

District I1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720**District II**811 S. First St., Artesia, NM 88210
Phone:(575) 748-1283 Fax:(575) 748-9720**District III**1000 Rio Brazos Rd., Aztec, NM 87410
Phone:(505) 334-6178 Fax:(505) 334-6170**District IV**1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural
Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

Form C-101
August 1, 2011

Permit 260471

NMOC

DEC 05 2018

DISTRICT III

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

1. Operator Name and Address LOGOS OPERATING, LLC 4001 N Butler Farmington, NM 87401		2. OGRID Number 289408
		3. API Number 30-045- 35913
4. Property Code 322997	5. Property Name STATE 2408 32A COM	6. Well No. 003H

7. Surface Location

UL - Lot	Section	Township	Range	Lot Idn	Feet From	N/S Line	Feet From	E/W Line	County
A	32	24N	08W		330	N	300	E	SAN JUAN

8. Proposed Bottom Hole Location

UL - Lot	Section	Township	Range	Lot Idn	Feet From	N/S Line	Feet From	E/W Line	County
E	32	24N	08W	E	2312	N	20	W	San Juan

9. Pool Information

NAGEEZI GALLUP	47540
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Additional Well Information

11. Work Type New Well	12. Well Type OIL	13. Cable/Rotary R	14. Lease Type State	15. Ground Level Elevation 7013
16. Multiple N	17. Proposed Depth 12018	18. Formation Gallup Formation	19. Contractor TBA	20. Spud Date 1/1/2019
Depth to Ground water		Distance from nearest fresh water well		Distance to nearest surface water

☒ We will be using a closed-loop system in lieu of lined pits**21. Proposed Casing and Cement Program**

Type	Hole Size	Casing Size	Casing Weight/ft	Setting Depth	Sacks of Cement	Estimated TOC
Surf	12.25	9.625	36	320	100	0
Int1	8.75	7	23	6698	908	0
Liner1	6.125	4.5	11.6	12018	494	6548

Casing/Cement Program: Additional Comments

If necessary, LOGOS will add a stage (DV) tool to the 7" intermediate casing within the Pictured Cliffs/Chacra zone. If cement is not being returned to surface, the DV tool will be utilized and two stages of cement will be pumped, otherwise a DV cancellation plug will be used and one stage of cement will be pumped.

22. Proposed Blowout Prevention Program

Type	Working Pressure	Test Pressure	Manufacturer
Double Ram	2000	1500	

23. I hereby certify that the information given above is true and complete to the best of my knowledge and belief.
 I further certify I have complied with 19.15.14.9 (A) NMAC ☒ and/or 19.15.14.9 (B) NMAC ☒, if applicable.

Signature:

Printed Name: Marie E. Florez

Title: Regulatory Specialist

Email Address: mflorez@logosresourcesllc.com

Date: 12/3/2018

Phone: 505-419-8420

OIL CONSERVATION DIVISION

Approved By:

Title: I & E Supervisor

Approved Date: 12-19-18

Expiration Date: 12-19-2020

Conditions of Approval Attached

SEE ATTACHED NMOC
 CONDITIONS OF APPROVAL

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

Form C-102
Revised August 1, 2011

Submit one copy to
Appropriate District Office

OIL CONSERVATION DIVISION
1220 South St. Francis Drive
Santa Fe, NM 87505

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

*API Number 30-045-35913	*Pool Code 47540	*Pool Name NAGEEZI GALLUP
*Property Code 322997	*Property Name STATE 2408-32A COM	*Well Number 3H
*GRID No. 289408	*Operator Name LOGOS OPERATING, LLC	*Elevation 7013'

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
A	32	24N	8W		330	NORTH	300	EAST	SAN JUAN

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
E	32	24N	8W		2312	NORTH	20	WEST	SAN JUAN

12 Dedicated Acres S/2 N/2 - Section 32	13 Joint or Infill	14 Consolidation Code	15 Order No.
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END-OF-LATERAL
2312' FNL 20' FWL
SECTION 32, T24N, R8W
LAT: 36.271735°N
LONG: 107.713465°W
DATUM: NAD1927

LAT: 36.271748°N
LONG: 107.714078°W
DATUM: NAD1983

FIRST PERFORATION
2312' FNL 100' FWL
SECTION 32, T24N, R8W
LAT: 36.271735°N
LONG: 107.713194°W
DATUM: NAD1927

LAT: 36.271748°N
LONG: 107.713806°W
DATUM: NAD1983

SURFACE LOCATION
330' FNL 300' FWL
SECTION 32, T24N, R8W
LAT: 36.271768°N
LONG: 107.696596°W
DATUM: NAD1927

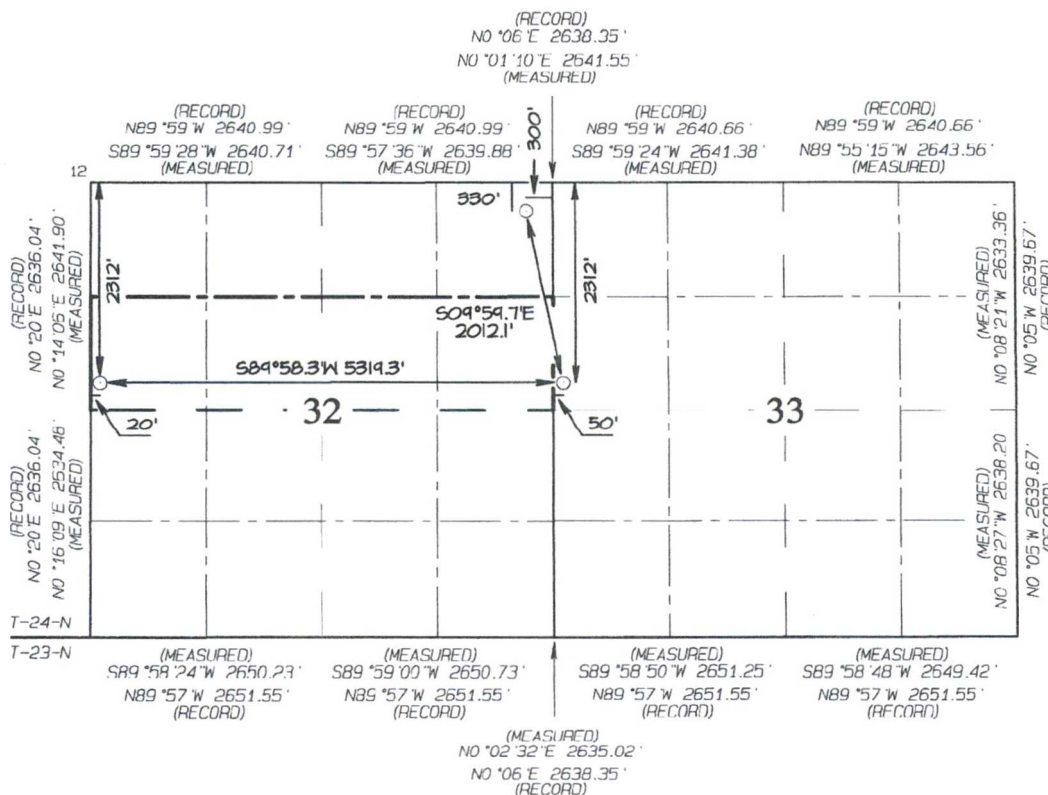
LAT: 36.277180°N
LONG: 107.697207°W
DATUM: NAD1983

LAST PERFORATION
2312' FNL 100' FWL
SECTION 32, T24N, R8W
LAT: 36.271724°N
LONG: 107.695929°W
DATUM: NAD1927

LAT: 36.271736°N
LONG: 107.696541°W
DATUM: NAD1983

POINT-OF-ENTRY
2312' FNL 50' FWL
SECTION 33, T24N, R8W
LAT: 36.271723°N
LONG: 107.695420°W
DATUM: NAD1927

LAT: 36.271736°N
LONG: 107.696032°W
DATUM: NAD1983



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 an 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 Marie E Florez Date 12/31/18

Printed Name
mflorez@logosresourcesllc.com

E-mail Address

18 SURVEYOR CERTIFICATION

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

Date Revised: NOVEMBER 13, 2018
Survey Date: NOVEMBER 9, 2018

Signature and Seal of 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:	December 3, 2018	Pool:	Nageezi Gallup
Well Name:	State 2408 32A Com 3H	Elevation:	7,013'
Surface Location:	Sec 32, T24N, R8W 330 FNL, 300 FEL (36.277180° N, 107.697207° W – NAD83)	Measured Depth:	12,018'
Bottom Hole Location:	Sec 32, T24N, R8W 2312 FNL, 20 FWL (36.271748° N, 107.714078° W – NAD83)	County:	San Juan

Lease Serial #VC-0472

I. GEOLOGY

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

NAME	MD	TVD	NAME	MD	TVD
OJO ALAMO	1,155	1,155	*POINT LOOKOUT	4,647	4,247
KIRTLAND	1,310	1,310	*MANCOS	4,887	4,432
*FRUITLAND	1,518	1,518	GALLUP	6,175	5,410
*PICTURED CLIFFS	1,839	1,839	KICKOFF POINT	5,296	4,746
CHACRA	2,284	2,278	LANDING POINT	6,698	5,557
*CLIFF HOUSE	3,462	3,334	TD	12,018	5,512
MENEFEE	3,511	3,372			

* 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 3/4" 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	OHSIZE (IN)	DEPTH (MD)	CSG SIZE	WEIGHT	GRADE	CON N
SURFACE	12.25"	320'	9.625"	36 LBS	J-55 or equiv	STC
INTERMEDIATE	8.75"	6,698'	7"	23 LBS	J-55 or equiv	LTC
PRODUCTION	6.125"	6,548' – 12,018'	4.5"	11.6 LBS	P-110 or equiv	LTC
TIE BACK	6.125"	Surf. – 6,548'	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: 223 bbls, 641 sks (1250 cu.ft.), 12.3 ppg@ 1.95 cuft/sk yield. Tail Cement: 62 bbls, 267 sks, (347 cuft), 13.5 ppg@ 1.3 cu'ft/sk yield. Displacement: Displace w/ +/- 262 bbl Drilling mud or water. Total Cement: 284 bbls, 908 sks, (1597 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 III. Spacer #3: 10 bbl Water Spacer. Lead Cement: Extencem TM System. Yield 1.36 cuft/sk 13.3 ppg (494 sx / 671 cuft /120 bbls). Tail Spacer: 40 BBL of MMCR. Displacement: Displace w/ +/- 155 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



Company: Logos Operating LLC
 Project: San Juan, NM NAD83
 Site: State 2408-32A
 Well: State 2408-32A 3H
 Wellbore: OH
 Design: Plan #1

PROJECT DETAILS: San Juan, NAD83

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



Azimuths to True North
 Magnetic North: 8.85°

Magnetic Field
 Strength: 49528.6snT
 Dip Angle: 62.85°
 Date: 11/28/2018
 Model: HDGM

WELL DETAILS: State 2408-32A 3H

GL 7013' & RKB 14' @ 7027.00usft
 +N/-S +E/-W Northing Easting Latitude Longitude
 0.00 0.00 1920220.88 2763214.76 36.2771800 -107.6972070

Plan: Plan #1 (State 2408-32A 3H/OH)

Created By: Janie Collins Date: 18:10, November 30 2018

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
State 3H LP	5557.00	-1981.75	346.35	1918239.62	2763563.90	36.2717360	-107.6960320
State 3H BHL	5512.00	-1976.95	-4973.06	1918236.94	2758244.48	36.2717480	-107.7140780
State 3H FPerf	5512.00	-1976.96	-4892.88	1918237.04	2758324.66	36.2717480	-107.7138060
State 3H LPerf	5557.00	-1981.75	196.32	1918239.41	2763413.86	36.2717360	-107.6965410

