State of New Mexico
Energy, Minerals and Natural Resources Department

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 29E

API# 30-039-31379, Section 29, Township 24 (N/S), Range 7 (E/W)

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

- ☒ Notify Aztec OCD 24hrs prior to casing & cement.
- ☒ Hold C-104 for directional survey & "As Drilled" Plat - 5.9 Compliance
- ☒ Hold C-104 for NSL, NSP, DHC
- ○ Spacing rule violation. Operator must follow up with change of status notification on other well to be shut in or abandoned
- ○ Regarding the use of a pit, closed loop system or below grade tank, the operator must comply with the following as applicable:
  - A pit requires a complete C-144 be submitted and approved prior to the construction or use of the pit, pursuant to 19.15.17.8.A
  - A closed loop system requires notification prior to use, pursuant to 19.15.17.9.A
  - A below grade tank requires a registration be filed prior to the construction or use of the below grade tank, pursuant to 19.15.17.8.C
- ○ Once the well is spud, to prevent ground water contamination through whole or partial conduits from the surface, the operator shall drill without interruption through the fresh water zone or zones and shall immediately set in cement the water protection string
- ○ Submit Gas Capture Plan form prior to spudding or initiating recompletion operations
- ✓ Regarding Hydraulic Fracturing, review EPA Underground Injection Control Guidance 84
- ✓ Oil base muds are not to be used until fresh water zones are cased and cemented providing isolation from the oil or diesel. This includes synthetic oils. Oil based mud, drilling fluids and solids must be contained in a steel closed loop system.
- ✓ Well-bore communication is regulated under 19.15.29 NMAC. This requires well-bore Communication to be reported in accordance with 19.15.29.8.

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

NMOCD Approved by Signature

12.12
3/26/19
Date

NMOCD

NOV 12 2019

DISTRICT III

Form 3160-3
(June 2015)

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 29E
1H

2. Name of Operator
LOGOS OPERATING LLC

9. API Well No.
30-039-31379

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 SWNW / 2188 FNL / 93 FWL / LAT 36.286109 / LONG -107.606383

At proposed prod. zone NENW / 85 FNL / 2352 FWL / LAT 36.306274 / LONG -107.61695

11. Sec., T. R. M. or Blk. and Survey or Area
SEC 29 / T24N / R7W / NMP

14. Distance in miles and direction from nearest town or post office*	12. County or Parish	13. State
46.8 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
85 feet	1520	320

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
20 feet	6169 feet / 13058 feet	FED: NMB001387

21. Elevations (Show whether DF, KDB, RT, GL, etc.)	22. Approximate date work will start*	23. Estimated duration
7300 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)* (Electronic Submission)	Name *(Printed/Typed)* Richard Fields / Ph: (505)564-7612	Date 11/07/2019
Title: Field Manager	Office: FARMINGTON	

Application approval does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.
Conditions of approval, if any, are attached.

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

APPROVED

NMOCD

(Continued on page 2)

*(Instructions on page 2)

Approval Date: 11/07/2019

District I
1625 N. French Drive, Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720
District II
811 S. First Street, Artesia, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720
District III
1000 Rio Brazos Road, Aztec, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170
District IV
1220 S. St. Francis Drive, 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 Drive
Santa Fe, NM 87505

Form C-102
Revised August 1, 2011

Submit one copy to
Appropriate District Office

☐ AMENDED REPORT

NMOCD
NOV 12 2019
DISTRICT III

WELL LOCATION AND ACREAGE DEDICATION PLAT

1 API Number	2 Pool Code	3 Pool Name
30-039-31379	22619	ESCRITO GALLUP (ASSOCIATED)

4 Property Code	5 Property Name	6 Well Number
326488	FEDERAL 2407 29E	111

7 OGRID No.	8 Operator Name	9 Elevation
289408	LOGOS OPERATING, LLC	7300'

10 Surface Location

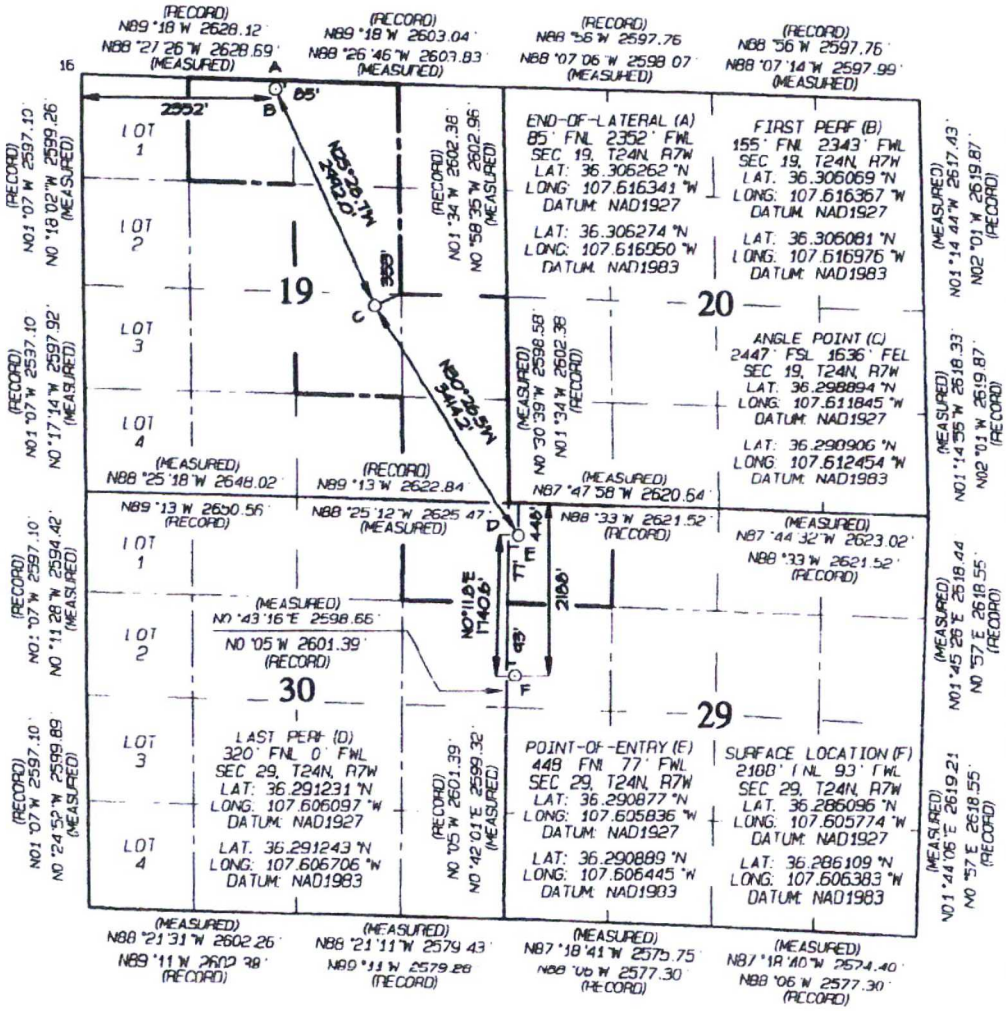
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
E	29	24N	7W		2188	NORTH	93	WEST	RIO ARRIBA

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
C	19	24N	7W		85	NORTH	2352	WEST	RIO ARRIBA

12 Dedicated Acres		13 Joint or Infill	14 Consolidation Code	15 Order No.
320.00	NE/4 NE/4 - Section 30 NW/4 NW/4 - Section 29 SE/4 SE/4, N/2 SE/4 W/2 NE/4, NE/4 NW/4 - Section 19			

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



17 OPERATOR CERTIFICATION

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

Date Revised: FEBRUARY 11, 2019
Survey Date: OCTOBER 31, 2018

Signature and Seal of Professional Surveyor

JASON C. EDWARDS
NEW MEXICO
15269
REGISTERED PROFESSIONAL SURVEYOR

JASON C. EDWARDS
Certificate Number 15269

LOGOS Operating, LLC
Operations Plan

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

Date:	February 6, 2019	Pool:	Escrito Gallup
Well Name:	**Federal 2407 29E Com 1H**	Elevation:	7,300'
Surface Location:	Sec 29, T24N, R7W 2188 FNL, 93 FWL (36.286109° N, 107.606383° W – NAD83)	Measured Depth:	13,058'
Bottom Hole Location:	Sec 19, T24N, R7W 85 FNL, 2352 FWL (36.306274° N, 107.616950° W – NAD83)	County:	Rio Arriba

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

I. GEOLOGY

A. Formation Tops (KB): Estimated top of important geological markers:

SURFACE FORMATION - NACIMIENTO

NAME	MD	TVD	NAME	MD	TVD
OJO ALAMO	1794	1793	MENEFEE	4065	4029
KIRTLAND	1934	1931	*POINT LOOKOUT	4744	4698
*FRUITLAND	2314	2305	*MANCOS	5088	5037
*PICTURED CLIFFS	2465	2454	GALLUP	6055	5989
LEWIS	2588	2575	KICKOFF POINT	5,698	5,543
CHACRA	2897	2879	LANDING POINT	6,659	6,094
*CLIFF HOUSE	4017	3982	TD	13,058	6,169

* 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 blindrams 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"	6,659'	7"	23 LBS	J-55 or equiv	LTC
PRODUCTION	6.125"	6,509' – 13,058'	4.5"	11.6 LBS	P-110 or equiv	LTC
TIE BACK	6.125"	Surf. – 6,509'	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: 240 bbls, 691 sks (1347 cu.ft.), 12.3 ppg@ 1.95 cuft/sk yield. Tail Cement: 42.8 bbls, 185 sks, (240.4 cuft), 13.5 ppg@ 1.3 cu'ft/sk yield. Displacement: Displace w/ +/- 261 bbl Drilling mud or water. Total Cement: 283 bbls, 876 sks, (1587 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 (591 sx / 804 cuft /143 bbls). Tail Spacer: 40 BBL of MMCR. Displacement: Displace w/ +/- 172 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

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

Federal 2407 29E Com 1H

	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 29E Com 1H

Intermediate	Top Interval	Btm Interval	Size	Weight	Grade	Conn	Collapse	Burst	Tension	Notes
Interval 1	0	6659	7	23	J55	LTC	3,270	4,360	313,000	0'-6659'
							1.125	1.000	1.200	

Collapse

			Depth TVD	MW in	MW out	Pres in	Pres out	SF - 1.125
Interval 1	0	6659	6094	0	9	0	2852	1.15
23	J55							

Burst

			Depth TVD	MW in	MW out	Pres in	Pres out	SF - 1.0	Frac Pres
Interval 1	0	6659	6094	9	0	2852	0	1.53	0
23	J55					2852			

Tension

			Depth TVD	Mud Wt	Air Wt	Bouy Wt	BW +100k	SF - 1.2
Interval 1	0	6659	6094	9	140,162	120,903	220,903	1.42
23	J55			BF				
				0.8626				

BF= 1- (MW)/65.5

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

Federal 2407 29E Com 1H

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 13058', TVD 6169'
					1.125	1.000	1.200	

Collapse	Casing Depth (TVD)	MW in	MW out	Pres in	Pres out	SF		
	6169	0.00	9.00	0	2887	2.62		
Burst	6169	9.00	0.00	2887	0	1.14	6500	6500 psi frac pressure + no backup
				9387				Burst pressure = Hyd + frac pressure
Tension		Mud Wt	Air Wt	Bouy Wt	BW +100k			100k over pull
	6169	8.80	71,560	61,946	161,946	1.72		
		BF						BF= 1- (MW)/65.5
		0.8656						

LOGOS RESOURCES II, LLC

Company: Logos Operating LLC
Project: Rio Arriba, NM NAD83
Site: Federal 2407-29E
Well: Federal 2407-29E 1H
Wellbore: OH
Design: Plan #2

PROJECT DETAILS: Rio Arriba, NM NAD83

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

Scientific Drilling

Azimuths to True North
Magnetic North: 8.77°

Magnetic Field
Strength: 49509.9snT
Dip Angle: 62.88°
Date: 12/6/2018
Model: HDGM

WELL DETAILS: Federal 2407-29E 1H

GL 7300' & RKB 14' @ 7314.00usft

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	
0.00	0.00	1923521.45	2789977.45	36.2861090	-107.6063830	Fed 1H

Plan: Plan #2 (Federal 2407-29E 1H/OH)

Created By: Janie Collins Date: 18:23, January 03 2019

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Fed 29E 1H LP	6094.00	1740.05	-18.27	1925261.45	2789955.10	36.2908890	-107.6064450
Fed 29E 1H BHL	6169.00	7340.78	-3113.47	1930854.92	2786846.78	36.3062740	-107.6169500

SECTION DETAILS

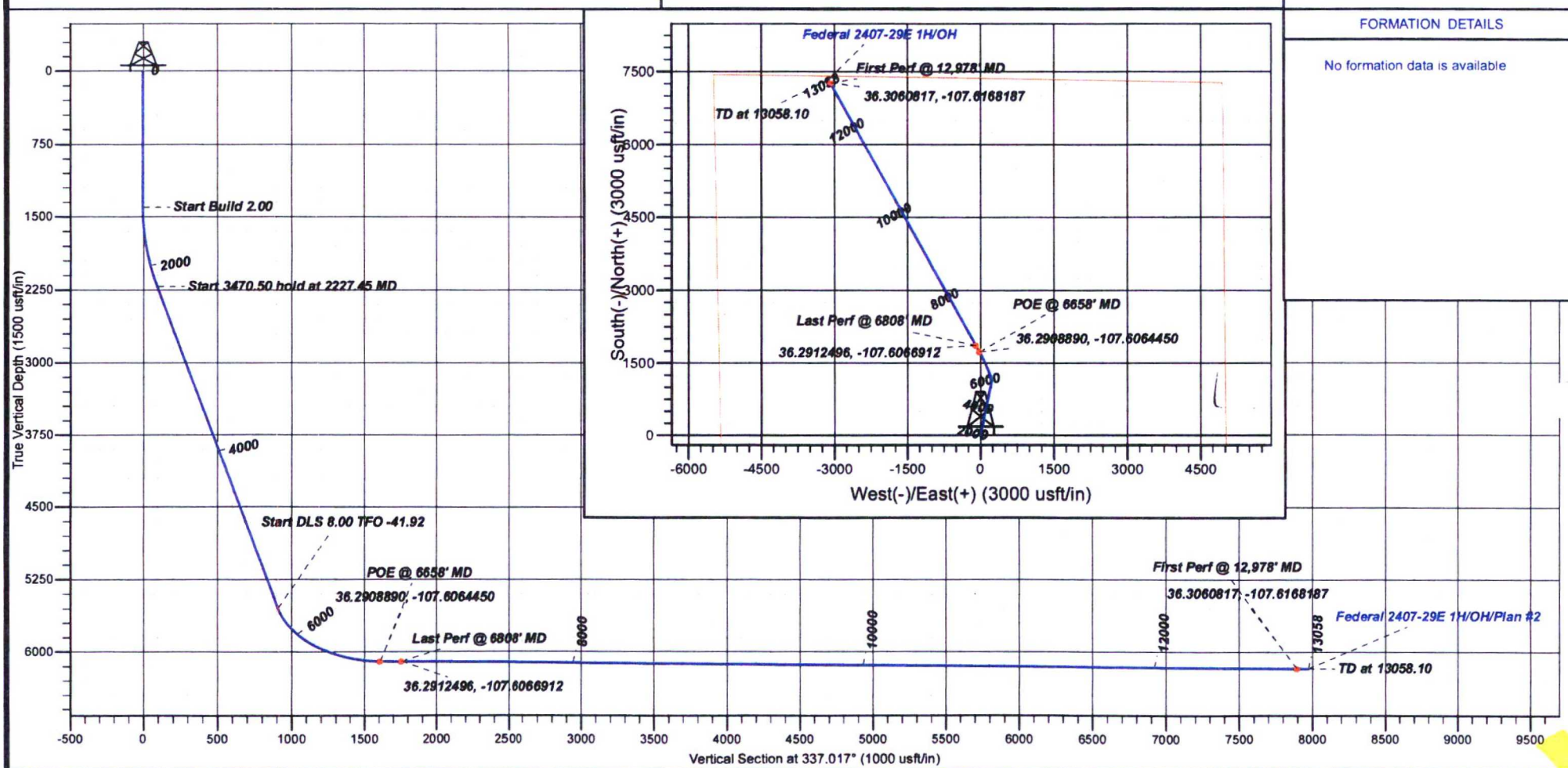
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	
1400.00	0.00	0.000	1400.00	0.00	0.00	0.00	0.00	0.00	
2227.45	16.55	11.662	2215.99	116.22	23.99	2.00	11.66	97.63	
5697.95	16.55	11.662	5542.73	1084.33	223.81	0.00	0.00	910.87	
6658.56	89.33	331.073	6094.00	1740.05	-18.27	8.00	-41.92	1609.05	Fed 29E 1H LP
13058.10	89.33	331.073	6169.00	7340.78	-3113.47	0.00	0.00	7973.76	Fed 29E 1H BHL

