State of New Mexico
Energy, Minerals and Natural Resources Department

Michelle Lujan Grisham
Governor

Sarah Cottrell Propst
Cabinet Secretary

Todd E. Leahy, JD, PhD
Deputy Secretary

Adrienne Sandoval, 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: 3/11/2019
Well information;
Operator LOGOS, Well Name and Number Federal 2407 28O 2H

API# 30-039-31381, Section 28, Township 24 (N)/S, Range 7 E/(W)

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

- [x] Notify Aztec OCD 24hrs prior to casing & cement.
- [x] Hold C-104 for directional survey & "As Drilled" Plat - 5.9 Compliance
- [x] 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
- [x] Regarding Hydraulic Fracturing, review EPA Underground Injection Control Guidance 84
- [x] 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.
- [x] 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.

✓ If cement doesn't circulate on any string notify regulatory agencies before proceeding

NMOCD Approved by Signature

12/12/19
Date

Form 3160-3
(June 2015)

NMOCD
NOV 12 2019
DISTRICT III

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

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

5. Lease Serial No.
NMSF0078924

6. If Indian, Allotee or Tribe Name

1a. Type of work: ☑ DRILL ☐ REENTER

1b. Type of Well: ☑ Oil Well ☐ Gas Well ☐ Other

1c. Type of Completion: ☐ Hydraulic Fracturing ☑ Single Zone ☐ Multiple Zone

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

8. Lease Name and Well No.
FEDERAL 2407 28O
2H

2. Name of Operator
LOGOS OPERATING LLC

9. API Well No.
30-039-31381

3a. Address	3b. Phone No. *(include area code)*	10. Field and Pool, or Exploratory
2010 Afton Place FARMINGTON NM 87401	(505)324-4145	ESCRITO / GALLUP

4. Location of Well *(Report location clearly and in accordance with any State requirements.*)*
At surface SWSE / 904 FSL / 2485 FEL / LAT 36.279807 / LONG -107.580039
At proposed prod. zone SWSE / 21 FSL / 1637 FEL / LAT 36.262616 / LONG -107.577044

11. Sec., T. R. M. or Blk. and Survey or Area
SEC 28 / T24N / R7W / NMP

14. Distance in miles and direction from nearest town or post office*	12. County or Parish	13. State
46.9 miles	RIO ARRIBA	NM

15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any)	16. No of acres in lease	17. Spacing Unit dedicated to this well
21 feet	1520	200

18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft.	19. Proposed Depth	20. BLM/BIA Bond No. in file
30 feet	6020 feet / 13169 feet	FED: NMB001387

21. Elevations (Show whether DF, KDB, RT, GL, etc.)	22. Approximate date work will start*	23. Estimated duration
7346 feet	04/01/2019	45 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.
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 requested by the BLM.

25. Signature	Name *(Printed/Typed)*	Date
(Electronic Submission)	Marie Florez / Ph: (505)324-4145	03/11/2019

Title
Regulatory Specialist

Approved by *(Signature)*	Name *(Printed/Typed)*	Date
(Electronic Submission)	Richard Fields / Ph: (505)564-7612	11/07/2019

Title	Office
Field Manager	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.

APPROVED

nmocd

(Continued on page 2)

*(Instructions on page 2)

Approval Date: 11/07/2019

NMOCD

NOV 1 2 2019

DISTRICT III

DISTRICT I
1625 N. French Dr., Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720

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

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

DISTRICT IV
1220 S St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3460 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	[2] Pool Code	[3] Pool Name
30-039-31381	22619	ESCRITO GALLUP

[4] Property Code	[5] Property Name	[6] Well Number
326487	FEDERAL 2407 280 ~~COM~~	2H

[7] OGRID No.	[8] Operator Name	[9] Elevation
289408	LOGOS OPERATING, LLC	7346

[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
O	28	24-N	7-W		904	SOUTH	2485	EAST	RIO ARRIBA

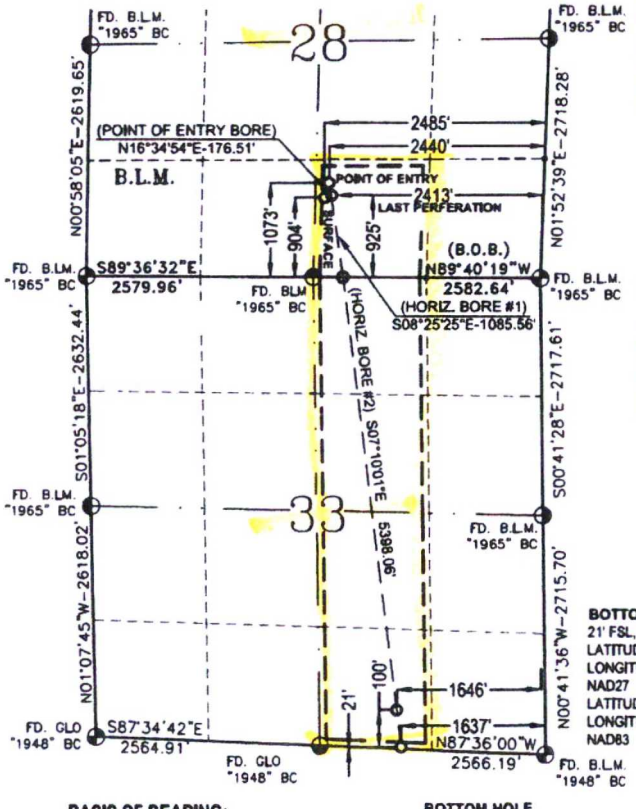
[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
O	33	24-N	7-W		21	SOUTH	1637	EAST	RIO ARRIBA

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
EG= W2/E2 SEC 33. SW/SE SEC 28 TOTAL 200 ACRES			

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

16



SURFACE
904' FSL, 2485' FEL SEC. 28
LATITUDE: 36°16.7877' N
LONGITUDE: 107°34.7659' W
NAD27
LATITUDE: 36.279807° N
LONGITUDE: 107.580039° W
NAD83

LAST PERFERATION
925' FSL, 2413' FEL SEC. 28
LATITUDE: 36°16.7911' N
LONGITUDE: 107°34.7512' W
NAD27
LATITUDE: 36.279864° N
LONGITUDE: 107.579794° W
NAD83

POINT OF ENTRY
1073' FSL, 2440' FEL SEC. 28
LATITUDE: 36°16.8155' N
LONGITUDE: 107°34.7556' W
NAD27
LATITUDE: 36.280272° N
LONGITUDE: 107.579868° W
NAD83

FIRST PERFERATION
100' FSL, 1646' FEL SEC. 33
LATITUDE: 36°16.7693' N
LONGITUDE: 107°34.5883' W
NAD27
LATITUDE: 36.262834° N
LONGITUDE: 107.577079° W
NAD83

BOTTOM HOLE
21' FSL, 1637' FWL SEC. 33
LATITUDE: 36°15.7562' N
LONGITUDE: 107°34.5862' W
NAD27
LATITUDE: 36.262616° N
LONGITUDE: 107.577044° W
NAD83

BASIS OF BEARING:
BETWEEN FOUND MONUMENTS AT THE NORTHEAST CORNER AND THE NORTH QUARTER CORNER OF SECTION 33, TOWNSHIP 24 NORTH, RANGE 7 WEST, N.M.P.M. RIO ARRIBA COUNTY, NEW MEXICO.

LINE BEARS: N 89°40'19" W A DISTANCE OF 2582.64 FEET AS MEASURED BY G.P.S. LOCAL GRID NAD83.

BOTTOM HOLE

[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 Date

Printed Name

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.

FEBRUARY 14, 2019
Date of Survey

Signature and Seal of Professional Surveyor:

GLEN W. RUSSELL NEW MEXICO 15703 LICENSED PROFESSIONAL SURVEYOR

GLEN W. RUSSELL
Certificate Number 15703

LOGOS Operating, LLC
Operations Plan

Note: This procedure will be adjusted onsite based upon actual conditions

Date:	January 11, 2019	Pool:	Escrito Gallup
Well Name:	**Federal 2407 28O Com 2H**	Elevation:	7,346'
Surface Location:	Sec 28, T24N, R7W 904 FSL, 2485 FEL (36.279807° N, 107.580039° W – NAD83)	Measured Depth:	13,169'
Bottom Hole Location:	Sec 33, T24N, R7W 21 FSL, 1637 FEL (36.262616° N, 107.577044° W – NAD83)	County:	Rio Arriba

Lease Serial #NMSF-0078924, NMNM-0557391, NMNM-117567

I. GEOLOGY

A. Formation Tops (KB): Estimated top of important geological markers:
SURFACE FORMATION - NACIMIENTO

NAME	MD	TVD	NAME	MD	TVD
OJO ALAMO	1860	1860	MENEFEE	4133	4110
KIRTLAND	2000	2000	*POINT LOOKOUT	4795	4765
*FRUITLAND	2380	2377	*MANCOS	5121	5088
*PICTURED CLIFFS	2530	2525	GALLUP	6084	6040
LEWIS	2654	2648	KICKOFF POINT	5,349	5,233
CHACRA	3010	3000	LANDING POINT	6,686	6,145
*CLIFF HOUSE	4085	4063	TD	13,169	6,020

* indicates depth at which anticipated water, oil, gas or other mineral bearing formations are expected to be encountered.

B. **MUD LOGGING PROGRAM;** Mudlogger on location from KOP to TD.

C. **LOGGING PROGRAM;** LWD GR from surface casing to TD.

D. **NATURAL GAUGES:** Gauge any noticeable increases in gas flow. Record all gauges in Tour book and on morning reports.

II. DRILLING

A. **MUD PROGRAM:** LSND mud (WBM) will be used to drill the 12-1/4" Surface hole, the 8 ¾" Directional Vertical hole, and the curve portion of the wellbore. A LSND (WBM) or (OBM) will be used to drill the lateral portion of well. Treat for lost circulation as necessary. Obtain 100% returns prior to cementing. Notify Engineering of any mud losses.

B. **BOP TESTING:** While drill pipe is in use, the pipe rams and the blind rams will be function tested once each trip. The BOPE will be tested to **250 psi (Low) for 5 minutes** and **1500 psi (High) for 10 minutes.** Pressure test surface casing to **600 psi for 30 minutes** and intermediate casing to **1500 psi for 30 minutes.** Utilize a BOPE Testing Unit with a recording chart and appropriate test plug for testing. The drum brakes will be inspected and tested each tour. **All tests and inspections will be recorded and logged with time and**

results.

III. MATERIALS

A. CASING EQUIPMENT:

CASING TYPE	OH SIZE (IN)	DEPTH (MD)	CSG SIZE	WEIGHT	GRADE	CONN
SURFACE	12.25"	320'	9.625"	36 LBS	J-55 or equiv	STC
INTERMEDIATE	8.75"	6,686'	7"	23 LBS	J-55 or equiv	LTC
PRODUCTION	6.125"	6,536' – 13,169'	4.5"	11.6 LBS	P-110 or equiv	LTC
TIE BACK	6.125"	Surf. – 6,536'	4.5"	11.6 LBS	P-110 or equiv	LTC

B. FLOAT EQUIPMENT:

1. SURFACE CASING: 9-5/8" notched regular pattern guide shoe. Run (1) standard centralizer on each of the bottom (4) joints of Surface Casing.
2. INTERMEDIATE CASING: 7" cement nose guide shoe with a self-fill insert float. Place float collar one joint above the shoe. Install (1) centralizer on each of the bottom (3) joints and one standard centralizer every (3) joints to 2,500 ft. Run (1) centralizer at 2,500 ft., 2,300ft., 2,000ft., 1,500 ft., and 1,000 ft.
3. PRODUCTION LINER: Run 4-1/2" Liner with cement nose guide Float Shoe+ 2jts. of 4-1/2" casing+ Landing Collar+ 4-1/2" pup joint+ 1 RSI (Sliding Sleeve) positioned inside the **100** ft Hard line. Centralizer program will be determined by wellbore condition. Set seals on Liner Hanger. Liner to be pressure tested during completion operations.

C. CEMENTING:

(Note: Volumes may be adjusted onsite due to actual conditions)

1. SURFACE: 5 bbl Fresh Water Spacer, 100 sx (161 cu.ft.) of 14.5 ppg Type 1-11 (Neat G) + 20% Fly Ash cement w/ 7.41 gal/sack mix water ratio @ 1.61 cu ft/sx yield. Calculated @volume+ 50% excess. WOC 12 hours. Test csg to 600 psi. Total Volume: (160cu-ft/100 sx/ Bbls). TOC at Surface.

2. INTERMEDIATE: Stage 1: Spacer #1: 20 bbl (112 cuft) Chemwash. Lead Cement: 225 bbls, 648 sks (1263 cu.ft.), 12.3 ppg@ 1.95 cuft/sk yield. Tail Cement: 59 bbls, 255 sks, (331 cuft), 13.5 ppg@ 1.3 cu'ft/sk yield. Displacement: Displace w/ +/- 262 bbl Drilling mud or water. Total Cement: 284 bbls, 902 sks, (1594 cuft)

3. PRODUCTION LINER: Spacer #1:10 bbl (56.cu-ft) Water Spacer. Spacer #2: 40 bbl 9.5 ppg (224.6 cu-ft) Tuned Spacer Ill. Spacer #3: 10 bbl Water Spacer. Lead Cement: Extencem TM System. Yield 1.36 cuft/sk 13.3 ppg (599 sx / 814 cuft /145 bbls). Tail Spacer: 40 BBL of MMCR. Displacement: Displace w/ +/- 173 bbl.

IV. COMPLETION

A. CBL

CBLs and/or Temperature Surveys Will Be Performed as Needed or Required

B. PRESSURE TEST

Pressure test 4-1/2" casing to 4000 psi max, hold at 1500 psi for 30 minutes. Increase pressure to Open RSI sleeves.

C. STIMULATION

Stimulate with sand, water and N2. Isolate stages with flow through frac plugs. Drill out frac plugs and flowback lateral.

D. PRODUCTION TUBING

Run 2-7/8", 6.5#, J-55, EUE tubing

Liner Casing Design - Evacuation/Max Mud Wt (collaspe), Max Frac Pres (burst) & 100k overpull (tension)

Federal 2407 28O Com 2H

Liner	Size	Weight	Grade	Conn	Collapse	Burst	Tension	Notes
Interval 1	4.5	11.6	P-110	LTC	7,560	10,690	278,000	TD 13169', TVD 6145'
					1.125	1.000	1.200	

Collapse	Casing Depth (TVD)	MW in	MW out	Pres in	Pres out	SF		
	6145	0.00	9.00	0	2876	2.63		
Burst	**6145**	9.00	0.00	2876	0	1.14	6500	6500 psi frac pressure + no backup
				9376				Burst pressure = Hyd + frac pressure
Tension		**Mud Wt**	**Air Wt**	**Bouy Wt**	**BW +100k**			100k over pull
	6145	8.80	71,282	61,705	161,705	1.72		
		BF						BF= 1- (MW)/65.5
		0.8656						

Surface Casing Design - Evacuated/Max SICP (collaspe & burst), 100k overpull (tension)

Federal 2407 28O Com 2H

	Size	Weight	Grade	Conn	Collapse	Burst	Tension	Notes
Surface	9.625	36	J55	STC	2,020	3,520	394,000	0' - 320'
					1.125	1.000	1.200	

341 psi (Maximum Estimated SIP)

36 ppf K55 STC

Collapse	**Casing Depth**	**MW in**	**MW out**	**Pres in**	**Pres out**	**SF**
	320	0	9	0	146	13.79
Burst	**320**	9	0	146	0	24.04

		Mud Wt	**Air Wt**	**Bouy Wt**	**BW +100k**	**SF**	100k over pull
Tension	**320**	9	11,520	9,937	109,937	3.58	
		BF					BF= 1- (MW)/65.5
		0.8626					

Intermediate Casing Design - Evacuated/Max Mud Wt (collaspe & burst), 100k overpull (tension)

Federal 2407 28O Com 2H

Intermediate	Top Interval	Btm Interval	Size	Weight	Grade	Conn	Collapse	Burst	Tension	Notes
Interval 1	**0**	**6686**	7	23	J55	LTC	3,270	4,360	313,000	0'-6686'
							1.125	1.000	1.200	

Collapse

			Depth TVD	MW in	MW out	Pres in	Pres out	SF - 1.125
Interval 1	**0**	**6686**	**6145**	0	9	0	2876	1.14
23	J55							

Burst

			Depth TVD	MW in	MW out	Pres in	Pres out	SF - 1.0	Frac Pres
Interval 1	**0**	**6686**	**6145**	9	0	2876	0	1.52	0
23	J55					**2876**			

Tension

			Depth TVD	Mud Wt	Air Wt	Bouy Wt	BW +100k	SF - 1.2
Interval 1	**0**	**6686**	**6145**	9	141,335	121,915	221,915	1.41
23	J55			**BF**				
				0.8626				

BF= 1- (MW)/65.5

LOGOS RESOURCES II, LLC

Company: Logos Operating LLC
Project: Rio Arriba, NM NAD83
Site: Federal 2407-28O
Well: Federal 2407-28O Com 2H
Wellbore: OH
Design: Plan #2

PROJECT DETAILS: Rio Arriba, NM NAD83

Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: New Mexico Western Zone
System Datum: Mean Sea Level
Local North: True

Scientific Drilling

Azimuths to True North
Magnetic North: 8.75°

Magnetic Field
Strength: 49493.5snT
Dip Angle: 62.87°
Date: 12/18/2018
Model: HDGM

WELL DETAILS: Federal 2407-28O Com 2H

GL 7346' & RKB 14' @ 7360.00usft

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.00	0.00	1921246.62	2797747.45	36.2798070	-107.5800390

Plan: Plan #2 (Federal 2407-28O Com 2H/OH)

Created By: Janie Collins Date: 17:37, January 03 2019

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Fed 28O 2H LP	6145.00	169.27	50.40	1921416.02	2797797.41	36.2802720	-107.5798680
Fed 28O 2H BHL	6020.00	-6257.97	882.94	1914990.98	2798646.76	36.2626160	-107.5770440

