

State of New Mexico
Energy, Minerals and Natural Resources Department

Susana Martinez
Governor

Ken McQueen
Cabinet Secretary

Matthias Sayer
Deputy Cabinet Secretary

Heather Riley, Division Director
Oil Conservation Division



New Mexico Oil Conservation Division approval and conditions listed below are made in accordance with OCD Rule 19.15.7.11 and are in addition to the actions approved by BLM on the following 3160-3 APD form.

Operator Signature Date: 5/31/2018

Well information;

Operator LOGOS, Well Name and Number Federal 2307 OPL Com #1 H

API# 30-039-31366, Section 7, Township 23 N/S, Range 7 E/W

Conditions of Approval: (See the below checked and handwritten conditions)

- ☒ Notify Aztec OCD 24hrs prior to casing & cement.
- ☒ Hold C-104 for directional survey & "As Drilled" Plat
- ☒ Hold C-104 for NSL, NSP, DHC
 - Spacing rule violation. Operator must follow up with change of status notification on other well to be shut in or abandoned
 - Regarding the use of a pit, closed loop system or below grade tank, the operator must comply with the following as applicable:
 - A pit requires a complete C-144 be submitted and approved prior to the construction or use of the pit, pursuant to 19.15.17.8.A
 - A closed loop system requires notification prior to use, pursuant to 19.15.17.9.A
 - A below grade tank requires a registration be filed prior to the construction or use of the below grade tank, pursuant to 19.15.17.8.C
 - Once the well is spud, to prevent ground water contamination through whole or partial conduits from the surface, the operator shall drill without interruption through the fresh water zone or zones and shall immediately set in cement the water protection string
 - Submit Gas Capture Plan form prior to spudding or initiating recompletion operations
- ☒ Regarding Hydraulic Fracturing, review EPA Underground Injection Control Guidance 84
- ☒ Oil base muds are not to be used until fresh water zones are cased and cemented providing isolation from the oil or diesel. This includes synthetic oils. Oil based mud, drilling fluids and solids must be contained in a steel closed loop system.
- ☒ Well-bore communication is regulated under 19.15.29 NMAC. This requires well-bore Communication to be reported in accordance with 19.15.29.8.

Charles R. Hernandez
NMOCD Approved by Signature

10-2-2018
Date

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

FORM APPROVED
OMB No. 1004-0137
Expires October 31, 2014

5. Lease Serial No.
NMNM136672

6. If Indian, Allottee or Tribe Name

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

8. Lease Name and Well No.
FEDERAL 2307 07P COM 1H

9. API Well No.

10. Field and Pool, or Exploratory
BASIN / MANCOS

11. Sec., T. R. M. or Blk. and Survey or Area
SEC 7 / T23N / R7W / NMP

12. County or Parish
RIO ARRIBA

13. State
NM

1a. Type of work: ☒ DRILL ☐ REENTER

1b. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other ☒ Single Zone ☐ Multiple Zone

2. Name of Operator
LOGOS OPERATING LLC

3a. Address
2010 Afton Place FARMINGTON NM 87401

3b. Phone No. (include area code)
(505)324-4145

4. Location of Well (Report location clearly and in accordance with any State requirements*)

At surface ^P SESE / 1279 FSL / 298 FEL / LAT 36.237893 / LONG -107.607283

At proposed prod. zone ^K NESW / 2377 FSL / 2047 FWL / LAT 36.255501 / LONG -107.617306

14. Distance in miles and direction from nearest town or post office*
46.8 miles

15. Distance from proposed*
location to nearest
property or lease line, ft.
(Also to nearest drig. unit line, if any)
298 feet

16. No. of acres in lease
441.5

17. Spacing Unit dedicated to this well
602.72

18. Distance from proposed location*
to nearest well, drilling, completed, 30 feet
applied for, on this lease, ft.

19. Proposed Depth
5577 feet / 11651 feet

20. BLM/BIA Bond No. on file
FED: NMB001387

21. Elevations (Show whether DF, KDB, RT, GL, etc.)
7265 feet

22. Approximate date work will start*
06/26/2018

23. Estimated duration
30 days

24. Attachments

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No.1, must be attached to this form:

1. Well plat certified by a registered surveyor.
2. A Drilling Plan.
3. A Surface Use Plan (if the location is on National Forest System Lands, the SUPO must be filed with the appropriate Forest Service Office).

4. Bond to cover the operations unless covered by an existing bond on file (see Item 20 above).
5. Operator certification
6. Such other site specific information and/or plans as may be required by the BLM.

25. Signature
(Electronic Submission)

Name (Printed/Typed)
Marie Florez / Ph: (505)419-8420

Date
05/31/2018

Title
Regulatory Specialist

Approved by (Signature)

Name (Printed/Typed)

Date

Title

Office
FARMINGTON

Application approval 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.
Conditions of approval, if any, are attached.

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.

(Continued on page 2)

*(Instructions on page 2)

NMOCD

BLM'S APPROVAL OR ACCEPTANCE OF
THIS ACTION DOES NOT RELIEVE THE
LESSOR AND OPERATOR FROM
OBTAINING ANY OTHER AUTHORIZATION
REQUIRED FOR OPERATIONS ON
FEDERAL AND INDIAN LANDS

NMOCD

SEP 24 2018

DISTRICT III

DRILLING OPERATIONS
AUTHORIZED ARE SUBJECT TO
COMPLIANCE WITH ATTACHED
"GENERAL REQUIREMENTS"

This action is subject to technical
and procedural review pursuant to
43 CFR 3165.3 and appeal
pursuant to 43 CFR 3165.4

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

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

1a. Type of work: ☒ DRILL ☐ REENTER		5. Lease Serial No. NMNM136672
1b. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other		6. If Indian, Allottee or Tribe Name
1c. Type of Completion: ☐ Hydraulic Fracturing ☒ Single Zone ☐ Multiple Zone		7. If Unit or CA Agreement, Name and No.
2. Name of Operator LOGOS OPERATING LLC		8. Lease Name and Well No. FEDERAL 2307 07P COM 1H
3a. Address 2010 Afton Place FARMINGTON NM 87401	3b. Phone No. (include area code) (505)324-4145	9. API Well No.
4. Location of Well (Report location clearly and in accordance with any State requirements. *) At surface SESE / 1279 FSL / 298 FEL / LAT 36.237893 / LONG -107.607283 At proposed prod. zone NESW / 2377 FSL / 2047 FWL / LAT 36.255501 / LONG -107.617306		10. Field and Pool, or Exploratory BASIN / MANCOS
11. Sec., T, R, M. or Blk. and Survey or Area SEC 7 / T23N / R7W / NMP		
14. Distance in miles and direction from nearest town or post office* 46.8 miles		12. County or Parish RIO ARRIBA
13. State NM		
15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any) 298 feet	16. No of acres in lease 441.5	17. Spacing Unit dedicated to this well 602.72
18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft. 30 feet	19. Proposed Depth 5577 feet / 11651 feet	20. BLM/BIA Bond No. in file FED: NMB001387
21. Elevations (Show whether DF, KDB, RT, GL, etc.) 7265 feet	22. Approximate date work will start* 06/26/2018	23. Estimated duration 30 days

24. Attachments

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No. 1, and the Hydraulic Fracturing rule per 43 CFR 3162.3-3 (as applicable)

- | | |
|--|---|
| 1. Well plat certified by a registered surveyor. | 4. Bond to cover the operations unless covered by an existing bond on file (see Item 20 above). |
| 2. A Drilling Plan. | 5. Operator certification. |
| 3. A Surface Use Plan (if the location is on National Forest System Lands, the SUPO must be filed with the appropriate Forest Service Office). | 6. Such other site specific information and/or plans as may be requested by the BLM. |

25. Signature (Electronic Submission)	Name (Printed/Typed) Marie Florez / Ph: (505)419-8420	Date 05/31/2018
Title Regulatory Specialist		
Approved by (Signature) (Electronic Submission)	Name (Printed/Typed) Richard Fields / Ph: (505)564-7612	Date 09/21/2018
Title Field Manager		
Office FARMINGTON		

Application approval 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.

Conditions of approval, if any, are attached.

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.



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

OIL CONSERVATION DIVISION

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

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) 476-3482

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

¹ API Number 30-039- 313106	² Pool Code 97232	³ Pool Name BASIN MANCOS
⁴ Property Code 322501	⁵ Property Name FEDERAL 2307 7P COM	⁶ Well Number 1H
⁷ OGRID No. 289408	⁸ Operator Name LOGOS OPERATING, LLC	⁹ Elevation 7265

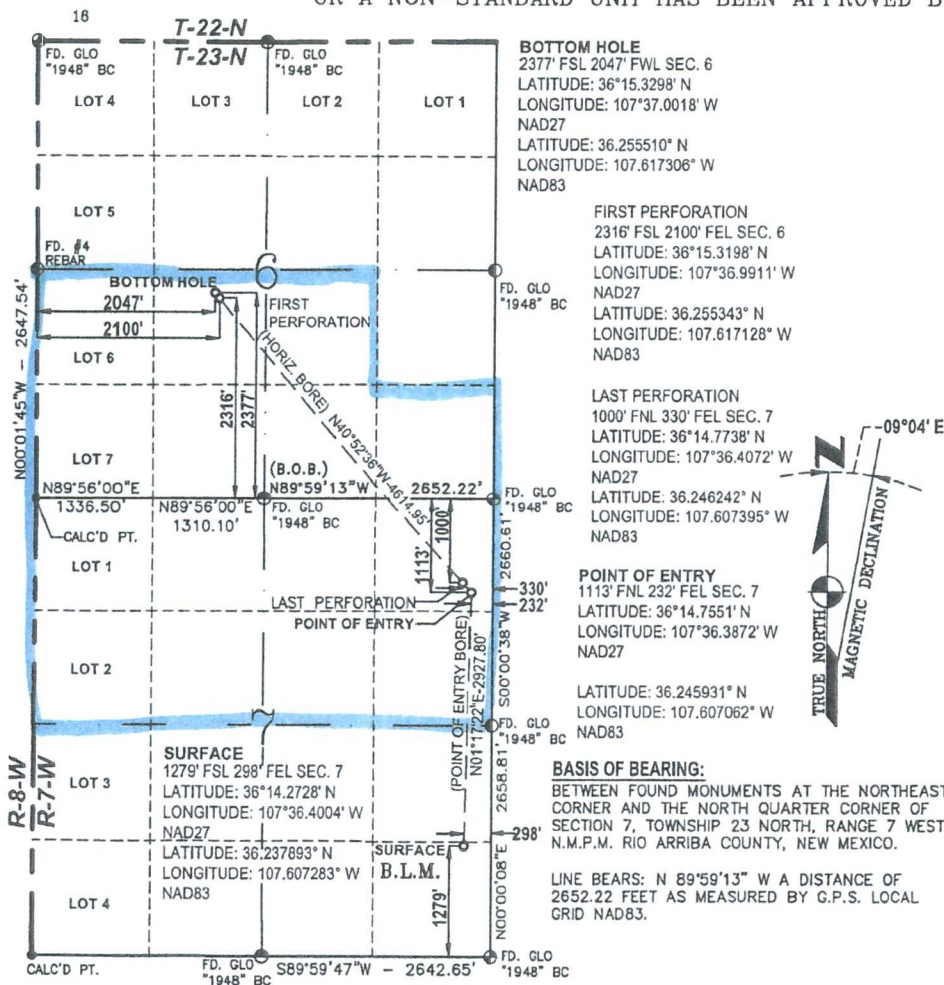
¹⁰ Surface Location

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		1279	SOUTH	298	EAST	RIO ARRIBA

¹¹ Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot	Feet from the	North/South line	Feet from the	East/West line	County
K	6	23-N	7-W		2377	SOUTH	2047	WEST	RIO ARRIBA
¹² Dedicated Acres Sec 6: Lots 6,7, E2SW, W2SE, SESE = 281.20 acres Sec 7: Lots 1,2, E2NW, NE = 321.52 acres Total acres 602.72				¹³ Joint or Infill		¹⁴ Consolidation Code		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.

Signature Walter Naez Date 5/31/2018

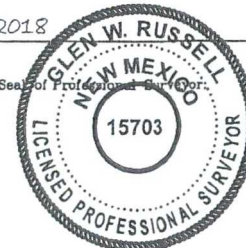
Marie E. Florez
Printed Name
mflorez@logosresourcesllc.com
E-mail Address

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.

