,761.16	1,207.72	-1,666.21	2,051.33	0.00	0.00	0.00	
9,300.00	89.60	315.10	5,761.85	1,278.55	-1,736.79	2,151.01	0.00	0.00	0.00	
9,400.00	89.60	315.10	5,762.54	1,349.38	-1,807.38	2,250.69	0.00	0.00	0.00	
9,500.00	89.60	315.10	5,763.24	1,420.21	-1,877.97	2,350.36	0.00	0.00	0.00	
9,600.00	89.60	315.10	5,763.93	1,491.03	-1,948.56	2,450.04	0.00	0.00	0.00	
9,604.16	89.60	315.10	5,763.96	1,493.98	-1,951.50	2,454.19	0.00	0.00	0.00	
Fed 7P 3H LP										
9,700.00	89.60	315.10	5,764.62	1,561.86	-2,019.15	2,549.71	0.00	0.00	0.00	
9,743.96	89.60	315.10	5,764.93	1,593.00	-2,050.18	2,593.53	0.00	0.00	0.00	
9,753.77	89.54	315.28	5,765.00	1,599.96	-2,057.09	2,603.31	2.00	-0.64	1.89	
Fed 7P 3H T2										



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Federal 2307-7P COM 3H - Slot 7P 3H
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 3H	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)
9,781.99	89.54	315.85	5,765.23	1,620.11	-2,076.85	2,631.42	2.00	-0.02	2.00
9,800.00	89.54	315.85	5,765.37	1,633.03	-2,089.39	2,649.35	0.00	0.00	0.00
9,900.00	89.54	315.85	5,766.19	1,704.78	-2,159.05	2,748.91	0.00	0.00	0.00
10,000.00	89.54	315.85	5,767.00	1,776.52	-2,228.70	2,848.47	0.00	0.00	0.00
10,100.00	89.54	315.85	5,767.81	1,848.27	-2,298.36	2,948.04	0.00	0.00	0.00
10,200.00	89.54	315.85	5,768.62	1,920.02	-2,368.01	3,047.60	0.00	0.00	0.00
10,300.00	89.54	315.85	5,769.43	1,991.77	-2,437.67	3,147.16	0.00	0.00	0.00
10,400.00	89.54	315.85	5,770.24	2,063.51	-2,507.32	3,246.72	0.00	0.00	0.00
10,500.00	89.54	315.85	5,771.05	2,135.26	-2,576.97	3,346.28	0.00	0.00	0.00
10,600.00	89.54	315.85	5,771.86	2,207.01	-2,646.63	3,445.85	0.00	0.00	0.00
10,700.00	89.54	315.85	5,772.68	2,278.75	-2,716.28	3,545.41	0.00	0.00	0.00
10,777.00	89.54	315.85	5,773.30	2,334.00	-2,789.92	3,622.07	0.00	0.00	0.00
First Perf @ 10,777' MD - 36.2511599, -107.6231167									
10,800.00	89.54	315.85	5,773.49	2,350.50	-2,785.94	3,644.97	0.00	0.00	0.00
10,857.77	89.54	315.85	5,773.95	2,391.95	-2,826.18	3,702.49	0.00	0.00	0.00
TD at 10857.77									
10,900.00	89.54	315.85	5,774.30	2,422.25	-2,855.59	3,744.53	0.00	0.00	0.00
11,000.00	89.54	315.85	5,775.11	2,493.99	-2,925.25	3,844.09	0.00	0.00	0.00
11,100.00	89.54	315.85	5,775.92	2,565.74	-2,994.90	3,943.66	0.00	0.00	0.00
11,200.00	89.54	315.85	5,776.73	2,637.49	-3,064.56	4,043.22	0.00	0.00	0.00
11,299.69	89.54	315.85	5,777.54	2,709.01	-3,133.99	4,142.47	0.00	0.00	0.00
11,300.00	89.54	315.84	5,777.54	2,709.23	-3,134.21	4,142.78	2.00	0.02	-2.00
11,400.00	89.55	313.84	5,778.34	2,779.74	-3,205.11	4,242.48	2.00	0.02	-2.00
11,500.00	89.57	311.84	5,779.10	2,847.73	-3,278.43	4,342.39	2.00	0.02	-2.00
11,600.00	89.59	309.84	5,779.83	2,913.12	-3,354.07	4,442.38	2.00	0.02	-2.00
11,623.40	89.59	309.37	5,780.00	2,928.05	-3,372.11	4,465.78	2.00	0.02	-2.00
Fed 7P 3H T3									
11,700.00	89.59	309.37	5,780.54	2,976.63	-3,431.31	4,542.36	0.00	0.00	0.00
11,800.00	89.59	309.37	5,781.25	3,040.07	-3,508.62	4,642.34	0.00	0.00	0.00
11,900.00	89.59	309.37	5,781.96	3,103.51	-3,585.92	4,742.32	0.00	0.00	0.00
12,000.00	89.59	309.37	5,782.66	3,166.94	-3,663.22	4,842.30	0.00	0.00	0.00
12,100.00	89.59	309.37	5,783.37	3,230.38	-3,740.52	4,942.28	0.00	0.00	0.00
12,200.00	89.59	309.37	5,784.08	3,293.81	-3,817.82	5,042.25	0.00	0.00	0.00
12,300.00	89.59	309.37	5,784.78	3,357.25	-3,895.12	5,142.23	0.00	0.00	0.00
12,400.00	89.59	309.37	5,785.49	3,420.68	-3,972.42	5,242.21	0.00	0.00	0.00
12,500.00	89.59	309.37	5,786.20	3,484.12	-4,049.72	5,342.19	0.00	0.00	0.00
12,600.00	89.59	309.37	5,786.91	3,547.55	-4,127.02	5,442.17	0.00	0.00	0.00
12,700.00	89.59	309.37	5,787.61	3,610.99	-4,204.32	5,542.14	0.00	0.00	0.00
12,800.00	89.59	309.37	5,788.32	3,674.43	-4,281.62	5,642.12	0.00	0.00	0.00
12,900.00	89.59	309.37	5,789.03	3,737.86	-4,358.93	5,742.10	0.00	0.00	0.00
13,000.00	89.59	309.37	5,789.73	3,801.30	-4,436.23	5,842.08	0.00	0.00	0.00
13,100.00	89.59	309.37	5,790.44	3,864.73	-4,513.53	5,942.06	0.00	0.00	0.00
13,200.00	89.59	309.37	5,791.15	3,928.17	-4,590.83	6,042.03	0.00	0.00	0.00
13,300.00	89.59	309.37	5,791.86	3,991.60	-4,668.13	6,142.01	0.00	0.00	0.00
13,382.03	89.59	309.37	5,792.44	4,043.64	-4,731.54	6,224.02	0.00	0.00	0.00
Fed 7P 3H FPerf									
13,400.00	89.59	309.37	5,792.56	4,055.04	-4,745.43	6,241.99	0.00	0.00	0.00
13,461.76	89.59	309.37	5,793.00	4,094.22	-4,793.17	6,303.74	0.00	0.00	0.00
Fed 7P 3H BHL - Fed 7P 3H BHL REV									



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

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 7P 3H LPerf - plan misses target center by 1.21usft at 6604.39usft MD (5743.06 TVD, -685.80 N, 106.91 E) - Point	0.00	0.00	5,742.00	-686.18	106.46	1,905,295.34	2,789,802.81	36.2360420	-107.6071200
Fed 7P 3H LP REV - plan hits target center - Point	0.00	0.00	5,742.00	-799.03	205.25	1,905,182.72	2,789,901.86	36.2357320	-107.6067850
Fed 7P 3H T1 - plan hits target center - Point	0.00	0.00	5,752.00	270.84	-732.52	1,906,250.41	2,788,961.60	36.2386710	-107.6099650
Fed 7P 3H T2 - plan hits target center - Point	0.00	0.00	5,765.00	1,599.96	-2,057.09	1,907,576.43	2,787,633.93	36.2423220	-107.6144570
Fed 7P 3H T3 - plan hits target center - Point	0.00	0.00	5,780.00	2,928.05	-3,372.11	1,908,901.45	2,786,315.83	36.2459700	-107.6189170
Fed 7P 3H FPerf - plan misses target center by 0.56usft at 13382.03usft MD (5792.44 TVD, 4043.64 N, -4731.54 E) - Point	0.00	0.00	5,793.00	4,043.61	-4,731.55	1,910,013.84	2,784,953.78	36.2490340	-107.6235280
Fed 7P 3H BHL REV - plan hits target center - Point	0.00	0.00	5,793.00	4,094.22	-4,793.17	1,910,064.31	2,784,892.05	36.2491730	-107.6237370