SECTION DETAILS

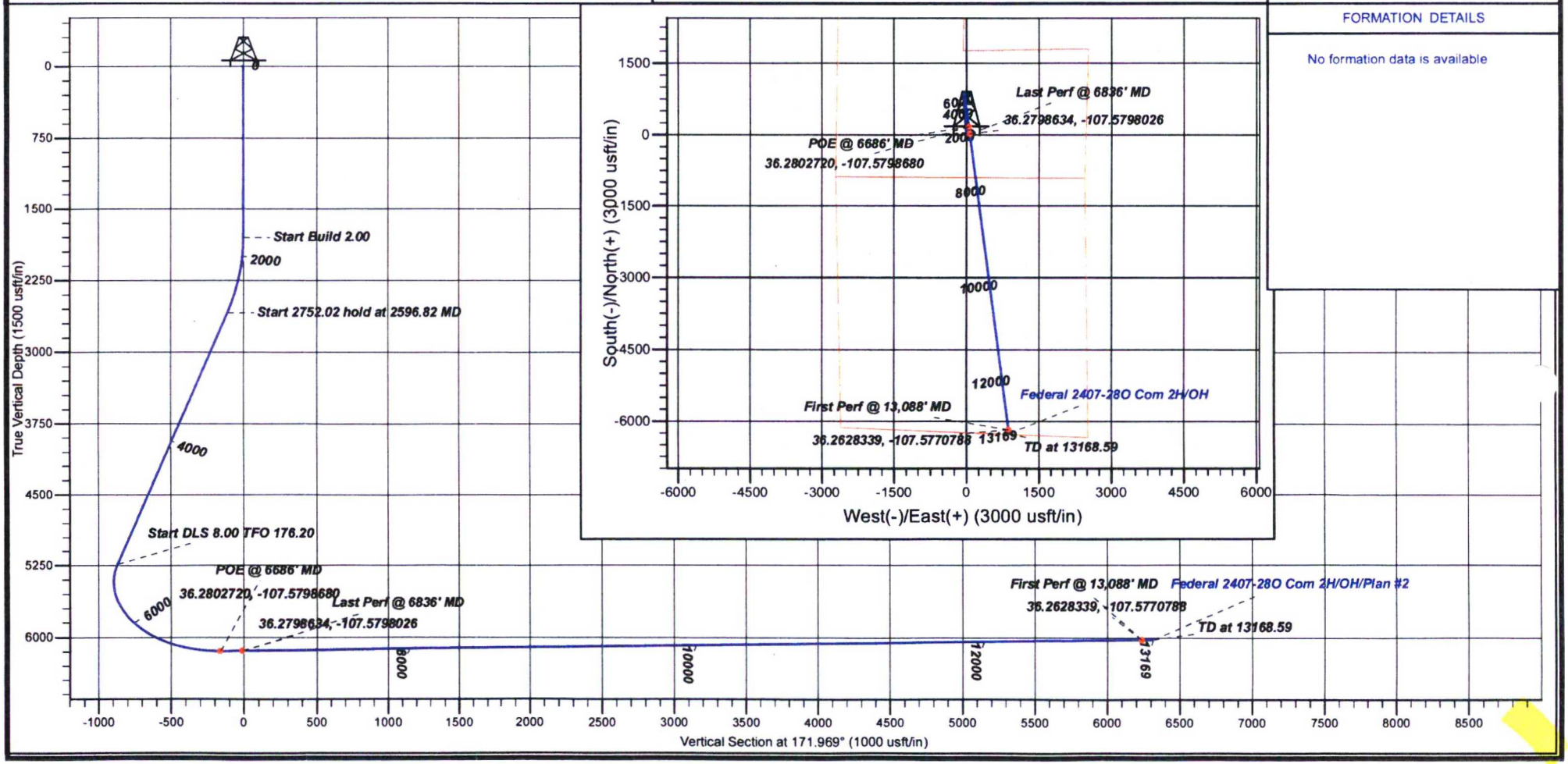
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	
1800.00	0.00	0.000	1800.00	0.00	0.00	0.00	0.00	0.00	
2596.82	15.94	356.254	2586.59	109.87	-7.19	2.00	356.25	-109.80	
5348.84	15.94	356.254	5232.84	863.88	-56.56	0.00	0.00	-863.31	
6686.45	91.10	172.619	6145.00	169.27	50.40	8.00	176.20	-160.57	Fed 28O 2H LP
13168.59	91.10	172.619	6020.00	-6257.97	882.94	0.00	0.00	6319.95	Fed 28O 2H BHL

CASING DETAILS

No casing data is available

FORMATION DETAILS

No formation data is available



LOGOS RESOURCES II, LLC

Logos Operating LLC

Rio Arriba, NM NAD83
Federal 2407-28O
Federal 2407-28O Com 2H

OH

Plan: Plan #2

Standard Planning Report

03 January, 2019

Scientific Drilling

www.scientificdrilling.com

Database:	Grand Junction District	**Local Co-ordinate Reference:**	Well Federal 2407-28O Com 2H
Company:	Logos Operating LLC	**TVD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Project:	Rio Arriba, NM NAD83	**MD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Site:	Federal 2407-28O	**North Reference:**	True
Well:	Federal 2407-28O Com 2H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

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 2407-28O				
Site Position:		**Northing:**	1,921,253.10 usft	**Latitude:**	36.2798250
From:	Lat/Long	**Easting:**	2,797,717.96 usft	**Longitude:**	-107.5801390
Position Uncertainty:	0.00 usft	**Slot Radius:**	13.20 in	**Grid Convergence:**	0.15 °

Well	Federal 2407-28O Com 2H				
Well Position	**+N/-S**	-6.55 usft	**Northing:**	1,921,246.62 usft	**Latitude:**	36.2798070
	+E/-W	29.47 usft	**Easting:**	2,797,747.45 usft	**Longitude:**	-107.5800390
Position Uncertainty		0.00 usft	**Wellhead Elevation:**	0.00 usft	**Ground Level:**	7,346.00 usft

Wellbore	OH			
Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	HDGM	12/18/2018	8.75	62.87	49,494

Design	Plan #2				
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	171.969	

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	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,800.00	0.00	0.000	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,596.82	15.94	356.254	2,586.59	109.87	-7.19	2.00	2.00	0.00	356.25	
5,348.84	15.94	356.254	5,232.84	863.88	-56.56	0.00	0.00	0.00	0.00	
6,686.45	91.10	172.619	6,145.00	169.27	50.40	8.00	5.62	13.19	176.20	Fed 28O 2H LP
13,168.59	91.10	172.619	6,020.00	-6,257.97	882.94	0.00	0.00	0.00	0.00	Fed 28O 2H BHL

Database:	Grand Junction District	**Local Co-ordinate Reference:**	Well Federal 2407-28O Com 2H
Company:	Logos Operating LLC	**TVD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Project:	Rio Arriba, NM NAD83	**MD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Site:	Federal 2407-28O	**North Reference:**	True
Well:	Federal 2407-28O Com 2H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.000	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.000	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.000	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.000	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.000	500.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.000	600.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.000	700.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.000	800.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.000	900.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.000	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.000	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.000	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.000	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.000	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.000	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.000	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.000	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.000	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 2.00									
1,900.00	2.00	356.254	1,899.98	1.74	-0.11	-1.74	2.00	2.00	0.00
2,000.00	4.00	356.254	1,999.84	6.96	-0.46	-6.96	2.00	2.00	0.00
2,100.00	6.00	356.254	2,099.45	15.66	-1.03	-15.65	2.00	2.00	0.00
2,200.00	8.00	356.254	2,198.70	27.82	-1.82	-27.80	2.00	2.00	0.00
2,300.00	10.00	356.254	2,297.47	43.43	-2.84	-43.40	2.00	2.00	0.00
2,400.00	12.00	356.254	2,395.62	62.47	-4.09	-62.43	2.00	2.00	0.00
2,500.00	14.00	356.254	2,493.06	84.91	-5.56	-84.86	2.00	2.00	0.00
2,596.82	15.94	356.254	2,586.59	109.87	-7.19	-109.80	2.00	2.00	0.00
Start 2752.02 hold at 2596.82 MD									
2,600.00	15.94	356.254	2,589.64	110.74	-7.25	-110.67	0.00	0.00	0.00
2,700.00	15.94	356.254	2,685.80	138.14	-9.04	-138.05	0.00	0.00	0.00
2,800.00	15.94	356.254	2,781.96	165.54	-10.84	-165.43	0.00	0.00	0.00
2,900.00	15.94	356.254	2,878.11	192.93	-12.63	-192.81	0.00	0.00	0.00
3,000.00	15.94	356.254	2,974.27	220.33	-14.43	-220.19	0.00	0.00	0.00
3,100.00	15.94	356.254	3,070.43	247.73	-16.22	-247.57	0.00	0.00	0.00
3,200.00	15.94	356.254	3,166.58	275.13	-18.01	-274.95	0.00	0.00	0.00
3,300.00	15.94	356.254	3,262.74	302.53	-19.81	-302.33	0.00	0.00	0.00
3,400.00	15.94	356.254	3,358.90	329.93	-21.60	-329.71	0.00	0.00	0.00
3,500.00	15.94	356.254	3,455.05	357.32	-23.40	-357.09	0.00	0.00	0.00
3,600.00	15.94	356.254	3,551.21	384.72	-25.19	-384.47	0.00	0.00	0.00
3,700.00	15.94	356.254	3,647.37	412.12	-26.98	-411.85	0.00	0.00	0.00
3,800.00	15.94	356.254	3,743.52	439.52	-28.78	-439.23	0.00	0.00	0.00
3,900.00	15.94	356.254	3,839.68	466.92	-30.57	-466.61	0.00	0.00	0.00
4,000.00	15.94	356.254	3,935.84	494.32	-32.37	-493.99	0.00	0.00	0.00
4,100.00	15.94	356.254	4,031.99	521.72	-34.16	-521.37	0.00	0.00	0.00
4,200.00	15.94	356.254	4,128.15	549.11	-35.95	-548.75	0.00	0.00	0.00
4,300.00	15.94	356.254	4,224.31	576.51	-37.75	-576.13	0.00	0.00	0.00
4,400.00	15.94	356.254	4,320.46	603.91	-39.54	-603.51	0.00	0.00	0.00
4,500.00	15.94	356.254	4,416.62	631.31	-41.34	-630.89	0.00	0.00	0.00
4,600.00	15.94	356.254	4,512.78	658.71	-43.13	-658.27	0.00	0.00	0.00
4,700.00	15.94	356.254	4,608.93	686.11	-44.92	-685.65	0.00	0.00	0.00
4,800.00	15.94	356.254	4,705.09	713.51	-46.72	-713.03	0.00	0.00	0.00
4,900.00	15.94	356.254	4,801.25	740.90	-48.51	-740.41	0.00	0.00	0.00
5,000.00	15.94	356.254	4,897.40	768.30	-50.31	-767.80	0.00	0.00	0.00

Database:	Grand Junction District	**Local Co-ordinate Reference:**	Well Federal 2407-28O Com 2H
Company:	Logos Operating LLC	**TVD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Project:	Rio Arriba, NM NAD83	**MD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Site:	Federal 2407-28O	**North Reference:**	True
Well:	Federal 2407-28O Com 2H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,100.00	15.94	356.254	4,993.56	795.70	-52.10	-795.18	0.00	0.00	0.00
5,200.00	15.94	356.254	5,089.72	823.10	-53.89	-822.56	0.00	0.00	0.00
5,300.00	15.94	356.254	5,185.87	850.50	-55.69	-849.94	0.00	0.00	0.00
5,348.84	15.94	356.254	5,232.84	863.88	-56.56	-863.31	0.00	0.00	0.00
Start DLS 8.00 TFO 176.20									
5,400.00	11.86	357.573	5,282.49	876.14	-57.25	-875.55	8.00	-7.98	2.58
5,500.00	3.95	7.880	5,381.46	889.84	-57.21	-889.11	8.00	-7.91	10.31
5,600.00	4.32	158.647	5,481.37	889.75	-55.36	-888.76	8.00	0.37	150.77
5,700.00	12.23	167.784	5,580.25	875.87	-51.74	-874.51	8.00	7.92	9.14
5,800.00	20.22	169.766	5,676.19	848.46	-46.42	-846.63	8.00	7.98	1.98
5,900.00	28.21	170.655	5,767.32	808.08	-39.51	-805.67	8.00	7.99	0.89
6,000.00	36.20	171.174	5,851.87	755.49	-31.12	-752.43	8.00	8.00	0.52
6,100.00	44.20	171.527	5,928.18	691.73	-21.44	-687.94	8.00	8.00	0.35
6,200.00	52.20	171.790	5,994.79	618.03	-10.65	-613.46	8.00	8.00	0.26
6,300.00	60.19	172.002	6,050.38	535.83	1.05	-530.43	8.00	8.00	0.21
6,400.00	68.19	172.182	6,093.87	446.73	13.42	-440.47	8.00	8.00	0.18
6,500.00	76.19	172.343	6,124.43	352.47	26.23	-345.34	8.00	8.00	0.16
6,600.00	84.19	172.493	6,141.45	254.87	39.22	-246.89	8.00	8.00	0.15
6,686.45	91.10	172.619	6,145.00	169.27	50.40	-160.57	8.00	8.00	0.15
POE @ 6686' MD - 36.2802720, -107.5798680									
6,700.00	91.10	172.619	6,144.74	155.84	52.14	-147.02	0.00	0.00	0.00
6,800.00	91.10	172.619	6,142.81	56.68	64.98	-47.05	0.00	0.00	0.00
6,836.45	91.10	172.619	6,142.11	20.54	69.67	-10.61	0.00	0.00	0.00
Last Perf @ 6836' MD - 36.2798634, -107.5798026									
6,900.00	91.10	172.619	6,140.88	-42.47	77.83	52.93	0.00	0.00	0.00
7,000.00	91.10	172.619	6,138.95	-141.62	90.67	152.90	0.00	0.00	0.00
7,100.00	91.10	172.619	6,137.03	-240.78	103.52	252.88	0.00	0.00	0.00
7,200.00	91.10	172.619	6,135.10	-339.93	116.36	352.85	0.00	0.00	0.00
7,300.00	91.10	172.619	6,133.17	-439.08	129.20	452.83	0.00	0.00	0.00
7,400.00	91.10	172.619	6,131.24	-538.24	142.05	552.80	0.00	0.00	0.00
7,500.00	91.10	172.619	6,129.31	-637.39	154.89	652.78	0.00	0.00	0.00
7,600.00	91.10	172.619	6,127.38	-736.54	167.73	752.75	0.00	0.00	0.00
7,700.00	91.10	172.619	6,125.46	-835.70	180.58	852.73	0.00	0.00	0.00
7,800.00	91.10	172.619	6,123.53	-934.85	193.42	952.70	0.00	0.00	0.00
7,900.00	91.10	172.619	6,121.60	-1,034.00	206.26	1,052.68	0.00	0.00	0.00
8,000.00	91.10	172.619	6,119.67	-1,133.15	219.11	1,152.65	0.00	0.00	0.00
8,100.00	91.10	172.619	6,117.74	-1,232.31	231.95	1,252.63	0.00	0.00	0.00
8,200.00	91.10	172.619	6,115.81	-1,331.46	244.79	1,352.60	0.00	0.00	0.00
8,300.00	91.10	172.619	6,113.88	-1,430.61	257.64	1,452.58	0.00	0.00	0.00
8,400.00	91.10	172.619	6,111.96	-1,529.77	270.48	1,552.55	0.00	0.00	0.00
8,500.00	91.10	172.619	6,110.03	-1,628.92	283.33	1,652.53	0.00	0.00	0.00
8,600.00	91.10	172.619	6,108.10	-1,728.07	296.17	1,752.50	0.00	0.00	0.00
8,700.00	91.10	172.619	6,106.17	-1,827.23	309.01	1,852.48	0.00	0.00	0.00
8,800.00	91.10	172.619	6,104.24	-1,926.38	321.86	1,952.45	0.00	0.00	0.00
8,900.00	91.10	172.619	6,102.31	-2,025.53	334.70	2,052.43	0.00	0.00	0.00
9,000.00	91.10	172.619	6,100.39	-2,124.68	347.54	2,152.40	0.00	0.00	0.00
9,100.00	91.10	172.619	6,098.46	-2,223.84	360.39	2,252.38	0.00	0.00	0.00
9,200.00	91.10	172.619	6,096.53	-2,322.99	373.23	2,352.35	0.00	0.00	0.00
9,300.00	91.10	172.619	6,094.60	-2,422.14	386.07	2,452.33	0.00	0.00	0.00
9,400.00	91.10	172.619	6,092.67	-2,521.30	398.92	2,552.30	0.00	0.00	0.00
9,500.00	91.10	172.619	6,090.74	-2,620.45	411.76	2,652.28	0.00	0.00	0.00
9,600.00	91.10	172.619	6,088.82	-2,719.60	424.60	2,752.25	0.00	0.00	0.00
9,700.00	91.10	172.619	6,086.89	-2,818.76	437.45	2,852.23	0.00	0.00	0.00