MAY 15, 2018
Date of Survey

Signature and Seal of Professional Surveyor:



GLEN W. RUSSELL
Certificate Number 15703

**APD Drilling Plan
LOGOS Operating, LLC**

May 23, 2018

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

Surface Location: 1279 FSL, 298 FEL

Legal Description: Sec 7, T23N, R7W (36.237893° N, 107.607283° W – NAD83)

Bottom Hole Location: 2377 FSL, 2047 FWL

Legal Description: Sec 6, T23N, R7W (36.255510° N, 107.617306° W – NAD83)

Rio Arriba County, NM

1. The elevation of the unprepared ground is 7,265 feet above sea level.
2. The geological name of the surface formation is the Nacimiento.
3. A rotary rig will be used to drill the well to a Proposed Total Depth of 5,577' TVD/11,651' 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	1465	1512
Kirtland	1617	1693
Fruitland	1814	1937
Pictured Cliffs	2151	2353
Chacra	3002	3403
Cliff House	3653	4207
Menefee	3743	4316
Point Lookout	4520	5147
Mancos	4720	5348
Gallup	5417	6178

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	1814	Gas
Pictured Cliffs	2151	Gas
Cliffhouse	3653	Gas
Point Lookout	4520	Gas
Mancos	4720	Oil/Gas

6. All proposed casing is new and the program is as follows:

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"	0-7,037'	0-5,557'	J-55	23.00	LTC	4360	3270	313
Production	4-1/2"	6,887'-11,651'	5,557'-5,577'	P-110	11.60	LTC	10690	7560	279

7. Cementing Program:

- 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.
- a. 8-3/4" hole x 7" casing at 7,037'. Cement will be circulated to surface in a single stage with 538 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 484 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.
- a. 6-1/8" hole x 4-1/2" liner at 11,651' MD in a single stage using excess of approximately 30% for TOC at 6,887". Base slurry to consist of 429 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 6000' 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. Pressure Control Equipment

- a. BOPE to be installed prior to Surface Casing drillout.
- b. Pressure control equipment will be used to meet 2,000 (2M) psi specifications.
- c. BOPE working pressure of 3,000 psi.
- d. Function test and visual inspection to be done at each casing size change prior to drill out.
- e. BOP annular to be tested to 50% of working pressure.
- f. All BOP and related equipment will be tested in accordance with the requirements outlined in Onshore Order No. 2 and Notice to Operators dated May 27, 2005.
- g. BOP remote controls to be located on rig floor and readily accessible, master control on ground at accumulator will be able to function all preventors.
- h. Kill line will be 2 in min and have two kill line valves, one being a check valve.
- i. Choke line will be 2 in min and have two choke line valves, choke manifold with have two adjustable chokes, one manual and one remote. All choke lines will be as straight as possible. Any turns will be properly targeted using block and/or running tees. Choke line and manifold to be pressure tested to 1,500 psi.
- j. Float sub and TIW valve will be on the rig floor at all times.
- k. If high pressure co-flex hoses are used, they will be run as straight as possible and anchored to prevent whip.
- l. The main discharge line (panic line) will be at least 100' from the choke manifold and discharged into an appropriately sized discharge facility.

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' – 7,037'	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%
7,037' – 11,651'	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) Grinder/Particle Sizer Package
- (2) HS-2172 Variable Speed/High Volume Centrifuges w/ HCCS Stand & Feed Pumps
- (1) DWU 250 – Dewatering Unit/Command Center
- (1) High-Sided Drive-In Tank

10. Testing, Logging and Coring Program:

- a. Testing Program: No drillstem tests are anticipated
 - b. Electric Logging Program: TBD
 - c. LWD Program: TBD
 - d. Coring Program: None.
 - e. CBL's and/or Temperature Surveys Will Be Performed as Needed or Required.
11. Bottom Hole Pressure expected to be 2,500 +/- psi
12. Bottom Hole Temperature expected to be 160 deg F.



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

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
Magnetic North:

Magnetic
Strength: 49534
Dip Angle: 6
Date: 5/17/
Model: H

WELL DETAILS: Federal 2307-7P COM 1H

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

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

Created By: Janie Collins Date: 19:19, May 20 2018

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting
Fed 7P 1H LP	5557.00	2926.03	65.17	1908895.20	2789811.51
Fed 7P 1H BHL	5577.00	6413.17	-2955.10	1912375.29	2786783.11
Fed 7P 1H FPerf	5577.00	6352.37	-2902.63	1912314.61	2786835.73
Fed 7P 1H LPerf	5557.00	3039.24	-33.03	1909008.18	2789713.05

SECTION DETAILS

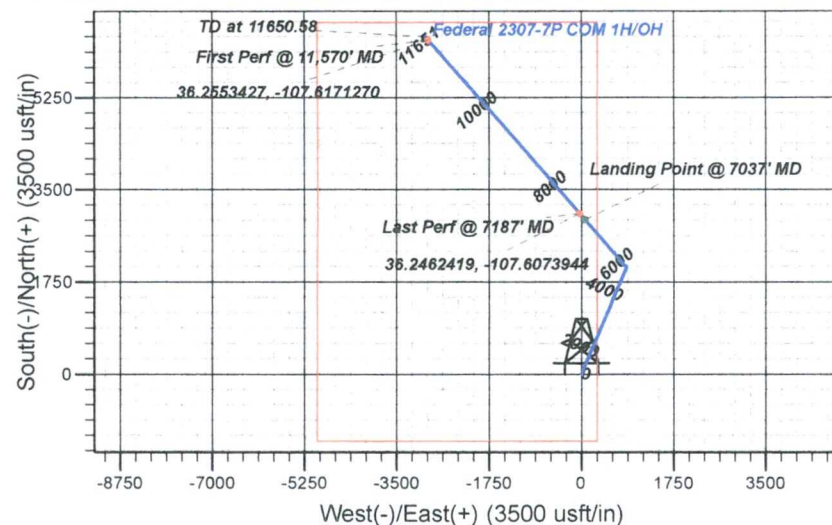
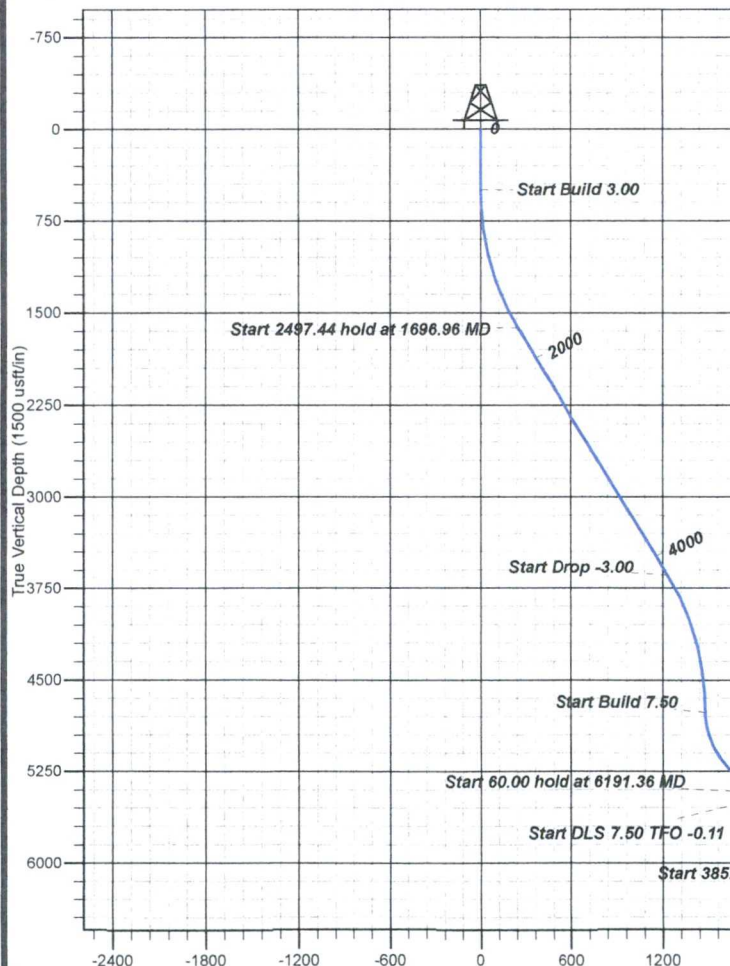
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSecl	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	
1696.96	35.91	22.90	1620.13	334.36	141.24	3.00	22.90	244.56	
4194.40	35.91	22.90	3642.93	1683.64	711.23	0.00	0.00	1231.47	
5391.36	0.00	0.00	4763.06	2018.00	852.48	3.00	180.00	1476.03	
6191.36	60.00	319.10	5424.65	2306.71	602.39	7.50	319.10	1842.91	
8251.36	60.00	319.10	5454.65	2345.99	568.37	0.00	0.00	1892.82	
8651.37	90.00	319.04	5557.00	2634.58	318.12	7.50	-0.11	2259.65	
7037.28	90.00	319.04	5557.00	2926.03	65.17	0.00	0.00	2630.20	Fed 7P 1H LP
7050.09	89.75	319.10	5557.03	2935.71	56.77	2.00	166.64	2642.51	
11650.58	89.75	319.10	5577.00	6413.17	-2955.10	0.00	0.00	7081.26	Fed 7P 1H BHL

CASING DETAILS

No casing data is available

FORMATION DETAILS

TVDPath	MDPath	Formation
1315.00	1342.01	Ojo Alamo
1488.00	1538.41	Kirtland
1646.00	1728.90	Fruitland
2838.00	3200.60	Chaco
3469.00	3979.66	Cliff House
3552.00	4082.13	Menefer
4326.00	4950.39	Point Lookout
4544.00	5171.82	Manco
5079.00	5717.08	Pictured Cliff
5267.00	5941.68	Gallup



Vertical Section at 225.00° (4000 usft/in)



Logos Operating LLC

Rio Arriba, NM NAD83

Federal 2307-7P

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

OH

Plan: Plan #1

Standard Planning Report

20 May, 2018



www.scientificdrilling.com

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

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
From:	Lat/Long	Easting:	2,789,753.17 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in
		Latitude:	36.2378930
		Longitude:	-107.6072830
		Grid Convergence:	0.13 °

Well	Federal 2307-7P COM 1H - Slot 7P 1H		
Well Position	+N/-S	0.00 usft	Northing: 1,905,969.03 usft
	+E/-W	0.00 usft	Easting: 2,789,753.17 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft
		Latitude:	36.2378930
		Longitude:	-107.6072830
		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 #1			
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	335.26

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	
1,696.96	35.91	22.90	1,620.13	334.36	141.24	3.00	3.00	0.00	22.90	
4,194.40	35.91	22.90	3,642.93	1,683.64	711.23	0.00	0.00	0.00	0.00	
5,391.36	0.00	0.00	4,763.06	2,018.00	852.48	3.00	-3.00	0.00	180.00	
6,191.36	60.00	319.10	5,424.65	2,306.71	602.39	7.50	7.50	0.00	319.10	
6,251.36	60.00	319.10	5,454.65	2,345.99	568.37	0.00	0.00	0.00	0.00	
6,651.37	90.00	319.04	5,557.00	2,634.58	318.12	7.50	7.50	-0.01	-0.11	
7,037.28	90.00	319.04	5,557.00	2,926.03	65.17	0.00	0.00	0.00	0.00	Fed 7P 1H LP
7,050.09	89.75	319.10	5,557.03	2,935.71	56.77	2.00	-1.95	0.46	166.64	
11,650.58	89.75	319.10	5,577.00	6,413.17	-2,955.10	0.00	0.00	0.00	0.00	Fed 7P 1H BHL

