

Form 3160-5
(June 2019)UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENTFORM APPROVED
OMB No. 1004-0137
Expires: October 31, 2021**SUNDRY NOTICES AND REPORTS ON WELLS**
Do not use this form for proposals to drill or to re-enter an abandoned well. Use Form 3160-3 (APD) for such proposals.5. Lease Serial No.
NMSF078771
6. If Indian, Allottee or Tribe Name**SUBMIT IN TRIPLICATE - Other instructions on page 2**

1. Type of Well ☐ Oil Well ☒ Gas Well ☐ Other		7. If Unit of CA/Agreement, Name and/or No. NMNM78407E
2. Name of Operator LOGOS OPERATING LLC		8. Well Name and No. ROSA UNIT 652H
3a. Address 2010 AFTON PLACE FARMINGTON, NM 87401	3b. Phone No. (include area code) (505) 278-8720	9. API Well No. 30-039-31413
4. Location of Well (Footage, Sec., T., R., M., or Survey Description) SEC 25 T31N R06W NE/NE (A) 1076 FNL 253 FEL		10. Field and Pool or Exploratory Area BASIN MANCOS
		11. Country or Parish, State RIO ARriba COUNTY, NM

12. CHECK THE APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION				
☒ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off	
☐ Subsequent Report	☐ Alter Casing	☐ Hydraulic Fracturing	☐ Reclamation	☐ Well Integrity	
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☐ Other	
	☒ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon		
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal		

13. Describe Proposed or Completed Operation: Clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recompleat horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports must be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompleat in a new interval, a Form 3160-4 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed and the operator has determined that the site is ready for final inspection.)

LOGOS Operating request a change in plans for the following:

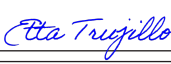
Original surface-hole location from 1075' FNL & 259' FEL to **new surface-hole location 1076' FNL & 253' FEL**Original bottom-hole location from 1219' FNL & 148' FWL to **new bottom-hole location 970' FNL & 156' FWL**Original TD @ 16,346' MD 6984' TVD to **new TD @ 16,197' MD 7250' TVD.**

Geology tops have been updated per changes.

Original KOP @ 6334' MD 6322' TVD to **new KOP @ 6642' MD 6639' TVD**Original Landing point @ 7362' MD 6986' TVD to new **Landing point @ 7627' MD 7260' TVD**Original Intermediate 9.625" casing @ 6244' MD to **new Intermediate casing set depth @ 6241' MD 6197' TVD**Original Production 5.5" casing @ 16,346' MD to **new Production casing set depth @ 16,197' MD 7250' TVD**

The 9.625" Intermediate & 5.5" production casing grade, weight and cement sacks have been update per casing depth changes.

Attached: New C102, Operation and Directional Drill plans.

14. I hereby certify that the foregoing is true and correct. Name (Printed/Typed) Etta Trujillo		Title Regulatory Specialist
Signature 		Date 09/20/2022

THE SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by	Title	Date
Conditions of approval, if any, are attached. Approval of this notice 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.	Office	

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.

(Instructions on page 2)

Well Name: ROSA UNIT	Well Location: T31N / R6W / SEC 25 / NENE /	County or Parish/State: RIO ARRIBA / NM
Well Number: 652H	Type of Well: CONVENTIONAL GAS WELL	Allottee or Tribe Name:
Lease Number: NMSF078771	Unit or CA Name: ROSA UNIT-MANCOS PA	Unit or CA Number: NMNM78407E
US Well Number: 300393141300X1	Well Status: Temporarily Abandoned	Operator: LOGOS OPERATING LLC

Notice of Intent

Sundry ID: 2693496

Type of Submission: Notice of Intent Type of Action: Other

Date Sundry Submitted: 09/20/2022 Time Sundry Submitted: 09:31

Date proposed operation will begin: 09/20/2022

Procedure Description: LOGOS Operating request a change in plans for the following: Original surface-hole location from 1075' FNL & 259' FEL to new surface-hole location 1076' FNL & 253' FEL Original bottom-hole location from 1219' FNL & 148' FWL to new bottom-hole location 970' FNL & 156' FWL Original TD @ 16,346' MD 6984' TVD to new TD @ 16,197' MD 7250' TVD. Geology tops have been updated per changes. Original KOP @ 6334' MD 6322' TVD to new KOP @ 6642' MD 6639' TVD Original Landing point @ 7362' MD 6986' TVD to new Landing point @ 7627' MD 7260' TVD Original Intermediate 9.625" casing @ 6244' MD to new Intermediate casing set depth @ 6241' MD 6197' TVD Original Production 5.5" casing @ 16,346' MD to new Production casing set depth @ 16,197' MD 7250' TVD The 9.625" Intermediate & 5.5" production casing grade, weight and cement sacks have been update per casing depth changes. Attached: New C102, Operation and Directional Drill plans.

Surface Disturbance

Is any additional surface disturbance proposed?: No

NOI Attachments

Procedure Description

3160_5_Rosa_Unit_652H_PROD_Change_of_Plans_20220920_20220920093055.pdf

Received by OCD: 9/29/2022 3:50:29 PM

Page 3 of 43

Well Name: ROSA UNIT	Well Location: T31N / R6W / SEC 25 / NENE /	County or Parish/State: RIO ARRIBA / NM
Well Number: 652H	Type of Well: CONVENTIONAL GAS WELL	Allottee or Tribe Name:
Lease Number: NMSF078771	Unit or CA Name: ROSA UNIT-MANCOS PA	Unit or CA Number: NMNM78407E
US Well Number: 300393141300X1	Well Status: Temporarily Abandoned	Operator: LOGOS OPERATING LLC

Operator

I certify that the foregoing is true and correct. 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. Electronic submission of Sundry Notices through this system satisfies regulations requiring a

Operator Electronic Signature: ETTA TRUJILLO	Signed on: SEP 20, 2022 09:31 AM
Name: LOGOS OPERATING LLC	
Title: Regulatory Specialist	
Street Address: 2010 AFTON PLACE	
City: Farmington	State: NM
Phone: (505) 324-4154	
Email address: ETRUJILLO@LOGOSRESOURCESLLC.COM	

Field

Representative Name:		
Street Address:		
City:	State:	Zip:
Phone:		
Email address:		

BLM Point of Contact

BLM POC Name: KENNETH G RENNICK	BLM POC Title: Petroleum Engineer
BLM POC Phone: 5055647742	BLM POC Email Address: krennick@blm.gov
Disposition: Approved	Disposition Date: 09/29/2022
Signature: Kenneth Rennick	



LOGOS Operating, LLC Operations Plan

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

Date:	September 19, 2022	Pool:	Basin Mancos
Well Name:	Rosa Unit 652H	GL Elevation:	6,372'
Surface Location:	Sec 25, T31N, R6W 1076 FNL, 253 FEL (36.874905° N, 107.408651° W – NAD83)	Measured Depth:	16,197' (KB)
Bottom Hole Location:	Sec 26, T31N, R6W 970 FNL, 156 FWL (36.875204° N, 107.440652° W – NAD83)	County:	Rio Arriba

Lease Serial #NMSF078771, CA Serial #NMNM78407E

I. GEOLOGY

A. Formation Tops (Based on 25' KB Elevation): Estimated top of important geological markers:
SURFACE FORMATION – NACIMIENTO

NAME	MD	TVD	NAME	MD	TVD
OJO ALAMO	2502	2501	*POINT LOOKOUT	5664	5661
KIRTLAND	2630	2629	*MANCOS	6166	6163
*FRUITLAND	3077	3076	KICKOFF POINT	6642	6639
*PICTURED CLIFFS	3415	3414	LANDING POINT	7627	7260
LEWIS	3515	3513			
CHACRA	4602	4600			
*CLIFF HOUSE	5429	5427			
MENEFEE	5474	5472	TD	16,197	7250

* 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 17-1/2" surface hole as well as the 12-1/4" directional vertical hole. A LSND (WBM) or (OBM) will be used to drill the 8-1/2" curve and lateral portion of the wellbore. Treat for lost circulation as necessary. Obtain 100% returns prior to cementing. Notify Engineering of any mud losses.

Above ground steel pits will be used for fluid and cuttings while drilling. In the unlikely event that a tank develops a leak, upon immediate visual discovery, the fluid would be transferred to another tank and contaminated soil would be removed and disposed. Any leaks, spills or other undesirable events will be reported in accordance with BLM NTL 3A. Rig crews will monitor the tanks at all times.

ROSA UNIT 652H



- B. BOP TESTING:** 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. BOP equipment will be tested every 30 days, after any repairs are made to the BOP equipment, and after the BOP equipment is subjected to pressure. Annular preventers will be functionally operated at least once per week. Pipe and blind rams shall be activated each trip or but not more than once a day. The New Mexico Oil & Gas Conservation Commission and the BLM will be notified 24 hours in advance of testing of BOPE. **All tests and inspections will be recorded and logged with time and results.** A full BOP test will be conducted when initially installed for the first well on the pad or if seals subject to test pressure are broken, following related repairs and at a minimum of 30 day intervals. A BOPE Shell Test only will be conducted for subsequent wells on the pad when seals subject to pressure have not been broken or repaired and fall within the 30 day interval of first full test.

III. MATERIALS

A. CASING EQUIPMENT:

CASING TYPE	OHSIZE (IN)	GL DEPTH (MD)	CSG SIZE	WEIGHT	GRADE	CONN
SURFACE	17.5"	320' or greater	13.375"	54.5 LBS	J-55 or equiv	LTC/BTC
INTERMEDIATE	12.25"	6,241'	9.625"	43.5 LBS	N-80 or equiv	LTC/BTC
PRODUCTION	8.5"	16,197'	5.5"	20 LBS	P-110 or equiv	LTC/BTC

NOTE: All casing depths are approximate, based on 25' KB elevation and will be adjusted based on actual drilling KB and drilling conditions +/- 50'. Weights, grades and connections will be based on availability and may vary but will be equivalent or greater.

B. FLOAT EQUIPMENT:

- SURFACE CASING:** 13-3/8" notched regular pattern guide shoe. Run (1) standard centralizer on each of the bottom (3) joints of Surface Casing.
- INTERMEDIATE CASING:** 9-5/8" 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 Tools (2) will be strategically placed above loss circulation zones anticipated in the Mesaverde and Fruitland Coal. Optional use of cancellation plugs for DV tools may be used if losses while cementing are not encountered.
- PRODUCTION CASING:** Run 5-1/2" casing with cement nose guide Float Shoe, 5-1/2" full or pup joints as necessary, Landing Collar, 5-1/2" full or pup joints as necessary, at least (1) one Toe Sleeve (Sliding Sleeve) positioned inside the applicable production area. Centralizer program will be determined by wellbore conditions. Production casing to be pressure tested during completion operations with frac stack installed.

C. CEMENTING:

(Note: Cement type and volumes may be adjusted onsite due to actual conditions and availability)

- SURFACE:** Casing shall be set at ~ 320' and cemented to surface. TOC at Surface. 263 sks of 15.8 ppg Type Neat G, 1.18 cuft/sk yield or equivalent 223 sks of 14.6 ppg Type III with 1.39 cuft/sk yield, 30% excess.



2. **INTERMEDIATE:** Intermediate casing shall be kept fluid filled while running in to the hole to meet BLM minimum collapse requirements. The intermediate casing will be cemented in 2 or 3 stages using DV/STAGE tools in order to reduce cement losses and maximize cement coverage. The operator proposes optional DV tools above anticipated loss circulation zones in the Mesaverde and in the Fruitland coal. If losses are not observed during the second stage a cancellation plug will be pumped and the remaining cement will be pumped during stage 2. If cement does not circulate to the DV tool(s) or to surface, a CBL will be run to determine TOC.

	Top (ft)	Footage (ft)	Cement (ft3/ft) Annular Capacity	Excess (30%)	Total (ft3)	Total (bbl)	Slurry Yield (ft3/sk)	Sacks Cement	Density (PPG)
Stage 1 Tail	5,677	1,564	0.31318	1.3	654	117	1.15	569	15.8
Stage 1 Lead	4,677	1,000	0.31318	1.3	407	73	2.30	177	12
					1,061	189		746	
Stage 2 Tail	4,127	550	0.31318	1.3	224	40	1.73	129	13.2
Stage 2 Lead	3,127	1,000	0.31318	1.3	407	73	2.30	177	12
					631	112		306	
Stage 3 Tail	1,350	1,778	0.31318	1.3	724	129	1.73	418	13.2
Stage 3 Lead	350	1,000	0.31318	1.3	407	73	2.30	177	12
Stage 3 Lead	-	350	0.36268	1	127	23	2.30	55	12
					1,258	224		650	
All Stage Totals					2,950	525		1,703	

Calculations based on 30% excess for open hole and cement to surface. Actual excess pumped will be determined by well conditions.

3. **PRODUCTION:** Production casing will be cemented in 1 stage with 100' of cement overlap above intermediate shoe. A CBL, or alternatively, a Temperature Survey will be used to determine TOC.

	Top (ft)	Footage (ft)	Cement (ft3/ft) Annular Capacity	Excess (15%)	Total (ft3)	Total (bbl)	Slurry Yield (ft3/sk)	Sacks Cement	Density (PPG)
Cased Lead	6,144	100	0.2531	1	25	5	1.56	16	13
Open Hole Lead	6,244	9,956	0.2291	1.15	2,633	469	1.56	1,688	13
					2,659	474		1,704	

Calculations based on 15% excess for open hole and 100' overlap into intermediate casing. Actual volumes will vary.

Cement calculations are used for volume estimation. Well conditions will dictate final cement job design. Actual volumes will be calculated and determined by conditions onsite. All cement slurries will meet or exceed minimum BLM and New Mexico Oil Conservation Division requirements. Slurries used will be the slurries listed above or equivalent slurries depending on service provider selected. Cement yields may change depending on slurries selected. All waiting on cement times shall be a minimum of 8 hours or adequate to achieve a minimum of 500 psi compressive strength at the casing shoe prior to drilling out.

IV. **COMPLETION**

A. **CBL**

CBLs and/or Temperature Surveys will be performed as needed or required to determine cement top if cement is not circulated.

B. **PRESSURE TEST**

- C. NU Frac Stack. Pressure test 5-1/2" casing to 1600 psi (0.22 psi/ft * 7260' TVD) for 30 minutes. Increase pressure to Open Toe sleeves.

D. **STIMULATION**

ROSA UNIT 652H



Stimulate with sand and water. Isolate stages with flow through or dissolvable frac plugs. Drill out frac plugs as required and flowback lateral.

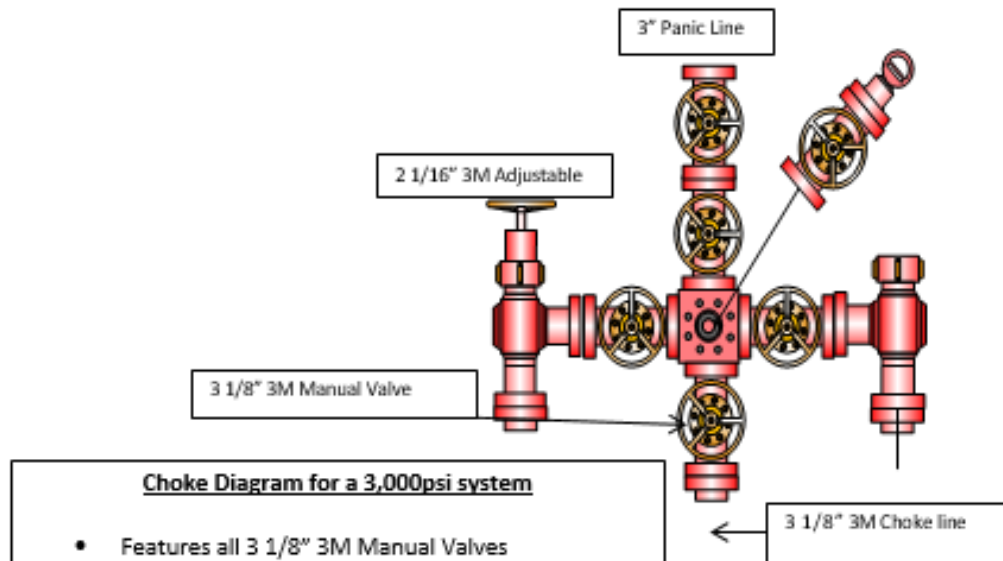
E. PRODUCTION TUBING

2-7/8", 6.5#, J-55 or L-80, EUE tubing will be run once volumes and pressures dictate. Due to the extremely high initial flow rates and pressures seen in offset wells, tubing will be installed once it is safe to do so, typically 12-18 months after completion.

*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.

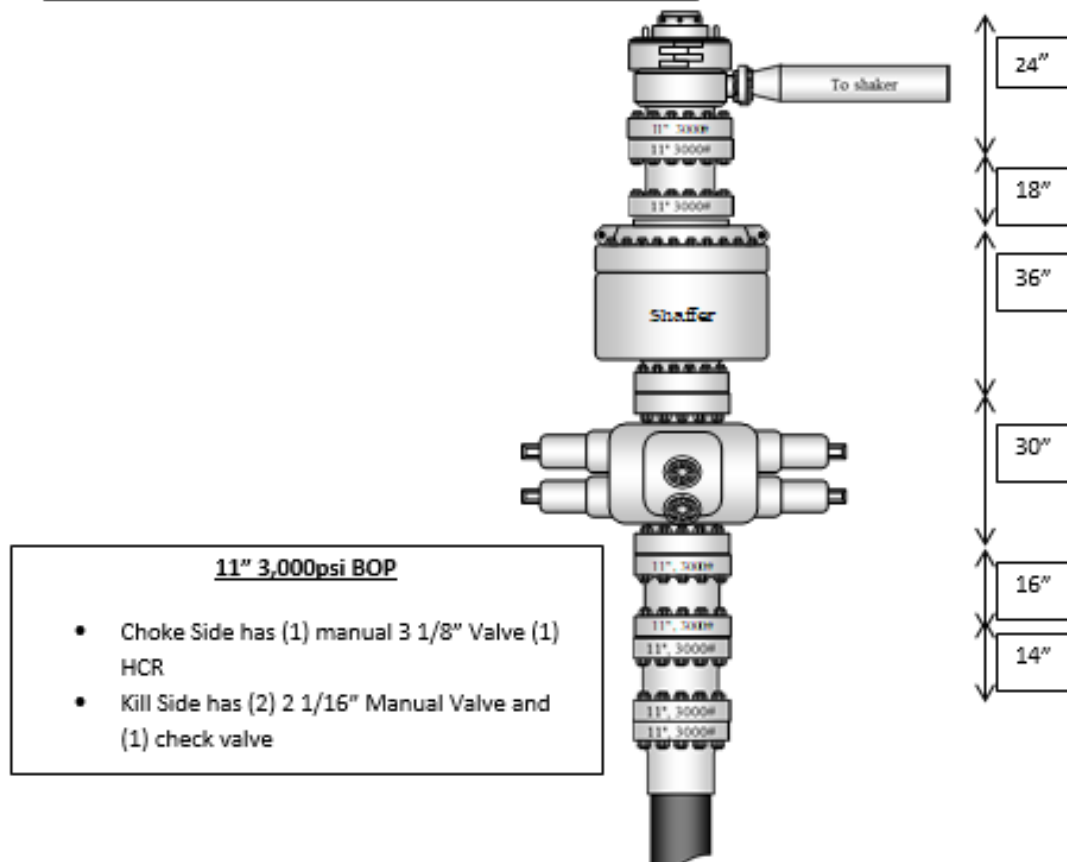


3M 11" B.O.P.E Diagram



Choke Diagram for a 3,000psi system

- Features all 3 1/8" 3M Manual Valves
- Two 2 1/16" Manual Adjustable Choke Valves
- 3" Panic Line and 2" Vent lines
- (2) 3 1/8" 3M Coflex Hose f/Choke to BOP



ROSA UNIT 652H



Logos Operating LLC

Rio Arriba, NM NAD83

Rosa Unit 29

Rosa Unit #652H

OH

Plan #9

Anticollision Report

31 August, 2022





Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Reference Site:	Rosa Unit 29	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Reference	Plan #9
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria
Interpolation Method:	Stations
Depth Range:	Unlimited
Results Limited by:	Maximum centre distance of 8,000.02ft
Warning Levels Evaluated at:	2.00 Sigma
Error Model:	ISCWSA
Scan Method:	Closest Approach 3D
Error Surface:	Pedal Curve
Casing Method:	Not applied

Survey Tool Program		Date	8/31/2022		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
0.00	16,196.58	Plan #9 (OH)	MWD+HDGM	OWSG MWD + HDGM	

Summary						
Site Name	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Rosa Unit 29						
Rosa Unit #650H - OH - Plan #9	970.84	971.44	7.53	0.75	1.111	Level 3, CC, ES, SF
Rosa Unit #654H - OH - OH	1,046.39	1,045.92	29.09	22.46	4.387	CC
Rosa Unit #654H - OH - OH	1,100.00	1,099.18	29.42	22.41	4.198	ES
Rosa Unit #654H - OH - OH	1,200.00	1,198.63	31.56	23.85	4.091	SF
Rosa Unit #654H - ST1 - ST1	1,046.39	1,045.92	29.09	22.46	4.387	CC
Rosa Unit #654H - ST1 - ST1	1,100.00	1,099.18	29.42	22.41	4.198	ES
Rosa Unit #654H - ST1 - ST1	1,200.00	1,198.63	31.56	23.85	4.091	SF
Rosa Unit #654H - ST2 - ST2	1,046.39	1,045.92	29.09	22.46	4.387	CC
Rosa Unit #654H - ST2 - ST2	1,100.00	1,099.18	29.42	22.41	4.198	ES
Rosa Unit #654H - ST2 - ST2	1,200.00	1,198.63	31.56	23.85	4.091	SF
Rosa Unit #656H - OH - OH	908.74	908.47	22.74	17.16	4.079	CC, ES
Rosa Unit #656H - OH - OH	1,000.00	999.12	24.04	17.84	3.874	SF

Offset Design:	Rosa Unit 29 - Rosa Unit #650H - OH - Plan #9												Offset Site Error:	0.00 ft
Survey Program:	0-MWD+HDGM												Offset Well Error:	0.00 ft
Reference	Offset	Semi Major Axis		Offset Wellbore Centre		Distance		Rule Assigned:		Warning				
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
0.00	0.00	0.00	0.00	0.00	0.00	-150.31	-7.85	-4.47	9.03					
100.00	100.00	100.00	100.00	0.27	0.27	-150.31	-7.85	-4.47	9.03	8.49	0.54	16.685		
200.00	200.00	200.00	200.00	0.63	0.63	-150.31	-7.85	-4.47	9.03	7.77	1.26	7.178		
300.00	300.00	300.00	300.00	0.99	0.99	-150.31	-7.85	-4.47	9.03	7.06	1.98	4.573		
350.00	350.00	350.00	350.00	1.17	1.17	-150.31	-7.85	-4.47	9.03	6.70	2.33	3.870		
400.00	400.00	400.00	400.00	1.34	1.35	-100.61	-7.85	-4.47	9.12	6.43	2.69	3.388		
420.23	420.22	420.22	420.22	1.42	1.42	-103.84	-7.85	-4.47	9.23	6.39	2.83	3.256		
500.00	499.95	499.95	499.95	1.70	1.70	-117.43	-7.85	-4.47	10.10	6.69	3.40	2.966		
600.00	599.90	599.90	599.90	2.06	2.06	-130.72	-7.85	-4.47	11.83	7.71	4.12	2.871		
700.00	699.86	700.10	700.09	2.41	2.42	-140.46	-7.41	-4.53	13.58	8.75	4.83	2.810		
800.00	799.81	800.52	800.45	2.77	2.78	-151.01	-3.93	-5.00	12.68	7.13	5.55	2.285		
900.00	899.76	900.72	900.40	3.13	3.15	-172.93	3.02	-5.93	9.31	3.05	6.26	1.488	Level 3	
970.84	970.57	971.44	970.77	3.39	3.40	148.95	10.01	-6.87	7.53	0.75	6.77	1.111	Level 3, CC, ES, SF	

