

State of New Mexico
Energy, Minerals and Natural Resources Department

Michelle Lujan Grisham
Governor

Sarah Cottrell Propst
Cabinet Secretary

Todd E. Leahy, JD, PhD
Deputy Secretary

Adrienne Sandoval, Division Director
Oil Conservation Division



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

Operator Signature Date: 5/13/2019

Well information;

Operator UGOS, Well Name and Number Chaco 23 08 3 3H

API# 30-045-38171, Section 3, Township 23 NS, Range 8 EW

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

- ☒ Notify Aztec OCD 24hrs prior to casing & cement.
- ☒ If cement doesn't circulate on any casing string or stage tool a CBL will be required. Contact the regulatory agencies prior to proceeding.
- ☒ Hold C-104 for directional survey & "As Drilled" Plat
- ☒ Hold C-104 for: NSL, NSP, DHC, 5.9 Compliance
- ☐ 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.


NMOCD Approved by Signature

2/26/20
Date

- Change of
Plans Next
Sundry

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
APPLICATION FOR PERMIT TO DRILL OR REENTER

1a. Type of work: ☒ DRILL ☐ REENTER		5. Lease Serial No. NMNM018463
1b. Type of Well: ☐ Oil Well ☐ Gas Well ☒ Other OTH		6. If Indian, Allottee or Tribe Name
1c. Type of Completion: ☐ Hydraulic Fracturing ☒ Single Zone ☐ Multiple Zone		7. If Unit or CA Agreement, Name and No.
2. Name of Operator LOGOS OPERATING LLC		8. Lease Name and Well No. CHACO 23 08 3 3H
3a. Address 2010 Afton Place FARMINGTON NM 87401		9. API Well No. 30-045-38171
3b. Phone No. (include area code) (505)324-4145		10. Field and Pool, or Exploratory MANCOS
4. Location of Well (Report location clearly and in accordance with any State requirements. *) At surface SENE / 2036 FNL / 187 FEL / LAT 36.257963 / LONG -107.660786 At proposed prod. zone LOT 4 / 1325 FNL / 20 FWL / LAT 36.259935 / LONG -107.678081		11. Sec., T. R. M. or Blk. and Survey or Area SEC 3 / T23N / R8W / NMP
14. Distance in miles and direction from nearest town or post office* 41 miles		12. County or Parish SAN JUAN
15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any) 20 feet		13. State NM
16. No of acres in lease 2243.16		17. Spacing Unit dedicated to this well 323.2
18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft. 22 feet		20. BLM/BIA Bond No. in file FED: NMB001387
21. Elevations (Show whether DF, KDB, RT, GL, etc.) 6908 feet		22. Approximate date work will start* 06/14/2019
23. Estimated duration 30 days		

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

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

25. Signature (Electronic Submission)	Name (Printed/Typed) Tamra Sessions / Ph: (505)324-4145	Date 05/13/2019
Title REGULATORY SPECIALIST		
Approved by (Signature) (Electronic Submission)	Name (Printed/Typed) Dave Mankiewicz / Ph: (505)564-7761	Date 02/11/2020
Title AFM-Minerals		
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 WITH CONDITIONS
Approval Date: 02/11/2020

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

¹ API Number 30-045-38171	² Pool Code 97232	³ Pool Name BASIN MANCOS
⁴ Property Code	⁵ Property Name CHACO 23-08-3	⁶ Well Number 3H
⁷ GRID No. 289408	⁸ Operator Name LOGOS OPERATING, LLC	⁹ Elevation 6908'

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
H	3	23N	8W		2036	NORTH	187	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
D	3	23N	8W	4	1325	NORTH	20	WEST	SAN JUAN

¹² Dedicated Acres 323.20 Acres N/2 - Section 3	¹³ Joint or Infill	¹⁴ Consolidation Code	¹⁵ Order No.
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END-OF-LATERAL (A)
1325' FNL 20' FWL
SECTION 3, T23N, R8W
LAT: 36.259922°N
LONG: 107.677470°W
DATUM: NAD1927

LAT: 36.259935°N
LONG: 107.678081°W
DATUM: NAD1983

FIRST PERFORATION (B)
1324' FNL 100' FWL
SECTION 3, T23N, R8W
LAT: 36.259922°N
LONG: 107.677199°W
DATUM: NAD1927

LAT: 36.259935°N
LONG: 107.677810°W
DATUM: NAD1983

LAST PERFORATION (C)
1308' FNL 100' FWL
SECTION 3, T23N, R8W
LAT: 36.259949°N
LONG: 107.659915°W
DATUM: NAD1927

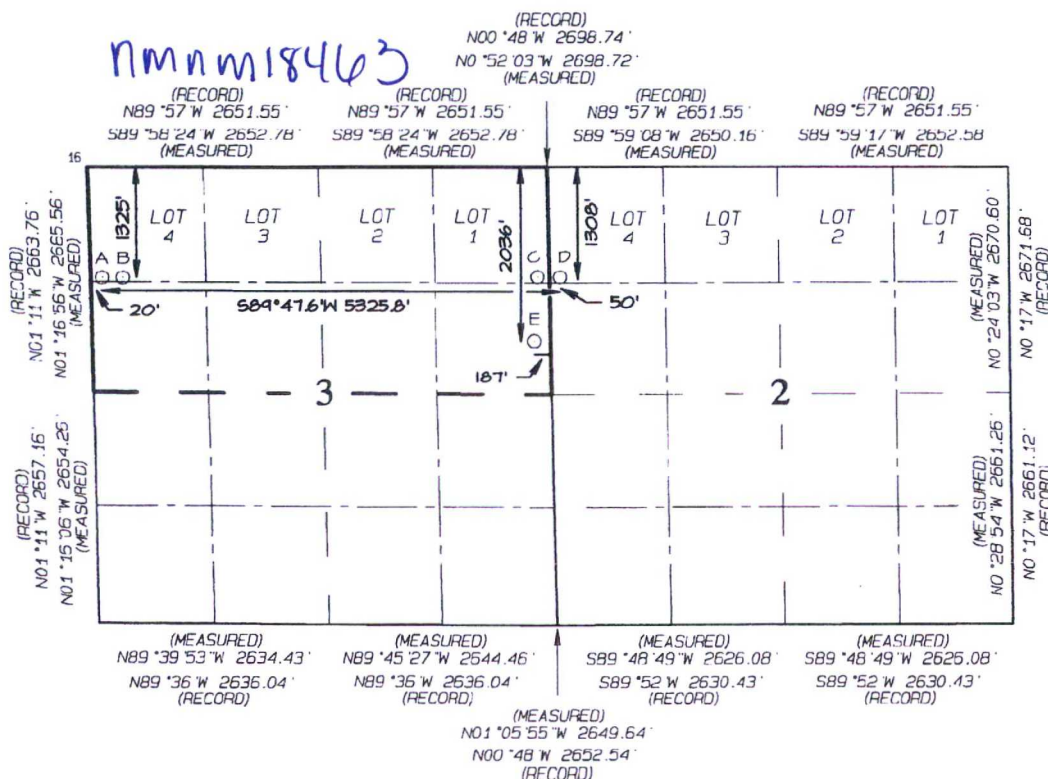
LAT: 36.259962°N
LONG: 107.660525°W
DATUM: NAD1983