SECTION DETAILS

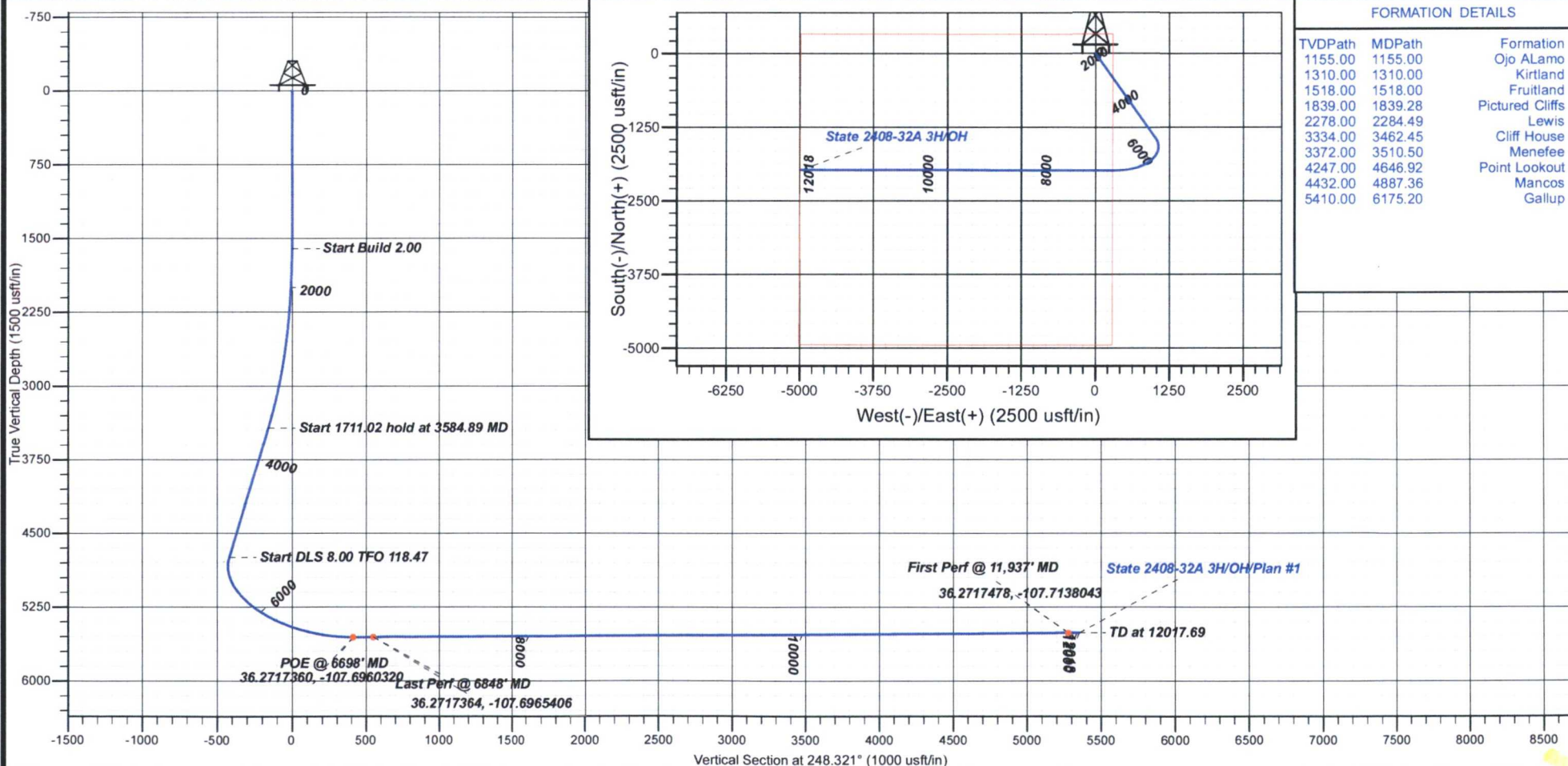
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSecl	Target
0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	
1600.00	0.00	0.000	1600.00	0.00	0.00	0.00	0.00	0.00	
3584.89	39.70	144.551	3429.85	-538.10	383.11	2.00	144.55	-157.23	
5295.91	39.70	144.551	4746.35	-1428.40	1016.96	0.00	0.00	-417.36	
6698.08	90.48	270.052	5557.00	-1981.75	346.35	8.00	118.47	410.23	State 3H LP
12017.69	90.48	270.052	5512.00	-1976.95	-4973.06	0.00	0.00	5351.60	State 3H BHL

CASING DETAILS

No casing data is available

FORMATION DETAILS

TVDPath	MDPath	Formation
1155.00	1155.00	Ojo Alamo
1310.00	1310.00	Kirtland
1518.00	1518.00	Fruitland
1839.00	1839.28	Pictured Cliffs
2278.00	2284.49	Lewis
3334.00	3462.45	Cliff House
3372.00	3510.50	Menefee
4247.00	4646.92	Point Lookout
4432.00	4887.36	Mancos
5410.00	6175.20	Gallup





Logos Operating LLC

San Juan, NM NAD83

State 2408-32A

State 2408-32A 3H

OH

Plan: Plan #1

Standard Planning Report

30 November, 2018





Scientific Drilling, Intl
Planning Report



Database:	Grand Junction District	Local Co-ordinate Reference:	Well State 2408-32A 3H
Company:	Logos Operating LLC	TVD Reference:	GL 7013' & RKB 14' @ 7027.00usft
Project:	San Juan, NM NAD83	MD Reference:	GL 7013' & RKB 14' @ 7027.00usft
Site:	State 2408-32A	North Reference:	True
Well:	State 2408-32A 3H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1		

Project	San Juan, 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	State 2408-32A		
Site Position:		Northing:	1,920,260.92 usft
From:	Lat/Long	Easting:	2,763,214.70 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in
		Latitude:	36.2772900
		Longitude:	-107.6972070
		Grid Convergence:	0.08 °

Well	State 2408-32A 3H		
Well Position	+N/-S	-40.04 usft	Northing:
	+E/-W	0.00 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft
		Latitude:	36.2771800
		Longitude:	-107.6972070
		Ground Level:	7,013.00 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination (°)
	HDGM	11/28/2018	8.85
			Dip Angle (°)
			62.85
			Field Strength (nT)
			49,529

Design	Plan #1		
Audit Notes:			
Version:	Phase:	PLAN	Tie On Depth:
			0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction (°)
			248.321

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	
1,600.00	0.00	0.000	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,584.89	39.70	144.551	3,429.85	-538.10	383.11	2.00	2.00	0.00	144.55	
5,295.91	39.70	144.551	4,746.35	-1,428.40	1,016.96	0.00	0.00	0.00	0.00	
6,698.08	90.48	270.052	5,557.00	-1,981.75	346.35	8.00	3.62	8.95	118.47	State 3H LP
12,017.69	90.48	270.052	5,512.00	-1,976.95	-4,973.06	0.00	0.00	0.00	0.00	State 3H BHL



Scientific Drilling, Intl
Planning Report



Database: Grand Junction District
Company: Logos Operating LLC
Project: San Juan, NM NAD83
Site: State 2408-32A
Well: State 2408-32A 3H
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference: Well State 2408-32A 3H
TVD Reference: GL 7013' & RKB 14' @ 7027.00usft
MD Reference: GL 7013' & RKB 14' @ 7027.00usft
North Reference: True
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.000	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.000	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.000	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.000	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.000	500.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.000	600.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.000	700.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.000	800.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.000	900.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.000	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.000	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.000	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.000	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.000	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.000	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.000	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 2.00									
1,700.00	2.00	144.551	1,699.98	-1.42	1.01	-0.42	2.00	2.00	0.00
1,800.00	4.00	144.551	1,799.84	-5.68	4.05	-1.66	2.00	2.00	0.00
1,900.00	6.00	144.551	1,899.45	-12.78	9.10	-3.74	2.00	2.00	0.00
2,000.00	8.00	144.551	1,998.70	-22.71	16.17	-6.64	2.00	2.00	0.00
2,100.00	10.00	144.551	2,097.47	-35.45	25.24	-10.36	2.00	2.00	0.00
2,200.00	12.00	144.551	2,195.62	-51.00	36.31	-14.90	2.00	2.00	0.00
2,300.00	14.00	144.551	2,293.06	-69.32	49.35	-20.25	2.00	2.00	0.00
2,400.00	16.00	144.551	2,389.64	-90.41	64.36	-26.42	2.00	2.00	0.00
2,500.00	18.00	144.551	2,485.27	-114.22	81.32	-33.37	2.00	2.00	0.00
2,600.00	20.00	144.551	2,579.82	-140.74	100.20	-41.12	2.00	2.00	0.00
2,700.00	22.00	144.551	2,673.17	-169.93	120.99	-49.65	2.00	2.00	0.00
2,800.00	24.00	144.551	2,765.21	-201.76	143.65	-58.95	2.00	2.00	0.00
2,900.00	26.00	144.551	2,855.84	-236.19	168.16	-69.01	2.00	2.00	0.00
3,000.00	28.00	144.551	2,944.94	-273.17	194.49	-79.82	2.00	2.00	0.00
3,100.00	30.00	144.551	3,032.39	-312.66	222.60	-91.36	2.00	2.00	0.00
3,200.00	32.00	144.551	3,118.11	-354.62	252.47	-103.61	2.00	2.00	0.00
3,300.00	34.00	144.551	3,201.97	-398.98	284.06	-116.58	2.00	2.00	0.00
3,400.00	36.00	144.551	3,283.88	-445.70	317.32	-130.23	2.00	2.00	0.00
3,500.00	38.00	144.551	3,363.74	-494.73	352.23	-144.55	2.00	2.00	0.00
3,584.89	39.70	144.551	3,429.85	-538.10	383.11	-157.23	2.00	2.00	0.00
Start 1711.02 hold at 3584.89 MD									
3,600.00	39.70	144.551	3,441.48	-545.97	388.71	-159.52	0.00	0.00	0.00
3,700.00	39.70	144.551	3,518.42	-598.00	425.75	-174.73	0.00	0.00	0.00
3,800.00	39.70	144.551	3,595.36	-650.03	462.80	-189.93	0.00	0.00	0.00
3,900.00	39.70	144.551	3,672.30	-702.07	499.84	-205.13	0.00	0.00	0.00
4,000.00	39.70	144.551	3,749.25	-754.10	536.89	-220.34	0.00	0.00	0.00
4,100.00	39.70	144.551	3,826.19	-806.13	573.93	-235.54	0.00	0.00	0.00
4,200.00	39.70	144.551	3,903.13	-858.17	610.98	-250.74	0.00	0.00	0.00
4,300.00	39.70	144.551	3,980.07	-910.20	648.02	-265.95	0.00	0.00	0.00
4,400.00	39.70	144.551	4,057.02	-962.23	685.07	-281.15	0.00	0.00	0.00
4,500.00	39.70	144.551	4,133.96	-1,014.27	722.12	-296.35	0.00	0.00	0.00
4,600.00	39.70	144.551	4,210.90	-1,066.30	759.16	-311.56	0.00	0.00	0.00
4,700.00	39.70	144.551	4,287.84	-1,118.33	796.21	-326.76	0.00	0.00	0.00
4,800.00	39.70	144.551	4,364.79	-1,170.37	833.25	-341.96	0.00	0.00	0.00
4,900.00	39.70	144.551	4,441.73	-1,222.40	870.30	-357.17	0.00	0.00	0.00
5,000.00	39.70	144.551	4,518.67	-1,274.43	907.34	-372.37	0.00	0.00	0.00