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



Lonestar Consulting, LLC

Anticollision Report



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Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 29 - Rosa Unit #650H - OH - Plan #9													Offset Site Error:	0.00 ft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 ft
Reference	Offset	Semi Major Axis		Offset Wellbore Centre		Rule Assigned:		Distance		Minimum	Separation	Warning		
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Separation (ft)	Factor		
1,000.00	999.72	1,000.47	999.59	3.49	3.51	128.15	13.37	-7.32	8.02	1.03	6.98	1.148	Level 3	
1,100.00	1,099.67	1,099.51	1,097.67	3.85	3.87	83.96	27.03	-9.15	16.33	8.65	7.68	2.127		
1,200.00	1,199.62	1,197.63	1,194.30	4.21	4.24	69.33	43.87	-11.41	30.59	22.23	8.36	3.660		
1,300.00	1,299.58	1,294.62	1,289.19	4.57	4.63	62.86	63.73	-14.08	48.76	39.73	9.03	5.402		
1,400.00	1,399.53	1,391.83	1,383.76	4.93	5.03	59.37	86.05	-17.07	69.64	59.93	9.72	7.166		
1,500.00	1,499.48	1,489.53	1,478.76	5.29	5.44	57.45	108.64	-20.10	90.82	80.39	10.43	8.704		
1,600.00	1,599.44	1,587.23	1,573.76	5.65	5.87	56.27	131.22	-23.13	112.06	100.90	11.15	10.046		
1,700.00	1,699.39	1,684.92	1,668.77	6.01	6.29	55.45	153.81	-26.16	133.33	121.45	11.88	11.226		
1,800.00	1,799.34	1,782.62	1,763.77	6.37	6.73	54.87	176.39	-29.19	154.61	142.01	12.60	12.270		
1,900.00	1,899.29	1,880.32	1,858.77	6.73	7.17	54.42	198.97	-32.22	175.91	162.58	13.33	13.200		
2,000.00	1,999.25	1,978.02	1,953.78	7.09	7.61	54.07	221.56	-35.25	197.22	183.16	14.05	14.032		
2,100.00	2,099.20	2,075.71	2,048.78	7.45	8.05	53.79	244.14	-38.28	218.53	203.74	14.78	14.782		
2,200.00	2,199.15	2,173.41	2,143.78	7.81	8.50	53.56	266.73	-41.31	239.84	224.33	15.51	15.460		
2,300.00	2,299.11	2,271.11	2,238.79	8.17	8.95	53.37	289.31	-44.34	261.16	244.92	16.25	16.076		
2,400.00	2,399.06	2,368.81	2,333.79	8.53	9.40	53.20	311.89	-47.37	282.48	265.51	16.98	16.639		
2,500.00	2,499.01	2,466.50	2,428.79	8.89	9.86	53.06	334.48	-50.40	303.81	286.10	17.71	17.155		
2,600.00	2,598.97	2,564.20	2,523.80	9.25	10.31	52.94	357.06	-53.43	325.13	306.69	18.44	17.629		
2,700.00	2,698.92	2,661.90	2,618.80	9.61	10.77	52.83	379.65	-56.46	346.46	327.28	19.18	18.066		
2,800.00	2,798.87	2,759.60	2,713.80	9.97	11.22	52.74	402.23	-59.49	367.79	347.88	19.91	18.471		
2,900.00	2,898.82	2,857.29	2,808.81	10.33	11.68	52.65	424.82	-62.52	389.11	368.47	20.65	18.847		
3,000.00	2,998.78	2,954.99	2,903.81	10.70	12.14	52.58	447.40	-65.55	410.44	389.06	21.38	19.196		
3,100.00	3,098.73	3,052.69	2,998.81	11.06	12.60	52.51	469.98	-68.58	431.77	409.66	22.12	19.522		
3,200.00	3,198.68	3,150.39	3,093.82	11.42	13.06	52.45	492.57	-71.61	453.10	430.25	22.85	19.827		
3,300.00	3,298.64	3,248.08	3,188.82	11.78	13.52	52.39	515.15	-74.64	474.43	450.84	23.59	20.112		
3,400.00	3,398.59	3,345.78	3,283.82	12.14	13.98	52.34	537.74	-77.67	495.76	471.44	24.33	20.380		
3,500.00	3,498.54	3,443.48	3,378.82	12.50	14.44	52.29	560.32	-80.70	517.09	492.03	25.06	20.632		
3,600.00	3,598.50	3,541.18	3,473.83	12.86	14.90	52.25	582.90	-83.73	538.43	512.63	25.80	20.869		
3,700.00	3,698.45	3,638.87	3,568.83	13.22	15.36	52.21	605.49	-86.76	559.76	533.22	26.54	21.093		
3,800.00	3,798.40	3,736.57	3,663.83	13.58	15.83	52.17	628.07	-89.79	581.09	553.81	27.27	21.305		
3,900.00	3,898.36	3,834.27	3,758.84	13.94	16.29	52.14	650.66	-92.82	602.42	574.41	28.01	21.505		
4,000.00	3,998.31	3,931.97	3,853.84	14.30	16.75	52.10	673.24	-95.85	623.75	595.00	28.75	21.695		
4,100.00	4,098.26	4,029.66	3,948.84	14.66	17.22	52.07	695.82	-98.88	645.09	615.60	29.49	21.876		
4,200.00	4,198.21	4,127.36	4,043.85	15.02	17.68	52.05	718.41	-101.91	666.42	636.19	30.23	22.047		
4,300.00	4,298.17	4,225.06	4,138.85	15.38	18.14	52.02	740.99	-104.94	687.75	656.79	30.97	22.210		
4,400.00	4,398.12	4,322.76	4,233.85	15.74	18.61	51.99	763.58	-107.97	709.09	677.38	31.70	22.366		
4,500.00	4,498.07	4,420.46	4,328.86	16.10	19.07	51.97	786.16	-111.00	730.42	697.98	32.44	22.514		
4,600.00	4,598.03	4,518.15	4,423.86	16.46	19.54	51.95	808.75	-114.03	751.75	718.57	33.18	22.656		
4,700.00	4,697.98	4,615.85	4,518.86	16.82	20.00	51.93	831.33	-117.06	773.08	739.16	33.92	22.791		
4,800.00	4,797.93	4,713.55	4,613.87	17.19	20.47	51.91	853.91	-120.09	794.42	759.76	34.66	22.921		
4,900.00	4,897.89	4,811.25	4,708.87	17.55	20.93	51.89	876.50	-123.12	815.75	780.35	35.40	23.045		
5,000.00	4,997.84	4,908.94	4,803.87	17.91	21.40	51.87	899.08	-126.15	837.09	800.95	36.14	23.164		
5,100.00	5,097.79	5,006.64	4,898.87	18.27	21.86	51.85	921.67	-129.18	858.42	821.54	36.88	23.278		
5,200.00	5,197.75	5,104.34	4,993.88	18.63	22.33	51.84	944.25	-132.21	879.75	842.14	37.62	23.387		
5,300.00	5,297.70	5,202.04	5,088.88	18.99	22.79	51.82	966.83	-135.24	901.09	862.73	38.36	23.492		
5,400.00	5,397.65	5,299.73	5,183.88	19.35	23.26	51.81	989.42	-138.27	922.42	883.32	39.10	23.593		
5,500.00	5,497.60	5,397.43	5,278.89	19.71	23.72	51.80	1,012.00	-141.30	943.75	903.92	39.84	23.691		
5,600.00	5,597.56	5,495.13	5,373.89	20.07	24.19	51.78	1,034.59	-144.33	965.09	924.51	40.58	23.785		
5,700.00	5,697.51	5,592.83	5,468.89	20.43	24.66	51.77	1,057.17	-147.35	986.42	945.11	41.32	23.875		
5,800.00	5,797.46	5,690.52	5,563.90	20.79	25.12	51.76	1,079.75	-150.38	1,007.76	965.70	42.06	23.962		

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



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Reference Site:	Rosa Unit 29	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 29 - Rosa Unit #650H - OH - Plan #9													Offset Site Error:	0.00 ft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
5,900.00	5,897.42	5,788.22	5,658.90	21.15	25.59	51.75	1,102.34	-153.41	1,029.09	986.29	42.80	24.046		
6,000.00	5,997.37	5,885.92	5,753.90	21.51	26.05	51.73	1,124.92	-156.44	1,050.42	1,006.89	43.54	24.127		
6,100.00	6,097.32	5,983.62	5,848.91	21.87	26.52	51.72	1,147.51	-159.47	1,071.76	1,027.48	44.28	24.205		
6,200.00	6,197.28	6,081.31	5,943.91	22.23	26.99	51.71	1,170.09	-162.50	1,093.09	1,048.07	45.02	24.281		
6,300.00	6,297.23	6,179.01	6,038.91	22.59	27.45	51.70	1,192.68	-165.53	1,114.43	1,068.67	45.76	24.354		
6,400.00	6,397.18	6,276.71	6,133.92	22.96	27.92	51.69	1,215.26	-168.56	1,135.76	1,089.26	46.50	24.425		
6,500.00	6,497.13	6,374.41	6,228.92	23.32	28.39	51.68	1,237.84	-171.59	1,157.10	1,109.85	47.24	24.494		
6,600.00	6,597.09	6,472.10	6,323.92	23.68	28.85	51.68	1,260.43	-174.62	1,178.43	1,130.45	47.98	24.560		
6,642.00	6,639.07	6,513.14	6,363.82	23.83	29.05	51.67	1,269.91	-175.90	1,187.39	1,139.10	48.29	24.587		
6,650.00	6,647.06	6,520.95	6,371.42	23.86	29.09	62.05	1,271.72	-176.14	1,189.10	1,140.74	48.35	24.593		
6,700.00	6,696.90	6,569.74	6,418.87	24.04	29.32	78.58	1,283.00	-177.65	1,199.69	1,150.96	48.73	24.620		
6,750.00	6,746.28	6,618.21	6,465.99	24.23	29.55	81.55	1,294.20	-179.15	1,210.15	1,161.04	49.11	24.642		
6,800.00	6,794.90	6,666.05	6,512.52	24.42	29.78	82.63	1,305.26	-180.64	1,220.46	1,170.97	49.50	24.656		
6,850.00	6,842.47	6,712.98	6,558.15	24.61	30.00	83.17	1,316.11	-182.09	1,230.67	1,180.78	49.89	24.665		
6,900.00	6,888.68	6,758.70	6,602.61	24.82	30.22	83.55	1,326.68	-183.51	1,240.83	1,190.53	50.30	24.670		
6,950.00	6,933.27	6,802.93	6,645.63	25.03	30.43	83.87	1,336.90	-184.88	1,251.02	1,200.31	50.71	24.670		
7,000.00	6,975.94	6,847.71	6,689.15	25.25	30.65	84.20	1,347.25	-186.66	1,261.34	1,210.19	51.15	24.658		
7,050.00	7,016.44	6,896.06	6,735.92	25.49	30.88	84.56	1,358.39	-191.66	1,271.72	1,220.07	51.66	24.619		
7,100.00	7,054.51	6,946.74	6,784.40	25.75	31.13	84.92	1,369.96	-200.81	1,282.08	1,229.87	52.21	24.556		
7,150.00	7,089.93	7,000.11	6,834.50	26.03	31.40	85.29	1,381.94	-214.69	1,292.35	1,239.53	52.82	24.465		
7,200.00	7,122.47	7,056.59	6,886.09	26.36	31.68	85.69	1,394.31	-234.03	1,302.44	1,248.94	53.50	24.344		
7,250.00	7,151.94	7,116.65	6,938.87	26.73	31.97	86.13	1,406.99	-259.66	1,312.26	1,258.01	54.25	24.190		
7,300.00	7,178.15	7,180.79	6,992.38	27.15	32.29	86.62	1,419.89	-292.54	1,321.67	1,266.60	55.07	24.000		
7,350.00	7,200.94	7,249.55	7,045.84	27.62	32.64	87.14	1,432.83	-333.75	1,330.55	1,274.58	55.97	23.772		
7,400.00	7,220.17	7,323.41	7,098.08	28.16	33.02	87.71	1,445.53	-384.34	1,338.74	1,281.76	56.98	23.494		
7,450.00	7,235.72	7,402.79	7,147.45	28.76	33.46	88.30	1,457.61	-445.24	1,346.06	1,287.95	58.11	23.163		
7,500.00	7,247.49	7,487.88	7,191.74	29.42	33.99	88.88	1,468.55	-516.99	1,352.31	1,292.90	59.41	22.763		
7,550.00	7,255.42	7,578.53	7,228.22	30.13	34.64	89.43	1,477.69	-599.38	1,357.28	1,296.37	60.91	22.284		
7,600.00	7,259.45	7,674.11	7,253.96	30.90	35.46	89.90	1,484.33	-691.11	1,360.78	1,298.14	62.64	21.724		
7,627.16	7,260.00	7,727.71	7,262.44	31.33	36.00	90.10	1,486.65	-743.96	1,362.01	1,298.33	63.68	21.389		
7,700.00	7,259.92	7,840.06	7,266.93	32.56	37.31	90.29	1,488.37	-856.11	1,363.09	1,296.65	66.43	20.518		
7,800.00	7,259.80	7,940.06	7,266.74	34.41	38.70	90.29	1,488.90	-956.11	1,363.79	1,293.78	70.02	19.478		
7,900.00	7,259.68	8,040.05	7,266.54	36.41	40.30	90.29	1,489.43	-1,056.10	1,364.50	1,290.58	73.92	18.460		
8,000.00	7,259.57	8,140.05	7,266.35	38.55	42.08	90.28	1,489.97	-1,156.10	1,365.21	1,287.12	78.09	17.483		
8,100.00	7,259.45	8,240.05	7,266.15	40.79	44.02	90.28	1,490.50	-1,256.09	1,365.91	1,283.42	82.49	16.559		
8,200.00	7,259.33	8,340.05	7,265.95	43.13	46.09	90.28	1,491.03	-1,356.09	1,366.62	1,279.53	87.09	15.693		
8,300.00	7,259.21	8,440.04	7,265.76	45.55	48.28	90.27	1,491.56	-1,456.09	1,367.32	1,275.47	91.85	14.886		
8,400.00	7,259.10	8,540.04	7,265.56	48.04	50.56	90.27	1,492.10	-1,556.08	1,368.03	1,271.27	96.76	14.139		
8,500.00	7,258.98	8,640.04	7,265.37	50.59	52.92	90.27	1,492.63	-1,656.08	1,368.73	1,266.95	101.79	13.447		
8,600.00	7,258.86	8,740.03	7,265.17	53.18	55.35	90.26	1,493.16	-1,756.07	1,369.44	1,262.52	106.92	12.808		
8,700.00	7,258.75	8,840.03	7,264.97	55.82	57.84	90.26	1,493.69	-1,856.07	1,370.14	1,258.00	112.14	12.218		
8,800.00	7,258.63	8,940.03	7,264.78	58.49	60.38	90.26	1,494.22	-1,956.06	1,370.85	1,253.41	117.44	11.673		
8,900.00	7,258.51	9,040.03	7,264.58	61.20	62.97	90.25	1,494.76	-2,056.06	1,371.56	1,248.75	122.81	11.168		
9,000.00	7,258.40	9,140.02	7,264.39	63.93	65.59	90.25	1,495.29	-2,156.06	1,372.26	1,244.02	128.24	10.701		
9,100.00	7,258.28	9,240.02	7,264.19	66.69	68.25	90.25	1,495.82	-2,256.05	1,372.97	1,239.25	133.72	10.268		
9,200.00	7,258.16	9,340.02	7,263.99	69.47	70.94	90.24	1,496.35	-2,356.05	1,373.67	1,234.43	139.24	9.865		
9,300.00	7,258.05	9,440.02	7,263.80	72.27	73.66	90.24	1,496.88	-2,456.04	1,374.38	1,229.57	144.81	9.491		
9,400.00	7,257.93	9,540.01	7,263.60	75.08	76.40	90.24	1,497.42	-2,556.04	1,375.08	1,224.67	150.41	9.142		
9,500.00	7,257.81	9,640.01	7,263.41	77.91	79.16	90.23	1,497.95	-2,656.04	1,375.79	1,219.74	156.05	8.816		

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



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Reference Site:	Rosa Unit 29	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 29 - Rosa Unit #650H - OH - Plan #9														Offset Site Error:	0.00 ft
Survey Program: 0-MWD+HDGM														Offset Well Error:	0.00 ft
Reference	Offset	Semi Major Axis		Offset Wellbore Centre		Rule Assigned:				Warning					
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor			
9,600.00	7,257.70	9,740.01	7,263.21	80.76	81.94	90.23	1,498.48	-2,756.03	1,376.50	1,214.78	161.71	8.512			
9,700.00	7,257.58	9,840.01	7,263.01	83.62	84.73	90.23	1,499.01	-2,856.03	1,377.20	1,209.80	167.40	8.227			
9,800.00	7,257.46	9,940.00	7,262.82	86.48	87.54	90.22	1,499.54	-2,956.02	1,377.91	1,204.79	173.12	7.959			
9,900.00	7,257.35	10,040.00	7,262.62	89.36	90.37	90.22	1,500.08	-3,056.02	1,378.61	1,199.76	178.85	7.708			
10,000.00	7,257.23	10,140.00	7,262.43	92.24	93.21	90.22	1,500.61	-3,156.02	1,379.32	1,194.71	184.60	7.472			
10,100.00	7,257.11	10,240.00	7,262.23	95.14	96.06	90.21	1,501.14	-3,256.01	1,380.02	1,189.65	190.38	7.249			
10,200.00	7,257.00	10,339.99	7,262.04	98.04	98.92	90.21	1,501.67	-3,356.01	1,380.73	1,184.57	196.16	7.039			
10,300.00	7,256.88	10,439.99	7,261.84	100.95	101.79	90.21	1,502.21	-3,456.00	1,381.43	1,179.47	201.96	6.840			
10,400.00	7,256.76	10,539.99	7,261.64	103.86	104.66	90.20	1,502.74	-3,556.00	1,382.14	1,174.36	207.78	6.652			
10,500.00	7,256.65	10,639.99	7,261.45	106.78	107.55	90.20	1,503.27	-3,655.99	1,382.85	1,169.24	213.61	6.474			
10,600.00	7,256.53	10,739.98	7,261.25	109.71	110.44	90.20	1,503.80	-3,755.99	1,383.55	1,164.11	219.45	6.305			
10,700.00	7,256.41	10,839.98	7,261.06	112.64	113.34	90.19	1,504.33	-3,855.99	1,384.26	1,158.96	225.29	6.144			
10,800.00	7,256.30	10,939.98	7,260.86	115.57	116.25	90.19	1,504.87	-3,955.98	1,384.96	1,153.81	231.15	5.992			
10,900.00	7,256.18	11,039.98	7,260.66	118.51	119.16	90.18	1,505.40	-4,055.98	1,385.67	1,148.65	237.02	5.846			
11,000.00	7,256.06	11,139.97	7,260.47	121.45	122.07	90.18	1,505.93	-4,155.97	1,386.37	1,143.48	242.90	5.708			
11,100.00	7,255.95	11,239.97	7,260.27	124.40	125.00	90.18	1,506.46	-4,255.97	1,387.08	1,138.30	248.78	5.576			
11,200.00	7,255.83	11,339.97	7,260.08	127.35	127.92	90.17	1,506.99	-4,355.97	1,387.79	1,133.11	254.67	5.449			
11,300.00	7,255.71	11,439.97	7,259.88	130.30	130.85	90.17	1,507.53	-4,455.96	1,388.49	1,127.92	260.57	5.329			
11,400.00	7,255.60	11,539.96	7,259.68	133.26	133.79	90.17	1,508.06	-4,555.96	1,389.20	1,122.73	266.47	5.213			
11,500.00	7,255.48	11,639.96	7,259.49	136.21	136.72	90.16	1,508.59	-4,655.95	1,389.90	1,117.52	272.38	5.103			
11,600.00	7,255.36	11,739.96	7,259.29	139.17	139.67	90.16	1,509.12	-4,755.95	1,390.61	1,112.31	278.30	4.997			
11,700.00	7,255.25	11,839.96	7,259.10	142.14	142.61	90.16	1,509.66	-4,855.95	1,391.31	1,107.10	284.22	4.895			
11,800.00	7,255.13	11,939.95	7,258.90	145.10	145.56	90.15	1,510.19	-4,955.94	1,392.02	1,101.88	290.14	4.798			
11,900.00	7,255.01	12,039.95	7,258.70	148.07	148.51	90.15	1,510.72	-5,055.94	1,392.73	1,096.66	296.07	4.704			
12,000.00	7,254.90	12,139.95	7,258.51	151.04	151.46	90.15	1,511.25	-5,155.93	1,393.43	1,091.43	302.00	4.614			
12,100.00	7,254.78	12,239.95	7,258.31	154.01	154.42	90.14	1,511.78	-5,255.93	1,394.14	1,086.20	307.94	4.527			
12,200.00	7,254.66	12,339.94	7,258.12	156.98	157.38	90.14	1,512.32	-5,355.92	1,394.84	1,080.96	313.88	4.444			
12,300.00	7,254.55	12,439.94	7,257.92	159.96	160.34	90.14	1,512.85	-5,455.92	1,395.55	1,075.72	319.83	4.363			
12,400.00	7,254.43	12,539.94	7,257.72	162.93	163.30	90.13	1,513.38	-5,555.92	1,396.25	1,070.48	325.77	4.286			
12,500.00	7,254.31	12,639.94	7,257.53	165.91	166.27	90.13	1,513.91	-5,655.91	1,396.96	1,065.24	331.73	4.211			
12,600.00	7,254.20	12,739.93	7,257.33	168.89	169.23	90.13	1,514.44	-5,755.91	1,397.67	1,059.99	337.68	4.139			
12,700.00	7,254.08	12,839.93	7,257.14	171.87	172.20	90.12	1,514.98	-5,855.90	1,398.37	1,054.74	343.64	4.069			
12,800.00	7,253.96	12,939.93	7,256.94	174.85	175.17	90.12	1,515.51	-5,955.90	1,399.08	1,049.48	349.60	4.002			
12,900.00	7,253.85	13,039.93	7,256.74	177.83	178.15	90.12	1,516.04	-6,055.90	1,399.78	1,044.23	355.56	3.937			
13,000.00	7,253.73	13,139.92	7,256.55	180.82	181.12	90.11	1,516.57	-6,155.89	1,400.49	1,038.97	361.52	3.874			
13,100.00	7,253.61	13,239.92	7,256.35	183.80	184.09	90.11	1,517.10	-6,255.89	1,401.20	1,033.71	367.49	3.813			
13,200.00	7,253.50	13,339.92	7,256.16	186.79	187.07	90.11	1,517.64	-6,355.88	1,401.90	1,028.44	373.46	3.754			
13,300.00	7,253.38	13,439.92	7,255.96	189.77	190.05	90.10	1,518.17	-6,455.88	1,402.61	1,023.18	379.43	3.697			
13,400.00	7,253.26	13,539.91	7,255.76	192.76	193.03	90.10	1,518.70	-6,555.87	1,403.31	1,017.91	385.40	3.641			
13,500.00	7,253.15	13,639.91	7,255.57	195.75	196.01	90.10	1,519.23	-6,655.87	1,404.02	1,012.64	391.38	3.587			
13,600.00	7,253.03	13,739.91	7,255.37	198.74	198.99	90.10	1,519.77	-6,755.87	1,404.72	1,007.37	397.36	3.535			
13,700.00	7,252.91	13,839.91	7,255.18	201.73	201.97	90.09	1,520.30	-6,855.86	1,405.43	1,002.09	403.34	3.485			
13,800.00	7,252.80	13,939.90	7,254.98	204.72	204.96	90.09	1,520.83	-6,955.86	1,406.14	996.82	409.32	3.435			
13,900.00	7,252.68	14,039.90	7,254.78	207.71	207.94	90.09	1,521.36	-7,055.85	1,406.84	991.54	415.30	3.388			
14,000.00	7,252.56	14,139.90	7,254.59	210.70	210.93	90.08	1,521.89	-7,155.85	1,407.55	986.27	421.28	3.341			
14,100.00	7,252.45	14,239.90	7,254.39	213.70	213.91	90.08	1,522.43	-7,255.85	1,408.25	980.99	427.27	3.296			
14,200.00	7,252.33	14,339.89	7,254.20	216.69	216.90	90.08	1,522.96	-7,355.84	1,408.96	975.71	433.25	3.252			
14,300.00	7,252.21	14,439.89	7,254.00	219.69	219.89	90.07	1,523.49	-7,455.84	1,409.67	970.42	439.24	3.209			
14,400.00	7,252.10	14,539.89	7,253.80	222.68	222.88	90.07	1,524.02	-7,555.83	1,410.37	965.14	445.23	3.168			