Database:	Grand Junction District	**Local Co-ordinate Reference:**	Well Federal 2407-28O Com 2H
Company:	Logos Operating LLC	**TVD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Project:	Rio Arriba, NM NAD83	**MD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Site:	Federal 2407-28O	**North Reference:**	True
Well:	Federal 2407-28O Com 2H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
9,800.00	91.10	172.619	6,084.96	-2,917.91	450.29	2,952.20	0.00	0.00	0.00
9,900.00	91.10	172.619	6,083.03	-3,017.06	463.13	3,052.18	0.00	0.00	0.00
10,000.00	91.10	172.619	6,081.10	-3,116.21	475.98	3,152.15	0.00	0.00	0.00
10,100.00	91.10	172.619	6,079.17	-3,215.37	488.82	3,252.13	0.00	0.00	0.00
10,200.00	91.10	172.619	6,077.25	-3,314.52	501.67	3,352.10	0.00	0.00	0.00
10,300.00	91.10	172.619	6,075.32	-3,413.67	514.51	3,452.08	0.00	0.00	0.00
10,400.00	91.10	172.619	6,073.39	-3,512.83	527.35	3,552.05	0.00	0.00	0.00
10,500.00	91.10	172.619	6,071.46	-3,611.98	540.20	3,652.03	0.00	0.00	0.00
10,600.00	91.10	172.619	6,069.53	-3,711.13	553.04	3,752.00	0.00	0.00	0.00
10,700.00	91.10	172.619	6,067.60	-3,810.29	565.88	3,851.98	0.00	0.00	0.00
10,800.00	91.10	172.619	6,065.68	-3,909.44	578.73	3,951.95	0.00	0.00	0.00
10,900.00	91.10	172.619	6,063.75	-4,008.59	591.57	4,051.93	0.00	0.00	0.00
11,000.00	91.10	172.619	6,061.82	-4,107.75	604.41	4,151.90	0.00	0.00	0.00
11,100.00	91.10	172.619	6,059.89	-4,206.90	617.26	4,251.88	0.00	0.00	0.00
11,200.00	91.10	172.619	6,057.96	-4,306.05	630.10	4,351.85	0.00	0.00	0.00
11,300.00	91.10	172.619	6,056.03	-4,405.20	642.94	4,451.83	0.00	0.00	0.00
11,400.00	91.10	172.619	6,054.11	-4,504.36	655.79	4,551.80	0.00	0.00	0.00
11,500.00	91.10	172.619	6,052.18	-4,603.51	668.63	4,651.78	0.00	0.00	0.00
11,600.00	91.10	172.619	6,050.25	-4,702.66	681.48	4,751.75	0.00	0.00	0.00
11,700.00	91.10	172.619	6,048.32	-4,801.82	694.32	4,851.73	0.00	0.00	0.00
11,800.00	91.10	172.619	6,046.39	-4,900.97	707.16	4,951.70	0.00	0.00	0.00
11,900.00	91.10	172.619	6,044.46	-5,000.12	720.01	5,051.68	0.00	0.00	0.00
12,000.00	91.10	172.619	6,042.53	-5,099.28	732.85	5,151.65	0.00	0.00	0.00
12,100.00	91.10	172.619	6,040.61	-5,198.43	745.69	5,251.63	0.00	0.00	0.00
12,200.00	91.10	172.619	6,038.68	-5,297.58	758.54	5,351.60	0.00	0.00	0.00
12,300.00	91.10	172.619	6,036.75	-5,396.73	771.38	5,451.58	0.00	0.00	0.00
12,400.00	91.10	172.619	6,034.82	-5,495.89	784.22	5,551.55	0.00	0.00	0.00
12,500.00	91.10	172.619	6,032.89	-5,595.04	797.07	5,651.53	0.00	0.00	0.00
12,600.00	91.10	172.619	6,030.96	-5,694.19	809.91	5,751.50	0.00	0.00	0.00
12,700.00	91.10	172.619	6,029.04	-5,793.35	822.75	5,851.48	0.00	0.00	0.00
12,800.00	91.10	172.619	6,027.11	-5,892.50	835.60	5,951.45	0.00	0.00	0.00
12,900.00	91.10	172.619	6,025.18	-5,991.65	848.44	6,051.43	0.00	0.00	0.00
13,000.00	91.10	172.619	6,023.25	-6,090.81	861.29	6,151.40	0.00	0.00	0.00
13,088.59	91.10	172.619	6,021.54	-6,178.65	872.66	6,239.97	0.00	0.00	0.00
First Perf @ 13,088' MD - 36.2628339, -107.5770788									
13,100.00	91.10	172.619	6,021.32	-6,189.96	874.13	6,251.38	0.00	0.00	0.00
13,168.59	91.10	172.619	6,020.00	-6,257.97	882.94	6,319.95	0.00	0.00	0.00
TD at 13168.59									

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 28O 2H BHL - plan hits target center - Point	0.00	0.000	6,020.00	-6,257.97	882.94	1,914,990.98	2,798,646.76	36.2626160	-107.5770440
Fed 28O 2H LP - plan hits target center - Point	0.00	0.000	6,145.00	169.27	50.40	1,921,416.02	2,797,797.41	36.2802720	-107.5798680

Database:	Grand Junction District	**Local Co-ordinate Reference:**	Well Federal 2407-28O Com 2H
Company:	Logos Operating LLC	**TVD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Project:	Rio Arriba, NM NAD83	**MD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Site:	Federal 2407-28O	**North Reference:**	True
Well:	Federal 2407-28O Com 2H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
1,800.00	1,800.00	0.00	0.00	Start Build 2.00
2,596.82	2,586.59	109.87	-7.19	Start 2752.02 hold at 2596.82 MD
5,348.84	5,232.84	863.88	-56.56	Start DLS 8.00 TFO 176.20
6,686.45	6,145.00	169.27	50.40	POE @ 6686' MD
6,686.45	6,145.00	169.27	50.40	36.2802720, -107.5798680
6,836.45	6,142.11	20.54	69.67	Last Perf @ 6836' MD
6,836.45	6,142.11	20.54	69.67	36.2798634, -107.5798026
13,088.59	6,021.54	-6,178.65	872.66	First Perf @ 13,088' MD
13,088.59	6,021.54	-6,178.65	872.66	36.2628339, -107.5770788
13,168.59	6,020.00	-6,257.97	882.94	TD at 13168.59

LOGOS RESOURCES II, LLC

Logos Operating LLC

Rio Arriba, NM NAD83
Federal 2407-28O
Federal 2407-28O Com 2H

OH
Plan #2

Anticollision Report

03 January, 2019

Scientific Drilling

www.scientificdrilling.com

Company:	Logos Operating LLC	**Local Co-ordinate Reference:**	Well Federal 2407-28O Com 2H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Reference Site:	Federal 2407-28O	**MD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-28O Com 2H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

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

Survey Tool Program **Date** 1/3/2019

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	13,168.59	Plan #2 (OH)	MWD+HDGM	OWSG MWD + HDGM

Summary

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Federal 2407-28M						
Federal 2407-28M 3H - OH - Plan #2	12,956.56	12,081.33	1,230.29	1,022.71	5.927	CC, ES
Federal 2407-28M 3H - OH - Plan #2	13,000.00	12,081.33	1,231.06	1,023.18	5.922	SF
Federal 2407-28O						
Federal 2407-28O Com 1H - OH - Plan #2	1,800.00	1,800.00	30.19	17.70	2.416	CC
Federal 2407-28O Com 1H - OH - Plan #2	1,900.00	1,899.56	30.42	17.23	2.306	ES, SF
Federal 2407-28O Com 3H - OH - Plan #2	1,800.00	1,798.00	29.70	17.21	2.378	CC, ES, SF
Federal 2407-28O Com 4H - OH - Plan #2	1,800.00	1,800.00	59.89	47.40	4.793	CC, ES
Federal 2407-28O Com 4H - OH - Plan #2	1,900.00	1,897.89	62.12	48.92	4.707	SF

Offset Design Federal 2407-28M - Federal 2407-28M 3H - OH - Plan #2 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	43.00	43.00	0.00	0.07	-116.26	-880.52	-1,784.42	1,989.84				
100.00	100.00	143.00	143.00	0.15	0.31	-116.26	-880.52	-1,784.42	1,989.84	1,989.38	0.46	4,303.022	
200.00	200.00	243.00	243.00	0.51	0.67	-116.26	-880.52	-1,784.42	1,989.84	1,988.66	1.18	1,687.204	
300.00	300.00	343.00	343.00	0.87	1.03	-116.26	-880.52	-1,784.42	1,989.84	1,987.94	1.90	1,049.320	
400.00	400.00	443.00	443.00	1.23	1.38	-116.26	-880.52	-1,784.42	1,989.84	1,987.23	2.61	761.441	
500.00	500.00	543.00	543.00	1.59	1.74	-116.26	-880.52	-1,784.42	1,989.84	1,986.51	3.33	597.514	
600.00	600.00	643.00	643.00	1.95	2.10	-116.26	-880.52	-1,784.42	1,989.84	1,985.79	4.05	491.665	
700.00	700.00	743.00	743.00	2.30	2.46	-116.26	-880.52	-1,784.42	1,989.84	1,985.08	4.76	417.675	
800.00	800.00	843.00	843.00	2.66	2.82	-116.26	-880.52	-1,784.42	1,989.84	1,984.36	5.48	363.041	
900.00	900.00	943.00	943.00	3.02	3.18	-116.26	-880.52	-1,784.42	1,989.84	1,983.64	6.20	321.047	
1,000.00	1,000.00	1,043.00	1,043.00	3.38	3.53	-116.26	-880.52	-1,784.42	1,989.84	1,982.93	6.91	287.761	
1,100.00	1,100.00	1,143.00	1,143.00	3.74	3.89	-116.26	-880.52	-1,784.42	1,989.84	1,982.21	7.63	260.728	
1,200.00	1,200.00	1,243.00	1,243.00	4.10	4.25	-116.26	-880.52	-1,784.42	1,989.84	1,981.49	8.35	238.338	
1,300.00	1,300.00	1,343.00	1,343.00	4.46	4.61	-116.26	-880.52	-1,784.42	1,989.84	1,980.77	9.07	219.490	
1,400.00	1,400.00	1,443.00	1,443.00	4.81	4.97	-116.26	-880.52	-1,784.42	1,989.84	1,980.06	9.78	203.404	
1,500.00	1,500.00	1,608.41	1,608.38	5.17	5.56	-116.23	-878.83	-1,783.27	1,989.13	1,978.40	10.74	185.277	
1,600.00	1,600.00	1,858.81	1,857.87	5.53	6.46	-115.94	-861.94	-1,771.84	1,982.05	1,970.05	12.01	165.102	
1,700.00	1,700.00	2,103.83	2,099.36	5.89	7.35	-115.33	-828.01	-1,748.90	1,967.55	1,954.30	13.25	148.513	
1,800.00	1,800.00	2,251.17	2,242.77	6.25	7.93	-114.82	-799.97	-1,729.94	1,947.42	1,933.30	14.12	137.892	

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 2407-28O Com 2H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Reference Site:	Federal 2407-28O	**MD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-28O Com 2H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-28M - Federal 2407-28M 3H - OH - Plan #2 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
1,900.00	1,899.98	2,348.61	2,337.40	6.61	8.32	-111.13	-780.76	-1,716.95	1,927.54	1,912.72	14.82	130.075	
2,000.00	1,999.84	2,446.58	2,432.56	6.97	8.72	-111.27	-761.45	-1,703.89	1,908.93	1,893.41	15.52	122.980	
2,100.00	2,099.45	2,544.98	2,528.13	7.32	9.13	-111.47	-742.06	-1,690.77	1,891.59	1,875.36	16.23	116.520	
2,200.00	2,198.70	2,643.67	2,623.98	7.68	9.55	-111.74	-722.60	-1,677.62	1,875.52	1,858.56	16.95	110.625	
2,300.00	2,297.47	2,742.53	2,720.01	8.04	9.97	-112.09	-703.12	-1,664.44	1,860.72	1,843.04	17.68	105.230	
2,400.00	2,395.62	2,841.46	2,816.09	8.41	10.40	-112.51	-683.62	-1,651.25	1,847.23	1,828.81	18.42	100.280	
2,500.00	2,493.06	2,940.32	2,912.12	8.79	10.83	-113.01	-664.13	-1,638.07	1,835.10	1,815.93	19.17	95.728	
2,600.00	2,589.64	3,039.00	3,007.96	9.18	11.27	-113.58	-644.68	-1,624.92	1,824.38	1,804.45	19.93	91.534	
2,700.00	2,685.80	3,137.55	3,103.69	9.58	11.71	-114.01	-625.25	-1,611.78	1,814.41	1,793.70	20.71	87.627	
2,800.00	2,781.96	3,236.11	3,199.41	10.00	12.15	-114.45	-605.83	-1,598.64	1,804.53	1,783.04	21.49	83.967	
2,900.00	2,878.11	3,334.67	3,295.14	10.42	12.60	-114.88	-586.40	-1,585.51	1,794.77	1,772.48	22.28	80.538	
3,000.00	2,974.27	3,433.22	3,390.86	10.85	13.04	-115.33	-566.98	-1,572.37	1,785.11	1,762.02	23.09	77.325	
3,100.00	3,070.43	3,531.78	3,486.59	11.29	13.49	-115.78	-547.55	-1,559.23	1,775.56	1,751.66	23.89	74.312	
3,200.00	3,166.58	3,630.33	3,582.31	11.74	13.94	-116.23	-528.12	-1,546.09	1,766.12	1,741.41	24.71	71.485	
3,300.00	3,262.74	3,728.89	3,678.04	12.19	14.40	-116.68	-508.70	-1,532.95	1,756.79	1,731.26	25.52	68.830	
3,400.00	3,358.90	3,827.45	3,773.76	12.65	14.85	-117.15	-489.27	-1,519.82	1,747.57	1,721.23	26.34	66.335	
3,500.00	3,455.05	3,926.00	3,869.49	13.11	15.31	-117.61	-469.84	-1,506.68	1,738.48	1,711.31	27.17	63.987	
3,600.00	3,551.21	4,024.56	3,965.21	13.57	15.77	-118.08	-450.42	-1,493.54	1,729.50	1,701.50	28.00	61.776	
3,700.00	3,647.37	4,123.12	4,060.94	14.04	16.23	-118.56	-430.99	-1,480.40	1,720.64	1,691.81	28.83	59.692	
3,800.00	3,743.52	4,221.67	4,156.66	14.51	16.69	-119.04	-411.57	-1,467.27	1,711.90	1,682.24	29.66	57.726	
3,900.00	3,839.68	4,320.23	4,252.39	14.99	17.15	-119.53	-392.14	-1,454.13	1,703.28	1,672.80	30.49	55.868	
4,000.00	3,935.84	4,418.78	4,348.11	15.46	17.61	-120.02	-372.71	-1,440.99	1,694.80	1,663.47	31.32	54.112	
4,100.00	4,031.99	4,517.34	4,443.84	15.94	18.07	-120.51	-353.29	-1,427.85	1,686.43	1,654.28	32.15	52.449	
4,200.00	4,128.15	4,615.90	4,539.56	16.43	18.54	-121.01	-333.86	-1,414.72	1,678.20	1,645.21	32.99	50.874	
4,300.00	4,224.31	4,714.45	4,635.29	16.91	19.00	-121.52	-314.43	-1,401.58	1,670.10	1,636.28	33.82	49.381	
4,400.00	4,320.46	4,813.01	4,731.02	17.40	19.47	-122.03	-295.01	-1,388.44	1,662.13	1,627.48	34.65	47.964	
4,500.00	4,416.62	4,911.56	4,826.74	17.89	19.93	-122.54	-275.58	-1,375.30	1,654.30	1,618.81	35.49	46.618	
4,600.00	4,512.78	5,010.12	4,922.47	18.38	20.40	-123.06	-256.16	-1,362.16	1,646.60	1,610.28	36.32	45.338	
4,700.00	4,608.93	5,108.68	5,018.19	18.87	20.86	-123.58	-236.73	-1,349.03	1,639.04	1,601.89	37.15	44.120	
4,800.00	4,705.09	5,207.23	5,113.92	19.36	21.33	-124.11	-217.30	-1,335.89	1,631.62	1,593.64	37.98	42.960	
4,900.00	4,801.25	5,305.79	5,209.64	19.85	21.80	-124.65	-197.88	-1,322.75	1,624.35	1,585.54	38.81	41.855	
5,000.00	4,897.40	5,404.34	5,305.37	20.35	22.27	-125.18	-178.45	-1,309.61	1,617.22	1,577.58	39.64	40.800	
5,100.00	4,993.56	5,463.92	5,363.37	20.85	22.55	-125.54	-167.55	-1,301.53	1,611.13	1,570.75	40.38	39.895	
5,200.00	5,089.72	5,500.00	5,398.78	21.34	22.71	-125.82	-163.07	-1,296.31	1,608.39	1,567.35	41.03	39.198	
5,231.10	5,119.63	5,523.96	5,422.38	21.50	22.80	-126.03	-161.08	-1,292.69	1,608.15	1,566.90	41.25	38.983	
5,300.00	5,185.87	5,550.00	5,448.07	21.84	22.91	-126.30	-159.81	-1,288.62	1,609.01	1,567.35	41.65	38.628	
5,400.00	5,282.49	5,600.00	5,497.39	22.33	23.08	-128.24	-160.02	-1,280.46	1,612.28	1,570.07	42.21	38.195	
5,500.00	5,381.46	5,650.00	5,546.50	22.73	23.24	-138.95	-163.68	-1,271.87	1,612.51	1,569.85	42.66	37.797	
5,600.00	5,481.37	5,685.06	5,580.68	23.02	23.33	70.39	-168.30	-1,265.60	1,608.51	1,565.59	42.92	37.478	
5,700.00	5,580.25	5,728.72	5,622.81	23.22	23.44	61.66	-176.39	-1,257.55	1,600.38	1,557.28	43.10	37.133	
5,800.00	5,676.19	5,772.43	5,664.36	23.37	23.53	60.47	-187.08	-1,249.24	1,588.12	1,544.93	43.19	36.767	
5,900.00	5,767.32	5,816.13	5,705.13	23.46	23.61	60.78	-200.30	-1,240.72	1,571.88	1,528.66	43.22	36.368	
6,000.00	5,851.87	5,850.00	5,736.09	23.51	23.67	61.81	-212.26	-1,233.98	1,551.98	1,508.84	43.14	35.974	
6,100.00	5,928.18	5,900.00	5,780.62	23.54	23.73	63.49	-232.60	-1,223.87	1,528.57	1,485.41	43.16	35.412	
6,200.00	5,994.79	5,950.00	5,823.56	23.57	23.78	65.69	-256.04	-1,213.60	1,502.33	1,459.10	43.22	34.756	
6,300.00	6,050.38	6,000.00	5,864.71	23.63	23.81	68.37	-282.47	-1,203.21	1,473.82	1,430.46	43.36	33.989	
6,400.00	6,093.87	6,032.46	5,890.36	23.74	23.82	71.19	-301.17	-1,196.43	1,443.56	1,400.07	43.50	33.188	
6,500.00	6,124.43	6,074.76	5,922.43	23.90	23.83	74.44	-327.27	-1,187.59	1,412.59	1,368.74	43.85	32.211	
6,600.00	6,141.45	6,116.47	5,952.46	24.13	23.84	77.90	-354.87	-1,178.88	1,381.79	1,337.41	44.38	31.134	
6,700.00	6,144.74	6,150.00	5,975.39	24.44	23.83	80.91	-378.32	-1,171.90	1,352.29	1,307.25	45.04	30.024	
6,800.00	6,142.81	6,200.00	6,007.43	24.84	23.82	82.31	-415.28	-1,161.58	1,326.29	1,280.39	45.90	28.894	
6,900.00	6,140.88	6,250.00	6,036.78	25.33	23.79	83.62	-454.44	-1,151.41	1,304.75	1,257.93	46.82	27.865	

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 2407-28O Com 2H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Reference Site:	Federal 2407-28O	**MD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-28O Com 2H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-28M - Federal 2407-28M 3H - OH - Plan #2

Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HDGM
Offset Well Error: 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
7,000.00	6,138.95	6,300.00	6,063.29	25.93	23.76	84.82	-495.63	-1,141.43	1,287.43	1,239.62	47.80	26.932	
7,100.00	6,137.03	6,361.80	6,091.95	26.61	23.70	86.14	-549.03	-1,129.42	1,273.94	1,225.07	48.87	26.069	
7,200.00	6,135.10	6,426.03	6,116.70	27.37	23.64	87.30	-607.05	-1,117.44	1,263.88	1,213.90	49.98	25.289	
7,300.00	6,133.17	6,500.00	6,138.60	28.21	23.56	88.35	-676.45	-1,104.37	1,256.77	1,205.61	51.15	24.569	
7,400.00	6,131.24	6,568.31	6,152.35	29.12	23.44	89.04	-742.39	-1,093.12	1,252.12	1,199.75	52.37	23.908	
7,500.00	6,129.31	6,650.00	6,160.46	30.08	23.69	89.48	-822.69	-1,080.85	1,249.61	1,195.95	53.66	23.288	
7,600.00	6,127.38	6,729.11	6,160.35	31.11	24.10	89.54	-901.06	-1,070.19	1,248.84	1,193.83	55.01	22.700	
7,700.00	6,125.46	6,829.11	6,158.44	32.18	24.70	89.54	-1,000.17	-1,057.00	1,248.50	1,191.91	56.59	22.063	
7,800.00	6,123.53	6,929.11	6,156.53	33.30	25.37	89.54	-1,099.28	-1,043.81	1,248.15	1,189.85	58.31	21.407	
7,900.00	6,121.60	7,029.11	6,154.61	34.47	26.12	89.55	-1,198.39	-1,030.63	1,247.80	1,187.65	60.16	20.743	
8,000.00	6,119.67	7,129.11	6,152.70	35.67	26.94	89.55	-1,297.49	-1,017.44	1,247.46	1,185.33	62.13	20.079	
8,100.00	6,117.74	7,229.11	6,150.79	36.90	27.82	89.55	-1,396.60	-1,004.25	1,247.11	1,182.90	64.21	19.422	
8,200.00	6,115.81	7,329.10	6,148.88	38.16	28.76	89.55	-1,495.71	-991.06	1,246.76	1,180.37	66.40	18.778	
8,300.00	6,113.88	7,429.10	6,146.97	39.46	29.76	89.55	-1,594.82	-977.88	1,246.42	1,177.75	68.67	18.151	
8,400.00	6,111.96	7,529.10	6,145.05	40.77	30.81	89.55	-1,693.92	-964.69	1,246.07	1,175.04	71.03	17.543	
8,500.00	6,110.03	7,629.10	6,143.14	42.11	31.91	89.55	-1,793.03	-951.50	1,245.73	1,172.27	73.46	16.958	
8,600.00	6,108.10	7,729.10	6,141.23	43.47	33.05	89.55	-1,892.14	-938.32	1,245.38	1,169.42	75.96	16.395	
8,700.00	6,106.17	7,829.10	6,139.32	44.85	34.23	89.55	-1,991.25	-925.13	1,245.03	1,166.51	78.52	15.857	
8,800.00	6,104.24	7,929.10	6,137.40	46.25	35.44	89.55	-2,090.35	-911.94	1,244.69	1,163.55	81.13	15.341	
8,900.00	6,102.31	8,029.10	6,135.49	47.66	36.69	89.55	-2,189.46	-898.75	1,244.34	1,160.54	83.80	14.850	
9,000.00	6,100.39	8,129.10	6,133.58	49.09	37.96	89.55	-2,288.57	-885.57	1,243.99	1,157.49	86.50	14.381	
9,100.00	6,098.46	8,229.10	6,131.67	50.52	39.27	89.55	-2,387.68	-872.38	1,243.65	1,154.39	89.25	13.934	
9,200.00	6,096.53	8,329.10	6,129.75	51.98	40.59	89.55	-2,486.79	-859.19	1,243.30	1,151.26	92.04	13.509	
9,300.00	6,094.60	8,429.10	6,127.84	53.44	41.94	89.55	-2,585.89	-846.01	1,242.95	1,148.10	94.85	13.104	
9,400.00	6,092.67	8,529.10	6,125.93	54.91	43.31	89.55	-2,685.00	-832.82	1,242.61	1,144.90	97.70	12.718	
9,500.00	6,090.74	8,629.10	6,124.02	56.39	44.69	89.56	-2,784.11	-819.63	1,242.26	1,141.68	100.58	12.351	
9,600.00	6,088.82	8,729.10	6,122.11	57.88	46.10	89.56	-2,883.22	-806.45	1,241.91	1,138.44	103.48	12.002	
9,700.00	6,086.89	8,829.10	6,120.19	59.38	47.51	89.56	-2,982.32	-793.26	1,241.57	1,135.16	106.40	11.669	
9,800.00	6,084.96	8,929.10	6,118.28	60.88	48.94	89.56	-3,081.43	-780.07	1,241.22	1,131.87	109.35	11.351	
9,900.00	6,083.03	9,029.09	6,116.37	62.39	50.39	89.56	-3,180.54	-766.88	1,240.87	1,128.56	112.31	11.049	
10,000.00	6,081.10	9,129.09	6,114.46	63.91	51.84	89.56	-3,279.65	-753.70	1,240.53	1,125.23	115.29	10.760	
10,100.00	6,079.17	9,229.09	6,112.54	65.43	53.31	89.56	-3,378.75	-740.51	1,240.18	1,121.89	118.29	10.484	
10,200.00	6,077.25	9,329.09	6,110.63	66.96	54.79	89.56	-3,477.86	-727.32	1,239.83	1,118.53	121.30	10.221	
10,300.00	6,075.32	9,429.09	6,108.72	68.50	56.27	89.56	-3,576.97	-714.14	1,239.49	1,115.15	124.33	9.969	
10,400.00	6,073.39	9,529.09	6,106.81	70.04	57.76	89.56	-3,676.08	-700.95	1,239.14	1,111.77	127.37	9.728	
10,500.00	6,071.46	9,629.09	6,104.89	71.58	59.27	89.56	-3,775.18	-687.76	1,238.79	1,108.37	130.43	9.498	
10,600.00	6,069.53	9,729.09	6,102.98	73.13	60.77	89.56	-3,874.29	-674.58	1,238.45	1,104.96	133.49	9.277	
10,700.00	6,067.60	9,829.09	6,101.07	74.68	62.29	89.56	-3,973.40	-661.39	1,238.10	1,101.54	136.56	9.066	
10,800.00	6,065.68	9,929.09	6,099.16	76.23	63.81	89.56	-4,072.51	-648.20	1,237.75	1,098.11	139.65	8.863	
10,900.00	6,063.75	10,029.09	6,097.25	77.79	65.34	89.56	-4,171.62	-635.01	1,237.41	1,094.67	142.74	8.669	
11,000.00	6,061.82	10,129.09	6,095.33	79.35	66.87	89.56	-4,270.72	-621.83	1,237.06	1,091.22	145.84	8.482	
11,100.00	6,059.89	10,229.09	6,093.42	80.92	68.41	89.57	-4,369.83	-608.64	1,236.71	1,087.76	148.95	8.303	
11,200.00	6,057.96	10,329.09	6,091.51	82.49	69.95	89.57	-4,468.94	-595.45	1,236.37	1,084.30	152.07	8.130	
11,300.00	6,056.03	10,429.09	6,089.60	84.06	71.50	89.57	-4,568.05	-582.27	1,236.02	1,080.83	155.19	7.964	
11,400.00	6,054.11	10,529.09	6,087.68	85.63	73.05	89.57	-4,667.15	-569.08	1,235.67	1,077.35	158.32	7.805	
11,500.00	6,052.18	10,629.08	6,085.77	87.21	74.61	89.57	-4,766.26	-555.89	1,235.33	1,073.87	161.46	7.651	
11,600.00	6,050.25	10,729.08	6,083.86	88.78	76.17	89.57	-4,865.37	-542.71	1,234.98	1,070.38	164.60	7.503	
11,700.00	6,048.32	10,829.08	6,081.95	90.36	77.73	89.57	-4,964.48	-529.52	1,234.64	1,066.88	167.75	7.360	
11,800.00	6,046.39	10,929.08	6,080.03	91.95	79.29	89.57	-5,063.58	-516.33	1,234.29	1,063.38	170.90	7.222	
11,900.00	6,044.46	11,029.08	6,078.12	93.53	80.86	89.57	-5,162.69	-503.14	1,233.94	1,059.88	174.06	7.089	
12,000.00	6,042.53	11,129.08	6,076.21	95.12	82.43	89.57	-5,261.80	-489.96	1,233.60	1,056.37	177.23	6.961	
12,100.00	6,040.61	11,229.08	6,074.30	96.70	84.01	89.57	-5,360.91	-476.77	1,233.25	1,052.86	180.39	6.836	

Company:	Logos Operating LLC	**Local Co-ordinate Reference:**	Well Federal 2407-28O Com 2H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Reference Site:	Federal 2407-28O	**MD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-28O Com 2H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-28M - Federal 2407-28M 3H - OH - Plan #2 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
12,200.00	6,038.68	11,329.08	6,072.39	98.29	85.58	89.57	-5,460.01	-463.58	1,232.90	1,049.34	183.56	6.716	
12,300.00	6,036.75	11,429.08	6,070.47	99.89	87.16	89.57	-5,559.12	-450.40	1,232.56	1,045.82	186.74	6.600	
12,400.00	6,034.82	11,529.08	6,068.56	101.48	88.75	89.57	-5,658.23	-437.21	1,232.21	1,042.29	189.92	6.488	
12,500.00	6,032.89	11,629.08	6,066.65	103.07	90.33	89.57	-5,757.34	-424.02	1,231.86	1,038.76	193.10	6.379	
12,600.00	6,030.96	11,729.08	6,064.74	104.67	91.92	89.57	-5,856.45	-410.84	1,231.52	1,035.23	196.29	6.274	
12,700.00	6,029.04	11,829.08	6,062.82	106.27	93.50	89.58	-5,955.55	-397.65	1,231.17	1,031.70	199.47	6.172	
12,800.00	6,027.11	11,929.08	6,060.91	107.86	95.09	89.58	-6,054.66	-384.46	1,230.82	1,028.16	202.67	6.073	
12,900.00	6,025.18	12,029.08	6,059.00	109.46	96.68	89.58	-6,153.77	-371.27	1,230.48	1,024.62	205.86	5.977	
12,956.56	6,024.09	12,081.33	6,058.00	110.37	97.52	89.58	-6,205.56	-364.38	1,230.29	1,022.71	207.57	5.927	CC, ES
13,000.00	6,023.25	12,081.33	6,058.00	111.06	97.52	89.58	-6,205.56	-364.38	1,231.06	1,023.18	207.88	5.922	SF
13,100.00	6,021.32	12,081.33	6,058.00	112.67	97.52	89.58	-6,205.56	-364.38	1,238.63	1,030.98	207.65	5.965	
13,168.59	6,020.00	12,081.33	6,058.00	113.76	97.52	89.58	-6,205.56	-364.38	1,248.43	1,041.66	206.77	6.038	

Company:	Logos Operating LLC	**Local Co-ordinate Reference:**	Well Federal 2407-28O Com 2H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Reference Site:	Federal 2407-28O	**MD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-28O Com 2H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-28O - Federal 2407-28O Com 1H - OH - Plan #2

Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HDGM
Offset Well Error: 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	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	-77.47	6.55	-29.47	30.19				
100.00	100.00	100.00	100.00	0.15	0.15	-77.47	6.55	-29.47	30.19	29.89	0.31	97.940	
200.00	200.00	200.00	200.00	0.51	0.51	-77.47	6.55	-29.47	30.19	29.17	1.03	29.451	
300.00	300.00	300.00	300.00	0.87	0.87	-77.47	6.55	-29.47	30.19	28.45	1.74	17.331	
400.00	400.00	400.00	400.00	1.23	1.23	-77.47	6.55	-29.47	30.19	27.73	2.46	12.278	
500.00	500.00	500.00	500.00	1.59	1.59	-77.47	6.55	-29.47	30.19	27.02	3.18	9.507	
600.00	600.00	600.00	600.00	1.95	1.95	-77.47	6.55	-29.47	30.19	26.30	3.89	7.756	
700.00	700.00	700.00	700.00	2.30	2.30	-77.47	6.55	-29.47	30.19	25.58	4.61	6.550	
800.00	800.00	800.00	800.00	2.66	2.66	-77.47	6.55	-29.47	30.19	24.87	5.33	5.668	
900.00	900.00	900.00	900.00	3.02	3.02	-77.47	6.55	-29.47	30.19	24.15	6.04	4.996	
1,000.00	1,000.00	1,000.00	1,000.00	3.38	3.38	-77.47	6.55	-29.47	30.19	23.43	6.76	4.466	
1,100.00	1,100.00	1,100.00	1,100.00	3.74	3.74	-77.47	6.55	-29.47	30.19	22.72	7.48	4.038	
1,200.00	1,200.00	1,200.00	1,200.00	4.10	4.10	-77.47	6.55	-29.47	30.19	22.00	8.19	3.685	
1,300.00	1,300.00	1,300.00	1,300.00	4.46	4.46	-77.47	6.55	-29.47	30.19	21.28	8.91	3.388	
1,400.00	1,400.00	1,400.00	1,400.00	4.81	4.81	-77.47	6.55	-29.47	30.19	20.57	9.63	3.136	
1,500.00	1,500.00	1,500.00	1,500.00	5.17	5.17	-77.47	6.55	-29.47	30.19	19.85	10.35	2.919	
1,600.00	1,600.00	1,600.00	1,600.00	5.53	5.53	-77.47	6.55	-29.47	30.19	19.13	11.06	2.729	
1,700.00	1,700.00	1,700.00	1,700.00	5.89	5.89	-77.47	6.55	-29.47	30.19	18.41	11.78	2.563	
1,800.00	1,800.00	1,800.00	1,800.00	6.25	6.25	-77.47	6.55	-29.47	30.19	17.70	12.50	2.416	CC
1,800.34	1,800.34	1,800.34	1,800.34	6.25	6.25	-73.72	6.55	-29.47	30.19	17.69	12.50	2.416	
1,900.00	1,899.98	1,899.56	1,899.54	6.61	6.59	-79.96	5.06	-30.35	30.42	17.23	13.19	2.306	ES, SF
2,000.00	1,999.84	1,998.47	1,998.31	6.97	6.91	-97.07	0.64	-32.97	33.16	19.29	13.87	2.390	
2,100.00	2,099.45	2,096.21	2,095.68	7.32	7.24	-117.23	-6.61	-37.25	42.69	28.14	14.54	2.935	
2,200.00	2,198.70	2,193.96	2,192.94	7.68	7.56	-132.07	-15.00	-42.21	59.15	43.93	15.22	3.886	
2,300.00	2,297.47	2,290.94	2,289.44	8.04	7.89	-141.65	-23.34	-47.13	80.52	64.62	15.90	5.065	
2,400.00	2,395.62	2,387.03	2,385.06	8.41	8.22	-148.06	-31.59	-52.01	106.09	89.52	16.57	6.402	
2,500.00	2,493.06	2,482.13	2,479.67	8.79	8.55	-152.56	-39.76	-56.83	135.47	118.23	17.25	7.856	
2,600.00	2,589.64	2,576.10	2,573.18	9.18	8.88	-155.87	-47.84	-61.60	168.44	150.52	17.92	9.400	
2,700.00	2,685.80	2,669.51	2,666.13	9.58	9.21	-158.48	-55.86	-66.35	203.24	184.66	18.58	10.937	
2,800.00	2,781.96	2,762.93	2,759.07	10.00	9.55	-160.33	-63.89	-71.09	238.31	219.05	19.25	12.378	
2,900.00	2,878.11	2,856.34	2,852.02	10.42	9.88	-161.70	-71.92	-75.83	273.53	253.61	19.93	13.728	
3,000.00	2,974.27	2,949.75	2,944.97	10.85	10.22	-162.76	-79.94	-80.57	308.87	288.26	20.60	14.992	
3,100.00	3,070.43	3,043.17	3,037.91	11.29	10.56	-163.60	-87.97	-85.31	344.27	322.99	21.28	16.176	
3,200.00	3,166.58	3,136.58	3,130.86	11.74	10.90	-164.29	-95.99	-90.05	379.73	357.77	21.97	17.287	
3,300.00	3,262.74	3,229.99	3,223.81	12.19	11.24	-164.86	-104.02	-94.79	415.23	392.58	22.65	18.330	
3,400.00	3,358.90	3,323.41	3,316.76	12.65	11.58	-165.34	-112.05	-99.53	450.76	427.42	23.34	19.311	
3,500.00	3,455.05	3,416.82	3,409.70	13.11	11.92	-165.75	-120.07	-104.28	486.32	462.28	24.03	20.234	
3,600.00	3,551.21	3,510.24	3,502.65	13.57	12.27	-166.10	-128.10	-109.02	521.89	497.16	24.73	21.105	
3,700.00	3,647.37	3,603.65	3,595.60	14.04	12.61	-166.41	-136.12	-113.76	557.48	532.05	25.42	21.927	
3,800.00	3,743.52	3,697.06	3,688.55	14.51	12.96	-166.68	-144.15	-118.50	593.08	566.96	26.12	22.704	
3,900.00	3,839.68	3,790.48	3,781.49	14.99	13.31	-166.92	-152.18	-123.24	628.69	601.87	26.82	23.439	
4,000.00	3,935.84	3,883.89	3,874.44	15.46	13.66	-167.14	-160.20	-127.98	664.31	636.79	27.52	24.136	
4,100.00	4,031.99	3,977.30	3,967.39	15.94	14.00	-167.33	-168.23	-132.72	699.94	671.71	28.23	24.797	
4,200.00	4,128.15	4,070.72	4,060.34	16.43	14.35	-167.51	-176.25	-137.46	735.57	706.64	28.93	25.425	
4,300.00	4,224.31	4,164.13	4,153.28	16.91	14.70	-167.66	-184.28	-142.21	771.21	741.57	29.64	26.022	
4,400.00	4,320.46	4,257.55	4,246.23	17.40	15.06	-167.81	-192.31	-146.95	806.85	776.51	30.34	26.591	
4,500.00	4,416.62	4,350.96	4,339.18	17.89	15.41	-167.94	-200.33	-151.69	842.50	811.45	31.05	27.132	
4,600.00	4,512.78	4,444.37	4,432.13	18.38	15.76	-168.06	-208.36	-156.43	878.15	846.39	31.76	27.649	
4,700.00	4,608.93	4,537.79	4,525.07	18.87	16.11	-168.17	-216.38	-161.17	913.80	881.33	32.47	28.143	
4,800.00	4,705.09	4,631.20	4,618.02	19.36	16.46	-168.28	-224.41	-165.91	949.46	916.28	33.18	28.614	
4,900.00	4,801.25	4,724.61	4,710.97	19.85	16.82	-168.37	-232.44	-170.65	985.12	951.23	33.89	29.065	
5,000.00	4,897.40	4,818.03	4,803.92	20.35	17.17	-168.46	-240.46	-175.39	1,020.78	986.17	34.61	29.497	