CASING DETAILS

No casing data is available

FORMATION DETAILS

No formation data is available



Logos Operating LLC

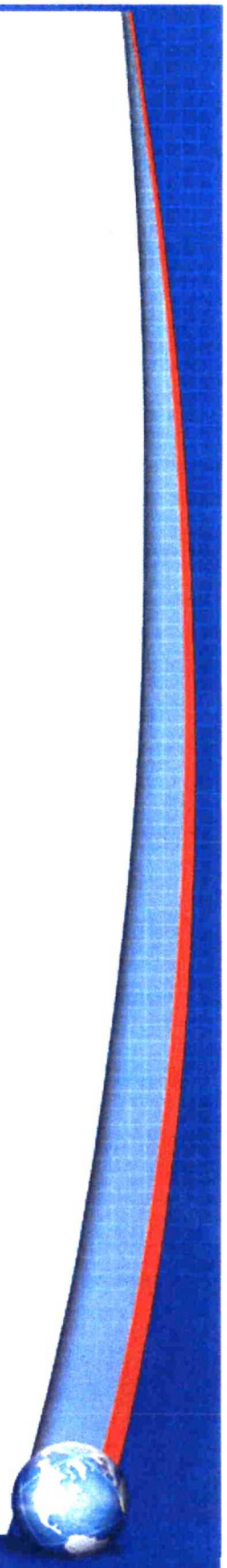
Rio Arriba, NM NAD83
Federal 2407-29E
Federal 2407-29E 1H - Slot Fed 1H

OH

Plan: Plan #2

Standard Planning Report

03 January, 2019



www.scientificdrilling.com

Database:	Grand Junction District	**Local Co-ordinate Reference:**	Well Federal 2407-29E 1H - Slot Fed 1H
Company:	Logos Operating LLC	**TVD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Project:	Rio Arriba, NM NAD83	**MD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Site:	Federal 2407-29E	**North Reference:**	True
Well:	Federal 2407-29E 1H	**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 2407-29E				
Site Position:		**Northing:**	1,923,521.45 usft	**Latitude:**	36.2861090
From:	Lat/Long	**Easting:**	2,789,977.45 usft	**Longitude:**	-107.6063830
Position Uncertainty:	0.00 usft	**Slot Radius:**	13.20 in	**Grid Convergence:**	0.13 °

Well	Federal 2407-29E 1H - Slot Fed 1H					
Well Position	**+N/-S**	0.00 usft	**Northing:**	1,923,521.45 usft	**Latitude:**	36.2861090
	+E/-W	0.00 usft	**Easting:**	2,789,977.45 usft	**Longitude:**	-107.6063830
Position Uncertainty		0.00 usft	**Wellhead Elevation:**	0.00 usft	**Ground Level:**	7,300.00 usft

Wellbore	OH			
Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	HDGM	12/6/2018	8.77	62.88	49,510

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	337.017	

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	
1,400.00	0.00	0.000	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,227.45	16.55	11.662	2,215.99	116.22	23.99	2.00	2.00	0.00	11.66	
5,697.95	16.55	11.662	5,542.73	1,084.33	223.81	0.00	0.00	0.00	0.00	
6,658.56	89.33	331.073	6,094.00	1,740.05	-18.27	8.00	7.58	-4.23	-41.92	Fed 29E 1H LP
13,058.10	89.33	331.073	6,169.00	7,340.78	-3,113.47	0.00	0.00	0.00	0.00	Fed 29E 1H BHL

Database:	Grand Junction District	**Local Co-ordinate Reference:**	Well Federal 2407-29E 1H - Slot Fed 1H
Company:	Logos Operating LLC	**TVD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Project:	Rio Arriba, NM NAD83	**MD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Site:	Federal 2407-29E	**North Reference:**	True
Well:	Federal 2407-29E 1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.000	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
Start Build 2.00									
1,500.00	2.00	11.662	1,499.98	1.71	0.35	1.44	2.00	2.00	0.00
1,600.00	4.00	11.662	1,599.84	6.83	1.41	5.74	2.00	2.00	0.00
1,700.00	6.00	11.662	1,699.45	15.37	3.17	12.91	2.00	2.00	0.00
1,800.00	8.00	11.662	1,798.70	27.30	5.64	22.94	2.00	2.00	0.00
1,900.00	10.00	11.662	1,897.47	42.62	8.80	35.81	2.00	2.00	0.00
2,000.00	12.00	11.662	1,995.62	61.31	12.65	51.50	2.00	2.00	0.00
2,100.00	14.00	11.662	2,093.06	83.34	17.20	70.01	2.00	2.00	0.00
2,200.00	16.00	11.662	2,189.64	108.69	22.43	91.30	2.00	2.00	0.00
2,227.45	16.55	11.662	2,215.99	116.22	23.99	97.63	2.00	2.00	0.00
Start 3470.50 hold at 2227.45 MD									
2,300.00	16.55	11.662	2,285.54	136.46	28.17	114.63	0.00	0.00	0.00
2,400.00	16.55	11.662	2,381.40	164.35	33.92	138.06	0.00	0.00	0.00
2,500.00	16.55	11.662	2,477.25	192.25	39.68	161.49	0.00	0.00	0.00
2,600.00	16.55	11.662	2,573.11	220.14	45.44	184.93	0.00	0.00	0.00
2,700.00	16.55	11.662	2,668.97	248.04	51.20	208.36	0.00	0.00	0.00
2,800.00	16.55	11.662	2,764.83	275.94	56.95	231.79	0.00	0.00	0.00
2,900.00	16.55	11.662	2,860.68	303.83	62.71	255.23	0.00	0.00	0.00
3,000.00	16.55	11.662	2,956.54	331.73	68.47	278.66	0.00	0.00	0.00
3,100.00	16.55	11.662	3,052.40	359.62	74.23	302.09	0.00	0.00	0.00
3,200.00	16.55	11.662	3,148.26	387.52	79.98	325.52	0.00	0.00	0.00
3,300.00	16.55	11.662	3,244.11	415.41	85.74	348.96	0.00	0.00	0.00
3,400.00	16.55	11.662	3,339.97	443.31	91.50	372.39	0.00	0.00	0.00
3,500.00	16.55	11.662	3,435.83	471.20	97.26	395.82	0.00	0.00	0.00
3,600.00	16.55	11.662	3,531.69	499.10	103.01	419.26	0.00	0.00	0.00
3,700.00	16.55	11.662	3,627.54	527.00	108.77	442.69	0.00	0.00	0.00
3,800.00	16.55	11.662	3,723.40	554.89	114.53	466.12	0.00	0.00	0.00
3,900.00	16.55	11.662	3,819.26	582.79	120.29	489.56	0.00	0.00	0.00
4,000.00	16.55	11.662	3,915.12	610.68	126.05	512.99	0.00	0.00	0.00
4,100.00	16.55	11.662	4,010.98	638.58	131.80	536.42	0.00	0.00	0.00
4,200.00	16.55	11.662	4,106.83	666.47	137.56	559.85	0.00	0.00	0.00
4,300.00	16.55	11.662	4,202.69	694.37	143.32	583.29	0.00	0.00	0.00
4,400.00	16.55	11.662	4,298.55	722.26	149.08	606.72	0.00	0.00	0.00
4,500.00	16.55	11.662	4,394.41	750.16	154.83	630.15	0.00	0.00	0.00
4,600.00	16.55	11.662	4,490.26	778.05	160.59	653.59	0.00	0.00	0.00
4,700.00	16.55	11.662	4,586.12	805.95	166.35	677.02	0.00	0.00	0.00
4,800.00	16.55	11.662	4,681.98	833.85	172.11	700.45	0.00	0.00	0.00
4,900.00	16.55	11.662	4,777.84	861.74	177.86	723.88	0.00	0.00	0.00
5,000.00	16.55	11.662	4,873.69	889.64	183.62	747.32	0.00	0.00	0.00

Database:	Grand Junction District	**Local Co-ordinate Reference:**	Well Federal 2407-29E 1H - Slot Fed 1H
Company:	Logos Operating LLC	**TVD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Project:	Rio Arriba, NM NAD83	**MD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Site:	Federal 2407-29E	**North Reference:**	True
Well:	Federal 2407-29E 1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,100.00	16.55	11.662	4,969.55	917.53	189.38	770.75	0.00	0.00	0.00
5,200.00	16.55	11.662	5,065.41	945.43	195.14	794.18	0.00	0.00	0.00
5,300.00	16.55	11.662	5,161.27	973.32	200.89	817.62	0.00	0.00	0.00
5,400.00	16.55	11.662	5,257.13	1,001.22	206.65	841.05	0.00	0.00	0.00
5,500.00	16.55	11.662	5,352.98	1,029.11	212.41	864.48	0.00	0.00	0.00
5,600.00	16.55	11.662	5,448.84	1,057.01	218.17	887.91	0.00	0.00	0.00
5,697.95	16.55	11.662	5,542.73	1,084.33	223.81	910.87	0.00	0.00	0.00
Start DLS 8.00 TFO -41.92									
5,700.00	16.67	11.279	5,544.70	1,084.91	223.92	911.35	8.00	5.97	-18.63
5,800.00	23.25	357.757	5,638.69	1,118.75	225.96	941.72	8.00	6.58	-13.52
5,900.00	30.49	350.160	5,727.85	1,163.55	220.84	984.96	8.00	7.24	-7.60
6,000.00	38.02	345.299	5,810.46	1,218.43	208.67	1,040.23	8.00	7.52	-4.86
6,100.00	45.68	341.854	5,884.91	1,282.31	189.69	1,106.46	8.00	7.67	-3.45
6,200.00	53.43	339.212	5,949.74	1,353.97	164.25	1,182.35	8.00	7.74	-2.64
6,300.00	61.22	337.055	6,003.69	1,431.99	132.86	1,266.44	8.00	7.79	-2.16
6,400.00	69.04	335.201	6,045.72	1,514.87	96.14	1,357.07	8.00	7.82	-1.85
6,500.00	76.88	333.532	6,075.00	1,600.98	54.78	1,452.50	8.00	7.84	-1.67
6,600.00	84.73	331.967	6,090.97	1,688.66	9.61	1,550.86	8.00	7.85	-1.56
6,658.56	89.33	331.073	6,094.00	1,740.05	-18.27	1,609.06	8.00	7.85	-1.53
POE @ 6658' MD - 36.2908890, -107.6064450									
6,700.00	89.33	331.073	6,094.49	1,776.32	-38.32	1,650.27	0.00	0.00	0.00
6,800.00	89.33	331.073	6,095.66	1,863.84	-86.68	1,749.73	0.00	0.00	0.00
6,808.56	89.33	331.073	6,095.76	1,871.33	-90.82	1,758.24	0.00	0.00	0.00
Last Perf @ 6808' MD - 36.2912496, -107.6066912									
6,900.00	89.33	331.073	6,096.83	1,951.36	-135.05	1,849.18	0.00	0.00	0.00
7,000.00	89.33	331.073	6,098.00	2,038.87	-183.41	1,948.64	0.00	0.00	0.00
7,100.00	89.33	331.073	6,099.17	2,126.39	-231.78	2,048.10	0.00	0.00	0.00
7,200.00	89.33	331.073	6,100.35	2,213.91	-280.15	2,147.55	0.00	0.00	0.00
7,300.00	89.33	331.073	6,101.52	2,301.43	-328.51	2,247.01	0.00	0.00	0.00
7,400.00	89.33	331.073	6,102.69	2,388.95	-376.88	2,346.46	0.00	0.00	0.00
7,500.00	89.33	331.073	6,103.86	2,476.46	-425.24	2,445.92	0.00	0.00	0.00
7,600.00	89.33	331.073	6,105.03	2,563.98	-473.61	2,545.37	0.00	0.00	0.00
7,700.00	89.33	331.073	6,106.21	2,651.50	-521.98	2,644.83	0.00	0.00	0.00
7,800.00	89.33	331.073	6,107.38	2,739.02	-570.34	2,744.29	0.00	0.00	0.00
7,900.00	89.33	331.073	6,108.55	2,826.53	-618.71	2,843.74	0.00	0.00	0.00
8,000.00	89.33	331.073	6,109.72	2,914.05	-667.07	2,943.20	0.00	0.00	0.00
8,100.00	89.33	331.073	6,110.89	3,001.57	-715.44	3,042.65	0.00	0.00	0.00
8,200.00	89.33	331.073	6,112.07	3,089.09	-763.81	3,142.11	0.00	0.00	0.00
8,300.00	89.33	331.073	6,113.24	3,176.60	-812.17	3,241.56	0.00	0.00	0.00
8,400.00	89.33	331.073	6,114.41	3,264.12	-860.54	3,341.02	0.00	0.00	0.00
8,500.00	89.33	331.073	6,115.58	3,351.64	-908.90	3,440.48	0.00	0.00	0.00
8,600.00	89.33	331.073	6,116.75	3,439.16	-957.27	3,539.93	0.00	0.00	0.00
8,700.00	89.33	331.073	6,117.93	3,526.68	-1,005.64	3,639.39	0.00	0.00	0.00
8,800.00	89.33	331.073	6,119.10	3,614.19	-1,054.00	3,738.84	0.00	0.00	0.00
8,900.00	89.33	331.073	6,120.27	3,701.71	-1,102.37	3,838.30	0.00	0.00	0.00
9,000.00	89.33	331.073	6,121.44	3,789.23	-1,150.73	3,937.75	0.00	0.00	0.00
9,100.00	89.33	331.073	6,122.61	3,876.75	-1,199.10	4,037.21	0.00	0.00	0.00
9,200.00	89.33	331.073	6,123.78	3,964.26	-1,247.47	4,136.66	0.00	0.00	0.00
9,300.00	89.33	331.073	6,124.96	4,051.78	-1,295.83	4,236.12	0.00	0.00	0.00
9,400.00	89.33	331.073	6,126.13	4,139.30	-1,344.20	4,335.58	0.00	0.00	0.00
9,500.00	89.33	331.073	6,127.30	4,226.82	-1,392.56	4,435.03	0.00	0.00	0.00
9,600.00	89.33	331.073	6,128.47	4,314.34	-1,440.93	4,534.49	0.00	0.00	0.00
9,700.00	89.33	331.073	6,129.64	4,401.85	-1,489.30	4,633.94	0.00	0.00	0.00

Database:	Grand Junction District	**Local Co-ordinate Reference:**	Well Federal 2407-29E 1H - Slot Fed 1H
Company:	Logos Operating LLC	**TVD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Project:	Rio Arriba, NM NAD83	**MD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Site:	Federal 2407-29E	**North Reference:**	True
Well:	Federal 2407-29E 1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
9,800.00	89.33	331.073	6,130.82	4,489.37	-1,537.66	4,733.40	0.00	0.00	0.00
9,900.00	89.33	331.073	6,131.99	4,576.89	-1,586.03	4,832.85	0.00	0.00	0.00
10,000.00	89.33	331.073	6,133.16	4,664.41	-1,634.39	4,932.31	0.00	0.00	0.00
10,100.00	89.33	331.073	6,134.33	4,751.92	-1,682.76	5,031.77	0.00	0.00	0.00
10,200.00	89.33	331.073	6,135.50	4,839.44	-1,731.13	5,131.22	0.00	0.00	0.00
10,300.00	89.33	331.073	6,136.68	4,926.96	-1,779.49	5,230.68	0.00	0.00	0.00
10,400.00	89.33	331.073	6,137.85	5,014.48	-1,827.86	5,330.13	0.00	0.00	0.00
10,500.00	89.33	331.073	6,139.02	5,102.00	-1,876.22	5,429.59	0.00	0.00	0.00
10,600.00	89.33	331.073	6,140.19	5,189.51	-1,924.59	5,529.04	0.00	0.00	0.00
10,700.00	89.33	331.073	6,141.36	5,277.03	-1,972.96	5,628.50	0.00	0.00	0.00
10,800.00	89.33	331.073	6,142.54	5,364.55	-2,021.32	5,727.95	0.00	0.00	0.00
10,900.00	89.33	331.073	6,143.71	5,452.07	-2,069.69	5,827.41	0.00	0.00	0.00
11,000.00	89.33	331.073	6,144.88	5,539.58	-2,118.05	5,926.87	0.00	0.00	0.00
11,100.00	89.33	331.073	6,146.05	5,627.10	-2,166.42	6,026.32	0.00	0.00	0.00
11,200.00	89.33	331.073	6,147.22	5,714.62	-2,214.79	6,125.78	0.00	0.00	0.00
11,300.00	89.33	331.073	6,148.40	5,802.14	-2,263.15	6,225.23	0.00	0.00	0.00
11,400.00	89.33	331.073	6,149.57	5,889.66	-2,311.52	6,324.69	0.00	0.00	0.00
11,500.00	89.33	331.073	6,150.74	5,977.17	-2,359.88	6,424.14	0.00	0.00	0.00
11,600.00	89.33	331.073	6,151.91	6,064.69	-2,408.25	6,523.60	0.00	0.00	0.00
11,700.00	89.33	331.073	6,153.08	6,152.21	-2,456.62	6,623.06	0.00	0.00	0.00
11,800.00	89.33	331.073	6,154.26	6,239.73	-2,504.98	6,722.51	0.00	0.00	0.00
11,900.00	89.33	331.073	6,155.43	6,327.24	-2,553.35	6,821.97	0.00	0.00	0.00
12,000.00	89.33	331.073	6,156.60	6,414.76	-2,601.71	6,921.42	0.00	0.00	0.00
12,100.00	89.33	331.073	6,157.77	6,502.28	-2,650.08	7,020.88	0.00	0.00	0.00
12,200.00	89.33	331.073	6,158.94	6,589.80	-2,698.45	7,120.33	0.00	0.00	0.00
12,300.00	89.33	331.073	6,160.12	6,677.31	-2,746.81	7,219.79	0.00	0.00	0.00
12,400.00	89.33	331.073	6,161.29	6,764.83	-2,795.18	7,319.24	0.00	0.00	0.00
12,500.00	89.33	331.073	6,162.46	6,852.35	-2,843.54	7,418.70	0.00	0.00	0.00
12,600.00	89.33	331.073	6,163.63	6,939.87	-2,891.91	7,518.16	0.00	0.00	0.00
12,700.00	89.33	331.073	6,164.80	7,027.39	-2,940.28	7,617.61	0.00	0.00	0.00
12,800.00	89.33	331.073	6,165.98	7,114.90	-2,988.64	7,717.07	0.00	0.00	0.00
12,900.00	89.33	331.073	6,167.15	7,202.42	-3,037.01	7,816.52	0.00	0.00	0.00
12,978.10	89.33	331.073	6,168.06	7,270.77	-3,074.78	7,894.20	0.00	0.00	0.00
First Perf @ 12,978' MD - 36.3060817, -107.6168187									
13,000.00	89.33	331.073	6,168.32	7,289.94	-3,085.37	7,915.98	0.00	0.00	0.00
13,058.10	89.33	331.073	6,169.00	7,340.78	-3,113.47	7,973.76	0.00	0.00	0.00
TD at 13058.10									