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

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 3.00									
600.00	3.00	22.90	599.95	2.41	1.02	1.76	3.00	3.00	0.00
700.00	6.00	22.90	699.63	9.64	4.07	7.05	3.00	3.00	0.00
800.00	9.00	22.90	798.77	21.66	9.15	15.84	3.00	3.00	0.00
900.00	12.00	22.90	897.08	38.45	16.24	28.12	3.00	3.00	0.00
1,000.00	15.00	22.90	994.31	59.95	25.32	43.85	3.00	3.00	0.00
1,100.00	18.00	22.90	1,090.18	86.11	36.37	62.98	3.00	3.00	0.00
1,200.00	21.00	22.90	1,184.43	116.85	49.36	85.47	3.00	3.00	0.00
1,300.00	24.00	22.90	1,276.81	152.10	64.25	111.25	3.00	3.00	0.00
1,342.01	25.26	22.90	1,315.00	168.23	71.07	123.05	3.00	3.00	0.00
Ojo Alamo									
1,400.00	27.00	22.90	1,367.06	191.75	81.00	140.26	3.00	3.00	0.00
1,500.00	30.00	22.90	1,454.93	235.70	99.57	172.40	3.00	3.00	0.00
1,538.41	31.15	22.90	1,488.00	253.70	107.17	185.57	3.00	3.00	0.00
Kirtland									
1,600.00	33.00	22.90	1,540.18	283.83	119.90	207.60	3.00	3.00	0.00
1,696.96	35.91	22.90	1,620.13	334.36	141.24	244.56	3.00	3.00	0.00
Start 2497.44 hold at 1696.96 MD									
1,700.00	35.91	22.90	1,622.59	336.00	141.94	245.76	0.00	0.00	0.00
1,728.90	35.91	22.90	1,646.00	351.61	148.54	257.18	0.00	0.00	0.00
Fruitland									
1,800.00	35.91	22.90	1,703.58	390.03	164.76	285.28	0.00	0.00	0.00
1,900.00	35.91	22.90	1,784.58	444.05	187.58	324.79	0.00	0.00	0.00
2,000.00	35.91	22.90	1,865.57	498.08	210.41	364.31	0.00	0.00	0.00
2,100.00	35.91	22.90	1,946.57	552.11	233.23	403.83	0.00	0.00	0.00
2,200.00	35.91	22.90	2,027.56	606.13	256.05	443.34	0.00	0.00	0.00
2,300.00	35.91	22.90	2,108.56	660.16	278.88	482.86	0.00	0.00	0.00
2,400.00	35.91	22.90	2,189.55	714.19	301.70	522.38	0.00	0.00	0.00
2,500.00	35.91	22.90	2,270.55	768.21	324.52	561.89	0.00	0.00	0.00
2,600.00	35.91	22.90	2,351.55	822.24	347.34	601.41	0.00	0.00	0.00
2,700.00	35.91	22.90	2,432.54	876.27	370.17	640.93	0.00	0.00	0.00
2,800.00	35.91	22.90	2,513.54	930.29	392.99	680.45	0.00	0.00	0.00
2,900.00	35.91	22.90	2,594.53	984.32	415.81	719.96	0.00	0.00	0.00
3,000.00	35.91	22.90	2,675.53	1,038.35	438.64	759.48	0.00	0.00	0.00
3,100.00	35.91	22.90	2,756.52	1,092.37	461.46	799.00	0.00	0.00	0.00
3,200.00	35.91	22.90	2,837.52	1,146.40	484.28	838.51	0.00	0.00	0.00
3,200.60	35.91	22.90	2,838.00	1,146.72	484.42	838.75	0.00	0.00	0.00
Chacra									
3,300.00	35.91	22.90	2,918.51	1,200.43	507.11	878.03	0.00	0.00	0.00
3,400.00	35.91	22.90	2,999.51	1,254.45	529.93	917.55	0.00	0.00	0.00
3,500.00	35.91	22.90	3,080.50	1,308.48	552.75	957.06	0.00	0.00	0.00
3,600.00	35.91	22.90	3,161.50	1,362.51	575.57	996.58	0.00	0.00	0.00
3,700.00	35.91	22.90	3,242.49	1,416.53	598.40	1,036.10	0.00	0.00	0.00
3,800.00	35.91	22.90	3,323.49	1,470.56	621.22	1,075.61	0.00	0.00	0.00
3,900.00	35.91	22.90	3,404.48	1,524.59	644.04	1,115.13	0.00	0.00	0.00

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

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)	
3,979.66	35.91	22.90	3,469.00	1,567.62	662.22	1,146.61	0.00	0.00	0.00	
Cliff House										
4,000.00	35.91	22.90	3,485.48	1,578.61	666.87	1,154.65	0.00	0.00	0.00	
4,082.13	35.91	22.90	3,552.00	1,622.99	685.61	1,187.10	0.00	0.00	0.00	
Menefee										
4,100.00	35.91	22.90	3,566.47	1,632.64	689.69	1,194.17	0.00	0.00	0.00	
4,194.40	35.91	22.90	3,642.93	1,683.64	711.23	1,231.47	0.00	0.00	0.00	
Start Drop -3.00										
4,200.00	35.74	22.90	3,647.47	1,686.66	712.51	1,233.68	3.00	-3.00	0.00	
4,300.00	32.74	22.90	3,730.13	1,738.49	734.40	1,271.58	3.00	-3.00	0.00	
4,400.00	29.74	22.90	3,815.62	1,786.26	754.58	1,306.53	3.00	-3.00	0.00	
4,500.00	26.74	22.90	3,903.71	1,829.84	772.99	1,338.40	3.00	-3.00	0.00	
4,600.00	23.74	22.90	3,994.15	1,869.12	789.59	1,367.13	3.00	-3.00	0.00	
4,700.00	20.74	22.90	4,086.70	1,903.98	804.31	1,392.63	3.00	-3.00	0.00	
4,800.00	17.74	22.90	4,181.10	1,934.33	817.14	1,414.83	3.00	-3.00	0.00	
4,900.00	14.74	22.90	4,277.10	1,960.09	828.02	1,433.67	3.00	-3.00	0.00	
4,950.39	13.23	22.90	4,326.00	1,971.31	832.76	1,441.88	3.00	-3.00	0.00	
Point Lookout										
5,000.00	11.74	22.90	4,374.43	1,981.19	836.93	1,449.11	3.00	-3.00	0.00	
5,100.00	8.74	22.90	4,472.83	1,997.57	843.85	1,461.08	3.00	-3.00	0.00	
5,171.82	6.59	22.90	4,544.00	2,006.39	847.57	1,467.54	3.00	-3.00	0.00	
Mancos										
5,200.00	5.74	22.90	4,572.02	2,009.18	848.75	1,469.57	3.00	-3.00	0.00	
5,300.00	2.74	22.90	4,671.73	2,015.99	851.63	1,474.56	3.00	-3.00	0.00	
5,391.36	0.00	0.00	4,763.06	2,018.00	852.48	1,476.03	3.00	-3.00	0.00	
Start Build 7.50										
5,400.00	0.65	319.10	4,771.70	2,018.04	852.45	1,476.08	7.50	7.50	0.00	
5,500.00	8.15	319.10	4,871.33	2,023.83	847.43	1,483.44	7.50	7.50	0.00	
5,600.00	15.65	319.10	4,969.11	2,039.40	833.94	1,503.22	7.50	7.50	0.00	
5,700.00	23.15	319.10	5,063.37	2,064.49	812.21	1,535.10	7.50	7.50	0.00	
5,717.08	24.43	319.10	5,079.00	2,069.69	807.70	1,541.72	7.50	7.50	0.00	
Pictured Cliffs										
5,800.00	30.65	319.10	5,152.49	2,098.66	782.61	1,578.52	7.50	7.50	0.00	
5,900.00	38.15	319.10	5,234.94	2,141.33	745.65	1,632.74	7.50	7.50	0.00	
5,941.68	41.27	319.10	5,267.00	2,161.45	728.22	1,658.32	7.50	7.50	0.00	
Gallup										
6,000.00	45.65	319.10	5,309.32	2,191.77	701.96	1,696.84	7.50	7.50	0.00	
6,100.00	53.15	319.10	5,374.36	2,249.12	652.28	1,769.71	7.50	7.50	0.00	
6,191.36	60.00	319.10	5,424.65	2,306.71	602.39	1,842.91	7.50	7.50	0.00	
Start 60.00 hold at 6191.36 MD										
6,200.00	60.00	319.10	5,428.97	2,312.37	597.49	1,850.09	0.00	0.00	0.00	
6,251.36	60.00	319.10	5,454.65	2,345.99	568.37	1,892.82	0.00	0.00	0.00	
Start DLS 7.50 TFO -0.11										
6,300.00	63.65	319.09	5,477.62	2,378.39	540.30	1,933.99	7.50	7.50	-0.02	
6,400.00	71.15	319.08	5,516.02	2,448.10	479.87	2,022.59	7.50	7.50	-0.01	
6,500.00	78.65	319.06	5,542.06	2,520.99	416.67	2,115.24	7.50	7.50	-0.01	
6,600.00	86.15	319.05	5,555.28	2,595.81	351.76	2,210.36	7.50	7.50	-0.01	
6,651.37	90.00	319.04	5,557.00	2,634.58	318.12	2,259.65	7.50	7.50	-0.01	
Start 385.91 hold at 6651.37 MD										
6,700.00	90.00	319.04	5,557.00	2,671.31	286.24	2,306.34	0.00	0.00	0.00	
6,800.00	90.00	319.04	5,557.00	2,746.83	220.69	2,402.36	0.00	0.00	0.00	

Database: Grand Junction District
Company: Logos Operating LLC

Project: Rio Arriba, NM NAD83

Site: Federal 2307-7P
Well: Federal 2307-7P COM 1H
Wellbore: OH
Design: Plan #1

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

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
6,900.00	90.00	319.04	5,557.00	2,822.35	155.15	2,498.39	0.00	0.00	0.00
7,000.00	90.00	319.04	5,557.00	2,897.87	89.60	2,594.41	0.00	0.00	0.00
7,037.28	90.00	319.04	5,557.00	2,926.03	65.17	2,630.20	0.00	0.00	0.00
Landing Point @ 7037' MD - Fed 7P 1H LP									
7,050.09	89.75	319.10	5,557.03	2,935.71	56.77	2,642.51	2.00	-1.95	0.46
Start 4600.49 hold at 7050.09 MD									
7,100.00	89.75	319.10	5,557.24	2,973.43	24.10	2,690.44	0.00	0.00	0.00
7,187.00	89.75	319.10	5,557.62	3,039.20	-32.86	2,774.01	0.00	0.00	0.00
Last Perf @ 7187' MD - 36.2462419, -107.6073944									
7,187.14	89.75	319.10	5,557.62	3,039.30	-32.95	2,774.14	0.00	0.00	0.00
Fed 7P 1H LPerf									
7,200.00	89.75	319.10	5,557.68	3,049.02	-41.37	2,786.49	0.00	0.00	0.00
7,300.00	89.75	319.10	5,558.11	3,124.61	-106.84	2,882.54	0.00	0.00	0.00
7,400.00	89.75	319.10	5,558.55	3,200.20	-172.31	2,978.59	0.00	0.00	0.00
7,500.00	89.75	319.10	5,558.98	3,275.79	-237.78	3,074.64	0.00	0.00	0.00
7,600.00	89.75	319.10	5,559.42	3,351.38	-303.24	3,170.69	0.00	0.00	0.00
7,700.00	89.75	319.10	5,559.85	3,426.97	-368.71	3,266.74	0.00	0.00	0.00
7,800.00	89.75	319.10	5,560.28	3,502.56	-434.18	3,362.79	0.00	0.00	0.00
7,900.00	89.75	319.10	5,560.72	3,578.14	-499.65	3,458.84	0.00	0.00	0.00
8,000.00	89.75	319.10	5,561.15	3,653.73	-565.12	3,554.89	0.00	0.00	0.00
8,100.00	89.75	319.10	5,561.59	3,729.32	-630.59	3,650.94	0.00	0.00	0.00
8,200.00	89.75	319.10	5,562.02	3,804.91	-696.06	3,746.99	0.00	0.00	0.00
8,300.00	89.75	319.10	5,562.45	3,880.50	-761.52	3,843.04	0.00	0.00	0.00
8,400.00	89.75	319.10	5,562.89	3,956.09	-826.99	3,939.09	0.00	0.00	0.00
8,500.00	89.75	319.10	5,563.32	4,031.68	-892.46	4,035.14	0.00	0.00	0.00
8,600.00	89.75	319.10	5,563.76	4,107.27	-957.93	4,131.19	0.00	0.00	0.00
8,700.00	89.75	319.10	5,564.19	4,182.86	-1,023.40	4,227.24	0.00	0.00	0.00
8,800.00	89.75	319.10	5,564.62	4,258.45	-1,088.87	4,323.29	0.00	0.00	0.00
8,900.00	89.75	319.10	5,565.06	4,334.03	-1,154.34	4,419.34	0.00	0.00	0.00
9,000.00	89.75	319.10	5,565.49	4,409.62	-1,219.80	4,515.39	0.00	0.00	0.00
9,100.00	89.75	319.10	5,565.93	4,485.21	-1,285.27	4,611.44	0.00	0.00	0.00
9,200.00	89.75	319.10	5,566.36	4,560.80	-1,350.74	4,707.49	0.00	0.00	0.00
9,300.00	89.75	319.10	5,566.80	4,636.39	-1,416.21	4,803.53	0.00	0.00	0.00
9,400.00	89.75	319.10	5,567.23	4,711.98	-1,481.68	4,899.58	0.00	0.00	0.00
9,500.00	89.75	319.10	5,567.66	4,787.57	-1,547.15	4,995.63	0.00	0.00	0.00
9,600.00	89.75	319.10	5,568.10	4,863.16	-1,612.61	5,091.68	0.00	0.00	0.00
9,700.00	89.75	319.10	5,568.53	4,938.75	-1,678.08	5,187.73	0.00	0.00	0.00
9,800.00	89.75	319.10	5,568.97	5,014.33	-1,743.55	5,283.78	0.00	0.00	0.00
9,900.00	89.75	319.10	5,569.40	5,089.92	-1,809.02	5,379.83	0.00	0.00	0.00
10,000.00	89.75	319.10	5,569.83	5,165.51	-1,874.49	5,475.88	0.00	0.00	0.00
10,100.00	89.75	319.10	5,570.27	5,241.10	-1,939.96	5,571.93	0.00	0.00	0.00
10,200.00	89.75	319.10	5,570.70	5,316.69	-2,005.43	5,667.98	0.00	0.00	0.00
10,300.00	89.75	319.10	5,571.14	5,392.28	-2,070.89	5,764.03	0.00	0.00	0.00
10,400.00	89.75	319.10	5,571.57	5,467.87	-2,136.36	5,860.08	0.00	0.00	0.00
10,500.00	89.75	319.10	5,572.01	5,543.46	-2,201.83	5,956.13	0.00	0.00	0.00
10,600.00	89.75	319.10	5,572.44	5,619.05	-2,267.30	6,052.18	0.00	0.00	0.00
10,700.00	89.75	319.10	5,572.87	5,694.64	-2,332.77	6,148.23	0.00	0.00	0.00
10,800.00	89.75	319.10	5,573.31	5,770.22	-2,398.24	6,244.28	0.00	0.00	0.00
10,900.00	89.75	319.10	5,573.74	5,845.81	-2,463.71	6,340.33	0.00	0.00	0.00
11,000.00	89.75	319.10	5,574.18	5,921.40	-2,529.17	6,436.38	0.00	0.00	0.00
11,100.00	89.75	319.10	5,574.61	5,996.99	-2,594.64	6,532.43	0.00	0.00	0.00
11,200.00	89.75	319.10	5,575.04	6,072.58	-2,660.11	6,628.48	0.00	0.00	0.00