Database: Grand Junction District
Company: Logos Operating LLC
Project: San Juan, NM NAD83
Site: State 2408-32A
Well: State 2408-32A 3H
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference: Well State 2408-32A 3H
TVD Reference: GL 7013' & RKB 14' @ 7027.00usft
MD Reference: GL 7013' & RKB 14' @ 7027.00usft
North Reference: True
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,100.00	39.70	144.551	4,595.61	-1,326.47	944.39	-387.57	0.00	0.00	0.00
5,200.00	39.70	144.551	4,672.56	-1,378.50	981.44	-402.78	0.00	0.00	0.00
5,295.91	39.70	144.551	4,746.35	-1,428.40	1,016.96	-417.36	0.00	0.00	0.00
Start DLS 8.00 TFO 118.47									
5,300.00	39.54	145.003	4,749.50	-1,430.54	1,018.47	-417.97	8.00	-3.79	11.05
5,400.00	36.35	156.955	4,828.46	-1,483.97	1,048.38	-426.02	8.00	-3.19	11.95
5,500.00	34.51	170.410	4,910.06	-1,539.27	1,064.72	-420.79	8.00	-1.84	13.46
5,600.00	34.26	184.593	4,992.72	-1,595.35	1,067.19	-402.37	8.00	-0.26	14.18
5,700.00	35.61	198.386	5,074.83	-1,651.12	1,055.74	-371.12	8.00	1.36	13.79
5,800.00	38.41	210.862	5,154.79	-1,705.50	1,030.58	-327.65	8.00	2.80	12.48
5,900.00	42.36	221.622	5,231.04	-1,757.43	992.21	-272.81	8.00	3.95	10.76
6,000.00	47.16	230.724	5,302.11	-1,805.90	941.37	-207.66	8.00	4.80	9.10
6,100.00	52.57	238.437	5,366.60	-1,849.97	879.06	-133.48	8.00	5.42	7.71
6,200.00	58.42	245.070	5,423.26	-1,888.77	806.48	-51.70	8.00	5.85	6.63
6,300.00	64.57	250.900	5,470.99	-1,921.55	725.05	36.08	8.00	6.15	5.83
6,400.00	70.93	256.153	5,508.86	-1,947.68	636.35	128.16	8.00	6.36	5.25
6,500.00	77.42	261.013	5,536.13	-1,966.64	542.12	222.73	8.00	6.49	4.86
6,600.00	84.00	265.631	5,552.28	-1,978.07	444.18	317.97	8.00	6.58	4.62
6,698.08	90.48	270.052	5,557.00	-1,981.75	346.35	410.23	8.00	6.61	4.51
36.2717360, -107.6960320 - POE @ 6698' MD									
6,700.00	90.48	270.052	5,556.98	-1,981.75	344.44	412.01	0.00	0.00	0.00
6,800.00	90.48	270.052	5,556.14	-1,981.66	244.44	504.90	0.00	0.00	0.00
6,848.00	90.48	270.052	5,555.73	-1,981.62	196.44	549.49	0.00	0.00	0.00
Last Perf @ 6848' MD - 36.2717364, -107.6965406									
6,900.00	90.48	270.052	5,555.29	-1,981.57	144.44	597.79	0.00	0.00	0.00
7,000.00	90.48	270.052	5,554.45	-1,981.48	44.45	690.68	0.00	0.00	0.00
7,100.00	90.48	270.052	5,553.60	-1,981.39	-55.55	783.57	0.00	0.00	0.00
7,200.00	90.48	270.052	5,552.75	-1,981.30	-155.55	876.46	0.00	0.00	0.00
7,300.00	90.48	270.052	5,551.91	-1,981.21	-255.54	969.35	0.00	0.00	0.00
7,400.00	90.48	270.052	5,551.06	-1,981.12	-355.54	1,062.24	0.00	0.00	0.00
7,500.00	90.48	270.052	5,550.22	-1,981.03	-455.54	1,155.13	0.00	0.00	0.00
7,600.00	90.48	270.052	5,549.37	-1,980.94	-555.53	1,248.02	0.00	0.00	0.00
7,700.00	90.48	270.052	5,548.52	-1,980.85	-655.53	1,340.91	0.00	0.00	0.00
7,800.00	90.48	270.052	5,547.68	-1,980.76	-755.52	1,433.80	0.00	0.00	0.00
7,900.00	90.48	270.052	5,546.83	-1,980.67	-855.52	1,526.69	0.00	0.00	0.00
8,000.00	90.48	270.052	5,545.99	-1,980.58	-955.52	1,619.58	0.00	0.00	0.00
8,100.00	90.48	270.052	5,545.14	-1,980.49	-1,055.51	1,712.47	0.00	0.00	0.00
8,200.00	90.48	270.052	5,544.29	-1,980.39	-1,155.51	1,805.36	0.00	0.00	0.00
8,300.00	90.48	270.052	5,543.45	-1,980.30	-1,255.51	1,898.25	0.00	0.00	0.00
8,400.00	90.48	270.052	5,542.60	-1,980.21	-1,355.50	1,991.14	0.00	0.00	0.00
8,500.00	90.48	270.052	5,541.76	-1,980.12	-1,455.50	2,084.03	0.00	0.00	0.00
8,600.00	90.48	270.052	5,540.91	-1,980.03	-1,555.50	2,176.92	0.00	0.00	0.00
8,700.00	90.48	270.052	5,540.07	-1,979.94	-1,655.49	2,269.81	0.00	0.00	0.00
8,800.00	90.48	270.052	5,539.22	-1,979.85	-1,755.49	2,362.70	0.00	0.00	0.00
8,900.00	90.48	270.052	5,538.37	-1,979.76	-1,855.48	2,455.59	0.00	0.00	0.00
9,000.00	90.48	270.052	5,537.53	-1,979.67	-1,955.48	2,548.48	0.00	0.00	0.00
9,100.00	90.48	270.052	5,536.68	-1,979.58	-2,055.48	2,641.37	0.00	0.00	0.00
9,200.00	90.48	270.052	5,535.84	-1,979.49	-2,155.47	2,734.26	0.00	0.00	0.00
9,300.00	90.48	270.052	5,534.99	-1,979.40	-2,255.47	2,827.15	0.00	0.00	0.00
9,400.00	90.48	270.052	5,534.14	-1,979.31	-2,355.47	2,920.04	0.00	0.00	0.00
9,500.00	90.48	270.052	5,533.30	-1,979.22	-2,455.46	3,012.93	0.00	0.00	0.00
9,600.00	90.48	270.052	5,532.45	-1,979.13	-2,555.46	3,105.82	0.00	0.00	0.00
9,700.00	90.48	270.052	5,531.61	-1,979.04	-2,655.46	3,198.71	0.00	0.00	0.00



Database: Grand Junction District
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Project: San Juan, NM NAD83
Site: State 2408-32A
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Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference: Well State 2408-32A 3H
TVD Reference: GL 7013' & RKB 14' @ 7027.00usft
MD Reference: GL 7013' & RKB 14' @ 7027.00usft
North Reference: True
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
9,800.00	90.48	270.052	5,530.76	-1,978.95	-2,755.45	3,291.60	0.00	0.00	0.00
9,900.00	90.48	270.052	5,529.91	-1,978.86	-2,855.45	3,384.49	0.00	0.00	0.00
10,000.00	90.48	270.052	5,529.07	-1,978.77	-2,955.45	3,477.38	0.00	0.00	0.00
10,100.00	90.48	270.052	5,528.22	-1,978.68	-3,055.44	3,570.27	0.00	0.00	0.00
10,200.00	90.48	270.052	5,527.38	-1,978.59	-3,155.44	3,663.16	0.00	0.00	0.00
10,300.00	90.48	270.052	5,526.53	-1,978.50	-3,255.43	3,756.05	0.00	0.00	0.00
10,400.00	90.48	270.052	5,525.68	-1,978.41	-3,355.43	3,848.94	0.00	0.00	0.00
10,500.00	90.48	270.052	5,524.84	-1,978.32	-3,455.43	3,941.82	0.00	0.00	0.00
10,600.00	90.48	270.052	5,523.99	-1,978.23	-3,555.42	4,034.71	0.00	0.00	0.00
10,700.00	90.48	270.052	5,523.15	-1,978.14	-3,655.42	4,127.60	0.00	0.00	0.00
10,800.00	90.48	270.052	5,522.30	-1,978.05	-3,755.42	4,220.49	0.00	0.00	0.00
10,900.00	90.48	270.052	5,521.45	-1,977.96	-3,855.41	4,313.38	0.00	0.00	0.00
11,000.00	90.48	270.052	5,520.61	-1,977.87	-3,955.41	4,406.27	0.00	0.00	0.00
11,100.00	90.48	270.052	5,519.76	-1,977.78	-4,055.41	4,499.16	0.00	0.00	0.00
11,200.00	90.48	270.052	5,518.92	-1,977.69	-4,155.40	4,592.05	0.00	0.00	0.00
11,300.00	90.48	270.052	5,518.07	-1,977.60	-4,255.40	4,684.94	0.00	0.00	0.00
11,400.00	90.48	270.052	5,517.23	-1,977.51	-4,355.39	4,777.83	0.00	0.00	0.00
11,500.00	90.48	270.052	5,516.38	-1,977.42	-4,455.39	4,870.72	0.00	0.00	0.00
11,600.00	90.48	270.052	5,515.53	-1,977.33	-4,555.39	4,963.61	0.00	0.00	0.00
11,700.00	90.48	270.052	5,514.69	-1,977.24	-4,655.38	5,056.50	0.00	0.00	0.00
11,800.00	90.48	270.052	5,513.84	-1,977.15	-4,755.38	5,149.39	0.00	0.00	0.00
11,900.00	90.48	270.052	5,513.00	-1,977.06	-4,855.38	5,242.28	0.00	0.00	0.00
11,937.00	90.48	270.052	5,512.68	-1,977.02	-4,892.37	5,276.65	0.00	0.00	0.00
36.2717478, -107.7138043									
11,937.69	90.48	270.052	5,512.68	-1,977.02	-4,893.06	5,277.29	0.00	0.00	0.00
First Perf @ 11,937' MD									
12,000.00	90.48	270.052	5,512.15	-1,976.97	-4,955.37	5,335.17	0.00	0.00	0.00
12,017.69	90.48	270.052	5,512.00	-1,976.95	-4,973.06	5,351.60	0.00	0.00	0.00
TD at 12017.69									

Design Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
State 3H BHL	0.00	0.000	5,512.00	-1,976.95	-4,973.06	1,918,236.94	2,758,244.48	36.2717480	-107.7140780
- plan hits target center									
- Point									
State 3H FPerf	0.00	0.000	5,512.00	-1,976.96	-4,892.88	1,918,237.04	2,758,324.66	36.2717480	-107.7138060
- plan misses target center by 0.68usft at 11937.51usft MD (5512.68 TVD, -1977.02 N, -4892.89 E)									
- Point									
State 3H LP	0.00	0.000	5,557.00	-1,981.75	346.35	1,918,239.62	2,763,563.90	36.2717360	-107.6960320
- plan hits target center									
- Point									
State 3H LPerf	0.00	0.000	5,557.00	-1,981.75	196.32	1,918,239.41	2,763,413.86	36.2717360	-107.6965410
- plan misses target center by 1.28usft at 6848.11usft MD (5555.73 TVD, -1981.61 N, 196.33 E)									
- Point									