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 29E 1H LP - plan hits target center - Point	0.00	0.000	6,094.00	1,740.05	-18.27	1,925,261.46	2,789,955.10	36.2908890	-107.6064450
Fed 29E 1H BHL - plan hits target center - Point	0.00	0.000	6,169.00	7,340.78	-3,113.47	1,930,854.92	2,786,846.78	36.3062740	-107.6169500

Database:	Grand Junction District	**Local Co-ordinate Reference:**	Well Federal 2407-29E 1H - Slot Fed 1H
Company:	Logos Operating LLC	**TVD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Project:	Rio Arriba, NM NAD83	**MD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Site:	Federal 2407-29E	**North Reference:**	True
Well:	Federal 2407-29E 1H	**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
1,400.00	1,400.00	0.00	0.00	Start Build 2.00
2,227.45	2,215.99	116.22	23.99	Start 3470.50 hold at 2227.45 MD
5,697.95	5,542.73	1,084.33	223.81	Start DLS 8.00 TFO -41.92
6,658.56	6,094.00	1,740.05	-18.27	POE @ 6658' MD
6,658.56	6,094.00	1,740.05	-18.27	36.2908890, -107.6064450
6,808.56	6,095.76	1,871.33	-90.82	Last Perf @ 6808' MD
6,808.56	6,095.76	1,871.33	-90.82	36.2912496, -107.6066912
12,978.10	6,168.06	7,270.77	-3,074.78	First Perf @ 12,978' MD
12,978.10	6,168.06	7,270.77	-3,074.78	36.3060817, -107.6168187
13,058.10	6,169.00	7,340.78	-3,113.47	TD at 13058.10

LOGOS RESOURCES II, LLC

Logos Operating LLC

Rio Arriba, NM NAD83
Federal 2407-29E
Federal 2407-29E 1H

OH
Plan #2

Anticollision Report

03 January, 2019

Scientific Drilling

www.scientificdrilling.com

Company:	Logos Operating LLC	**Local Co-ordinate Reference:**	Well Federal 2407-29E 1H - Slot Fed 1H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Reference Site:	Federal 2407-29E	**MD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-29E 1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

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

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

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	13,058.10	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 2407-29E						
Federal 2407-29E 2H - OH - Plan #2	200.00	200.00	19.53	18.51	19.052	CC, ES
Federal 2407-29E 2H - OH - Plan #2	13,058.10	12,796.80	1,809.19	1,477.15	5.449	SF
Federal 2407-29E 3H - OH - Plan #2	1,742.29	1,741.48	34.31	22.23	2.841	CC, ES
Federal 2407-29E 3H - OH - Plan #2	1,800.00	1,798.70	35.11	22.62	2.811	SF
Federal 2407-29E 4H - OH - Plan #2	1,949.53	1,946.38	53.85	40.28	3.969	CC, ES
Federal 2407-29E 4H - OH - Plan #2	2,000.00	1,996.28	54.36	40.43	3.902	SF
Federal 2407-29E 5H - OH - Plan #2	1,208.89	1,213.57	45.75	37.42	5.494	CC, ES, SF

Offset Design Federal 2407-29E - Federal 2407-29E 2H - 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	-46.40	13.47	-14.15	19.53				
100.00	100.00	100.00	100.00	0.15	0.15	-46.40	13.47	-14.15	19.53	19.22	0.31	63.360	
200.00	200.00	200.00	200.00	0.51	0.51	-46.40	13.47	-14.15	19.53	18.51	1.03	19.052	CC, ES
300.00	300.00	299.32	299.30	0.87	0.87	-44.93	14.99	-14.95	21.18	19.36	1.82	11.642	
400.00	400.00	398.40	398.24	1.23	1.23	-41.64	19.54	-17.37	26.20	23.52	2.68	9.792	
500.00	500.00	497.00	496.47	1.59	1.59	-38.29	27.06	-21.36	34.65	31.11	3.54	9.779	
600.00	600.00	594.91	593.66	1.95	1.96	-35.66	37.47	-26.89	46.55	42.15	4.41	10.564	
700.00	700.00	693.17	690.84	2.30	2.34	-33.81	50.31	-33.70	61.24	56.12	5.12	11.956	
800.00	800.00	792.03	788.57	2.66	2.73	-32.66	63.45	-40.67	76.22	70.46	5.77	13.220	
900.00	900.00	890.89	886.31	3.02	3.13	-31.88	76.58	-47.64	91.22	84.79	6.43	14.191	
1,000.00	1,000.00	989.75	984.05	3.38	3.53	-31.33	89.72	-54.61	106.23	99.13	7.10	14.959	
1,100.00	1,100.00	1,088.62	1,081.79	3.74	3.93	-30.91	102.85	-61.58	121.25	113.47	7.78	15.577	
1,200.00	1,200.00	1,187.48	1,179.53	4.10	4.33	-30.58	115.98	-68.55	136.27	127.80	8.47	16.083	
1,300.00	1,300.00	1,286.34	1,277.26	4.46	4.73	-30.32	129.12	-75.52	151.30	142.13	9.17	16.503	
1,400.00	1,400.00	1,385.20	1,375.00	4.81	5.14	-30.11	142.25	-82.49	166.33	156.46	9.87	16.857	
1,500.00	1,499.98	1,484.25	1,472.92	5.17	5.54	-41.78	155.41	-89.47	180.07	169.50	10.57	17.038	
1,600.00	1,599.84	1,583.58	1,571.12	5.53	5.95	-42.50	168.61	-96.47	191.25	179.98	11.27	16.964	
1,700.00	1,699.45	1,683.07	1,669.48	5.89	6.36	-43.84	181.83	-103.49	199.96	187.97	11.98	16.684	
1,800.00	1,798.70	1,782.60	1,767.88	6.25	6.77	-45.77	195.05	-110.51	206.34	193.64	12.70	16.245	
1,900.00	1,897.47	1,882.05	1,866.20	6.61	7.18	-48.30	208.26	-117.52	210.64	197.21	13.43	15.689	
2,000.00	1,995.62	1,981.31	1,964.32	6.98	7.58	-51.46	221.45	-124.52	213.17	199.00	14.16	15.052	

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 2407-29E 1H - Slot Fed 1H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Reference Site:	Federal 2407-29E	**MD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-29E 1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-29E - Federal 2407-29E 2H - 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
2,100.00	2,093.06	2,080.23	2,062.13	7.37	7.99	-55.29	234.59	-131.49	214.34	199.43	14.91	14.372	
2,200.00	2,189.64	2,178.72	2,159.49	7.77	8.40	-59.83	247.68	-138.43	214.72	199.03	15.69	13.684	
2,300.00	2,285.54	2,276.81	2,256.47	8.18	8.80	-64.92	260.71	-145.35	215.38	198.89	16.50	13.054	
2,400.00	2,381.40	2,374.88	2,353.42	8.61	9.20	-69.96	273.74	-152.26	217.74	200.41	17.34	12.560	
2,500.00	2,477.25	2,472.95	2,450.37	9.05	9.61	-74.86	286.77	-159.18	221.81	203.62	18.20	12.191	
2,600.00	2,573.11	2,571.01	2,547.32	9.50	10.01	-79.56	299.80	-166.09	227.50	208.42	19.07	11.928	
2,700.00	2,668.97	2,669.08	2,644.27	9.95	10.41	-84.01	312.82	-173.01	234.68	214.71	19.96	11.756	
2,800.00	2,764.83	2,767.15	2,741.23	10.41	10.82	-88.18	325.85	-179.92	243.22	222.36	20.86	11.661	
2,900.00	2,860.68	2,865.22	2,838.18	10.88	11.22	-92.06	338.88	-186.83	253.00	231.24	21.76	11.628	
3,000.00	2,956.54	2,963.28	2,935.13	11.35	11.63	-95.64	351.91	-193.75	263.86	241.21	22.65	11.647	
3,100.00	3,052.40	3,061.35	3,032.08	11.83	12.03	-98.93	364.94	-200.66	275.69	252.14	23.55	11.707	
3,200.00	3,148.26	3,159.42	3,129.03	12.31	12.43	-101.95	377.97	-207.58	288.36	263.92	24.44	11.799	
3,300.00	3,244.11	3,257.49	3,225.98	12.80	12.84	-104.72	391.00	-214.49	301.77	276.44	25.32	11.917	
3,400.00	3,339.97	3,355.55	3,322.94	13.28	13.24	-107.24	404.03	-221.40	315.82	289.62	26.20	12.053	
3,500.00	3,435.83	3,453.62	3,419.89	13.77	13.65	-109.56	417.05	-228.32	330.43	303.35	27.08	12.203	
3,600.00	3,531.69	3,551.69	3,516.84	14.27	14.05	-111.67	430.08	-235.23	345.53	317.59	27.95	12.364	
3,700.00	3,627.54	3,649.76	3,613.79	14.76	14.46	-113.61	443.11	-242.15	361.07	332.26	28.81	12.532	
3,800.00	3,723.40	3,747.82	3,710.74	15.26	14.86	-115.39	456.14	-249.06	376.97	347.30	29.67	12.705	
3,900.00	3,819.26	3,845.89	3,807.70	15.76	15.26	-117.03	469.17	-255.97	393.21	362.68	30.53	12.880	
4,000.00	3,915.12	3,943.96	3,904.65	16.26	15.67	-118.54	482.20	-262.89	409.74	378.36	31.38	13.056	
4,100.00	4,010.98	4,042.02	4,001.60	16.76	16.07	-119.93	495.23	-269.80	426.52	394.29	32.23	13.232	
4,200.00	4,106.83	4,140.09	4,098.55	17.27	16.48	-121.21	508.26	-276.72	443.54	410.45	33.08	13.407	
4,300.00	4,202.69	4,238.16	4,195.50	17.77	16.88	-122.40	521.28	-283.63	460.75	426.82	33.93	13.579	
4,400.00	4,298.55	4,336.23	4,292.46	18.28	17.29	-123.51	534.31	-290.54	478.15	443.38	34.78	13.750	
4,500.00	4,394.41	4,434.29	4,389.41	18.78	17.69	-124.53	547.34	-297.46	495.71	460.09	35.62	13.917	
4,600.00	4,490.26	4,532.36	4,486.36	19.29	18.10	-125.49	560.37	-304.37	513.41	476.95	36.46	14.081	
4,700.00	4,586.12	4,630.43	4,583.31	19.80	18.50	-126.39	573.40	-311.29	531.25	493.94	37.30	14.242	
4,800.00	4,681.98	4,728.50	4,680.26	20.31	18.90	-127.22	586.43	-318.20	549.20	511.06	38.14	14.399	
4,900.00	4,777.84	4,826.56	4,777.21	20.82	19.31	-128.01	599.46	-325.11	567.26	528.28	38.98	14.553	
5,000.00	4,873.69	4,924.63	4,874.17	21.33	19.71	-128.74	612.49	-332.03	585.41	545.59	39.82	14.702	
5,100.00	4,969.55	5,022.70	4,971.12	21.85	20.12	-129.43	625.51	-338.94	603.66	563.00	40.65	14.848	
5,200.00	5,065.41	5,120.77	5,068.07	22.36	20.52	-130.08	638.54	-345.86	621.98	580.49	41.49	14.991	
5,300.00	5,161.27	5,218.83	5,165.02	22.87	20.93	-130.70	651.57	-352.77	640.38	598.05	42.33	15.129	
5,400.00	5,257.13	5,316.90	5,261.97	23.39	21.33	-131.28	664.60	-359.68	658.84	615.68	43.16	15.264	
5,500.00	5,352.98	5,414.97	5,358.93	23.90	21.74	-131.82	677.63	-366.60	677.37	633.37	44.00	15.395	
5,600.00	5,448.84	5,513.04	5,455.88	24.42	22.14	-132.34	690.66	-373.51	695.95	651.12	44.83	15.523	
5,700.00	5,544.70	5,604.61	5,545.74	24.93	22.54	-132.10	705.72	-382.18	714.94	669.29	45.65	15.660	
5,800.00	5,638.69	5,694.08	5,630.78	25.49	23.01	-117.52	728.94	-397.16	735.05	688.46	46.58	15.779	
5,900.00	5,727.85	5,783.00	5,711.23	26.11	23.55	-108.95	760.16	-418.33	756.00	708.37	47.64	15.870	
6,000.00	5,810.46	5,871.61	5,786.15	26.79	24.17	-103.25	798.88	-445.34	777.39	728.57	48.82	15.923	
6,100.00	5,884.91	5,960.17	5,854.65	27.53	24.88	-99.12	844.57	-477.81	798.80	748.65	50.15	15.927	
6,200.00	5,949.74	6,050.00	5,916.53	28.33	25.69	-96.00	897.33	-515.83	819.83	768.15	51.68	15.863	
6,300.00	6,003.69	6,138.20	5,968.91	29.21	26.61	-93.59	954.63	-557.57	840.10	786.72	53.38	15.737	
6,400.00	6,045.72	6,226.19	6,012.96	30.18	27.67	-91.75	1,017.80	-604.00	859.26	803.91	55.35	15.525	
6,500.00	6,075.00	6,319.14	6,047.15	31.25	28.86	-90.39	1,085.47	-654.13	876.97	819.40	57.57	15.232	
6,600.00	6,090.97	6,411.28	6,070.64	32.40	30.18	-89.48	1,156.83	-707.37	892.93	832.87	60.06	14.868	
6,700.00	6,094.49	6,504.86	6,082.61	33.64	31.63	-89.34	1,230.97	-763.08	907.10	844.33	62.77	14.452	
6,800.00	6,095.66	6,602.02	6,084.50	34.97	33.21	-89.39	1,308.48	-821.62	921.24	855.55	65.70	14.023	
6,900.00	6,096.83	6,701.01	6,085.34	36.38	34.90	-89.39	1,387.44	-881.31	935.43	866.60	68.83	13.590	
7,000.00	6,098.00	6,800.00	6,086.18	37.87	36.67	-89.38	1,466.41	-940.99	949.62	877.50	72.12	13.167	
7,100.00	6,099.17	6,898.99	6,087.03	39.42	38.50	-89.37	1,545.38	-1,000.68	963.81	888.27	75.54	12.759	
7,200.00	6,100.35	6,997.97	6,087.87	41.04	40.40	-89.36	1,624.34	-1,060.36	978.00	898.92	79.07	12.368	