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
1,326.41	1,315.00	Ojo Alamo	Empty	0.00	0.00	
1,508.71	1,488.00	Kirtland	Empty	0.00	0.00	
1,678.53	1,646.00	Fruitland	Empty	0.00	0.00	
2,963.87	2,838.00	Chacra	Empty	0.00	0.00	
3,644.28	3,469.00	Cliff House	Empty	0.00	0.00	
3,733.78	3,552.00	Menefee	Empty	0.00	0.00	
4,568.38	4,326.00	Point Lookout	Empty	0.00	0.00	
4,803.45	4,544.00	Mancos	Empty	0.00	0.00	
5,358.92	5,079.00	Pictured Cliffs	Empty	0.00	0.00	
5,554.49	5,267.00	Gallup	Empty	0.00	0.00	



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

Plan Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
800.00	799.45	-13.61	7.81	Start Build 3.00
1,609.52	1,582.00	-184.01	105.62	Start 2624.30 hold at 1609.52 MD
4,233.82	4,015.73	-1,035.47	594.38	Start Drop -3.00
5,043.34	4,767.56	-1,295.89	743.07	Start Build 7.50
5,843.34	5,507.24	-1,197.79	579.15	Start 60.00 hold at 5843.34 MD
5,903.34	5,548.77	-1,167.49	548.24	Start DLS 7.50 TFO -4.96
6,305.71	5,726.58	-909.33	303.45	Start 228.57 hold at 6305.71 MD
6,534.27	5,742.56	-738.75	152.88	Landing Point @ 6534' MD
6,661.98	5,743.46	-642.31	69.16	Start 4195.79 hold at 6661.98 MD
6,684.00	5,743.62	-625.69	54.73	Last Perf @ 6684' MD
6,684.00	5,743.62	-625.69	54.73	36.2425894, -107.6141318
10,777.00	5,773.30	2,334.00	-2,769.92	First Perf @ 10,777' MD
10,777.00	5,773.30	2,334.00	-2,769.92	36.2511599, -107.6231167
10,857.77	5,773.95	2,391.95	-2,826.18	TD at 10857.77



Logos Operating LLC

Rio Arriba, NM NAD83
Federal 2307-7P
Federal 2307-7P COM 3H

OH
Plan #3

Anticollision Report

20 June, 2018



www.scientificdrilling.com



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Federal 2307-7P COM 3H - Slot 7P 3H
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 3H	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)
0.00	13,461.76	Plan #3 (OH)
		Tool Name
		MWD+HDGM
		Description
		OWSG MWD + HDGM

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	645.20	643.60	59.14	54.98	14.199	CC, ES
Federal 2307-7P COM 1H - OH - Plan #2	13,461.76	11,225.34	2,403.79	2,064.08	7.076	SF
Federal 2307-7P COM 2H - OH - Plan #3	839.11	838.32	22.50	16.98	4.079	CC, ES
Federal 2307-7P COM 2H - OH - Plan #3	900.00	898.70	23.82	17.87	4.002	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	Vertical Depth (usft)	Offset	Semi Major Axis	Reference	Offset	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.00	0.00	0.00	0.00	101.97	-12.38	58.39	59.69				
100.00	100.00	100.00	100.00	0.13	0.13	101.97	-12.38	58.39	59.69	59.42	0.27	222.003	
200.00	200.00	200.00	200.00	0.49	0.49	101.97	-12.38	58.39	59.69	58.70	0.99	60.546	
300.00	300.00	300.00	300.00	0.85	0.85	101.97	-12.38	58.39	59.69	57.98	1.70	35.053	
400.00	400.00	400.00	400.00	1.21	1.21	101.97	-12.38	58.39	59.69	57.27	2.42	24.667	
500.00	500.00	500.00	500.00	1.57	1.57	101.97	-12.38	58.39	59.69	56.55	3.14	19.029	
600.00	599.98	599.07	599.02	1.91	1.92	-51.83	-10.07	59.53	59.29	55.45	3.84	15.440	
645.20	645.14	643.60	643.46	2.06	2.09	-55.89	-7.54	60.79	59.14	54.98	4.16	14.199	CC, ES
700.00	699.84	697.19	696.84	2.25	2.28	-62.71	-3.27	62.91	59.58	55.00	4.58	13.013	
800.00	799.45	793.47	792.31	2.60	2.64	-79.00	7.78	68.39	64.64	59.19	5.45	11.859	
900.00	898.70	887.07	884.43	2.96	2.99	-95.72	22.64	75.76	78.90	72.46	6.44	12.250	
1,000.00	997.47	977.31	972.35	3.33	3.35	-108.71	40.77	84.76	103.81	96.41	7.40	14.030	
1,100.00	1,095.62	1,063.58	1,055.44	3.73	3.73	-117.47	61.57	95.08	138.29	130.03	8.26	16.740	
1,200.00	1,193.06	1,145.46	1,133.24	4.16	4.11	-123.15	84.40	106.41	180.85	171.81	9.05	19.995	
1,300.00	1,289.64	1,222.64	1,205.52	4.61	4.50	-126.82	108.64	118.44	230.32	220.55	9.76	23.588	
1,400.00	1,385.27	1,300.00	1,276.81	5.10	4.91	-129.39	135.53	131.78	285.87	275.50	10.38	27.547	
1,500.00	1,479.82	1,362.27	1,333.27	5.62	5.28	-130.64	159.05	143.45	346.67	335.62	11.05	31.366	
1,600.00	1,573.17	1,424.66	1,388.96	6.19	5.66	-131.49	184.25	155.96	412.30	400.67	11.64	35.436	
1,700.00	1,665.91	1,494.80	1,450.89	6.79	6.11	-133.44	213.75	170.59	480.60	468.43	12.17	39.494	
1,800.00	1,758.65	1,566.90	1,514.53	7.40	6.59	-134.96	244.10	185.65	549.16	536.43	12.73	43.143	
1,900.00	1,851.38	1,639.00	1,578.18	8.02	7.08	-136.15	274.44	200.71	617.89	604.58	13.32	46.405	