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 2407-28O Com 2H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Reference Site:	Federal 2407-28O	**MD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-28O Com 2H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-28O - Federal 2407-28O Com 1H - OH - Plan #2 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,100.00	4,993.56	4,911.44	4,896.86	20.85	17.52	-168.55	-248.49	-180.14	1,056.44	1,021.12	35.32	29.911	
5,200.00	5,089.72	5,004.86	4,989.81	21.34	17.88	-168.62	-256.51	-184.88	1,092.11	1,056.08	36.03	30.308	
5,300.00	5,185.87	5,098.27	5,082.76	21.84	18.23	-168.70	-264.54	-189.62	1,127.78	1,091.03	36.75	30.690	
5,400.00	5,282.49	5,192.28	5,176.30	22.33	18.59	-170.38	-272.62	-194.39	1,161.78	1,124.32	37.46	31.013	
5,500.00	5,381.46	5,289.58	5,273.11	22.73	18.96	179.03	-280.98	-199.33	1,184.38	1,146.21	38.17	31.030	
5,600.00	5,481.37	5,388.90	5,371.94	23.02	19.34	28.43	-289.51	-204.37	1,193.66	1,154.82	38.84	30.730	
5,700.00	5,580.25	6,574.43	6,140.03	23.22	26.82	64.23	171.04	-762.87	1,147.10	1,104.01	43.09	26.619	
5,800.00	5,676.19	6,500.30	6,136.69	23.37	25.74	62.71	118.55	-710.68	1,089.07	1,045.28	43.78	24.873	
5,900.00	5,767.32	6,431.92	6,126.92	23.46	24.82	62.53	71.04	-662.52	1,029.89	985.52	44.37	23.211	
6,000.00	5,851.87	6,379.12	6,115.00	23.51	24.16	63.68	35.23	-625.60	970.26	925.37	44.89	21.614	
6,100.00	5,928.18	6,331.47	6,101.04	23.54	23.62	65.27	3.76	-592.68	910.76	865.55	45.21	20.145	
6,200.00	5,994.79	6,285.86	6,084.87	23.57	23.15	66.96	-25.49	-561.65	851.96	806.66	45.30	18.808	
6,300.00	6,050.38	6,240.96	6,066.36	23.63	22.73	68.57	-53.33	-531.69	794.47	749.31	45.16	17.594	
6,400.00	6,093.87	6,196.05	6,045.33	23.74	22.36	69.93	-80.12	-502.42	738.93	694.13	44.80	16.493	
6,500.00	6,124.43	6,150.00	6,021.24	23.90	22.03	70.88	-106.37	-473.26	686.06	641.78	44.28	15.495	
6,600.00	6,141.45	6,104.57	5,995.07	24.13	21.76	71.47	-130.97	-445.46	636.56	592.90	43.66	14.579	
6,700.00	6,144.74	6,057.49	5,965.54	24.44	21.53	70.98	-154.99	-417.76	591.21	548.16	43.05	13.732	
6,800.00	6,142.81	6,013.53	5,935.87	24.84	21.37	67.19	-175.98	-393.04	553.84	511.40	42.44	13.049	
6,900.00	6,140.88	5,974.72	5,908.08	25.33	21.24	63.62	-193.27	-372.21	528.65	486.75	41.90	12.616	
7,000.00	6,138.95	5,940.40	5,882.32	25.93	21.15	60.33	-207.57	-354.61	518.15	476.67	41.49	12.489	
7,015.51	6,138.65	5,935.44	5,878.51	26.03	21.13	59.84	-209.56	-352.13	517.96	476.51	41.45	12.497	
7,100.00	6,137.03	5,909.97	5,858.61	26.61	21.06	57.35	-219.44	-339.68	523.83	482.55	41.28	12.690	
7,200.00	6,135.10	5,882.89	5,836.85	27.37	20.99	54.68	-229.34	-326.97	545.64	504.34	41.29	13.214	
7,300.00	6,133.17	5,850.00	5,809.63	28.21	20.89	51.46	-240.50	-312.25	582.23	541.08	41.15	14.150	
7,400.00	6,131.24	5,837.03	5,798.68	29.12	20.86	50.21	-244.64	-306.68	630.99	589.24	41.76	15.112	
7,500.00	6,129.31	5,817.52	5,781.97	30.08	20.80	48.35	-250.58	-298.55	689.84	647.78	42.05	16.405	
7,600.00	6,127.38	5,800.00	5,766.74	31.11	20.75	46.70	-255.63	-291.51	756.47	714.14	42.33	17.872	
7,700.00	6,125.46	5,783.90	5,752.56	32.18	20.70	45.23	-260.01	-285.26	829.13	786.57	42.56	19.481	
7,800.00	6,123.53	5,769.34	5,739.61	33.30	20.66	43.92	-263.77	-279.79	906.46	863.71	42.76	21.201	
7,900.00	6,121.60	5,750.00	5,722.19	34.47	20.60	42.22	-268.45	-272.80	987.47	944.65	42.82	23.062	
8,000.00	6,119.67	5,750.00	5,722.19	35.67	20.60	42.22	-268.45	-272.80	1,071.30	1,028.17	43.13	24.840	
8,100.00	6,117.74	5,732.67	5,706.41	36.90	20.55	40.76	-272.35	-266.81	1,157.36	1,114.21	43.15	26.824	
8,200.00	6,115.81	5,722.35	5,696.93	38.16	20.51	39.90	-274.53	-263.37	1,245.31	1,202.08	43.23	28.806	
8,300.00	6,113.88	5,700.00	5,676.21	39.46	20.44	38.12	-278.92	-256.23	1,334.92	1,291.75	43.18	30.919	
8,400.00	6,111.96	5,700.00	5,676.21	40.77	20.44	38.12	-278.92	-256.23	1,425.46	1,382.13	43.32	32.904	
8,500.00	6,110.03	5,700.00	5,676.21	42.11	20.44	38.12	-278.92	-256.23	1,517.18	1,473.74	43.44	34.930	
8,600.00	6,108.10	5,700.00	5,676.21	43.47	20.44	38.12	-278.92	-256.23	1,609.88	1,566.36	43.53	36.987	
8,700.00	6,106.17	5,680.95	5,658.35	44.85	20.38	36.67	-282.27	-250.49	1,703.07	1,659.60	43.48	39.172	
8,800.00	6,104.24	5,674.27	5,652.05	46.25	20.36	36.18	-283.37	-248.56	1,797.03	1,753.53	43.51	41.305	
8,900.00	6,102.31	5,668.01	5,646.13	47.66	20.34	35.72	-284.35	-246.78	1,891.54	1,848.01	43.53	43.451	
9,000.00	6,100.39	5,650.00	5,629.01	49.09	20.28	34.45	-286.97	-241.86	1,986.65	1,943.16	43.50	45.674	
9,100.00	6,098.46	5,650.00	5,629.01	50.52	20.28	34.45	-286.97	-241.86	2,081.96	2,038.41	43.55	47.808	
9,200.00	6,096.53	5,650.00	5,629.01	51.98	20.28	34.45	-286.97	-241.86	2,177.68	2,134.09	43.59	49.953	
9,300.00	6,094.60	5,650.00	5,629.01	53.44	20.28	34.45	-286.97	-241.86	2,273.77	2,230.14	43.63	52.109	
9,400.00	6,092.67	5,650.00	5,629.01	54.91	20.28	34.45	-286.97	-241.86	2,370.19	2,326.52	43.67	54.273	
9,500.00	6,090.74	5,650.00	5,629.01	56.39	20.28	34.45	-286.97	-241.86	2,466.89	2,423.18	43.70	56.444	
9,600.00	6,088.82	5,650.00	5,629.01	57.88	20.28	34.45	-286.97	-241.86	2,563.84	2,520.11	43.74	58.621	
9,700.00	6,086.89	5,629.27	5,609.13	59.38	20.21	33.06	-289.60	-236.57	2,660.68	2,616.98	43.70	60.887	
9,800.00	6,084.96	5,625.50	5,605.51	60.88	20.20	32.82	-290.03	-235.65	2,757.93	2,714.21	43.72	63.084	
9,900.00	6,083.03	5,621.92	5,602.05	62.39	20.19	32.59	-290.42	-234.79	2,855.35	2,811.61	43.74	65.282	
10,000.00	6,081.10	5,600.00	5,580.82	63.91	20.11	31.24	-292.58	-229.78	2,953.19	2,909.48	43.71	67.566	
10,100.00	6,079.17	5,600.00	5,580.82	65.43	20.11	31.24	-292.58	-229.78	3,050.81	3,007.07	43.74	69.748	

Company:	Logos Operating LLC	**Local Co-ordinate Reference:**	Well Federal 2407-28O Com 2H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Reference Site:	Federal 2407-28O	**MD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-28O Com 2H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-28O - Federal 2407-28O Com 1H - OH - Plan #2

Offset Site Error: 0.00 usft
Offset Well Error: 0.00 usft

Survey Program: 0-MWD+HDGM

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,200.00	6,077.25	5,600.00	5,580.82	66.96	20.11	31.24	-292.58	-229.78	3,148.59	3,104.81	43.77	71.932	
10,300.00	6,075.32	5,600.00	5,580.82	68.50	20.11	31.24	-292.58	-229.78	3,246.50	3,202.69	43.80	74.115	
10,400.00	6,073.39	5,600.00	5,580.82	70.04	20.11	31.24	-292.58	-229.78	3,344.53	3,300.70	43.83	76.299	
10,500.00	6,071.46	5,600.00	5,580.82	71.58	20.11	31.24	-292.58	-229.78	3,442.68	3,398.81	43.87	78.482	
10,600.00	6,069.53	5,600.00	5,580.82	73.13	20.11	31.24	-292.58	-229.78	3,540.93	3,497.03	43.90	80.664	
10,700.00	6,067.60	5,600.00	5,580.82	74.68	20.11	31.24	-292.58	-229.78	3,639.27	3,595.35	43.93	82.844	
10,800.00	6,065.68	5,600.00	5,580.82	76.23	20.11	31.24	-292.58	-229.78	3,737.71	3,693.75	43.96	85.023	
10,900.00	6,063.75	5,600.00	5,580.82	77.79	20.11	31.24	-292.58	-229.78	3,836.22	3,792.23	43.99	87.199	
11,000.00	6,061.82	5,600.00	5,580.82	79.35	20.11	31.24	-292.58	-229.78	3,934.81	3,890.79	44.03	89.373	
11,100.00	6,059.89	5,600.00	5,580.82	80.92	20.11	31.24	-292.58	-229.78	4,033.47	3,989.41	44.06	91.543	
11,200.00	6,057.96	5,600.00	5,580.82	82.49	20.11	31.24	-292.58	-229.78	4,132.20	4,088.10	44.10	93.710	
11,300.00	6,056.03	5,600.00	5,580.82	84.06	20.11	31.24	-292.58	-229.78	4,230.98	4,186.85	44.13	95.874	
11,400.00	6,054.11	5,600.00	5,580.82	85.63	20.11	31.24	-292.58	-229.78	4,329.82	4,285.65	44.17	98.034	
11,500.00	6,052.18	5,600.00	5,580.82	87.21	20.11	31.24	-292.58	-229.78	4,428.71	4,384.51	44.20	100.191	
11,600.00	6,050.25	5,600.00	5,580.82	88.78	20.11	31.24	-292.58	-229.78	4,527.65	4,483.41	44.24	102.343	
11,700.00	6,048.32	5,578.15	5,559.52	90.36	20.04	29.97	-294.25	-225.23	4,626.30	4,582.06	44.24	104.578	
11,800.00	6,046.39	5,576.49	5,557.90	91.95	20.03	29.88	-294.36	-224.91	4,725.28	4,681.00	44.27	106.728	
11,900.00	6,044.46	5,574.89	5,556.33	93.53	20.02	29.79	-294.46	-224.59	4,824.29	4,779.98	44.31	108.873	
12,000.00	6,042.53	5,573.33	5,554.80	95.12	20.02	29.71	-294.55	-224.29	4,923.35	4,879.00	44.35	111.013	
12,100.00	6,040.61	5,571.83	5,553.33	96.70	20.01	29.62	-294.64	-224.00	5,022.43	4,978.05	44.39	113.148	
12,200.00	6,038.68	5,550.00	5,531.89	98.29	19.94	28.47	-295.70	-220.04	5,121.84	5,077.44	44.40	115.369	
12,300.00	6,036.75	5,550.00	5,531.89	99.89	19.94	28.47	-295.70	-220.04	5,220.95	5,176.51	44.44	117.487	
12,400.00	6,034.82	5,550.00	5,531.89	101.48	19.94	28.47	-295.70	-220.04	5,320.09	5,275.61	44.48	119.600	
12,500.00	6,032.89	5,550.00	5,531.89	103.07	19.94	28.47	-295.70	-220.04	5,419.27	5,374.74	44.53	121.707	
12,600.00	6,030.96	5,550.00	5,531.89	104.67	19.94	28.47	-295.70	-220.04	5,518.47	5,473.90	44.57	123.808	
12,700.00	6,029.04	5,550.00	5,531.89	106.27	19.94	28.47	-295.70	-220.04	5,617.71	5,573.09	44.62	125.904	
12,800.00	6,027.11	5,550.00	5,531.89	107.86	19.94	28.47	-295.70	-220.04	5,716.97	5,672.30	44.67	127.993	
12,900.00	6,025.18	5,550.00	5,531.89	109.46	19.94	28.47	-295.70	-220.04	5,816.25	5,771.54	44.71	130.077	
13,000.00	6,023.25	5,550.00	5,531.89	111.06	19.94	28.47	-295.70	-220.04	5,915.56	5,870.80	44.76	132.154	
13,100.00	6,021.32	5,550.00	5,531.89	112.67	19.94	28.47	-295.70	-220.04	6,014.90	5,970.09	44.81	134.225	
13,168.59	6,020.00	5,550.00	5,531.89	113.76	19.94	28.47	-295.70	-220.04	6,083.04	6,038.19	44.85	135.642	