Company:	Logos Operating LLC	**Local Co-ordinate Reference:**	Well Federal 2407-29E 1H - Slot Fed 1H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Reference Site:	Federal 2407-29E	**MD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-29E 1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-29E - Federal 2407-29E 2H - 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
7,300.00	6,101.52	7,096.96	6,088.72	42.71	42.34	-89.35	1,703.31	-1,120.04	992.18	909.48	82.70	11.997	
7,400.00	6,102.69	7,195.95	6,089.56	44.42	44.32	-89.34	1,782.28	-1,179.73	1,006.37	919.95	86.42	11.645	
7,500.00	6,103.86	7,294.94	6,090.40	46.18	46.34	-89.33	1,861.24	-1,239.41	1,020.56	930.35	90.21	11.313	
7,600.00	6,105.03	7,393.93	6,091.25	47.97	48.40	-89.33	1,940.21	-1,299.10	1,034.75	940.68	94.07	11.000	
7,700.00	6,106.21	7,492.91	6,092.09	49.79	50.48	-89.32	2,019.18	-1,358.78	1,048.94	950.95	97.99	10.705	
7,800.00	6,107.38	7,591.90	6,092.94	51.65	52.58	-89.31	2,098.14	-1,418.47	1,063.13	961.17	101.95	10.428	
7,900.00	6,108.55	7,690.89	6,093.78	53.53	54.71	-89.30	2,177.11	-1,478.15	1,077.32	971.35	105.97	10.166	
8,000.00	6,109.72	7,789.88	6,094.62	55.43	56.86	-89.30	2,256.08	-1,537.83	1,091.50	981.48	110.02	9.921	
8,100.00	6,110.89	7,888.87	6,095.47	57.35	59.03	-89.29	2,335.04	-1,597.52	1,105.69	991.58	114.12	9.689	
8,200.00	6,112.07	7,987.86	6,096.31	59.30	61.21	-89.28	2,414.01	-1,657.20	1,119.88	1,001.64	118.24	9.471	
8,300.00	6,113.24	8,086.84	6,097.16	61.26	63.41	-89.28	2,492.98	-1,716.89	1,134.07	1,011.67	122.40	9.266	
8,400.00	6,114.41	8,185.83	6,098.00	63.23	65.61	-89.27	2,571.94	-1,776.57	1,148.26	1,021.68	126.58	9.072	
8,500.00	6,115.58	8,284.82	6,098.84	65.22	67.84	-89.26	2,650.91	-1,836.26	1,162.45	1,031.66	130.78	8.888	
8,600.00	6,116.75	8,383.81	6,099.69	67.22	70.07	-89.26	2,729.88	-1,895.94	1,176.64	1,041.63	135.01	8.715	
8,700.00	6,117.93	8,482.80	6,100.53	69.23	72.31	-89.25	2,808.84	-1,955.62	1,190.82	1,051.57	139.26	8.551	
8,800.00	6,119.10	8,581.79	6,101.38	71.26	74.55	-89.25	2,887.81	-2,015.31	1,205.01	1,061.49	143.52	8.396	
8,900.00	6,120.27	8,680.77	6,102.22	73.29	76.81	-89.24	2,966.78	-2,074.99	1,219.20	1,071.40	147.80	8.249	
9,000.00	6,121.44	8,779.76	6,103.07	75.33	79.07	-89.23	3,045.74	-2,134.68	1,233.39	1,081.29	152.10	8.109	
9,100.00	6,122.61	8,878.75	6,103.91	77.38	81.34	-89.23	3,124.71	-2,194.36	1,247.58	1,091.17	156.41	7.976	
9,200.00	6,123.78	8,977.74	6,104.75	79.44	83.62	-89.22	3,203.68	-2,254.05	1,261.77	1,101.03	160.74	7.850	
9,300.00	6,124.96	9,076.73	6,105.60	81.50	85.90	-89.22	3,282.64	-2,313.73	1,275.96	1,110.89	165.07	7.730	
9,400.00	6,126.13	9,175.71	6,106.44	83.57	88.19	-89.21	3,361.61	-2,373.42	1,290.15	1,120.73	169.42	7.615	
9,500.00	6,127.30	9,274.70	6,107.29	85.65	90.48	-89.21	3,440.58	-2,433.10	1,304.33	1,130.56	173.77	7.506	
9,600.00	6,128.47	9,373.69	6,108.13	87.73	92.78	-89.20	3,519.54	-2,492.78	1,318.52	1,140.38	178.14	7.402	
9,700.00	6,129.64	9,472.68	6,108.97	89.82	95.08	-89.20	3,598.51	-2,552.47	1,332.71	1,150.20	182.51	7.302	
9,800.00	6,130.82	9,571.67	6,109.82	91.91	97.38	-89.19	3,677.48	-2,612.15	1,346.90	1,160.01	186.89	7.207	
9,900.00	6,131.99	9,670.66	6,110.66	94.01	99.69	-89.19	3,756.44	-2,671.84	1,361.09	1,169.80	191.28	7.116	
10,000.00	6,133.16	9,769.64	6,111.51	96.11	102.00	-89.18	3,835.41	-2,731.52	1,375.28	1,179.60	195.68	7.028	
10,100.00	6,134.33	9,868.63	6,112.35	98.21	104.31	-89.18	3,914.38	-2,791.21	1,389.47	1,189.38	200.08	6.944	
10,200.00	6,135.50	9,967.62	6,113.19	100.32	106.63	-89.18	3,993.34	-2,850.89	1,403.66	1,199.16	204.49	6.864	
10,300.00	6,136.68	10,066.61	6,114.04	102.43	108.94	-89.17	4,072.31	-2,910.57	1,417.84	1,208.94	208.91	6.787	
10,400.00	6,137.85	10,165.60	6,114.88	104.55	111.27	-89.17	4,151.28	-2,970.26	1,432.03	1,218.70	213.33	6.713	
10,500.00	6,139.02	10,264.58	6,115.73	106.67	113.59	-89.16	4,230.25	-3,029.94	1,446.22	1,228.47	217.75	6.642	
10,600.00	6,140.19	10,363.57	6,116.57	108.79	115.92	-89.16	4,309.21	-3,089.63	1,460.41	1,238.23	222.18	6.573	
10,700.00	6,141.36	10,462.56	6,117.41	110.91	118.24	-89.16	4,388.18	-3,149.31	1,474.60	1,247.98	226.62	6.507	
10,800.00	6,142.54	10,561.55	6,118.26	113.04	120.57	-89.15	4,467.15	-3,209.00	1,488.79	1,257.73	231.06	6.443	
10,900.00	6,143.71	10,660.54	6,119.10	115.16	122.91	-89.15	4,546.11	-3,268.68	1,502.98	1,267.48	235.50	6.382	
11,000.00	6,144.88	10,759.53	6,119.95	117.29	125.24	-89.14	4,625.08	-3,328.36	1,517.17	1,277.22	239.95	6.323	
11,100.00	6,146.05	10,858.51	6,120.79	119.43	127.57	-89.14	4,704.05	-3,388.05	1,531.35	1,286.96	244.40	6.266	
11,200.00	6,147.22	10,957.50	6,121.63	121.56	129.91	-89.14	4,783.01	-3,447.73	1,545.54	1,296.69	248.85	6.211	
11,300.00	6,148.40	11,056.49	6,122.48	123.70	132.25	-89.13	4,861.98	-3,507.42	1,559.73	1,306.43	253.31	6.157	
11,400.00	6,149.57	11,155.48	6,123.32	125.83	134.59	-89.13	4,940.95	-3,567.10	1,573.92	1,316.15	257.77	6.106	
11,500.00	6,150.74	11,254.47	6,124.17	127.97	136.93	-89.13	5,019.91	-3,626.79	1,588.11	1,325.88	262.23	6.056	
11,600.00	6,151.91	11,353.46	6,125.01	130.12	139.27	-89.12	5,098.88	-3,686.47	1,602.30	1,335.60	266.69	6.008	
11,700.00	6,153.08	11,452.44	6,125.85	132.26	141.61	-89.12	5,177.85	-3,746.15	1,616.49	1,345.33	271.16	5.961	
11,800.00	6,154.26	11,551.43	6,126.70	134.40	143.96	-89.12	5,256.81	-3,805.84	1,630.68	1,355.04	275.63	5.916	
11,900.00	6,155.43	11,650.42	6,127.54	136.55	146.30	-89.11	5,335.78	-3,865.52	1,644.87	1,364.76	280.10	5.872	
12,000.00	6,156.60	11,749.41	6,128.39	138.70	148.65	-89.11	5,414.75	-3,925.21	1,659.05	1,374.48	284.58	5.830	
12,100.00	6,157.77	11,848.40	6,129.23	140.84	151.00	-89.11	5,493.71	-3,984.89	1,673.24	1,384.19	289.06	5.789	
12,200.00	6,158.94	11,947.38	6,130.07	142.99	153.35	-89.11	5,572.68	-4,044.58	1,687.43	1,393.90	293.54	5.749	
12,300.00	6,160.12	12,046.37	6,130.92	145.14	155.70	-89.10	5,651.65	-4,104.26	1,701.62	1,403.61	298.02	5.710	
12,400.00	6,161.29	12,145.36	6,131.76	147.30	158.05	-89.10	5,730.61	-4,163.94	1,715.81	1,413.31	302.50	5.672	

Company:	Logos Operating LLC	**Local Co-ordinate Reference:**	Well Federal 2407-29E 1H - Slot Fed 1H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Reference Site:	Federal 2407-29E	**MD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-29E 1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-29E - Federal 2407-29E 2H - 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
12,500.00	6,162.46	12,244.35	6,132.61	149.45	160.40	-89.10	5,809.58	-4,223.63	1,730.00	1,423.02	306.98	5.635	
12,600.00	6,163.63	12,343.34	6,133.45	151.60	162.75	-89.09	5,888.55	-4,283.31	1,744.19	1,432.72	311.47	5.600	
12,700.00	6,164.80	12,442.33	6,134.29	153.76	165.10	-89.09	5,967.51	-4,343.00	1,758.38	1,442.42	315.96	5.565	
12,800.00	6,165.98	12,541.31	6,135.14	155.91	167.46	-89.09	6,046.48	-4,402.68	1,772.57	1,452.12	320.45	5.532	
12,900.00	6,167.15	12,640.30	6,135.98	158.07	169.81	-89.09	6,125.45	-4,462.37	1,786.76	1,461.82	324.94	5.499	
13,000.00	6,168.32	12,739.29	6,136.83	160.23	172.16	-89.08	6,204.41	-4,522.05	1,800.94	1,471.52	329.43	5.467	
13,058.10	6,169.00	12,796.80	6,137.32	161.48	173.53	-89.08	6,250.29	-4,556.72	1,809.19	1,477.15	332.04	5.449 SF	

Company:	Logos Operating LLC	**Local Co-ordinate Reference:**	Well Federal 2407-29E 1H - Slot Fed 1H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Reference Site:	Federal 2407-29E	**MD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-29E 1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-29E - Federal 2407-29E 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	-47.57	26.94	-29.47	39.93				
100.00	100.00	100.00	100.00	0.15	0.15	-47.57	26.94	-29.47	39.93	39.62	0.31	129.517	
200.00	200.00	200.00	200.00	0.51	0.51	-47.57	26.94	-29.47	39.93	38.90	1.03	38.946	
300.00	300.00	300.00	300.00	0.87	0.87	-47.57	26.94	-29.47	39.93	38.19	1.74	22.919	
400.00	400.00	400.00	400.00	1.23	1.23	-47.57	26.94	-29.47	39.93	37.47	2.46	16.237	
500.00	500.00	500.00	500.00	1.59	1.59	-47.57	26.94	-29.47	39.93	36.75	3.18	12.572	
600.00	600.00	600.00	600.00	1.95	1.95	-47.57	26.94	-29.47	39.93	36.04	3.89	10.256	
700.00	700.00	700.00	700.00	2.30	2.30	-47.57	26.94	-29.47	39.93	35.32	4.61	8.661	
800.00	800.00	800.00	800.00	2.66	2.66	-47.57	26.94	-29.47	39.93	34.60	5.33	7.496	
900.00	900.00	900.00	900.00	3.02	3.02	-47.57	26.94	-29.47	39.93	33.88	6.04	6.606	
1,000.00	1,000.00	1,000.00	1,000.00	3.38	3.38	-47.57	26.94	-29.47	39.93	33.17	6.76	5.906	
1,100.00	1,100.00	1,100.00	1,100.00	3.74	3.74	-47.57	26.94	-29.47	39.93	32.45	7.48	5.340	
1,200.00	1,200.00	1,200.00	1,200.00	4.10	4.10	-47.57	26.94	-29.47	39.93	31.73	8.19	4.872	
1,300.00	1,300.00	1,300.00	1,300.00	4.46	4.46	-47.57	26.94	-29.47	39.93	31.02	8.91	4.480	
1,400.00	1,400.00	1,400.00	1,400.00	4.81	4.81	-47.57	26.94	-29.47	39.93	30.30	9.63	4.147	
1,500.00	1,499.98	1,499.98	1,499.98	5.17	5.17	-61.45	26.94	-29.47	39.06	28.72	10.34	3.776	
1,600.00	1,599.84	1,599.84	1,599.84	5.53	5.53	-68.65	26.94	-29.47	36.85	25.79	11.06	3.332	
1,700.00	1,699.45	1,699.45	1,699.45	5.89	5.89	-82.19	26.94	-29.47	34.63	22.86	11.77	2.942	
1,742.29	1,741.48	1,741.48	1,741.48	6.04	6.04	-90.00	26.94	-29.47	34.31	22.23	12.08	2.841	CC, ES
1,800.00	1,798.70	1,798.70	1,798.70	6.25	6.24	-102.14	26.94	-29.47	35.11	22.62	12.49	2.811	SF
1,900.00	1,897.47	1,896.73	1,896.71	6.61	6.59	-121.49	27.93	-30.77	42.21	29.01	13.20	3.198	
2,000.00	1,995.62	1,994.48	1,994.33	6.98	6.94	-133.48	30.96	-34.70	56.26	42.35	13.91	4.046	
2,100.00	2,093.06	2,091.78	2,091.28	7.37	7.28	-139.61	36.00	-41.23	75.23	60.61	14.61	5.148	
2,200.00	2,189.64	2,188.44	2,187.25	7.77	7.63	-142.43	42.98	-50.30	98.05	82.72	15.33	6.397	
2,300.00	2,285.54	2,284.48	2,282.17	8.18	7.98	-143.46	51.87	-61.85	123.57	107.52	16.05	7.700	
2,400.00	2,381.40	2,380.23	2,376.27	8.61	8.34	-142.97	62.67	-75.87	149.74	132.96	16.78	8.926	
2,500.00	2,477.25	2,475.52	2,469.27	9.05	8.70	-141.57	75.31	-92.28	176.50	158.99	17.52	10.076	
2,600.00	2,573.11	2,570.13	2,560.89	9.50	9.08	-139.65	89.72	-111.00	204.04	185.77	18.27	11.166	
2,700.00	2,668.97	2,663.87	2,650.84	9.95	9.47	-137.42	105.81	-131.89	232.55	213.51	19.04	12.211	
2,800.00	2,764.83	2,756.56	2,738.89	10.41	9.88	-135.03	123.47	-154.83	262.24	242.42	19.83	13.228	
2,900.00	2,860.68	2,848.02	2,824.80	10.88	10.31	-132.57	142.60	-179.67	293.31	272.70	20.62	14.227	
3,000.00	2,956.54	2,938.10	2,908.39	11.35	10.77	-130.10	163.06	-206.24	325.93	304.52	21.41	15.222	
3,100.00	3,052.40	3,026.88	2,989.72	11.83	11.24	-127.67	184.79	-234.46	360.25	338.04	22.21	16.219	
3,200.00	3,148.26	3,119.30	3,073.86	12.31	11.78	-125.38	208.12	-264.76	395.68	372.59	23.09	17.136	
3,300.00	3,244.11	3,211.72	3,158.00	12.80	12.33	-123.47	231.45	-295.06	431.58	407.60	23.99	17.993	
3,400.00	3,339.97	3,304.14	3,242.13	13.28	12.89	-121.84	254.79	-325.36	467.85	442.95	24.90	18.792	
3,500.00	3,435.83	3,396.56	3,326.27	13.77	13.48	-120.45	278.12	-355.66	504.39	478.57	25.82	19.535	
3,600.00	3,531.69	3,488.99	3,410.41	14.27	14.08	-119.24	301.45	-385.95	541.17	514.41	26.76	20.226	
3,700.00	3,627.54	3,581.41	3,494.55	14.76	14.69	-118.19	324.78	-416.25	578.13	550.42	27.70	20.869	
3,800.00	3,723.40	3,673.83	3,578.69	15.26	15.31	-117.26	348.12	-446.55	615.23	586.58	28.66	21.469	
3,900.00	3,819.26	3,766.25	3,662.82	15.76	15.94	-116.44	371.45	-476.85	652.47	622.85	29.62	22.028	
4,000.00	3,915.12	3,858.67	3,746.96	16.26	16.58	-115.70	394.78	-507.15	689.80	659.21	30.59	22.550	
4,100.00	4,010.98	3,951.09	3,831.10	16.76	17.22	-115.04	418.11	-537.45	727.23	695.66	31.57	23.038	
4,200.00	4,106.83	4,043.51	3,915.24	17.27	17.88	-114.45	441.45	-567.75	764.73	732.18	32.55	23.495	
4,300.00	4,202.69	4,135.93	3,999.38	17.77	18.54	-113.91	464.78	-598.05	802.30	768.76	33.54	23.924	
4,400.00	4,298.55	4,228.36	4,083.52	18.28	19.20	-113.41	488.11	-628.35	839.92	805.39	34.53	24.326	
4,500.00	4,394.41	4,320.78	4,167.65	18.78	19.87	-112.96	511.44	-658.65	877.59	842.06	35.52	24.704	
4,600.00	4,490.26	4,413.20	4,251.79	19.29	20.54	-112.55	534.78	-688.95	915.30	878.78	36.52	25.060	
4,700.00	4,586.12	4,505.62	4,335.93	19.80	21.22	-112.17	558.11	-719.25	953.05	915.53	37.53	25.396	
4,800.00	4,681.98	4,598.04	4,420.07	20.31	21.90	-111.82	581.44	-749.55	990.84	952.30	38.53	25.713	
4,900.00	4,777.84	4,690.46	4,504.21	20.82	22.58	-111.49	604.77	-779.85	1,028.65	989.11	39.54	26.012	
5,000.00	4,873.69	4,782.88	4,588.34	21.33	23.27	-111.19	628.11	-810.15	1,066.49	1,025.94	40.56	26.296	

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 2407-29E 1H - Slot Fed 1H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Reference Site:	Federal 2407-29E	**MD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-29E 1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-29E - Federal 2407-29E 3H - OH - Plan #2