Scientific Drilling, Intl Planning Report



Database: Grand Junction District
Company: Logos Operating LLC
Project: San Juan, NM NAD83
Site: State 2408-32A
Well: State 2408-32A 3H
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference: Well State 2408-32A 3H
TVD Reference: GL 7013' & RKB 14' @ 7027.00usft
MD Reference: GL 7013' & RKB 14' @ 7027.00usft
North Reference: True
Survey Calculation Method: Minimum Curvature

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,155.00	1,155.00	Ojo ALamo		0.00	0.000
1,310.00	1,310.00	Kirtland		0.00	0.000
1,518.00	1,518.00	Fruitland		0.00	0.000
1,839.28	1,839.00	Pictured Cliffs		0.00	0.000
2,284.49	2,278.00	Lewis		0.00	0.000
3,462.45	3,334.00	Cliff House		0.00	0.000
3,510.50	3,372.00	Menefee		0.00	0.000
4,646.92	4,247.00	Point Lookout		0.00	0.000
4,887.36	4,432.00	Mancos		0.00	0.000
6,175.20	5,410.00	Gallup		0.00	0.000

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,600.00	1,600.00	0.00	0.00	Start Build 2.00
3,584.89	3,429.85	-538.10	383.11	Start 1711.02 hold at 3584.89 MD
5,295.91	4,746.35	-1,428.40	1,016.96	Start DLS 8.00 TFO 118.47
6,698.08	5,557.00	-1,981.75	346.36	36.2717360, -107.6960320
6,698.08	5,557.00	-1,981.75	346.35	POE @ 6698' MD
6,848.00	5,555.73	-1,981.62	196.44	Last Perf @ 6848' MD
6,848.00	5,555.73	-1,981.62	196.44	36.2717364, -107.6965406
11,937.00	5,512.68	-1,977.02	-4,892.37	36.2717478, -107.7138043
11,937.69	5,512.68	-1,977.02	-4,893.06	First Perf @ 11,937' MD
12,017.69	5,512.00	-1,976.95	-4,973.06	TD at 12017.69



Logos Operating LLC

San Juan, NM NAD83

State 2408-32A

State 2408-32A 3H

OH

Plan #1

Anticollision Report

29 November, 2018



Scientific Drilling

www.scientificdrilling.com





Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well State 2408-32A 3H
Project:	San Juan, NM NAD83	TVD Reference:	GL 7013' & RKB 14' @ 7027.00usft
Reference Site:	State 2408-32A	MD Reference:	GL 7013' & RKB 14' @ 7027.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	State 2408-32A 3H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Reference	Plan #1		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD Interval 100.00usft	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	11/29/2018		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.00	12,017.69	Plan #1 (OH)	MWD+HDGM	OWSG MWD + HDGM	

Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
State 2408-32A						
State 2408-32A 1H - OH - Plan #1	1,600.00	1,600.00	40.04	28.98	3.620 CC, ES	
State 2408-32A 1H - OH - Plan #1	1,700.00	1,699.98	41.48	29.71	3.526 SF	
State 2408-32A 2H - OH - Plan #1	1,600.00	1,600.00	20.02	8.96	1.810 CC, ES, SF	

Offset Design													State 2408-32A - State 2408-32A 1H - OH - Plan #1		Offset Site Error: 0.00 usft	
Survey Program: 0-MWD+HDGM													Offset Well Error: 0.00 usft			
Reference		Offset		Semi Major Axis			Distance						Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor				
0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.04	0.00	40.04							
100.00	100.00	100.00	100.00	0.15	0.15	0.00	40.04	0.00	40.04	39.73	0.31	129.888				
200.00	200.00	200.00	200.00	0.51	0.51	0.00	40.04	0.00	40.04	39.02	1.03	39.057				
300.00	300.00	300.00	300.00	0.87	0.87	0.00	40.04	0.00	40.04	38.30	1.74	22.984				
400.00	400.00	400.00	400.00	1.23	1.23	0.00	40.04	0.00	40.04	37.58	2.46	16.283				
500.00	500.00	500.00	500.00	1.59	1.59	0.00	40.04	0.00	40.04	36.87	3.18	12.608				
600.00	600.00	600.00	600.00	1.95	1.95	0.00	40.04	0.00	40.04	36.15	3.89	10.286				
700.00	700.00	700.00	700.00	2.30	2.30	0.00	40.04	0.00	40.04	35.43	4.61	8.686				
800.00	800.00	800.00	800.00	2.66	2.66	0.00	40.04	0.00	40.04	34.72	5.33	7.517				
900.00	900.00	900.00	900.00	3.02	3.02	0.00	40.04	0.00	40.04	34.00	6.04	6.625				
1,000.00	1,000.00	1,000.00	1,000.00	3.38	3.38	0.00	40.04	0.00	40.04	33.28	6.76	5.923				
1,100.00	1,100.00	1,100.00	1,100.00	3.74	3.74	0.00	40.04	0.00	40.04	32.57	7.48	5.355				
1,200.00	1,200.00	1,200.00	1,200.00	4.10	4.10	0.00	40.04	0.00	40.04	31.85	8.19	4.886				
1,300.00	1,300.00	1,300.00	1,300.00	4.46	4.46	0.00	40.04	0.00	40.04	31.13	8.91	4.493				
1,400.00	1,400.00	1,400.00	1,400.00	4.81	4.81	0.00	40.04	0.00	40.04	30.41	9.63	4.159				
1,500.00	1,500.00	1,500.00	1,500.00	5.17	5.17	0.00	40.04	0.00	40.04	29.70	10.35	3.871				
1,600.00	1,600.00	1,600.00	1,600.00	5.53	5.53	0.00	40.04	0.00	40.04	28.98	11.06	3.620 CC, ES				
1,700.00	1,699.98	1,699.98	1,699.98	5.87	5.89	-145.93	40.04	0.00	41.48	29.71	11.76	3.526 SF				
1,800.00	1,799.84	1,799.84	1,799.84	6.20	6.25	-149.55	40.04	0.00	45.91	33.46	12.45	3.687				
1,900.00	1,899.45	1,899.78	1,899.76	6.54	6.60	-152.38	39.99	1.74	53.29	40.16	13.13	4.058				
2,000.00	1,998.70	1,999.63	1,999.47	6.88	6.94	-152.75	39.85	6.95	63.24	49.43	13.81	4.578				
2,100.00	2,097.47	2,099.24	2,098.69	7.23	7.29	-151.58	39.61	15.61	75.69	61.19	14.50	5.220				
2,200.00	2,195.62	2,198.47	2,197.18	7.59	7.64	-149.58	39.28	27.66	90.70	75.51	15.20	5.969				
2,300.00	2,293.06	2,297.18	2,294.69	7.96	7.99	-147.24	38.86	43.02	108.38	92.47	15.90	6.814				

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



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well State 2408-32A 3H
Project:	San Juan, NM NAD83	TVD Reference:	GL 7013' & RKB 14' @ 7027.00usft
Reference Site:	State 2408-32A	MD Reference:	GL 7013' & RKB 14' @ 7027.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	State 2408-32A 3H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Offset Design State 2408-32A - State 2408-32A 1H - OH - Plan #1														Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM														Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)							
2,400.00	2,389.64	2,395.25	2,390.98	8.36	8.35	-144.82	38.34	61.60	128.78	112.15	16.63	7.743			
2,500.00	2,485.27	2,492.55	2,485.82	8.78	8.73	-142.48	37.74	83.27	151.98	134.60	17.38	8.744			
2,600.00	2,579.82	2,588.96	2,579.02	9.23	9.12	-140.27	37.06	107.91	177.98	159.82	18.16	9.801			
2,700.00	2,673.17	2,684.38	2,670.40	9.71	9.52	-138.22	36.31	135.37	206.76	187.79	18.97	10.898			
2,800.00	2,765.21	2,778.70	2,759.78	10.23	9.95	-136.33	35.48	165.50	238.30	218.48	19.83	12.019			
2,900.00	2,855.84	2,871.85	2,847.02	10.80	10.41	-134.57	34.58	198.11	272.56	251.83	20.73	13.148			
3,000.00	2,944.94	2,963.74	2,932.00	11.41	10.90	-132.95	33.61	233.05	309.47	287.78	21.69	14.269			
3,100.00	3,032.39	3,054.31	3,014.61	12.08	11.41	-131.42	32.59	270.13	348.96	326.26	22.70	15.373			
3,200.00	3,118.11	3,144.90	3,096.53	12.81	11.97	-130.15	31.52	308.80	390.82	367.03	23.79	16.428			
3,300.00	3,201.97	3,234.74	3,177.75	13.59	12.54	-129.32	30.46	347.17	434.73	409.81	24.93	17.441			
3,400.00	3,283.88	3,323.55	3,258.05	14.44	13.13	-128.82	29.42	385.11	480.63	454.52	26.10	18.412			
3,500.00	3,363.74	3,411.24	3,337.33	15.36	13.72	-128.55	28.38	422.56	528.48	501.16	27.32	19.347			
3,600.00	3,441.48	3,497.71	3,415.51	16.34	14.32	-128.57	27.36	459.49	578.27	549.71	28.56	20.249			
3,700.00	3,518.42	3,583.71	3,493.27	17.37	14.93	-129.34	26.35	496.23	628.82	598.99	29.82	21.085			
3,800.00	3,595.36	3,669.71	3,571.02	18.43	15.56	-129.99	25.34	532.96	679.44	648.33	31.11	21.838			
3,900.00	3,672.30	3,755.71	3,648.78	19.51	16.19	-130.55	24.32	569.69	730.12	697.70	32.42	22.519			
4,000.00	3,749.25	3,841.71	3,726.53	20.60	16.83	-131.04	23.31	606.42	780.84	747.09	33.75	23.135			
4,100.00	3,826.19	3,927.71	3,804.29	21.71	17.47	-131.46	22.30	643.15	831.60	796.51	35.10	23.694			
4,200.00	3,903.13	4,013.71	3,882.04	22.84	18.13	-131.84	21.28	679.89	882.40	845.94	36.46	24.204			
4,300.00	3,980.07	4,099.72	3,959.80	23.97	18.79	-132.18	20.27	716.62	933.21	895.38	37.83	24.668			
4,400.00	4,057.02	4,185.72	4,037.56	25.12	19.45	-132.49	19.25	753.35	984.05	944.84	39.22	25.092			
4,500.00	4,133.96	4,271.72	4,115.31	26.27	20.12	-132.76	18.24	790.08	1,034.91	994.30	40.61	25.482			
4,600.00	4,210.90	4,357.72	4,193.07	27.43	20.80	-133.01	17.23	826.81	1,085.78	1,043.76	42.02	25.840			
4,700.00	4,287.84	4,443.72	4,270.82	28.60	21.47	-133.23	16.21	863.55	1,136.67	1,093.24	43.43	26.170			
4,800.00	4,364.79	4,529.72	4,348.58	29.77	22.16	-133.44	15.20	900.28	1,187.57	1,142.71	44.86	26.474			
4,900.00	4,441.73	4,615.72	4,426.33	30.95	22.84	-133.63	14.19	937.01	1,238.48	1,192.19	46.29	26.757			
5,000.00	4,518.67	4,701.73	4,504.09	32.14	23.53	-133.80	13.17	973.74	1,289.40	1,241.68	47.72	27.018			
5,100.00	4,595.61	4,789.92	4,583.97	33.32	24.23	-133.99	12.13	1,011.11	1,340.31	1,291.12	49.19	27.248			
5,200.00	4,672.56	4,884.41	4,672.83	34.52	24.85	-134.58	10.98	1,043.02	1,390.85	1,340.30	50.54	27.518			
5,300.00	4,749.50	4,974.90	4,761.16	35.71	25.27	-136.17	9.85	1,062.36	1,441.10	1,389.54	51.56	27.952			
5,400.00	4,828.46	5,060.83	4,846.67	36.80	25.56	-151.43	8.76	1,070.28	1,493.00	1,440.76	52.24	28.577			
5,500.00	4,910.06	5,144.05	4,929.81	37.70	25.74	-168.36	7.71	1,068.14	1,547.11	1,494.44	52.67	29.374			
5,600.00	4,992.72	5,225.72	5,010.61	38.39	25.88	174.04	6.70	1,056.69	1,602.18	1,549.23	52.95	30.258			
5,700.00	5,074.83	5,306.85	5,089.09	38.90	26.02	157.11	5.72	1,036.28	1,657.02	1,603.84	53.18	31.157			
5,800.00	5,154.79	5,388.37	5,165.10	39.25	26.19	141.96	4.79	1,006.97	1,710.48	1,657.04	53.44	32.006			
5,900.00	5,231.04	5,471.05	5,238.29	39.47	26.42	129.13	3.89	968.61	1,761.50	1,707.69	53.81	32.736			
6,000.00	5,302.11	5,555.58	5,308.04	39.61	26.73	118.65	3.05	920.95	1,809.08	1,754.72	54.36	33.282			
6,100.00	5,366.60	5,642.48	5,373.38	39.70	27.19	110.30	2.27	863.75	1,852.31	1,797.13	55.18	33.569			
6,200.00	5,423.26	5,732.11	5,433.01	39.77	27.83	103.77	1.57	796.91	1,890.39	1,834.02	56.37	33.536			
6,300.00	5,470.99	5,824.63	5,485.31	39.86	28.69	98.79	0.97	720.68	1,922.58	1,864.57	58.01	33.144			
6,400.00	5,508.86	5,919.91	5,528.45	40.00	29.82	95.16	0.49	635.80	1,948.27	1,888.11	60.16	32.384			
6,500.00	5,536.13	6,017.61	5,560.58	40.24	31.23	92.69	0.16	543.62	1,966.96	1,904.11	62.85	31.294			
6,600.00	5,552.28	6,117.08	5,580.12	40.61	32.89	91.27	0.00	446.17	1,978.27	1,912.22	66.05	29.953			
6,700.00	5,556.98	6,217.46	5,585.98	41.19	34.72	90.84	0.01	346.04	1,981.97	1,912.34	69.62	28.467			
6,800.00	5,556.14	6,317.46	5,585.34	41.99	36.70	90.84	0.10	246.04	1,981.97	1,908.47	73.50	26.964			
6,900.00	5,555.29	6,417.46	5,584.70	43.02	38.79	90.85	0.19	146.04	1,981.97	1,904.33	77.64	25.527			
7,000.00	5,554.45	6,517.46	5,584.06	44.31	41.00	90.86	0.28	46.05	1,981.98	1,899.97	82.01	24.168			
7,100.00	5,553.60	6,617.46	5,583.42	45.85	43.30	90.86	0.37	-53.95	1,981.98	1,895.41	86.56	22.896			
7,200.00	5,552.75	6,717.46	5,582.78	47.63	45.68	90.87	0.46	-153.95	1,981.98	1,890.70	91.29	21.712			
7,300.00	5,551.91	6,817.46	5,582.14	49.61	48.13	90.87	0.55	-253.95	1,981.99	1,885.84	96.15	20.614			
7,400.00	5,551.06	6,917.46	5,581.50	51.75	50.64	90.88	0.64	-353.94	1,981.99	1,880.86	101.13	19.599			
7,500.00	5,550.22	7,017.46	5,580.86	54.02	53.19	90.89	0.73	-453.94	1,981.99	1,875.78	106.21	18.661			