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 3H - Slot 7P 3H
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 3H	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														Offset Site Error:		
Federal 2307-7P - Federal 2307-7P COM 1H - OH - Plan #2														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				
2,000.00	1,944.12	1,711.10	1,641.83	8.65	7.58	-137.10	304.78	215.76	686.73	672.81	13.92	49.323				
2,100.00	2,036.86	1,783.20	1,705.47	9.29	8.08	-137.88	335.13	230.82	755.66	741.11	14.55	51.934				
2,200.00	2,129.60	1,855.30	1,769.12	9.94	8.59	-138.53	365.47	245.88	824.65	809.45	15.19	54.274				
2,300.00	2,222.34	1,927.40	1,832.76	10.59	9.10	-139.08	395.82	260.94	893.68	877.83	15.85	56.378				
2,400.00	2,315.08	1,999.50	1,896.41	11.25	9.62	-139.56	426.16	275.99	962.75	946.23	16.52	58.274				
2,500.00	2,407.82	2,071.60	1,960.05	11.90	10.14	-139.97	456.51	291.05	1,031.85	1,014.65	17.20	59.985				
2,600.00	2,500.55	2,143.70	2,023.70	12.57	10.66	-140.33	486.85	306.11	1,100.98	1,083.09	17.89	61.537				
2,700.00	2,593.29	2,215.80	2,087.35	13.23	11.18	-140.64	517.20	321.16	1,170.12	1,151.54	18.59	62.946				
2,800.00	2,686.03	2,287.89	2,150.99	13.89	11.71	-140.92	547.54	336.22	1,239.29	1,219.99	19.29	64.231				
2,900.00	2,778.77	2,359.99	2,214.64	14.56	12.24	-141.17	577.89	351.28	1,308.46	1,288.46	20.01	65.403				
3,000.00	2,871.51	2,432.09	2,278.28	15.23	12.77	-141.40	608.23	366.34	1,377.65	1,356.93	20.72	66.478				
3,100.00	2,964.25	2,504.19	2,341.93	15.90	13.30	-141.61	638.57	381.39	1,446.85	1,425.40	21.45	67.466				
3,200.00	3,056.98	2,576.29	2,405.57	16.57	13.83	-141.79	668.92	396.45	1,516.06	1,493.88	22.17	68.375				
3,300.00	3,149.72	2,648.39	2,469.22	17.24	14.36	-141.96	699.26	411.51	1,585.27	1,562.37	22.90	69.214				
3,400.00	3,242.46	2,720.49	2,532.87	17.92	14.90	-142.12	729.61	426.56	1,654.49	1,630.85	23.64	69.991				
3,500.00	3,335.20	2,792.59	2,596.51	18.59	15.43	-142.26	759.95	441.62	1,723.72	1,699.34	24.38	70.711				
3,600.00	3,427.94	2,864.69	2,660.16	19.27	15.97	-142.39	790.30	456.68	1,792.95	1,767.83	25.12	71.380				
3,700.00	3,520.68	2,936.79	2,723.80	19.94	16.51	-142.51	820.64	471.73	1,862.19	1,836.33	25.86	72.003				
3,800.00	3,613.42	3,008.89	2,787.45	20.62	17.04	-142.63	850.99	486.79	1,931.43	1,904.82	26.61	72.585				
3,900.00	3,706.15	3,080.98	2,851.09	21.29	17.58	-142.73	881.33	501.85	2,000.68	1,973.32	27.36	73.129				
4,000.00	3,798.89	3,153.08	2,914.74	21.97	18.12	-142.83	911.68	516.91	2,069.92	2,041.81	28.11	73.638				
4,100.00	3,891.63	3,225.18	2,978.39	22.65	18.66	-142.93	942.02	531.96	2,139.17	2,110.31	28.86	74.116				
4,200.00	3,984.37	3,297.28	3,042.03	23.33	19.20	-143.01	972.36	547.02	2,208.43	2,178.81	29.62	74.565				
4,300.00	4,077.11	3,369.38	3,105.68	24.00	19.73	-143.09	1,002.71	562.08	2,277.69	2,247.31	30.37	74.987				
4,400.00	4,169.85	3,441.48	3,169.32	24.68	20.27	-143.17	1,033.05	577.13	2,346.94	2,315.81	31.13	75.385				
4,500.00	4,262.58	3,513.58	3,232.97	25.36	20.81	-143.24	1,063.40	592.19	2,416.20	2,384.31	31.89	75.761				
4,600.00	4,355.32	3,585.68	3,296.61	26.04	21.35	-143.31	1,093.74	607.25	2,485.47	2,452.81	32.65	76.116				
4,700.00	4,448.06	3,657.78	3,360.26	26.72	21.90	-143.37	1,124.09	622.30	2,554.73	2,521.32	33.42	76.452				
4,800.00	4,540.80	3,729.88	3,423.91	27.40	22.44	-143.43	1,154.43	637.36	2,624.00	2,589.82	34.18	76.771				
4,900.00	4,633.54	3,801.98	3,487.55	28.08	22.98	-143.49	1,184.78	652.42	2,693.26	2,658.32	34.94	77.073				
5,000.00	4,726.28	3,874.30	3,551.40	28.75	23.52	-143.53	1,215.22	667.52	2,762.30	2,726.59	35.71	77.359				
5,100.00	4,822.33	3,950.78	3,618.91	29.30	24.09	-143.56	1,247.40	683.49	2,826.38	2,789.93	36.44	77.553				
5,200.00	4,920.92	4,031.85	3,690.47	29.69	24.70	-143.59	1,281.52	700.42	2,882.88	2,845.73	37.15	77.610				
5,300.00	5,020.53	4,116.11	3,764.86	29.92	25.34	-143.61	1,316.99	718.02	2,930.98	2,893.18	37.80	77.537				
5,400.00	5,119.45	4,202.14	3,840.79	30.05	25.98	-143.62	1,353.19	735.99	2,970.07	2,931.65	38.42	77.299				
5,500.00	5,215.99	4,288.44	3,916.98	30.15	26.63	-143.63	1,389.52	754.01	2,999.77	2,960.75	39.02	76.884				
5,600.00	5,308.50	4,373.55	3,992.11	30.22	27.27	-143.64	1,425.34	771.79	3,019.88	2,980.29	39.59	76.283				
5,700.00	5,395.41	4,456.02	4,064.91	30.32	27.89	-143.64	1,460.05	789.01	3,030.41	2,990.26	40.15	75.478				
5,800.00	5,475.21	4,534.42	4,134.12	30.46	28.49	-143.64	1,493.04	805.38	3,031.55	2,990.83	40.72	74.440				
5,900.00	5,546.54	4,607.43	4,198.57	30.69	29.03	-143.63	1,523.77	820.63	3,023.67	2,982.33	41.34	73.137				
6,000.00	5,608.20	4,673.78	4,257.14	31.04	29.53	-143.61	1,551.70	834.48	3,007.27	2,965.23	42.04	71.539				
6,100.00	5,659.11	4,732.35	4,308.84	31.54	29.98	-143.59	1,576.35	846.72	2,982.96	2,940.12	42.84	69.634				
6,200.00	5,698.40	4,782.13	4,352.79	32.22	30.35	-143.56	1,597.30	857.11	2,951.46	2,907.69	43.77	67.435				
6,300.00	5,725.42	4,822.27	4,388.22	33.07	30.65	-143.52	1,614.19	865.49	2,913.56	2,868.73	44.83	64.988				
6,400.00	5,739.69	4,852.09	4,414.54	34.07	30.88	-143.47	1,626.74	871.72	2,870.09	2,824.07	46.02	62.367				
6,500.00	5,742.32	4,872.30	4,432.38	35.20	31.03	-143.41	1,635.25	875.94	2,822.44	2,775.13	47.31	59.662				
6,600.00	5,743.02	5,670.55	5,154.53	36.45	34.93	-143.25	1,920.65	819.00	2,767.70	2,713.46	54.24	51.026				
6,700.00	5,743.73	5,714.33	5,193.96	37.83	35.05	-143.10	1,933.39	804.84	2,714.39	2,658.51	55.88	48.573				
6,800.00	5,744.43	5,758.12	5,233.39	39.33	35.17	-142.93	1,946.13	790.69	2,663.05	2,605.36	57.69	46.163				
6,900.00	5,745.13	5,801.91	5,272.82	40.92	35.29	-142.74	1,958.86	776.54	2,613.80	2,554.15	59.64	43.824				
7,000.00	5,745.84	5,845.69	5,312.25	42.60	35.41	-142.53	1,971.60	762.39	2,566.74	2,504.99	61.75	41.568				