Survey Program: 0-MWD+HDGM

Offset Site Error: 0.00 usft
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	4,969.55	4,875.31	4,672.48	21.85	23.96	-110.91	651.44	-840.45	1,104.36	1,062.78	41.57	26.564	
5,200.00	5,065.41	4,967.73	4,756.62	22.36	24.65	-110.64	674.77	-870.75	1,142.24	1,099.65	42.59	26.819	
5,300.00	5,161.27	5,060.15	4,840.76	22.87	25.35	-110.40	698.10	-901.05	1,180.15	1,136.54	43.61	27.061	
5,400.00	5,257.13	5,152.57	4,924.90	23.39	26.04	-110.17	721.44	-931.35	1,218.07	1,173.44	44.63	27.291	
5,500.00	5,352.98	5,244.99	5,009.03	23.90	26.74	-109.95	744.77	-961.65	1,256.01	1,210.36	45.66	27.510	
5,600.00	5,448.84	5,337.41	5,093.17	24.42	27.44	-109.74	768.10	-991.95	1,293.97	1,247.28	46.68	27.718	
5,700.00	5,544.70	5,429.83	5,177.31	24.93	28.14	-109.12	791.43	-1,022.25	1,331.93	1,284.22	47.71	27.917	
5,800.00	5,638.69	5,523.28	5,262.38	25.49	28.85	-93.74	815.03	-1,052.88	1,367.22	1,318.40	48.82	28.004	
5,900.00	5,727.85	5,617.44	5,348.10	26.11	29.57	-85.35	838.80	-1,083.75	1,397.02	1,346.93	50.08	27.893	
6,000.00	5,810.46	5,710.49	5,432.81	26.79	30.28	-80.65	862.29	-1,114.26	1,421.13	1,369.65	51.48	27.605	
6,100.00	5,884.91	5,800.61	5,514.86	27.53	30.97	-78.18	885.04	-1,143.81	1,439.78	1,386.78	53.00	27.167	
6,200.00	5,949.74	5,886.06	5,592.65	28.33	31.63	-77.19	906.61	-1,171.82	1,453.52	1,398.90	54.62	26.612	
6,300.00	6,003.69	5,952.54	5,653.17	29.21	32.14	-76.89	923.40	-1,193.61	1,463.24	1,407.09	56.15	26.059	
6,400.00	6,045.72	6,000.00	5,695.70	30.18	32.52	-76.80	936.37	-1,210.19	1,470.94	1,413.34	57.60	25.539	
6,500.00	6,075.00	6,034.29	5,725.52	31.25	32.84	-76.80	946.96	-1,223.40	1,477.71	1,418.69	59.02	25.038	
6,600.00	6,090.97	6,069.91	5,755.60	32.40	33.19	-77.18	959.01	-1,238.18	1,483.86	1,423.22	60.64	24.472	
6,700.00	6,094.49	6,100.00	5,780.24	33.64	33.51	-77.84	970.00	-1,251.48	1,490.19	1,427.91	62.28	23.926	
6,800.00	6,095.66	6,150.00	5,819.54	34.97	34.08	-79.40	989.85	-1,275.16	1,500.86	1,436.48	64.38	23.312	
6,900.00	6,096.83	6,186.49	5,846.81	36.38	34.54	-80.48	1,005.54	-1,293.64	1,516.38	1,450.16	66.22	22.898	
7,000.00	6,098.00	6,237.07	5,882.49	37.87	35.22	-81.89	1,028.89	-1,320.82	1,536.30	1,467.92	68.38	22.468	
7,100.00	6,099.17	6,295.30	5,920.33	39.42	36.07	-83.37	1,057.93	-1,354.20	1,559.94	1,489.21	70.73	22.053	
7,200.00	6,100.35	6,362.12	5,959.16	41.04	37.15	-84.88	1,093.86	-1,394.98	1,586.60	1,513.24	73.36	21.629	
7,300.00	6,101.52	6,438.14	5,996.97	42.71	38.47	-86.32	1,137.73	-1,444.15	1,615.47	1,539.19	76.29	21.176	
7,400.00	6,102.69	6,523.30	6,030.78	44.42	40.08	-87.59	1,190.10	-1,502.11	1,645.76	1,566.20	79.57	20.684	
7,500.00	6,103.86	6,616.55	6,056.89	46.18	41.96	-88.53	1,250.48	-1,568.10	1,676.71	1,593.53	83.18	20.157	
7,600.00	6,105.03	6,715.56	6,071.67	47.97	44.04	-89.04	1,316.97	-1,639.86	1,707.72	1,620.67	87.05	19.617	
7,700.00	6,106.21	6,813.95	6,074.28	49.79	46.16	-89.11	1,384.19	-1,711.62	1,738.49	1,647.55	90.94	19.117	
7,800.00	6,107.38	6,909.11	6,074.87	51.65	48.24	-89.11	1,449.31	-1,781.01	1,769.21	1,674.42	94.79	18.664	
7,900.00	6,108.55	7,004.28	6,075.46	53.53	50.36	-89.11	1,514.43	-1,850.40	1,799.93	1,701.23	98.71	18.235	
8,000.00	6,109.72	7,099.44	6,076.05	55.43	52.51	-89.11	1,579.55	-1,919.79	1,830.66	1,727.98	102.68	17.829	
8,100.00	6,110.89	7,194.60	6,076.64	57.35	54.69	-89.11	1,644.67	-1,989.18	1,861.38	1,754.68	106.70	17.446	
8,200.00	6,112.07	7,289.77	6,077.23	59.30	56.90	-89.11	1,709.80	-2,058.56	1,892.10	1,781.34	110.76	17.083	
8,300.00	6,113.24	7,384.93	6,077.82	61.26	59.14	-89.11	1,774.92	-2,127.95	1,922.83	1,807.96	114.87	16.740	
8,400.00	6,114.41	7,480.09	6,078.41	63.23	61.39	-89.11	1,840.04	-2,197.34	1,953.55	1,834.54	119.00	16.416	
8,500.00	6,115.58	7,575.26	6,079.00	65.22	63.67	-89.11	1,905.16	-2,266.73	1,984.27	1,861.10	123.18	16.109	
8,600.00	6,116.75	7,670.42	6,079.59	67.22	65.96	-89.11	1,970.28	-2,336.12	2,015.00	1,887.62	127.37	15.819	
8,700.00	6,117.93	7,765.59	6,080.18	69.23	68.26	-89.11	2,035.41	-2,405.51	2,045.72	1,914.12	131.60	15.545	
8,800.00	6,119.10	7,860.75	6,080.77	71.26	70.58	-89.11	2,100.53	-2,474.90	2,076.44	1,940.59	135.85	15.285	
8,900.00	6,120.27	7,955.91	6,081.36	73.29	72.91	-89.10	2,165.65	-2,544.29	2,107.16	1,967.05	140.12	15.038	
9,000.00	6,121.44	8,051.08	6,081.95	75.33	75.25	-89.10	2,230.77	-2,613.68	2,137.89	1,993.48	144.41	14.805	
9,100.00	6,122.61	8,146.24	6,082.54	77.38	77.60	-89.10	2,295.89	-2,683.07	2,168.61	2,019.90	148.71	14.582	
9,200.00	6,123.78	8,241.40	6,083.13	79.44	79.96	-89.10	2,361.02	-2,752.46	2,199.33	2,046.30	153.04	14.371	
9,300.00	6,124.96	8,336.57	6,083.72	81.50	82.33	-89.10	2,426.14	-2,821.85	2,230.06	2,072.68	157.37	14.170	
9,400.00	6,126.13	8,431.73	6,084.31	83.57	84.71	-89.10	2,491.26	-2,891.24	2,260.78	2,099.05	161.73	13.979	
9,500.00	6,127.30	8,526.89	6,084.90	85.65	87.09	-89.10	2,556.38	-2,960.63	2,291.50	2,125.41	166.09	13.797	
9,600.00	6,128.47	8,622.06	6,085.49	87.73	89.48	-89.10	2,621.50	-3,030.02	2,322.22	2,151.76	170.47	13.623	
9,700.00	6,129.64	8,717.22	6,086.08	89.82	91.88	-89.10	2,686.62	-3,099.41	2,352.95	2,178.10	174.85	13.457	
9,800.00	6,130.82	8,812.38	6,086.67	91.91	94.28	-89.10	2,751.75	-3,168.80	2,383.67	2,204.42	179.25	13.298	
9,900.00	6,131.99	8,907.55	6,087.26	94.01	96.69	-89.10	2,816.87	-3,238.19	2,414.39	2,230.74	183.65	13.146	
10,000.00	6,133.16	9,002.71	6,087.85	96.11	99.10	-89.10	2,881.99	-3,307.57	2,445.12	2,257.05	188.07	13.001	
10,100.00	6,134.33	9,097.88	6,088.44	98.21	101.52	-89.10	2,947.11	-3,376.96	2,475.84	2,283.35	192.49	12.862	
10,200.00	6,135.50	9,193.04	6,089.03	100.32	103.94	-89.10	3,012.23	-3,446.35	2,506.56	2,309.64	196.92	12.729	

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 2407-29E 1H - Slot Fed 1H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Reference Site:	Federal 2407-29E	**MD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-29E 1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-29E - Federal 2407-29E 3H - OH - Plan #2

Survey Program: 0-MWD+HDGM

Offset Site Error: 0.00 usft
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	6,136.68	9,288.20	6,089.63	102.43	106.37	-89.10	3,077.36	-3,515.74	2,537.28	2,335.93	201.36	12.601	
10,400.00	6,137.85	9,383.37	6,090.22	104.55	108.79	-89.10	3,142.48	-3,585.13	2,568.01	2,362.21	205.80	12.478	
10,500.00	6,139.02	9,478.53	6,090.81	106.67	111.22	-89.10	3,207.60	-3,654.52	2,598.73	2,388.48	210.25	12.360	
10,600.00	6,140.19	9,573.69	6,091.40	108.79	113.66	-89.10	3,272.72	-3,723.91	2,629.45	2,414.75	214.70	12.247	
10,700.00	6,141.36	9,668.86	6,091.99	110.91	116.10	-89.10	3,337.84	-3,793.30	2,660.18	2,441.01	219.16	12.138	
10,800.00	6,142.54	9,764.02	6,092.58	113.04	118.54	-89.10	3,402.97	-3,862.69	2,690.90	2,467.27	223.63	12.033	
10,900.00	6,143.71	9,859.18	6,093.17	115.16	120.98	-89.10	3,468.09	-3,932.08	2,721.62	2,493.52	228.10	11.932	
11,000.00	6,144.88	9,954.35	6,093.76	117.29	123.43	-89.10	3,533.21	-4,001.47	2,752.35	2,519.77	232.57	11.834	
11,100.00	6,146.05	10,049.51	6,094.35	119.43	125.87	-89.10	3,598.33	-4,070.86	2,783.07	2,546.02	237.05	11.740	
11,200.00	6,147.22	10,144.67	6,094.94	121.56	128.32	-89.10	3,663.45	-4,140.25	2,813.79	2,572.26	241.53	11.650	
11,300.00	6,148.40	10,239.84	6,095.53	123.70	130.77	-89.10	3,728.58	-4,209.64	2,844.51	2,598.49	246.02	11.562	
11,400.00	6,149.57	10,335.00	6,096.12	125.83	133.23	-89.10	3,793.70	-4,279.03	2,875.24	2,624.73	250.51	11.477	
11,500.00	6,150.74	10,430.16	6,096.71	127.97	135.68	-89.10	3,858.82	-4,348.42	2,905.96	2,650.96	255.00	11.396	
11,600.00	6,151.91	10,525.33	6,097.30	130.12	138.14	-89.10	3,923.94	-4,417.81	2,936.68	2,677.18	259.50	11.317	
11,700.00	6,153.08	10,620.49	6,097.89	132.26	140.60	-89.10	3,989.06	-4,487.20	2,967.41	2,703.40	264.00	11.240	
11,800.00	6,154.26	10,715.66	6,098.48	134.40	143.06	-89.10	4,054.18	-4,556.58	2,998.13	2,729.63	268.50	11.166	
11,900.00	6,155.43	10,810.82	6,099.07	136.55	145.52	-89.10	4,119.31	-4,625.97	3,028.85	2,755.84	273.01	11.094	
12,000.00	6,156.60	10,905.98	6,099.66	138.70	147.98	-89.10	4,184.43	-4,695.36	3,059.57	2,782.06	277.52	11.025	
12,100.00	6,157.77	11,001.15	6,100.25	140.84	150.45	-89.10	4,249.55	-4,764.75	3,090.30	2,808.27	282.03	10.957	
12,200.00	6,158.94	11,096.31	6,100.84	142.99	152.91	-89.10	4,314.67	-4,834.14	3,121.02	2,834.48	286.54	10.892	
12,300.00	6,160.12	11,191.47	6,101.43	145.14	155.38	-89.10	4,379.79	-4,903.53	3,151.74	2,860.69	291.05	10.829	
12,400.00	6,161.29	11,286.64	6,102.02	147.30	157.85	-89.10	4,444.92	-4,972.92	3,182.47	2,886.89	295.57	10.767	
12,500.00	6,162.46	11,381.80	6,102.61	149.45	160.32	-89.10	4,510.04	-5,042.31	3,213.19	2,913.10	300.09	10.707	
12,600.00	6,163.63	11,476.96	6,103.20	151.60	162.79	-89.10	4,575.16	-5,111.70	3,243.91	2,939.30	304.61	10.649	
12,700.00	6,164.80	11,572.13	6,103.79	153.76	165.26	-89.09	4,640.28	-5,181.09	3,274.63	2,965.50	309.13	10.593	
12,800.00	6,165.98	11,605.76	6,104.00	155.91	166.13	-89.09	4,663.30	-5,205.61	3,305.93	2,994.87	311.06	10.628	
12,900.00	6,167.15	11,605.76	6,104.00	158.07	166.13	-89.09	4,663.30	-5,205.61	3,339.76	3,028.41	311.35	10.727	
13,000.00	6,168.32	11,605.76	6,104.00	160.23	166.13	-89.09	4,663.30	-5,205.61	3,376.21	3,064.81	311.40	10.842	
13,058.10	6,169.00	11,605.76	6,104.00	161.48	166.13	-89.09	4,663.30	-5,205.61	3,398.56	3,087.23	311.33	10.916	

Company:	Logos Operating LLC	**Local Co-ordinate Reference:**	Well Federal 2407-29E 1H - Slot Fed 1H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Reference Site:	Federal 2407-29E	**MD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-29E 1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-29E - Federal 2407-29E 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	-47.57	40.41	-44.21	59.89				
100.00	100.00	100.00	100.00	0.15	0.15	-47.57	40.41	-44.21	59.89	59.58	0.31	194.273	
200.00	200.00	200.00	200.00	0.51	0.51	-47.57	40.41	-44.21	59.89	58.87	1.03	58.418	
300.00	300.00	300.00	300.00	0.87	0.87	-47.57	40.41	-44.21	59.89	58.15	1.74	34.378	
400.00	400.00	400.00	400.00	1.23	1.23	-47.57	40.41	-44.21	59.89	57.43	2.46	24.355	
500.00	500.00	500.00	500.00	1.59	1.59	-47.57	40.41	-44.21	59.89	56.72	3.18	18.857	
600.00	600.00	600.00	600.00	1.95	1.95	-47.57	40.41	-44.21	59.89	56.00	3.89	15.384	
700.00	700.00	700.00	700.00	2.30	2.30	-47.57	40.41	-44.21	59.89	55.28	4.61	12.992	
800.00	800.00	800.00	800.00	2.66	2.66	-47.57	40.41	-44.21	59.89	54.56	5.33	11.243	
900.00	900.00	900.00	900.00	3.02	3.02	-47.57	40.41	-44.21	59.89	53.85	6.04	9.910	
1,000.00	1,000.00	1,000.00	1,000.00	3.38	3.38	-47.57	40.41	-44.21	59.89	53.13	6.76	8.859	
1,100.00	1,100.00	1,100.00	1,100.00	3.74	3.74	-47.57	40.41	-44.21	59.89	52.41	7.48	8.009	
1,200.00	1,200.00	1,200.00	1,200.00	4.10	4.10	-47.57	40.41	-44.21	59.89	51.70	8.19	7.309	
1,300.00	1,300.00	1,300.00	1,300.00	4.46	4.46	-47.57	40.41	-44.21	59.89	50.98	8.91	6.721	
1,400.00	1,400.00	1,400.00	1,400.00	4.81	4.81	-47.57	40.41	-44.21	59.89	50.26	9.63	6.220	
1,500.00	1,499.98	1,498.77	1,498.75	5.17	5.17	-59.34	42.10	-44.03	60.02	49.68	10.34	5.804	
1,600.00	1,599.84	1,598.20	1,598.08	5.53	5.53	-60.04	46.72	-43.54	60.12	49.07	11.06	5.438	
1,700.00	1,699.45	1,698.13	1,697.87	5.89	5.88	-63.44	51.72	-43.02	58.80	47.03	11.77	4.996	
1,800.00	1,798.70	1,797.86	1,797.48	6.25	6.24	-70.24	56.72	-42.49	56.42	43.93	12.49	4.519	
1,900.00	1,897.47	1,897.29	1,896.78	6.61	6.60	-81.08	61.70	-41.97	54.23	41.03	13.21	4.107	
1,949.53	1,946.17	1,946.38	1,945.81	6.80	6.77	-87.99	64.16	-41.71	53.85	40.28	13.57	3.969	CC, ES
2,000.00	1,995.62	1,996.28	1,995.64	6.98	6.95	-95.89	66.65	-41.44	54.36	40.43	13.93	3.902	SF
2,100.00	2,093.06	2,094.71	2,093.95	7.37	7.30	-112.67	71.58	-40.92	59.31	44.65	14.66	4.045	
2,200.00	2,189.64	2,192.47	2,191.59	7.77	7.66	-128.05	76.48	-40.41	70.64	55.25	15.39	4.590	
2,300.00	2,285.54	2,289.67	2,288.66	8.18	8.01	-139.85	81.35	-39.90	87.63	71.52	16.11	5.440	
2,400.00	2,381.40	2,386.83	2,385.70	8.61	8.36	-147.76	86.21	-39.38	107.23	90.41	16.82	6.374	
2,500.00	2,477.25	2,483.99	2,482.74	9.05	8.71	-153.19	91.08	-38.87	128.20	110.67	17.54	7.310	
2,600.00	2,573.11	2,581.16	2,579.78	9.50	9.06	-157.08	95.94	-38.36	149.98	131.72	18.25	8.216	
2,700.00	2,668.97	2,678.32	2,676.82	9.95	9.41	-159.99	100.81	-37.85	172.24	153.27	18.97	9.078	
2,800.00	2,764.83	2,775.48	2,773.86	10.41	9.76	-162.22	105.67	-37.34	194.84	175.14	19.69	9.893	
2,900.00	2,860.68	2,872.65	2,870.90	10.88	10.11	-164.00	110.54	-36.82	217.65	197.24	20.42	10.660	
3,000.00	2,956.54	2,969.81	2,967.94	11.35	10.46	-165.43	115.41	-36.31	240.63	219.49	21.14	11.381	
3,100.00	3,052.40	3,066.97	3,064.98	11.83	10.81	-166.62	120.27	-35.80	263.73	241.86	21.87	12.059	
3,200.00	3,148.26	3,164.14	3,162.02	12.31	11.17	-167.62	125.14	-35.29	286.92	264.32	22.60	12.696	
3,300.00	3,244.11	3,261.30	3,259.06	12.80	11.52	-168.46	130.00	-34.77	310.17	286.84	23.33	13.296	
3,400.00	3,339.97	3,358.46	3,356.10	13.28	11.87	-169.19	134.87	-34.26	333.48	309.42	24.06	13.860	
3,500.00	3,435.83	3,455.63	3,453.14	13.77	12.22	-169.82	139.73	-33.75	356.84	332.05	24.79	14.393	
3,600.00	3,531.69	3,552.79	3,550.18	14.27	12.57	-170.38	144.60	-33.24	380.23	354.71	25.53	14.895	
3,700.00	3,627.54	3,649.95	3,647.22	14.76	12.93	-170.87	149.46	-32.72	403.66	377.39	26.26	15.370	
3,800.00	3,723.40	3,747.12	3,744.26	15.26	13.28	-171.31	154.33	-32.21	427.10	400.11	27.00	15.820	
3,900.00	3,819.26	3,844.28	3,841.30	15.76	13.63	-171.70	159.20	-31.70	450.57	422.84	27.73	16.246	
4,000.00	3,915.12	3,941.44	3,938.34	16.26	13.98	-172.05	164.06	-31.19	474.06	445.59	28.47	16.650	
4,100.00	4,010.98	4,038.61	4,035.38	16.76	14.33	-172.37	168.93	-30.68	497.56	468.35	29.21	17.034	
4,200.00	4,106.83	4,135.77	4,132.42	17.27	14.69	-172.66	173.79	-30.16	521.08	491.13	29.95	17.399	
4,300.00	4,202.69	4,232.93	4,229.46	17.77	15.04	-172.93	178.66	-29.65	544.60	513.91	30.69	17.746	
4,400.00	4,298.55	4,330.10	4,326.50	18.28	15.39	-173.17	183.52	-29.14	568.14	536.71	31.43	18.077	
4,500.00	4,394.41	4,427.26	4,423.54	18.78	15.74	-173.40	188.39	-28.63	591.68	559.52	32.17	18.393	
4,600.00	4,490.26	4,524.42	4,520.58	19.29	16.10	-173.60	193.26	-28.11	615.24	582.33	32.91	18.695	
4,700.00	4,586.12	4,621.59	4,617.62	19.80	16.45	-173.80	198.12	-27.60	638.80	605.15	33.65	18.983	
4,800.00	4,681.98	4,718.75	4,714.66	20.31	16.80	-173.98	202.99	-27.09	662.37	627.97	34.39	19.259	
4,900.00	4,777.84	4,815.91	4,811.70	20.82	17.15	-174.14	207.85	-26.58	685.94	650.80	35.14	19.523	
5,000.00	4,873.69	4,913.08	4,908.74	21.33	17.51	-174.30	212.72	-26.06	709.52	673.64	35.88	19.776	