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

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)	
11,300.00	89.75	319.10	5,575.48	6,148.17	-2,725.58	6,724.53	0.00	0.00	0.00	
11,400.00	89.75	319.10	5,575.91	6,223.76	-2,791.05	6,820.58	0.00	0.00	0.00	
11,500.00	89.75	319.10	5,576.35	6,299.35	-2,856.52	6,916.62	0.00	0.00	0.00	
11,570.00	89.75	319.10	5,576.65	6,352.26	-2,902.34	6,983.86	0.00	0.00	0.00	
First Perf @ 11,570' MD - 36.2553427, -107.6171270										
11,570.27	89.75	319.10	5,576.65	6,352.47	-2,902.52	6,984.12	0.00	0.00	0.00	
Fed 7P 1H FPerf										
11,600.00	89.75	319.10	5,576.78	6,374.94	-2,921.98	7,012.67	0.00	0.00	0.00	
11,650.58	89.75	319.10	5,577.00	6,413.17	-2,955.10	7,061.26	0.00	0.00	0.00	
TD at 11650.58 - Fed 7P 1H BHL										

Design Targets										
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude	
Fed 7P 1H LPerf	0.00	0.00	5,557.00	3,039.24	-33.03	1,909,008.18	2,789,713.05	36.2462420	-107.6073950	
- hit/miss target										
- Shape										
- plan misses target center by 0.63usft at 7187.14usft MD (5557.62 TVD, 3039.30 N, -32.95 E)										
- Point										
Fed 7P 1H LP	0.00	0.00	5,557.00	2,926.03	65.17	1,908,895.20	2,789,811.51	36.2459310	-107.6070620	
- plan hits target center										
- Point										
Fed 7P 1H FPerf	0.00	0.00	5,577.00	6,352.37	-2,902.63	1,912,314.62	2,786,835.73	36.2553430	-107.6171280	
- plan misses target center by 0.38usft at 11570.27usft MD (5576.65 TVD, 6352.46 N, -2902.52 E)										
- Point										
Fed 7P 1H BHL	0.00	0.00	5,577.00	6,413.17	-2,955.10	1,912,375.29	2,786,783.12	36.2555100	-107.6173060	
- plan hits target center										
- Point										

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
1,342.01	1,315.00	Ojo Alamo		0.00	0.00	
1,538.41	1,488.00	Kirtland		0.00	0.00	
1,728.90	1,646.00	Fruitland		0.00	0.00	
3,200.60	2,838.00	Chacra		0.00	0.00	
3,979.66	3,469.00	Cliff House		0.00	0.00	
4,082.13	3,552.00	Menefee		0.00	0.00	
4,950.39	4,326.00	Point Lookout		0.00	0.00	
5,171.82	4,544.00	Mancos		0.00	0.00	
5,717.08	5,079.00	Pictured Cliffs		0.00	0.00	
5,941.68	5,267.00	Gallup		0.00	0.00	

Database: Grand Junction District
Company: Logos Operating LLC

Project: Rio Arriba, NM NAD83

Site: Federal 2307-7P
Well: Federal 2307-7P COM 1H
Wellbore: OH
Design: Plan #1

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

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
500.00	500.00	0.00	0.00	Start Build 3.00
1,696.96	1,620.13	334.36	141.24	Start 2497.44 hold at 1696.96 MD
4,194.40	3,642.93	1,683.64	711.23	Start Drop -3.00
5,391.36	4,763.06	2,018.00	852.48	Start Build 7.50
6,191.36	5,424.65	2,306.71	602.39	Start 60.00 hold at 6191.36 MD
6,251.36	5,454.65	2,345.99	568.37	Start DLS 7.50 TFO -0.11
6,651.37	5,557.00	2,634.58	318.12	Start 385.91 hold at 6651.37 MD
7,037.28	5,557.00	2,926.03	65.17	Landing Point @ 7037' MD
7,050.09	5,557.03	2,935.71	56.77	Start 4600.49 hold at 7050.09 MD
7,187.00	5,557.62	3,039.20	-32.86	Last Perf @ 7187' MD
7,187.00	5,557.62	3,039.20	-32.86	36.2462419, -107.6073944
11,570.00	5,576.65	6,352.26	-2,902.34	First Perf @ 11,570' MD
11,570.00	5,576.65	6,352.26	-2,902.34	36.2553427, -107.6171270
11,650.58	5,577.00	6,413.17	-2,955.10	TD at 11650.58



Logos Operating LLC

Rio Arriba, NM NAD83

Federal 2307-7P

Federal 2307-7P COM 1H

OH

Plan #1

Anticollision Report

20 May, 2018



www.scientificdrilling.com



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

Reference	Plan #1
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria
Interpolation Method:	MD Interval 100.00usft
Depth Range:	Unlimited
Results Limited by:	Maximum center-center distance of 15,000.00 usft
Warning Levels Evaluated at:	2.00 Sigma
Error Model:	ISCWSA
Scan Method:	Closest Approach 3D
Error Surface:	Elliptical Conic
Casing Method:	Not applied

Survey Tool Program		Date	5/20/2018		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.00	11,650.58	Plan #1 (OH)	MWD+HDGM	OWSG MWD + HDGM	

Summary						
Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Federal 2307-7P						
Federal 2307-7P COM 2H - OH - Plan #1	500.00	500.00	29.56	26.42	9.423	CC
Federal 2307-7P COM 2H - OH - Plan #1	600.00	599.95	30.16	26.30	7.828	ES
Federal 2307-7P COM 2H - OH - Plan #1	11,650.58	11,945.40	1,257.70	942.85	3.995	SF
Federal 2307-7P COM 3H - OH - Plan #1	500.00	500.00	59.69	56.55	19.029	CC
Federal 2307-7P COM 3H - OH - Plan #1	600.00	599.95	60.24	56.39	15.638	ES
Federal 2307-7P COM 3H - OH - Plan #1	11,650.58	10,857.77	2,330.97	2,028.86	7.716	SF

Offset Design	Federal 2307-7P - Federal 2307-7P COM 2H - OH - Plan #1										Offset Site Error:	0.00 usft
Survey Program:	0-MWD+HDGM										Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum Separation		Separation Factor	Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	
0.00	0.00	0.00	0.00	0.00	0.00	-77.91	6.19	-28.90	29.56			
100.00	100.00	100.00	100.00	0.13	0.13	-77.91	6.19	-28.90	29.56	29.29	0.27	109.931
200.00	200.00	200.00	200.00	0.49	0.49	-77.91	6.19	-28.90	29.56	28.57	0.99	29.981
300.00	300.00	300.00	300.00	0.85	0.85	-77.91	6.19	-28.90	29.56	27.85	1.70	17.358
400.00	400.00	400.00	400.00	1.21	1.21	-77.91	6.19	-28.90	29.56	27.14	2.42	12.215
500.00	500.00	500.00	500.00	1.57	1.57	-77.91	6.19	-28.90	29.56	26.42	3.14	9.423 CC
600.00	599.95	599.95	599.95	1.93	1.93	-105.68	6.19	-28.90	30.16	26.30	3.85	7.828 ES
700.00	699.63	699.63	699.63	2.29	2.28	-118.74	6.19	-28.90	33.15	28.58	4.57	7.255
800.00	798.77	798.77	798.77	2.66	2.64	-134.67	6.19	-28.90	41.08	35.78	5.29	7.759
900.00	897.08	897.08	897.08	3.04	2.99	-147.88	6.19	-28.90	55.48	49.46	6.02	9.213
1,000.00	994.31	996.85	996.83	3.45	3.35	-157.06	7.41	-27.82	74.77	67.99	6.77	11.040
1,100.00	1,090.18	1,096.97	1,096.81	3.89	3.70	-163.40	11.26	-24.41	96.65	89.10	7.55	12.799
1,200.00	1,184.43	1,197.40	1,196.86	4.37	4.07	-168.10	17.74	-18.68	120.86	112.51	8.35	14.469
1,300.00	1,276.81	1,298.15	1,296.87	4.91	4.43	-171.79	26.87	-10.59	147.26	138.09	9.17	16.055
1,400.00	1,367.06	1,399.23	1,396.71	5.49	4.80	-174.81	38.68	-0.14	175.77	165.77	10.01	17.567
1,500.00	1,454.93	1,500.66	1,496.27	6.14	5.19	-177.36	53.17	12.68	206.34	195.49	10.85	19.009
1,600.00	1,540.18	1,602.46	1,595.45	6.84	5.60	-179.57	70.36	27.89	238.93	227.21	11.72	20.386
1,700.00	1,622.59	1,704.66	1,694.12	7.61	6.04	-178.48	90.26	45.50	273.51	260.90	12.61	21.689
1,800.00	1,703.58	1,808.30	1,793.16	8.42	6.50	-176.74	113.11	65.73	307.42	293.92	13.51	22.761
1,900.00	1,784.58	1,914.18	1,893.13	9.24	7.01	-175.09	139.22	88.84	338.31	323.88	14.44	23.434