Company:	Logos Operating LLC	**Local Co-ordinate Reference:**	Well Federal 2407-28O Com 2H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Reference Site:	Federal 2407-28O	**MD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-28O Com 2H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-28O - Federal 2407-28O Com 3H - OH - Plan #2 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	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	103.47	-6.92	28.88	29.77				
100.00	100.00	98.00	98.00	0.15	0.15	103.47	-6.92	28.88	29.70	29.40	0.31	97.316	
200.00	200.00	198.00	198.00	0.51	0.51	103.47	-6.92	28.88	29.70	28.68	1.02	29.174	
300.00	300.00	298.00	298.00	0.87	0.86	103.47	-6.92	28.88	29.70	27.97	1.74	17.119	
400.00	400.00	398.00	398.00	1.23	1.22	103.47	-6.92	28.88	29.70	27.25	2.45	12.113	
500.00	500.00	498.00	498.00	1.59	1.58	103.47	-6.92	28.88	29.70	26.53	3.17	9.373	
600.00	600.00	598.00	598.00	1.95	1.94	103.47	-6.92	28.88	29.70	25.82	3.89	7.643	
700.00	700.00	698.00	698.00	2.30	2.30	103.47	-6.92	28.88	29.70	25.10	4.60	6.453	
800.00	800.00	798.00	798.00	2.66	2.66	103.47	-6.92	28.88	29.70	24.38	5.32	5.583	
900.00	900.00	898.00	898.00	3.02	3.01	103.47	-6.92	28.88	29.70	23.66	6.04	4.920	
1,000.00	1,000.00	998.00	998.00	3.38	3.37	103.47	-6.92	28.88	29.70	22.95	6.75	4.398	
1,100.00	1,100.00	1,098.00	1,098.00	3.74	3.73	103.47	-6.92	28.88	29.70	22.23	7.47	3.976	
1,200.00	1,200.00	1,198.00	1,198.00	4.10	4.09	103.47	-6.92	28.88	29.70	21.51	8.19	3.628	
1,300.00	1,300.00	1,298.00	1,298.00	4.46	4.45	103.47	-6.92	28.88	29.70	20.80	8.90	3.336	
1,400.00	1,400.00	1,398.00	1,398.00	4.81	4.81	103.47	-6.92	28.88	29.70	20.08	9.62	3.087	
1,500.00	1,500.00	1,498.00	1,498.00	5.17	5.17	103.47	-6.92	28.88	29.70	19.36	10.34	2.873	
1,600.00	1,600.00	1,598.00	1,598.00	5.53	5.52	103.47	-6.92	28.88	29.70	18.65	11.06	2.687	
1,700.00	1,700.00	1,698.00	1,698.00	5.89	5.88	103.47	-6.92	28.88	29.70	17.93	11.77	2.523	
1,800.00	1,800.00	1,798.00	1,798.00	6.25	6.24	103.47	-6.92	28.88	29.70	17.21	12.49	2.378	CC, ES, SF
1,900.00	1,899.98	1,896.92	1,896.90	6.61	6.58	110.48	-7.48	30.42	31.92	18.73	13.19	2.420	
2,000.00	1,999.84	1,995.33	1,995.18	6.97	6.92	117.91	-9.22	35.13	39.18	25.31	13.88	2.824	
2,100.00	2,099.45	2,092.75	2,092.24	7.32	7.25	125.39	-12.09	42.90	52.22	37.67	14.55	3.589	
2,200.00	2,198.70	2,188.72	2,187.53	7.68	7.58	131.05	-16.04	53.59	71.26	56.04	15.22	4.683	
2,300.00	2,297.47	2,282.81	2,280.53	8.04	7.92	134.89	-20.98	66.96	96.15	80.28	15.86	6.061	
2,400.00	2,395.62	2,374.61	2,370.77	8.41	8.25	137.41	-26.81	82.76	126.64	110.14	16.50	7.677	
2,500.00	2,493.06	2,463.79	2,457.86	8.79	8.59	139.05	-33.44	100.70	162.48	145.37	17.11	9.496	
2,600.00	2,589.64	2,550.02	2,541.48	9.18	8.93	140.12	-40.74	120.46	203.43	185.73	17.71	11.488	
2,700.00	2,685.80	2,633.73	2,622.01	9.58	9.27	141.13	-48.65	141.89	247.97	229.69	18.28	13.564	
2,800.00	2,781.96	2,715.38	2,699.88	10.00	9.63	141.58	-57.15	164.91	294.77	275.93	18.84	15.647	
2,900.00	2,878.11	2,794.93	2,775.05	10.42	9.99	141.68	-66.17	189.33	343.71	324.33	19.38	17.734	
3,000.00	2,974.27	2,872.33	2,847.46	10.85	10.38	141.57	-75.64	214.96	394.71	374.80	19.91	19.824	
3,100.00	3,070.43	2,947.56	2,917.11	11.29	10.77	141.34	-85.48	241.62	447.67	427.25	20.42	21.919	
3,200.00	3,166.58	3,020.61	2,984.02	11.74	11.18	141.02	-95.65	269.15	502.54	481.62	20.92	24.021	
3,300.00	3,262.74	3,091.49	3,048.19	12.19	11.60	140.66	-106.07	297.38	559.23	537.83	21.40	26.130	
3,400.00	3,358.90	3,160.21	3,109.68	12.65	12.04	140.28	-116.70	326.15	617.68	595.81	21.87	28.241	
3,500.00	3,455.05	3,226.79	3,168.53	13.11	12.49	139.88	-127.49	355.35	677.82	655.50	22.32	30.367	
3,600.00	3,551.21	3,302.60	3,234.97	13.57	13.03	139.43	-140.14	389.61	739.11	716.17	22.94	32.222	
3,700.00	3,647.37	3,381.46	3,304.05	14.04	13.63	139.03	-153.31	425.28	800.47	776.85	23.62	33.892	
3,800.00	3,743.52	3,460.31	3,373.13	14.51	14.23	138.69	-166.48	460.94	861.85	837.54	24.31	35.453	
3,900.00	3,839.68	3,539.16	3,442.21	14.99	14.86	138.40	-179.66	496.61	923.24	898.23	25.01	36.915	
4,000.00	3,935.84	3,618.01	3,511.29	15.46	15.49	138.14	-192.83	532.28	984.65	958.93	25.72	38.285	
4,100.00	4,031.99	3,696.87	3,580.37	15.94	16.14	137.91	-206.00	567.94	1,046.07	1,019.63	26.44	39.569	
4,200.00	4,128.15	3,775.72	3,649.45	16.43	16.80	137.71	-219.17	603.61	1,107.49	1,080.33	27.16	40.772	
4,300.00	4,224.31	3,854.57	3,718.53	16.91	17.47	137.53	-232.34	639.27	1,168.93	1,141.03	27.90	41.903	
4,400.00	4,320.46	3,933.42	3,787.61	17.40	18.15	137.37	-245.52	674.94	1,230.37	1,201.74	28.64	42.967	
4,500.00	4,416.62	4,012.27	3,856.69	17.89	18.84	137.22	-258.69	710.61	1,291.82	1,262.44	29.38	43.969	
4,600.00	4,512.78	4,091.13	3,925.77	18.38	19.53	137.09	-271.86	746.27	1,353.27	1,323.14	30.13	44.913	
4,700.00	4,608.93	4,169.98	3,994.85	18.87	20.23	136.96	-285.03	781.94	1,414.73	1,383.84	30.89	45.802	
4,800.00	4,705.09	4,248.83	4,063.93	19.36	20.94	136.85	-298.20	817.60	1,476.19	1,444.54	31.65	46.643	
4,900.00	4,801.25	8,187.23	6,161.94	19.85	61.98	117.73	995.56	213.62	1,410.85	1,381.96	28.89	48.835	
5,000.00	4,897.40	8,208.22	6,162.00	20.35	62.43	116.37	1,010.44	198.82	1,313.38	1,284.05	29.33	44.784	
5,100.00	4,993.56	8,229.22	6,162.07	20.85	62.89	114.82	1,025.33	184.01	1,215.96	1,186.14	29.82	40.777	

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 2407-28O Com 2H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Reference Site:	Federal 2407-28O	**MD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-28O Com 2H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-28O - Federal 2407-28O Com 3H - OH - Plan #2 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,200.00	5,089.72	8,250.21	6,162.13	21.34	63.35	113.04	1,040.21	169.21	1,118.61	1,088.23	30.38	36.819	
5,300.00	5,185.87	8,271.20	6,162.20	21.84	63.81	110.98	1,055.10	154.40	1,021.33	990.30	31.03	32.910	
5,400.00	5,282.49	8,290.79	6,162.26	22.33	64.24	90.22	1,068.99	140.59	924.04	892.19	31.85	29.011	
5,500.00	5,381.46	8,300.79	6,162.29	22.73	64.46	46.29	1,076.08	133.54	826.98	793.77	33.21	24.902	
5,600.00	5,481.37	8,299.74	6,162.29	23.02	64.44	-122.39	1,075.33	134.28	732.66	697.18	35.48	20.652	
5,700.00	5,580.25	8,287.66	6,162.25	23.22	64.17	-139.07	1,066.76	142.80	644.48	605.33	39.15	16.462	
5,800.00	5,676.19	8,264.78	6,162.18	23.37	63.67	-143.45	1,050.54	158.93	566.69	521.96	44.73	12.669	
5,900.00	5,767.32	8,231.55	6,162.08	23.46	62.94	-143.68	1,026.99	182.36	504.54	452.20	52.34	9.640	
6,000.00	5,851.87	8,188.62	6,161.94	23.51	62.01	-141.26	996.55	212.64	463.59	402.44	61.16	7.581	
6,100.00	5,928.18	8,136.83	6,161.78	23.54	60.89	-136.68	959.83	249.16	447.89	378.62	69.28	6.465	
6,110.32	5,935.53	8,131.02	6,161.76	23.54	60.76	-136.10	955.71	253.26	447.76	377.77	69.99	6.397	
6,200.00	5,994.79	8,077.17	6,161.59	23.57	59.61	-130.20	917.53	291.23	457.52	382.67	74.85	6.113	
6,300.00	6,050.38	8,010.82	6,161.38	23.63	58.20	-122.20	870.49	338.02	488.17	410.72	77.45	6.303	
6,400.00	6,093.87	7,939.06	6,161.15	23.74	56.70	-113.38	819.61	388.62	533.49	455.57	77.92	6.846	
6,500.00	6,124.43	7,863.30	6,160.91	23.90	55.14	-104.63	765.89	442.06	587.64	510.39	77.25	7.607	
6,600.00	6,141.45	7,784.99	6,160.67	24.13	53.56	-96.75	710.37	497.28	646.34	570.26	76.08	8.495	
6,700.00	6,144.74	7,705.67	6,160.41	24.44	51.99	-90.96	654.14	553.21	706.89	632.14	74.75	9.457	
6,800.00	6,142.81	7,626.31	6,160.16	24.84	50.46	-90.97	597.87	609.18	767.73	694.26	73.46	10.451	
6,900.00	6,140.88	7,546.95	6,159.91	25.33	48.98	-90.99	541.60	665.14	828.57	756.29	72.28	11.464	
7,000.00	6,138.95	7,467.59	6,159.66	25.93	47.53	-91.00	485.33	721.11	889.41	818.21	71.20	12.492	
7,100.00	6,137.03	7,388.22	6,159.41	26.61	46.13	-91.01	429.06	777.08	950.25	880.03	70.22	13.533	
7,200.00	6,135.10	7,308.86	6,159.16	27.37	44.80	-91.01	372.79	833.04	1,011.08	941.74	69.34	14.581	
7,300.00	6,133.17	7,229.50	6,158.91	28.21	43.52	-91.02	316.53	889.01	1,071.92	1,003.34	68.58	15.629	
7,400.00	6,131.24	7,150.13	6,158.66	29.12	42.31	-91.03	260.26	944.98	1,132.76	1,064.83	67.93	16.675	
7,500.00	6,129.31	7,070.77	6,158.41	30.08	41.17	-91.03	203.99	1,000.94	1,193.60	1,126.22	67.38	17.713	
7,600.00	6,127.38	6,991.41	6,158.16	31.11	40.10	-91.04	147.72	1,056.91	1,254.44	1,187.50	66.94	18.739	
7,700.00	6,125.46	6,887.31	6,155.86	32.18	38.84	-90.94	73.63	1,129.96	1,315.01	1,248.67	66.34	19.821	
7,800.00	6,123.53	6,737.48	6,129.34	33.30	37.32	-89.66	-34.89	1,229.40	1,372.31	1,306.73	65.58	20.925	
7,900.00	6,121.60	6,593.23	6,076.22	34.47	36.26	-87.28	-137.99	1,314.75	1,426.00	1,360.64	65.36	21.817	
8,000.00	6,119.67	6,464.54	6,007.71	35.67	35.64	-84.39	-225.38	1,379.45	1,477.34	1,411.72	65.62	22.513	
8,100.00	6,117.74	6,355.75	5,935.95	36.90	35.30	-81.50	-293.71	1,424.10	1,527.90	1,461.75	66.16	23.095	
8,200.00	6,115.81	6,266.47	5,868.79	38.16	35.12	-78.86	-344.81	1,453.07	1,579.07	1,512.26	66.80	23.638	
8,300.00	6,113.88	6,193.99	5,809.55	39.46	35.02	-76.58	-382.39	1,471.17	1,631.82	1,564.37	67.45	24.192	
8,400.00	6,111.96	6,135.10	5,758.76	40.77	34.96	-74.64	-410.05	1,482.15	1,686.78	1,618.72	68.07	24.781	
8,500.00	6,110.03	6,086.92	5,715.69	42.11	34.91	-73.01	-430.64	1,488.60	1,744.27	1,675.65	68.62	25.419	
8,600.00	6,108.10	6,047.11	5,679.22	43.47	34.87	-71.64	-446.18	1,492.18	1,804.41	1,735.30	69.11	26.109	
8,700.00	6,106.17	6,013.85	5,648.22	44.85	34.84	-70.47	-458.11	1,493.95	1,867.20	1,797.67	69.53	26.854	
8,800.00	6,104.24	5,985.76	5,621.73	46.25	34.80	-69.48	-467.42	1,494.57	1,932.54	1,862.65	69.89	27.652	
8,900.00	6,102.31	5,961.79	5,598.93	47.66	34.77	-68.63	-474.79	1,494.47	2,000.31	1,930.13	70.19	28.500	
9,000.00	6,100.39	5,941.15	5,579.16	49.09	34.74	-67.89	-480.72	1,493.93	2,070.36	1,999.94	70.43	29.396	
9,100.00	6,098.46	5,923.21	5,561.90	50.52	34.71	-67.24	-485.55	1,493.10	2,142.53	2,071.91	70.62	30.338	
9,200.00	6,096.53	5,900.00	5,539.48	51.98	34.67	-66.40	-491.34	1,491.55	2,216.68	2,145.94	70.74	31.335	
9,300.00	6,094.60	5,900.00	5,539.48	53.44	34.67	-66.40	-491.34	1,491.55	2,292.61	2,221.68	70.92	32.325	
9,400.00	6,092.67	5,881.29	5,521.35	54.91	34.63	-65.73	-495.63	1,489.91	2,370.17	2,299.20	70.97	33.395	
9,500.00	6,090.74	5,870.28	5,510.65	56.39	34.61	-65.33	-498.00	1,488.78	2,449.28	2,378.25	71.03	34.482	
9,600.00	6,088.82	5,850.00	5,490.93	57.88	34.56	-64.59	-502.05	1,486.38	2,529.82	2,458.81	71.01	35.625	
9,700.00	6,086.89	5,850.00	5,490.93	59.38	34.56	-64.59	-502.05	1,486.38	2,611.54	2,540.47	71.07	36.745	
9,800.00	6,084.96	5,850.00	5,490.93	60.88	34.56	-64.59	-502.05	1,486.38	2,694.50	2,623.39	71.11	37.891	
9,900.00	6,083.03	5,850.00	5,490.93	62.39	34.56	-64.59	-502.05	1,486.38	2,778.58	2,707.45	71.13	39.062	
10,000.00	6,081.10	5,829.16	5,470.63	63.91	34.50	-63.83	-505.80	1,483.49	2,863.49	2,792.46	71.03	40.314	
10,100.00	6,079.17	5,822.95	5,464.58	65.43	34.48	-63.60	-506.83	1,482.54	2,949.39	2,878.40	70.99	41.544	
10,200.00	6,077.25	5,817.22	5,459.00	66.96	34.47	-63.39	-507.75	1,481.64	3,036.12	2,965.17	70.95	42.792	

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 2407-28O Com 2H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Reference Site:	Federal 2407-28O	**MD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-28O Com 2H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-28O - Federal 2407-28O Com 3H - OH - Plan #2

Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HDGM
Offset Well Error: 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,300.00	6,075.32	5,800.00	5,442.23	68.50	34.42	-62.77	-510.32	1,478.72	3,123.69	3,052.85	70.84	44.096	
10,400.00	6,073.39	5,800.00	5,442.23	70.04	34.42	-62.77	-510.32	1,478.72	3,211.85	3,141.04	70.81	45.357	
10,500.00	6,071.46	5,800.00	5,442.23	71.58	34.42	-62.77	-510.32	1,478.72	3,300.69	3,229.90	70.78	46.632	
10,600.00	6,069.53	5,800.00	5,442.23	73.13	34.42	-62.77	-510.32	1,478.72	3,390.15	3,319.40	70.75	47.919	
10,700.00	6,067.60	5,800.00	5,442.23	74.68	34.42	-62.77	-510.32	1,478.72	3,480.18	3,409.47	70.71	49.219	
10,800.00	6,065.68	5,800.00	5,442.23	76.23	34.42	-62.77	-510.32	1,478.72	3,570.74	3,500.07	70.67	50.530	
10,900.00	6,063.75	5,800.00	5,442.23	77.79	34.42	-62.77	-510.32	1,478.72	3,661.79	3,591.17	70.62	51.850	
11,000.00	6,061.82	5,800.00	5,442.23	79.35	34.42	-62.77	-510.32	1,478.72	3,753.30	3,682.72	70.58	53.179	
11,100.00	6,059.89	5,780.73	5,423.46	80.92	34.35	-62.06	-512.85	1,475.11	3,845.05	3,774.63	70.42	54.599	
11,200.00	6,057.96	5,777.82	5,420.64	82.49	34.34	-61.96	-513.20	1,474.54	3,937.32	3,866.95	70.36	55.958	
11,300.00	6,056.03	5,775.08	5,417.97	84.06	34.33	-61.86	-513.52	1,473.99	4,029.94	3,959.64	70.30	57.323	
11,400.00	6,054.11	5,772.49	5,415.45	85.63	34.32	-61.76	-513.82	1,473.46	4,122.91	4,052.66	70.24	58.694	
11,500.00	6,052.18	5,770.03	5,413.06	87.21	34.31	-61.67	-514.09	1,472.96	4,216.18	4,146.00	70.19	60.071	
11,600.00	6,050.25	5,750.00	5,393.61	88.78	34.24	-60.94	-516.11	1,468.62	4,309.92	4,239.89	70.03	61.546	
11,700.00	6,048.32	5,750.00	5,393.61	90.36	34.24	-60.94	-516.11	1,468.62	4,403.73	4,333.75	69.99	62.922	
11,800.00	6,046.39	5,750.00	5,393.61	91.95	34.24	-60.94	-516.11	1,468.62	4,497.82	4,427.87	69.95	64.301	
11,900.00	6,044.46	5,750.00	5,393.61	93.53	34.24	-60.94	-516.11	1,468.62	4,592.15	4,522.24	69.91	65.685	
12,000.00	6,042.53	5,750.00	5,393.61	95.12	34.24	-60.94	-516.11	1,468.62	4,686.71	4,616.84	69.88	67.073	
12,100.00	6,040.61	5,750.00	5,393.61	96.70	34.24	-60.94	-516.11	1,468.62	4,781.50	4,711.66	69.84	68.463	
12,200.00	6,038.68	5,750.00	5,393.61	98.29	34.24	-60.94	-516.11	1,468.62	4,876.50	4,806.69	69.81	69.857	
12,300.00	6,036.75	5,750.00	5,393.61	99.89	34.24	-60.94	-516.11	1,468.62	4,971.69	4,901.92	69.78	71.253	
12,400.00	6,034.82	5,750.00	5,393.61	101.48	34.24	-60.94	-516.11	1,468.62	5,067.07	4,997.33	69.74	72.652	
12,500.00	6,032.89	5,750.00	5,393.61	103.07	34.24	-60.94	-516.11	1,468.62	5,162.62	5,092.91	69.72	74.052	
12,600.00	6,030.96	5,750.00	5,393.61	104.67	34.24	-60.94	-516.11	1,468.62	5,258.34	5,188.65	69.69	75.454	
12,700.00	6,029.04	5,750.00	5,393.61	106.27	34.24	-60.94	-516.11	1,468.62	5,354.22	5,284.55	69.66	76.858	
12,800.00	6,027.11	5,750.00	5,393.61	107.86	34.24	-60.94	-516.11	1,468.62	5,450.24	5,380.60	69.64	78.263	
12,900.00	6,025.18	5,750.00	5,393.61	109.46	34.24	-60.94	-516.11	1,468.62	5,546.40	5,476.78	69.62	79.669	
13,000.00	6,023.25	5,750.00	5,393.61	111.06	34.24	-60.94	-516.11	1,468.62	5,642.70	5,573.10	69.60	81.076	
13,100.00	6,021.32	5,750.00	5,393.61	112.67	34.24	-60.94	-516.11	1,468.62	5,739.12	5,669.54	69.58	82.484	
13,168.59	6,020.00	5,750.00	5,393.61	113.76	34.24	-60.94	-516.11	1,468.62	5,805.33	5,735.76	69.57	83.450	