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



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Reference Site:	Rosa Unit 29	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 29 - Rosa Unit #650H - OH - Plan #9													Offset Site Error:	0.00 ft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Semi Major Axis Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
14,500.00	7,251.98	14,639.89	7,253.61	225.68	225.87	90.07	1,524.55	-7,655.83	1,411.08	959.86	451.22	3.127		
14,600.00	7,251.86	14,739.88	7,253.41	228.67	228.86	90.06	1,525.09	-7,755.83	1,411.78	954.57	457.21	3.088		
14,700.00	7,251.75	14,839.88	7,253.22	231.67	231.85	90.06	1,525.62	-7,855.82	1,412.49	949.28	463.21	3.049		
14,800.00	7,251.63	14,939.88	7,253.02	234.67	234.85	90.06	1,526.15	-7,955.82	1,413.19	943.99	469.20	3.012		
14,900.00	7,251.51	15,039.88	7,252.83	237.66	237.84	90.05	1,526.68	-8,055.81	1,413.90	938.71	475.19	2.975		
15,000.00	7,251.40	15,139.87	7,252.63	240.66	240.83	90.05	1,527.22	-8,155.81	1,414.61	933.42	481.19	2.940		
15,100.00	7,251.28	15,239.87	7,252.43	243.66	243.83	90.05	1,527.75	-8,255.80	1,415.31	928.12	487.19	2.905		
15,200.00	7,251.16	15,339.87	7,252.24	246.66	246.82	90.04	1,528.28	-8,355.80	1,416.02	922.83	493.19	2.871		
15,300.00	7,251.05	15,439.87	7,252.04	249.66	249.82	90.04	1,528.81	-8,455.80	1,416.72	917.54	499.18	2.838		
15,400.00	7,250.93	15,539.86	7,251.85	252.66	252.81	90.04	1,529.34	-8,555.79	1,417.43	912.25	505.18	2.806		
15,500.00	7,250.81	15,639.86	7,251.65	255.66	255.81	90.03	1,529.88	-8,655.79	1,418.14	906.95	511.19	2.774		
15,600.00	7,250.70	15,739.86	7,251.45	258.66	258.81	90.03	1,530.41	-8,755.78	1,418.84	901.66	517.19	2.743		
15,700.00	7,250.58	15,839.86	7,251.26	261.66	261.80	90.03	1,530.94	-8,855.78	1,419.55	896.36	523.19	2.713		
15,800.00	7,250.46	15,939.85	7,251.06	264.66	264.80	90.02	1,531.47	-8,955.78	1,420.25	891.06	529.19	2.684		
15,900.00	7,250.35	16,039.85	7,250.87	267.66	267.80	90.02	1,532.00	-9,055.77	1,420.96	885.76	535.20	2.655		
16,000.00	7,250.23	16,139.85	7,250.67	270.67	270.80	90.02	1,532.54	-9,155.77	1,421.67	880.47	541.20	2.627		
16,100.00	7,250.11	16,239.85	7,250.47	273.67	273.80	90.01	1,533.07	-9,255.76	1,422.37	875.17	547.20	2.599		
16,196.58	7,250.00	16,336.42	7,250.28	276.57	276.70	90.01	1,533.58	-9,352.34	1,423.05	870.05	553.01	2.573		

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



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Reference Site:	Rosa Unit 29	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 29 - Rosa Unit #654H - OH - OH														Offset Site Error:	0.00 ft
Survey Program: 359-MWD+HDGM														Offset Well Error:	0.00 ft
Reference	Offset	Semi Major Axis		Offset Wellbore Centre		Rule Assigned:				Warning					
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor			
0.00	0.00	0.50	0.50	0.00	0.00	-64.81	19.16	-40.72	45.00						
100.00	100.00	100.43	100.43	0.27	0.17	-64.31	19.54	-40.62	45.08	44.64	0.44	102.762			
200.00	200.00	200.34	200.33	0.63	0.34	-62.85	20.69	-40.34	45.34	44.37	0.96	47.017			
300.00	300.00	300.23	300.21	0.99	0.50	-60.45	22.60	-39.87	45.83	44.34	1.49	30.764			
350.00	350.00	350.17	350.12	1.17	0.59	-58.93	23.84	-39.57	46.20	44.45	1.75	26.359			
400.00	400.00	400.12	400.05	1.34	0.75	-4.16	25.25	-39.22	46.10	44.01	2.09	22.027			
420.23	420.22	420.33	420.25	1.42	0.82	-3.47	25.86	-39.07	45.78	43.54	2.24	20.455			
500.00	499.95	500.29	500.18	1.70	1.11	-0.66	28.18	-38.39	44.10	41.29	2.81	15.709			
600.00	599.90	600.64	600.52	2.06	1.46	1.44	29.47	-37.53	41.13	37.62	3.51	11.706			
700.00	699.86	700.66	700.53	2.41	1.80	0.13	28.44	-37.74	37.61	33.41	4.21	8.942			
800.00	799.81	800.36	800.20	2.77	2.13	-3.32	26.64	-38.81	34.38	29.48	4.90	7.016			
900.00	899.76	900.38	900.21	3.13	2.48	-6.80	25.42	-40.12	31.79	26.19	5.60	5.677			
1,000.00	999.72	999.87	999.69	3.49	2.82	-10.43	24.39	-41.35	29.36	23.06	6.30	4.657			
1,046.39	1,046.09	1,045.92	1,045.71	3.66	2.98	-12.24	24.29	-42.63	29.09	22.46	6.63	4.387 CC			
1,100.00	1,099.67	1,099.18	1,098.94	3.85	3.17	-13.68	24.73	-44.54	29.42	22.41	7.01	4.198 ES			
1,200.00	1,199.62	1,198.63	1,198.25	4.21	3.53	-14.51	26.98	-49.11	31.56	23.85	7.71	4.091 SF			
1,300.00	1,299.58	1,297.78	1,297.15	4.57	3.88	-14.07	30.58	-55.13	35.60	27.19	8.42	4.230			
1,400.00	1,399.53	1,396.63	1,395.56	4.93	4.24	-12.75	35.75	-63.04	42.06	32.94	9.11	4.614			
1,500.00	1,499.48	1,495.34	1,493.56	5.29	4.60	-10.82	42.60	-72.54	50.74	40.93	9.81	5.172			
1,600.00	1,599.44	1,593.96	1,591.25	5.65	4.97	-8.59	51.03	-83.11	61.18	50.68	10.51	5.822			
1,700.00	1,699.39	1,692.00	1,688.08	6.01	5.34	-6.05	61.33	-94.49	73.46	62.26	11.20	6.559			
1,800.00	1,799.34	1,788.00	1,782.55	6.37	5.72	-3.77	73.09	-106.86	87.89	76.04	11.86	7.413			
1,900.00	1,899.29	1,884.97	1,877.54	6.73	6.12	-1.98	86.43	-121.07	104.75	92.21	12.54	8.354			
2,000.00	1,999.25	1,980.18	1,970.28	7.09	6.52	-0.97	100.51	-137.32	124.25	111.05	13.20	9.416			
2,100.00	2,099.20	2,074.40	2,061.51	7.45	6.94	-0.39	115.50	-155.46	146.20	132.36	13.84	10.563			
2,200.00	2,199.15	2,170.98	2,154.67	7.81	7.38	0.21	132.01	-174.86	169.56	155.02	14.54	11.658			
2,300.00	2,299.11	2,268.59	2,248.80	8.17	7.84	0.74	148.95	-194.37	193.02	177.75	15.27	12.640			
2,400.00	2,399.06	2,366.27	2,343.05	8.53	8.31	1.24	166.01	-213.57	216.29	200.29	16.00	13.519			
2,500.00	2,499.01	2,464.95	2,438.37	8.89	8.78	1.71	183.19	-232.46	239.14	222.40	16.74	14.283			
2,600.00	2,598.97	2,562.54	2,532.70	9.25	9.25	2.10	200.03	-250.89	261.71	244.24	17.47	14.979			
2,700.00	2,698.92	2,659.94	2,626.88	9.61	9.73	2.42	216.76	-269.28	284.22	266.02	18.20	15.618			
2,800.00	2,798.87	2,756.52	2,720.20	9.97	10.20	2.71	233.54	-287.61	306.95	288.04	18.92	16.227			
2,900.00	2,898.82	2,854.53	2,814.92	10.33	10.69	2.96	250.56	-306.20	329.66	310.01	19.65	16.773			
3,000.00	2,998.78	2,952.81	2,909.93	10.70	11.17	3.21	267.70	-324.62	352.26	331.87	20.40	17.272			
3,100.00	3,098.73	3,054.43	3,008.36	11.06	11.67	3.40	284.79	-343.23	374.14	352.96	21.18	17.669			
3,200.00	3,198.68	3,156.09	3,107.10	11.42	12.17	3.61	301.31	-360.84	394.88	372.93	21.95	17.989			
3,300.00	3,298.64	3,255.26	3,203.59	11.78	12.65	3.79	317.01	-377.56	415.00	392.30	22.70	18.284			
3,400.00	3,398.59	3,349.41	3,295.16	12.14	13.10	3.89	331.66	-393.79	435.24	411.85	23.39	18.607			
3,500.00	3,498.54	3,438.62	3,381.58	12.50	13.55	3.93	346.21	-410.45	457.06	433.03	24.03	19.019			
3,600.00	3,598.50	3,529.55	3,469.25	12.86	14.02	3.95	361.97	-428.70	480.62	455.92	24.69	19.463			
3,700.00	3,698.45	3,627.25	3,563.31	13.22	14.53	3.93	378.98	-448.96	504.73	479.29	25.44	19.843			
3,800.00	3,798.40	3,729.01	3,661.44	13.58	15.05	3.92	396.35	-469.51	528.21	501.99	26.22	20.143			
3,900.00	3,898.36	3,837.21	3,766.12	13.94	15.60	3.88	413.84	-490.60	550.59	523.51	27.07	20.339			
4,000.00	3,998.31	3,948.40	3,874.36	14.30	16.15	3.87	430.15	-510.08	570.44	542.51	27.93	20.424			
4,100.00	4,098.26	4,054.06	3,977.63	14.66	16.64	3.85	444.42	-527.26	588.57	559.84	28.73	20.488			
4,200.00	4,198.21	4,149.08	4,070.57	15.02	17.09	3.80	456.74	-542.70	606.35	576.92	29.43	20.601			
4,300.00	4,298.17	4,238.38	4,157.72	15.38	17.52	3.71	468.63	-558.16	625.16	595.07	30.09	20.775			
4,400.00	4,398.12	4,334.30	4,251.12	15.74	17.98	3.68	482.44	-575.13	644.97	614.17	30.81	20.935			
4,500.00	4,498.07	4,425.41	4,339.71	16.10	18.43	3.72	496.47	-591.08	665.31	633.83	31.48	21.132			

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



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Reference Site:	Rosa Unit 29	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 29 - Rosa Unit #654H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 359-MWD+HDGM													Offset Well Error:	0.00 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
4,600.00	4,598.03	4,507.01	4,418.74	16.46	18.85	3.75	509.86	-606.36	687.26	655.20	32.06	21.434		
4,700.00	4,697.98	4,595.03	4,503.48	16.82	19.31	3.79	525.58	-624.22	711.31	678.60	32.71	21.748		
4,800.00	4,797.93	4,700.52	4,605.01	17.19	19.87	3.84	544.53	-645.69	735.52	701.99	33.53	21.934		
4,900.00	4,897.89	4,798.47	4,699.57	17.55	20.38	3.82	560.83	-665.31	758.60	724.32	34.28	22.130		
5,000.00	4,997.84	4,878.78	4,776.89	17.91	20.82	3.80	574.65	-682.07	782.73	747.88	34.85	22.462		
5,100.00	5,097.79	4,958.15	4,852.74	18.27	21.26	3.77	589.49	-700.12	809.20	773.81	35.40	22.861		
5,200.00	5,197.75	5,048.14	4,938.30	18.63	21.77	3.78	607.69	-721.28	837.28	801.21	36.07	23.214		
5,300.00	5,297.70	5,151.71	5,036.88	18.99	22.37	3.80	628.42	-745.31	864.99	828.10	36.89	23.445		
5,400.00	5,397.65	5,241.78	5,122.75	19.35	22.88	3.81	646.16	-765.91	892.28	854.71	37.57	23.750		
5,500.00	5,497.60	5,324.98	5,201.67	19.71	23.37	3.84	663.57	-785.71	921.02	882.86	38.17	24.131		
5,600.00	5,597.56	5,418.14	5,289.79	20.07	23.93	3.89	683.77	-808.19	950.55	911.67	38.88	24.446		
5,700.00	5,697.51	5,519.01	5,385.29	20.43	24.52	3.97	705.72	-832.11	979.81	940.13	39.69	24.689		
5,800.00	5,797.46	5,619.56	5,480.66	20.79	25.12	4.06	727.53	-855.35	1,008.57	968.09	40.48	24.913		
5,900.00	5,897.42	5,722.26	5,578.21	21.15	25.72	4.16	749.68	-878.54	1,036.86	995.56	41.30	25.106		
6,000.00	5,997.37	5,828.76	5,679.65	21.51	26.33	4.32	773.00	-901.12	1,064.32	1,022.17	42.15	25.250		
6,100.00	6,097.32	5,953.59	5,798.88	21.87	27.00	4.81	803.14	-922.35	1,090.23	1,047.07	43.16	25.259		
6,200.00	6,197.28	6,030.00	5,871.95	22.23	27.40	5.33	823.73	-930.90	1,114.24	1,070.53	43.71	25.491		
6,300.00	6,297.23	6,030.00	5,871.95	22.59	27.40	5.33	823.73	-930.90	1,144.62	1,101.23	43.40	26.376		
6,400.00	6,397.18	6,030.00	5,871.95	22.96	27.40	5.33	823.73	-930.90	1,182.71	1,139.83	42.88	27.581		
6,500.00	6,497.13	6,030.00	5,871.95	23.32	27.40	5.33	823.73	-930.90	1,227.77	1,185.56	42.22	29.083		
6,600.00	6,597.09	6,030.00	5,871.95	23.68	27.40	5.33	823.73	-930.90	1,279.09	1,237.63	41.45	30.856		
6,642.00	6,639.07	6,030.00	5,871.95	23.83	27.40	5.33	823.73	-930.90	1,302.32	1,261.21	41.12	31.675		
6,650.00	6,647.06	6,030.00	5,871.95	23.86	27.40	15.54	823.73	-930.90	1,306.83	1,265.78	41.05	31.835		
6,700.00	6,696.90	6,030.00	5,871.95	24.04	27.40	30.98	823.73	-930.90	1,334.31	1,293.69	40.62	32.847		
6,750.00	6,746.28	6,030.00	5,871.95	24.23	27.40	32.85	823.73	-930.90	1,360.59	1,320.42	40.17	33.872		
6,800.00	6,794.90	6,030.00	5,871.95	24.42	27.40	32.81	823.73	-930.90	1,385.58	1,345.88	39.69	34.906		
6,850.00	6,842.47	6,030.00	5,871.95	24.61	27.40	32.24	823.73	-930.90	1,409.19	1,369.99	39.20	35.945		
6,900.00	6,888.68	6,030.00	5,871.95	24.82	27.40	31.51	823.73	-930.90	1,431.36	1,392.66	38.70	36.985		
6,950.00	6,933.27	6,030.00	5,871.95	25.03	27.40	30.75	823.73	-930.90	1,452.02	1,413.83	38.19	38.021		
7,000.00	6,975.94	6,030.00	5,871.95	25.25	27.40	30.01	823.73	-930.90	1,471.10	1,433.43	37.68	39.047		
7,050.00	7,016.44	6,030.00	5,871.95	25.49	27.40	29.33	823.73	-930.90	1,488.56	1,451.39	37.17	40.053		
7,100.00	7,054.51	6,030.00	5,871.95	25.75	27.40	28.72	823.73	-930.90	1,504.33	1,467.67	36.67	41.028		
7,150.00	7,089.93	6,030.00	5,871.95	26.03	27.40	28.18	823.73	-930.90	1,518.38	1,482.20	36.18	41.962		
7,200.00	7,122.47	6,030.00	5,871.95	26.36	27.40	27.72	823.73	-930.90	1,530.67	1,494.94	35.73	42.837		
7,250.00	7,151.94	6,030.00	5,871.95	26.73	27.40	27.33	823.73	-930.90	1,541.17	1,505.85	35.32	43.638		
7,300.00	7,178.15	6,030.00	5,871.95	27.15	27.40	27.01	823.73	-930.90	1,549.85	1,514.90	34.95	44.346		
7,350.00	7,200.94	6,030.00	5,871.95	27.62	27.40	26.76	823.73	-930.90	1,556.68	1,522.04	34.64	44.942		
7,400.00	7,220.17	6,030.00	5,871.95	28.16	27.40	26.59	823.73	-930.90	1,561.65	1,527.26	34.39	45.407		
7,409.98	7,223.57	6,030.00	5,871.95	28.28	27.40	26.57	823.73	-930.90	1,562.42	1,528.07	34.35	45.480		
7,450.00	7,235.72	6,030.00	5,871.95	28.76	27.40	26.49	823.73	-930.90	1,564.75	1,530.53	34.22	45.722		
7,460.94	7,238.62	6,030.00	5,871.95	28.90	27.40	26.48	823.73	-930.90	1,565.18	1,530.98	34.20	45.767		
7,500.00	7,247.49	6,030.00	5,871.95	29.42	27.40	26.46	823.73	-930.90	1,565.97	1,531.83	34.14	45.872		
7,539.41	7,254.07	6,030.00	5,871.95	29.98	27.40	26.49	823.73	-930.90	1,565.60	1,531.46	34.13	45.866		
7,550.00	7,255.42	6,030.00	5,871.95	30.13	27.40	26.50	823.73	-930.90	1,565.30	1,531.16	34.14	45.847		
7,589.97	7,258.96	6,030.00	5,871.95	30.74	27.40	26.59	823.73	-930.90	1,563.41	1,529.19	34.21	45.695		
7,600.00	7,259.45	6,030.00	5,871.95	30.90	27.40	26.62	823.73	-930.90	1,562.75	1,528.51	34.24	45.641		
7,621.96	7,259.98	6,030.00	5,871.95	31.25	27.40	26.69	823.73	-930.90	1,561.03	1,526.72	34.31	45.491		
7,627.16	7,260.00	6,030.00	5,871.95	31.33	27.40	26.71	823.73	-930.90	1,560.57	1,526.24	34.33	45.451		
7,685.42	7,259.93	6,030.00	5,871.95	32.31	27.40	26.71	823.73	-930.90	1,556.40	1,521.78	34.62	44.959		