POINT-OF-ENTRY (D)
1308' FNL 50' FWL
SECTION 2, T23N, R8W
LAT: 36.259950°N
LONG: 107.659406°W
DATUM: NAD1927

LAT: 36.259963°N
LONG: 107.660017°W
DATUM: NAD1983

SURFACE LOCATION (E)
2036' FNL 187' FWL
SECTION 2, T23N, R8W
LAT: 36.257950°N
LONG: 107.660176°W
DATUM: NAD1927

LAT: 36.257963°N
LONG: 107.660786°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

surface = Indian

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: *Marie E. Florez* Date: 07/16/2019
Printed Name: Marie E. Florez
Email Address: mflorez@logosresourcesllc.com

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: MAY 7, 2019
Date of Survey: MAY 4, 2019
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:	May 5, 2019	Pool:	Basin Mancos
Well Name:	Chaco 23 08 3 #3H	Elevation:	6,908
Surface Location:	Sec 3, T23N, R8W 2036 FNL, 187 FEL (36.257963° N, -107.660789° W – NAD83)	Measured Depth:	11,389
Bottom Hole Location:	Sec 3, T23N, R8W 1325 FNL, 20 FWL (36.259935° N, -107.678081° W – NAD83)	County:	San Juan

Lease Serial #NMNM 18463

I. GEOLOGY

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

NAME	MD	TVD	NAME	MD	TVD
OJO ALAMO	1,065	1,065	MENEFEE	3,401	3,302
KIRTLAND	1,236	1,234	*POINT LOOKOUT	4,303	4,159
*FRUITLAND	1,382	1,378	*MANCOS	4,516	4,362
*PICTURED CLIFFS	1,797	1,777	GALLUP	5,632	5,347
CHACRA	2,657	2,595	KICKOFF POINT	4,743	4,577
*CLIFF HOUSE	3,349	3,252	LANDING POINT	6,064	5,469
			TD	11,389	5,434

* 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' or greater	9.625"	36 LBS	J-55 or equiv	LTC
INTERMEDIATE	8.75"	6,064' ✓	7"	23 LBS	J-55 or equiv	LTC
PRODUCTION	6.125"	5,914' – 11,389'	4.5"	11.6 LBS	P-110 or equiv	LTC or BTC
TIE BACK	6.125"	Surf. – 5,914'	4.5"	11.6 LBS	P-110 or equiv	LTC or BTC

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. Optional use of DV Tool will be considered if losses while drilling are encountered. See note below.
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). Centralizer program will be determined by wellbore condition. Set seals on Liner Hanger. Liner to be pressure tested during completion operations.

NOTE: Use of DV tool would be considered by operator as back up in case we experience heavy losses and are concerned with cement not reaching surface. If major losses are not encountered we will not run DV tool. Optional use of cancelation plugs for DV tools may be used if losses while cementing are not encountered.

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: If deemed necessary, the intermediate casing will be cemented in 1 or 2 stages using DV/STAGE tools in order to reduce cement losses and maximize cement coverage. If losses are not observed a cancelation plug will be pumped and the remaining cement will be pumped during stage 1.



Stage 1: Spacer #1: 20 bbl (112 cuft) Chemwash. Lead Cement: 203 bbls, 585 sks, 12.3 ppg@ 1.95 cuft/sk yield. Tail Cement: 56.6 bbls, 245 sks, 13.5 ppg@ 1.3 cuft/sk yield. Displacement: Displace w/ Drilling mud or water. Total Cement: 259.7 bbls, 830 sks.

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 (497 sk / 120.3 bbls). Tail Spacer: 40 BBL of MMCR. Displacement: Displace w/ drilling mud or water.

IV. COMPLETION

A. CBL

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

B. PRESSURE TEST

With frac stack installed on wellhead, pressure test 4-1/2" casing to 4000 psi max, hold at 1500 psi for 15 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

*NOTE: Although this horizontal well may be drilled past the applicable setbacks, an unorthodox location application is not required because the completed interval in this well, as defined by 19.15.16.7 8(1) NMAC, will be entirely within the applicable setbacks. This approach complies with all applicable rules, including 19.15.16.14 A(3) NMAC, 19.15.16.14 8(2) NMAC, 19.15.16.15 8(2)NMAC, and 19.15.16.15. 8(4) NMAC.