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 3H - Slot 7P 3H
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 3H	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													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Offset		Semi Major Axis			Distance						Warning	
		Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Tooface (°)	Offset Wellbore Centre +N-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
7,100.00	5,746.54	5,889.48	5,351.68	44.37	35.53	79.79	1,984.34	748.24	2,522.02	2,458.03	63.99	39.414		
7,200.00	5,747.25	5,917.45	5,376.81	46.20	35.61	80.40	1,992.55	739.11	2,479.84	2,413.52	66.33	37.387		
7,300.00	5,747.95	5,950.00	5,405.54	48.09	35.71	81.11	2,002.81	727.75	2,440.66	2,371.86	68.80	35.476		
7,400.00	5,748.65	5,965.33	5,418.84	50.03	35.75	81.44	2,007.93	722.09	2,404.44	2,333.08	71.36	33.696		
7,500.00	5,749.36	6,000.00	5,448.32	52.02	35.86	82.17	2,020.17	708.59	2,371.36	2,297.32	74.04	32.027		
7,600.00	5,750.06	6,025.96	5,469.84	54.06	35.94	82.71	2,029.92	697.85	2,341.36	2,264.55	76.81	30.483		
7,700.00	5,750.76	6,062.46	5,499.25	56.13	36.06	83.46	2,044.48	681.86	2,314.52	2,234.86	79.66	29.056		
7,800.00	5,751.46	6,100.00	5,528.37	58.27	36.18	84.25	2,060.43	664.36	2,293.00	2,210.39	82.61	27.757		
7,900.00	5,752.16	6,150.00	5,565.29	60.47	36.34	85.20	2,083.16	639.48	2,277.71	2,192.03	85.68	26.583		
8,000.00	5,752.85	6,206.48	5,604.25	62.72	36.54	86.18	2,110.77	609.32	2,266.19	2,177.37	88.82	25.514		
8,100.00	5,753.54	6,268.88	5,643.64	64.99	36.76	87.17	2,143.47	573.68	2,257.09	2,165.09	92.01	24.531		
8,200.00	5,754.24	6,339.81	5,683.45	67.28	37.03	88.17	2,183.18	530.50	2,250.02	2,154.76	95.26	23.619		
8,300.00	5,754.93	6,419.65	5,721.53	69.60	37.37	89.13	2,230.71	478.92	2,244.51	2,145.88	98.62	22.758		
8,400.00	5,755.62	6,508.15	5,754.94	71.93	37.80	89.97	2,286.26	418.75	2,240.04	2,137.90	102.14	21.932		
8,500.00	5,756.31	6,604.03	5,780.19	74.29	38.36	90.60	2,349.04	350.90	2,236.12	2,130.27	105.85	21.125		
8,600.00	5,757.01	6,704.95	5,794.05	76.65	39.09	90.94	2,416.96	277.65	2,232.35	2,122.56	109.79	20.332		
8,700.00	5,757.70	6,808.41	5,796.29	79.03	40.04	90.98	2,487.29	201.85	2,228.47	2,114.59	113.88	19.568		
8,800.00	5,758.39	6,908.33	5,796.84	81.43	41.14	90.98	2,555.23	128.58	2,224.53	2,106.41	118.12	18.833		
8,900.00	5,759.08	7,008.25	5,797.39	83.83	42.45	90.97	2,623.17	55.31	2,220.58	2,098.14	122.44	18.136		
9,000.00	5,759.77	7,108.17	5,797.95	86.25	43.94	90.97	2,691.10	-17.97	2,216.63	2,089.78	126.85	17.474		
9,100.00	5,760.47	7,208.10	5,798.50	88.67	45.59	90.97	2,759.04	-91.24	2,212.69	2,081.35	131.34	16.847		
9,200.00	5,761.16	7,308.02	5,799.05	91.11	47.38	90.97	2,826.98	-164.51	2,208.74	2,072.84	135.90	16.253		
9,300.00	5,761.85	7,407.94	5,799.60	93.55	49.29	90.97	2,894.92	-237.78	2,204.80	2,064.28	140.52	15.690		
9,400.00	5,762.54	7,507.86	5,800.15	96.00	51.29	90.96	2,962.86	-311.05	2,200.85	2,055.66	145.19	15.159		
9,500.00	5,763.24	7,607.78	5,800.70	98.46	53.36	90.96	3,030.79	-384.32	2,196.91	2,047.00	149.90	14.655		
9,600.00	5,763.93	7,707.71	5,801.25	100.92	55.50	90.96	3,098.73	-457.59	2,192.96	2,038.30	154.66	14.179		
9,700.00	5,764.62	7,807.63	5,801.80	103.39	57.69	90.96	3,166.67	-530.86	2,189.02	2,029.56	159.45	13.728		
9,800.00	5,765.37	7,907.53	5,802.35	105.86	59.93	90.95	3,234.59	-604.11	2,184.59	2,020.32	164.27	13.299		
9,900.00	5,766.19	8,007.39	5,802.90	108.33	62.21	90.94	3,302.49	-677.34	2,179.33	2,010.23	169.10	12.888		
10,000.00	5,767.00	8,107.25	5,803.46	110.80	64.51	90.94	3,370.39	-750.57	2,174.08	2,000.12	173.96	12.498		
10,100.00	5,767.81	8,207.11	5,804.01	113.27	66.85	90.93	3,438.28	-823.79	2,168.82	1,989.98	178.84	12.127		
10,200.00	5,768.62	8,306.97	5,804.56	115.75	69.21	90.93	3,506.18	-897.02	2,163.57	1,979.83	183.74	11.775		
10,300.00	5,769.43	8,406.84	5,805.11	118.23	71.60	90.92	3,574.08	-970.24	2,158.31	1,969.65	188.66	11.440		
10,400.00	5,770.24	8,506.70	5,805.66	120.72	74.00	90.92	3,641.97	-1,043.47	2,153.06	1,959.46	193.60	11.121		
10,500.00	5,771.05	8,606.56	5,806.21	123.21	76.42	90.91	3,709.87	-1,116.70	2,147.80	1,949.25	198.55	10.817		
10,600.00	5,771.86	8,670.21	5,806.59	125.70	77.97	90.91	3,753.44	-1,163.09	2,143.26	1,940.38	202.88	10.564		
10,700.00	5,772.68	8,733.08	5,807.05	128.20	79.50	90.91	3,797.45	-1,207.99	2,140.69	1,933.55	207.14	10.334		
10,800.00	5,773.49	8,851.57	5,807.98	130.70	82.39	90.91	3,880.28	-1,292.72	2,138.02	1,925.56	212.46	10.063		
10,900.00	5,774.30	8,951.54	5,808.76	133.20	84.84	90.91	3,950.09	-1,364.26	2,135.31	1,917.88	217.43	9.821		
11,000.00	5,775.11	9,051.50	5,809.54	135.70	87.30	90.91	4,019.90	-1,435.80	2,132.61	1,910.20	222.42	9.588		
11,100.00	5,775.92	9,151.46	5,810.32	138.21	89.77	90.91	4,089.72	-1,507.34	2,129.91	1,902.50	227.41	9.366		
11,200.00	5,776.73	9,251.43	5,811.10	140.72	92.25	90.91	4,159.53	-1,578.88	2,127.21	1,894.80	232.41	9.153		
11,300.00	5,777.54	9,351.39	5,811.88	143.23	94.73	90.91	4,229.35	-1,650.42	2,124.51	1,887.09	237.42	8.948		
11,377.08	5,778.16	9,428.46	5,812.49	145.18	96.65	90.93	4,283.17	-1,705.58	2,123.47	1,882.17	241.31	8.800		
11,400.00	5,778.34	9,451.38	5,812.67	145.76	97.22	90.93	4,299.18	-1,721.99	2,123.56	1,881.10	242.46	8.758		
11,500.00	5,779.10	9,551.34	5,813.45	148.34	99.72	90.94	4,368.99	-1,793.53	2,126.11	1,878.56	247.55	8.589		
11,600.00	5,779.83	9,651.16	5,814.23	150.95	102.22	90.96	4,438.70	-1,864.96	2,132.14	1,879.46	252.68	8.438		
11,700.00	5,780.54	9,750.80	5,815.00	153.58	104.72	90.96	4,508.29	-1,936.27	2,140.63	1,882.80	257.84	8.302		
11,800.00	5,781.25	9,850.43	5,815.78	156.22	107.22	90.96	4,577.87	-2,007.57	2,149.22	1,886.22	263.00	8.172		
11,900.00	5,781.96	9,950.06	5,816.56	158.86	109.73	90.96	4,647.45	-2,078.87	2,157.81	1,889.65	268.16	8.047		