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 2407-29E 1H - Slot Fed 1H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Reference Site:	Federal 2407-29E	**MD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-29E 1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-29E - Federal 2407-29E 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
5,100.00	4,969.55	5,010.24	5,005.78	21.85	17.86	-174.44	217.58	-25.55	733.10	696.48	36.62	20.018	
5,200.00	5,065.41	5,107.40	5,102.82	22.36	18.21	-174.58	222.45	-25.04	756.69	719.32	37.36	20.251	
5,300.00	5,161.27	5,204.57	5,199.86	22.87	18.56	-174.71	227.31	-24.53	780.28	742.17	38.11	20.475	
5,400.00	5,257.13	5,301.73	5,296.90	23.39	18.92	-174.83	232.18	-24.02	803.87	765.02	38.85	20.690	
5,500.00	5,352.98	5,400.87	5,395.91	23.90	19.28	-174.90	237.34	-24.03	827.44	787.83	39.61	20.889	
5,600.00	5,448.84	5,504.42	5,498.44	24.42	19.65	-174.22	246.45	-34.37	850.43	810.03	40.41	21.047	
5,700.00	5,544.70	5,603.56	5,593.90	24.93	20.00	-172.27	258.76	-57.21	873.11	831.93	41.18	21.201	
5,800.00	5,638.69	5,696.09	5,678.98	25.49	20.34	-155.89	276.01	-89.59	900.78	858.84	41.95	21.475	
5,900.00	5,727.85	5,782.34	5,753.50	26.11	20.69	-144.82	294.24	-128.89	937.38	894.67	42.71	21.949	
6,000.00	5,810.46	5,862.87	5,817.94	26.79	21.06	-135.89	313.70	-173.02	981.97	938.50	43.47	22.587	
6,100.00	5,884.91	5,938.44	5,873.14	27.53	21.48	-127.83	333.89	-220.45	1,033.37	989.10	44.27	23.343	
6,200.00	5,949.74	6,009.89	5,920.09	28.33	21.96	-120.10	354.49	-270.18	1,090.21	1,045.09	45.12	24.162	
6,300.00	6,003.69	6,078.09	5,959.70	29.21	22.52	-112.54	375.33	-321.61	1,151.09	1,105.02	46.07	24.987	
6,400.00	6,045.72	6,143.94	5,992.77	30.18	23.16	-105.18	396.36	-374.49	1,214.64	1,167.50	47.14	25.766	
6,500.00	6,075.00	6,208.28	6,019.92	31.25	23.90	-98.17	417.60	-428.80	1,279.57	1,231.19	48.38	26.448	
6,600.00	6,090.97	6,272.02	6,041.55	32.40	24.75	-91.72	439.14	-484.72	1,344.66	1,294.86	49.81	26.997	
6,700.00	6,094.49	6,336.14	6,057.86	33.64	25.71	-88.62	461.14	-542.68	1,409.05	1,357.62	51.43	27.399	
6,800.00	6,095.66	6,400.00	6,068.54	34.97	26.75	-89.19	483.22	-601.62	1,473.77	1,420.60	53.18	27.714	
6,900.00	6,096.83	6,468.19	6,073.71	36.38	27.97	-89.44	506.76	-665.38	1,539.04	1,483.87	55.17	27.899	
7,000.00	6,098.00	6,540.74	6,073.95	37.87	29.36	-89.45	531.65	-733.53	1,604.66	1,547.25	57.41	27.953	
7,100.00	6,099.17	6,616.18	6,073.87	39.42	30.88	-89.43	557.52	-804.39	1,670.30	1,610.44	59.86	27.903	
7,200.00	6,100.35	6,691.62	6,073.79	41.04	32.49	-89.42	583.39	-875.26	1,735.94	1,673.47	62.47	27.791	
7,300.00	6,101.52	6,767.06	6,073.71	42.71	34.17	-89.41	609.25	-946.13	1,801.58	1,736.37	65.21	27.628	
7,400.00	6,102.69	6,842.50	6,073.64	44.42	35.92	-89.40	635.12	-1,017.00	1,867.22	1,799.16	68.06	27.437	
7,500.00	6,103.86	6,917.94	6,073.56	46.18	37.71	-89.39	660.99	-1,087.86	1,932.86	1,861.86	71.00	27.224	
7,600.00	6,105.03	6,993.38	6,073.48	47.97	39.55	-89.39	686.85	-1,158.73	1,998.50	1,924.47	74.03	26.997	
7,700.00	6,106.21	7,068.83	6,073.40	49.79	41.43	-89.38	712.72	-1,229.60	2,064.14	1,987.00	77.14	26.758	
7,800.00	6,107.38	7,144.27	6,073.33	51.65	43.35	-89.37	738.59	-1,300.46	2,129.78	2,049.46	80.32	26.517	
7,900.00	6,108.55	7,219.71	6,073.25	53.53	45.29	-89.36	764.45	-1,371.33	2,195.42	2,111.87	83.55	26.276	
8,000.00	6,109.72	7,295.15	6,073.17	55.43	47.26	-89.36	790.32	-1,442.20	2,261.06	2,174.22	86.84	26.037	
8,100.00	6,110.89	7,370.59	6,073.09	57.35	49.26	-89.35	816.19	-1,513.07	2,326.70	2,236.52	90.18	25.800	
8,200.00	6,112.07	7,446.03	6,073.02	59.30	51.27	-89.34	842.05	-1,583.93	2,392.34	2,298.78	93.56	25.570	
8,300.00	6,113.24	7,521.47	6,072.94	61.26	53.31	-89.34	867.92	-1,654.80	2,457.98	2,361.01	96.98	25.346	
8,400.00	6,114.41	7,596.91	6,072.86	63.23	55.35	-89.33	893.79	-1,725.67	2,523.62	2,423.19	100.43	25.129	
8,500.00	6,115.58	7,672.35	6,072.78	65.22	57.42	-89.33	919.65	-1,796.54	2,589.26	2,485.35	103.91	24.917	
8,600.00	6,116.75	7,747.79	6,072.71	67.22	59.50	-89.32	945.52	-1,867.40	2,654.91	2,547.48	107.43	24.714	
8,700.00	6,117.93	7,823.23	6,072.63	69.23	61.59	-89.32	971.39	-1,938.27	2,720.55	2,609.58	110.96	24.518	
8,800.00	6,119.10	7,898.67	6,072.55	71.26	63.69	-89.32	997.25	-2,009.14	2,786.19	2,671.67	114.52	24.329	
8,900.00	6,120.27	7,974.11	6,072.47	73.29	65.80	-89.31	1,023.12	-2,080.01	2,851.83	2,733.73	118.10	24.147	
9,000.00	6,121.44	8,049.55	6,072.40	75.33	67.91	-89.31	1,048.99	-2,150.87	2,917.47	2,795.77	121.70	23.972	
9,100.00	6,122.61	8,124.99	6,072.32	77.38	70.04	-89.30	1,074.85	-2,221.74	2,983.11	2,857.79	125.32	23.804	
9,200.00	6,123.78	8,200.43	6,072.24	79.44	72.17	-89.30	1,100.72	-2,292.61	3,048.75	2,919.80	128.95	23.643	
9,300.00	6,124.96	8,275.87	6,072.16	81.50	74.31	-89.30	1,126.59	-2,363.48	3,114.39	2,981.79	132.60	23.487	
9,400.00	6,126.13	8,351.31	6,072.09	83.57	76.46	-89.29	1,152.45	-2,434.34	3,180.03	3,043.77	136.26	23.338	
9,500.00	6,127.30	8,426.75	6,072.01	85.65	78.61	-89.29	1,178.32	-2,505.21	3,245.67	3,105.74	139.93	23.194	
9,600.00	6,128.47	8,502.20	6,071.93	87.73	80.76	-89.29	1,204.19	-2,576.08	3,311.31	3,167.69	143.62	23.056	
9,700.00	6,129.64	8,577.64	6,071.85	89.82	82.92	-89.28	1,230.05	-2,646.94	3,376.95	3,229.64	147.32	22.923	
9,800.00	6,130.82	8,653.08	6,071.78	91.91	85.09	-89.28	1,255.92	-2,717.81	3,442.59	3,291.57	151.02	22.795	
9,900.00	6,131.99	8,728.52	6,071.70	94.01	87.26	-89.28	1,281.79	-2,788.68	3,508.23	3,353.50	154.74	22.672	
10,000.00	6,133.16	8,803.96	6,071.62	96.11	89.43	-89.28	1,307.65	-2,859.55	3,573.88	3,415.41	158.46	22.553	
10,100.00	6,134.33	8,879.40	6,071.54	98.21	91.60	-89.27	1,333.52	-2,930.41	3,639.52	3,477.32	162.19	22.439	
10,200.00	6,135.50	8,954.84	6,071.47	100.32	93.78	-89.27	1,359.39	-3,001.28	3,705.16	3,539.22	165.93	22.329	

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 2407-29E 1H - Slot Fed 1H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Reference Site:	Federal 2407-29E	**MD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-29E 1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-29E - Federal 2407-29E 4H - OH - Plan #2

Survey Program: 0-MWD+HDGM

Offset Site Error: 0.00 usft
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	6,136.68	9,030.28	6,071.39	102.43	95.97	-89.27	1,385.25	-3,072.15	3,770.80	3,601.12	169.68	22.223	
10,400.00	6,137.85	9,105.72	6,071.31	104.55	98.15	-89.27	1,411.12	-3,143.02	3,836.44	3,663.00	173.43	22.120	
10,500.00	6,139.02	9,181.16	6,071.23	106.67	100.34	-89.26	1,436.99	-3,213.88	3,902.08	3,724.89	177.19	22.022	
10,600.00	6,140.19	9,256.60	6,071.16	108.79	102.53	-89.26	1,462.85	-3,284.75	3,967.72	3,786.76	180.96	21.926	
10,700.00	6,141.36	9,332.04	6,071.08	110.91	104.72	-89.26	1,488.72	-3,355.62	4,033.36	3,848.63	184.73	21.834	
10,800.00	6,142.54	9,407.48	6,071.00	113.04	106.91	-89.26	1,514.59	-3,426.49	4,099.00	3,910.50	188.50	21.745	
10,900.00	6,143.71	9,482.92	6,070.92	115.16	109.11	-89.26	1,540.45	-3,497.35	4,164.64	3,972.36	192.28	21.659	
11,000.00	6,144.88	9,558.36	6,070.85	117.29	111.31	-89.26	1,566.32	-3,568.22	4,230.28	4,034.21	196.07	21.575	
11,100.00	6,146.05	9,633.80	6,070.77	119.43	113.51	-89.25	1,592.19	-3,639.09	4,295.92	4,096.07	199.86	21.495	
11,200.00	6,147.22	9,709.24	6,070.69	121.56	115.71	-89.25	1,618.05	-3,709.95	4,361.57	4,157.91	203.65	21.417	
11,300.00	6,148.40	9,784.68	6,070.61	123.70	117.91	-89.25	1,643.92	-3,780.82	4,427.21	4,219.76	207.45	21.341	
11,400.00	6,149.57	9,860.12	6,070.54	125.83	120.12	-89.25	1,669.79	-3,851.69	4,492.85	4,281.60	211.25	21.268	
11,500.00	6,150.74	9,935.57	6,070.46	127.97	122.32	-89.25	1,695.65	-3,922.56	4,558.49	4,343.44	215.05	21.197	
11,600.00	6,151.91	10,011.01	6,070.38	130.12	124.53	-89.25	1,721.52	-3,993.42	4,624.13	4,405.27	218.86	21.128	
11,700.00	6,153.08	10,086.45	6,070.30	132.26	126.74	-89.24	1,747.39	-4,064.29	4,689.77	4,467.10	222.67	21.062	
11,800.00	6,154.26	10,161.89	6,070.23	134.40	128.95	-89.24	1,773.25	-4,135.16	4,755.41	4,528.93	226.48	20.997	
11,900.00	6,155.43	10,237.33	6,070.15	136.55	131.16	-89.24	1,799.12	-4,206.03	4,821.05	4,590.75	230.30	20.934	
12,000.00	6,156.60	10,312.77	6,070.07	138.70	133.37	-89.24	1,824.99	-4,276.89	4,886.69	4,652.58	234.12	20.873	
12,100.00	6,157.77	10,388.21	6,069.99	140.84	135.58	-89.24	1,850.85	-4,347.76	4,952.33	4,714.40	237.94	20.814	
12,200.00	6,158.94	10,463.65	6,069.92	142.99	137.80	-89.24	1,876.72	-4,418.63	5,017.97	4,776.21	241.76	20.756	
12,300.00	6,160.12	10,539.09	6,069.84	145.14	140.01	-89.24	1,902.59	-4,489.50	5,083.61	4,838.03	245.59	20.700	
12,400.00	6,161.29	10,614.53	6,069.76	147.30	142.23	-89.23	1,928.45	-4,560.36	5,149.26	4,899.84	249.41	20.645	
12,500.00	6,162.46	10,689.97	6,069.68	149.45	144.45	-89.23	1,954.32	-4,631.23	5,214.90	4,961.65	253.24	20.592	
12,600.00	6,163.63	10,765.41	6,069.61	151.60	146.66	-89.23	1,980.19	-4,702.10	5,280.54	5,023.46	257.08	20.541	
12,700.00	6,164.80	10,840.85	6,069.53	153.76	148.88	-89.23	2,006.05	-4,772.97	5,346.18	5,085.27	260.91	20.491	
12,800.00	6,165.98	10,916.29	6,069.45	155.91	151.10	-89.23	2,031.92	-4,843.83	5,411.82	5,147.07	264.74	20.442	
12,900.00	6,167.15	10,991.73	6,069.37	158.07	153.32	-89.23	2,057.79	-4,914.70	5,477.46	5,208.88	268.58	20.394	
13,000.00	6,168.32	11,067.17	6,069.30	160.23	155.54	-89.23	2,083.65	-4,985.57	5,543.10	5,270.68	272.42	20.348	
13,058.10	6,169.00	11,111.00	6,069.25	161.48	156.83	-89.23	2,098.68	-5,026.74	5,581.23	5,306.58	274.65	20.321	