Company: Logos Operating LLC
Project: San Juan, NM NAD83
Site: Chaco 2308-3
Well: Chaco 2308-3 3H
Wellbore: OH
Design: Plan #2

PROJECT DETAILS: San Juan, NM NAD83

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



Azimuths to True North
Magnetic North: 0.00°

Magnetic Field
Strength: 0.0snT
Dip Angle: 0.00°
Date: 5/3/2019
Model: USER DEFINED

WELL DETAILS: Chaco 2308-3 3H

GL 6908' & RKB 25' @ 6933.00usft (Aztec 1000)

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.00	0.00	1913242.53	2773962.28	36.2579630	-107.6607860

Plan: Plan #2 (Chaco 2308-3 3H/OH)

Created By: Janie Collins Date: 17:20, May 07 2019

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Chaco 3H POE	5469.00	728.05	226.71	1913970.98	2774187.70	36.2599630	-107.6600170
Chaco 3H BHL	5434.00	718.31	-5098.82	1913951.78	2768862.19	36.2599350	-107.6780810
Chaco 3H FPerf	5434.00	718.30	-5018.92	1913951.89	2768942.09	36.2599350	-107.6778100
Chaco 3H LPerf	5469.00	727.69	78.95	1913970.35	2774037.93	36.2599620	-107.6605250

SECTION DETAILS

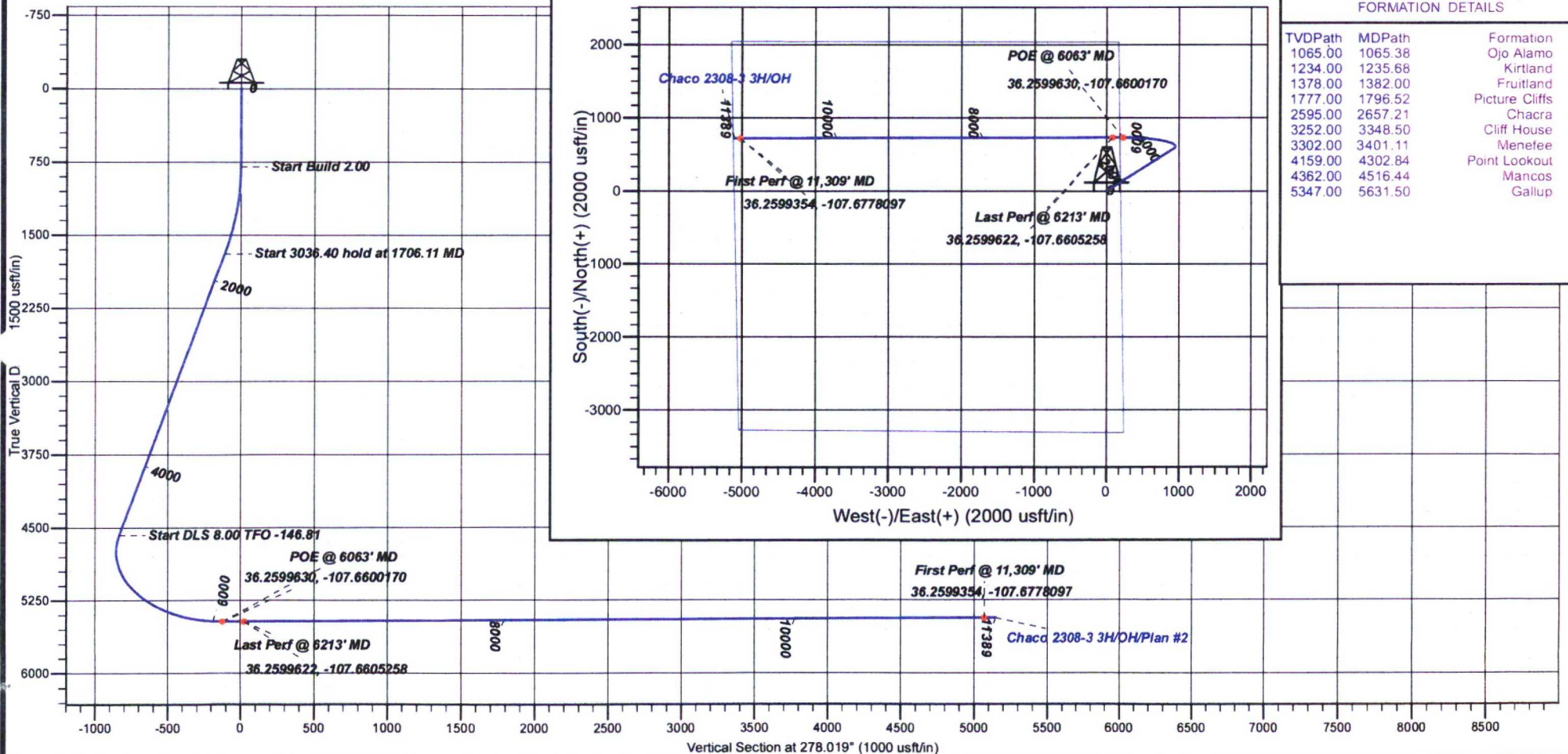
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Target
0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	
800.00	0.00	0.000	800.00	0.00	0.00	0.00	0.00	0.00	
1706.11	18.12	58.089	1691.08	75.12	120.63	2.00	58.09	-108.97	
4742.51	18.12	58.089	4576.86	574.36	922.35	0.00	0.00	-833.21	
6063.74	90.38	269.895	5469.00	728.05	226.71	8.00	-146.81	-122.93	Chaco 3H POE
11389.40	90.38	269.895	5434.00	718.31	-5098.82	0.00	0.00	5149.16	Chaco 3H BHL

CASING DETAILS

No casing data is available

FORMATION DETAILS

TVDPATH	MDPATH	FORMATION
1065.00	1065.38	Ojo Alamo
1234.00	1235.68	Kirtland
1378.00	1382.00	Fruitland
1777.00	1796.52	Picture Cliffs
2595.00	2657.21	Chacra
3252.00	3348.50	Cliff House
3302.00	3401.11	Menefee
4159.00	4302.84	Point Lookout
4362.00	4516.44	Mancos
5347.00	5631.50	Gallup





Logos Operating LLC

San Juan, NM NAD83

Chaco 2308-3

Chaco 2308-3 3H

OH

Plan: Plan #2

Standard Planning Report

07 May, 2019



www.scientificdrilling.com



Scientific Drilling, Intl
Planning Report



Database: Grand Junction District
Company: Logos Operating LLC
Project: San Juan, NM NAD83
Site: Chaco 2308-3
Well: Chaco 2308-3 3H
Wellbore: OH
Design: Plan #2

Local Co-ordinate Reference: Well Chaco 2308-3 3H
TVD Reference: GL 6908' & RKB 25' @ 6933.00usft (Aztec 1000)
MD Reference: GL 6908' & RKB 25' @ 6933.00usft (Aztec 1000)
North Reference: True
Survey Calculation Method: Minimum Curvature