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



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Reference Site:	Rosa Unit 29	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 29 - Rosa Unit #654H - OH - OH														Offset Site Error:	0.00 ft
Survey Program: 359-MWD+HDGM														Offset Well Error:	0.00 ft
Reference	Offset	Semi Major Axis		Offset Wellbore Centre		Rule Assigned:				Warning					
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor			
7,700.00	7,259.92	6,030.00	5,871.95	32.56	27.40	26.71	823.73	-930.90	1,555.69	1,520.99	34.70	44.834			
7,767.96	7,259.84	6,030.00	5,871.95	33.82	27.40	26.71	823.73	-930.90	1,554.21	1,519.03	35.18	44.185			
7,800.00	7,259.80	6,030.00	5,871.95	34.41	27.40	26.71	823.73	-930.90	1,554.54	1,519.11	35.43	43.881			
7,820.70	7,259.77	6,030.00	5,871.95	34.82	27.40	26.71	823.73	-930.90	1,555.10	1,519.49	35.61	43.666			
7,900.00	7,259.68	6,030.00	5,871.95	36.41	27.40	26.71	823.73	-930.90	1,559.81	1,523.42	36.39	42.868			
8,000.00	7,259.57	6,030.00	5,871.95	38.55	27.40	26.71	823.73	-930.90	1,571.43	1,533.90	37.53	41.869			
8,100.00	7,259.45	6,030.00	5,871.95	40.79	27.40	26.71	823.73	-930.90	1,589.28	1,550.47	38.81	40.947			
8,200.00	7,259.33	6,030.00	5,871.95	43.13	27.40	26.71	823.73	-930.90	1,613.14	1,572.96	40.18	40.147			
8,300.00	7,259.21	6,030.00	5,871.95	45.55	27.40	26.71	823.73	-930.90	1,642.75	1,601.16	41.59	39.502			
8,400.00	7,259.10	6,030.00	5,871.95	48.04	27.40	26.71	823.73	-930.90	1,677.81	1,634.81	42.99	39.025			
8,500.00	7,258.98	6,030.00	5,871.95	50.59	27.40	26.71	823.73	-930.90	1,717.98	1,673.61	44.37	38.720			
8,600.00	7,258.86	6,030.00	5,871.95	53.18	27.40	26.71	823.73	-930.90	1,762.91	1,717.22	45.69	38.583			
8,700.00	7,258.75	6,030.00	5,871.95	55.82	27.40	26.71	823.73	-930.90	1,812.25	1,765.31	46.94	38.604			
8,800.00	7,258.63	6,030.00	5,871.95	58.49	27.40	26.71	823.73	-930.90	1,865.66	1,817.54	48.12	38.773			
8,900.00	7,258.51	6,030.00	5,871.95	61.20	27.40	26.71	823.73	-930.90	1,922.78	1,873.57	49.21	39.076			
9,000.00	7,258.40	6,030.00	5,871.95	63.93	27.40	26.71	823.73	-930.90	1,983.30	1,933.09	50.21	39.500			
9,100.00	7,258.28	6,030.00	5,871.95	66.69	27.40	26.71	823.73	-930.90	2,046.92	1,995.79	51.13	40.033			
9,200.00	7,258.16	6,030.00	5,871.95	69.47	27.40	26.71	823.73	-930.90	2,113.36	2,061.39	51.97	40.663			
9,300.00	7,258.05	6,030.00	5,871.95	72.27	27.40	26.71	823.73	-930.90	2,182.36	2,129.63	52.74	41.381			
9,400.00	7,257.93	6,030.00	5,871.95	75.08	27.40	26.71	823.73	-930.90	2,253.69	2,200.26	53.43	42.176			
9,500.00	7,257.81	6,030.00	5,871.95	77.91	27.40	26.71	823.73	-930.90	2,327.13	2,273.06	54.07	43.041			
9,600.00	7,257.70	6,030.00	5,871.95	80.76	27.40	26.71	823.73	-930.90	2,402.49	2,347.84	54.64	43.968			
9,700.00	7,257.58	6,030.00	5,871.95	83.62	27.40	26.71	823.73	-930.90	2,479.59	2,424.42	55.16	44.950			
9,800.00	7,257.46	6,030.00	5,871.95	86.48	27.40	26.71	823.73	-930.90	2,558.27	2,502.63	55.64	45.982			
9,900.00	7,257.35	6,030.00	5,871.95	89.36	27.40	26.71	823.73	-930.90	2,638.40	2,582.33	56.07	47.058			
10,000.00	7,257.23	6,030.00	5,871.95	92.24	27.40	26.71	823.73	-930.90	2,719.85	2,663.39	56.46	48.173			
10,100.00	7,257.11	6,030.00	5,871.95	95.14	27.40	26.71	823.73	-930.90	2,802.49	2,745.68	56.82	49.325			
10,200.00	7,257.00	6,030.00	5,871.95	98.04	27.40	26.71	823.73	-930.90	2,886.24	2,829.10	57.14	50.509			
10,300.00	7,256.88	6,030.00	5,871.95	100.95	27.40	26.71	823.73	-930.90	2,970.99	2,913.55	57.44	51.722			
10,400.00	7,256.76	6,030.00	5,871.95	103.86	27.40	26.71	823.73	-930.90	3,056.67	2,998.95	57.72	52.961			
10,500.00	7,256.65	6,030.00	5,871.95	106.78	27.40	26.71	823.73	-930.90	3,143.18	3,085.22	57.97	54.223			
10,600.00	7,256.53	6,030.00	5,871.95	109.71	27.40	26.71	823.73	-930.90	3,230.48	3,172.28	58.20	55.508			
10,700.00	7,256.41	6,030.00	5,871.95	112.64	27.40	26.71	823.73	-930.90	3,318.50	3,260.08	58.41	56.811			
10,800.00	7,256.30	6,030.00	5,871.95	115.57	27.40	26.71	823.73	-930.90	3,407.17	3,348.56	58.61	58.133			
10,900.00	7,256.18	6,030.00	5,871.95	118.51	27.40	26.71	823.73	-930.90	3,496.46	3,437.67	58.79	59.470			
11,000.00	7,256.06	6,030.00	5,871.95	121.45	27.40	26.71	823.73	-930.90	3,586.31	3,527.35	58.96	60.822			
11,100.00	7,255.95	6,030.00	5,871.95	124.40	27.40	26.71	823.73	-930.90	3,676.69	3,617.57	59.12	62.187			
11,200.00	7,255.83	6,030.00	5,871.95	127.35	27.40	26.71	823.73	-930.90	3,767.55	3,708.28	59.27	63.564			
11,300.00	7,255.71	6,030.00	5,871.95	130.30	27.40	26.71	823.73	-930.90	3,858.87	3,799.46	59.41	64.952			
11,400.00	7,255.60	6,030.00	5,871.95	133.26	27.40	26.71	823.73	-930.90	3,950.61	3,891.06	59.54	66.350			
11,500.00	7,255.48	6,030.00	5,871.95	136.21	27.40	26.71	823.73	-930.90	4,042.73	3,983.07	59.67	67.757			
11,600.00	7,255.36	6,030.00	5,871.95	139.17	27.40	26.71	823.73	-930.90	4,135.23	4,075.44	59.78	69.172			
11,700.00	7,255.25	6,030.00	5,871.95	142.14	27.40	26.71	823.73	-930.90	4,228.06	4,168.17	59.89	70.594			
11,800.00	7,255.13	6,030.00	5,871.95	145.10	27.40	26.71	823.73	-930.90	4,321.22	4,261.22	60.00	72.024			
11,900.00	7,255.01	6,030.00	5,871.95	148.07	27.40	26.71	823.73	-930.90	4,414.67	4,354.57	60.10	73.459			
12,000.00	7,254.90	6,030.00	5,871.95	151.04	27.40	26.71	823.73	-930.90	4,508.41	4,448.21	60.19	74.900			
12,100.00	7,254.78	6,030.00	5,871.95	154.01	27.40	26.71	823.73	-930.90	4,602.41	4,542.12	60.28	76.345			
12,200.00	7,254.66	6,030.00	5,871.95	156.98	27.40	26.71	823.73	-930.90	4,696.65	4,636.28	60.37	77.795			
12,300.00	7,254.55	6,030.00	5,871.95	159.96	27.40	26.71	823.73	-930.90	4,791.13	4,730.68	60.46	79.249			

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



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Reference Site:	Rosa Unit 29	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 29 - Rosa Unit #654H - OH - OH														Offset Site Error:	0.00 ft
Survey Program: 359-MWD+HDGM														Offset Well Error:	0.00 ft
Reference	Offset	Semi Major Axis		Offset Wellbore Centre		Rule Assigned:				Warning					
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor			
12,400.00	7,254.43	6,030.00	5,871.95	162.93	27.40	26.71	823.73	-930.90	4,885.83	4,825.30	60.54	80.707			
12,500.00	7,254.31	6,030.00	5,871.95	165.91	27.40	26.71	823.73	-930.90	4,980.74	4,920.12	60.62	82.168			
12,600.00	7,254.20	6,030.00	5,871.95	168.89	27.40	26.71	823.73	-930.90	5,075.84	5,015.15	60.69	83.631			
12,700.00	7,254.08	6,030.00	5,871.95	171.87	27.40	26.71	823.73	-930.90	5,171.13	5,110.36	60.77	85.097			
12,800.00	7,253.96	6,030.00	5,871.95	174.85	27.40	26.71	823.73	-930.90	5,266.59	5,205.75	60.84	86.565			
12,900.00	7,253.85	6,030.00	5,871.95	177.83	27.40	26.71	823.73	-930.90	5,362.22	5,301.31	60.91	88.034			
13,000.00	7,253.73	6,030.00	5,871.95	180.82	27.40	26.71	823.73	-930.90	5,458.00	5,397.02	60.98	89.505			
13,100.00	7,253.61	6,030.00	5,871.95	183.80	27.40	26.71	823.73	-930.90	5,553.94	5,492.89	61.05	90.977			
13,200.00	7,253.50	6,030.00	5,871.95	186.79	27.40	26.71	823.73	-930.90	5,650.01	5,588.90	61.11	92.450			
13,300.00	7,253.38	6,030.00	5,871.95	189.77	27.40	26.71	823.73	-930.90	5,746.22	5,685.04	61.18	93.924			
13,400.00	7,253.26	6,030.00	5,871.95	192.76	27.40	26.71	823.73	-930.90	5,842.56	5,781.31	61.24	95.398			
13,500.00	7,253.15	6,030.00	5,871.95	195.75	27.40	26.71	823.73	-930.90	5,939.01	5,877.70	61.31	96.872			
13,600.00	7,253.03	6,030.00	5,871.95	198.74	27.40	26.71	823.73	-930.90	6,035.58	5,974.21	61.37	98.347			
13,700.00	7,252.91	6,030.00	5,871.95	201.73	27.40	26.71	823.73	-930.90	6,132.27	6,070.83	61.43	99.821			
13,800.00	7,252.80	6,030.00	5,871.95	204.72	27.40	26.71	823.73	-930.90	6,229.05	6,167.56	61.49	101.295			
13,900.00	7,252.68	6,030.00	5,871.95	207.71	27.40	26.71	823.73	-930.90	6,325.94	6,264.38	61.56	102.768			
14,000.00	7,252.56	6,030.00	5,871.95	210.70	27.40	26.71	823.73	-930.90	6,422.92	6,361.30	61.62	104.241			
14,100.00	7,252.45	6,030.00	5,871.95	213.70	27.40	26.71	823.73	-930.90	6,519.99	6,458.32	61.68	105.713			
14,200.00	7,252.33	6,030.00	5,871.95	216.69	27.40	26.71	823.73	-930.90	6,617.15	6,555.42	61.74	107.184			
14,300.00	7,252.21	6,030.00	5,871.95	219.69	27.40	26.71	823.73	-930.90	6,714.40	6,652.60	61.80	108.653			
14,400.00	7,252.10	6,030.00	5,871.95	222.68	27.40	26.71	823.73	-930.90	6,811.72	6,749.86	61.86	110.122			
14,500.00	7,251.98	6,030.00	5,871.95	225.68	27.40	26.71	823.73	-930.90	6,909.12	6,847.20	61.92	111.589			
14,600.00	7,251.86	6,030.00	5,871.95	228.67	27.40	26.71	823.73	-930.90	7,006.59	6,944.62	61.98	113.054			
14,700.00	7,251.75	6,030.00	5,871.95	231.67	27.40	26.71	823.73	-930.90	7,104.14	7,042.10	62.03	114.518			
14,800.00	7,251.63	6,030.00	5,871.95	234.67	27.40	26.71	823.73	-930.90	7,201.75	7,139.65	62.09	115.981			
14,900.00	7,251.51	6,030.00	5,871.95	237.66	27.40	26.71	823.73	-930.90	7,299.42	7,237.27	62.15	117.441			
15,000.00	7,251.40	6,030.00	5,871.95	240.66	27.40	26.71	823.73	-930.90	7,397.16	7,334.95	62.21	118.899			
15,100.00	7,251.28	6,030.00	5,871.95	243.66	27.40	26.71	823.73	-930.90	7,494.96	7,432.68	62.27	120.356			
15,200.00	7,251.16	6,030.00	5,871.95	246.66	27.40	26.71	823.73	-930.90	7,592.81	7,530.48	62.33	121.810			
15,300.00	7,251.05	6,030.00	5,871.95	249.66	27.40	26.71	823.73	-930.90	7,690.72	7,628.33	62.39	123.262			
15,400.00	7,250.93	6,030.00	5,871.95	252.66	27.40	26.71	823.73	-930.90	7,788.69	7,726.23	62.45	124.712			
15,500.00	7,250.81	6,030.00	5,871.95	255.66	27.40	26.71	823.73	-930.90	7,886.70	7,824.19	62.51	126.159			
15,600.00	7,250.70	6,030.00	5,871.95	258.66	27.40	26.71	823.73	-930.90	7,984.76	7,922.19	62.57	127.604			

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



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Reference Site:	Rosa Unit 29	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 29 - Rosa Unit #654H - ST1 - ST1														Offset Site Error:	0.00 ft
Survey Program: 359-MWD+HDGM, 5279-MWD+HDGM														Offset Well Error:	0.00 ft
Reference	Offset	Semi Major Axis	Rule Assigned:												
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Distance		Minimum Separation	Separation Factor	Warning		
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	(ft)				
0.00	0.00	0.50	0.50	0.00	0.00	-64.81	19.16	-40.72	45.00						
100.00	100.00	100.43	100.43	0.27	0.17	-64.31	19.54	-40.62	45.08	44.64	0.44	102.761			
200.00	200.00	200.34	200.33	0.63	0.34	-62.85	20.69	-40.34	45.34	44.37	0.96	47.017			
300.00	300.00	300.23	300.21	0.99	0.50	-60.45	22.60	-39.87	45.83	44.34	1.49	30.763			
350.00	350.00	350.17	350.12	1.17	0.59	-58.93	23.84	-39.57	46.20	44.45	1.75	26.359			
400.00	400.00	400.12	400.05	1.34	0.75	-4.16	25.25	-39.22	46.10	44.01	2.09	22.027			
420.23	420.22	420.33	420.25	1.42	0.82	-3.47	25.86	-39.07	45.78	43.54	2.24	20.455			
500.00	499.95	500.29	500.18	1.70	1.11	-0.66	28.18	-38.39	44.10	41.29	2.81	15.709			
600.00	599.90	600.64	600.52	2.06	1.46	1.44	29.47	-37.53	41.13	37.62	3.51	11.706			
700.00	699.86	700.66	700.53	2.41	1.80	0.13	28.44	-37.74	37.61	33.41	4.21	8.942			
800.00	799.81	800.36	800.20	2.77	2.13	-3.32	26.64	-38.81	34.38	29.48	4.90	7.016			
900.00	899.76	900.38	900.21	3.13	2.48	-6.80	25.42	-40.12	31.79	26.19	5.60	5.677			
1,000.00	999.72	999.87	999.69	3.49	2.82	-10.43	24.39	-41.35	29.36	23.06	6.30	4.657			
1,046.39	1,046.09	1,045.92	1,045.71	3.66	2.98	-12.24	24.29	-42.63	29.09	22.46	6.63	4.387 CC			
1,100.00	1,099.67	1,099.18	1,098.94	3.85	3.17	-13.68	24.73	-44.54	29.42	22.41	7.01	4.198 ES			
1,200.00	1,199.62	1,198.63	1,198.25	4.21	3.53	-14.51	26.98	-49.11	31.56	23.85	7.71	4.091 SF			
1,300.00	1,299.58	1,297.78	1,297.15	4.57	3.88	-14.07	30.58	-55.13	35.60	27.19	8.42	4.230			
1,400.00	1,399.53	1,396.63	1,395.56	4.93	4.24	-12.75	35.75	-63.04	42.06	32.94	9.11	4.614			
1,500.00	1,499.48	1,495.34	1,493.56	5.29	4.60	-10.82	42.60	-72.54	50.74	40.93	9.81	5.172			
1,600.00	1,599.44	1,593.96	1,591.25	5.65	4.97	-8.59	51.03	-83.11	61.18	50.68	10.51	5.822			
1,700.00	1,699.39	1,692.00	1,688.08	6.01	5.34	-6.05	61.33	-94.49	73.46	62.26	11.20	6.559			
1,800.00	1,799.34	1,788.00	1,782.55	6.37	5.72	-3.77	73.09	-106.86	87.89	76.04	11.86	7.413			
1,900.00	1,899.29	1,884.97	1,877.54	6.73	6.12	-1.98	86.43	-121.07	104.75	92.21	12.54	8.354			
2,000.00	1,999.25	1,980.18	1,970.28	7.09	6.52	-0.97	100.51	-137.32	124.25	111.05	13.20	9.416			
2,100.00	2,099.20	2,074.40	2,061.51	7.45	6.94	-0.39	115.50	-155.46	146.20	132.36	13.84	10.563			
2,200.00	2,199.15	2,170.98	2,154.67	7.81	7.38	0.21	132.01	-174.86	169.56	155.02	14.54	11.658			
2,300.00	2,299.11	2,268.59	2,248.80	8.17	7.84	0.74	148.95	-194.37	193.02	177.75	15.27	12.640			
2,400.00	2,399.06	2,366.27	2,343.05	8.53	8.31	1.24	166.01	-213.57	216.29	200.29	16.00	13.519			
2,500.00	2,499.01	2,464.95	2,438.37	8.89	8.78	1.71	183.19	-232.46	239.14	222.40	16.74	14.283			
2,600.00	2,598.97	2,562.54	2,532.70	9.25	9.25	2.10	200.03	-250.89	261.71	244.24	17.47	14.979			
2,700.00	2,698.92	2,659.94	2,626.88	9.61	9.73	2.42	216.76	-269.28	284.22	266.02	18.20	15.618			
2,800.00	2,798.87	2,756.52	2,720.20	9.97	10.20	2.71	233.54	-287.61	306.95	288.04	18.92	16.227			
2,900.00	2,898.82	2,854.53	2,814.92	10.33	10.69	2.96	250.56	-306.20	329.66	310.01	19.65	16.773			
3,000.00	2,998.78	2,952.81	2,909.93	10.70	11.17	3.21	267.70	-324.62	352.26	331.87	20.40	17.272			
3,100.00	3,098.73	3,054.43	3,008.36	11.06	11.68	3.40	284.79	-343.23	374.14	352.96	21.18	17.669			
3,200.00	3,198.68	3,156.09	3,107.10	11.42	12.17	3.61	301.31	-360.84	394.88	372.93	21.95	17.989			
3,300.00	3,298.64	3,255.26	3,203.59	11.78	12.65	3.79	317.01	-377.56	415.00	392.30	22.70	18.284			
3,400.00	3,398.59	3,349.41	3,295.16	12.14	13.10	3.89	331.66	-393.79	435.24	411.85	23.39	18.607			
3,500.00	3,498.54	3,438.62	3,381.58	12.50	13.55	3.93	346.21	-410.45	457.06	433.03	24.03	19.019			
3,600.00	3,598.50	3,529.55	3,469.25	12.86	14.02	3.95	361.97	-428.70	480.62	455.92	24.69	19.463			
3,700.00	3,698.45	3,627.25	3,563.31	13.22	14.53	3.93	378.98	-448.96	504.73	479.29	25.44	19.843			
3,800.00	3,798.40	3,729.01	3,661.44	13.58	15.06	3.92	396.35	-469.51	528.21	501.99	26.22	20.143			
3,900.00	3,898.36	3,837.21	3,766.12	13.94	15.60	3.88	413.84	-490.60	550.59	523.51	27.07	20.339			
4,000.00	3,998.31	3,948.40	3,874.36	14.30	16.15	3.87	430.15	-510.08	570.44	542.51	27.93	20.424			
4,100.00	4,098.26	4,054.06	3,977.63	14.66	16.64	3.85	444.42	-527.26	588.57	559.84	28.73	20.488			
4,200.00	4,198.21	4,149.08	4,070.57	15.02	17.09	3.80	456.74	-542.70	606.35	576.92	29.43	20.601			
4,300.00	4,298.17	4,238.38	4,157.72	15.38	17.52	3.71	468.63	-558.16	625.16	595.07	30.09	20.775			
4,400.00	4,398.12	4,334.30	4,251.12	15.74	17.98	3.68	482.44	-575.13	644.97	614.17	30.81	20.935			
4,500.00	4,498.07	4,425.41	4,339.71	16.10	18.43	3.72	496.47	-591.08	665.31	633.83	31.48	21.132			