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



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well State 2408-32A 3H
Project:	San Juan, NM NAD83	TVD Reference:	GL 7013' & RKB 14' @ 7027.00usft
Reference Site:	State 2408-32A	MD Reference:	GL 7013' & RKB 14' @ 7027.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	State 2408-32A 3H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Offset Design State 2408-32A - State 2408-32A 1H - OH - Plan #1													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)						
7,600.00	5,549.37	7,117.46	5,580.22	56.39	55.79	90.89	0.82	-553.94	1,982.00	1,870.62	111.38	17.795		
7,700.00	5,548.52	7,217.46	5,579.58	58.85	58.43	90.90	0.91	-653.94	1,982.00	1,865.37	116.63	16.994		
7,800.00	5,547.68	7,317.46	5,578.94	61.38	61.10	90.90	1.00	-753.93	1,982.00	1,860.06	121.94	16.254		
7,900.00	5,546.83	7,417.46	5,578.30	63.96	63.79	90.91	1.09	-853.93	1,982.01	1,854.69	127.31	15.568		
8,000.00	5,545.99	7,517.46	5,577.65	66.59	66.52	90.92	1.18	-953.93	1,982.01	1,849.27	132.74	14.932		
8,100.00	5,545.14	7,617.46	5,577.01	69.25	69.26	90.92	1.27	-1,053.93	1,982.01	1,843.81	138.21	14.341		
8,200.00	5,544.29	7,717.46	5,576.37	71.95	72.02	90.93	1.36	-1,153.93	1,982.02	1,838.30	143.72	13.791		
8,300.00	5,543.45	7,817.46	5,575.73	74.67	74.80	90.93	1.45	-1,253.92	1,982.02	1,832.76	149.26	13.279		
8,400.00	5,542.60	7,917.46	5,575.09	77.42	77.60	90.94	1.54	-1,353.92	1,982.02	1,827.18	154.84	12.801		
8,500.00	5,541.76	8,017.46	5,574.45	80.19	80.41	90.95	1.63	-1,453.92	1,982.03	1,821.58	160.44	12.353		
8,600.00	5,540.91	8,117.46	5,573.81	82.97	83.23	90.95	1.72	-1,553.92	1,982.03	1,815.95	166.07	11.935		
8,700.00	5,540.07	8,217.46	5,573.17	85.77	86.06	90.96	1.81	-1,653.91	1,982.03	1,810.30	171.73	11.542		
8,800.00	5,539.22	8,317.46	5,572.53	88.59	88.90	90.96	1.90	-1,753.91	1,982.04	1,804.63	177.40	11.172		
8,900.00	5,538.37	8,417.46	5,571.89	91.41	91.76	90.97	1.99	-1,853.91	1,982.04	1,798.94	183.10	10.825		
9,000.00	5,537.53	8,517.45	5,571.25	94.25	94.62	90.98	2.08	-1,953.91	1,982.04	1,793.24	188.81	10.498		
9,100.00	5,536.68	8,617.45	5,570.61	97.10	97.48	90.98	2.17	-2,053.90	1,982.05	1,787.51	194.54	10.189		
9,200.00	5,535.84	8,717.45	5,569.97	99.96	100.36	90.99	2.26	-2,153.90	1,982.05	1,781.77	200.28	9.897		
9,300.00	5,534.99	8,817.45	5,569.33	102.82	103.24	90.99	2.35	-2,253.90	1,982.05	1,776.02	206.03	9.620		
9,400.00	5,534.14	8,917.45	5,568.69	105.70	106.13	91.00	2.44	-2,353.90	1,982.06	1,770.26	211.80	9.358		
9,500.00	5,533.30	9,017.45	5,568.05	108.58	109.02	91.00	2.53	-2,453.90	1,982.06	1,764.49	217.57	9.110		
9,600.00	5,532.45	9,117.45	5,567.41	111.46	111.92	91.01	2.62	-2,553.89	1,982.07	1,758.70	223.36	8.874		
9,700.00	5,531.61	9,217.45	5,566.77	114.35	114.82	91.02	2.72	-2,653.89	1,982.07	1,752.91	229.16	8.649		
9,800.00	5,530.76	9,317.45	5,566.13	117.25	117.72	91.02	2.81	-2,753.89	1,982.07	1,747.11	234.97	8.436		
9,900.00	5,529.91	9,417.45	5,565.49	120.15	120.63	91.03	2.90	-2,853.89	1,982.08	1,741.30	240.78	8.232		
10,000.00	5,529.07	9,517.45	5,564.85	123.06	123.55	91.03	2.99	-2,953.88	1,982.08	1,735.48	246.60	8.038		
10,100.00	5,528.22	9,617.45	5,564.21	125.97	126.47	91.04	3.08	-3,053.88	1,982.08	1,729.65	252.43	7.852		
10,200.00	5,527.38	9,717.45	5,563.57	128.88	129.39	91.05	3.17	-3,153.88	1,982.09	1,723.82	258.26	7.675		
10,300.00	5,526.53	9,817.45	5,562.93	131.79	132.31	91.05	3.26	-3,253.88	1,982.09	1,717.99	264.11	7.505		
10,400.00	5,525.68	9,917.45	5,562.29	134.71	135.24	91.06	3.35	-3,353.87	1,982.10	1,712.14	269.95	7.342		
10,500.00	5,524.84	10,017.45	5,561.65	137.64	138.16	91.06	3.44	-3,453.87	1,982.10	1,706.29	275.81	7.187		
10,600.00	5,523.99	10,117.45	5,561.01	140.56	141.10	91.07	3.53	-3,553.87	1,982.10	1,700.44	281.66	7.037		
10,700.00	5,523.15	10,217.45	5,560.37	143.49	144.03	91.08	3.62	-3,653.87	1,982.11	1,694.58	287.52	6.894		
10,800.00	5,522.30	10,317.45	5,559.73	146.42	146.96	91.08	3.71	-3,753.87	1,982.11	1,688.72	293.39	6.756		
10,900.00	5,521.45	10,417.45	5,559.09	149.36	149.90	91.09	3.80	-3,853.86	1,982.12	1,682.85	299.26	6.623		
11,000.00	5,520.61	10,517.45	5,558.45	152.29	152.84	91.09	3.89	-3,953.86	1,982.12	1,676.98	305.14	6.496		
11,100.00	5,519.76	10,617.45	5,557.81	155.23	155.78	91.10	3.98	-4,053.86	1,982.12	1,671.11	311.01	6.373		
11,200.00	5,518.92	10,717.45	5,557.17	158.17	158.73	91.11	4.07	-4,153.86	1,982.13	1,665.23	316.90	6.255		
11,300.00	5,518.07	10,817.45	5,556.53	161.11	161.67	91.11	4.16	-4,253.85	1,982.13	1,659.35	322.78	6.141		
11,400.00	5,517.23	10,917.45	5,555.89	164.05	164.62	91.12	4.25	-4,353.85	1,982.14	1,653.47	328.67	6.031		
11,500.00	5,516.38	11,017.45	5,555.25	166.99	167.56	91.12	4.34	-4,453.85	1,982.14	1,647.58	334.56	5.925		
11,600.00	5,515.53	11,117.45	5,554.61	169.94	170.51	91.13	4.43	-4,553.85	1,982.14	1,641.69	340.45	5.822		
11,700.00	5,514.69	11,217.45	5,553.97	172.89	173.46	91.14	4.52	-4,653.85	1,982.15	1,635.80	346.35	5.723		
11,800.00	5,513.84	11,317.45	5,553.33	175.84	176.42	91.14	4.61	-4,753.84	1,982.15	1,629.90	352.25	5.627		
11,900.00	5,513.00	11,417.45	5,552.69	178.79	179.37	91.15	4.70	-4,853.84	1,982.16	1,624.00	358.15	5.534		
12,000.00	5,512.15	11,517.45	5,552.05	181.74	182.32	91.15	4.79	-4,953.84	1,982.16	1,618.11	364.06	5.445		
12,000.13	5,512.15	11,517.57	5,552.05	181.74	182.33	91.15	4.79	-4,953.96	1,982.16	1,618.10	364.06	5.445		
12,017.69	5,512.00	11,525.71	5,552.00	182.26	182.57	91.15	4.80	-4,962.10	1,982.18	1,617.36	364.83	5.433		