Project San Juan, NM NAD83
Map System: US State Plane 1983
Geo Datum: North American Datum 1983
Map Zone: New Mexico Western Zone
System Datum: Mean Sea Level

Site Chaco 2308-3
Site Position: Northing: 1,913,242.53 usft Latitude: 36.2579630
From: Lat/Long Easting: 2,773,962.28 usft Longitude: -107.6607860
Position Uncertainty: 0.00 usft Slot Radius: 13.20 in Grid Convergence: 0.10 °

Well Chaco 2308-3 3H
Well Position +N/-S 0.00 usft Northing: 1,913,242.53 usft Latitude: 36.2579630
+E/-W 0.00 usft Easting: 2,773,962.28 usft Longitude: -107.6607860
Position Uncertainty 0.00 usft Wellhead Elevation: 0.00 usft Ground Level: 6,908.00 usft

Wellbore OH
Magnetics Model Name Sample Date Declination (°) Dip Angle (°) Field Strength (nT)
User Defined 5/3/2019 0.00 0.00 0

Design Plan #2
Audit Notes:
Version: Phase: PLAN Tie On Depth: 0.00
Vertical Section: Depth From (TVD) +N/-S +E/-W Direction
(usft) (usft) (usft) (°)
0.00 0.00 0.00 278.019

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	
800.00	0.00	0.000	800.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,706.11	18.12	58.089	1,691.08	75.12	120.63	2.00	2.00	0.00	58.09	
4,742.51	18.12	58.089	4,576.86	574.36	922.35	0.00	0.00	0.00	0.00	
6,063.74	90.38	269.895	5,469.00	728.05	226.71	8.00	5.47	-11.22	-146.81	Chaco 3H POE
11,389.40	90.38	269.895	5,434.00	718.31	-5,098.82	0.00	0.00	0.00	0.00	Chaco 3H BHL



Scientific Drilling, Intl
Planning Report



Database: Grand Junction District
Company: Logos Operating LLC
Project: San Juan, NM NAD83
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Local Co-ordinate Reference: Well Chaco 2308-3 3H
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MD Reference: GL 6908' & RKB 25' @ 6933.00usft (Aztec 1000)
North Reference: True
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
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
Start Build 2.00									
900.00	2.00	58.089	899.98	0.92	1.48	-1.34	2.00	2.00	0.00
1,000.00	4.00	58.089	999.84	3.69	5.92	-5.35	2.00	2.00	0.00
1,100.00	6.00	58.089	1,099.45	8.30	13.32	-12.03	2.00	2.00	0.00
1,200.00	8.00	58.089	1,198.70	14.74	23.67	-21.38	2.00	2.00	0.00
1,300.00	10.00	58.089	1,297.46	23.01	36.94	-33.37	2.00	2.00	0.00
1,400.00	12.00	58.089	1,395.62	33.09	53.14	-48.00	2.00	2.00	0.00
1,500.00	14.00	58.089	1,493.05	44.98	72.24	-65.25	2.00	2.00	0.00
1,600.00	16.00	58.089	1,589.64	58.66	94.20	-85.10	2.00	2.00	0.00
1,700.00	18.00	58.089	1,685.27	74.12	119.02	-107.52	2.00	2.00	0.00
1,706.11	18.12	58.089	1,691.08	75.12	120.63	-108.97	2.00	2.00	0.00
Start 3036.40 hold at 1706.11 MD									
1,800.00	18.12	58.089	1,780.31	90.55	145.42	-131.37	0.00	0.00	0.00
1,900.00	18.12	58.089	1,875.35	107.00	171.82	-155.22	0.00	0.00	0.00
2,000.00	18.12	58.089	1,970.39	123.44	198.23	-179.07	0.00	0.00	0.00
2,100.00	18.12	58.089	2,065.42	139.88	224.63	-202.92	0.00	0.00	0.00
2,200.00	18.12	58.089	2,160.46	156.32	251.03	-226.77	0.00	0.00	0.00
2,300.00	18.12	58.089	2,255.50	172.76	277.44	-250.62	0.00	0.00	0.00
2,400.00	18.12	58.089	2,350.54	189.21	303.84	-274.48	0.00	0.00	0.00
2,500.00	18.12	58.089	2,445.58	205.65	330.25	-298.33	0.00	0.00	0.00
2,599.99	18.12	58.089	2,540.62	222.09	356.65	-322.18	0.00	0.00	0.00
2,699.99	18.12	58.089	2,635.66	238.53	383.05	-346.03	0.00	0.00	0.00
2,799.99	18.12	58.089	2,730.70	254.97	409.46	-369.88	0.00	0.00	0.00
2,899.99	18.12	58.089	2,825.74	271.42	435.86	-393.74	0.00	0.00	0.00
2,999.99	18.12	58.089	2,920.78	287.86	462.26	-417.59	0.00	0.00	0.00
3,099.99	18.12	58.089	3,015.82	304.30	488.67	-441.44	0.00	0.00	0.00
3,199.99	18.12	58.089	3,110.86	320.74	515.07	-465.29	0.00	0.00	0.00
3,299.99	18.12	58.089	3,205.90	337.18	541.48	-489.14	0.00	0.00	0.00
3,399.99	18.12	58.089	3,300.94	353.63	567.88	-513.00	0.00	0.00	0.00
3,499.99	18.12	58.089	3,395.97	370.07	594.28	-536.85	0.00	0.00	0.00
3,599.99	18.12	58.089	3,491.01	386.51	620.69	-560.70	0.00	0.00	0.00
3,699.99	18.12	58.089	3,586.05	402.95	647.09	-584.55	0.00	0.00	0.00
3,799.99	18.12	58.089	3,681.09	419.39	673.49	-608.40	0.00	0.00	0.00
3,899.99	18.12	58.089	3,776.13	435.84	699.90	-632.25	0.00	0.00	0.00
3,999.99	18.12	58.089	3,871.17	452.28	726.30	-656.11	0.00	0.00	0.00
4,099.99	18.12	58.089	3,966.21	468.72	752.71	-679.96	0.00	0.00	0.00
4,199.99	18.12	58.089	4,061.25	485.16	779.11	-703.81	0.00	0.00	0.00
4,299.99	18.12	58.089	4,156.29	501.60	805.51	-727.66	0.00	0.00	0.00
4,399.99	18.12	58.089	4,251.33	518.04	831.92	-751.51	0.00	0.00	0.00
4,499.99	18.12	58.089	4,346.37	534.49	858.32	-775.37	0.00	0.00	0.00
4,599.99	18.12	58.089	4,441.41	550.93	884.72	-799.22	0.00	0.00	0.00
4,699.99	18.12	58.089	4,536.45	567.37	911.13	-823.07	0.00	0.00	0.00
4,742.51	18.12	58.089	4,576.86	574.36	922.35	-833.21	0.00	0.00	0.00