Company:	Logos Operating LLC	**Local Co-ordinate Reference:**	Well Federal 2407-28O Com 2H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Reference Site:	Federal 2407-28O	**MD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-28O Com 2H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-28O - Federal 2407-28O Com 4H - OH - Plan #2 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	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	103.00	-13.47	58.36	59.89				
100.00	100.00	100.00	100.00	0.15	0.15	103.00	-13.47	58.36	59.89	59.58	0.31	194.277	
200.00	200.00	200.00	200.00	0.51	0.51	103.00	-13.47	58.36	59.89	58.87	1.03	58.419	
300.00	300.00	300.00	300.00	0.87	0.87	103.00	-13.47	58.36	59.89	58.15	1.74	34.378	
400.00	400.00	400.00	400.00	1.23	1.23	103.00	-13.47	58.36	59.89	57.43	2.46	24.355	
500.00	500.00	500.00	500.00	1.59	1.59	103.00	-13.47	58.36	59.89	56.72	3.18	18.858	
600.00	600.00	600.00	600.00	1.95	1.95	103.00	-13.47	58.36	59.89	56.00	3.89	15.385	
700.00	700.00	700.00	700.00	2.30	2.30	103.00	-13.47	58.36	59.89	55.28	4.61	12.992	
800.00	800.00	800.00	800.00	2.66	2.66	103.00	-13.47	58.36	59.89	54.57	5.33	11.243	
900.00	900.00	900.00	900.00	3.02	3.02	103.00	-13.47	58.36	59.89	53.85	6.04	9.910	
1,000.00	1,000.00	1,000.00	1,000.00	3.38	3.38	103.00	-13.47	58.36	59.89	53.13	6.76	8.859	
1,100.00	1,100.00	1,100.00	1,100.00	3.74	3.74	103.00	-13.47	58.36	59.89	52.42	7.48	8.010	
1,200.00	1,200.00	1,200.00	1,200.00	4.10	4.10	103.00	-13.47	58.36	59.89	51.70	8.19	7.309	
1,300.00	1,300.00	1,300.00	1,300.00	4.46	4.46	103.00	-13.47	58.36	59.89	50.98	8.91	6.721	
1,400.00	1,400.00	1,400.00	1,400.00	4.81	4.81	103.00	-13.47	58.36	59.89	50.26	9.63	6.220	
1,500.00	1,500.00	1,500.00	1,500.00	5.17	5.17	103.00	-13.47	58.36	59.89	49.55	10.35	5.789	
1,600.00	1,600.00	1,600.00	1,600.00	5.53	5.53	103.00	-13.47	58.36	59.89	48.83	11.06	5.414	
1,700.00	1,700.00	1,700.00	1,700.00	5.89	5.89	103.00	-13.47	58.36	59.89	48.11	11.78	5.085	
1,800.00	1,800.00	1,800.00	1,800.00	6.25	6.25	103.00	-13.47	58.36	59.89	47.40	12.50	4.793	CC, ES
1,900.00	1,899.98	1,897.89	1,897.87	6.61	6.59	108.07	-13.70	60.02	62.12	48.92	13.20	4.707	SF
2,000.00	1,999.84	1,995.36	1,995.21	6.97	6.92	111.52	-14.37	64.96	68.96	55.08	13.88	4.968	
2,100.00	2,099.45	2,092.01	2,091.51	7.32	7.26	115.88	-15.49	73.09	80.79	66.23	14.56	5.550	
2,200.00	2,198.70	2,187.44	2,186.26	7.68	7.59	120.13	-17.03	84.28	97.87	82.65	15.22	6.429	
2,300.00	2,297.47	2,281.29	2,279.03	8.04	7.93	123.70	-18.95	98.32	120.27	104.40	15.88	7.576	
2,400.00	2,395.62	2,373.21	2,369.39	8.41	8.26	126.50	-21.24	114.98	147.90	131.38	16.52	8.955	
2,500.00	2,493.06	2,462.89	2,456.99	8.79	8.61	128.58	-23.85	134.00	180.58	163.44	17.14	10.534	
2,600.00	2,589.64	2,550.07	2,541.53	9.18	8.95	130.11	-26.75	155.09	218.11	200.35	17.76	12.281	
2,700.00	2,685.80	2,635.09	2,623.31	9.58	9.30	131.56	-29.91	178.09	259.16	240.80	18.36	14.116	
2,800.00	2,781.96	2,718.31	2,702.67	10.00	9.67	132.33	-33.32	202.93	302.53	283.58	18.95	15.967	
2,900.00	2,878.11	2,802.15	2,781.88	10.42	10.05	132.68	-37.05	230.13	347.98	328.41	19.56	17.789	
3,000.00	2,974.27	2,890.96	2,865.60	10.85	10.48	132.91	-41.08	259.50	393.93	373.67	20.26	19.442	
3,100.00	3,070.43	2,979.77	2,949.31	11.29	10.93	133.09	-45.11	288.86	439.89	418.91	20.98	20.971	
3,200.00	3,166.58	3,068.57	3,033.02	11.74	11.39	133.24	-49.15	318.22	485.85	464.15	21.70	22.388	
3,300.00	3,262.74	3,157.38	3,116.74	12.19	11.86	133.36	-53.18	347.59	531.81	509.37	22.44	23.703	
3,400.00	3,358.90	3,246.18	3,200.45	12.65	12.34	133.47	-57.21	376.95	577.78	554.59	23.18	24.923	
3,500.00	3,455.05	3,334.99	3,284.16	13.11	12.83	133.55	-61.24	406.32	623.74	599.81	23.94	26.059	
3,600.00	3,551.21	3,423.79	3,367.88	13.57	13.32	133.63	-65.27	435.68	669.71	645.01	24.70	27.116	
3,700.00	3,647.37	3,512.60	3,451.59	14.04	13.83	133.70	-69.30	465.05	715.68	690.21	25.47	28.102	
3,800.00	3,743.52	3,601.41	3,535.30	14.51	14.34	133.76	-73.33	494.41	761.64	735.40	26.24	29.023	
3,900.00	3,839.68	3,690.21	3,619.02	14.99	14.85	133.81	-77.36	523.78	807.61	780.59	27.03	29.884	
4,000.00	3,935.84	3,779.02	3,702.73	15.46	15.38	133.85	-81.40	553.14	853.58	825.77	27.81	30.690	
4,100.00	4,031.99	3,867.82	3,786.44	15.94	15.90	133.89	-85.43	582.51	899.55	870.95	28.61	31.447	
4,200.00	4,128.15	3,956.63	3,870.16	16.43	16.43	133.93	-89.46	611.87	945.52	916.12	29.40	32.158	
4,300.00	4,224.31	4,045.44	3,953.87	16.91	16.97	133.97	-93.49	641.23	991.49	961.29	30.20	32.826	
4,400.00	4,320.46	4,134.24	4,037.59	17.40	17.50	134.00	-97.52	670.60	1,037.46	1,006.45	31.01	33.456	
4,500.00	4,416.62	4,223.05	4,121.30	17.89	18.05	134.02	-101.55	699.96	1,083.43	1,051.61	31.82	34.050	
4,600.00	4,512.78	4,311.85	4,205.01	18.38	18.59	134.05	-105.58	729.33	1,129.40	1,096.77	32.63	34.611	
4,700.00	4,608.93	4,400.66	4,288.73	18.87	19.14	134.07	-109.62	758.69	1,175.37	1,141.93	33.45	35.142	
4,800.00	4,705.09	4,489.46	4,372.44	19.36	19.68	134.10	-113.65	788.06	1,221.35	1,187.08	34.27	35.644	
4,900.00	4,801.25	4,578.27	4,456.15	19.85	20.24	134.12	-117.68	817.42	1,267.32	1,232.23	35.09	36.120	
5,000.00	4,897.40	4,667.08	4,539.87	20.35	20.79	134.14	-121.71	846.79	1,313.29	1,277.38	35.91	36.571	
5,100.00	4,993.56	4,755.88	4,623.58	20.85	21.34	134.15	-125.74	876.15	1,359.26	1,322.52	36.74	37.000	

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 2407-28O Com 2H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Reference Site:	Federal 2407-28O	**MD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-28O Com 2H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-28O - Federal 2407-28O Com 4H - OH - Plan #2 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,200.00	5,089.72	4,844.69	4,707.29	21.34	21.90	134.17	-129.77	905.52	1,405.23	1,367.67	37.57	37.408	
5,300.00	5,185.87	4,933.49	4,791.01	21.84	22.46	134.19	-133.80	934.88	1,451.20	1,412.81	38.40	37.796	
5,400.00	5,282.49	5,022.89	4,875.28	22.33	23.02	134.18	-137.86	964.44	1,495.95	1,456.73	39.22	38.141	
5,500.00	5,381.46	5,115.58	4,962.65	22.73	23.61	125.58	-142.07	995.09	1,532.18	1,492.17	40.01	38.298	
5,600.00	5,481.37	5,210.37	5,052.00	23.02	24.21	-24.43	-146.37	1,026.43	1,558.26	1,517.54	40.72	38.265	
5,700.00	5,580.25	5,305.41	5,141.59	23.22	24.81	-33.65	-150.69	1,057.86	1,573.99	1,532.63	41.36	38.054	
5,800.00	5,676.19	5,398.85	5,229.68	23.37	25.41	-36.47	-154.93	1,088.76	1,579.49	1,537.57	41.93	37.673	
5,900.00	5,767.32	5,488.88	5,314.54	23.46	25.98	-38.92	-159.02	1,118.52	1,575.22	1,532.81	42.40	37.148	
6,000.00	5,851.87	5,573.73	5,394.53	23.51	26.52	-41.70	-162.87	1,146.58	1,561.90	1,519.10	42.79	36.498	
6,100.00	5,928.18	5,651.77	5,468.09	23.54	27.02	-44.97	-166.41	1,172.39	1,540.55	1,497.45	43.10	35.743	
6,200.00	5,994.79	5,704.64	5,517.94	23.57	27.36	-48.26	-168.81	1,189.87	1,512.53	1,469.38	43.14	35.059	
6,300.00	6,050.38	5,750.00	5,560.54	23.63	27.66	-51.92	-172.29	1,205.01	1,480.16	1,437.01	43.16	34.298	
6,400.00	6,093.87	5,764.70	5,574.27	23.74	27.76	-54.99	-174.03	1,209.97	1,444.66	1,401.77	42.89	33.680	
6,500.00	6,124.43	5,787.42	5,595.39	23.90	27.91	-58.63	-177.29	1,217.68	1,407.16	1,364.27	42.89	32.812	
6,600.00	6,141.45	5,800.00	5,607.02	24.13	27.99	-62.10	-179.41	1,221.97	1,368.62	1,325.66	42.96	31.861	
6,700.00	6,144.74	5,821.85	5,627.12	24.44	28.14	-65.67	-183.59	1,229.46	1,330.12	1,286.71	43.41	30.641	
6,800.00	6,142.81	5,836.49	5,640.50	24.84	28.25	-66.33	-186.75	1,234.49	1,295.89	1,251.89	44.00	29.454	
6,900.00	6,140.88	5,850.00	5,652.78	25.33	28.34	-66.94	-189.93	1,239.15	1,268.33	1,223.55	44.78	28.323	
7,000.00	6,138.95	5,874.81	5,675.14	25.93	28.51	-68.04	-196.40	1,247.73	1,247.76	1,201.84	45.91	27.176	
7,100.00	6,137.03	5,900.00	5,697.57	26.61	28.69	-69.15	-203.81	1,256.45	1,234.40	1,187.18	47.23	26.137	
7,200.00	6,135.10	5,932.62	5,726.18	27.37	28.92	-70.57	-214.64	1,267.77	1,228.28	1,179.51	48.77	25.187	
7,236.95	6,134.38	5,946.60	5,738.26	27.68	29.02	-71.18	-219.70	1,272.62	1,227.80	1,178.41	49.39	24.860	
7,300.00	6,133.17	5,973.79	5,761.49	28.21	29.21	-72.33	-230.26	1,282.04	1,229.14	1,178.66	50.48	24.348	
7,400.00	6,131.24	6,028.00	5,806.43	29.12	29.61	-74.57	-254.10	1,300.75	1,236.46	1,184.10	52.35	23.617	
7,500.00	6,129.31	6,101.58	5,864.18	30.08	30.15	-77.43	-292.15	1,325.79	1,249.19	1,194.83	54.36	22.979	
7,600.00	6,127.38	6,204.38	5,937.55	31.11	30.91	-81.04	-355.56	1,359.64	1,265.64	1,209.13	56.50	22.399	
7,700.00	6,125.46	6,350.17	6,024.34	32.18	32.02	-85.23	-463.56	1,404.17	1,282.92	1,224.15	58.77	21.828	
7,800.00	6,123.53	6,550.80	6,104.93	33.30	33.57	-89.06	-639.17	1,455.73	1,296.61	1,235.50	61.11	21.217	
7,900.00	6,121.60	6,786.91	6,134.88	34.47	35.38	-90.59	-868.59	1,497.15	1,301.51	1,238.18	63.33	20.550	
8,000.00	6,119.67	6,886.91	6,132.79	35.67	36.16	-90.58	-967.75	1,509.88	1,301.39	1,235.88	65.51	19.865	
8,100.00	6,117.74	6,986.91	6,130.70	36.90	36.99	-90.57	-1,066.92	1,522.61	1,301.28	1,233.50	67.78	19.200	
8,200.00	6,115.81	7,086.91	6,128.61	38.16	37.87	-90.56	-1,166.08	1,535.34	1,301.16	1,231.04	70.12	18.556	
8,300.00	6,113.88	7,186.91	6,126.51	39.46	38.80	-90.56	-1,265.25	1,548.07	1,301.04	1,228.50	72.54	17.935	
8,400.00	6,111.96	7,286.91	6,124.42	40.77	39.78	-90.55	-1,364.41	1,560.79	1,300.93	1,225.90	75.03	17.339	
8,500.00	6,110.03	7,386.91	6,122.33	42.11	40.80	-90.54	-1,463.57	1,573.52	1,300.81	1,223.24	77.57	16.769	
8,600.00	6,108.10	7,486.91	6,120.24	43.47	41.86	-90.54	-1,562.74	1,586.25	1,300.69	1,220.52	80.17	16.224	
8,700.00	6,106.17	7,586.91	6,118.14	44.85	42.95	-90.53	-1,661.90	1,598.98	1,300.57	1,217.75	82.82	15.703	
8,800.00	6,104.24	7,686.91	6,116.05	46.25	44.08	-90.52	-1,761.07	1,611.71	1,300.46	1,214.94	85.51	15.208	
8,900.00	6,102.31	7,786.91	6,113.96	47.66	45.25	-90.51	-1,860.23	1,624.44	1,300.34	1,212.09	88.25	14.735	
9,000.00	6,100.39	7,886.91	6,111.87	49.09	46.44	-90.51	-1,959.40	1,637.16	1,300.22	1,209.20	91.02	14.285	
9,100.00	6,098.46	7,986.91	6,109.77	50.52	47.66	-90.50	-2,058.56	1,649.89	1,300.10	1,206.28	93.82	13.857	
9,200.00	6,096.53	8,086.91	6,107.68	51.98	48.91	-90.49	-2,157.72	1,662.62	1,299.99	1,203.33	96.65	13.450	
9,300.00	6,094.60	8,186.91	6,105.59	53.44	50.18	-90.49	-2,256.89	1,675.35	1,299.87	1,200.36	99.51	13.062	
9,400.00	6,092.67	8,286.91	6,103.50	54.91	51.47	-90.48	-2,356.05	1,688.08	1,299.75	1,197.35	102.40	12.693	
9,500.00	6,090.74	8,386.91	6,101.41	56.39	52.78	-90.47	-2,455.22	1,700.81	1,299.64	1,194.33	105.31	12.341	
9,600.00	6,088.82	8,486.91	6,099.31	57.88	54.11	-90.46	-2,554.38	1,713.53	1,299.52	1,191.28	108.24	12.006	
9,700.00	6,086.89	8,586.91	6,097.22	59.38	55.46	-90.46	-2,653.55	1,726.26	1,299.40	1,188.21	111.19	11.686	
9,800.00	6,084.96	8,686.91	6,095.13	60.88	56.82	-90.45	-2,752.71	1,738.99	1,299.29	1,185.12	114.16	11.381	
9,900.00	6,083.03	8,786.91	6,093.04	62.39	58.19	-90.44	-2,851.88	1,751.72	1,299.17	1,182.02	117.15	11.090	
10,000.00	6,081.10	8,886.91	6,090.94	63.91	59.59	-90.44	-2,951.04	1,764.45	1,299.05	1,178.90	120.15	10.812	
10,100.00	6,079.17	8,986.91	6,088.85	65.43	60.99	-90.43	-3,050.20	1,777.18	1,298.93	1,175.77	123.16	10.546	
10,200.00	6,077.25	9,086.91	6,086.76	66.96	62.40	-90.42	-3,149.37	1,789.91	1,298.82	1,172.63	126.19	10.292	

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 2407-28O Com 2H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Reference Site:	Federal 2407-28O	**MD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-28O Com 2H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-28O - Federal 2407-28O Com 4H - OH - Plan #2 — **Offset Site Error:** 0.00 usft