Company:	Logos Operating LLC	**Local Co-ordinate Reference:**	Well Federal 2407-29E 1H - Slot Fed 1H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Reference Site:	Federal 2407-29E	**MD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-29E 1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-29E - Federal 2407-29E 5H - 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	-47.57	53.88	-58.94	79.86				
100.00	100.00	100.00	100.00	0.15	0.15	-47.57	53.88	-58.94	79.86	79.55	0.31	259.031	
200.00	200.00	200.00	200.00	0.51	0.51	-47.57	53.88	-58.94	79.86	78.83	1.03	77.891	
300.00	300.00	300.00	300.00	0.87	0.87	-47.57	53.88	-58.94	79.86	78.11	1.74	45.837	
400.00	400.00	400.00	400.00	1.23	1.23	-47.57	53.88	-58.94	79.86	77.40	2.46	32.473	
500.00	500.00	500.00	500.00	1.59	1.59	-47.57	53.88	-58.94	79.86	76.68	3.18	25.143	
600.00	600.00	600.00	600.00	1.95	1.95	-47.57	53.88	-58.94	79.86	75.96	3.89	20.513	
700.00	700.00	702.29	702.27	2.30	2.30	-46.81	53.64	-57.13	78.40	73.77	4.63	16.939	
800.00	800.00	804.33	804.16	2.66	2.66	-44.34	52.93	-51.72	74.12	68.74	5.38	13.780	
900.00	900.00	905.85	905.27	3.02	3.02	-39.57	51.75	-42.77	67.35	61.22	6.13	10.986	
1,000.00	1,000.00	1,006.60	1,005.24	3.38	3.39	-31.22	50.13	-30.38	58.85	51.99	6.86	8.578	
1,100.00	1,100.00	1,106.35	1,103.72	3.74	3.77	-16.99	48.07	-14.69	50.40	42.84	7.55	6.671	
1,200.00	1,200.00	1,204.88	1,200.39	4.10	4.16	5.18	45.59	4.14	45.78	37.53	8.26	5.545	
1,208.89	1,208.89	1,213.57	1,208.89	4.13	4.20	7.48	45.36	5.96	45.75	37.42	8.33	5.494	CC, ES, SF
1,300.00	1,300.00	1,301.97	1,294.97	4.46	4.57	31.22	42.74	25.90	50.23	41.14	9.09	5.526	
1,400.00	1,400.00	1,397.45	1,387.19	4.81	5.01	51.89	39.52	50.39	65.31	55.34	9.97	6.549	
1,500.00	1,499.98	1,491.16	1,476.86	5.17	5.47	53.93	35.98	77.38	87.42	76.63	10.79	8.103	
1,600.00	1,599.84	1,582.92	1,563.75	5.53	5.96	63.67	32.14	106.61	114.06	102.53	11.53	9.891	
1,700.00	1,699.45	1,672.95	1,648.04	5.89	6.47	70.91	28.03	137.94	144.80	132.58	12.22	11.852	
1,800.00	1,798.70	1,765.75	1,734.52	6.25	7.04	76.70	23.64	171.34	177.74	164.89	12.85	13.834	
1,900.00	1,897.47	1,858.19	1,820.65	6.61	7.62	81.38	19.28	204.61	211.63	198.14	13.49	15.690	
2,000.00	1,995.62	1,950.16	1,906.35	6.98	8.21	85.36	14.93	237.71	246.51	232.36	14.15	17.422	
2,100.00	2,093.06	2,041.54	1,991.50	7.37	8.80	88.88	10.61	270.59	282.51	267.67	14.84	19.035	
2,200.00	2,189.64	2,132.23	2,076.00	7.77	9.40	92.03	6.33	303.23	319.75	304.18	15.57	20.539	
2,300.00	2,285.54	2,222.33	2,159.96	8.18	10.00	95.36	2.07	335.66	358.30	341.97	16.33	21.940	
2,400.00	2,381.40	2,312.41	2,243.89	8.61	10.61	98.27	-2.18	368.07	397.87	380.75	17.12	23.238	
2,500.00	2,477.25	2,402.48	2,327.82	9.05	11.22	100.66	-6.44	400.49	438.17	420.23	17.93	24.432	
2,600.00	2,573.11	2,492.56	2,411.76	9.50	11.83	102.65	-10.70	432.91	479.02	460.25	18.77	25.527	
2,700.00	2,668.97	2,582.63	2,495.69	9.95	12.45	104.34	-14.95	465.32	520.28	500.67	19.61	26.530	
2,800.00	2,764.83	2,672.71	2,579.62	10.41	13.07	105.79	-19.21	497.74	561.88	541.41	20.47	27.449	
2,900.00	2,860.68	2,762.78	2,663.55	10.88	13.70	107.03	-23.46	530.16	603.73	582.39	21.34	28.292	
3,000.00	2,956.54	2,852.85	2,747.48	11.35	14.32	108.12	-27.72	562.57	645.79	623.57	22.22	29.067	
3,100.00	3,052.40	2,942.93	2,831.41	11.83	14.95	109.08	-31.98	594.99	688.02	664.92	23.10	29.781	
3,200.00	3,148.26	3,033.00	2,915.34	12.31	15.58	109.93	-36.23	627.41	730.40	706.40	23.99	30.440	
3,300.00	3,244.11	3,123.08	2,999.27	12.80	16.21	110.68	-40.49	659.82	772.89	748.00	24.89	31.048	
3,400.00	3,339.97	3,213.15	3,083.20	13.28	16.84	111.36	-44.74	692.24	815.48	789.69	25.80	31.613	
3,500.00	3,435.83	3,303.22	3,167.14	13.77	17.47	111.97	-49.00	724.65	858.16	831.45	26.70	32.136	
3,600.00	3,531.69	3,393.30	3,251.07	14.27	18.11	112.52	-53.25	757.07	900.91	873.29	27.62	32.623	
3,700.00	3,627.54	3,483.37	3,335.00	14.76	18.74	113.02	-57.51	789.49	943.72	915.19	28.53	33.077	
3,800.00	3,723.40	3,573.45	3,418.93	15.26	19.38	113.48	-61.77	821.90	986.58	957.13	29.45	33.501	
3,900.00	3,819.26	3,663.52	3,502.86	15.76	20.02	113.90	-66.02	854.32	1,029.50	999.13	30.37	33.898	
4,000.00	3,915.12	3,753.60	3,586.79	16.26	20.65	114.29	-70.28	886.74	1,072.45	1,041.16	31.29	34.270	
4,100.00	4,010.98	3,843.67	3,670.72	16.76	21.29	114.65	-74.53	919.15	1,115.45	1,083.22	32.22	34.620	
4,200.00	4,106.83	3,933.74	3,754.65	17.27	21.93	114.98	-78.79	951.57	1,158.47	1,125.32	33.15	34.948	
4,300.00	4,202.69	4,023.82	3,838.58	17.77	22.57	115.29	-83.05	983.98	1,201.53	1,167.45	34.08	35.258	
4,400.00	4,298.55	4,113.89	3,922.52	18.28	23.21	115.58	-87.30	1,016.40	1,244.61	1,209.60	35.01	35.550	
4,500.00	4,394.41	4,203.97	4,006.45	18.78	23.85	115.84	-91.56	1,048.82	1,287.71	1,251.77	35.94	35.826	
4,600.00	4,490.26	4,294.04	4,090.38	19.29	24.49	116.09	-95.81	1,081.23	1,330.84	1,293.96	36.88	36.087	
4,700.00	4,586.12	4,384.12	4,174.31	19.80	25.13	116.33	-100.07	1,113.65	1,373.99	1,336.17	37.82	36.334	
4,800.00	4,681.98	4,474.19	4,258.24	20.31	25.77	116.55	-104.32	1,146.07	1,417.15	1,378.40	38.75	36.568	
4,900.00	4,777.84	4,564.26	4,342.17	20.82	26.41	116.76	-108.58	1,178.48	1,460.33	1,420.64	39.69	36.791	
5,000.00	4,873.69	4,654.34	4,426.10	21.33	27.05	116.95	-112.84	1,210.90	1,503.53	1,462.89	40.63	37.003	

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 2407-29E 1H - Slot Fed 1H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Reference Site:	Federal 2407-29E	**MD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-29E 1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Offset Design Federal 2407-29E - Federal 2407-29E 5H - 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	4,969.55	7,480.60	6,074.98	21.85	55.78	175.05	-45.64	99.85	1,468.91	1,415.08	53.83	27.289	
5,200.00	5,065.41	7,476.72	6,075.00	22.36	55.69	174.87	-45.98	103.72	1,417.93	1,361.04	56.89	24.924	
5,300.00	5,161.27	7,472.84	6,075.02	22.87	55.59	174.69	-46.31	107.59	1,372.34	1,312.34	59.99	22.874	
5,400.00	5,257.13	7,468.95	6,075.05	23.39	55.50	174.52	-46.65	111.46	1,332.69	1,269.62	63.08	21.128	
5,500.00	5,352.98	7,465.07	6,075.07	23.90	55.41	174.34	-46.98	115.33	1,299.54	1,233.48	66.07	19.670	
5,600.00	5,448.84	7,461.19	6,075.09	24.42	55.32	174.16	-47.31	119.20	1,273.39	1,204.52	68.87	18.489	
5,700.00	5,544.70	7,457.31	6,075.11	24.93	55.23	174.33	-47.65	123.06	1,254.67	1,183.26	71.41	17.570	
5,776.17	5,616.66	7,456.83	6,075.12	25.35	55.22	-175.52	-47.69	123.53	1,249.07	1,175.89	73.18	17.069	
5,800.00	5,638.69	7,457.66	6,075.11	25.49	55.24	-173.15	-47.62	122.71	1,249.62	1,175.92	73.70	16.955	
5,900.00	5,727.85	7,466.10	6,075.06	26.11	55.43	-165.29	-46.89	114.30	1,263.76	1,188.01	75.75	16.684	
6,000.00	5,810.46	7,482.48	6,074.97	26.79	55.82	-158.82	-45.48	97.99	1,296.03	1,218.55	77.47	16.729	
6,100.00	5,884.91	7,506.46	6,074.83	27.53	56.39	-152.19	-43.42	74.09	1,344.25	1,265.32	78.92	17.033	
6,200.00	5,949.74	7,537.60	6,074.65	28.33	57.14	-144.46	-40.74	43.07	1,405.52	1,325.33	80.19	17.527	
6,300.00	6,003.69	7,575.28	6,074.44	29.21	58.06	-134.98	-37.50	5.53	1,476.69	1,395.30	81.38	18.145	
6,400.00	6,045.72	7,618.76	6,074.19	30.18	59.12	-123.45	-33.75	-37.79	1,554.66	1,472.05	82.61	18.820	
6,500.00	6,075.00	7,667.20	6,073.92	31.25	60.32	-110.33	-29.58	-86.05	1,636.64	1,552.71	83.93	19.499	
6,600.00	6,090.97	7,719.67	6,073.62	32.40	61.62	-97.02	-25.07	-138.32	1,720.19	1,634.79	85.40	20.142	
6,700.00	6,094.49	7,774.93	6,073.30	33.64	63.02	-89.79	-20.31	-193.38	1,803.44	1,716.41	87.02	20.723	
6,800.00	6,095.66	7,830.64	6,072.98	34.97	64.43	-89.76	-15.52	-248.88	1,886.48	1,797.75	88.73	21.260	
6,900.00	6,096.83	7,886.35	6,072.67	36.38	65.86	-89.74	-10.73	-304.39	1,969.52	1,879.01	90.51	21.760	
7,000.00	6,098.00	7,942.06	6,072.35	37.87	67.30	-89.72	-5.93	-359.89	2,052.57	1,960.21	92.36	22.224	
7,100.00	6,099.17	7,997.77	6,072.03	39.42	68.75	-89.69	-1.14	-415.39	2,135.61	2,041.35	94.26	22.656	
7,200.00	6,100.35	8,053.48	6,071.71	41.04	70.21	-89.67	3.66	-470.89	2,218.65	2,122.42	96.24	23.054	
7,300.00	6,101.52	8,109.19	6,071.39	42.71	71.68	-89.65	8.45	-526.40	2,301.70	2,203.44	98.26	23.425	
7,400.00	6,102.69	8,164.91	6,071.08	44.42	73.16	-89.64	13.24	-581.90	2,384.74	2,284.40	100.34	23.767	
7,500.00	6,103.86	8,220.62	6,070.76	46.18	74.65	-89.62	18.04	-637.40	2,467.78	2,365.32	102.46	24.084	
7,600.00	6,105.03	8,276.33	6,070.44	47.97	76.14	-89.61	22.83	-692.91	2,550.83	2,446.19	104.64	24.378	
7,700.00	6,106.21	8,332.04	6,070.12	49.79	77.65	-89.59	27.63	-748.41	2,633.87	2,527.02	106.85	24.649	
7,800.00	6,107.38	8,387.75	6,069.80	51.65	79.16	-89.58	32.42	-803.91	2,716.91	2,607.80	109.11	24.901	
7,900.00	6,108.55	8,443.46	6,069.49	53.53	80.67	-89.57	37.21	-859.41	2,799.96	2,688.55	111.40	25.133	
8,000.00	6,109.72	8,499.17	6,069.17	55.43	82.20	-89.55	42.01	-914.92	2,883.00	2,769.27	113.73	25.349	
8,100.00	6,110.89	8,554.88	6,068.85	57.35	83.73	-89.54	46.80	-970.42	2,966.05	2,849.95	116.09	25.549	
8,200.00	6,112.07	8,610.59	6,068.53	59.30	85.26	-89.53	51.60	-1,025.92	3,049.09	2,930.61	118.48	25.734	
8,300.00	6,113.24	8,666.30	6,068.22	61.26	86.80	-89.52	56.39	-1,081.43	3,132.13	3,011.23	120.90	25.906	
8,400.00	6,114.41	8,722.01	6,067.90	63.23	88.34	-89.51	61.19	-1,136.93	3,215.18	3,091.83	123.35	26.066	
8,500.00	6,115.58	8,777.72	6,067.58	65.22	89.89	-89.50	65.98	-1,192.43	3,298.22	3,172.41	125.81	26.215	
8,600.00	6,116.75	8,833.43	6,067.26	67.22	91.45	-89.50	70.77	-1,247.93	3,381.26	3,252.96	128.31	26.353	
8,700.00	6,117.93	8,889.14	6,066.94	69.23	93.01	-89.49	75.57	-1,303.44	3,464.31	3,333.49	130.82	26.482	
8,800.00	6,119.10	8,944.85	6,066.63	71.26	94.57	-89.48	80.36	-1,358.94	3,547.35	3,414.00	133.35	26.602	
8,900.00	6,120.27	9,000.56	6,066.31	73.29	96.14	-89.47	85.16	-1,414.44	3,630.40	3,494.50	135.90	26.715	
9,000.00	6,121.44	9,056.27	6,065.99	75.33	97.71	-89.47	89.95	-1,469.94	3,713.44	3,574.98	138.46	26.819	
9,100.00	6,122.61	9,111.98	6,065.67	77.38	99.28	-89.46	94.74	-1,525.45	3,796.48	3,655.44	141.04	26.917	
9,200.00	6,123.78	9,167.69	6,065.36	79.44	100.86	-89.45	99.54	-1,580.95	3,879.53	3,735.89	143.64	27.009	
9,300.00	6,124.96	9,223.40	6,065.04	81.50	102.44	-89.45	104.33	-1,636.45	3,962.57	3,816.32	146.25	27.095	
9,400.00	6,126.13	9,279.11	6,064.72	83.57	104.02	-89.44	109.13	-1,691.96	4,045.62	3,896.74	148.87	27.175	
9,500.00	6,127.30	9,334.82	6,064.40	85.65	105.61	-89.43	113.92	-1,747.46	4,128.66	3,977.15	151.51	27.251	
9,600.00	6,128.47	9,390.53	6,064.08	87.73	107.20	-89.43	118.71	-1,802.96	4,211.70	4,057.55	154.15	27.322	
9,700.00	6,129.64	9,446.24	6,063.77	89.82	108.79	-89.42	123.51	-1,858.46	4,294.75	4,137.94	156.81	27.388	
9,800.00	6,130.82	9,501.95	6,063.45	91.91	110.38	-89.42	128.30	-1,913.97	4,377.79	4,218.32	159.47	27.451	
9,900.00	6,131.99	9,557.66	6,063.13	94.01	111.98	-89.41	133.10	-1,969.47	4,460.84	4,298.68	162.15	27.510	
10,000.00	6,133.16	9,613.37	6,062.81	96.11	113.58	-89.41	137.89	-2,024.97	4,543.88	4,379.04	164.84	27.566	
10,100.00	6,134.33	9,669.09	6,062.50	98.21	115.18	-89.40	142.68	-2,080.48	4,626.92	4,459.39	167.53	27.619	

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 2407-29E 1H - Slot Fed 1H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Reference Site:	Federal 2407-29E	**MD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-29E 1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