Scientific Drilling, Intl
Planning Report



Database: Grand Junction District
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Project: San Juan, NM NAD83
Site: Chaco 2308-3
Well: Chaco 2308-3 3H
Wellbore: OH
Design: Plan #2

Local Co-ordinate Reference: Well Chaco 2308-3 3H
TVD Reference: GL 6908' & RKB 25' @ 6933.00usft (Aztec 1000)
MD Reference: GL 6908' & RKB 25' @ 6933.00usft (Aztec 1000)
North Reference: True
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
Start DLS 8.00 TFO -146.81									
4,799.99	14.49	47.984	4,632.03	583.90	935.29	-844.69	8.00	-6.32	-17.58
4,899.99	10.17	15.539	4,729.81	600.81	946.97	-853.90	8.00	-4.32	-32.45
4,999.99	11.12	331.463	4,828.24	617.82	944.72	-849.30	8.00	0.95	-44.08
5,099.99	16.46	305.766	4,925.41	634.60	928.59	-830.99	8.00	5.33	-25.70
5,199.99	23.34	293.574	5,019.43	650.83	898.90	-799.32	8.00	6.88	-12.19
5,299.99	30.74	286.852	5,108.46	666.18	856.22	-754.91	8.00	7.41	-6.72
5,399.99	38.37	282.569	5,190.77	680.37	801.38	-698.63	8.00	7.63	-4.28
5,499.99	46.10	279.531	5,264.76	693.11	735.45	-631.57	8.00	7.74	-3.04
5,599.99	53.90	277.199	5,328.99	704.15	659.71	-555.03	8.00	7.80	-2.33
5,699.99	61.74	275.290	5,382.20	713.29	575.63	-470.50	8.00	7.84	-1.91
5,799.99	69.60	273.645	5,423.38	720.34	484.87	-379.64	8.00	7.86	-1.65
5,899.99	77.47	272.161	5,451.70	725.17	389.17	-284.20	8.00	7.87	-1.48
5,999.99	85.35	270.766	5,466.62	727.68	290.40	-186.05	8.00	7.88	-1.40
6,063.74	90.38	269.895	5,469.00	728.05	226.71	-122.93	8.00	7.88	-1.37
36.2599630, -107.6600170 - POE @ 6063' MD									
6,099.99	90.38	269.895	5,468.76	727.98	190.47	-87.05	0.00	0.00	0.00
6,199.99	90.38	269.895	5,468.10	727.80	90.47	11.94	0.00	0.00	0.00
6,213.74	90.38	269.895	5,468.01	727.78	76.72	25.56	0.00	0.00	0.00
Last Perf @ 6213' MD - 36.2599622, -107.6605258									
6,299.99	90.38	269.895	5,467.45	727.62	-9.53	110.94	0.00	0.00	0.00
6,399.99	90.38	269.895	5,466.79	727.44	-109.52	209.93	0.00	0.00	0.00
6,499.99	90.38	269.895	5,466.13	727.25	-209.52	308.92	0.00	0.00	0.00
6,599.99	90.38	269.895	5,465.48	727.07	-309.52	407.92	0.00	0.00	0.00
6,699.99	90.38	269.895	5,464.82	726.89	-409.52	506.91	0.00	0.00	0.00
6,799.99	90.38	269.895	5,464.16	726.70	-509.51	605.91	0.00	0.00	0.00
6,899.99	90.38	269.895	5,463.50	726.52	-609.51	704.90	0.00	0.00	0.00
6,999.99	90.38	269.895	5,462.85	726.34	-709.51	803.89	0.00	0.00	0.00
7,099.99	90.38	269.895	5,462.19	726.16	-809.51	902.89	0.00	0.00	0.00
7,199.99	90.38	269.895	5,461.53	725.97	-909.50	1,001.88	0.00	0.00	0.00
7,299.99	90.38	269.895	5,460.88	725.79	-1,009.50	1,100.88	0.00	0.00	0.00
7,399.99	90.38	269.895	5,460.22	725.61	-1,109.50	1,199.87	0.00	0.00	0.00
7,499.99	90.38	269.895	5,459.56	725.42	-1,209.49	1,298.87	0.00	0.00	0.00
7,599.98	90.38	269.895	5,458.90	725.24	-1,309.49	1,397.86	0.00	0.00	0.00
7,699.98	90.38	269.895	5,458.25	725.06	-1,409.49	1,496.85	0.00	0.00	0.00
7,799.98	90.38	269.895	5,457.59	724.88	-1,509.49	1,595.85	0.00	0.00	0.00
7,899.98	90.38	269.895	5,456.93	724.69	-1,609.48	1,694.84	0.00	0.00	0.00
7,999.98	90.38	269.895	5,456.28	724.51	-1,709.48	1,793.84	0.00	0.00	0.00
8,099.98	90.38	269.895	5,455.62	724.33	-1,809.48	1,892.83	0.00	0.00	0.00
8,199.98	90.38	269.895	5,454.96	724.14	-1,909.48	1,991.82	0.00	0.00	0.00
8,299.98	90.38	269.895	5,454.30	723.96	-2,009.47	2,090.82	0.00	0.00	0.00
8,399.98	90.38	269.895	5,453.65	723.78	-2,109.47	2,189.81	0.00	0.00	0.00
8,499.98	90.38	269.895	5,452.99	723.60	-2,209.47	2,288.81	0.00	0.00	0.00
8,599.98	90.38	269.895	5,452.33	723.41	-2,309.47	2,387.80	0.00	0.00	0.00
8,699.98	90.38	269.895	5,451.67	723.23	-2,409.46	2,486.80	0.00	0.00	0.00
8,799.98	90.38	269.895	5,451.02	723.05	-2,509.46	2,585.79	0.00	0.00	0.00
8,899.98	90.38	269.895	5,450.36	722.86	-2,609.46	2,684.78	0.00	0.00	0.00
8,999.98	90.38	269.895	5,449.70	722.68	-2,709.46	2,783.78	0.00	0.00	0.00
9,099.98	90.38	269.895	5,449.05	722.50	-2,809.45	2,882.77	0.00	0.00	0.00
9,199.98	90.38	269.895	5,448.39	722.32	-2,909.45	2,981.77	0.00	0.00	0.00
9,299.98	90.38	269.895	5,447.73	722.13	-3,009.45	3,080.76	0.00	0.00	0.00