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

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

Offset Design Federal 2307-7P - Federal 2307-7P COM 2H - OH - Plan #1													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance							
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
2,000.00	1,865.57	2,022.08	1,993.61	10.08	7.57	173.47	168.65	114.89	366.12	350.71	15.40	23.771		
2,100.00	1,946.57	2,124.77	2,087.97	10.93	8.14	171.94	198.98	141.73	391.23	374.89	16.35	23.935		
2,200.00	2,027.56	2,221.22	2,176.41	11.79	8.70	170.66	227.79	167.23	416.16	398.89	17.27	24.102		
2,300.00	2,108.56	2,317.66	2,264.85	12.66	9.27	169.52	256.60	192.73	441.26	423.04	18.22	24.225		
2,400.00	2,189.55	2,414.11	2,353.29	13.53	9.86	168.50	285.41	218.22	466.51	447.32	19.19	24.313		
2,500.00	2,270.55	2,510.55	2,441.73	14.41	10.45	167.59	314.22	243.72	491.88	471.70	20.18	24.373		
2,600.00	2,351.55	2,606.99	2,530.17	15.29	11.05	166.77	343.02	269.22	517.36	496.16	21.19	24.411		
2,700.00	2,432.54	2,703.44	2,618.61	16.18	11.67	166.02	371.83	294.72	542.93	520.70	22.22	24.431		
2,800.00	2,513.54	2,799.88	2,707.05	17.06	12.28	165.34	400.64	320.21	568.57	545.31	23.27	24.437		
2,900.00	2,594.53	2,896.33	2,795.49	17.95	12.90	164.72	429.45	345.71	594.29	569.97	24.32	24.432		
3,000.00	2,675.53	2,992.77	2,883.93	18.84	13.53	164.15	458.26	371.21	620.07	594.67	25.39	24.419		
3,100.00	2,756.52	3,089.21	2,972.36	19.74	14.16	163.63	487.06	396.70	645.90	619.42	26.47	24.400		
3,200.00	2,837.52	3,185.66	3,060.80	20.63	14.80	163.14	515.87	422.20	671.77	644.21	27.56	24.375		
3,300.00	2,918.51	3,282.10	3,149.24	21.53	15.43	162.69	544.68	447.70	697.69	669.03	28.66	24.347		
3,400.00	2,999.51	3,378.55	3,237.68	22.42	16.07	162.28	573.49	473.19	723.64	693.88	29.76	24.316		
3,500.00	3,080.50	3,474.99	3,326.12	23.32	16.71	161.89	602.30	498.69	749.63	718.76	30.87	24.283		
3,600.00	3,161.50	3,571.43	3,414.56	24.22	17.36	161.53	631.10	524.19	775.65	743.66	31.99	24.248		
3,700.00	3,242.49	3,667.88	3,503.00	25.12	18.00	161.19	659.91	549.68	801.69	768.58	33.11	24.213		
3,800.00	3,323.49	3,764.32	3,591.44	26.02	18.65	160.87	688.72	575.18	827.76	793.53	34.24	24.177		
3,900.00	3,404.48	3,848.15	3,668.49	26.92	19.21	160.63	713.43	597.05	854.33	819.09	35.24	24.241		
4,000.00	3,485.48	3,925.10	3,740.00	27.82	19.70	160.50	734.73	615.90	882.90	846.75	36.15	24.423		
4,100.00	3,566.47	4,000.00	3,810.30	28.72	20.16	160.46	754.07	633.02	913.53	876.54	37.00	24.693		
4,200.00	3,647.47	4,075.98	3,882.28	29.63	20.60	160.52	772.28	649.14	946.17	908.37	37.81	25.028		
4,300.00	3,730.13	4,150.49	3,953.46	30.50	21.01	160.91	788.74	663.71	978.21	939.65	38.56	25.371		
4,400.00	3,815.62	4,225.16	4,025.36	31.31	21.40	161.25	803.84	677.07	1,007.54	968.28	39.26	25.661		
4,500.00	3,903.71	4,300.00	4,097.92	32.06	21.77	161.55	817.57	689.22	1,034.14	994.21	39.92	25.902		
4,600.00	3,994.15	4,374.95	4,171.04	32.75	22.12	161.80	829.88	700.12	1,057.97	1,017.44	40.53	26.101		
4,700.00	4,086.70	4,450.04	4,244.70	33.38	22.44	162.02	840.78	709.76	1,079.03	1,037.94	41.09	26.258		
4,800.00	4,181.10	4,525.23	4,318.83	33.95	22.75	162.20	850.24	718.13	1,097.28	1,055.68	41.60	26.376		
4,900.00	4,277.10	4,600.00	4,392.83	34.45	23.04	162.35	858.20	725.18	1,112.72	1,070.67	42.05	26.460		
5,000.00	4,374.43	4,675.88	4,468.20	34.89	23.31	162.47	864.79	731.02	1,125.32	1,082.87	42.46	26.504		
5,100.00	4,472.83	4,751.31	4,543.32	35.26	23.55	162.56	869.87	735.51	1,135.08	1,092.28	42.80	26.519		
5,200.00	4,572.02	4,826.77	4,618.63	35.57	23.78	162.62	873.46	738.69	1,141.99	1,098.89	43.09	26.500		
5,300.00	4,671.73	4,900.00	4,691.80	35.82	23.99	162.66	875.52	740.51	1,146.04	1,102.74	43.30	26.468		
5,400.00	4,771.70	5,074.34	4,862.83	36.00	24.06	-115.72	1,168.46	747.93	1,138.84	1,093.56	45.29	25.146		
5,500.00	4,871.33	5,174.75	4,961.06	36.20	24.27	-115.28	1,235.69	747.27	1,085.35	1,038.81	46.54	23.323		
5,600.00	4,969.11	5,274.86	5,064.79	36.45	24.45	-108.20	1,388.07	747.87	1,033.57	983.57	49.99	20.674		
5,700.00	5,063.37	5,374.76	5,157.09	36.75	24.63	-105.24	1,475.01	747.13	985.92	932.46	53.46	18.442		
5,800.00	5,152.49	5,474.71	5,257.09	37.08	24.82	-105.61	1,510.55	746.46	946.25	890.77	55.48	17.055		
5,900.00	5,234.94	5,574.05	5,357.05	37.43	25.00	-104.95	1,551.45	745.71	916.38	858.95	57.43	15.956		
6,000.00	5,309.32	5,674.67	5,457.00	37.81	25.13	-103.33	1,599.81	744.90	895.80	836.40	59.40	15.080		
6,100.00	5,374.36	5,764.68	5,557.03	38.22	25.28	-101.73	1,642.29	743.94	884.01	823.13	60.88	14.520		
6,200.00	5,428.97	5,854.16	5,647.25	38.67	25.42	-99.31	1,696.45	742.06	880.18	817.37	62.82	14.012		
6,230.42	5,443.93	5,869.63	5,662.32	38.82	25.43	-98.46	1,715.16	740.77	880.01	816.48	63.53	13.852		
6,300.00	5,477.62	5,904.43	5,697.51	39.16	25.54	-96.48	1,758.16	739.76	880.65	815.51	65.14	13.520		
6,400.00	5,516.02	5,974.57	5,737.78	39.72	25.62	-93.88	1,823.32	738.90	884.56	816.80	67.76	13.055		
6,500.00	5,542.06	6,008.88	5,798.06	40.37	25.67	-91.81	1,891.43	737.00	890.55	819.78	70.77	12.584		
6,600.00	5,555.28	6,079.72	5,868.36	41.13	25.70	-90.47	1,961.33	735.88	897.41	823.22	74.19	12.096		
6,700.00	5,557.00	6,150.44	5,869.65	42.00	25.70	-90.10	2,031.85	734.38	904.45	826.49	77.96	11.602		
6,800.00	5,557.00	6,221.19	5,880.95	43.01	25.65	-90.12	2,102.40	732.90	911.49	829.60	81.89	11.131		
6,900.00	5,557.00	6,292.94	5,951.24	44.15	25.53	-90.14	2,172.94	731.43	918.53	832.59	85.94	10.688		

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

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

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

Offset Design Federal 2307-7P - Federal 2307-7P COM 2H - OH - Plan #1													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)						
7,000.00	5,557.00	7,306.69	5,559.54	45.43	50.45	-90.16	2,243.49	-564.95	925.57	835.47	90.10	10.273		
7,100.00	5,557.24	7,406.44	5,559.84	46.83	52.79	-90.18	2,314.03	-635.48	932.66	838.32	94.34	9.886		
7,200.00	5,557.68	7,506.19	5,560.13	48.35	55.15	-90.17	2,384.57	-706.00	939.81	841.14	98.67	9.525		
7,300.00	5,558.11	7,605.93	5,560.43	49.98	57.53	-90.16	2,455.11	-776.52	946.95	843.89	103.06	9.188		
7,400.00	5,558.55	7,705.67	5,560.72	51.71	59.93	-90.15	2,525.64	-847.04	954.09	846.57	107.52	8.874		
7,500.00	5,558.98	7,805.42	5,561.02	53.52	62.34	-90.14	2,596.18	-917.56	961.23	849.20	112.03	8.580		
7,600.00	5,559.42	7,905.16	5,561.31	55.40	64.76	-90.13	2,666.72	-988.08	968.38	851.79	116.59	8.306		
7,700.00	5,559.85	8,004.91	5,561.61	57.35	67.20	-90.12	2,737.26	-1,058.60	975.52	854.33	121.19	8.050		
7,800.00	5,560.28	8,104.65	5,561.91	59.35	69.65	-90.11	2,807.80	-1,129.12	982.66	856.84	125.83	7.810		
7,900.00	5,560.72	8,204.40	5,562.20	61.39	72.11	-90.10	2,878.34	-1,199.64	989.80	859.31	130.50	7.585		
8,000.00	5,561.15	8,304.14	5,562.50	63.48	74.57	-90.10	2,948.88	-1,270.16	996.95	861.75	135.20	7.374		
8,100.00	5,561.59	8,403.89	5,562.79	65.61	77.05	-90.09	3,019.42	-1,340.68	1,004.09	864.17	139.92	7.176		
8,200.00	5,562.02	8,503.63	5,563.09	67.76	79.53	-90.08	3,089.96	-1,411.20	1,011.23	866.56	144.67	6.990		
8,300.00	5,562.45	8,603.37	5,563.39	69.95	82.01	-90.07	3,160.50	-1,481.72	1,018.37	868.93	149.45	6.814		
8,400.00	5,562.89	8,703.12	5,563.68	72.16	84.51	-90.06	3,231.04	-1,552.24	1,025.52	871.28	154.24	6.649		
8,500.00	5,563.32	8,802.86	5,563.98	74.39	87.00	-90.05	3,301.58	-1,622.76	1,032.66	873.61	159.05	6.493		
8,600.00	5,563.76	8,902.61	5,564.27	76.64	89.51	-90.05	3,372.12	-1,693.28	1,039.80	875.93	163.87	6.345		
8,700.00	5,564.19	9,002.35	5,564.57	78.91	92.01	-90.04	3,442.65	-1,763.80	1,046.94	878.23	168.71	6.205		
8,800.00	5,564.62	9,102.10	5,564.86	81.19	94.53	-90.03	3,513.19	-1,834.32	1,054.09	880.52	173.57	6.073		
8,900.00	5,565.06	9,201.84	5,565.16	83.49	97.04	-90.02	3,583.73	-1,904.84	1,061.23	882.80	178.43	5.947		
9,000.00	5,565.49	9,301.59	5,565.46	85.80	99.56	-90.02	3,654.27	-1,975.36	1,068.37	885.06	183.31	5.828		
9,100.00	5,565.93	9,401.33	5,565.75	88.12	102.08	-90.01	3,724.81	-2,045.88	1,075.52	887.31	188.20	5.715		
9,200.00	5,566.36	9,501.08	5,566.05	90.46	104.60	-90.00	3,795.35	-2,116.40	1,082.66	889.56	193.10	5.607		
9,300.00	5,566.80	9,600.82	5,566.34	92.80	107.13	-89.99	3,865.89	-2,186.92	1,089.80	891.80	198.00	5.504		
9,400.00	5,567.23	9,700.56	5,566.64	95.15	109.66	-89.99	3,936.43	-2,257.44	1,096.94	894.02	202.92	5.406		
9,500.00	5,567.66	9,800.31	5,566.93	97.51	112.19	-89.98	4,006.97	-2,327.96	1,104.09	896.24	207.84	5.312		
9,600.00	5,568.10	9,900.05	5,567.23	99.88	114.73	-89.97	4,077.51	-2,398.48	1,111.23	898.46	212.77	5.223		
9,700.00	5,568.53	9,999.80	5,567.53	102.25	117.26	-89.97	4,148.05	-2,469.00	1,118.37	900.67	217.71	5.137		
9,800.00	5,568.97	10,099.54	5,567.82	104.63	119.80	-89.96	4,218.59	-2,539.52	1,125.51	902.87	222.65	5.055		
9,900.00	5,569.40	10,199.29	5,568.12	107.02	122.34	-89.95	4,289.13	-2,610.04	1,132.66	905.06	227.60	4.977		
10,000.00	5,569.83	10,299.03	5,568.41	109.41	124.89	-89.95	4,359.67	-2,680.56	1,139.80	907.25	232.55	4.901		
10,100.00	5,570.27	10,398.78	5,568.71	111.81	127.43	-89.94	4,430.20	-2,751.08	1,146.94	909.44	237.51	4.829		
10,200.00	5,570.70	10,498.52	5,569.00	114.21	129.97	-89.93	4,500.74	-2,821.60	1,154.09	911.62	242.47	4.760		
10,300.00	5,571.14	10,598.26	5,569.30	116.61	132.52	-89.93	4,571.28	-2,892.12	1,161.23	913.79	247.44	4.693		
10,400.00	5,571.57	10,698.01	5,569.60	119.02	135.07	-89.92	4,641.82	-2,962.64	1,168.37	915.96	252.41	4.629		
10,500.00	5,572.01	10,797.75	5,569.89	121.43	137.62	-89.91	4,712.36	-3,033.16	1,175.51	918.13	257.39	4.567		
10,600.00	5,572.44	10,897.50	5,570.19	123.85	140.17	-89.91	4,782.90	-3,103.68	1,182.66	920.29	262.36	4.508		
10,700.00	5,572.87	10,997.24	5,570.48	126.27	142.72	-89.90	4,853.44	-3,174.20	1,189.80	922.45	267.35	4.450		
10,800.00	5,573.31	11,096.99	5,570.78	128.69	145.27	-89.90	4,923.98	-3,244.72	1,196.94	924.61	272.33	4.395		
10,900.00	5,573.74	11,196.73	5,571.08	131.12	147.83	-89.89	4,994.52	-3,315.24	1,204.09	926.77	277.32	4.342		
11,000.00	5,574.18	11,296.48	5,571.37	133.55	150.38	-89.88	5,065.06	-3,385.76	1,211.23	928.92	282.31	4.290		
11,100.00	5,574.61	11,396.22	5,571.67	135.98	152.94	-89.88	5,135.60	-3,456.28	1,218.37	931.07	287.31	4.241		
11,200.00	5,575.04	11,495.96	5,571.96	138.41	155.49	-89.87	5,206.14	-3,526.80	1,225.52	933.21	292.30	4.193		
11,300.00	5,575.48	11,595.71	5,572.26	140.85	158.05	-89.87	5,276.68	-3,597.32	1,232.66	935.35	297.30	4.146		
11,400.00	5,575.91	11,695.45	5,572.55	143.29	160.61	-89.86	5,347.21	-3,667.84	1,239.80	937.50	302.31	4.101		
11,500.00	5,576.35	11,795.20	5,572.85	145.73	163.17	-89.86	5,417.75	-3,738.36	1,246.95	939.63	307.31	4.058		
11,600.00	5,576.78	11,894.94	5,573.15	148.17	165.73	-89.85	5,488.29	-3,808.88	1,254.09	941.77	312.32	4.015		
11,650.58	5,577.00	11,945.40	5,573.30	149.40	167.02	-89.85	5,523.97	-3,844.55	1,257.70	942.85	314.85	3.995 SF		