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well State 2408-32A 3H
Project:	San Juan, NM NAD83	TVD Reference:	GL 7013' & RKB 14' @ 7027.00usft
Reference Site:	State 2408-32A	MD Reference:	GL 7013' & RKB 14' @ 7027.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	State 2408-32A 3H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Offset Design State 2408-32A - State 2408-32A 2H - OH - Plan #1													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Tooface (")	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)						
0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.02	0.00	20.02					
100.00	100.00	100.00	100.00	0.15	0.15	0.00	20.02	0.00	20.02	19.71	0.31	64.944		
200.00	200.00	200.00	200.00	0.51	0.51	0.00	20.02	0.00	20.02	19.00	1.03	19.529		
300.00	300.00	300.00	300.00	0.87	0.87	0.00	20.02	0.00	20.02	18.28	1.74	11.492		
400.00	400.00	400.00	400.00	1.23	1.23	0.00	20.02	0.00	20.02	17.56	2.46	8.142		
500.00	500.00	500.00	500.00	1.59	1.59	0.00	20.02	0.00	20.02	16.85	3.18	6.304		
600.00	600.00	600.00	600.00	1.95	1.95	0.00	20.02	0.00	20.02	16.13	3.89	5.143		
700.00	700.00	700.00	700.00	2.30	2.30	0.00	20.02	0.00	20.02	15.41	4.61	4.343		
800.00	800.00	800.00	800.00	2.66	2.66	0.00	20.02	0.00	20.02	14.69	5.33	3.759		
900.00	900.00	900.00	900.00	3.02	3.02	0.00	20.02	0.00	20.02	13.98	6.04	3.313		
1,000.00	1,000.00	1,000.00	1,000.00	3.38	3.38	0.00	20.02	0.00	20.02	13.26	6.76	2.961		
1,100.00	1,100.00	1,100.00	1,100.00	3.74	3.74	0.00	20.02	0.00	20.02	12.54	7.48	2.677		
1,200.00	1,200.00	1,200.00	1,200.00	4.10	4.10	0.00	20.02	0.00	20.02	11.83	8.19	2.443		
1,300.00	1,300.00	1,300.00	1,300.00	4.46	4.46	0.00	20.02	0.00	20.02	11.11	8.91	2.247		
1,400.00	1,400.00	1,400.00	1,400.00	4.81	4.81	0.00	20.02	0.00	20.02	10.39	9.63	2.079		
1,500.00	1,500.00	1,500.00	1,500.00	5.17	5.17	0.00	20.02	0.00	20.02	9.68	10.35	1.935		
1,600.00	1,600.00	1,600.00	1,600.00	5.53	5.53	0.00	20.02	0.00	20.02	8.96	11.06	1.810 CC, ES, SF		
1,700.00	1,699.98	1,699.98	1,699.98	5.87	5.89	-147.24	20.02	0.00	21.47	9.70	11.76	1.825		
1,800.00	1,799.84	1,799.84	1,799.84	6.20	6.25	-153.44	20.02	0.00	26.02	13.57	12.45	2.090		
1,900.00	1,899.45	1,900.32	1,900.30	6.54	6.59	-158.02	19.03	1.45	32.74	19.61	13.13	2.493		
2,000.00	1,998.70	2,001.00	2,000.84	6.88	6.93	-159.45	16.06	5.83	40.18	26.38	13.80	2.912		
2,100.00	2,097.47	2,101.85	2,101.29	7.23	7.27	-159.13	11.08	13.13	48.24	33.76	14.47	3.333		
2,200.00	2,195.62	2,202.85	2,201.53	7.59	7.62	-157.79	4.11	23.38	56.91	41.76	15.15	3.755		
2,300.00	2,293.06	2,303.98	2,301.38	7.96	7.98	-155.87	-4.86	36.55	66.25	50.40	15.84	4.181		
2,400.00	2,389.64	2,405.21	2,400.72	8.36	8.34	-153.62	-15.82	52.65	76.31	59.76	16.55	4.611		
2,500.00	2,485.27	2,506.53	2,499.39	8.78	8.73	-151.22	-28.75	71.66	87.16	69.89	17.27	5.046		
2,600.00	2,579.82	2,607.90	2,597.24	9.23	9.13	-148.76	-43.65	93.55	98.86	80.83	18.03	5.482		
2,700.00	2,673.17	2,709.32	2,694.13	9.71	9.57	-146.32	-60.50	118.30	111.45	92.62	18.83	5.918		
2,800.00	2,765.21	2,810.75	2,789.91	10.23	10.03	-143.93	-79.27	145.88	124.98	105.29	19.69	6.347		
2,900.00	2,855.84	2,912.19	2,884.46	10.80	10.53	-141.62	-99.94	176.24	139.46	118.84	20.61	6.765		
3,000.00	2,944.94	3,013.61	2,977.63	11.41	11.08	-139.41	-122.47	209.35	154.92	133.30	21.62	7.165		
3,100.00	3,032.39	3,114.99	3,069.30	12.08	11.67	-137.30	-146.84	245.14	171.37	148.65	22.72	7.541		
3,200.00	3,118.11	3,216.33	3,159.33	12.81	12.33	-135.29	-173.00	283.58	188.82	164.88	23.94	7.888		
3,300.00	3,201.97	3,317.60	3,247.61	13.59	13.04	-133.39	-200.92	324.60	207.26	181.99	25.27	8.203		
3,400.00	3,283.88	3,416.75	3,332.62	14.44	13.81	-131.75	-229.63	366.79	226.95	200.24	26.71	8.497		
3,500.00	3,363.74	3,514.29	3,416.11	15.36	14.60	-130.88	-258.01	408.48	248.88	220.70	28.19	8.830		
3,600.00	3,441.48	3,611.33	3,499.17	16.34	15.41	-130.67	-286.24	449.95	273.01	243.34	29.68	9.200		
3,700.00	3,518.42	3,708.16	3,582.05	17.37	16.24	-130.96	-314.41	491.34	297.95	266.76	31.19	9.552		
3,800.00	3,595.36	3,804.99	3,664.94	18.43	17.09	-131.20	-342.58	532.73	322.89	290.14	32.75	9.860		
3,900.00	3,672.30	3,901.82	3,747.82	19.51	17.95	-131.40	-370.75	574.12	347.83	313.50	34.33	10.132		
4,000.00	3,749.25	3,998.65	3,830.71	20.60	18.84	-131.58	-398.92	615.50	372.78	336.84	35.94	10.372		
4,100.00	3,826.19	4,095.49	3,913.59	21.71	19.73	-131.73	-427.09	656.89	397.73	360.16	37.58	10.584		
4,200.00	3,903.13	4,192.32	3,996.48	22.84	20.64	-131.87	-455.26	698.28	422.69	383.45	39.23	10.773		
4,300.00	3,980.07	4,289.15	4,079.36	23.97	21.55	-131.99	-483.43	739.66	447.64	406.74	40.91	10.943		
4,400.00	4,057.02	4,385.98	4,162.25	25.12	22.47	-132.10	-511.60	781.05	472.60	430.00	42.60	11.094		
4,500.00	4,133.96	4,482.81	4,245.13	26.27	23.40	-132.20	-539.77	822.44	497.56	453.26	44.30	11.231		
4,600.00	4,210.90	4,579.65	4,328.02	27.43	24.34	-132.29	-567.95	863.83	522.52	476.50	46.02	11.354		
4,700.00	4,287.84	4,676.48	4,410.90	28.60	25.28	-132.37	-596.12	905.21	547.48	499.74	47.75	11.466		
4,800.00	4,364.79	4,773.31	4,493.79	29.77	26.23	-132.44	-624.29	946.60	572.45	522.96	49.49	11.568		
4,900.00	4,441.73	4,870.14	4,576.67	30.95	27.18	-132.51	-652.46	987.99	597.41	546.18	51.23	11.661		
5,000.00	4,518.67	4,962.46	4,674.60	32.14	28.21	-133.03	-685.75	1,031.54	621.52	568.57	52.95	11.737		
5,100.00	4,595.61	5,098.71	4,781.28	33.32	29.01	-135.10	-722.04	1,059.62	642.72	588.86	53.86	11.933		