Scientific Drilling, Intl
Planning Report



Database: Grand Junction District
Company: Logos Operating LLC
Project: San Juan, NM NAD83
Site: Chaco 2308-3
Well: Chaco 2308-3 3H
Wellbore: OH
Design: Plan #2

Local Co-ordinate Reference: Well Chaco 2308-3 3H
TVD Reference: GL 6908' & RKB 25' @ 6933.00usft (Aztec 1000)
MD Reference: GL 6908' & RKB 25' @ 6933.00usft (Aztec 1000)
North Reference: True
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
9,399.98	90.38	269.895	5,447.07	721.95	-3,109.45	3,179.76	0.00	0.00	0.00
9,499.98	90.38	269.895	5,446.42	721.77	-3,209.44	3,278.75	0.00	0.00	0.00
9,599.98	90.38	269.895	5,445.76	721.58	-3,309.44	3,377.74	0.00	0.00	0.00
9,699.98	90.38	269.895	5,445.10	721.40	-3,409.44	3,476.74	0.00	0.00	0.00
9,799.98	90.38	269.895	5,444.45	721.22	-3,509.44	3,575.73	0.00	0.00	0.00
9,899.98	90.38	269.895	5,443.79	721.04	-3,609.43	3,674.73	0.00	0.00	0.00
9,999.98	90.38	269.895	5,443.13	720.85	-3,709.43	3,773.72	0.00	0.00	0.00
10,099.98	90.38	269.895	5,442.47	720.67	-3,809.43	3,872.71	0.00	0.00	0.00
10,199.98	90.38	269.895	5,441.82	720.49	-3,909.43	3,971.71	0.00	0.00	0.00
10,299.98	90.38	269.895	5,441.16	720.30	-4,009.42	4,070.70	0.00	0.00	0.00
10,399.98	90.38	269.895	5,440.50	720.12	-4,109.42	4,169.70	0.00	0.00	0.00
10,499.98	90.38	269.895	5,439.85	719.94	-4,209.42	4,268.69	0.00	0.00	0.00
10,599.98	90.38	269.895	5,439.19	719.76	-4,309.42	4,367.69	0.00	0.00	0.00
10,699.98	90.38	269.895	5,438.53	719.57	-4,409.41	4,466.68	0.00	0.00	0.00
10,799.98	90.38	269.895	5,437.87	719.39	-4,509.41	4,565.67	0.00	0.00	0.00
10,899.98	90.38	269.895	5,437.22	719.21	-4,609.41	4,664.67	0.00	0.00	0.00
10,999.98	90.38	269.895	5,436.56	719.02	-4,709.41	4,763.66	0.00	0.00	0.00
11,099.98	90.38	269.895	5,435.90	718.84	-4,809.40	4,862.66	0.00	0.00	0.00
11,199.98	90.38	269.895	5,435.24	718.66	-4,909.40	4,961.65	0.00	0.00	0.00
11,299.98	90.38	269.895	5,434.59	718.48	-5,009.40	5,060.64	0.00	0.00	0.00
11,309.40	90.38	269.895	5,434.53	718.46	-5,018.82	5,069.97	0.00	0.00	0.00
First Perf @ 11,309' MD - 36.2599354, -107.6778097									
11,389.40	90.38	269.895	5,434.00	718.31	-5,098.82	5,149.16	0.00	0.00	0.00
TD at 11389.40									

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
Chaco 3H FPerf - plan misses target center by 0.56usft at 11309.40usft MD (5434.53 TVD, 718.46 N, -5018.82 E) - Point	0.00	0.000	5,434.00	718.30	-5,018.92	1,913,951.89	2,768,942.09	36.2599350	-107.6778100
Chaco 3H BHL - plan hits target center - Point	0.00	0.000	5,434.00	718.31	-5,098.82	1,913,951.76	2,768,862.19	36.2599350	-107.6780810
Chaco 3H LPerf - plan misses target center by 0.99usft at 6213.51usft MD (5468.02 TVD, 727.78 N, 76.95 E) - Point	0.00	0.000	5,469.00	727.69	76.95	1,913,970.35	2,774,037.93	36.2599620	-107.6605250
Chaco 3H POE - plan hits target center - Point	0.00	0.000	5,469.00	728.05	226.71	1,913,970.99	2,774,187.70	36.2599630	-107.6600170



Database: Grand Junction District
Company: Logos Operating LLC

Project: San Juan, NM NAD83

Site: Chaco 2308-3
Well: Chaco 2308-3 3H
Wellbore: OH
Design: Plan #2

Local Co-ordinate Reference: Well Chaco 2308-3 3H
TVD Reference: GL 6908' & RKB 25' @ 6933.00usft (Aztec 1000)
MD Reference: GL 6908' & RKB 25' @ 6933.00usft (Aztec 1000)
North Reference: True
Survey Calculation Method: Minimum Curvature