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



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Federal 2307-7P COM 3H - Slot 7P 3H
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 3H	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													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Federal 2307-7P - Federal 2307-7P COM 1H - OH - Plan #2														
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		
12,000.00	5,782.66	10,049.69	5,817.34	161.50	112.25	90.96	4,717.03	-2,150.18	2,166.40	1,893.06	273.33	7.926		
12,100.00	5,783.37	10,149.32	5,818.12	164.14	114.75	90.95	4,786.61	-2,221.48	2,174.98	1,896.47	278.51	7.809		
12,200.00	5,784.08	10,248.95	5,818.90	166.79	117.28	90.95	4,856.19	-2,292.78	2,183.57	1,899.88	283.69	7.697		
12,300.00	5,784.78	10,300.00	5,819.30	169.44	118.57	90.95	4,892.07	-2,329.10	2,193.01	1,905.20	287.81	7.620		
12,400.00	5,785.49	10,365.48	5,819.84	172.08	120.21	90.95	4,939.01	-2,374.75	2,204.32	1,912.19	292.13	7.546		
12,500.00	5,786.20	10,400.00	5,820.14	174.74	121.07	90.95	4,964.17	-2,398.38	2,217.79	1,922.29	295.51	7.505		
12,600.00	5,786.91	10,477.05	5,820.83	177.39	122.97	90.95	5,021.34	-2,450.02	2,232.83	1,932.89	299.94	7.444		
12,700.00	5,787.61	10,532.33	5,821.35	180.04	124.32	90.95	5,063.20	-2,486.11	2,249.96	1,946.33	303.62	7.410		
12,800.00	5,788.32	10,599.52	5,822.00	182.70	125.94	90.95	5,115.02	-2,528.89	2,269.04	1,961.44	307.59	7.377		
12,900.00	5,789.03	10,675.37	5,822.76	185.36	127.76	90.95	5,174.07	-2,576.48	2,289.31	1,977.51	311.80	7.342		
13,000.00	5,789.73	10,773.27	5,823.73	188.02	130.11	90.95	5,250.29	-2,637.92	2,309.69	1,992.93	316.76	7.292		
13,100.00	5,790.44	10,871.17	5,824.70	190.68	132.46	90.94	5,326.51	-2,699.35	2,330.07	2,008.34	321.73	7.242		
13,200.00	5,791.15	10,969.07	5,825.67	193.34	134.81	90.94	5,402.73	-2,760.78	2,350.45	2,023.75	326.70	7.195		
13,300.00	5,791.86	11,066.97	5,826.65	196.00	137.16	90.94	5,478.96	-2,822.22	2,370.82	2,039.16	331.67	7.148		
13,400.00	5,792.56	11,164.87	5,827.62	198.66	139.51	90.94	5,555.18	-2,883.65	2,391.20	2,054.56	336.64	7.103		
13,461.76	5,793.00	11,225.34	5,828.22	200.31	140.97	90.94	5,602.25	-2,921.59	2,403.79	2,064.08	339.71	7.076 SF		



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Federal 2307-7P COM 3H - Slot 7P 3H
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 3H	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 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		
0.00	0.00	0.00	0.00	0.00	0.00	101.85	-6.19	29.49	30.13					
100.00	100.00	100.00	100.00	0.13	0.13	101.85	-6.19	29.49	30.13	29.86	0.27	112.075		
200.00	200.00	200.00	200.00	0.49	0.49	101.85	-6.19	29.49	30.13	29.15	0.99	30.566		
300.00	300.00	300.00	300.00	0.85	0.85	101.85	-6.19	29.49	30.13	28.43	1.70	17.696		
400.00	400.00	400.00	400.00	1.21	1.21	101.85	-6.19	29.49	30.13	27.71	2.42	12.453		
500.00	500.00	500.00	500.00	1.57	1.57	101.85	-6.19	29.49	30.13	27.00	3.14	9.606		
600.00	599.98	599.98	599.98	1.91	1.93	-50.89	-6.19	29.49	29.00	25.16	3.84	7.557		
700.00	699.84	699.84	699.84	2.25	2.28	-59.91	-6.19	29.49	26.02	21.48	4.53	5.741		
800.00	799.45	799.45	799.45	2.60	2.64	-79.11	-6.19	29.49	22.91	17.68	5.24	4.377		
839.11	838.32	838.32	838.32	2.73	2.78	-90.00	-6.19	29.49	22.50	16.98	5.52	4.079 CC, ES		
900.00	898.70	898.70	898.70	2.96	3.00	-109.02	-6.19	29.49	23.82	17.87	5.95	4.002 SF		
1,000.00	997.47	997.47	997.47	3.33	3.35	-135.78	-6.19	29.49	32.51	25.84	6.67	4.874		
1,100.00	1,095.62	1,095.62	1,095.62	3.73	3.70	-151.61	-6.19	29.49	48.14	40.75	7.38	6.520		
1,200.00	1,193.06	1,193.06	1,193.06	4.16	4.05	-160.38	-6.19	29.49	68.83	60.73	8.09	8.504		
1,300.00	1,289.64	1,289.64	1,289.64	4.61	4.40	-165.57	-6.19	29.49	93.67	84.86	8.81	10.637		
1,400.00	1,385.27	1,385.27	1,385.27	5.10	4.74	-168.86	-6.19	29.49	122.25	112.73	9.52	12.843		
1,500.00	1,479.82	1,479.82	1,479.82	5.62	5.08	-171.09	-6.19	29.49	154.37	144.14	10.23	15.086		
1,600.00	1,573.17	1,573.17	1,573.17	6.19	5.42	-172.67	-6.19	29.49	189.89	178.94	10.95	17.340		
1,700.00	1,665.91	1,665.91	1,665.91	6.79	5.75	-173.87	-6.19	29.49	227.08	215.43	11.66	19.483		
1,800.00	1,758.65	1,758.65	1,758.65	7.40	6.08	-174.74	-6.19	29.49	264.34	251.97	12.37	21.378		
1,900.00	1,851.38	1,851.38	1,851.38	8.02	6.41	-175.39	-6.19	29.49	301.63	288.55	13.08	23.062		
2,000.00	1,944.12	1,944.12	1,944.12	8.65	6.75	-175.90	-6.19	29.49	338.95	325.15	13.80	24.566		
2,100.00	2,036.86	2,036.86	2,036.86	9.29	7.08	-176.27	-6.16	29.75	376.20	361.67	14.53	25.892		
2,200.00	2,129.60	2,136.35	2,136.29	9.94	7.42	-176.21	-5.83	32.71	412.57	397.29	15.28	26.992		
2,300.00	2,222.34	2,234.85	2,234.59	10.59	7.76	-175.72	-5.12	39.05	447.87	431.82	16.05	27.910		
2,400.00	2,315.08	2,333.88	2,333.12	11.25	8.11	-174.90	-4.02	48.80	482.13	465.31	16.82	28.666		
2,500.00	2,407.82	2,433.20	2,431.55	11.90	8.46	-173.81	-2.55	61.98	515.47	497.86	17.60	29.283		
2,600.00	2,500.55	2,532.58	2,529.52	12.57	8.82	-172.49	-0.69	78.55	547.99	529.59	18.40	29.781		
2,700.00	2,593.29	2,629.17	2,624.20	13.23	9.18	-171.07	1.44	97.51	579.96	560.77	19.19	30.216		
2,800.00	2,686.03	2,723.00	2,716.10	13.89	9.54	-169.79	3.55	116.35	612.11	592.13	19.98	30.634		
2,900.00	2,778.77	2,816.84	2,808.00	14.56	9.90	-168.64	5.66	135.19	644.51	623.73	20.78	31.015		
3,000.00	2,871.51	2,910.67	2,899.90	15.23	10.27	-167.59	7.77	154.03	677.12	655.53	21.59	31.363		
3,100.00	2,964.25	3,004.51	2,991.80	15.90	10.65	-166.65	9.89	172.87	709.92	687.51	22.41	31.680		
3,200.00	3,056.98	3,098.34	3,083.70	16.57	11.03	-165.78	12.00	191.71	742.88	719.64	23.24	31.969		
3,300.00	3,149.72	3,192.18	3,175.60	17.24	11.41	-164.99	14.11	210.56	775.98	751.90	24.07	32.234		
3,400.00	3,242.46	3,286.01	3,267.50	17.92	11.80	-164.26	16.22	229.40	809.20	784.28	24.92	32.478		
3,500.00	3,335.20	3,379.85	3,359.40	18.59	12.19	-163.59	18.33	248.24	842.53	816.76	25.76	32.701		
3,600.00	3,427.94	3,473.68	3,451.30	19.27	12.59	-162.97	20.45	267.08	875.96	849.34	26.62	32.908		
3,700.00	3,520.68	3,567.52	3,543.20	19.94	12.98	-162.39	22.56	285.92	909.47	881.99	27.48	33.098		
3,800.00	3,613.42	3,661.35	3,635.10	20.62	13.38	-161.85	24.67	304.76	943.05	914.71	28.34	33.274		
3,900.00	3,706.15	3,755.19	3,727.00	21.29	13.78	-161.36	26.78	323.60	976.71	947.50	29.21	33.437		
4,000.00	3,798.89	3,849.02	3,818.90	21.97	14.19	-160.89	28.89	342.44	1,010.43	980.35	30.08	33.589		
4,100.00	3,891.63	3,942.86	3,910.80	22.65	14.59	-160.46	31.01	361.29	1,044.20	1,013.24	30.96	33.730		
4,200.00	3,984.37	4,036.89	4,002.70	23.33	15.00	-160.05	33.12	380.13	1,078.03	1,046.19	31.84	33.862		
4,300.00	4,077.11	4,130.53	4,094.60	24.00	15.41	-159.66	35.23	398.97	1,111.89	1,079.18	32.72	33.984		
4,400.00	4,169.85	4,224.36	4,186.50	24.68	15.82	-159.30	37.34	417.81	1,145.81	1,112.20	33.60	34.099		
4,500.00	4,262.58	4,318.20	4,278.40	25.36	16.23	-158.96	39.45	436.65	1,179.76	1,145.27	34.49	34.207		
4,600.00	4,355.32	4,412.03	4,370.30	26.04	16.65	-158.64	41.57	455.49	1,213.74	1,178.36	35.38	34.308		
4,700.00	4,448.06	4,505.87	4,462.20	26.72	17.06	-158.34	43.68	474.33	1,247.76	1,211.49	36.27	34.403		
4,800.00	4,540.80	4,599.70	4,554.10	27.40	17.48	-158.05	45.79	493.17	1,281.80	1,244.64	37.16	34.492		
4,900.00	4,633.54	4,693.54	4,645.99	28.08	17.90	-157.78	47.90	512.01	1,315.88	1,277.82	38.06	34.577		