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

Offset Design Federal 2307-7P - Federal 2307-7P COM 3H - OH - Plan #1														Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM														Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)							
0.00	0.00	0.00	0.00	0.00	0.00	-78.03	12.38	-58.39	59.69						
100.00	100.00	100.00	100.00	0.13	0.13	-78.03	12.38	-58.39	59.69	59.42	0.27	222.005			
200.00	200.00	200.00	200.00	0.49	0.49	-78.03	12.38	-58.39	59.69	58.70	0.99	60.547			
300.00	300.00	300.00	300.00	0.85	0.85	-78.03	12.38	-58.39	59.69	57.98	1.70	35.054			
400.00	400.00	400.00	400.00	1.21	1.21	-78.03	12.38	-58.39	59.69	57.27	2.42	24.667			
500.00	500.00	500.00	500.00	1.57	1.57	-78.03	12.38	-58.39	59.69	56.55	3.14	19.029 CC			
600.00	599.95	599.95	599.95	1.93	1.93	-103.36	12.38	-58.39	60.24	56.39	3.85	15.638 ES			
700.00	699.63	699.63	699.63	2.29	2.28	-110.29	12.38	-58.39	62.52	57.95	4.57	13.686			
800.00	798.77	798.77	798.77	2.66	2.64	-120.42	12.38	-58.39	68.17	62.88	5.29	12.884			
900.00	897.08	894.68	894.64	3.04	2.98	-129.91	13.70	-60.33	80.50	74.48	6.03	13.359			
1,000.00	994.31	989.48	989.17	3.45	3.32	-136.18	17.68	-66.14	100.89	94.13	6.77	14.910			
1,100.00	1,090.18	1,082.64	1,081.61	3.89	3.66	-139.65	24.16	-75.62	128.27	120.77	7.51	17.082			
1,200.00	1,184.43	1,173.65	1,171.27	4.37	4.00	-141.25	32.94	-88.47	161.90	153.64	8.26	19.606			
1,300.00	1,276.81	1,262.06	1,257.56	4.91	4.35	-141.71	43.77	-104.30	201.29	192.27	9.02	22.312			
1,400.00	1,367.06	1,347.48	1,340.01	5.49	4.71	-141.46	56.37	-122.72	246.10	236.30	9.80	25.104			
1,500.00	1,454.93	1,429.60	1,418.26	6.14	5.09	-140.79	70.42	-143.28	296.04	285.44	10.60	27.918			
1,600.00	1,540.18	1,508.19	1,492.07	6.84	5.49	-139.82	85.64	-165.54	350.81	339.39	11.42	30.711			
1,700.00	1,622.59	1,583.06	1,561.30	7.61	5.91	-138.69	101.72	-189.06	410.12	397.85	12.28	33.410			
1,800.00	1,703.58	1,659.55	1,631.10	8.42	6.37	-138.79	119.39	-214.89	471.84	458.68	13.16	35.855			
1,900.00	1,784.58	1,738.17	1,702.77	9.24	6.88	-138.85	137.64	-241.58	533.64	519.53	14.10	37.835			
2,000.00	1,865.57	1,816.79	1,774.43	10.08	7.40	-138.89	155.89	-268.28	595.43	580.35	15.08	39.486			
2,100.00	1,946.57	1,895.42	1,846.09	10.93	7.93	-138.93	174.14	-294.97	657.23	641.15	16.08	40.871			
2,200.00	2,027.56	1,974.04	1,917.76	11.79	8.48	-138.96	192.39	-321.66	719.02	701.92	17.10	42.040			
2,300.00	2,108.56	2,052.66	1,989.42	12.66	9.04	-138.99	210.64	-348.35	780.82	762.67	18.14	43.038			
2,400.00	2,189.55	2,131.28	2,061.08	13.53	9.61	-139.01	228.89	-375.04	842.61	823.42	19.20	43.895			
2,500.00	2,270.55	2,209.90	2,132.75	14.41	10.18	-139.03	247.15	-401.74	904.41	884.15	20.26	44.636			
2,600.00	2,351.55	2,288.52	2,204.41	15.29	10.76	-139.04	265.40	-428.43	966.20	944.87	21.34	45.281			
2,700.00	2,432.54	2,367.14	2,276.07	16.18	11.34	-139.06	283.65	-455.12	1,028.00	1,005.58	22.42	45.845			
2,800.00	2,513.54	2,445.76	2,347.74	17.06	11.93	-139.07	301.90	-481.81	1,089.79	1,066.28	23.52	46.342			
2,900.00	2,594.53	2,524.38	2,419.40	17.95	12.52	-139.08	320.15	-508.51	1,151.59	1,126.98	24.62	46.783			
3,000.00	2,675.53	2,603.00	2,491.06	18.84	13.11	-139.09	338.40	-535.20	1,213.39	1,187.67	25.72	47.176			
3,100.00	2,756.52	2,681.63	2,562.73	19.74	13.71	-139.10	356.65	-561.89	1,275.18	1,248.35	26.83	47.527			
3,200.00	2,837.52	2,760.25	2,634.39	20.63	14.31	-139.11	374.90	-588.58	1,336.98	1,309.03	27.95	47.843			
3,300.00	2,918.51	2,838.87	2,706.06	21.53	14.91	-139.12	393.16	-615.28	1,398.77	1,369.71	29.06	48.128			
3,400.00	2,999.51	2,917.49	2,777.72	22.42	15.51	-139.13	411.41	-641.97	1,460.57	1,430.38	30.19	48.387			
3,500.00	3,080.50	2,996.11	2,849.38	23.32	16.12	-139.13	429.66	-668.66	1,522.37	1,491.06	31.31	48.622			
3,600.00	3,161.50	3,074.73	2,921.05	24.22	16.72	-139.14	447.91	-695.35	1,584.16	1,551.72	32.44	48.837			
3,700.00	3,242.49	3,153.35	2,992.71	25.12	17.33	-139.14	466.16	-722.05	1,645.96	1,612.39	33.57	49.034			
3,800.00	3,323.49	3,231.97	3,064.37	26.02	17.94	-139.15	484.41	-748.74	1,707.75	1,673.05	34.70	49.214			
3,900.00	3,404.48	3,310.59	3,136.04	26.92	18.55	-139.15	502.66	-775.43	1,769.55	1,733.71	35.83	49.381			
4,000.00	3,485.48	3,389.21	3,207.70	27.82	19.16	-139.16	520.92	-802.12	1,831.34	1,794.37	36.97	49.535			
4,100.00	3,566.47	3,467.84	3,279.36	28.72	19.77	-139.16	539.17	-828.82	1,893.14	1,855.03	38.11	49.677			
4,200.00	3,647.47	3,546.46	3,351.03	29.63	20.38	-139.25	557.42	-855.51	1,954.93	1,915.68	39.25	49.809			
4,300.00	3,730.13	3,626.40	3,423.90	30.50	21.00	-140.64	575.98	-882.65	2,014.96	1,974.57	40.39	49.887			
4,400.00	3,815.62	3,708.57	3,498.79	31.31	21.64	-141.76	595.05	-910.55	2,071.72	2,030.18	41.54	49.875			
4,500.00	3,903.71	3,792.72	3,575.50	32.06	22.30	-142.65	614.59	-939.12	2,125.06	2,082.38	42.69	49.783			
4,600.00	3,994.15	3,878.65	3,653.82	32.75	22.97	-143.34	634.53	-968.29	2,174.89	2,131.06	43.83	49.619			
4,700.00	4,086.70	3,966.10	3,733.53	33.38	23.66	-143.85	654.83	-997.98	2,221.12	2,176.15	44.97	49.393			
4,800.00	4,181.10	4,054.84	3,814.42	33.95	24.35	-144.19	675.44	-1,028.11	2,263.67	2,217.58	46.09	49.113			
4,900.00	4,277.10	4,144.63	3,896.27	34.45	25.05	-144.38	696.28	-1,058.59	2,302.51	2,255.32	47.19	48.788			
5,000.00	4,374.43	4,236.64	3,980.14	34.89	25.77	-144.42	717.64	-1,089.83	2,337.61	2,289.32	48.29	48.405			