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,065.38	1,065.00	Ojo Alamo		0.00	0.000
1,235.68	1,234.00	Kirtland		0.00	0.000
1,382.00	1,378.00	Fruitland		0.00	0.000
1,796.52	1,777.00	Picture Cliffs		0.00	0.000
2,657.21	2,595.00	Chacra		0.00	0.000
3,348.50	3,252.00	Cliff House		0.00	0.000
3,401.11	3,302.00	Menefee		0.00	0.000
4,302.84	4,159.00	Point Lookout		0.00	0.000
4,516.44	4,362.00	Mancos		0.00	0.000
5,631.50	5,347.00	Gallup		0.00	0.000

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
800.00	800.00	0.00	0.00	Start Build 2.00
1,706.11	1,691.08	75.12	120.63	Start 3036.40 hold at 1706.11 MD
4,742.51	4,576.86	574.36	922.35	Start DLS 8.00 TFO -146.81
6,063.74	5,469.00	728.05	226.72	36.2599630, -107.6600170
6,063.74	5,469.00	728.05	226.71	POE @ 6063' MD
6,213.74	5,468.01	727.78	76.72	Last Perf @ 6213' MD
6,213.74	5,468.01	727.78	76.72	36.2599622, -107.6605258
11,309.40	5,434.53	718.46	-5,018.82	First Perf @ 11,309' MD
11,309.40	5,434.53	718.46	-5,018.82	36.2599354, -107.6778097
11,389.40	5,434.00	718.31	-5,098.82	TD at 11389.40



Logos Operating LLC

San Juan, NM NAD83

Chaco 2308-3

Chaco 2308-3 3H

OH

Plan #2

Anticollision Report

07 May, 2019



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Scientific Drilling, Intl
Anticollision Report



Company: Logos Operating LLC
Project: San Juan, NM NAD83
Reference Site: Chaco 2308-3
Site Error: 0.00 usft
Reference Well: Chaco 2308-3 3H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan #2

Local Co-ordinate Reference: Well Chaco 2308-3 3H
TVD Reference: GL 6908' & RKB 25' @ 6933.00usft (Aztec 1000)
MD Reference: GL 6908' & RKB 25' @ 6933.00usft (Aztec 1000)
North Reference: True
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: Grand Junction District
Offset TVD Reference: Offset Datum

Reference	Plan #2		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD + Stations 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 5/7/2019		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	11,389.07	Plan #2 (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						
Chaco 2308-3						
Chaco 23-08-3 #1H - OH - OH	100.00	94.44	22.34	22.11	93.890 CC	
Chaco 23-08-3 #1H - OH - OH	200.00	194.38	22.74	22.03	32.277 ES	
Chaco 23-08-3 #1H - OH - OH	11,200.00	10,768.00	913.23	333.29	1.575 SF	
Chaco 23-08-3 #2H - OH - OH	467.90	463.70	22.25	20.24	11.042 CC, ES	
Chaco 23-08-3 #2H - OH - OH	11,200.00	10,310.00	950.17	402.42	1.735 SF	

Offset Design Chaco 2308-3 - Chaco 23-08-3 #1H - OH - OH														Offset Site Error: 0.00 usft
Survey Program: 396-SDI MWD, 5172-SDI MWD, 6368-SDI MWD														Offset Well Error: 0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum Separation		Separation Factor		Warning				
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
0.00	0.00	0.00	0.00	0.00	0.00	-2.05	22.21	-0.80	22.89					
100.00	100.00	94.44	94.44	0.13	0.10	-1.84	22.33	-0.72	22.34	22.11	0.24	93.890 CC		
200.00	200.00	194.38	194.38	0.49	0.21	-1.14	22.73	-0.45	22.74	22.03	0.70	32.277 ES		
300.00	300.00	294.31	294.31	0.85	0.32	-0.03	23.41	-0.01	23.41	22.24	1.17	19.988		
400.00	400.00	394.24	394.23	1.21	0.43	1.44	24.36	0.61	24.37	22.73	1.64	14.878		
500.00	500.00	494.00	493.98	1.57	0.64	2.96	25.65	1.33	25.69	23.47	2.21	11.609		
600.00	600.00	592.95	592.85	1.93	0.86	5.45	29.19	2.78	29.37	26.53	2.84	10.355		
700.00	700.00	691.44	691.06	2.29	1.10	6.81	36.32	4.34	36.74	33.25	3.49	10.539		
800.00	800.00	789.61	788.63	2.64	1.36	7.90	46.97	6.52	47.78	43.66	4.12	11.599		
900.00	899.98	888.14	886.31	3.00	1.65	-50.43	59.53	9.16	59.67	54.96	4.71	12.670		
1,000.00	999.84	985.18	982.20	3.36	1.96	-52.31	74.03	12.46	71.68	66.34	5.35	13.409		
1,100.00	1,099.45	1,082.33	1,077.68	3.73	2.31	-55.23	91.54	16.29	84.87	78.90	5.98	14.202		
1,200.00	1,198.70	1,179.44	1,172.73	4.13	2.69	-58.70	110.95	20.60	98.41	91.79	6.63	14.853		
1,300.00	1,297.47	1,274.44	1,265.20	4.56	3.10	-62.51	132.25	25.01	113.10	105.75	7.35	15.393		
1,400.00	1,395.62	1,367.93	1,355.33	5.06	3.55	-66.26	156.68	29.62	130.53	122.39	8.14	16.031		
1,500.00	1,493.06	1,462.17	1,445.35	5.63	4.05	-69.95	184.11	34.41	150.23	141.21	9.02	16.657		
1,600.00	1,589.64	1,554.46	1,532.75	6.29	4.58	-73.48	213.41	38.86	172.20	162.18	10.02	17.182		
1,700.00	1,685.27	1,649.40	1,622.05	7.07	5.14	-76.86	245.26	43.86	195.63	184.46	11.17	17.506		
1,706.11	1,691.08	1,655.04	1,627.34	7.12	5.17	-77.06	247.18	44.16	197.09	185.85	11.25	17.524		
1,800.00	1,780.31	1,741.51	1,708.11	7.94	5.72	-79.99	277.64	49.09	220.75	208.31	12.44	17.740		
1,900.00	1,875.35	1,832.95	1,792.47	8.85	6.35	-81.85	312.26	55.96	248.08	234.30	13.77	18.010		

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

- San Juan Basin Water Haulers (Permit WR-SP03453) multiple diversion points with various locations

Fresh water for drilling and completion operations will be stored on location in a lake tank.