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 3H - Slot 7P 3H
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 3H	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													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	4,726.45	4,787.49	4,738.01	28.75	18.31	-159.08	50.02	530.88	1,349.60	1,310.65	38.95	34.648		
5,100.00	4,822.33	4,883.26	4,831.80	29.30	18.74	-167.26	52.17	550.11	1,375.78	1,335.95	39.83	34.540		
5,200.00	4,920.92	4,980.16	4,926.71	29.69	19.17	-168.34	54.35	569.57	1,391.50	1,350.81	40.68	34.204		
5,300.00	5,020.53	5,018.43	4,964.28	29.92	19.34	90.32	55.94	576.65	1,398.77	1,357.88	40.89	34.207		
5,400.00	5,119.45	5,050.00	4,995.36	30.05	19.48	57.68	58.36	581.58	1,399.74	1,358.81	40.93	34.202		
5,500.00	5,215.99	5,100.00	5,044.63	30.15	19.67	49.48	64.22	587.66	1,394.43	1,353.33	41.10	33.929		
5,600.00	5,308.50	5,131.45	5,075.56	30.22	19.79	46.53	69.18	590.39	1,383.03	1,342.02	41.01	33.726		
5,700.00	5,395.41	5,168.40	5,111.77	30.32	19.92	45.82	76.24	592.51	1,365.85	1,324.86	40.99	33.325		
5,800.00	5,475.21	5,200.00	5,142.55	30.46	20.03	46.23	83.34	593.39	1,343.19	1,302.25	40.95	32.803		
5,900.00	5,546.54	5,250.00	5,190.77	30.69	20.19	47.94	96.51	593.02	1,315.50	1,274.20	41.31	31.847		
6,000.00	5,608.20	5,275.46	5,215.05	31.04	20.26	49.79	104.11	592.00	1,283.13	1,241.62	41.51	30.910		
6,100.00	5,659.11	5,300.00	5,238.23	31.54	20.34	52.21	112.01	590.49	1,246.98	1,204.99	41.99	29.699		
6,200.00	5,698.40	5,350.00	5,284.72	32.22	20.47	56.12	129.78	585.81	1,207.57	1,164.34	43.23	27.935		
6,300.00	5,725.42	5,372.75	5,305.50	33.07	20.53	59.62	138.60	582.98	1,165.86	1,121.41	44.45	26.229		
6,400.00	5,739.69	5,400.00	5,330.05	34.07	20.60	63.74	149.75	579.01	1,123.01	1,076.84	46.17	24.323		
6,500.00	5,742.32	5,428.40	5,355.20	35.20	20.67	66.76	162.04	574.21	1,080.59	1,032.30	48.29	22.378		
6,600.00	5,743.02	5,450.00	5,374.01	36.45	20.72	67.84	171.83	570.11	1,043.69	993.17	50.52	20.661		
6,700.00	5,743.73	5,500.00	5,416.42	37.83	20.83	70.30	195.92	559.14	1,013.70	960.41	53.28	19.024		
6,800.00	5,744.43	5,533.21	5,443.63	39.33	20.90	71.90	212.98	550.75	990.88	935.01	55.87	17.737		
6,900.00	5,745.13	5,580.67	5,481.11	40.92	20.99	74.12	238.76	537.24	975.24	916.64	58.60	16.642		
7,000.00	5,745.84	5,636.77	5,523.07	42.60	21.09	76.63	271.24	519.04	966.35	905.03	61.32	15.758		
7,100.00	5,746.54	5,703.33	5,569.25	44.37	21.20	79.39	312.34	494.45	963.44	899.43	64.01	15.052		
7,106.25	5,746.59	5,707.88	5,572.26	44.48	21.21	79.57	315.25	492.66	963.43	899.25	64.18	15.012		
7,200.00	5,747.25	5,782.21	5,618.49	46.20	21.34	82.34	364.27	461.34	965.29	898.60	66.68	14.476		
7,300.00	5,747.95	5,874.98	5,668.09	48.09	21.59	85.29	429.08	417.36	970.28	900.91	69.37	13.987		
7,400.00	5,748.65	5,982.15	5,713.32	50.03	22.27	87.95	507.80	360.58	976.53	904.27	72.26	13.514		
7,500.00	5,749.36	6,102.19	5,747.60	52.02	23.47	89.92	599.02	290.69	982.12	906.63	75.48	13.011		
7,600.00	5,750.06	6,230.79	5,764.19	54.06	25.09	90.83	697.86	210.36	985.45	906.35	79.10	12.458		
7,700.00	5,750.76	6,312.14	5,765.22	56.13	26.24	90.86	760.40	158.35	987.78	905.45	82.32	11.999		
7,800.00	5,751.46	6,408.66	5,764.99	58.27	27.72	90.81	836.27	98.69	995.01	909.10	85.92	11.581		
7,900.00	5,752.16	6,498.54	5,765.87	60.47	29.19	90.83	906.93	43.15	1,005.67	916.10	89.57	11.228		
8,000.00	5,752.85	6,597.83	5,766.84	62.72	30.92	90.84	985.09	-18.08	1,017.57	924.04	93.53	10.880		
8,100.00	5,753.54	6,697.12	5,767.81	64.99	32.73	90.85	1,063.25	-79.30	1,029.46	931.87	97.59	10.549		
8,200.00	5,754.24	6,796.41	5,768.78	67.28	34.61	90.85	1,141.41	-140.53	1,041.35	939.60	101.75	10.234		
8,300.00	5,754.93	6,895.70	5,769.76	69.60	36.55	90.86	1,219.57	-201.75	1,053.25	947.26	105.99	9.937		
8,400.00	5,755.62	6,994.99	5,770.73	71.93	38.55	90.87	1,297.73	-262.98	1,065.14	954.84	110.31	9.656		
8,500.00	5,756.31	7,094.28	5,771.70	74.29	40.59	90.87	1,375.89	-324.20	1,077.04	962.36	114.68	9.392		
8,600.00	5,757.01	7,193.57	5,772.68	76.65	42.67	90.88	1,454.05	-385.43	1,088.93	969.82	119.11	9.142		
8,700.00	5,757.70	7,292.86	5,773.65	79.03	44.78	90.88	1,532.21	-446.65	1,100.83	977.24	123.59	8.907		
8,800.00	5,758.39	7,392.15	5,774.62	81.43	46.93	90.89	1,610.37	-507.88	1,112.72	984.62	128.10	8.686		
8,900.00	5,759.08	7,491.44	5,775.59	83.83	49.09	90.89	1,688.53	-569.10	1,124.62	991.96	132.65	8.478		
9,000.00	5,759.77	7,590.73	5,776.57	86.25	51.28	90.90	1,766.69	-630.33	1,136.51	999.27	137.24	8.281		
9,100.00	5,760.47	7,690.02	5,777.54	88.67	53.48	90.91	1,844.85	-691.55	1,148.41	1,006.56	141.85	8.096		
9,200.00	5,761.16	7,789.31	5,778.51	91.11	55.71	90.91	1,923.01	-752.78	1,160.30	1,013.81	146.49	7.921		
9,300.00	5,761.85	7,888.60	5,779.49	93.55	57.94	90.92	2,001.17	-814.00	1,172.20	1,021.05	151.15	7.755		
9,400.00	5,762.54	7,987.89	5,780.46	96.00	60.19	90.92	2,079.33	-875.23	1,184.09	1,028.26	155.83	7.598		
9,500.00	5,763.24	8,087.18	5,781.43	98.46	62.46	90.93	2,157.49	-936.45	1,195.99	1,035.45	160.53	7.450		
9,600.00	5,763.93	8,213.99	5,782.66	100.92	65.37	90.93	2,256.86	-1,015.23	1,207.45	1,041.45	166.00	7.274		
9,700.00	5,764.62	8,386.84	5,784.18	103.39	69.46	90.94	2,387.07	-1,128.85	1,214.08	1,041.63	172.45	7.040		
9,800.00	5,765.37	8,533.52	5,785.31	105.86	73.03	90.93	2,492.20	-1,231.12	1,214.58	1,036.44	178.14	6.818		