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



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Reference Site:	Rosa Unit 29	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 29 - Rosa Unit #654H - ST1 - ST1														Offset Site Error:	0.00 ft
Survey Program: 359-MWD+HDGM, 5279-MWD+HDGM														Offset Well Error:	0.00 ft
Reference	Offset	Semi Major Axis	Rule Assigned:												
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre	Distance	Between Centres	Between Ellipses	Minimum Separation	Separation Factor	Warning		
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)	(ft)				
4,600.00	4,598.03	4,507.01	4,418.74	16.46	18.85	3.75	509.86	-606.36	687.26	655.20	32.06	21.434			
4,700.00	4,697.98	4,595.03	4,503.48	16.82	19.31	3.79	525.58	-624.22	711.31	678.60	32.71	21.748			
4,800.00	4,797.93	4,700.52	4,605.01	17.19	19.87	3.84	544.53	-645.69	735.52	701.99	33.53	21.934			
4,900.00	4,897.89	4,798.47	4,699.57	17.55	20.39	3.82	560.83	-665.31	758.60	724.32	34.28	22.130			
5,000.00	4,997.84	4,878.78	4,776.89	17.91	20.82	3.80	574.65	-682.07	782.73	747.88	34.85	22.462			
5,100.00	5,097.79	4,958.15	4,852.74	18.27	21.26	3.77	589.49	-700.12	809.20	773.81	35.40	22.861			
5,200.00	5,197.75	5,048.14	4,938.30	18.63	21.77	3.78	607.69	-721.28	837.28	801.21	36.07	23.214			
5,300.00	5,297.70	5,176.78	5,061.09	18.99	22.35	3.84	633.10	-749.95	864.31	827.30	37.01	23.355			
5,400.00	5,397.65	5,343.66	5,223.09	19.35	22.82	4.14	662.15	-777.25	885.24	847.33	37.90	23.355			
5,500.00	5,497.60	5,449.70	5,327.21	19.71	22.96	4.33	677.26	-790.42	900.91	862.61	38.30	23.522			
5,600.00	5,597.56	5,540.37	5,416.13	20.07	23.10	4.50	690.76	-801.96	917.30	878.65	38.65	23.731			
5,700.00	5,697.51	5,632.31	5,506.10	20.43	23.24	4.75	705.85	-813.39	934.50	895.49	39.02	23.952			
5,800.00	5,797.46	5,729.86	5,601.36	20.79	23.41	5.14	723.73	-824.37	952.17	912.76	39.41	24.162			
5,900.00	5,897.42	5,823.46	5,692.51	21.15	23.58	5.68	743.17	-832.94	970.02	930.23	39.79	24.378			
6,000.00	5,997.37	5,922.00	5,787.90	21.51	23.76	6.49	767.13	-839.01	988.32	948.12	40.20	24.584			
6,100.00	6,097.32	6,016.84	5,879.32	21.87	23.94	7.40	792.04	-842.87	1,006.77	966.17	40.60	24.795			
6,200.00	6,197.28	6,127.94	5,986.67	22.23	24.16	8.38	820.25	-847.80	1,025.10	984.01	41.08	24.951			
6,300.00	6,297.23	6,277.18	6,132.27	22.59	24.44	9.42	852.27	-854.07	1,040.67	998.97	41.70	24.956			
6,400.00	6,397.18	6,433.30	6,286.69	22.96	24.69	10.03	874.03	-860.41	1,050.47	1,008.22	42.26	24.859			
6,500.00	6,497.13	6,524.00	6,376.86	23.32	24.82	10.25	883.13	-864.08	1,057.66	1,014.96	42.70	24.772			
6,600.00	6,597.09	6,562.25	6,414.65	23.68	24.90	10.41	888.72	-865.56	1,068.60	1,025.60	43.00	24.848			
6,642.00	6,639.07	7,161.00	6,891.47	23.83	25.28	26.46	1,047.19	-625.11	1,074.65	1,031.96	42.68	25.178			
6,650.00	6,647.06	7,161.00	6,891.47	23.86	25.28	37.16	1,047.19	-625.11	1,072.56	1,029.78	42.79	25.067			
6,700.00	6,696.90	7,161.00	6,891.47	24.04	25.28	55.62	1,047.19	-625.11	1,059.85	1,016.43	43.42	24.408			
6,750.00	6,746.28	7,161.00	6,891.47	24.23	25.28	60.26	1,047.19	-625.11	1,047.73	1,003.72	44.00	23.810			
6,800.00	6,794.90	7,161.00	6,891.47	24.42	25.28	62.77	1,047.19	-625.11	1,036.29	991.76	44.53	23.271			
6,850.00	6,842.47	7,161.00	6,891.47	24.61	25.28	64.53	1,047.19	-625.11	1,025.62	980.63	45.00	22.793			
6,900.00	6,888.68	7,161.00	6,891.47	24.82	25.28	65.90	1,047.19	-625.11	1,015.83	970.42	45.41	22.371			
6,950.00	6,933.27	7,161.00	6,891.47	25.03	25.28	67.01	1,047.19	-625.11	1,007.00	961.23	45.76	22.004			
7,000.00	6,975.94	7,161.00	6,891.47	25.25	25.28	67.94	1,047.19	-625.11	999.20	953.13	46.07	21.688			
7,050.00	7,016.44	7,161.00	6,891.47	25.49	25.28	68.71	1,047.19	-625.11	992.51	946.17	46.34	21.416			
7,100.00	7,054.51	7,161.00	6,891.47	25.75	25.28	69.33	1,047.19	-625.11	987.00	940.40	46.59	21.183			
7,150.00	7,089.93	7,161.00	6,891.47	26.03	25.28	69.82	1,047.19	-625.11	982.71	935.87	46.84	20.981			
7,195.53	7,119.69	7,161.00	6,891.47	26.33	25.28	70.14	1,047.19	-625.11	979.91	932.84	47.07	20.817			
7,200.00	7,122.47	7,161.00	6,891.47	26.36	25.28	70.17	1,047.19	-625.11	979.70	932.60	47.10	20.802			
7,241.52	7,147.17	7,161.00	6,891.47	26.67	25.28	70.36	1,047.19	-625.11	978.18	930.84	47.34	20.664			
7,250.00	7,151.94	7,161.00	6,891.47	26.73	25.28	70.39	1,047.19	-625.11	977.98	930.60	47.39	20.638			
7,289.90	7,173.13	7,161.00	6,891.47	27.06	25.28	70.47	1,047.19	-625.11	977.56	929.90	47.66	20.512			
7,300.00	7,178.15	7,161.00	6,891.47	27.15	25.28	70.48	1,047.19	-625.11	977.59	929.86	47.73	20.482			
7,308.55	7,182.29	7,161.00	6,891.47	27.23	25.28	70.49	1,047.19	-625.11	977.65	929.86	47.80	20.454			
7,350.00	7,200.94	7,161.00	6,891.47	27.62	25.28	70.45	1,047.19	-625.11	978.52	930.38	48.14	20.327			
7,400.00	7,220.17	7,161.00	6,891.47	28.16	25.28	70.30	1,047.19	-625.11	980.76	932.13	48.63	20.169			
7,450.00	7,235.72	7,161.00	6,891.47	28.76	25.28	70.02	1,047.19	-625.11	984.29	935.09	49.20	20.005			
7,500.00	7,247.49	7,161.00	6,891.47	29.42	25.28	69.64	1,047.19	-625.11	989.08	939.21	49.87	19.835			
7,550.00	7,255.42	7,161.00	6,891.47	30.13	25.28	69.14	1,047.19	-625.11	995.07	944.46	50.61	19.661			
7,600.00	7,259.45	7,161.00	6,891.47	30.90	25.28	68.53	1,047.19	-625.11	1,002.22	950.78	51.43	19.486			
7,627.16	7,260.00	7,161.00	6,891.47	31.33	25.28	68.16	1,047.19	-625.11	1,006.56	954.65	51.91	19.392			
7,700.00	7,259.92	7,161.00	6,891.47	32.56	25.28	68.16	1,047.19	-625.11	1,021.14	967.94	53.20	19.195			
7,800.00	7,259.80	7,114.98	6,863.38	34.41	25.36	66.68	1,047.03	-661.56	1,048.09	993.57	54.52	19.224			

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



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Reference Site:	Rosa Unit 29	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 29 - Rosa Unit #654H - ST1 - ST1														Offset Site Error:	0.00 ft
Survey Program: 359-MWD+HDGM, 5279-MWD+HDGM														Offset Well Error:	0.00 ft
Reference	Offset	Semi Major Axis	Rule Assigned:												
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning		
7,900.00	7,259.68	6,982.42	6,774.60	36.41	25.56	61.95	1,037.46	-758.67	1,077.62	1,022.78	54.84	19.650			
8,000.00	7,259.57	6,893.27	6,706.61	38.55	25.62	58.21	1,018.93	-812.89	1,108.43	1,053.18	55.25	20.062			
8,100.00	7,259.45	6,825.60	6,651.02	40.79	25.57	54.99	995.23	-843.11	1,142.52	1,086.96	55.56	20.562			
8,200.00	7,259.33	6,810.00	6,637.96	43.13	25.56	54.21	988.71	-848.60	1,182.64	1,125.88	56.77	20.834			
8,300.00	7,259.21	6,810.00	6,637.96	45.55	25.56	54.21	988.71	-848.60	1,229.53	1,171.40	58.13	21.151			
8,400.00	7,259.10	6,810.00	6,637.96	48.04	25.56	54.21	988.71	-848.60	1,282.52	1,223.22	59.29	21.629			
8,500.00	7,258.98	6,771.71	6,605.35	50.59	25.46	52.26	971.69	-859.16	1,339.14	1,279.77	59.37	22.557			
8,600.00	7,258.86	6,765.43	6,599.94	53.18	25.45	51.94	968.80	-860.47	1,401.47	1,341.42	60.05	23.338			
8,700.00	7,258.75	6,760.17	6,595.39	55.82	25.43	51.67	966.36	-861.47	1,467.90	1,407.28	60.62	24.216			
8,800.00	7,258.63	6,755.70	6,591.51	58.49	25.42	51.43	964.27	-862.26	1,537.91	1,476.83	61.08	25.178			
8,900.00	7,258.51	6,751.85	6,588.17	61.20	25.41	51.23	962.46	-862.88	1,611.04	1,549.58	61.46	26.214			
9,000.00	7,258.40	6,715.00	6,556.07	63.93	25.32	49.32	944.79	-866.53	1,688.47	1,627.52	60.96	27.698			
9,100.00	7,258.28	6,715.00	6,556.07	66.69	25.32	49.32	944.79	-866.53	1,766.47	1,705.19	61.28	28.824			
9,200.00	7,258.16	6,715.00	6,556.07	69.47	25.32	49.32	944.79	-866.53	1,846.60	1,785.05	61.55	30.002			
9,300.00	7,258.05	6,715.00	6,556.07	72.27	25.32	49.32	944.79	-866.53	1,928.57	1,866.81	61.76	31.226			
9,400.00	7,257.93	6,715.00	6,556.07	75.08	25.32	49.32	944.79	-866.53	2,012.18	1,950.25	61.93	32.490			
9,500.00	7,257.81	6,715.00	6,556.07	77.91	25.32	49.32	944.79	-866.53	2,097.23	2,035.16	62.07	33.789			
9,600.00	7,257.70	6,715.00	6,556.07	80.76	25.32	49.32	944.79	-866.53	2,183.54	2,121.36	62.18	35.118			
9,700.00	7,257.58	6,715.00	6,556.07	83.62	25.32	49.32	944.79	-866.53	2,270.98	2,208.71	62.26	36.474			
9,800.00	7,257.46	6,715.00	6,556.07	86.48	25.32	49.32	944.79	-866.53	2,359.41	2,297.08	62.33	37.854			
9,900.00	7,257.35	6,715.00	6,556.07	89.36	25.32	49.32	944.79	-866.53	2,448.74	2,386.35	62.38	39.254			
10,000.00	7,257.23	6,715.00	6,556.07	92.24	25.32	49.32	944.79	-866.53	2,538.86	2,476.43	62.42	40.672			
10,100.00	7,257.11	6,715.00	6,556.07	95.14	25.32	49.32	944.79	-866.53	2,629.69	2,567.24	62.45	42.107			
10,200.00	7,257.00	6,715.00	6,556.07	98.04	25.32	49.32	944.79	-866.53	2,721.17	2,658.69	62.47	43.557			
10,300.00	7,256.88	6,715.00	6,556.07	100.95	25.32	49.32	944.79	-866.53	2,813.23	2,750.74	62.49	45.019			
10,400.00	7,256.76	6,715.00	6,556.07	103.86	25.32	49.32	944.79	-866.53	2,905.81	2,843.31	62.50	46.492			
10,500.00	7,256.65	6,715.00	6,556.07	106.78	25.32	49.32	944.79	-866.53	2,998.87	2,936.36	62.51	47.976			
10,600.00	7,256.53	6,715.00	6,556.07	109.71	25.32	49.32	944.79	-866.53	3,092.36	3,029.85	62.51	49.468			
10,700.00	7,256.41	6,715.00	6,556.07	112.64	25.32	49.32	944.79	-866.53	3,186.25	3,123.73	62.51	50.969			
10,800.00	7,256.30	6,715.00	6,556.07	115.57	25.32	49.32	944.79	-866.53	3,280.50	3,217.98	62.51	52.477			
10,900.00	7,256.18	6,715.00	6,556.07	118.51	25.32	49.32	944.79	-866.53	3,375.08	3,312.57	62.51	53.991			
11,000.00	7,256.06	6,715.00	6,556.07	121.45	25.32	49.32	944.79	-866.53	3,469.96	3,407.45	62.51	55.510			
11,100.00	7,255.95	6,715.00	6,556.07	124.40	25.32	49.32	944.79	-866.53	3,565.12	3,502.62	62.51	57.035			
11,200.00	7,255.83	6,715.00	6,556.07	127.35	25.32	49.32	944.79	-866.53	3,660.55	3,598.04	62.51	58.564			
11,300.00	7,255.71	6,715.00	6,556.07	130.30	25.32	49.32	944.79	-866.53	3,756.21	3,693.70	62.50	60.097			
11,400.00	7,255.60	6,715.00	6,556.07	133.26	25.32	49.32	944.79	-866.53	3,852.09	3,789.59	62.50	61.633			
11,500.00	7,255.48	6,715.00	6,556.07	136.21	25.32	49.32	944.79	-866.53	3,948.17	3,885.67	62.50	63.172			
11,600.00	7,255.36	6,715.00	6,556.07	139.17	25.32	49.32	944.79	-866.53	4,044.45	3,981.95	62.50	64.713			
11,700.00	7,255.25	6,715.00	6,556.07	142.14	25.32	49.32	944.79	-866.53	4,140.90	4,078.40	62.50	66.257			
11,800.00	7,255.13	6,715.00	6,556.07	145.10	25.32	49.32	944.79	-866.53	4,237.51	4,175.01	62.50	67.802			
11,900.00	7,255.01	6,715.00	6,556.07	148.07	25.32	49.32	944.79	-866.53	4,334.28	4,271.78	62.50	69.349			
12,000.00	7,254.90	6,715.00	6,556.07	151.04	25.32	49.32	944.79	-866.53	4,431.19	4,368.69	62.50	70.897			
12,100.00	7,254.78	6,715.00	6,556.07	154.01	25.32	49.32	944.79	-866.53	4,528.24	4,465.74	62.51	72.446			
12,200.00	7,254.66	6,715.00	6,556.07	156.98	25.32	49.32	944.79	-866.53	4,625.41	4,562.90	62.51	73.995			
12,300.00	7,254.55	6,715.00	6,556.07	159.96	25.32	49.32	944.79	-866.53	4,722.70	4,660.19	62.51	75.545			
12,400.00	7,254.43	6,715.00	6,556.07	162.93	25.32	49.32	944.79	-866.53	4,820.10	4,757.58	62.52	77.095			
12,500.00	7,254.31	6,715.00	6,556.07	165.91	25.32	49.32	944.79	-866.53	4,917.61	4,855.08	62.53	78.645			
12,600.00	7,254.20	6,715.00	6,556.07	168.89	25.32	49.32	944.79	-866.53	5,015.21	4,952.68	62.54	80.195			
12,700.00	7,254.08	6,715.00	6,556.07	171.87	25.32	49.32	944.79	-866.53	5,112.91	5,050.36	62.55	81.744			

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



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Reference Site:	Rosa Unit 29	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 29 - Rosa Unit #654H - ST1 - ST1													Offset Site Error:	0.00 ft
Survey Program: 359-MWD+HDGM, 5279-MWD+HDGM													Offset Well Error:	0.00 ft
Reference	Offset	Semi Major Axis	Rule Assigned:											
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Distance		Minimum Separation	Separation Factor	Warning	
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	(ft)			
12,800.00	7,253.96	6,715.00	6,556.07	174.85	25.32	49.32	944.79	-866.53	5,210.70	5,148.14	62.56	83.293		
12,900.00	7,253.85	6,715.00	6,556.07	177.83	25.32	49.32	944.79	-866.53	5,308.56	5,245.99	62.57	84.840		
13,000.00	7,253.73	6,715.00	6,556.07	180.82	25.32	49.32	944.79	-866.53	5,406.51	5,343.92	62.58	86.387		
13,100.00	7,253.61	6,715.00	6,556.07	183.80	25.32	49.32	944.79	-866.53	5,504.53	5,441.93	62.60	87.933		
13,200.00	7,253.50	6,715.00	6,556.07	186.79	25.32	49.32	944.79	-866.53	5,602.61	5,540.00	62.61	89.478		
13,300.00	7,253.38	6,715.00	6,556.07	189.77	25.32	49.32	944.79	-866.53	5,700.77	5,638.14	62.63	91.021		
13,400.00	7,253.26	6,715.00	6,556.07	192.76	25.32	49.32	944.79	-866.53	5,798.99	5,736.34	62.65	92.563		
13,500.00	7,253.15	6,715.00	6,556.07	195.75	25.32	49.32	944.79	-866.53	5,897.27	5,834.60	62.67	94.103		
13,600.00	7,253.03	6,715.00	6,556.07	198.74	25.32	49.32	944.79	-866.53	5,995.60	5,932.91	62.69	95.642		
13,700.00	7,252.91	6,715.00	6,556.07	201.73	25.32	49.32	944.79	-866.53	6,093.99	6,031.28	62.71	97.179		
13,800.00	7,252.80	6,715.00	6,556.07	204.72	25.32	49.32	944.79	-866.53	6,192.43	6,129.70	62.73	98.714		
13,900.00	7,252.68	6,715.00	6,556.07	207.71	25.32	49.32	944.79	-866.53	6,290.92	6,228.17	62.75	100.247		
14,000.00	7,252.56	6,715.00	6,556.07	210.70	25.32	49.32	944.79	-866.53	6,389.46	6,326.68	62.78	101.777		
14,100.00	7,252.45	6,715.00	6,556.07	213.70	25.32	49.32	944.79	-866.53	6,488.04	6,425.23	62.80	103.306		
14,200.00	7,252.33	6,715.00	6,556.07	216.69	25.32	49.32	944.79	-866.53	6,586.66	6,523.83	62.83	104.833		
14,300.00	7,252.21	6,715.00	6,556.07	219.69	25.32	49.32	944.79	-866.53	6,685.33	6,622.47	62.86	106.357		
14,400.00	7,252.10	6,715.00	6,556.07	222.68	25.32	49.32	944.79	-866.53	6,784.03	6,721.15	62.89	107.878		
14,500.00	7,251.98	6,715.00	6,556.07	225.68	25.32	49.32	944.79	-866.53	6,882.77	6,819.86	62.92	109.398		
14,600.00	7,251.86	6,715.00	6,556.07	228.67	25.32	49.32	944.79	-866.53	6,981.55	6,918.61	62.95	110.914		
14,700.00	7,251.75	6,715.00	6,556.07	231.67	25.32	49.32	944.79	-866.53	7,080.36	7,017.39	62.98	112.428		
14,800.00	7,251.63	6,715.00	6,556.07	234.67	25.32	49.32	944.79	-866.53	7,179.21	7,116.20	63.01	113.939		
14,900.00	7,251.51	6,715.00	6,556.07	237.66	25.32	49.32	944.79	-866.53	7,278.08	7,215.04	63.04	115.448		
15,000.00	7,251.40	6,715.00	6,556.07	240.66	25.32	49.32	944.79	-866.53	7,376.99	7,313.92	63.08	116.954		
15,100.00	7,251.28	6,715.00	6,556.07	243.66	25.32	49.32	944.79	-866.53	7,475.93	7,412.82	63.11	118.456		
15,200.00	7,251.16	6,715.00	6,556.07	246.66	25.32	49.32	944.79	-866.53	7,574.89	7,511.74	63.15	119.956		
15,300.00	7,251.05	6,715.00	6,556.07	249.66	25.32	49.32	944.79	-866.53	7,673.88	7,610.70	63.18	121.453		
15,400.00	7,250.93	6,715.00	6,556.07	252.66	25.32	49.32	944.79	-866.53	7,772.90	7,709.68	63.22	122.947		
15,500.00	7,250.81	6,715.00	6,556.07	255.66	25.32	49.32	944.79	-866.53	7,871.94	7,808.68	63.26	124.438		
15,600.00	7,250.70	6,715.00	6,556.07	258.66	25.32	49.32	944.79	-866.53	7,971.00	7,907.70	63.30	125.925		

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



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Reference Site:	Rosa Unit 29	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 29 - Rosa Unit #654H - ST2 - ST2														Offset Site Error:	0.00 ft
Survey Program: 359-MWD+HDGM, 5279-MWD+HDGM, 6808-MWD+HDGM														Offset Well Error:	0.00 ft
Reference	Offset	Semi Major Axis		Rule Assigned:		Distance		Warning							
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre	+N/-S	+E/-W	Between Centres	Between Ellipses	Minimum Separation	Separation Factor		
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)			
0.00	0.00	0.50	0.50	0.00	0.00	-64.81	19.16	-40.72	45.00						
100.00	100.00	100.43	100.43	0.27	0.17	-64.31	19.54	-40.62	45.08	44.64	0.44	102.761			
200.00	200.00	200.34	200.33	0.63	0.34	-62.85	20.69	-40.34	45.34	44.37	0.96	47.017			
300.00	300.00	300.23	300.21	0.99	0.50	-60.45	22.60	-39.87	45.83	44.34	1.49	30.763			
350.00	350.00	350.17	350.12	1.17	0.59	-58.93	23.84	-39.57	46.20	44.45	1.75	26.359			
400.00	400.00	400.12	400.05	1.34	0.75	-4.16	25.25	-39.22	46.10	44.01	2.09	22.027			
420.23	420.22	420.33	420.25	1.42	0.82	-3.47	25.86	-39.07	45.78	43.54	2.24	20.455			
500.00	499.95	500.29	500.18	1.70	1.11	-0.66	28.18	-38.39	44.10	41.29	2.81	15.709			
600.00	599.90	600.64	600.52	2.06	1.46	1.44	29.47	-37.53	41.13	37.62	3.51	11.706			
700.00	699.86	700.66	700.53	2.41	1.80	0.13	28.44	-37.74	37.61	33.41	4.21	8.942			
800.00	799.81	800.36	800.20	2.77	2.13	-3.32	26.64	-38.81	34.38	29.48	4.90	7.016			
900.00	899.76	900.38	900.21	3.13	2.48	-6.80	25.42	-40.12	31.79	26.19	5.60	5.677			
1,000.00	999.72	999.87	999.69	3.49	2.82	-10.43	24.39	-41.35	29.36	23.06	6.30	4.657			
1,046.39	1,046.09	1,045.92	1,045.71	3.66	2.98	-12.24	24.29	-42.63	29.09	22.46	6.63	4.387 CC			
1,100.00	1,099.67	1,099.18	1,098.94	3.85	3.17	-13.68	24.73	-44.54	29.42	22.41	7.01	4.198 ES			
1,200.00	1,199.62	1,198.63	1,198.25	4.21	3.53	-14.51	26.98	-49.11	31.56	23.85	7.71	4.091 SF			
1,300.00	1,299.58	1,297.78	1,297.15	4.57	3.88	-14.07	30.58	-55.13	35.60	27.19	8.42	4.230			
1,400.00	1,399.53	1,396.63	1,395.56	4.93	4.24	-12.75	35.75	-63.04	42.06	32.94	9.11	4.614			
1,500.00	1,499.48	1,495.34	1,493.56	5.29	4.60	-10.82	42.60	-72.54	50.74	40.93	9.81	5.172			
1,600.00	1,599.44	1,593.96	1,591.25	5.65	4.97	-8.59	51.03	-83.11	61.18	50.68	10.51	5.822			
1,700.00	1,699.39	1,692.00	1,688.08	6.01	5.34	-6.05	61.33	-94.49	73.46	62.26	11.20	6.559			
1,800.00	1,799.34	1,788.00	1,782.55	6.37	5.72	-3.77	73.09	-106.86	87.89	76.04	11.86	7.413			
1,900.00	1,899.29	1,884.97	1,877.54	6.73	6.12	-1.98	86.43	-121.07	104.75	92.21	12.54	8.354			
2,000.00	1,999.25	1,980.18	1,970.28	7.09	6.52	-0.97	100.51	-137.32	124.25	111.05	13.20	9.416			
2,100.00	2,099.20	2,074.40	2,061.51	7.45	6.94	-0.39	115.50	-155.46	146.20	132.36	13.84	10.563			
2,200.00	2,199.15	2,170.98	2,154.67	7.81	7.38	0.21	132.01	-174.86	169.56	155.02	14.54	11.658			
2,300.00	2,299.11	2,268.59	2,248.80	8.17	7.84	0.74	148.95	-194.37	193.02	177.75	15.27	12.640			
2,400.00	2,399.06	2,366.27	2,343.05	8.53	8.31	1.24	166.01	-213.57	216.29	200.29	16.00	13.519			
2,500.00	2,499.01	2,464.95	2,438.37	8.89	8.78	1.71	183.19	-232.46	239.14	222.40	16.74	14.283			
2,600.00	2,598.97	2,562.54	2,532.70	9.25	9.25	2.10	200.03	-250.89	261.71	244.24	17.47	14.979			
2,700.00	2,698.92	2,659.94	2,626.88	9.61	9.73	2.42	216.76	-269.28	284.22	266.02	18.20	15.618			
2,800.00	2,798.87	2,756.52	2,720.20	9.97	10.20	2.71	233.54	-287.61	306.95	288.04	18.92	16.227			
2,900.00	2,898.82	2,854.53	2,814.92	10.33	10.69	2.96	250.56	-306.20	329.66	310.01	19.65	16.773			
3,000.00	2,998.78	2,952.81	2,909.93	10.70	11.17	3.21	267.70	-324.62	352.26	331.87	20.40	17.272			
3,100.00	3,098.73	3,054.43	3,008.36	11.06	11.68	3.40	284.79	-343.23	374.14	352.96	21.18	17.669			
3,200.00	3,198.68	3,156.09	3,107.10	11.42	12.17	3.61	301.31	-360.84	394.88	372.93	21.95	17.989			
3,300.00	3,298.64	3,255.26	3,203.59	11.78	12.65	3.79	317.01	-377.56	415.00	392.30	22.70	18.284			
3,400.00	3,398.59	3,349.41	3,295.16	12.14	13.11	3.89	331.66	-393.79	435.24	411.85	23.39	18.607			
3,500.00	3,498.54	3,438.62	3,381.58	12.50	13.55	3.93	346.21	-410.45	457.06	433.03	24.03	19.019			
3,600.00	3,598.50	3,529.55	3,469.25	12.86	14.02	3.95	361.97	-428.70	480.62	455.92	24.69	19.463			
3,700.00	3,698.45	3,627.25	3,563.31	13.22	14.53	3.93	378.98	-448.96	504.73	479.30	25.44	19.843			
3,800.00	3,798.40	3,729.01	3,661.44	13.58	15.06	3.92	396.35	-469.51	528.21	501.99	26.22	20.143			
3,900.00	3,898.36	3,837.21	3,766.12	13.94	15.60	3.88	413.84	-490.60	550.59	523.51	27.07	20.339			
4,000.00	3,998.31	3,948.40	3,874.36	14.30	16.15	3.87	430.15	-510.08	570.44	542.51	27.93	20.424			
4,100.00	4,098.26	4,054.06	3,977.63	14.66	16.65	3.85	444.42	-527.26	588.57	559.84	28.73	20.488			
4,200.00	4,198.21	4,149.08	4,070.57	15.02	17.09	3.80	456.74	-542.70	606.35	576.92	29.43	20.601			
4,300.00	4,298.17	4,238.38	4,157.72	15.38	17.52	3.71	468.63	-558.16	625.16	595.07	30.09	20.775			
4,400.00	4,398.12	4,334.30	4,251.12	15.74	17.98	3.68	482.44	-575.13	644.97	614.17	30.81	20.935			
4,500.00	4,498.07	4,425.41	4,339.71	16.10	18.43	3.72	496.47	-591.08	665.31	633.83	31.48	21.132			