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



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well State 2408-32A 3H
Project:	San Juan, NM NAD83	TVD Reference:	GL 7013' & RKB 14' @ 7027.00usft
Reference Site:	State 2408-32A	MD Reference:	GL 7013' & RKB 14' @ 7027.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	State 2408-32A 3H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Offset Design		State 2408-32A - State 2408-32A 2H - OH - Plan #1										Offset Site Error:		0.00 usft	
Survey Program:		0-MWD+HDGM										Offset Well Error:		0.00 usft	
Reference		Offset		Semi Major Axis			Distance								
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning		
5,200.00	4,672.56	5,206.86	4,883.17	34.52	29.51	-138.32	-756.72	1,069.07	662.30	608.35	53.95	12.276			
5,300.00	4,749.50	5,303.45	4,974.40	35.71	29.80	-142.52	-787.80	1,063.73	682.45	628.93	53.53	12.750			
5,400.00	4,828.46	5,391.31	5,056.10	36.80	29.98	-157.52	-815.64	1,047.65	706.04	653.09	52.94	13.336			
5,500.00	4,910.06	5,474.65	5,131.33	37.70	30.11	-173.88	-841.29	1,022.74	733.41	680.97	52.44	13.986			
5,600.00	4,992.72	5,554.55	5,200.42	38.39	30.22	169.28	-864.86	990.35	763.31	711.23	52.09	14.654			
5,700.00	5,074.83	5,631.82	5,263.57	38.90	30.33	153.19	-886.42	951.49	794.52	742.57	51.94	15.296			
5,800.00	5,154.79	5,707.07	5,320.93	39.25	30.48	138.88	-906.01	906.94	825.88	773.85	52.03	15.873			
5,900.00	5,231.04	5,780.81	5,372.53	39.47	30.67	126.80	-923.65	857.36	856.38	803.99	52.39	16.346			
6,000.00	5,302.11	5,850.00	5,416.33	39.61	30.92	117.00	-938.64	805.97	885.17	832.08	53.09	16.672			
6,100.00	5,366.60	5,925.12	5,458.32	39.70	31.28	109.10	-953.02	745.40	911.48	857.36	54.12	16.842			
6,200.00	5,423.26	6,000.00	5,493.97	39.77	31.76	102.93	-965.24	680.74	934.72	879.16	55.57	16.821			
6,300.00	5,470.99	6,066.88	5,520.25	39.86	32.31	98.26	-974.27	619.94	954.36	896.80	57.57	16.578			
6,400.00	5,508.86	6,137.21	5,541.97	40.00	33.03	94.81	-981.76	553.49	970.03	910.01	60.03	16.160			
6,500.00	5,536.13	6,200.00	5,556.07	40.24	33.79	92.47	-986.64	492.52	981.46	918.48	62.98	15.585			
6,600.00	5,552.28	6,277.33	5,566.41	40.61	34.88	91.10	-990.26	416.01	988.31	922.02	66.29	14.909			
6,700.00	5,556.98	6,348.10	5,568.98	41.19	36.00	90.69	-991.24	345.32	990.59	920.67	69.92	14.168			
6,800.00	5,556.14	6,448.10	5,568.30	41.99	37.78	90.70	-991.14	245.32	990.59	916.78	73.81	13.421			
6,900.00	5,555.29	6,548.10	5,567.63	43.02	39.71	90.71	-991.04	145.32	990.60	912.65	77.95	12.707			
7,000.00	5,554.45	6,648.10	5,566.95	44.31	41.79	90.72	-990.94	45.32	990.61	908.29	82.32	12.033			
7,100.00	5,553.60	6,748.10	5,566.27	45.85	44.00	90.73	-990.85	-54.67	990.62	903.74	86.88	11.402			
7,200.00	5,552.75	6,848.10	5,565.60	47.63	46.30	90.74	-990.75	-154.67	990.63	899.03	91.60	10.814			
7,300.00	5,551.91	6,948.10	5,564.92	49.61	48.69	90.75	-990.65	-254.67	990.64	894.17	96.47	10.269			
7,400.00	5,551.06	7,048.10	5,564.24	51.75	51.15	90.76	-990.56	-354.67	990.65	889.20	101.45	9.765			
7,500.00	5,550.22	7,148.10	5,563.56	54.02	53.67	90.77	-990.46	-454.66	990.66	884.13	106.53	9.299			
7,600.00	5,549.37	7,248.10	5,562.89	56.39	56.23	90.78	-990.36	-554.66	990.67	878.97	111.70	8.869			
7,700.00	5,548.52	7,348.10	5,562.21	58.85	58.85	90.79	-990.26	-654.66	990.68	873.73	116.95	8.471			
7,800.00	5,547.68	7,448.10	5,561.53	61.38	61.49	90.80	-990.17	-754.66	990.69	868.42	122.26	8.103			
7,900.00	5,546.83	7,548.10	5,560.85	63.96	64.17	90.81	-990.07	-854.65	990.70	863.06	127.63	7.762			
8,000.00	5,545.99	7,648.10	5,560.18	66.59	66.88	90.82	-989.97	-954.65	990.70	857.65	133.06	7.446			
8,100.00	5,545.14	7,748.10	5,559.50	69.25	69.61	90.83	-989.88	-1,054.65	990.71	852.19	138.53	7.152			
8,200.00	5,544.29	7,848.10	5,558.82	71.95	72.37	90.84	-989.78	-1,154.65	990.72	846.69	144.04	6.878			
8,300.00	5,543.45	7,948.10	5,558.15	74.67	75.14	90.85	-989.68	-1,254.64	990.73	841.15	149.58	6.623			
8,400.00	5,542.60	8,048.10	5,557.47	77.42	77.93	90.86	-989.58	-1,354.64	990.74	835.58	155.16	6.385			
8,500.00	5,541.76	8,148.10	5,556.79	80.19	80.73	90.87	-989.49	-1,454.64	990.75	829.99	160.76	6.163			
8,600.00	5,540.91	8,248.10	5,556.11	82.97	83.54	90.88	-989.39	-1,554.64	990.76	824.37	166.39	5.954			
8,700.00	5,540.07	8,348.10	5,555.44	85.77	86.37	90.89	-989.29	-1,654.63	990.77	818.72	172.05	5.759			
8,800.00	5,539.22	8,448.10	5,554.76	88.59	89.21	90.90	-989.20	-1,754.63	990.78	813.06	177.72	5.575			
8,900.00	5,538.37	8,548.10	5,554.08	91.41	92.06	90.91	-989.10	-1,854.63	990.79	807.37	183.41	5.402			
9,000.00	5,537.53	8,648.10	5,553.41	94.25	94.92	90.92	-989.00	-1,954.63	990.80	801.67	189.13	5.239			
9,100.00	5,536.68	8,748.10	5,552.73	97.10	97.78	90.93	-988.90	-2,054.62	990.81	795.96	194.85	5.085			
9,200.00	5,535.84	8,848.10	5,552.05	99.96	100.65	90.94	-988.81	-2,154.62	990.82	790.23	200.59	4.939			
9,300.00	5,534.99	8,948.10	5,551.37	102.82	103.53	90.95	-988.71	-2,254.62	990.83	784.48	206.35	4.802			
9,400.00	5,534.14	9,048.10	5,550.70	105.70	106.42	90.96	-988.61	-2,354.62	990.84	778.72	212.11	4.671			
9,500.00	5,533.30	9,148.10	5,550.02	108.58	109.31	90.97	-988.52	-2,454.61	990.85	772.96	217.89	4.547			
9,600.00	5,532.45	9,248.10	5,549.34	111.46	112.20	90.98	-988.42	-2,554.61	990.86	767.18	223.68	4.430			
9,700.00	5,531.61	9,348.10	5,548.66	114.35	115.10	90.99	-988.32	-2,654.61	990.87	761.39	229.47	4.318			
9,800.00	5,530.76	9,448.10	5,547.99	117.25	118.01	91.00	-988.22	-2,754.61	990.88	755.60	235.28	4.211			
9,900.00	5,529.91	9,548.10	5,547.31	120.15	120.92	91.01	-988.13	-2,854.60	990.89	749.79	241.09	4.110			
10,000.00	5,529.07	9,648.10	5,546.63	123.06	123.83	91.02	-988.03	-2,954.60	990.90	743.98	246.92	4.013			
10,100.00	5,528.22	9,748.10	5,545.96	125.97	126.75	91.03	-987.93	-3,054.60	990.91	738.16	252.74	3.921			
10,200.00	5,527.38	9,848.10	5,545.28	128.88	129.67	91.04	-987.84	-3,154.60	990.92	732.34	258.58	3.832			
10,300.00	5,526.53	9,948.10	5,544.60	131.79	132.59	91.04	-987.74	-3,254.59	990.93	726.51	264.42	3.748			

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



Scientific Drilling, Intl
Anticollision Report



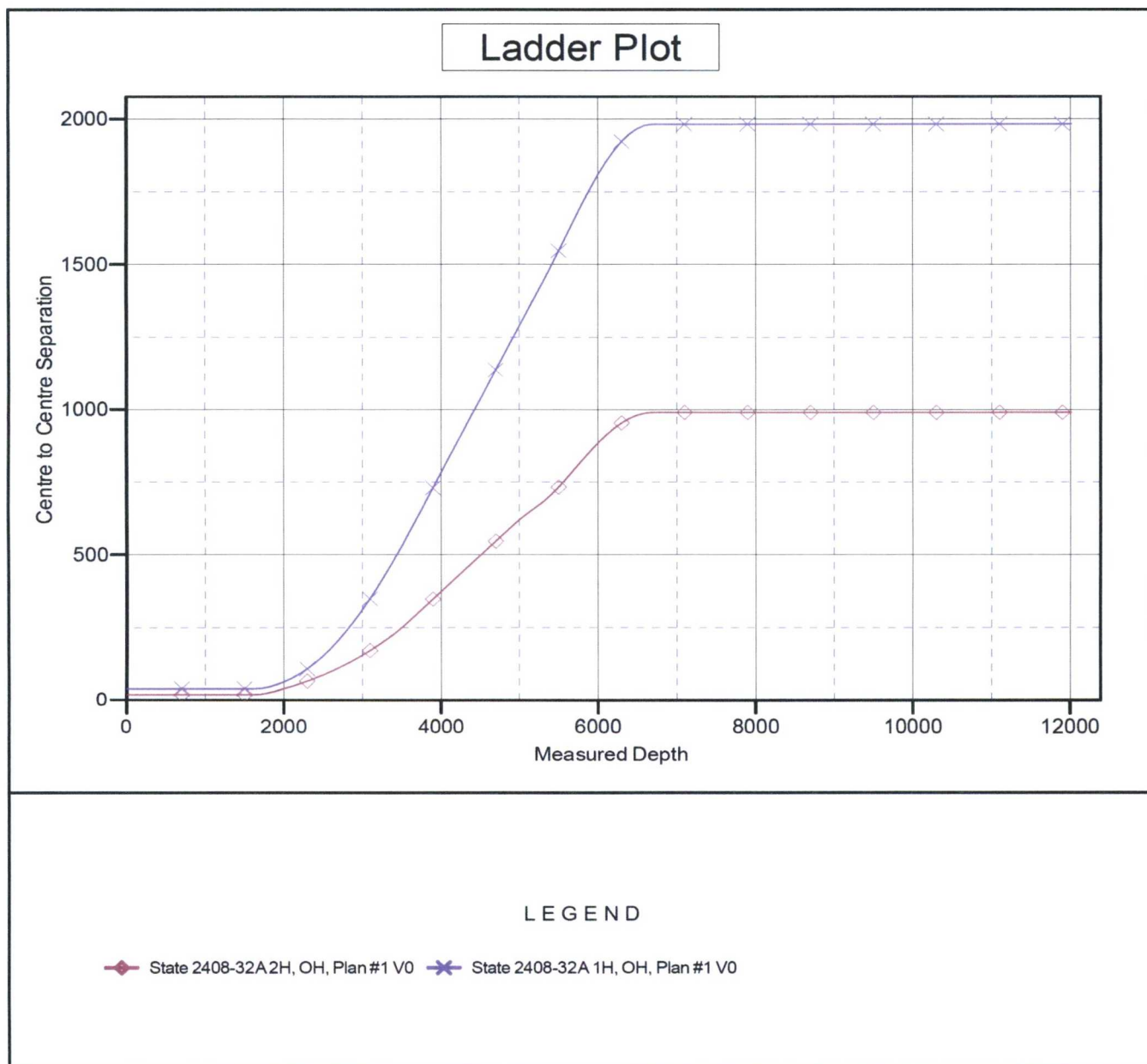
Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well State 2408-32A 3H
Project:	San Juan, NM NAD83	TVD Reference:	GL 7013' & RKB 14' @ 7027.00usft
Reference Site:	State 2408-32A	MD Reference:	GL 7013' & RKB 14' @ 7027.00usft
Site Error:	0.00 usft	North Reference:	True
Reference Well:	State 2408-32A 3H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Offset Design State 2408-32A - State 2408-32A 2H - OH - Plan #1													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance							
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor	Warning	
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(°)	+N/-S (usft)	+E/-W (usft)	(usft)	(usft)	(usft)			
10,400.00	5,525.68	10,048.10	5,543.92	134.71	135.51	91.05	-987.64	-3,354.59	990.94	720.67	270.27	3.667		
10,500.00	5,524.84	10,148.10	5,543.25	137.64	138.44	91.06	-987.54	-3,454.59	990.95	714.83	276.12	3.589		
10,600.00	5,523.99	10,248.10	5,542.57	140.56	141.37	91.07	-987.45	-3,554.59	990.96	708.98	281.98	3.514		
10,700.00	5,523.15	10,348.10	5,541.89	143.49	144.30	91.08	-987.35	-3,654.58	990.97	703.13	287.84	3.443		
10,800.00	5,522.30	10,448.10	5,541.22	146.42	147.24	91.09	-987.25	-3,754.58	990.98	697.27	293.70	3.374		
10,900.00	5,521.45	10,548.10	5,540.54	149.36	150.18	91.10	-987.16	-3,854.58	990.99	691.41	299.57	3.308		
11,000.00	5,520.61	10,648.10	5,539.86	152.29	153.11	91.11	-987.06	-3,954.58	991.00	685.55	305.45	3.244		
11,100.00	5,519.76	10,748.10	5,539.18	155.23	156.06	91.12	-986.96	-4,054.57	991.01	679.68	311.33	3.183		
11,200.00	5,518.92	10,848.10	5,538.51	158.17	159.00	91.13	-986.86	-4,154.57	991.02	673.81	317.21	3.124		
11,300.00	5,518.07	10,948.10	5,537.83	161.11	161.94	91.14	-986.77	-4,254.57	991.03	667.93	323.09	3.067		
11,400.00	5,517.23	11,048.10	5,537.15	164.05	164.89	91.15	-986.67	-4,354.57	991.04	662.06	328.98	3.012		
11,500.00	5,516.38	11,148.10	5,536.47	166.99	167.84	91.16	-986.57	-4,454.56	991.05	656.18	334.87	2.959		
11,600.00	5,515.53	11,248.10	5,535.80	169.94	170.78	91.17	-986.48	-4,554.56	991.06	650.29	340.76	2.908		
11,700.00	5,514.69	11,348.10	5,535.12	172.89	173.73	91.18	-986.38	-4,654.56	991.07	644.41	346.66	2.859		
11,800.00	5,513.84	11,448.10	5,534.44	175.84	176.68	91.19	-986.28	-4,754.56	991.08	638.52	352.56	2.811		
11,900.00	5,513.00	11,548.10	5,533.77	178.79	179.64	91.20	-986.18	-4,854.55	991.09	632.63	358.46	2.765		
12,000.00	5,512.15	11,648.10	5,533.09	181.74	182.59	91.21	-986.09	-4,954.55	991.10	626.74	364.36	2.720		
12,000.05	5,512.15	11,648.15	5,533.09	181.74	182.59	91.21	-986.09	-4,954.60	991.10	626.73	364.37	2.720		
12,017.69	5,512.00	11,661.13	5,533.00	182.26	182.98	91.21	-986.07	-4,967.58	991.11	625.83	365.28	2.713		