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

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

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

Offset Design Federal 2307-7P - Federal 2307-7P COM 3H - OH - Plan #1														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			
5,100.00	4,472.83	4,427.21	4,157.57	35.26	27.10	-143.82	756.77	-1,147.06	2,367.00	2,316.44	50.56	46.820			
5,200.00	4,572.02	4,630.85	4,353.77	35.57	28.19	-143.36	787.33	-1,191.76	2,388.35	2,335.85	52.51	45.488			
5,300.00	4,671.73	4,844.09	4,564.17	35.82	29.00	-143.08	806.52	-1,219.82	2,401.10	2,347.05	54.05	44.425			
5,400.00	4,771.70	5,050.00	4,769.72	36.00	29.52	-79.19	812.40	-1,228.41	2,404.89	2,349.79	55.10	43.644			
5,500.00	4,871.33	5,112.92	4,832.54	36.20	29.69	-79.27	814.79	-1,230.44	2,404.33	2,348.91	55.42	43.380			
5,600.00	4,969.11	5,177.09	4,896.12	36.45	29.91	-79.49	821.28	-1,235.95	2,402.83	2,346.97	55.87	43.011			
5,700.00	5,063.37	5,250.00	4,967.21	36.75	30.23	-79.88	833.55	-1,246.38	2,400.47	2,343.98	56.49	42.493			
5,800.00	5,152.49	5,300.00	5,014.92	37.08	30.51	-80.31	844.92	-1,256.05	2,397.28	2,340.25	57.02	42.039			
5,900.00	5,234.94	5,371.51	5,081.23	37.43	30.99	-80.95	865.26	-1,273.35	2,393.39	2,335.48	57.91	41.329			
6,000.00	5,309.32	5,437.41	5,139.89	37.81	31.51	-81.68	888.11	-1,292.78	2,388.97	2,330.08	58.89	40.565			
6,100.00	5,374.36	5,500.00	5,193.01	38.22	32.08	-82.48	913.31	-1,314.19	2,384.18	2,324.16	60.02	39.726			
6,200.00	5,428.97	5,571.88	5,250.43	38.67	32.85	-83.40	946.21	-1,342.17	2,379.19	2,317.66	61.53	38.667			
6,300.00	5,477.62	5,642.33	5,302.54	39.16	33.69	-84.08	982.31	-1,372.86	2,374.84	2,311.58	63.26	37.544			
6,400.00	5,516.02	5,714.56	5,351.19	39.72	34.66	-84.97	1,022.95	-1,407.41	2,370.67	2,305.37	65.30	36.306			
6,500.00	5,542.06	5,788.47	5,395.54	40.37	35.76	-85.93	1,067.97	-1,445.68	2,366.66	2,299.00	67.67	34.975			
6,600.00	5,555.28	5,868.20	5,437.09	41.13	37.05	-86.99	1,119.80	-1,489.75	2,362.99	2,292.55	70.44	33.546			
6,700.00	5,557.00	5,941.16	5,472.75	42.00	38.29	-87.95	1,168.23	-1,531.02	2,359.83	2,286.57	73.26	32.210			
6,800.00	5,557.00	6,008.20	5,500.72	43.01	39.49	-88.63	1,214.28	-1,570.88	2,358.31	2,282.20	76.11	30.985			
6,850.23	5,557.00	6,043.85	5,513.40	43.57	40.17	-88.94	1,239.34	-1,592.83	2,358.13	2,280.64	77.50	30.429			
6,900.00	5,557.00	6,080.36	5,524.76	44.15	40.87	-89.22	1,265.35	-1,615.80	2,358.30	2,279.07	79.22	29.767			
7,000.00	5,557.00	6,156.84	5,543.14	45.43	42.40	-89.66	1,320.68	-1,665.25	2,359.50	2,276.94	82.56	28.579			
7,100.00	5,557.24	6,236.40	5,554.30	46.83	44.05	-89.94	1,378.97	-1,718.19	2,361.75	2,275.68	86.07	27.438			
7,200.00	5,557.68	6,320.10	5,557.31	48.35	45.82	-90.00	1,440.41	-1,774.88	2,364.89	2,275.13	89.76	26.348			
7,300.00	5,558.11	6,420.03	5,557.17	49.98	47.97	-89.99	1,513.66	-1,842.86	2,368.31	2,274.39	93.92	25.215			
7,400.00	5,558.55	6,519.97	5,557.02	51.71	50.15	-89.97	1,586.92	-1,910.84	2,371.74	2,273.57	98.17	24.159			
7,500.00	5,558.98	6,724.71	5,557.50	53.52	54.65	-89.96	1,740.72	-2,045.93	2,371.89	2,266.72	105.17	22.552			
7,600.00	5,559.42	6,824.70	5,557.98	55.40	56.86	-89.96	1,816.95	-2,110.65	2,370.90	2,261.37	109.53	21.646			
7,700.00	5,559.85	6,924.70	5,558.45	57.35	59.10	-89.96	1,893.17	-2,175.36	2,369.92	2,255.98	113.94	20.799			
7,800.00	5,560.28	7,024.69	5,558.92	59.35	61.35	-89.96	1,969.40	-2,240.08	2,368.93	2,250.53	118.40	20.009			
7,900.00	5,560.72	7,124.69	5,559.39	61.39	63.63	-89.97	2,045.63	-2,304.79	2,367.94	2,245.05	122.89	19.269			
8,000.00	5,561.15	7,224.68	5,559.86	63.48	65.91	-89.97	2,121.86	-2,369.51	2,366.95	2,239.53	127.42	18.576			
8,100.00	5,561.59	7,324.68	5,560.33	65.61	68.21	-89.97	2,198.08	-2,434.23	2,365.97	2,233.98	131.98	17.926			
8,200.00	5,562.02	7,424.67	5,560.81	67.76	70.53	-89.97	2,274.31	-2,498.94	2,364.98	2,228.40	136.58	17.316			
8,300.00	5,562.45	7,524.67	5,561.28	69.95	72.85	-89.97	2,350.54	-2,563.66	2,363.99	2,222.80	141.19	16.743			
8,400.00	5,562.89	7,624.66	5,561.75	72.16	75.19	-89.97	2,426.77	-2,628.37	2,363.00	2,217.17	145.84	16.203			
8,500.00	5,563.32	7,724.66	5,562.22	74.39	77.53	-89.97	2,503.00	-2,693.09	2,362.02	2,211.52	150.50	15.695			
8,600.00	5,563.76	7,824.65	5,562.69	76.64	79.88	-89.97	2,579.22	-2,757.80	2,361.03	2,205.85	155.18	15.215			
8,700.00	5,564.19	7,924.65	5,563.16	78.91	82.24	-89.97	2,655.45	-2,822.52	2,360.04	2,200.16	159.88	14.761			
8,800.00	5,564.62	8,024.64	5,563.64	81.19	84.61	-89.97	2,731.68	-2,887.23	2,359.06	2,194.46	164.60	14.332			
8,900.00	5,565.06	8,124.64	5,564.11	83.49	86.98	-89.97	2,807.91	-2,951.95	2,358.07	2,188.74	169.33	13.926			
9,000.00	5,565.49	8,224.63	5,564.58	85.80	89.36	-89.98	2,884.14	-3,016.67	2,357.08	2,183.00	174.08	13.541			
9,100.00	5,565.93	8,324.63	5,565.05	88.12	91.74	-89.98	2,960.36	-3,081.38	2,356.09	2,177.26	178.83	13.175			
9,200.00	5,566.36	8,424.62	5,565.52	90.46	94.13	-89.98	3,036.59	-3,146.10	2,355.11	2,171.50	183.60	12.827			
9,300.00	5,566.80	8,524.62	5,565.99	92.80	96.52	-89.98	3,112.82	-3,210.81	2,354.12	2,165.74	188.38	12.496			
9,400.00	5,567.23	8,624.61	5,566.47	95.15	98.92	-89.98	3,189.05	-3,275.53	2,353.13	2,159.96	193.17	12.181			
9,500.00	5,567.66	8,724.61	5,566.94	97.51	101.32	-89.98	3,265.27	-3,340.24	2,352.14	2,154.17	197.97	11.881			
9,600.00	5,568.10	8,824.60	5,567.41	99.88	103.73	-89.98	3,341.50	-3,404.96	2,351.16	2,148.38	202.78	11.595			
9,700.00	5,568.53	8,924.60	5,567.88	102.25	106.14	-89.98	3,417.73	-3,469.68	2,350.17	2,142.57	207.59	11.321			
9,800.00	5,568.97	9,024.59	5,568.35	104.63	108.55	-89.98	3,493.96	-3,534.39	2,349.18	2,136.76	212.42	11.059			
9,900.00	5,569.40	9,124.59	5,568.82	107.02	110.97	-89.98	3,570.19	-3,599.11	2,348.19	2,130.95	217.25	10.809			

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

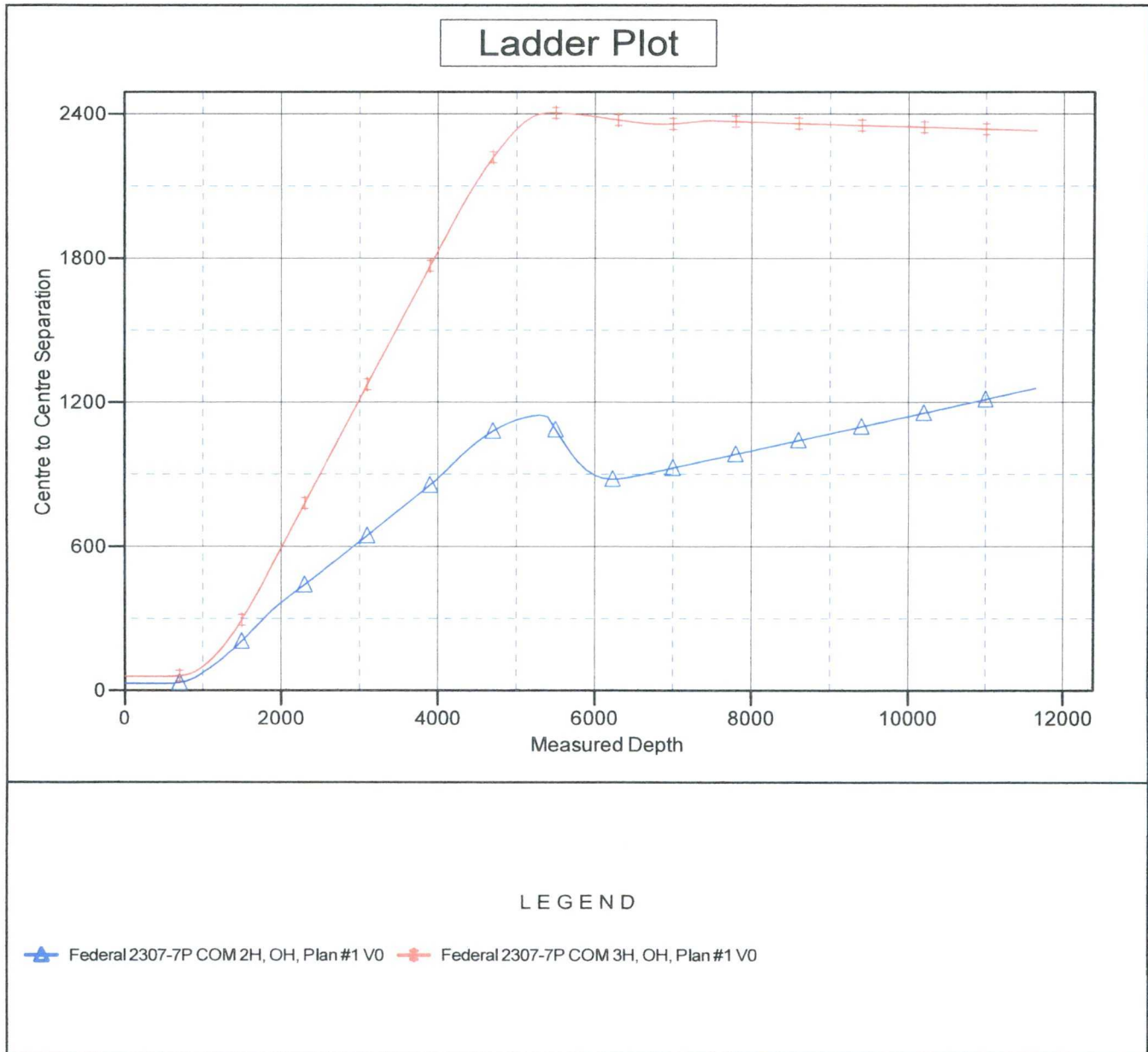
Offset Design Federal 2307-7P - Federal 2307-7P COM 3H - OH - Plan #1														Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM														Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation 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)					
10,000.00	5,569.83	9,224.58	5,569.30	109.41	113.39	-89.98	3,646.41	-3,663.82	2,347.21	2,125.12	222.08	10.569			
10,100.00	5,570.27	9,324.58	5,569.77	111.81	115.81	-89.99	3,722.64	-3,728.54	2,346.22	2,119.29	226.93	10.339			
10,200.00	5,570.70	9,424.57	5,570.24	114.21	118.23	-89.99	3,798.87	-3,793.25	2,345.23	2,113.46	231.77	10.119			
10,300.00	5,571.14	9,524.57	5,570.71	116.61	120.66	-89.99	3,875.10	-3,857.97	2,344.24	2,107.62	236.63	9.907			
10,400.00	5,571.57	9,624.56	5,571.18	119.02	123.08	-89.99	3,951.33	-3,922.69	2,343.26	2,101.77	241.49	9.703			
10,500.00	5,572.01	9,724.56	5,571.65	121.43	125.51	-89.99	4,027.55	-3,987.40	2,342.27	2,095.92	246.35	9.508			
10,600.00	5,572.44	9,824.55	5,572.13	123.85	127.95	-89.99	4,103.78	-4,052.12	2,341.28	2,090.07	251.22	9.320			
10,700.00	5,572.87	9,924.55	5,572.60	126.27	130.38	-89.99	4,180.01	-4,116.83	2,340.29	2,084.21	256.09	9.139			
10,800.00	5,573.31	10,024.54	5,573.07	128.69	132.82	-89.99	4,256.24	-4,181.55	2,339.31	2,078.34	260.96	8.964			
10,900.00	5,573.74	10,124.54	5,573.54	131.12	135.25	-89.99	4,332.46	-4,246.26	2,338.32	2,072.48	265.84	8.796			
11,000.00	5,574.18	10,224.53	5,574.01	133.55	137.69	-89.99	4,408.69	-4,310.98	2,337.33	2,066.61	270.73	8.634			
11,100.00	5,574.61	10,324.53	5,574.48	135.98	140.13	-89.99	4,484.92	-4,375.69	2,336.34	2,060.73	275.61	8.477			
11,200.00	5,575.04	10,424.52	5,574.96	138.41	142.57	-90.00	4,561.15	-4,440.41	2,335.36	2,054.86	280.50	8.326			
11,300.00	5,575.48	10,524.52	5,575.43	140.85	145.02	-90.00	4,637.38	-4,505.13	2,334.37	2,048.98	285.39	8.180			
11,400.00	5,575.91	10,624.51	5,575.90	143.29	147.46	-90.00	4,713.60	-4,569.84	2,333.38	2,043.09	290.29	8.038			
11,500.00	5,576.35	10,724.51	5,576.37	145.73	149.91	-90.00	4,789.83	-4,634.56	2,332.39	2,037.21	295.19	7.901			
11,600.00	5,576.78	10,824.50	5,576.84	148.17	152.35	-90.00	4,866.06	-4,699.27	2,331.41	2,031.32	300.09	7.769			
11,650.58	5,577.00	10,857.77	5,577.00	149.40	153.17	-90.00	4,891.42	-4,720.80	2,330.97	2,028.86	302.11	7.716 SF			