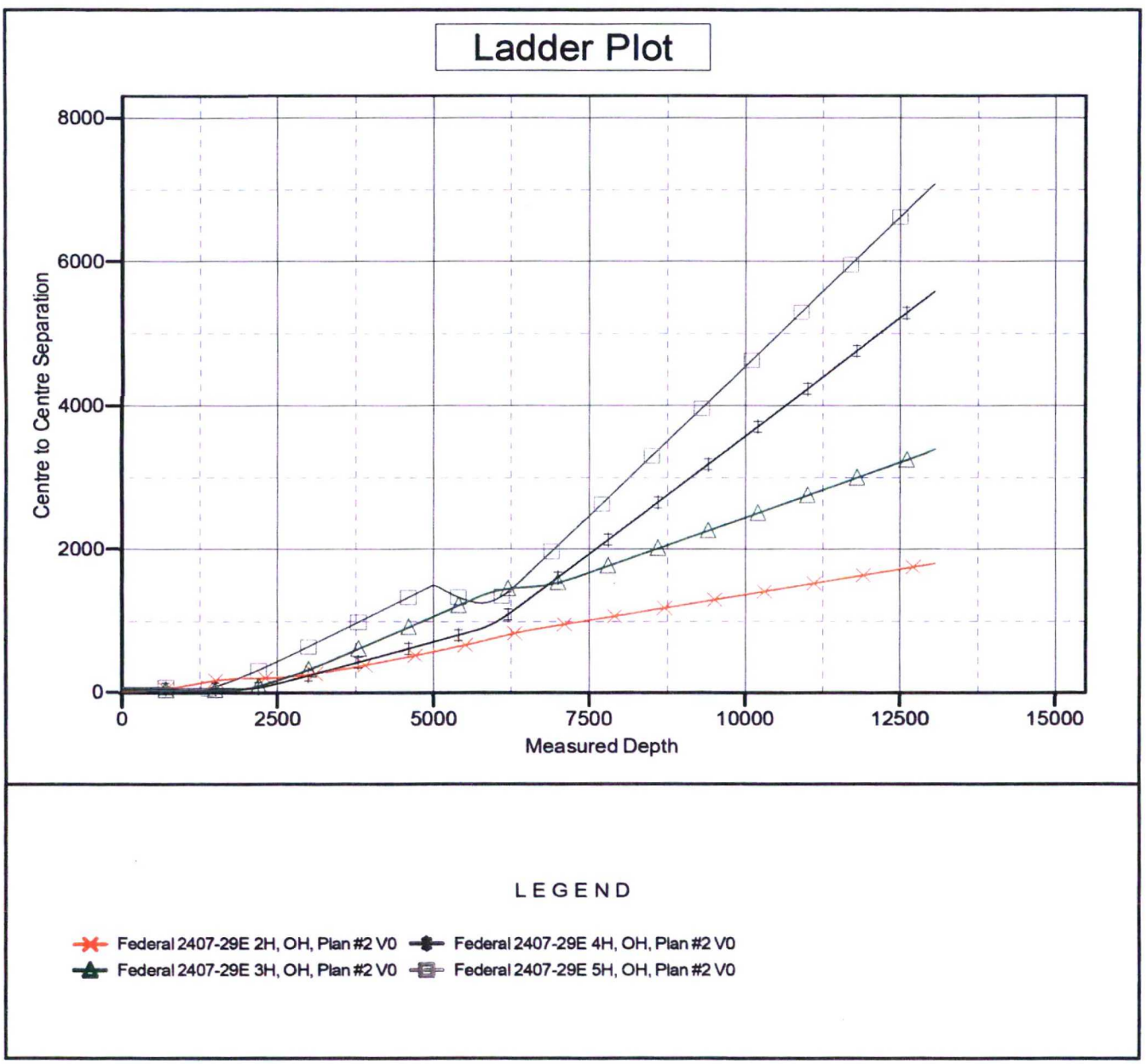
Offset Design Federal 2407-29E - Federal 2407-29E 5H - OH - Plan #2 — **Offset Site Error:** 0.00 usft

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
10,200.00	6,135.50	9,724.80	6,062.18	100.32	116.78	-89.40	147.48	-2,135.98	4,709.97	4,539.74	170.23	27.668	
10,300.00	6,136.68	9,780.51	6,061.86	102.43	118.39	-89.40	152.27	-2,191.48	4,793.01	4,620.07	172.94	27.715	
10,400.00	6,137.85	9,836.22	6,061.54	104.55	120.00	-89.39	157.07	-2,246.98	4,876.06	4,700.40	175.65	27.759	
10,500.00	6,139.02	9,891.93	6,061.22	106.67	121.61	-89.39	161.86	-2,302.49	4,959.10	4,780.72	178.38	27.801	
10,600.00	6,140.19	9,947.64	6,060.91	108.79	123.22	-89.38	166.66	-2,357.99	5,042.14	4,861.04	181.11	27.841	
10,700.00	6,141.36	10,003.35	6,060.59	110.91	124.83	-89.38	171.45	-2,413.49	5,125.19	4,941.35	183.84	27.879	
10,800.00	6,142.54	10,059.06	6,060.27	113.04	126.45	-89.38	176.24	-2,469.00	5,208.23	5,021.65	186.58	27.914	
10,900.00	6,143.71	10,114.77	6,059.95	115.16	128.06	-89.37	181.04	-2,524.50	5,291.28	5,101.95	189.33	27.948	
11,000.00	6,144.88	10,170.48	6,059.63	117.29	129.68	-89.37	185.83	-2,580.00	5,374.32	5,182.24	192.08	27.980	
11,100.00	6,146.05	10,226.19	6,059.32	119.43	131.30	-89.37	190.63	-2,635.50	5,457.37	5,262.53	194.83	28.010	
11,200.00	6,147.22	10,281.90	6,059.00	121.56	132.92	-89.36	195.42	-2,691.01	5,540.41	5,342.81	197.59	28.039	
11,300.00	6,148.40	10,337.61	6,058.68	123.70	134.54	-89.36	200.21	-2,746.51	5,623.45	5,423.09	200.36	28.067	
11,400.00	6,149.57	10,393.32	6,058.36	125.83	136.17	-89.36	205.01	-2,802.01	5,706.50	5,503.37	203.13	28.093	
11,500.00	6,150.74	10,449.03	6,058.05	127.97	137.79	-89.35	209.80	-2,857.51	5,789.54	5,583.64	205.90	28.118	
11,600.00	6,151.91	10,504.74	6,057.73	130.12	139.42	-89.35	214.60	-2,913.02	5,872.59	5,663.91	208.68	28.142	
11,700.00	6,153.08	10,560.45	6,057.41	132.26	141.05	-89.35	219.39	-2,968.52	5,955.63	5,744.17	211.46	28.164	
11,800.00	6,154.26	10,616.16	6,057.09	134.40	142.67	-89.35	224.18	-3,024.02	6,038.67	5,824.43	214.24	28.186	
11,900.00	6,155.43	10,671.87	6,056.77	136.55	144.30	-89.34	228.98	-3,079.53	6,121.72	5,904.69	217.03	28.207	
12,000.00	6,156.60	10,727.58	6,056.46	138.70	145.94	-89.34	233.77	-3,135.03	6,204.76	5,984.94	219.82	28.226	
12,100.00	6,157.77	10,783.29	6,056.14	140.84	147.57	-89.34	238.57	-3,190.53	6,287.81	6,065.19	222.62	28.245	
12,200.00	6,158.94	10,839.00	6,055.82	142.99	149.20	-89.34	243.36	-3,246.03	6,370.85	6,145.44	225.41	28.263	
12,300.00	6,160.12	10,894.71	6,055.50	145.14	150.83	-89.33	248.15	-3,301.54	6,453.89	6,225.68	228.21	28.280	
12,400.00	6,161.29	10,950.42	6,055.19	147.30	152.47	-89.33	252.95	-3,357.04	6,536.94	6,305.92	231.02	28.296	
12,500.00	6,162.46	11,006.13	6,054.87	149.45	154.10	-89.33	257.74	-3,412.54	6,619.98	6,386.16	233.82	28.312	
12,600.00	6,163.63	11,061.84	6,054.55	151.60	155.74	-89.33	262.54	-3,468.05	6,703.03	6,466.40	236.63	28.327	
12,700.00	6,164.80	11,117.55	6,054.23	153.76	157.38	-89.33	267.33	-3,523.55	6,786.07	6,546.63	239.44	28.341	
12,800.00	6,165.98	11,173.26	6,053.91	155.91	159.02	-89.32	272.13	-3,579.05	6,869.12	6,626.86	242.25	28.355	
12,900.00	6,167.15	11,228.98	6,053.60	158.07	160.66	-89.32	276.92	-3,634.55	6,952.16	6,707.09	245.07	28.368	
13,000.00	6,168.32	11,284.69	6,053.28	160.23	162.30	-89.32	281.71	-3,690.06	7,035.20	6,787.32	247.89	28.381	
13,058.10	6,169.00	11,317.05	6,053.09	161.48	163.25	-89.32	284.50	-3,722.30	7,083.45	6,833.93	249.52	28.388	

Company:	Logos Operating LLC	**Local Co-ordinate Reference:**	Well Federal 2407-29E 1H - Slot Fed 1H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Reference Site:	Federal 2407-29E	**MD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-29E 1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

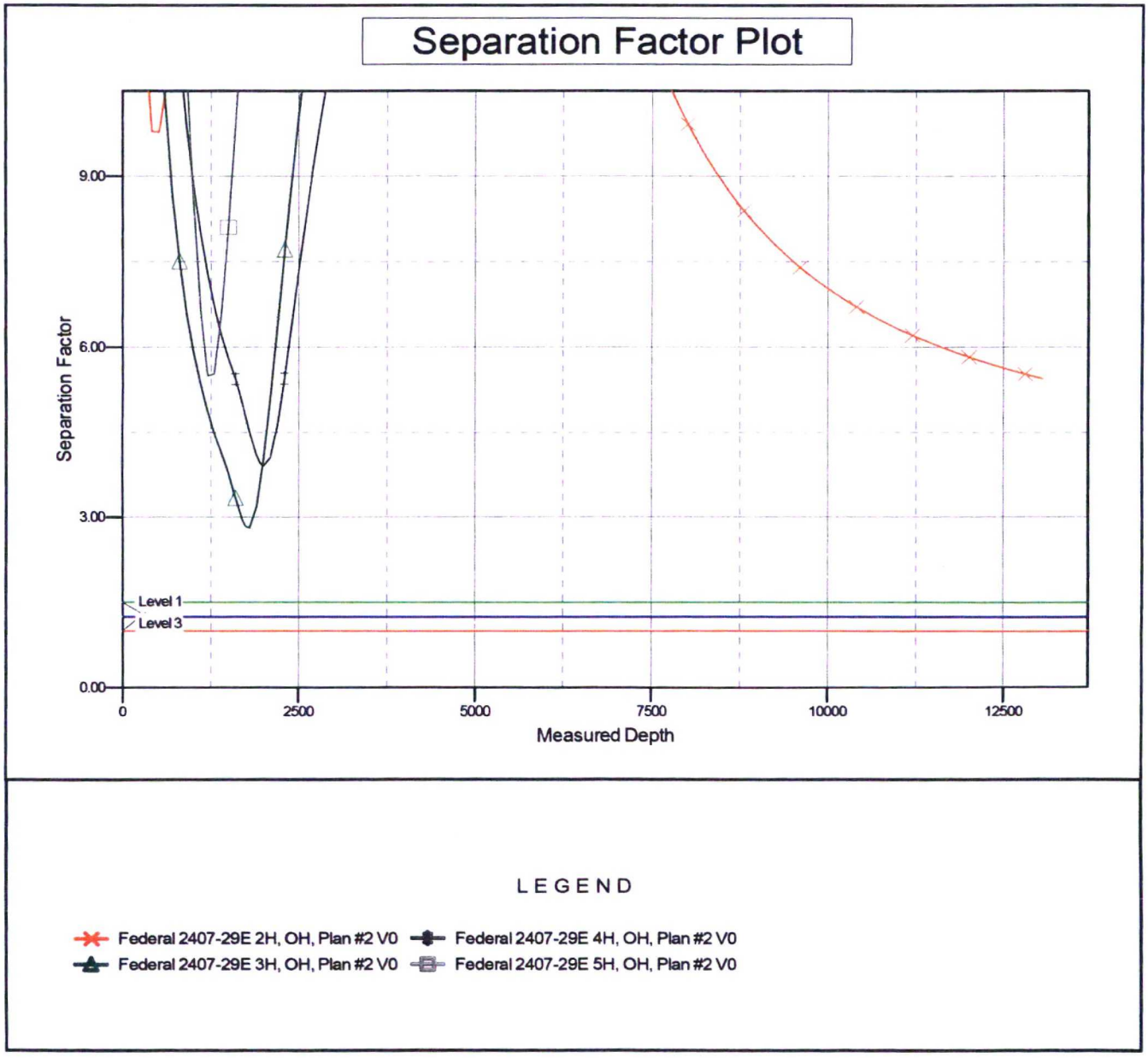
Reference Depths are relative to GL 7300' & RKB 14' @ 7314.00usft	Coordinates are relative to: Federal 2407-29E 1H - Slot Fed 1H
Offset Depths are relative to Offset Datum	Coordinate System is US State Plane 1983, New Mexico Western Zone
Central Meridian is -107.8333334	Grid Convergence at Surface is: 0.13°



Company:	Logos Operating LLC	**Local Co-ordinate Reference:**	Well Federal 2407-29E 1H - Slot Fed 1H
Project:	Rio Arriba, NM NAD83	**TVD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Reference Site:	Federal 2407-29E	**MD Reference:**	GL 7300' & RKB 14' @ 7314.00usft
Site Error:	0.00 usft	**North Reference:**	True
Reference Well:	Federal 2407-29E 1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	Grand Junction District
Reference Design:	Plan #2	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to GL 7300' & RKB 14' @ 7314.00usft
Offset Depths are relative to Offset Datum
Central Meridian is -107.8333334

Coordinates are relative to: Federal 2407-29E 1H - Slot Fed 1H
Coordinate System is US State Plane 1983, New Mexico Western Zone
Grid Convergence at Surface is: 0.13°



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.

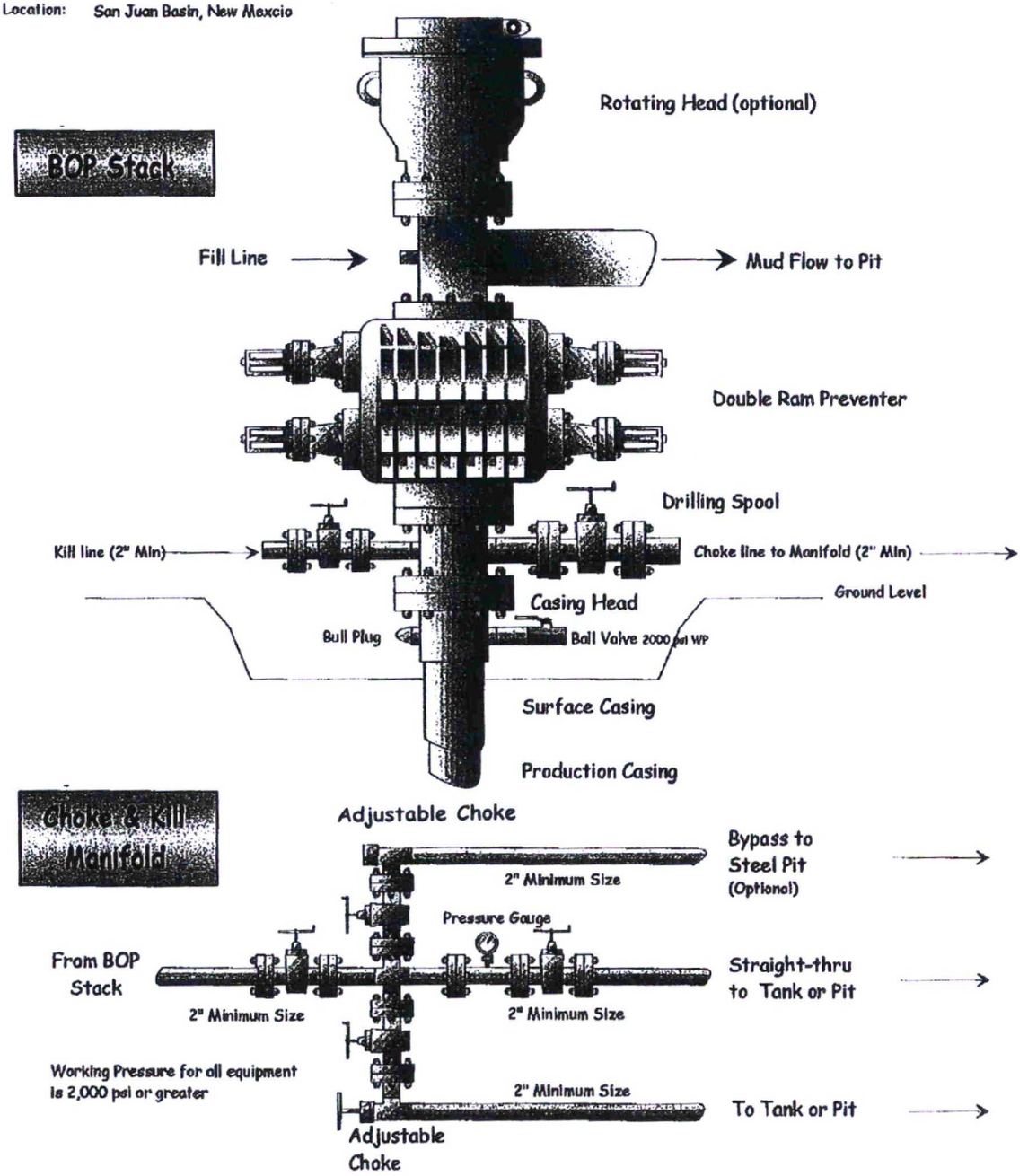
LOGOS RESOURCES II, LLC

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 US Hwy 550 & US Hwy 64

in Bloomfield, NM to Logos Operating, LLC Federal 2407-29E #1H

2188' FNL & 93' FWL, Section 29, T24N, R7W, N.M.P.M., Rio Arriba County, NM

Latitude: 36.286109°N Longitude: 107.606383°W Datum: NAD1983

From the intersection of US Hwy 550 & US Hwy 64 in Bloomfield, NM, travel Southerly on US Hwy 550 for 46.8 miles to Mile Marker 104.9;

Go Left (Northerly) on County Road #377 for 0.1 mile to fork in roadway;

Go Left (Northerly) which is straight remaining on County Road #377 for 4.1 miles to fork in roadway;

Go Left (Northerly) which is straight remaining on County Road #377 for 0.6 miles to begin proposed access on left-hand side of roadway which continues for 4599.6' to staked Logos Federal 2407-29E #1H location.