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



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Reference Site:	Rosa Unit 29	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 29 - Rosa Unit #654H - ST2 - ST2													Offset Site Error:	0.00 ft
Survey Program: 359-MWD+HDGM, 5279-MWD+HDGM, 6808-MWD+HDGM													Offset Well Error:	0.00 ft
Reference	Offset	Semi Major Axis	Reference	Offset	Highside	Offset Wellbore Centre	Distance	Rule Assigned:	Warning					
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
4,600.00	4,598.03	4,507.01	4,418.74	16.46	18.85	3.75	509.86	-606.36	687.26	655.20	32.06	21.434		
4,700.00	4,697.98	4,595.03	4,503.48	16.82	19.31	3.79	525.58	-624.22	711.31	678.60	32.71	21.748		
4,800.00	4,797.93	4,700.52	4,605.01	17.19	19.87	3.84	544.53	-645.69	735.52	701.99	33.53	21.934		
4,900.00	4,897.89	4,798.47	4,699.57	17.55	20.39	3.82	560.83	-665.31	758.60	724.32	34.28	22.130		
5,000.00	4,997.84	4,878.78	4,776.89	17.91	20.82	3.80	574.65	-682.07	782.73	747.88	34.85	22.462		
5,100.00	5,097.79	4,958.15	4,852.74	18.27	21.26	3.77	589.49	-700.12	809.20	773.81	35.40	22.861		
5,200.00	5,197.75	5,048.14	4,938.30	18.63	21.78	3.78	607.69	-721.28	837.28	801.21	36.07	23.214		
5,300.00	5,297.70	5,176.78	5,061.09	18.99	22.35	3.84	633.10	-749.95	864.31	827.30	37.01	23.355		
5,400.00	5,397.65	5,343.66	5,223.09	19.35	22.82	4.14	662.15	-777.25	885.24	847.33	37.90	23.355		
5,500.00	5,497.60	5,449.70	5,327.21	19.71	22.96	4.33	677.26	-790.42	900.91	862.61	38.30	23.522		
5,600.00	5,597.56	5,540.37	5,416.13	20.07	23.10	4.50	690.76	-801.96	917.30	878.65	38.65	23.731		
5,700.00	5,697.51	5,632.32	5,506.10	20.43	23.25	4.75	705.85	-813.39	934.50	895.49	39.02	23.952		
5,800.00	5,797.46	5,729.86	5,601.36	20.79	23.41	5.14	723.73	-824.37	952.17	912.76	39.41	24.162		
5,900.00	5,897.42	5,823.46	5,692.51	21.15	23.58	5.68	743.17	-832.94	970.02	930.23	39.79	24.378		
6,000.00	5,997.37	5,922.00	5,787.90	21.51	23.76	6.49	767.13	-839.01	988.32	948.12	40.20	24.584		
6,100.00	6,097.32	6,016.84	5,879.32	21.87	23.95	7.40	792.04	-842.87	1,006.77	966.17	40.60	24.795		
6,200.00	6,197.28	6,127.94	5,986.67	22.23	24.17	8.38	820.25	-847.80	1,025.10	984.01	41.08	24.951		
6,300.00	6,297.23	6,277.18	6,132.27	22.59	24.44	9.42	852.27	-854.07	1,040.67	998.97	41.70	24.956		
6,400.00	6,397.18	6,433.30	6,286.69	22.96	24.69	10.03	874.03	-860.41	1,050.47	1,008.22	42.26	24.859		
6,500.00	6,497.13	6,524.00	6,376.86	23.32	24.82	10.25	883.13	-864.08	1,057.66	1,014.96	42.70	24.772		
6,600.00	6,597.09	6,562.25	6,414.65	23.68	24.90	10.41	888.72	-865.56	1,068.60	1,025.60	43.00	24.848		
6,642.00	6,639.07	6,575.46	6,427.54	23.83	24.93	10.50	891.58	-866.01	1,075.09	1,032.00	43.09	24.950		
6,650.00	6,647.06	6,577.95	6,429.96	23.86	24.93	20.96	892.17	-866.09	1,076.42	1,033.32	43.10	24.973		
6,700.00	6,696.90	6,620.00	6,470.05	24.04	25.02	38.38	904.71	-867.31	1,085.14	1,041.84	43.30	25.061		
6,750.00	6,746.28	6,620.00	6,470.05	24.23	25.02	41.62	904.71	-867.31	1,090.92	1,047.65	43.27	25.212		
6,800.00	6,794.90	6,620.00	6,470.05	24.42	25.02	42.80	904.71	-867.31	1,096.31	1,053.13	43.18	25.390		
6,850.00	6,842.47	7,590.51	6,998.36	24.61	25.49	86.16	1,202.03	-273.54	1,097.38	1,048.84	48.54	22.606		
6,900.00	6,888.68	7,572.38	6,997.90	24.82	25.53	86.51	1,200.73	-291.62	1,089.58	1,040.84	48.74	22.356		
6,950.00	6,933.27	7,551.59	6,997.32	25.03	25.56	86.42	1,199.25	-312.34	1,083.61	1,034.71	48.89	22.163		
7,000.00	6,975.94	7,528.50	6,996.42	25.25	25.59	85.99	1,197.63	-335.36	1,079.36	1,030.38	48.97	22.040		
7,050.00	7,016.44	7,503.23	6,995.11	25.49	25.63	85.30	1,195.90	-360.54	1,076.69	1,027.71	48.98	21.981		
7,098.25	7,053.22	7,478.15	6,993.49	25.74	25.69	84.48	1,194.23	-385.51	1,075.47	1,026.52	48.95	21.970		
7,100.00	7,054.51	7,476.01	6,993.34	25.75	25.69	84.40	1,194.09	-387.64	1,075.45	1,026.51	48.94	21.975		
7,140.74	7,083.58	7,428.44	6,988.43	25.98	25.78	82.54	1,190.37	-434.80	1,075.06	1,026.36	48.70	22.074		
7,150.00	7,089.93	7,418.14	6,986.98	26.03	25.80	82.13	1,189.41	-444.95	1,075.00	1,026.35	48.65	22.098		
7,200.00	7,122.47	7,152.95	6,892.38	26.36	26.17	69.88	1,128.36	-681.08	1,069.98	1,023.26	46.72	22.903		
7,246.25	7,149.84	7,145.78	6,888.35	26.70	26.17	69.88	1,125.91	-686.48	1,066.43	1,019.48	46.95	22.713		
7,250.00	7,151.94	7,145.15	6,887.99	26.73	26.17	69.88	1,125.70	-686.95	1,066.18	1,019.21	46.97	22.699		
7,293.32	7,174.84	7,137.53	6,883.59	27.09	26.18	69.76	1,123.13	-692.63	1,063.66	1,016.44	47.22	22.525		
7,300.00	7,178.15	7,136.29	6,882.87	27.15	26.18	69.73	1,122.72	-693.55	1,063.33	1,016.07	47.26	22.500		
7,341.26	7,197.21	7,128.29	6,878.13	27.54	26.18	69.51	1,120.07	-699.42	1,061.67	1,014.13	47.54	22.332		
7,350.00	7,200.94	7,126.52	6,877.07	27.62	26.18	69.45	1,119.49	-700.71	1,061.39	1,013.79	47.60	22.298		
7,386.67	7,215.40	7,118.86	6,872.40	28.02	26.19	69.18	1,117.00	-706.25	1,060.51	1,012.62	47.90	22.142		
7,400.00	7,220.17	7,094.00	6,856.55	28.16	26.21	68.00	1,109.19	-723.73	1,060.78	1,013.01	47.77	22.204		
7,439.23	7,232.68	7,094.00	6,856.55	28.63	26.21	68.07	1,109.19	-723.73	1,060.19	1,011.96	48.23	21.981		
7,450.00	7,235.72	7,094.00	6,856.55	28.76	26.21	68.08	1,109.19	-723.73	1,060.13	1,011.77	48.36	21.921		
7,460.53	7,238.51	7,094.00	6,856.55	28.90	26.21	68.09	1,109.19	-723.73	1,060.12	1,011.62	48.50	21.857		
7,500.00	7,247.49	7,091.39	6,854.83	29.42	26.21	67.96	1,108.39	-725.52	1,060.45	1,011.42	49.02	21.631		
7,510.24	7,249.43	7,085.30	6,850.77	29.56	26.21	67.67	1,106.51	-729.66	1,060.60	1,011.49	49.11	21.595		

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



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Reference Site:	Rosa Unit 29	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 29 - Rosa Unit #654H - ST2 - ST2														Offset Site Error:	0.00 ft
Survey Program: 359-MWD+HDGM, 5279-MWD+HDGM, 6808-MWD+HDGM														Offset Well Error:	0.00 ft
Reference	Offset	Reference	Offset	Semi Major Axis	Reference	Offset	Highside Toolface	Offset Wellbore Centre	Distance	Rule Assigned:	Minimum Separation	Separation Factor	Warning		
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning		
7,550.00	7,255.42	7,062.37	6,835.12	30.13	26.22	66.59	1,099.26	-744.76	1,061.26	1,011.79	49.47	21.453			
7,560.34	7,256.58	7,056.58	6,831.06	30.29	26.22	66.32	1,097.39	-748.45	1,061.45	1,011.87	49.57	21.411			
7,600.00	7,259.45	7,034.94	6,815.58	30.90	26.23	65.29	1,090.27	-761.78	1,062.21	1,012.22	49.98	21.251			
7,605.81	7,259.67	7,031.84	6,813.32	30.99	26.24	65.15	1,089.23	-763.63	1,062.32	1,012.27	50.05	21.225			
7,627.16	7,260.00	7,020.58	6,805.02	31.33	26.24	64.62	1,085.43	-770.23	1,062.75	1,012.45	50.29	21.131			
7,641.98	7,259.98	6,957.61	6,756.36	31.58	26.23	61.67	1,060.61	-801.11	1,062.42	1,012.82	49.60	21.422			
7,700.00	7,259.92	6,879.55	6,694.82	32.56	26.17	57.87	1,026.08	-833.87	1,064.01	1,014.76	49.26	21.602			
7,717.82	7,259.89	6,874.05	6,690.39	32.89	26.16	57.59	1,023.35	-835.61	1,064.66	1,015.16	49.49	21.512			
7,800.00	7,259.80	6,852.40	6,672.76	34.41	26.12	56.48	1,012.50	-841.97	1,071.13	1,020.52	50.61	21.164			
7,900.00	7,259.68	6,832.19	6,656.14	36.41	26.09	55.43	1,002.24	-847.16	1,086.84	1,034.74	52.10	20.862			
8,000.00	7,259.57	6,808.00	6,636.05	38.55	26.06	54.16	989.84	-852.43	1,111.01	1,057.63	53.39	20.811			
8,100.00	7,259.45	6,808.00	6,636.05	40.79	26.06	54.16	989.84	-852.43	1,143.11	1,087.96	55.15	20.727			
8,200.00	7,259.33	6,808.00	6,636.05	43.13	26.06	54.16	989.84	-852.43	1,182.81	1,126.07	56.74	20.846			
8,300.00	7,259.21	6,789.58	6,620.57	45.55	25.83	53.20	980.51	-855.99	1,229.03	1,171.39	57.64	21.321			
8,400.00	7,259.10	6,781.98	6,614.12	48.04	25.73	52.80	976.77	-857.43	1,281.40	1,222.76	58.64	21.852			
8,500.00	7,258.98	6,760.00	6,595.24	50.59	25.46	51.66	966.28	-861.50	1,339.30	1,280.21	59.09	22.665			
8,600.00	7,258.86	6,760.00	6,595.24	53.18	25.46	51.66	966.28	-861.50	1,401.51	1,341.58	59.93	23.384			
8,700.00	7,258.75	6,760.00	6,595.24	55.82	25.46	51.66	966.28	-861.50	1,467.90	1,407.27	60.63	24.210			
8,800.00	7,258.63	6,760.00	6,595.24	58.49	25.46	51.66	966.28	-861.50	1,537.93	1,476.73	61.20	25.129			
8,900.00	7,258.51	6,760.00	6,595.24	61.20	25.46	51.66	966.28	-861.50	1,611.13	1,549.47	61.66	26.128			
9,000.00	7,258.40	6,760.00	6,595.24	63.93	25.46	51.66	966.28	-861.50	1,687.08	1,625.05	62.04	27.195			
9,100.00	7,258.28	6,760.00	6,595.24	66.69	25.46	51.66	966.28	-861.50	1,765.44	1,703.10	62.34	28.321			
9,200.00	7,258.16	6,760.00	6,595.24	69.47	25.46	51.66	966.28	-861.50	1,845.88	1,783.30	62.58	29.498			
9,300.00	7,258.05	6,740.68	6,578.46	72.27	25.40	50.66	957.18	-864.44	1,927.60	1,865.26	62.35	30.917			
9,400.00	7,257.93	6,738.62	6,576.66	75.08	25.39	50.55	956.19	-864.68	2,011.35	1,948.89	62.46	32.202			
9,500.00	7,257.81	6,736.76	6,575.04	77.91	25.39	50.45	955.30	-864.89	2,096.52	2,033.97	62.55	33.519			
9,600.00	7,257.70	6,735.07	6,573.57	80.76	25.38	50.36	954.50	-865.07	2,182.93	2,120.32	62.61	34.865			
9,700.00	7,257.58	6,715.00	6,556.07	83.62	25.32	49.32	944.79	-866.53	2,270.98	2,208.71	62.26	36.474			
9,800.00	7,257.46	6,715.00	6,556.07	86.48	25.32	49.32	944.79	-866.53	2,359.41	2,297.08	62.33	37.853			
9,900.00	7,257.35	6,715.00	6,556.07	89.36	25.32	49.32	944.79	-866.53	2,448.74	2,386.35	62.38	39.253			
10,000.00	7,257.23	6,715.00	6,556.07	92.24	25.32	49.32	944.79	-866.53	2,538.86	2,476.43	62.42	40.672			
10,100.00	7,257.11	6,715.00	6,556.07	95.14	25.32	49.32	944.79	-866.53	2,629.69	2,567.24	62.45	42.107			
10,200.00	7,257.00	6,715.00	6,556.07	98.04	25.32	49.32	944.79	-866.53	2,721.17	2,658.69	62.47	43.556			
10,300.00	7,256.88	6,715.00	6,556.07	100.95	25.32	49.32	944.79	-866.53	2,813.23	2,750.74	62.49	45.018			
10,400.00	7,256.76	6,715.00	6,556.07	103.86	25.32	49.32	944.79	-866.53	2,905.81	2,843.31	62.50	46.492			
10,500.00	7,256.65	6,715.00	6,556.07	106.78	25.32	49.32	944.79	-866.53	2,998.87	2,936.36	62.51	47.975			
10,600.00	7,256.53	6,715.00	6,556.07	109.71	25.32	49.32	944.79	-866.53	3,092.36	3,029.85	62.51	49.468			
10,700.00	7,256.41	6,715.00	6,556.07	112.64	25.32	49.32	944.79	-866.53	3,186.25	3,123.73	62.51	50.969			
10,800.00	7,256.30	6,715.00	6,556.07	115.57	25.32	49.32	944.79	-866.53	3,280.50	3,217.98	62.51	52.476			
10,900.00	7,256.18	6,715.00	6,556.07	118.51	25.32	49.32	944.79	-866.53	3,375.08	3,312.56	62.51	53.990			
11,000.00	7,256.06	6,715.00	6,556.07	121.45	25.32	49.32	944.79	-866.53	3,469.96	3,407.45	62.51	55.510			
11,100.00	7,255.95	6,715.00	6,556.07	124.40	25.32	49.32	944.79	-866.53	3,565.12	3,502.62	62.51	57.035			
11,200.00	7,255.83	6,715.00	6,556.07	127.35	25.32	49.32	944.79	-866.53	3,660.55	3,598.04	62.51	58.564			
11,300.00	7,255.71	6,715.00	6,556.07	130.30	25.32	49.32	944.79	-866.53	3,756.21	3,693.70	62.50	60.096			
11,400.00	7,255.60	6,715.00	6,556.07	133.26	25.32	49.32	944.79	-866.53	3,852.09	3,789.59	62.50	61.633			
11,500.00	7,255.48	6,715.00	6,556.07	136.21	25.32	49.32	944.79	-866.53	3,948.17	3,885.67	62.50	63.172			
11,600.00	7,255.36	6,715.00	6,556.07	139.17	25.32	49.32	944.79	-866.53	4,044.45	3,981.95	62.50	64.713			
11,700.00	7,255.25	6,715.00	6,556.07	142.14	25.32	49.32	944.79	-866.53	4,140.90	4,078.40	62.50	66.257			
11,800.00	7,255.13	6,715.00	6,556.07	145.10	25.32	49.32	944.79	-866.53	4,237.51	4,175.01	62.50	67.802			

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



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Reference Site:	Rosa Unit 29	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 29 - Rosa Unit #654H - ST2 - ST2													Offset Site Error: 0.00 ft	
Survey Program: 359-MWD+HDGM, 5279-MWD+HDGM, 6808-MWD+HDGM							Rule Assigned:						Offset Well Error: 0.00 ft	
Reference		Offset		Semi Major Axis			Offset Wellbore Centre		Distance					
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
11,900.00	7,255.01	6,715.00	6,556.07	148.07	25.32	49.32	944.79	-866.53	4,334.28	4,271.78	62.50	69.349		
12,000.00	7,254.90	6,715.00	6,556.07	151.04	25.32	49.32	944.79	-866.53	4,431.19	4,368.69	62.50	70.897		
12,100.00	7,254.78	6,715.00	6,556.07	154.01	25.32	49.32	944.79	-866.53	4,528.24	4,465.73	62.51	72.446		
12,200.00	7,254.66	6,715.00	6,556.07	156.98	25.32	49.32	944.79	-866.53	4,625.41	4,562.90	62.51	73.995		
12,300.00	7,254.55	6,715.00	6,556.07	159.96	25.32	49.32	944.79	-866.53	4,722.70	4,660.19	62.52	75.545		
12,400.00	7,254.43	6,715.00	6,556.07	162.93	25.32	49.32	944.79	-866.53	4,820.10	4,757.58	62.52	77.095		
12,500.00	7,254.31	6,715.00	6,556.07	165.91	25.32	49.32	944.79	-866.53	4,917.61	4,855.08	62.53	78.645		
12,600.00	7,254.20	6,715.00	6,556.07	168.89	25.32	49.32	944.79	-866.53	5,015.21	4,952.68	62.54	80.194		
12,700.00	7,254.08	6,715.00	6,556.07	171.87	25.32	49.32	944.79	-866.53	5,112.91	5,050.36	62.55	81.743		
12,800.00	7,253.96	6,715.00	6,556.07	174.85	25.32	49.32	944.79	-866.53	5,210.70	5,148.14	62.56	83.292		
12,900.00	7,253.85	6,715.00	6,556.07	177.83	25.32	49.32	944.79	-866.53	5,308.56	5,245.99	62.57	84.840		
13,000.00	7,253.73	6,715.00	6,556.07	180.82	25.32	49.32	944.79	-866.53	5,406.51	5,343.92	62.58	86.387		
13,100.00	7,253.61	6,715.00	6,556.07	183.80	25.32	49.32	944.79	-866.53	5,504.53	5,441.93	62.60	87.933		
13,200.00	7,253.50	6,715.00	6,556.07	186.79	25.32	49.32	944.79	-866.53	5,602.61	5,540.00	62.61	89.477		
13,300.00	7,253.38	6,715.00	6,556.07	189.77	25.32	49.32	944.79	-866.53	5,700.77	5,638.14	62.63	91.021		
13,400.00	7,253.26	6,715.00	6,556.07	192.76	25.32	49.32	944.79	-866.53	5,798.99	5,736.34	62.65	92.562		
13,500.00	7,253.15	6,715.00	6,556.07	195.75	25.32	49.32	944.79	-866.53	5,897.27	5,834.60	62.67	94.103		
13,600.00	7,253.03	6,715.00	6,556.07	198.74	25.32	49.32	944.79	-866.53	5,995.60	5,932.91	62.69	95.641		
13,700.00	7,252.91	6,715.00	6,556.07	201.73	25.32	49.32	944.79	-866.53	6,093.99	6,031.28	62.71	97.178		
13,800.00	7,252.80	6,715.00	6,556.07	204.72	25.32	49.32	944.79	-866.53	6,192.43	6,129.70	62.73	98.713		
13,900.00	7,252.68	6,715.00	6,556.07	207.71	25.32	49.32	944.79	-866.53	6,290.92	6,228.17	62.75	100.246		
14,000.00	7,252.56	6,715.00	6,556.07	210.70	25.32	49.32	944.79	-866.53	6,389.46	6,326.68	62.78	101.777		
14,100.00	7,252.45	6,715.00	6,556.07	213.70	25.32	49.32	944.79	-866.53	6,488.04	6,425.23	62.80	103.306		
14,200.00	7,252.33	6,715.00	6,556.07	216.69	25.32	49.32	944.79	-866.53	6,586.66	6,523.83	62.83	104.832		
14,300.00	7,252.21	6,715.00	6,556.07	219.69	25.32	49.32	944.79	-866.53	6,685.33	6,622.47	62.86	106.356		
14,400.00	7,252.10	6,715.00	6,556.07	222.68	25.32	49.32	944.79	-866.53	6,784.03	6,721.15	62.89	107.878		
14,500.00	7,251.98	6,715.00	6,556.07	225.68	25.32	49.32	944.79	-866.53	6,882.77	6,819.86	62.92	109.397		
14,600.00	7,251.86	6,715.00	6,556.07	228.67	25.32	49.32	944.79	-866.53	6,981.55	6,918.61	62.95	110.913		
14,700.00	7,251.75	6,715.00	6,556.07	231.67	25.32	49.32	944.79	-866.53	7,080.36	7,017.39	62.98	112.427		
14,800.00	7,251.63	6,715.00	6,556.07	234.67	25.32	49.32	944.79	-866.53	7,179.21	7,116.20	63.01	113.939		
14,900.00	7,251.51	6,715.00	6,556.07	237.66	25.32	49.32	944.79	-866.53	7,278.08	7,215.04	63.04	115.447		
15,000.00	7,251.40	6,715.00	6,556.07	240.66	25.32	49.32	944.79	-866.53	7,376.99	7,313.91	63.08	116.953		
15,100.00	7,251.28	6,715.00	6,556.07	243.66	25.32	49.32	944.79	-866.53	7,475.93	7,412.82	63.11	118.456		
15,200.00	7,251.16	6,715.00	6,556.07	246.66	25.32	49.32	944.79	-866.53	7,574.89	7,511.74	63.15	119.956		
15,300.00	7,251.05	6,715.00	6,556.07	249.66	25.32	49.32	944.79	-866.53	7,673.88	7,610.70	63.18	121.452		
15,400.00	7,250.93	6,715.00	6,556.07	252.66	25.32	49.32	944.79	-866.53	7,772.90	7,709.68	63.22	122.946		
15,500.00	7,250.81	6,715.00	6,556.07	255.66	25.32	49.32	944.79	-866.53	7,871.94	7,808.68	63.26	124.437		
15,600.00	7,250.70	6,715.00	6,556.07	258.66	25.32	49.32	944.79	-866.53	7,971.00	7,907.70	63.30	125.924		