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



Scientific Drilling, Intl
Anticollision Report



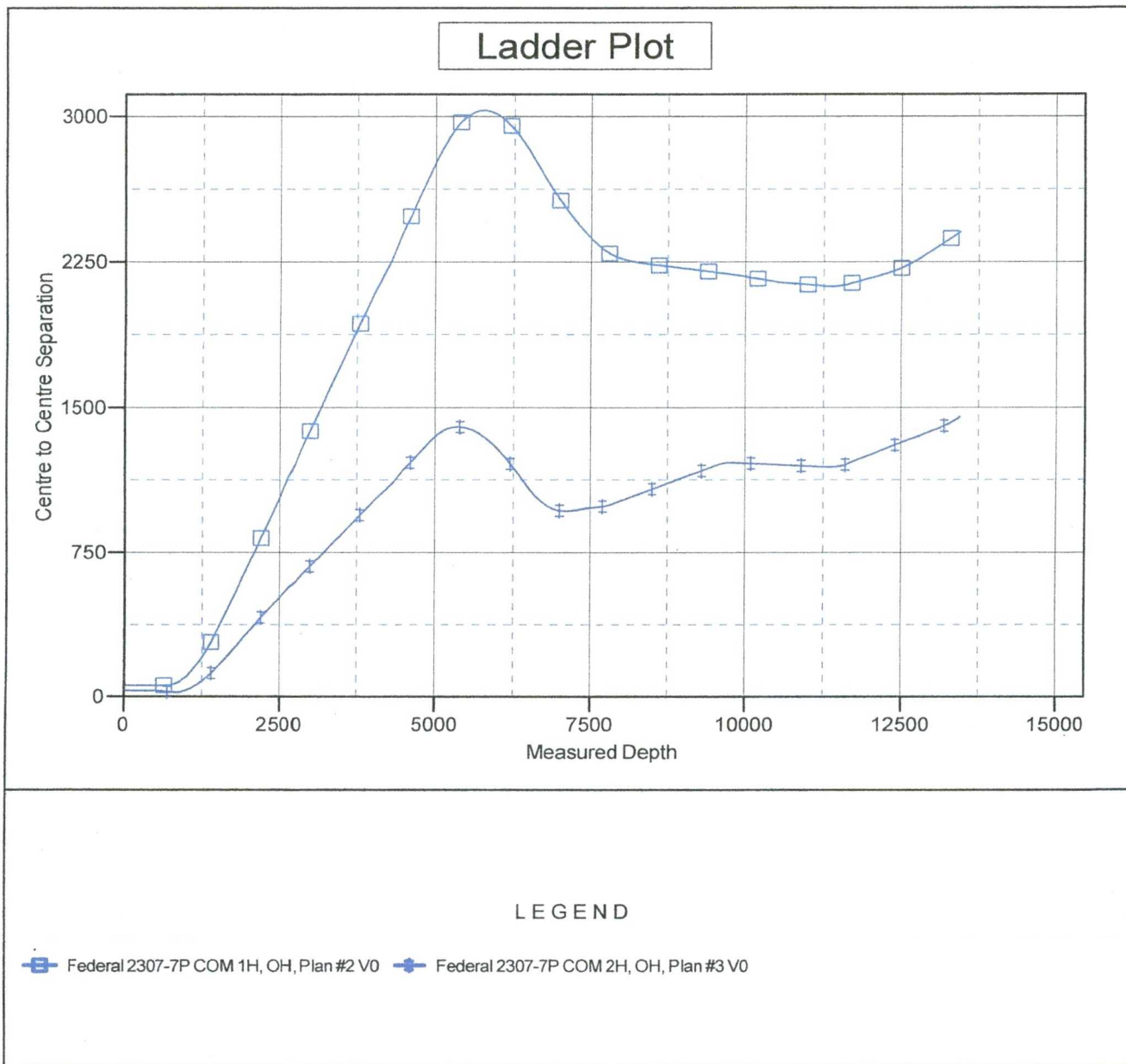
Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Federal 2307-7P COM 3H - Slot 7P 3H
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Reference Site:	Federal 2307-7P	MD Reference:	GL 7267' & RKB 25' @ 7292.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Federal 2307-7P COM 3H	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													Offset Site Error:	0.00 usft
Federal 2307-7P - Federal 2307-7P COM 2H - OH - Plan #3													Offset Well Error:	0.00 usft
Survey Program: 0-MWD+HDGM														
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
9,900.00	5,766.19	8,633.51	5,786.05	108.33	75.49	90.93	2,562.85	-1,301.86	1,213.03	1,029.95	183.09	6.625		
10,000.00	5,767.00	8,733.50	5,786.79	110.80	77.96	90.93	2,633.51	-1,372.61	1,211.49	1,023.45	188.04	6.443		
10,100.00	5,767.81	8,833.48	5,787.53	113.27	80.43	90.93	2,704.16	-1,443.35	1,209.95	1,016.93	193.01	6.269		
10,200.00	5,768.62	8,933.47	5,788.27	115.75	82.91	90.92	2,774.82	-1,514.10	1,208.40	1,010.41	197.99	6.103		
10,300.00	5,769.43	9,033.46	5,789.01	118.23	85.40	90.92	2,845.47	-1,584.84	1,206.86	1,003.88	202.98	5.946		
10,400.00	5,770.24	9,133.45	5,789.75	120.72	87.89	90.92	2,916.13	-1,655.59	1,205.31	997.34	207.97	5.796		
10,500.00	5,771.05	9,233.44	5,790.49	123.21	90.39	90.92	2,986.78	-1,726.34	1,203.77	990.79	212.98	5.652		
10,600.00	5,771.86	9,333.42	5,791.23	125.70	92.90	90.92	3,057.44	-1,797.08	1,202.22	984.24	217.99	5.515		
10,700.00	5,772.68	9,433.41	5,791.98	128.20	95.41	90.91	3,128.09	-1,867.83	1,200.68	977.68	223.00	5.384		
10,800.00	5,773.49	9,533.40	5,792.72	130.70	97.92	90.91	3,198.75	-1,938.57	1,199.14	971.11	228.03	5.259		
10,900.00	5,774.30	9,633.39	5,793.46	133.20	100.43	90.91	3,269.40	-2,009.32	1,197.59	964.53	233.06	5.139		
11,000.00	5,775.11	9,733.38	5,794.20	135.70	102.96	90.91	3,340.06	-2,080.06	1,196.05	957.95	238.09	5.023		
11,100.00	5,775.92	9,833.37	5,794.94	138.21	105.48	90.91	3,410.71	-2,150.81	1,194.50	951.37	243.14	4.913		
11,200.00	5,776.73	9,933.35	5,795.68	140.72	108.01	90.90	3,481.37	-2,221.55	1,192.96	944.78	248.18	4.807		
11,300.00	5,777.54	10,033.34	5,796.42	143.23	110.53	90.90	3,552.02	-2,292.30	1,191.41	938.18	253.23	4.705		
11,343.93	5,777.90	10,077.27	5,796.75	144.34	111.65	90.91	3,583.07	-2,323.38	1,191.08	935.61	255.46	4.662		
11,400.00	5,778.34	10,133.34	5,797.16	145.76	113.07	90.91	3,622.68	-2,363.05	1,191.63	933.32	258.31	4.613		
11,500.00	5,779.10	10,233.26	5,797.90	148.34	115.60	90.93	3,693.29	-2,433.75	1,195.33	931.90	263.43	4.538		
11,600.00	5,779.83	10,300.00	5,798.42	150.95	117.29	90.94	3,740.94	-2,480.48	1,203.65	935.65	268.00	4.491		
11,700.00	5,780.54	10,379.88	5,799.08	153.58	119.28	90.94	3,799.35	-2,534.96	1,216.82	944.13	272.69	4.462		
11,800.00	5,781.25	10,497.90	5,800.04	156.22	122.24	90.93	3,885.27	-2,615.85	1,229.53	951.30	278.23	4.419		
11,900.00	5,781.96	10,597.11	5,800.84	158.86	124.74	90.93	3,957.31	-2,684.07	1,242.04	958.67	283.36	4.383		
12,000.00	5,782.66	10,696.32	5,801.65	161.50	127.23	90.92	4,029.35	-2,752.29	1,254.55	966.05	288.50	4.349		
12,100.00	5,783.37	10,795.54	5,802.45	164.14	129.73	90.92	4,101.38	-2,820.50	1,267.06	973.42	293.64	4.315		
12,200.00	5,784.08	10,894.75	5,803.25	166.79	132.22	90.92	4,173.42	-2,888.72	1,279.57	980.79	298.78	4.283		
12,300.00	5,784.78	10,993.97	5,804.05	169.44	134.72	90.91	4,245.46	-2,956.94	1,292.08	988.16	303.92	4.251		
12,400.00	5,785.49	11,093.18	5,804.85	172.08	137.22	90.91	4,317.49	-3,025.15	1,304.59	995.52	309.07	4.221		
12,500.00	5,786.20	11,192.40	5,805.65	174.74	139.72	90.90	4,389.53	-3,093.37	1,317.10	1,002.88	314.22	4.192		
12,600.00	5,786.91	11,291.61	5,806.46	177.39	142.23	90.90	4,461.57	-3,161.59	1,329.61	1,010.24	319.37	4.163		
12,700.00	5,787.61	11,390.82	5,807.26	180.04	144.73	90.90	4,533.61	-3,229.80	1,342.12	1,017.60	324.52	4.136		
12,800.00	5,788.32	11,490.04	5,808.06	182.70	147.24	90.89	4,605.64	-3,298.02	1,354.63	1,024.96	329.68	4.109		
12,900.00	5,789.03	11,589.25	5,808.86	185.36	149.74	90.89	4,677.68	-3,366.24	1,367.14	1,032.31	334.83	4.083		
13,000.00	5,789.73	11,688.47	5,809.66	188.02	152.25	90.89	4,749.72	-3,434.45	1,379.66	1,039.66	339.99	4.058		
13,100.00	5,790.44	11,787.68	5,810.46	190.68	154.75	90.88	4,821.75	-3,502.67	1,392.17	1,047.01	345.15	4.033		
13,200.00	5,791.15	11,855.63	5,811.03	193.34	156.46	90.88	4,871.57	-3,548.87	1,405.73	1,056.29	349.44	4.023		
13,300.00	5,791.86	11,921.74	5,811.63	196.00	158.10	90.88	4,921.08	-3,592.68	1,421.59	1,068.13	353.46	4.022		
13,400.00	5,792.56	12,000.00	5,812.38	198.66	160.03	90.88	4,980.97	-3,643.04	1,439.79	1,082.03	357.76	4.024		
13,461.76	5,793.00	12,027.56	5,812.66	200.31	160.69	90.88	5,002.39	-3,660.38	1,452.02	1,092.55	359.47	4.039		

Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Federal 2307-7P COM 3H - Slot 7P 3H
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 3H	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 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 3H - Slot 7P 3H
Coordinate System is US State Plane 1983, New Mexico Western Zone
Grid Convergence at Surface is: 0.13°

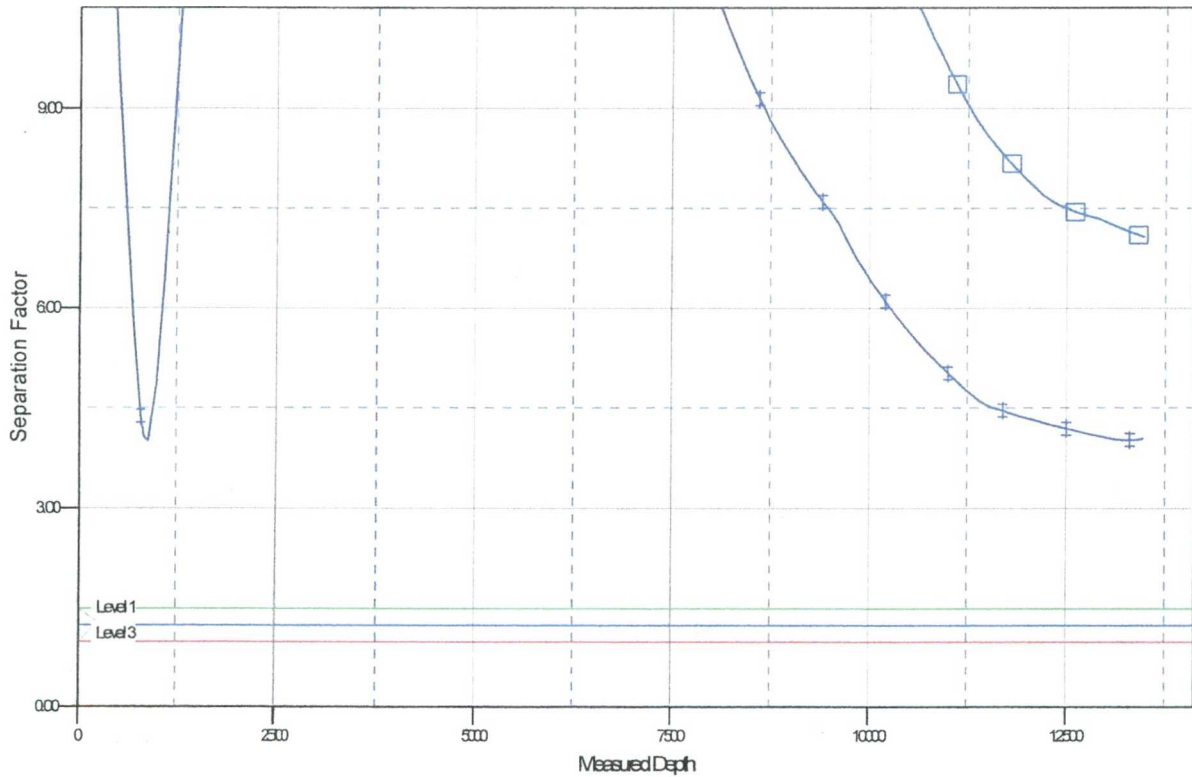


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Reference Depths are relative to GL 7267' & RKB 25' @ 7292.00usft (A)
Offset Depths are relative to Offset Datum
Central Meridian is -107.8333334

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