Produced water from nearby existing gas wells will be utilized for completions operations if such activity proves practicable.

The water hauler(s) will access the proposed well pad via the roads described in Section A: *Existing Access Roads*.

No water supply well will be drilled on this lease.

F. Construction Plan and Materials

The BLM-FFO (505-564-7600) will be notified at least 48 hours prior to the start of construction activities; approximately 2 days of construction will be required for the well pad expansion.

The cut/fill for the 0.83-acre expansions would be minimal and are indicated in C102 Plat package. The expansions will be leveled with heavy equipment to provide space and a level surface for vehicles and equipment. All native excavated material will be used on the well pad. Excavated materials from the cuts will be used for fill in order to level the proposed well pad. No additional materials will be required for the expansion of the well pad.

Activity will cease when construction equipment cause ruts in the soil 6 inches in depth and/or when equipment can no longer move or operate under its own power on access road surfaces.

Construction plats are provided in the APD and ROW grant permit packages.

G. Methods for Handling Waste

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

LOGOS will follow New Mexico Oil Conservation Division Pit Rule and Onshore Orders No. 1 and No. 7 regarding placement, operation, and closure of the closed-loop system. No blow pit will be used.

All refuse will be placed in metal trash basket and will be hauled off site and properly disposed in an approved landfill.

Portable toilets will be provided and maintained during all construction, drilling and completion operations.

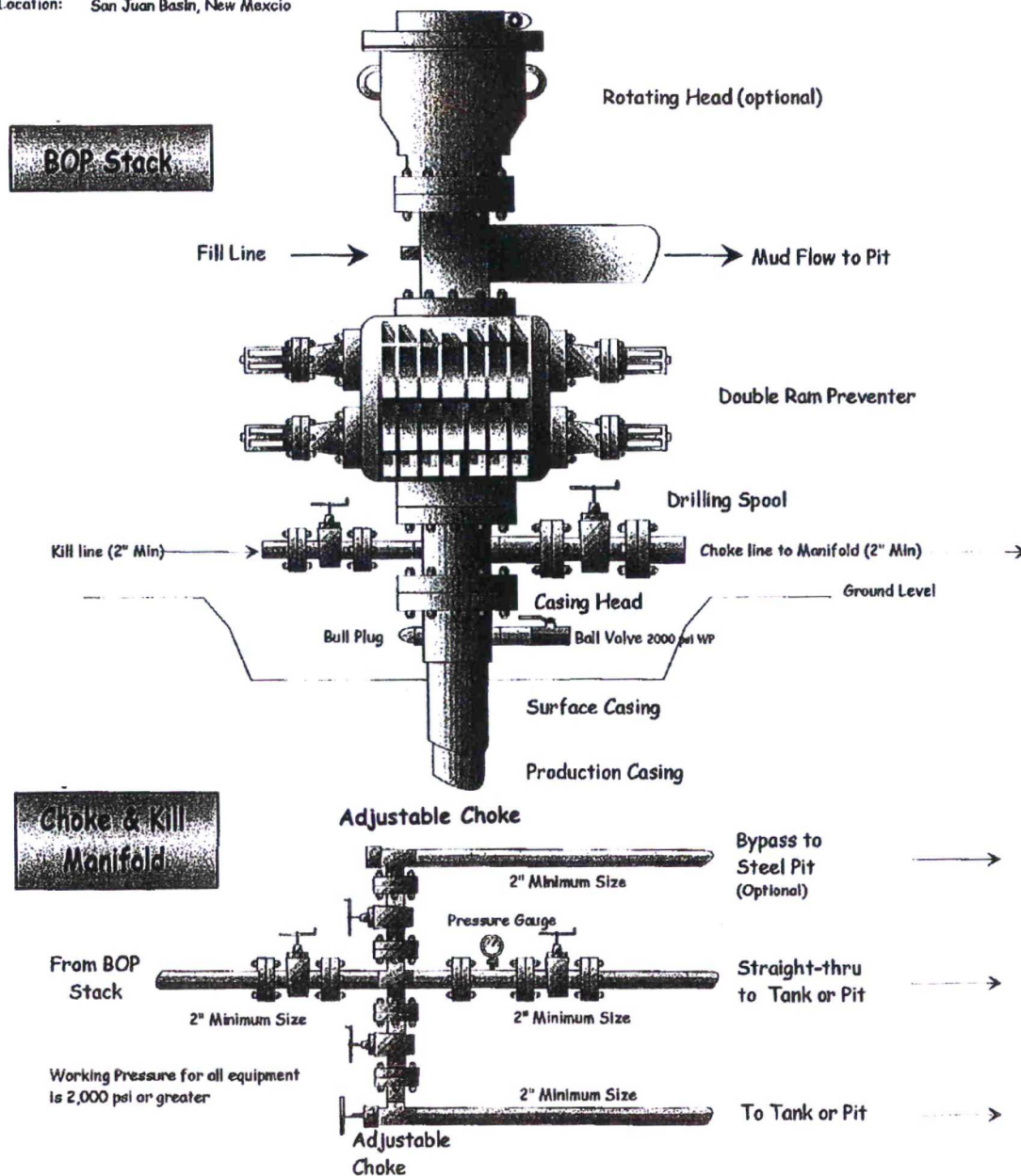


Well Control Equipment Schematic for 2M Service

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 Chaco 23-08-3 #3H

2036' FNL & 187' FEL, Section 3, T23N, R8W, N.M.P.M., San Juan County, NM

Latitude: 36.257963°N Longitude: 107.660786°W Datum: NAD1983

From the intersection of US Hwy 550 & US Hwy 64 in Bloomfield, NM, travel Southerly on US Hwy 550 for 41.1 miles to Mile Marker 110.6;

Go Left (Northerly) on existing roadway for 0.2 miles to fork in roadway;

Go Right (Easterly) on existing roadway for 0.4 miles to fork in roadway;

Go Left (Easterly) which is straight for 0.4 miles to existing Logos Chaco 23-08-3 #1H & #2H wellpad, on which is staked Logos Chaco 23-08-3 #3H location.