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



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Reference Site:	Rosa Unit 29	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 29 - Rosa Unit #656H - OH - OH														Offset Site Error:	0.00 ft
Survey Program: 435-MWD+HDGM, 6501-MWD+HDGM, 7540-MWD+HDGM														Offset Well Error:	0.00 ft
Reference	Offset	Reference	Offset	Semi Major Axis	Reference	Offset	Highside	Offset Wellbore Centre		Distance		Rule Assigned:	Warning		
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor			
0.00	0.00	0.50	0.50	0.00	0.00	-81.15	4.92	-31.62	32.00						
100.00	100.00	100.45	100.45	0.27	0.17	-80.90	5.07	-31.68	32.08	31.64	0.44	72.853			
200.00	200.00	200.39	200.39	0.63	0.34	-80.18	5.51	-31.86	32.33	31.36	0.97	33.410			
300.00	300.00	300.34	300.33	0.99	0.51	-79.00	6.25	-32.15	32.75	31.26	1.49	21.909			
350.00	350.00	350.30	350.30	1.17	0.59	-78.25	6.73	-32.34	33.04	31.28	1.76	18.786			
400.00	400.00	400.27	400.26	1.34	0.68	-24.68	7.28	-32.57	32.87	30.85	2.02	16.270			
420.23	420.22	420.49	420.48	1.42	0.71	-24.69	7.52	-32.66	32.54	30.41	2.13	15.300			
500.00	499.95	500.27	500.25	1.70	0.97	-25.00	8.48	-33.04	30.89	28.23	2.67	11.582			
600.00	599.90	600.33	600.31	2.06	1.33	-25.61	9.56	-33.34	28.63	25.25	3.38	8.470			
700.00	699.86	700.21	700.18	2.41	1.69	-25.52	10.98	-33.49	26.30	22.20	4.09	6.423			
800.00	799.81	800.22	800.18	2.77	2.04	-25.32	12.49	-33.89	24.22	19.41	4.81	5.036			
900.00	899.76	899.78	899.72	3.13	2.39	-30.03	12.19	-35.20	22.75	17.24	5.51	4.126			
908.74	908.50	908.47	908.40	3.16	2.42	-30.84	12.02	-35.43	22.74	17.16	5.57	4.079 CC, ES			
1,000.00	999.72	999.12	998.92	3.49	2.73	-42.77	8.83	-38.95	24.04	17.84	6.21	3.874 SF			
1,100.00	1,099.67	1,097.84	1,097.26	3.85	3.08	-56.75	3.05	-45.30	29.70	22.81	6.89	4.310			
1,200.00	1,199.62	1,195.28	1,193.90	4.21	3.43	-64.87	-4.07	-55.50	40.80	33.24	7.56	5.398			
1,300.00	1,299.58	1,293.00	1,290.14	4.57	3.80	-67.98	-12.30	-70.21	56.84	48.60	8.24	6.898			
1,400.00	1,399.53	1,388.00	1,383.15	4.93	4.18	-68.87	-20.99	-87.51	76.03	67.15	8.88	8.561			
1,500.00	1,499.48	1,483.00	1,475.56	5.29	4.58	-69.76	-31.63	-106.77	98.12	88.58	9.54	10.287			
1,600.00	1,599.44	1,579.09	1,568.52	5.65	5.02	-70.42	-43.72	-127.86	122.37	112.14	10.23	11.964			
1,700.00	1,699.39	1,676.38	1,662.51	6.01	5.47	-70.14	-54.60	-150.47	146.93	135.98	10.95	13.423			
1,800.00	1,799.34	1,773.96	1,756.84	6.37	5.93	-69.72	-64.85	-173.27	171.22	159.55	11.67	14.671			
1,900.00	1,899.29	1,873.82	1,853.60	6.73	6.41	-69.57	-75.33	-195.62	194.69	182.26	12.43	15.666			
2,000.00	1,999.25	1,977.94	1,955.07	7.09	6.90	-69.72	-85.86	-216.39	215.90	202.68	13.23	16.322			
2,100.00	2,099.20	2,084.41	2,059.59	7.45	7.37	-69.95	-95.06	-234.47	233.82	219.79	14.03	16.661			
2,200.00	2,199.15	2,187.35	2,161.17	7.81	7.82	-69.76	-100.74	-250.08	248.49	233.69	14.79	16.796			
2,300.00	2,299.11	2,283.11	2,255.58	8.17	8.23	-69.40	-105.47	-265.46	263.62	248.12	15.49	17.013			
2,400.00	2,399.06	2,385.12	2,356.12	8.53	8.67	-69.45	-112.41	-281.21	279.24	262.99	16.25	17.187			
2,500.00	2,499.01	2,489.80	2,459.74	8.89	9.10	-70.03	-120.34	-293.76	292.36	275.34	17.01	17.184			
2,600.00	2,598.97	2,584.83	2,553.84	9.25	9.49	-70.66	-128.10	-304.46	305.26	287.55	17.71	17.238			
2,700.00	2,698.92	2,678.80	2,646.61	9.61	9.89	-71.22	-136.73	-316.73	320.22	301.83	18.40	17.408			
2,800.00	2,798.87	2,780.70	2,747.11	9.97	10.32	-71.45	-144.83	-331.41	335.65	316.50	19.15	17.530			
2,900.00	2,898.82	2,882.99	2,848.20	10.33	10.76	-71.38	-150.73	-345.88	349.60	329.70	19.90	17.569			
3,000.00	2,998.78	2,975.31	2,939.39	10.70	11.15	-71.28	-155.97	-359.32	363.87	343.29	20.57	17.685			
3,100.00	3,098.73	3,070.99	3,033.59	11.06	11.57	-71.25	-162.85	-374.57	380.10	358.82	21.28	17.864			
3,200.00	3,198.68	3,175.22	3,136.31	11.42	12.02	-71.28	-170.42	-390.54	395.89	373.84	22.05	17.954			
3,300.00	3,298.64	3,276.58	3,236.42	11.78	12.45	-71.32	-177.09	-404.96	410.37	387.58	22.80	18.001			
3,400.00	3,398.59	3,372.26	3,330.90	12.14	12.86	-71.36	-183.55	-418.62	424.99	401.49	23.50	18.084			
3,500.00	3,498.54	3,475.41	3,432.73	12.50	13.30	-71.38	-190.36	-433.60	439.74	415.48	24.26	18.126			
3,600.00	3,598.50	3,574.77	3,530.92	12.86	13.72	-71.37	-196.40	-447.53	453.78	428.79	24.99	18.157			
3,700.00	3,698.45	3,681.83	3,636.86	13.22	14.17	-71.41	-202.75	-461.63	467.03	441.26	25.77	18.121			
3,800.00	3,798.40	3,791.81	3,746.02	13.58	14.61	-71.55	-208.57	-473.60	478.00	451.44	26.56	17.997			
3,900.00	3,898.36	3,890.66	3,844.24	13.94	15.00	-71.65	-213.13	-483.74	488.10	460.82	27.28	17.892			
4,000.00	3,998.31	3,987.54	3,940.44	14.30	15.38	-71.66	-217.22	-494.45	498.63	470.64	27.99	17.814			
4,100.00	4,098.26	4,084.44	4,036.58	14.66	15.77	-71.56	-220.77	-506.00	509.55	480.85	28.70	17.754			
4,200.00	4,198.21	4,177.63	4,128.93	15.02	16.15	-71.41	-224.16	-518.05	521.31	491.92	29.39	17.738			
4,300.00	4,298.17	4,268.94	4,219.22	15.38	16.53	-71.25	-228.16	-531.04	534.54	504.48	30.06	17.782			
4,400.00	4,398.12	4,362.71	4,311.79	15.74	16.93	-71.11	-232.93	-545.19	548.90	518.15	30.75	17.850			
4,500.00	4,498.07	4,456.32	4,404.05	16.10	17.34	-70.95	-238.00	-560.22	564.25	532.81	31.44	17.948			

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



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Reference Site:	Rosa Unit 29	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 29 - Rosa Unit #656H - OH - OH														Offset Site Error:	0.00 ft
Survey Program: 435-MWD+HDGM, 6501-MWD+HDGM, 7540-MWD+HDGM														Offset Well Error:	0.00 ft
Reference	Offset	Semi Major Axis		Rule Assigned:		Distance		Warning							
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor			
4,600.00	4,598.03	4,554.60	4,500.82	16.46	17.77	-70.83	-244.07	-576.27	580.25	548.08	32.16	18.040			
4,700.00	4,697.98	4,653.97	4,598.79	16.82	18.20	-70.78	-250.41	-591.67	595.67	562.77	32.90	18.106			
4,800.00	4,797.93	4,742.71	4,686.08	17.19	18.60	-70.73	-256.57	-606.38	612.31	578.76	33.55	18.253			
4,900.00	4,897.89	4,835.04	4,776.67	17.55	19.02	-70.62	-263.15	-622.95	630.18	595.96	34.22	18.415			
5,000.00	4,997.84	4,929.47	4,869.17	17.91	19.45	-70.50	-270.06	-640.66	648.85	613.94	34.92	18.582			
5,100.00	5,097.79	5,036.45	4,973.96	18.27	19.94	-70.40	-278.32	-660.53	667.64	631.91	35.73	18.687			
5,200.00	5,197.75	5,153.32	5,089.10	18.63	20.46	-70.44	-286.79	-678.66	683.49	646.89	36.61	18.671			
5,300.00	5,297.70	5,246.19	5,180.71	18.99	20.86	-70.39	-292.43	-692.83	698.57	661.28	37.29	18.733			
5,400.00	5,397.65	5,329.04	5,262.12	19.35	21.24	-70.24	-297.01	-707.49	715.39	677.50	37.89	18.880			
5,500.00	5,497.60	5,418.72	5,349.87	19.71	21.65	-70.09	-303.19	-724.89	734.35	695.80	38.54	19.052			
5,600.00	5,597.56	5,519.89	5,448.93	20.07	22.12	-69.99	-310.77	-744.05	753.28	713.97	39.30	19.165			
5,700.00	5,697.51	5,625.34	5,552.30	20.43	22.61	-69.98	-319.37	-762.98	771.75	731.65	40.10	19.245			
5,800.00	5,797.46	5,744.49	5,669.54	20.79	23.14	-70.08	-329.24	-781.77	788.48	747.48	41.00	19.233			
5,900.00	5,897.42	5,850.36	5,774.07	21.15	23.59	-70.19	-337.07	-796.62	803.23	761.46	41.78	19.228			
6,000.00	5,997.37	5,952.73	5,875.24	21.51	24.02	-70.28	-344.31	-810.52	817.44	774.92	42.53	19.222			
6,100.00	6,097.32	6,058.65	5,980.00	21.87	24.47	-70.38	-351.54	-824.31	831.05	787.75	43.30	19.193			
6,200.00	6,197.28	6,167.55	6,087.89	22.23	24.91	-70.50	-358.60	-837.40	843.63	799.55	44.09	19.136			
6,300.00	6,297.23	6,266.55	6,205.99	22.59	25.38	-70.62	-365.23	-850.35	854.82	809.90	44.92	19.031			
6,400.00	6,397.18	7,496.88	6,989.57	22.96	27.99	-126.06	-404.00	-169.39	784.65	747.87	36.78	21.336			
6,500.00	6,497.13	7,494.18	6,989.56	23.32	27.98	-125.77	-403.90	-172.09	713.53	673.88	39.65	17.995			
6,600.00	6,597.09	7,491.83	6,989.55	23.68	27.96	-125.51	-403.81	-174.43	650.06	607.19	42.87	15.164			
6,642.00	6,639.07	7,490.94	6,989.54	23.83	27.95	-125.42	-403.77	-175.33	626.25	581.96	44.29	14.141			
6,650.00	6,647.06	7,490.72	6,989.54	23.86	27.95	-115.32	-403.76	-175.55	621.93	577.37	44.56	13.958			
6,700.00	6,696.90	7,486.91	6,989.51	24.04	27.93	-100.16	-403.62	-179.35	596.63	550.40	46.23	12.906			
6,750.00	6,746.28	7,479.23	6,989.42	24.23	27.87	-97.92	-403.34	-187.03	574.60	526.78	47.82	12.016			
6,800.00	6,794.90	7,468.02	6,989.24	24.42	27.80	-96.97	-402.95	-198.23	556.19	506.93	49.26	11.292			
6,850.00	6,842.47	7,453.65	6,988.89	24.61	27.70	-95.99	-402.48	-212.58	541.68	491.20	50.48	10.731			
6,900.00	6,888.68	7,436.59	6,988.32	24.82	27.54	-94.68	-401.97	-229.63	531.22	479.82	51.40	10.335			
6,950.00	6,933.27	7,417.62	6,987.36	25.03	27.33	-93.00	-401.49	-248.57	524.82	472.85	51.97	10.099			
7,000.00	6,975.94	7,397.01	6,985.93	25.25	27.10	-90.95	-401.09	-269.12	522.38	470.15	52.23	10.002			
7,007.50	6,982.16	7,393.79	6,985.66	25.28	27.06	-90.61	-401.04	-272.33	522.34	470.10	52.24	9.999			
7,050.00	7,016.44	7,374.99	6,983.93	25.49	26.85	-88.56	-400.79	-291.06	523.65	471.46	52.19	10.034			
7,100.00	7,054.51	7,351.00	6,981.23	25.75	26.59	-85.82	-400.62	-314.89	528.30	476.41	51.88	10.182			
7,150.00	7,089.93	7,325.86	6,977.79	26.03	26.38	-82.85	-400.57	-339.79	535.86	484.43	51.44	10.418			
7,200.00	7,122.47	7,299.13	6,973.42	26.36	26.16	-79.67	-400.60	-366.16	545.84	494.98	50.86	10.731			
7,250.00	7,151.94	7,272.43	6,967.97	26.73	25.98	-76.45	-400.61	-392.29	557.79	507.53	50.26	11.099			
7,300.00	7,178.15	7,245.87	6,961.32	27.15	25.83	-73.24	-400.55	-418.00	571.33	521.68	49.65	11.508			
7,350.00	7,200.94	7,219.31	6,953.44	27.62	25.71	-70.05	-400.37	-443.37	586.09	537.00	49.08	11.941			
7,400.00	7,220.17	7,191.94	6,944.12	28.16	25.61	-66.89	-400.06	-469.10	601.72	553.13	48.59	12.384			
7,450.00	7,235.72	7,163.00	6,933.22	28.76	25.53	-63.79	-399.64	-495.90	617.81	569.65	48.17	12.826			
7,500.00	7,247.49	7,134.42	6,921.42	29.42	25.48	-60.89	-399.07	-521.92	634.03	586.14	47.88	13.241			
7,550.00	7,255.42	7,114.00	6,912.36	30.13	25.45	-58.56	-398.53	-540.21	650.14	602.30	47.84	13.591			
7,600.00	7,259.45	7,081.14	6,896.54	30.90	25.43	-55.84	-397.55	-569.00	665.88	618.16	47.72	13.953			
7,627.16	7,260.00	7,067.00	6,889.24	31.33	25.42	-54.61	-397.10	-581.10	674.34	626.58	47.76	14.119			
7,700.00	7,259.92	7,030.65	6,869.14	32.56	25.43	-53.10	-395.77	-611.34	698.67	650.72	47.95	14.571			
7,800.00	7,259.80	6,987.74	6,842.98	34.41	25.46	-51.20	-393.88	-645.29	738.04	689.74	48.30	15.279			
7,900.00	7,259.68	6,951.64	6,818.92	36.41	25.50	-49.54	-392.22	-672.15	784.37	735.63	48.74	16.094			
8,000.00	7,259.57	6,925.00	6,800.00	38.55	25.53	-48.28	-391.03	-690.86	837.25	787.97	49.29	16.988			
8,100.00	7,259.45	6,891.91	6,775.26	40.79	25.58	-46.71	-389.70	-712.78	895.87	846.23	49.64	18.049			

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



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Reference Site:	Rosa Unit 29	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 29 - Rosa Unit #656H - OH - OH														Offset Site Error:	0.00 ft
Survey Program: 435-MWD+HDGM, 6501-MWD+HDGM, 7540-MWD+HDGM														Offset Well Error:	0.00 ft
Reference	Offset	Semi Major Axis		Rule Assigned:		Distance		Warning							
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor			
8,200.00	7,259.33	6,877.00	6,763.70	43.13	25.60	-46.01	-389.17	-722.18	959.71	909.48	50.24	19.104			
8,300.00	7,259.21	6,832.00	6,727.70	45.55	25.68	-43.96	-388.38	-749.17	1,027.57	977.29	50.28	20.438			
8,400.00	7,259.10	6,815.59	6,714.21	48.04	25.71	-43.24	-388.33	-758.50	1,099.01	1,048.27	50.73	21.663			
8,500.00	7,258.98	6,783.00	6,686.76	50.59	25.77	-41.83	-388.05	-776.06	1,173.63	1,122.74	50.89	23.063			
8,600.00	7,258.86	6,783.00	6,686.76	53.18	25.77	-41.83	-388.05	-776.06	1,250.82	1,199.40	51.43	24.323			
8,700.00	7,258.75	6,759.27	6,666.18	55.82	25.81	-40.81	-387.70	-787.87	1,330.34	1,278.73	51.60	25.781			
8,800.00	7,258.63	6,737.00	6,646.37	58.49	25.84	-39.85	-387.23	-798.02	1,412.17	1,360.41	51.76	27.285			
8,900.00	7,258.51	6,737.00	6,646.37	61.20	25.84	-39.85	-387.23	-798.02	1,495.65	1,443.53	52.12	28.699			
9,000.00	7,258.40	6,737.00	6,646.37	63.93	25.84	-39.85	-387.23	-798.02	1,581.05	1,528.63	52.42	30.163			
9,100.00	7,258.28	6,711.95	6,623.58	66.69	25.88	-38.80	-386.62	-808.39	1,667.33	1,614.87	52.46	31.783			
9,200.00	7,258.16	6,690.00	6,603.22	69.47	25.91	-37.89	-386.07	-816.60	1,755.25	1,702.73	52.52	33.422			
9,300.00	7,258.05	6,690.00	6,603.22	72.27	25.91	-37.89	-386.07	-816.60	1,843.89	1,791.15	52.74	34.962			
9,400.00	7,257.93	6,690.00	6,603.22	75.08	25.91	-37.89	-386.07	-816.60	1,933.63	1,880.70	52.93	36.532			
9,500.00	7,257.81	6,690.00	6,603.22	77.91	25.91	-37.89	-386.07	-816.60	2,024.34	1,971.24	53.10	38.126			
9,600.00	7,257.70	6,665.92	6,580.57	80.76	25.94	-36.91	-385.22	-824.71	2,115.37	2,062.28	53.09	39.843			
9,700.00	7,257.58	6,643.00	6,558.76	83.62	25.97	-35.98	-384.00	-831.64	2,207.44	2,154.35	53.09	41.582			
9,800.00	7,257.46	6,643.00	6,558.76	86.48	25.97	-35.98	-384.00	-831.64	2,299.73	2,246.51	53.22	43.209			
9,900.00	7,257.35	6,643.00	6,558.76	89.36	25.97	-35.98	-384.00	-831.64	2,392.65	2,339.30	53.35	44.852			
10,000.00	7,257.23	6,643.00	6,558.76	92.24	25.97	-35.98	-384.00	-831.64	2,486.12	2,432.66	53.46	46.508			
10,100.00	7,257.11	6,643.00	6,558.76	95.14	25.97	-35.98	-384.00	-831.64	2,580.07	2,526.52	53.56	48.175			
10,200.00	7,257.00	6,643.00	6,558.76	98.04	25.97	-35.98	-384.00	-831.64	2,674.47	2,620.82	53.65	49.851			
10,300.00	7,256.88	6,643.00	6,558.76	100.95	25.97	-35.98	-384.00	-831.64	2,769.26	2,715.52	53.73	51.537			
10,400.00	7,256.76	6,620.65	6,537.25	103.86	25.99	-35.08	-382.56	-837.54	2,863.84	2,810.13	53.71	53.317			
10,500.00	7,256.65	6,616.93	6,533.65	106.78	25.99	-34.93	-382.31	-838.44	2,959.11	2,905.33	53.78	55.026			
10,600.00	7,256.53	6,596.00	6,513.27	109.71	26.01	-34.12	-380.84	-842.96	3,054.98	3,001.22	53.76	56.824			
10,700.00	7,256.41	6,596.00	6,513.27	112.64	26.01	-34.12	-380.84	-842.96	3,150.66	3,096.82	53.84	58.521			
10,800.00	7,256.30	6,596.00	6,513.27	115.57	26.01	-34.12	-380.84	-842.96	3,246.60	3,192.69	53.91	60.223			
10,900.00	7,256.18	6,596.00	6,513.27	118.51	26.01	-34.12	-380.84	-842.96	3,342.77	3,288.79	53.98	61.928			
11,000.00	7,256.06	6,596.00	6,513.27	121.45	26.01	-34.12	-380.84	-842.96	3,439.16	3,385.12	54.04	63.637			
11,100.00	7,255.95	6,596.00	6,513.27	124.40	26.01	-34.12	-380.84	-842.96	3,535.76	3,481.65	54.11	65.348			
11,200.00	7,255.83	6,596.00	6,513.27	127.35	26.01	-34.12	-380.84	-842.96	3,632.53	3,578.37	54.17	67.061			
11,300.00	7,255.71	6,596.00	6,513.27	130.30	26.01	-34.12	-380.84	-842.96	3,729.48	3,675.25	54.23	68.776			
11,400.00	7,255.60	6,596.00	6,513.27	133.26	26.01	-34.12	-380.84	-842.96	3,826.58	3,772.30	54.28	70.492			
11,500.00	7,255.48	6,596.00	6,513.27	136.21	26.01	-34.12	-380.84	-842.96	3,923.83	3,869.49	54.34	72.208			
11,600.00	7,255.36	6,576.36	6,494.03	139.17	26.02	-33.37	-379.47	-846.68	4,021.02	3,966.68	54.34	73.995			
11,700.00	7,255.25	6,571.94	6,489.69	142.14	26.02	-33.21	-379.18	-847.48	4,118.44	4,064.05	54.39	75.725			
11,800.00	7,255.13	6,567.67	6,485.50	145.10	26.03	-33.05	-378.89	-848.24	4,215.95	4,161.52	54.43	77.454			
11,900.00	7,255.01	6,548.00	6,466.15	148.07	26.04	-32.35	-377.66	-851.56	4,313.69	4,259.25	54.44	79.236			
12,000.00	7,254.90	6,548.00	6,466.15	151.04	26.04	-32.35	-377.66	-851.56	4,411.34	4,356.84	54.50	80.945			
12,100.00	7,254.78	6,548.00	6,466.15	154.01	26.04	-32.35	-377.66	-851.56	4,509.09	4,454.54	54.55	82.653			
12,200.00	7,254.66	6,548.00	6,466.15	156.98	26.04	-32.35	-377.66	-851.56	4,606.94	4,552.33	54.61	84.360			
12,300.00	7,254.55	6,548.00	6,466.15	159.96	26.04	-32.35	-377.66	-851.56	4,704.88	4,650.21	54.67	86.065			
12,400.00	7,254.43	6,548.00	6,466.15	162.93	26.04	-32.35	-377.66	-851.56	4,802.90	4,748.18	54.72	87.770			
12,500.00	7,254.31	6,548.00	6,466.15	165.91	26.04	-32.35	-377.66	-851.56	4,901.01	4,846.23	54.78	89.472			
12,600.00	7,254.20	6,548.00	6,466.15	168.89	26.04	-32.35	-377.66	-851.56	4,999.19	4,944.36	54.83	91.173			
12,700.00	7,254.08	6,548.00	6,466.15	171.87	26.04	-32.35	-377.66	-851.56	5,097.44	5,042.55	54.89	92.871			
12,800.00	7,253.96	6,548.00	6,466.15	174.85	26.04	-32.35	-377.66	-851.56	5,195.76	5,140.81	54.94	94.568			
12,900.00	7,253.85	6,548.00	6,466.15	177.83	26.04	-32.35	-377.66	-851.56	5,294.14	5,239.14	55.00	96.261			
13,000.00	7,253.73	6,548.00	6,466.15	180.82	26.04	-32.35	-377.66	-851.56	5,392.58	5,337.52	55.05	97.953			