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Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #1	Offset TVD Reference:	Offset Datum

Reference Depths are relative to GL 7013' & RKB 14' @ 7027.00usft
Offset Depths are relative to Offset Datum
Central Meridian is -107.8333334

Coordinates are relative to: State 2408-32A 3H
Coordinate System is US State Plane 1983, New Mexico Western Zone
Grid Convergence at Surface is: 0.08°



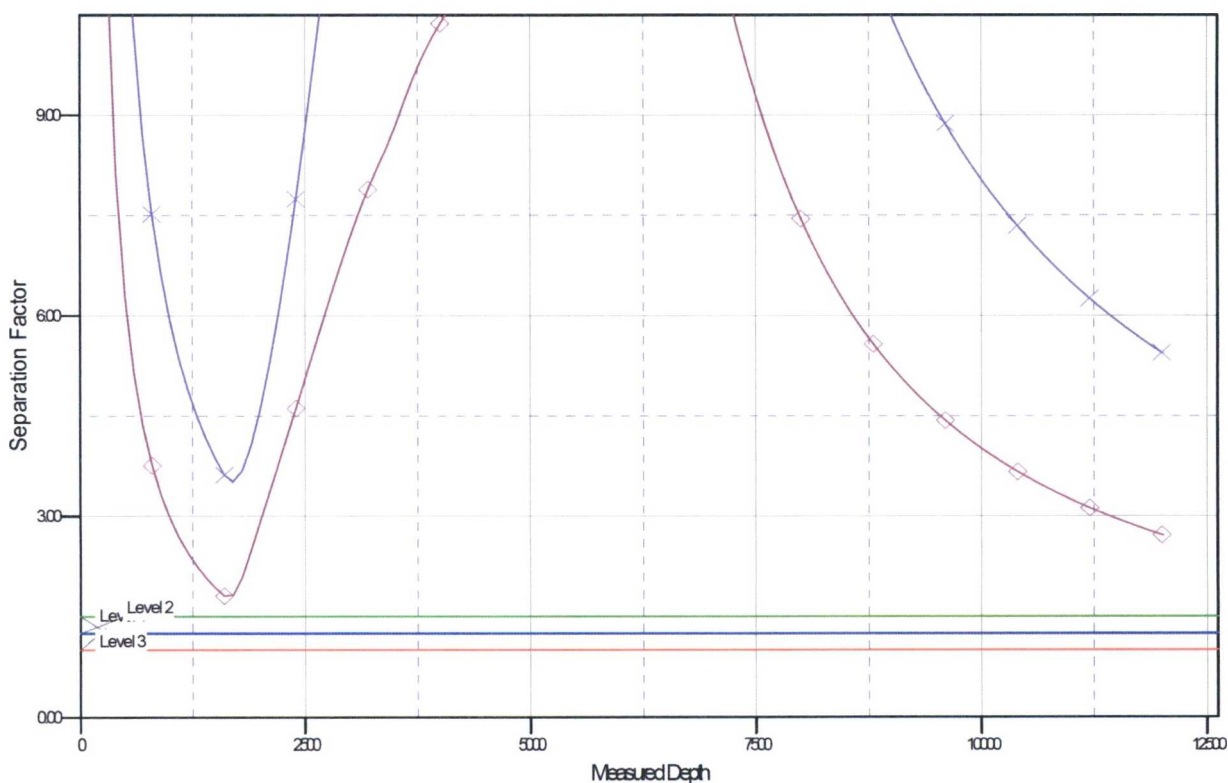
Company: Logos Operating LLC
Project: San Juan, NM NAD83
Reference Site: State 2408-32A
Site Error: 0.00 usft
Reference Well: State 2408-32A 3H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan #1

Local Co-ordinate Reference: Well State 2408-32A 3H
TVD Reference: GL 7013' & RKB 14' @ 7027.00usft
MD Reference: GL 7013' & RKB 14' @ 7027.00usft
North Reference: True
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: Grand Junction District
Offset TVD Reference: Offset Datum

Reference Depths are relative to GL 7013' & RKB 14' @ 7027.00usft
Offset Depths are relative to Offset Datum
Central Meridian is -107.833334

Coordinates are relative to: State 2408-32A 3H
Coordinate System is US State Plane 1983, New Mexico Western Zone
Grid Convergence at Surface is: 0.08°

Separation Factor Plot



LEGEND

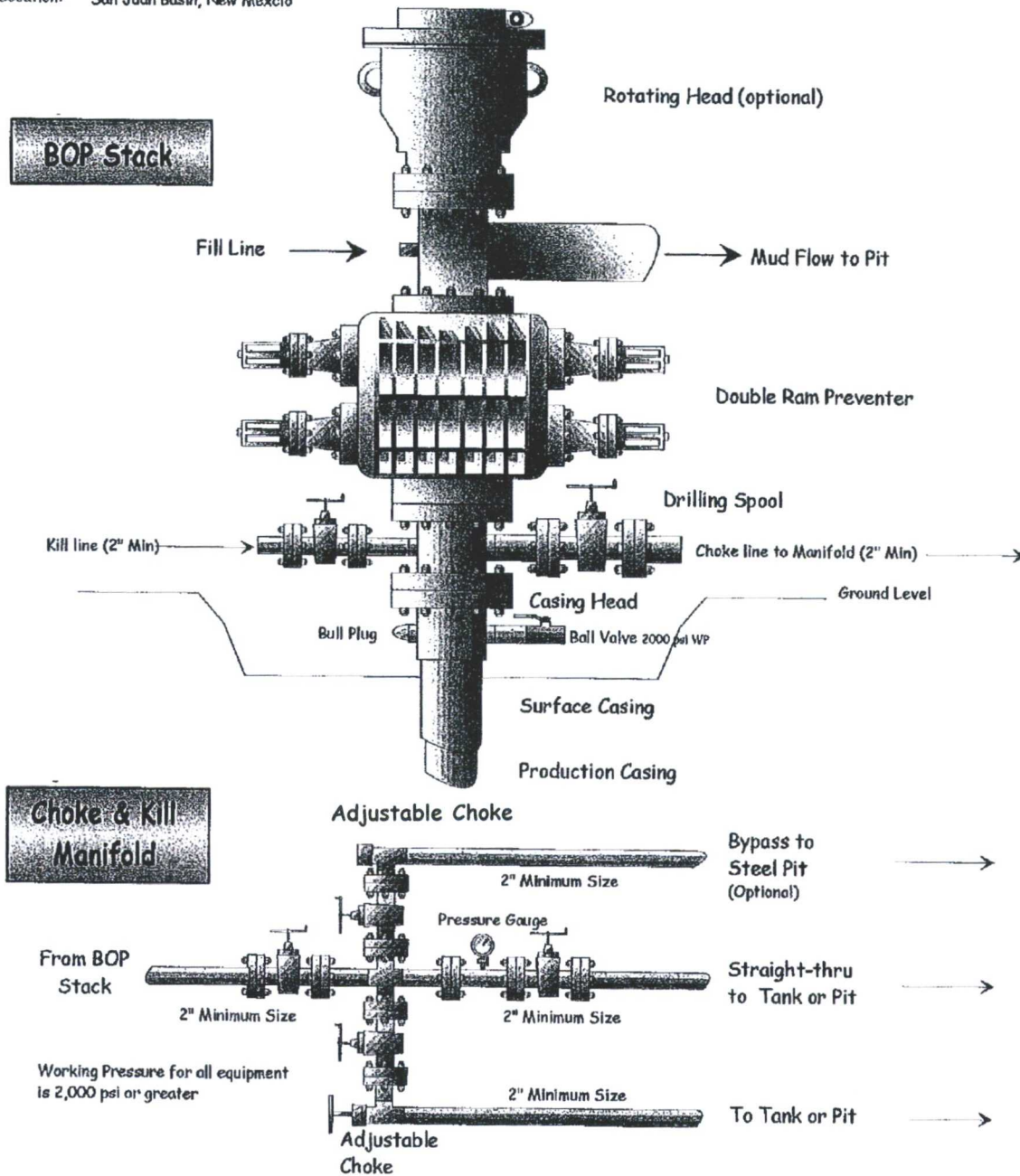
◆ State 2408-32A 2H, OH, Plan #1 V0 × State 2408-32A 1H, OH, Plan #1 V0

Well Control Equipment Schematic for 2M Service

Attachment to Drilling Technical Program

Exhibit #1 Typical BOP setup

Location: San Juan Basin, New Mexico



Directions from the Intersection of US Hwy 550 & US Hwy 64

in Bloomfield, NM to Logos Operating, LLC State 2408-32A #3H

330' FNL & 300' FEL, Section 32, T24N, R8W, N.M.P.M., San Juan County, NM

Latitude: 36.277180°N Longitude: 107.697207°W Datum: NAD1983

From the intersection of US Hwy 550 & US Hwy 64 in Bloomfield, NM, travel Southerly on US Hwy 550 for 36.4 miles to Mile Marker 115.3;

Go Left (Easterly) on existing roadway for 2.3 miles to fork in roadway;

Go Right (Easterly) on existing roadway for 0.6 miles to fork in roadway;

Go Right (Northerly) which is straight for 0.1 mile to fork in roadway;

Go Left (North-westerly) for approx. 200' to begin proposed access on right-hand side of existing roadway which continues for 1106.4' to staked Logos State 2408-32A #3H location.

State of New Mexico
Energy, Minerals and Natural Resources Department

Susana Martinez
Governor

Ken McQueen
Cabinet Secretary

Matthias Sayer
Deputy Cabinet Secretary

Heather Riley, Division Director
Oil Conservation Division



New Mexico Oil Conservation Division Conditions of Approval
C-101 Application for Permit to Drill

Operator Signature Date: 12/3/2018

Well information;

Operator LOLOS, Well Name and Number State 2408 32A Com 3H

API# 30-045-35913 Section 32 Township 24 N 15 S, Range 8 E W

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

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