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

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

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

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



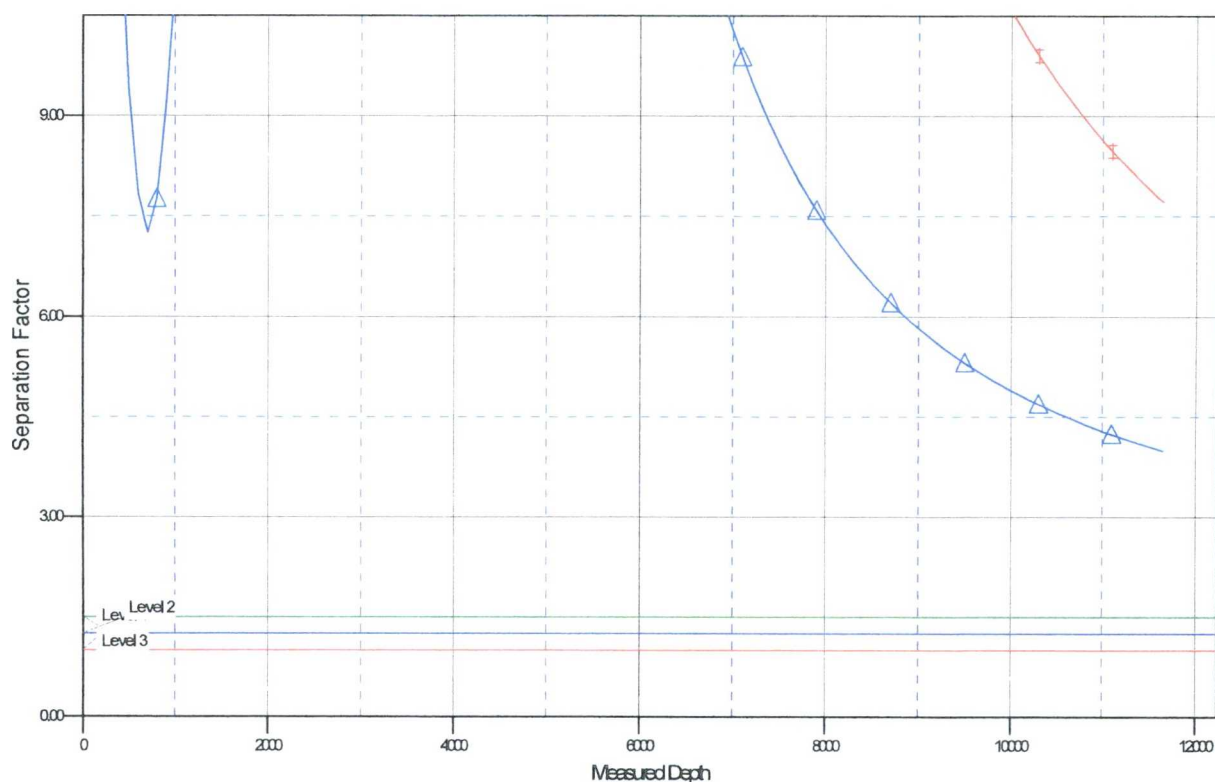
Company: Logos Operating LLC
Project: Rio Arriba, NM NAD83
Reference Site: Federal 2307-7P
Site Error: 0.00 usft
Reference Well: Federal 2307-7P COM 1H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan #1

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

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

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

Separation Factor Plot



LEGEND

▲ Federal 2307-7P COM 2H, OH, Plan #1 V0 ▲ Federal 2307-7P COM 3H, OH, Plan #1 V0

where the buffer would be reduced to 20-foot. The construction buffer would create an additional 1.8 acres of new surface disturbance. The total permitted area for the construction of the well pad would be 5.6 acres.

6. The well pad would be constructed from the earthen materials present on-site or imported from a predetermined borrow pit. Imported fill material would be weed-free and authorized. The additional fill would be brought in from off-site. No concrete or other foreign materials would be brought in for use in construction of the well pad.
7. Stormwater would be diverted to flow from the northern side of the well pad along the northern portion of the well pad and back into the natural drainage to the east.
8. Construction of the well pad would take approximately 7-10 days.

7. Methods for Handling Waste

Drilling operations will utilize a closed-loop system. Drilling of the horizontal lateral will be done using a water-based mud system. All water-based mud cuttings will be stored in metal containment bins until hauled to a commercial disposal facility. No reserve pit will be needed for this project. The drilling operations area will be enclosed by a containment berm and ditches, and the containment berm will be ramped to allow access to the solids control area. The contained operations area will drain gradually to one area of the pad which will be contoured for spill prevention and control.

LOGOS will follow New Mexico Oil Conservation Division Pit Rule and Onshore Orders No. 1 and No. 7 regarding placement, operation, and closure of the closed-loop system. No blow pit will be used. All refuse will be placed in metal trash basket and will be hauled off site and properly disposed in an approved landfill. Portable toilets will be provided and maintained during all construction, drilling and completion operations.

8. Ancillary Facilities

No additional ancillary facilities will be associated with the Federal 2307 7P Com #1H, #2H, and #3H project.

9. Well Site Layout

The cuts, fills, and orientation for the proposed Federal 2307 7P Com #1H, #2H, and #3H well pad are depicted on the construction plats included in the APD package.

10. Plans for Surface Reclamation

A surface reclamation plan has been created to cover the proposed disturbances associated with the Federal 2307 7P Com #1H, #2H, and #3H development (the well pad and access road constructed and maintained by LOGOS and the associated pipeline infrastructure constructed and maintained by Whiptail Midstream LLC.).

Well Control Equipment Schematic for 2M Service

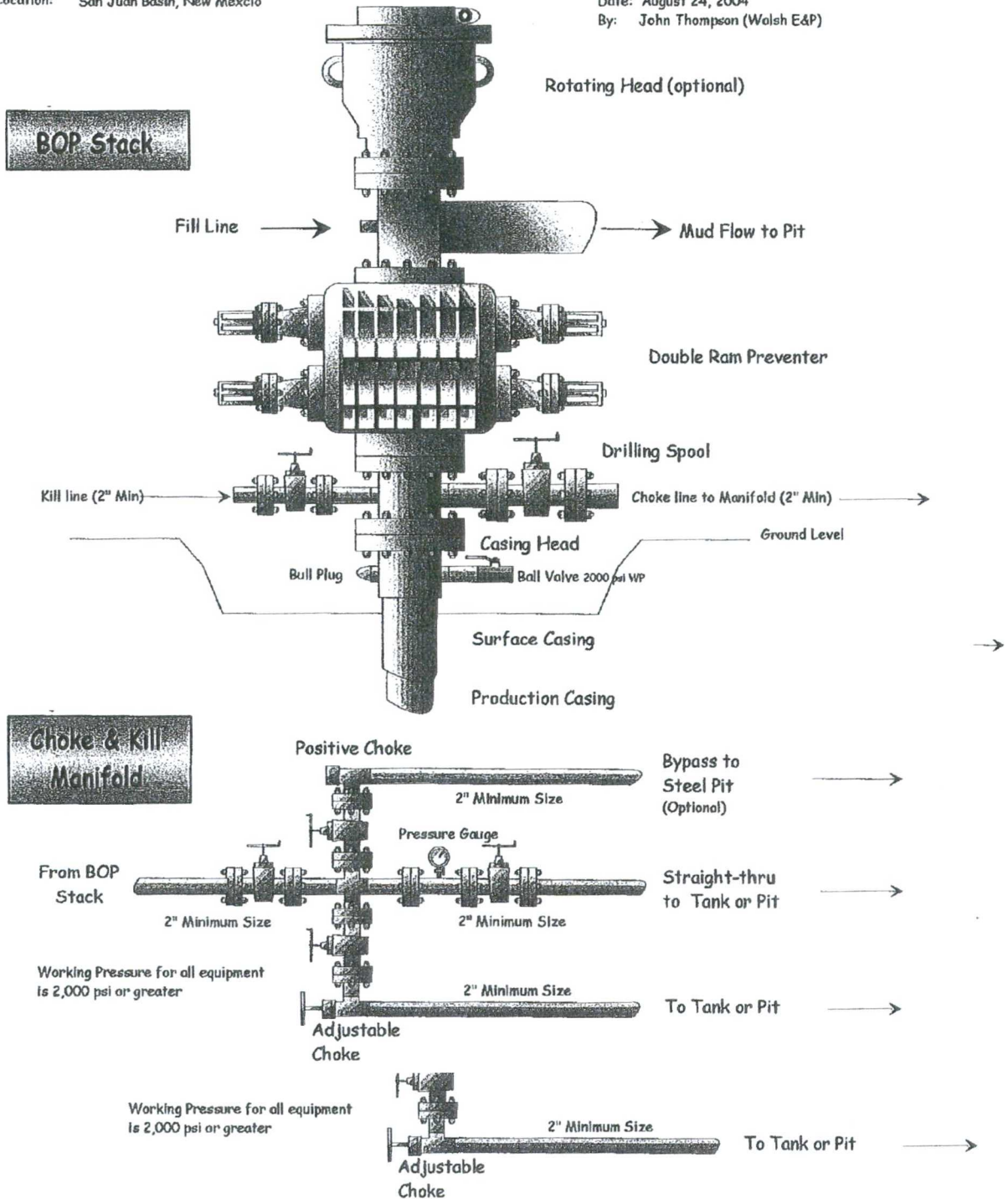
Attachment to Drilling Technical Program

Exhibit #1 Typical BOP setup

Location: San Juan Basin, New Mexico

Date: August 24, 2004

By: John Thompson (Walsh E&P)



**Directions from the Intersection of
Highway 550 and Highway 64 in Bloomfield, NM
to**

LOGOS OPERATING, LLC

FEDERAL 2307 7P COM #1H

1279' FSL 298' FEL,

Section 7, T23N, R7W, N.M.P.M.,

Rio Arriba County, New Mexico

Latitude: 36° 14' 16.416" N

Longitude: 107° 36' 26.217" W

Nad 1983

**From the Intersection of Highway 550 & Highway 64
Go South on Hwy 550 for 46.8 miles,
turn right (southerly) thru a locked gate for 0.1 miles,
stay right (westerly) over a cattle guard 0.2 miles,
then left (south- southwesterly) 0.2 miles,
stay right (west-northwesterly) 1.2 miles,
to the beginning of new access
on the right (north) side of the field road, which begins and
continues northerly for 210.88'
to the new location.**