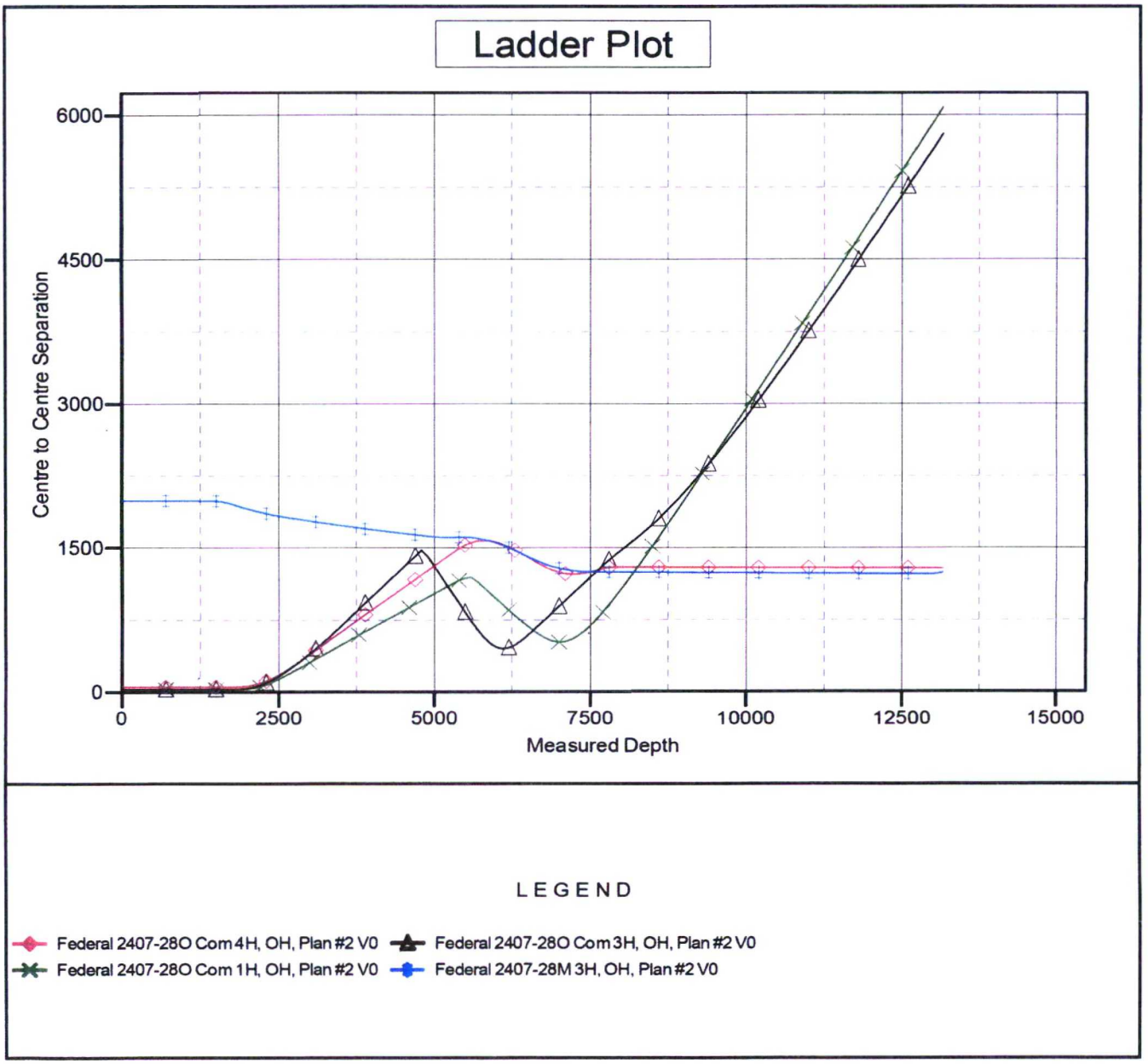
Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,300.00	6,075.32	9,186.91	6,084.67	68.50	63.83	-90.41	-3,248.53	1,802.63	1,298.70	1,169.47	129.23	10.049	
10,400.00	6,073.39	9,286.91	6,082.57	70.04	65.27	-90.41	-3,347.70	1,815.36	1,298.58	1,166.30	132.29	9.817	
10,500.00	6,071.46	9,386.91	6,080.48	71.58	66.71	-90.40	-3,446.86	1,828.09	1,298.47	1,163.12	135.35	9.594	
10,600.00	6,069.53	9,486.91	6,078.39	73.13	68.17	-90.39	-3,546.03	1,840.82	1,298.35	1,159.93	138.42	9.380	
10,700.00	6,067.60	9,586.91	6,076.30	74.68	69.63	-90.39	-3,645.19	1,853.55	1,298.23	1,156.73	141.50	9.175	
10,800.00	6,065.68	9,686.91	6,074.20	76.23	71.10	-90.38	-3,744.35	1,866.28	1,298.12	1,153.52	144.59	8.978	
10,900.00	6,063.75	9,786.91	6,072.11	77.79	72.58	-90.37	-3,843.52	1,879.00	1,298.00	1,150.31	147.69	8.788	
11,000.00	6,061.82	9,886.91	6,070.02	79.35	74.07	-90.36	-3,942.68	1,891.73	1,297.88	1,147.08	150.80	8.607	
11,100.00	6,059.89	9,986.91	6,067.93	80.92	75.56	-90.36	-4,041.85	1,904.46	1,297.77	1,143.85	153.91	8.432	
11,200.00	6,057.96	10,086.91	6,065.83	82.49	77.06	-90.35	-4,141.01	1,917.19	1,297.65	1,140.61	157.04	8.263	
11,300.00	6,056.03	10,186.91	6,063.74	84.06	78.56	-90.34	-4,240.18	1,929.92	1,297.53	1,137.37	160.16	8.101	
11,400.00	6,054.11	10,286.91	6,061.65	85.63	80.07	-90.33	-4,339.34	1,942.65	1,297.42	1,134.12	163.30	7.945	
11,500.00	6,052.18	10,386.91	6,059.56	87.21	81.58	-90.33	-4,438.51	1,955.37	1,297.30	1,130.87	166.43	7.795	
11,600.00	6,050.25	10,486.91	6,057.46	88.78	83.10	-90.32	-4,537.67	1,968.10	1,297.18	1,127.60	169.58	7.649	
11,700.00	6,048.32	10,586.91	6,055.37	90.36	84.63	-90.31	-4,636.83	1,980.83	1,297.07	1,124.34	172.73	7.509	
11,800.00	6,046.39	10,686.91	6,053.28	91.95	86.15	-90.31	-4,736.00	1,993.56	1,296.95	1,121.07	175.88	7.374	
11,900.00	6,044.46	10,786.91	6,051.19	93.53	87.68	-90.30	-4,835.16	2,006.29	1,296.83	1,117.79	179.04	7.243	
12,000.00	6,042.53	10,886.91	6,049.10	95.12	89.22	-90.29	-4,934.33	2,019.02	1,296.72	1,114.51	182.20	7.117	
12,100.00	6,040.61	10,986.91	6,047.00	96.70	90.76	-90.28	-5,033.49	2,031.74	1,296.60	1,111.23	185.37	6.995	
12,200.00	6,038.68	11,086.91	6,044.91	98.29	92.30	-90.28	-5,132.66	2,044.47	1,296.48	1,107.94	188.54	6.876	
12,300.00	6,036.75	11,186.90	6,042.82	99.89	93.85	-90.27	-5,231.82	2,057.20	1,296.37	1,104.65	191.71	6.762	
12,400.00	6,034.82	11,286.90	6,040.73	101.48	95.40	-90.26	-5,330.98	2,069.93	1,296.25	1,101.36	194.89	6.651	
12,500.00	6,032.89	11,386.90	6,038.63	103.07	96.95	-90.26	-5,430.15	2,082.66	1,296.13	1,098.06	198.07	6.544	
12,600.00	6,030.96	11,486.90	6,036.54	104.67	98.51	-90.25	-5,529.31	2,095.39	1,296.02	1,094.76	201.26	6.440	
12,700.00	6,029.04	11,586.90	6,034.45	106.27	100.06	-90.24	-5,628.48	2,108.11	1,295.90	1,091.46	204.44	6.339	
12,800.00	6,027.11	11,686.90	6,032.36	107.86	101.62	-90.23	-5,727.64	2,120.84	1,295.78	1,088.15	207.63	6.241	
12,900.00	6,025.18	11,786.90	6,030.26	109.46	103.19	-90.23	-5,826.81	2,133.57	1,295.67	1,084.84	210.82	6.146	
13,000.00	6,023.25	11,886.90	6,028.17	111.06	104.75	-90.22	-5,925.97	2,146.30	1,295.55	1,081.53	214.02	6.053	
13,100.00	6,021.32	11,986.90	6,026.08	112.67	106.32	-90.21	-6,025.13	2,159.03	1,295.44	1,078.22	217.22	5.964	
13,168.59	6,020.00	12,055.49	6,024.64	113.76	107.40	-90.21	-6,093.15	2,167.76	1,295.36	1,075.94	219.41	5.904	

Company:	Logos Operating LLC	**Local Co-ordinate Reference:**	Well Federal 2407-28O Com 2H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Reference Site:	Federal 2407-28O	**MD Reference:**	GL 7346' & RKB 14' @ 7360.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-28O Com 2H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to GL 7346' & RKB 14' @ 7360.00usft
Offset Depths are relative to Offset Datum
Central Meridian is -107.8333334

Coordinates are relative to: Federal 2407-28O Com 2H
Coordinate System is US State Plane 1983, New Mexico Western Zone
Grid Convergence at Surface is: 0.15°



Company:	Logos Operating LLC	**Local Co-ordinate Reference:**	Well Federal 2407-28O Com 2H
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Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
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Reference Depths are relative to GL 7346' & RKB 14' @ 7360.00usft
Offset Depths are relative to Offset Datum
Central Meridian is -107.8333334

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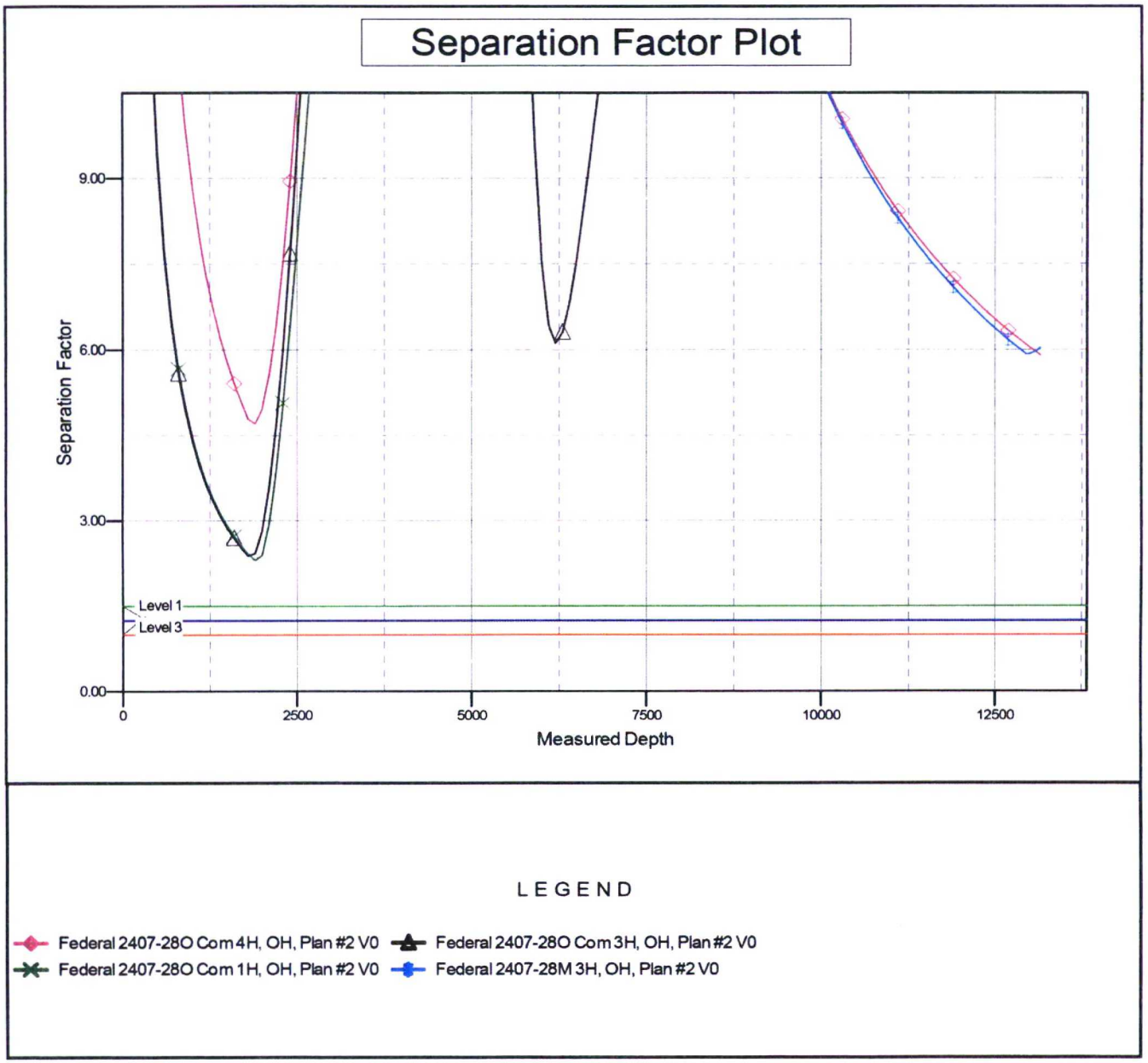
Coordinate System is US State Plane 1983, New Mexico Western Zone
Grid Convergence at Surface is: 0.15°



6 Construction Materials

Construction material would consist of native borrow material at the site locations. Topsoil at each site would be stripped and placed as a berm along the outer edge of the pad within EOD or as a windrow along the edge of the access and/or pipeline corridor. Topsoil would be stored separately and protected for use during interim reclamation. All pads and roads would be built with a balanced cut and fill, such that all material would be native. Subsoil horizons from cuts would be used as fill material to establish a level working surface, and to construct earthen berms where necessary. If the proposed projects cannot be constructed from the earthen materials present on-site, materials would be imported from a borrow pit or other location approved by the BLM-FFO. Imported fill material would be weed-free, and no concrete or other foreign materials would be brought in for use as fill. Vegetation removed during construction, including small trees and slash/brush, would be chipped or mulched and incorporated into the topsoil as additional organic matter. Trees with trunks that are 3 inches in diameter or greater would be cut, delimbed, and delivered to Navajo Chapter Houses in the area. The subsurface portion of trees (tree stumps) would be hauled to an approved disposal facility.

Whiptail may need to acquire material for use in padding pipelines and backfilling trenches in areas that are extremely rocky. No source for material has yet been identified because the volume that would be needed is unknown. If necessary, Whiptail would pursue permitting a quarry as a separate action.

Construction and maintenance activities would cease if soil or road surfaces become saturated to the extent that construction equipment is unable to stay within the permitted area and/or when activities cause irreparable harm to roads, soils, or streams.

7 Methods for Handling Waste

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

LOGOS would 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 would be used. All refuse would be placed in metal trash basket and would be hauled off site and properly disposed in an approved landfill. Portable toilets would be provided and maintained during all construction, drilling and completion operations.

Whiptail is considering development of a fluid transfer facility at the upper boring location (TUA #2). This location could assist operators in testing, treating, and storing water for reuse. All testing, treatment, and storage would be permitted as appropriate through the New Mexico Oil Conservation Division (NMOCD). Development of the site would depend on demand from operators and Whiptail's own needs in the area.

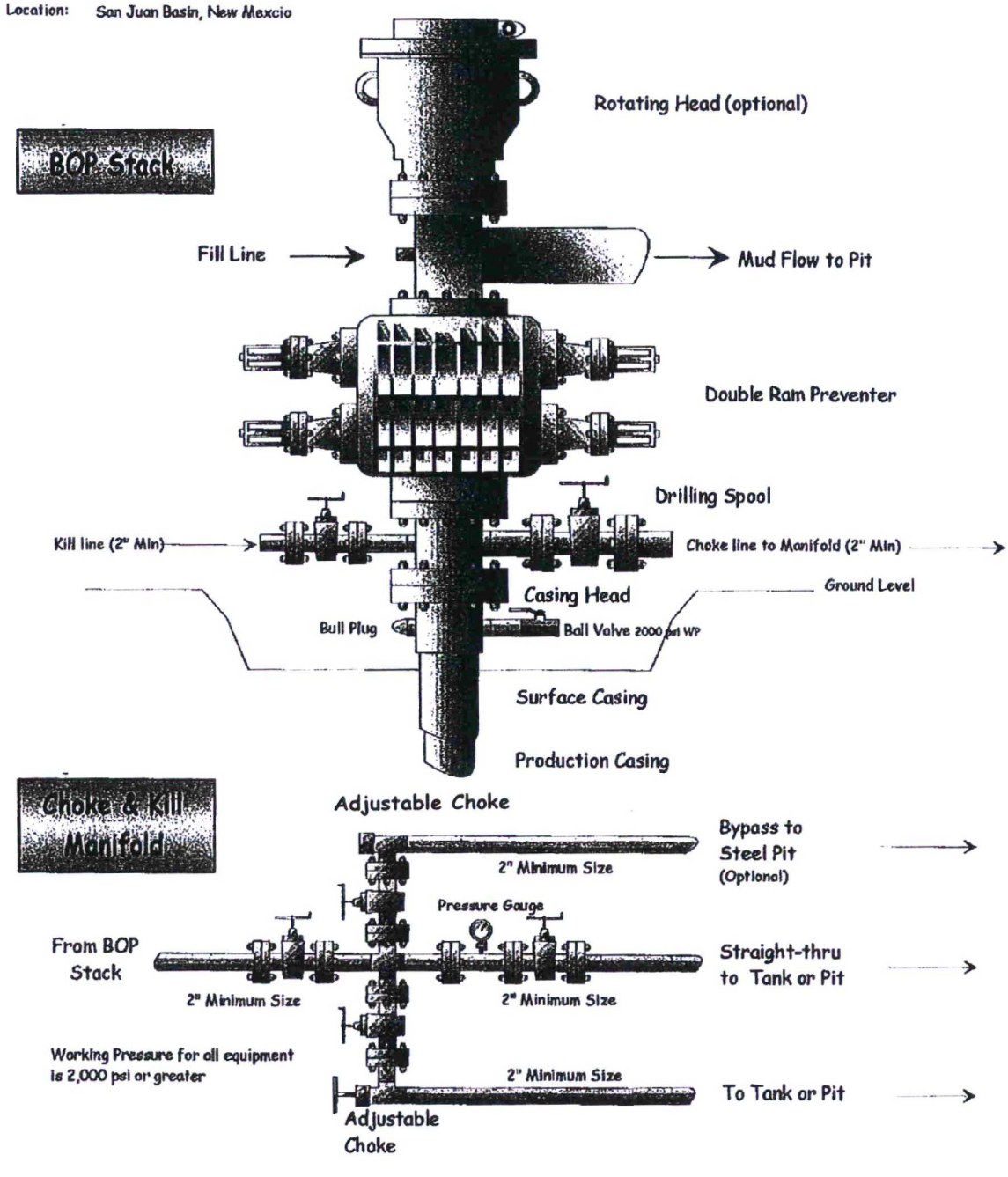
LOGOS RESOURCES II, LLC

Well Control Equipment Schematic for 2M Service

Attachment to Drilling Technical Program

Exhibit #1
Typical BOP setup

Location: San Juan Basin, New Mexcio



Directions from the Intersection of Highway 550 and Highway 64 in Bloomfield, NM
to
LOGOS OPERATING, LLC
FEDERAL 2407 28O COM #2H
904' FSL 2485' FEL,
Section 28, T24N, R7W, N.M.P.M.,
RIO ARRIBA COUNTY, NEW MEXICO
Latitude: 36° 16' 47.305" N
Longitude: 107° 34' 48.141" W
Nad 1983

From the Intersection of
Highway 550 & Highway 64, in Bloomfield, N.M.,
Go South on Hwy 550 for 46.9 miles to CR 0377
turn left on CR0377 (northerly) for 4.1 miles,
turn right (easterly) for 0.6 miles
to the new location.