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



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Reference Site:	Rosa Unit 29	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 29 - Rosa Unit #656H - OH - OH													Offset Site Error: 0.00 ft	
Survey Program: 435-MWD+HDGM, 6501-MWD+HDGM, 7540-MWD+HDGM		Offset							Rule Assigned:				Offset Well Error: 0.00 ft	
Reference		Offset		Semi Major Axis		Offset Wellbore Centre			Distance					
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
13,100.00	7,253.61	6,548.00	6,466.15	183.80	26.04	-32.35	-377.66	-851.56	5,491.07	5,435.96	55.11	99.641		
13,200.00	7,253.50	6,527.72	6,446.14	186.79	26.05	-31.64	-376.46	-854.61	5,589.36	5,534.22	55.14	101.375		
13,300.00	7,253.38	6,525.77	6,444.22	189.77	26.05	-31.58	-376.35	-854.88	5,687.91	5,632.72	55.19	103.061		
13,400.00	7,253.26	6,523.89	6,442.35	192.76	26.05	-31.51	-376.24	-855.14	5,786.50	5,731.26	55.24	104.743		
13,500.00	7,253.15	6,522.06	6,440.54	195.75	26.05	-31.45	-376.13	-855.39	5,885.14	5,829.84	55.30	106.422		
13,600.00	7,253.03	6,501.00	6,419.68	198.74	26.06	-30.76	-374.97	-857.97	5,984.05	5,928.72	55.33	108.146		
13,700.00	7,252.91	6,501.00	6,419.68	201.73	26.06	-30.76	-374.97	-857.97	6,082.73	6,027.34	55.39	109.812		
13,800.00	7,252.80	6,501.00	6,419.68	204.72	26.06	-30.76	-374.97	-857.97	6,181.45	6,125.99	55.45	111.475		
13,900.00	7,252.68	6,501.00	6,419.68	207.71	26.06	-30.76	-374.97	-857.97	6,280.21	6,224.69	55.51	113.134		
14,000.00	7,252.56	6,501.00	6,419.68	210.70	26.06	-30.76	-374.97	-857.97	6,379.00	6,323.43	55.57	114.790		
14,100.00	7,252.45	6,501.00	6,419.68	213.70	26.06	-30.76	-374.97	-857.97	6,477.84	6,422.21	55.63	116.441		
14,200.00	7,252.33	6,501.00	6,419.68	216.69	26.06	-30.76	-374.97	-857.97	6,576.71	6,521.02	55.69	118.089		
14,300.00	7,252.21	6,501.00	6,419.68	219.69	26.06	-30.76	-374.97	-857.97	6,675.61	6,619.86	55.75	119.734		
14,400.00	7,252.10	6,501.00	6,419.68	222.68	26.06	-30.76	-374.97	-857.97	6,774.55	6,718.73	55.82	121.374		
14,500.00	7,251.98	6,501.00	6,419.68	225.68	26.06	-30.76	-374.97	-857.97	6,873.52	6,817.64	55.88	123.010		
14,600.00	7,251.86	6,501.00	6,419.68	228.67	26.06	-30.76	-374.97	-857.97	6,972.51	6,916.57	55.94	124.642		
14,700.00	7,251.75	6,501.00	6,419.68	231.67	26.06	-30.76	-374.97	-857.97	7,071.54	7,015.53	56.00	126.270		
14,800.00	7,251.63	6,501.00	6,419.68	234.67	26.06	-30.76	-374.97	-857.97	7,170.59	7,114.52	56.07	127.894		
14,900.00	7,251.51	6,501.00	6,419.68	237.66	26.06	-30.76	-374.97	-857.97	7,269.67	7,213.54	56.13	129.513		
15,000.00	7,251.40	6,501.00	6,419.68	240.66	26.06	-30.76	-374.97	-857.97	7,368.77	7,312.57	56.20	131.128		
15,100.00	7,251.28	6,501.00	6,419.68	243.66	26.06	-30.76	-374.97	-857.97	7,467.90	7,411.64	56.26	132.739		
15,200.00	7,251.16	6,501.00	6,419.68	246.66	26.06	-30.76	-374.97	-857.97	7,567.05	7,510.72	56.33	134.345		
15,300.00	7,251.05	6,501.00	6,419.68	249.66	26.06	-30.76	-374.97	-857.97	7,666.22	7,609.83	56.39	135.946		
15,400.00	7,250.93	6,501.00	6,419.68	252.66	26.06	-30.76	-374.97	-857.97	7,765.41	7,708.95	56.46	137.543		
15,500.00	7,250.81	6,501.00	6,419.68	255.66	26.06	-30.76	-374.97	-857.97	7,864.62	7,808.10	56.52	139.136		
15,600.00	7,250.70	6,501.00	6,419.68	258.66	26.06	-30.76	-374.97	-857.97	7,963.86	7,907.26	56.59	140.723		



Lonestar Consulting, LLC

Anticollision Report

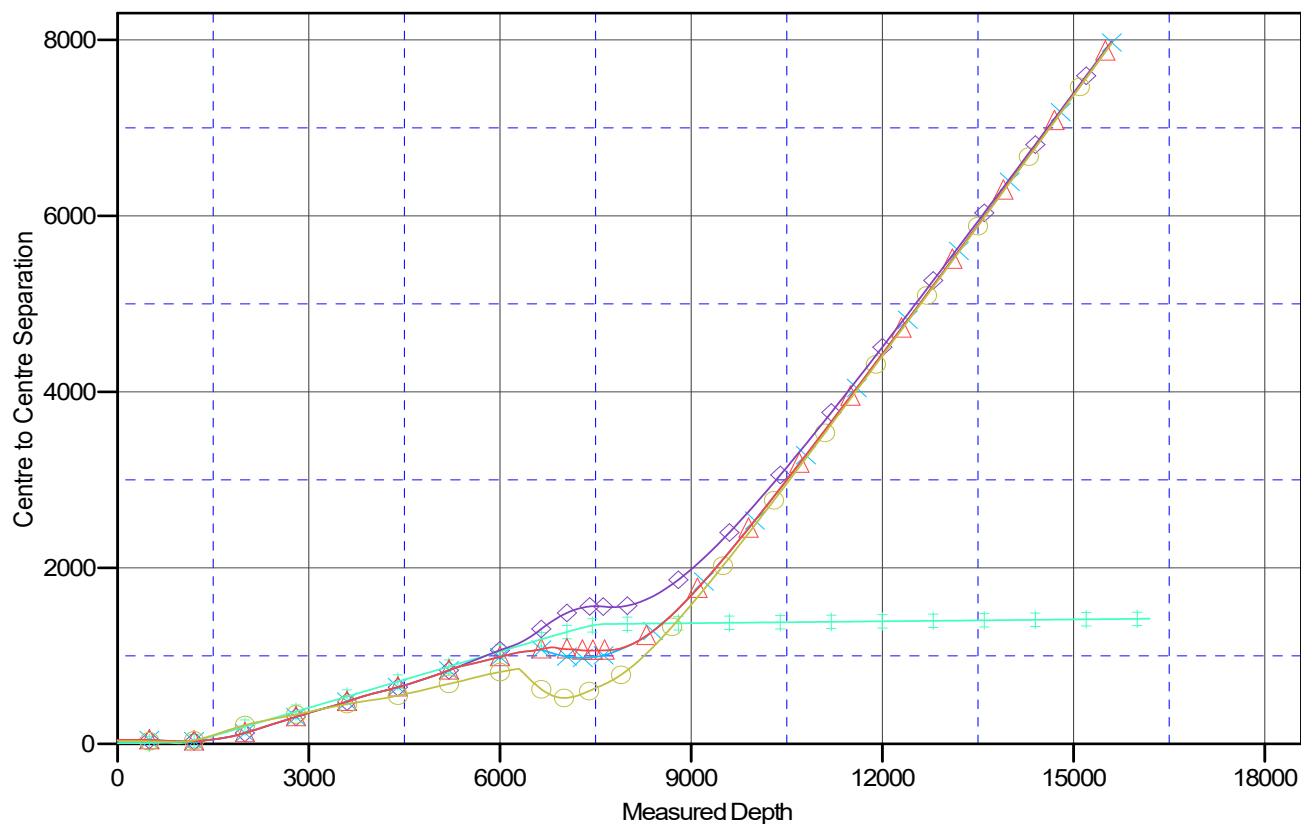


Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Reference Site:	Rosa Unit 29	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Reference Depths are relative to GL 6372' & RKB 24.5' @ 6396.50ft (E)
 Offset Depths are relative to Offset Datum
 Central Meridian is -107.8333334

Coordinates are relative to: Rosa Unit #652H - Slot A10 (652H Adjusted)
 Coordinate System is US State Plane 1983, New Mexico Western Zone
 Grid Convergence at Surface is: 0.25°

Ladder Plot



LEGEND

● Rosa Unit#650H OH Plan #9 V0
✕ Rosa Unit#654H ST1, ST1 V0
▲ Rosa Unit#654H ST2, ST2 V0
● Rosa Unit#656H OH O H V0

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



Lonestar Consulting, LLC

Anticollision Report

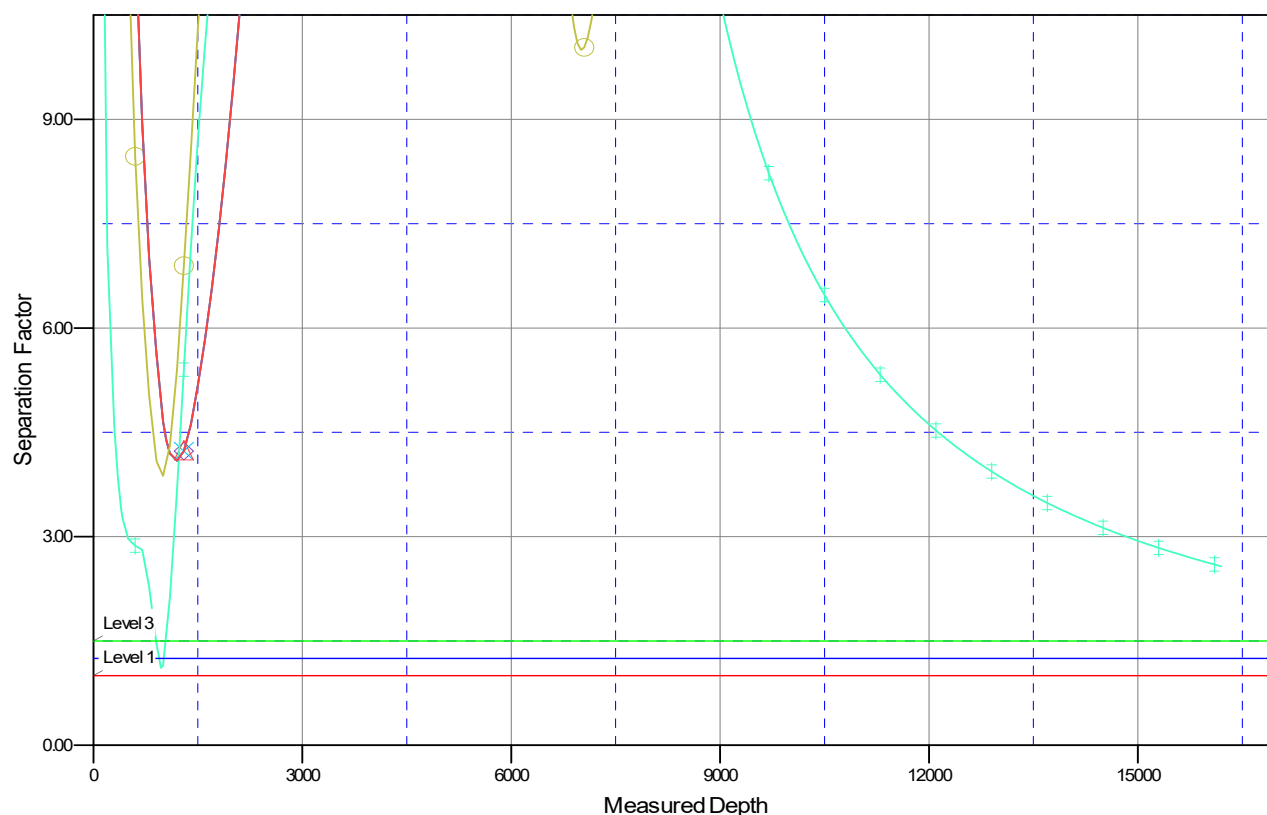


Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Reference Site:	Rosa Unit 29	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 ft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction
Reference Design:	Plan #9	Offset TVD Reference:	Offset Datum

Reference Depths are relative to GL 6372' & RKB 24.5' @ 6396.50ft (E)
 Offset Depths are relative to Offset Datum
 Central Meridian is -107.8333334

Coordinates are relative to: Rosa Unit #652H - Slot A10 (652H Adjusted)
 Coordinate System is US State Plane 1983, New Mexico Western Zone
 Grid Convergence at Surface is: 0.25°

Separation Factor Plot



LEGEND

Rosa Unit#650H OH Plan#9 V0
 Rosa Unit#654H ST1, ST1 V0
 Rosa Unit#654H ST2, ST2 V0
 Rosa Unit#656H OH HO V0

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

Released to Imaging: 10/5/2022 9:54:30 AM



Company: Logos Operating LLC
Project: Rio Arriba, NM NAD83
Site: Rosa Unit 29
Well: Rosa Unit #652H
Wellbore: OH
Design: Plan #9

PROJECT DETAILS: Rio Arriba, NM NAD83

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



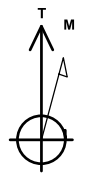
WELL DETAILS: Rosa Unit #652H

GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.00	0.00	2138066.36	2847305.45	36.8749049	-107.4065165 (652H Adjusted)

Plan: Plan #9 (Rosa Unit #652H/OH)

Created By: Janie Collins Date: 12:54, August 31 2022



Azimuths to True North: 929.24°
Magnetic North: 829.24°

Magnetic Field
Strength: 49909.01
Dip Angle: 63.82°
Date: 3/6/2019
Model: HDGM2021_FIT

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Rosa 652H POE Rev 3	7260.00	125.45	-790.51	2138188.28	2846514.39	36.8752494	-107.4113540
Rosa 652H BHL Rev 3	7250.00	110.55	-9359.91	2138135.27	2837945.16	36.8752042	-107.4406521
Rosa 652H FPerf	7250.00	110.78	-9185.85	2138136.28	2838119.21	36.8752050	-107.4400570

SECTION DETAILS

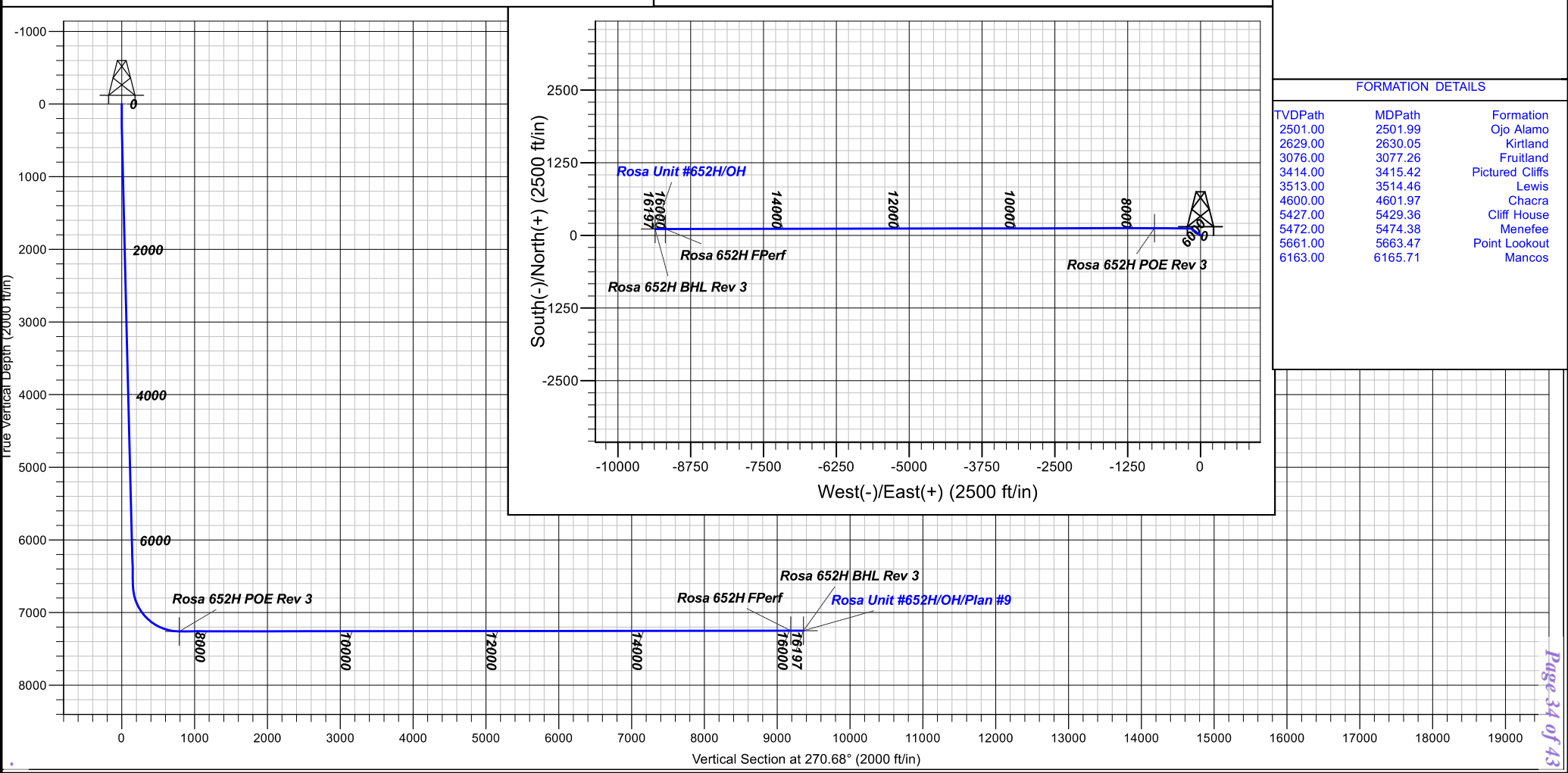
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
350.00	0.00	0.00	350.00	0.00	0.00	0.00	0.00	0.00
420.23	1.76	306.89	420.22	0.65	-0.86	2.50	306.89	0.87
6642.00	1.76	306.89	6639.07	115.09	-153.32	0.00	0.00	154.67
7627.16	90.07	269.90	7280.00	125.45	-790.51	9.00	-37.00	791.94
16196.58	90.07	269.90	7250.00	110.55	-9359.91	0.00	0.00	9360.56

CASING DETAILS

No casing data is available

FORMATION DETAILS

TVDPath	MDPath	Formation
2501.00	2501.99	Ojo Alamo
2629.00	2630.05	Kirtland
3076.00	3077.26	Fruitland
3414.00	3415.42	Pictured Cliffs
3513.00	3514.46	Lewis
4600.00	4601.97	Chacra
5427.00	5429.36	Cliff House
5472.00	5474.38	Menefee
5661.00	5663.47	Point Lookout
6163.00	6165.71	Mancos



Received by OCB: 9/29/2022 5:29 PM



Logos Operating LLC

Rio Arriba, NM NAD83

Rosa Unit 29

Rosa Unit #652H - Slot A10 (652H Adjusted)

OH

Plan: Plan #9

Standard Planning Report

31 August, 2022





Lonestar Consulting, LLC Planning Report



Database:	Grand Junction	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Company:	Logos Operating LLC	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site:	Rosa Unit 29	North Reference:	True
Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #9		

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

Site		Rosa Unit 29				
Site Position:		Northing:	2,138,126.53	usft	Latitude:	36.875071
From:	Map	Easting:	2,847,195.58	usft	Longitude:	-107.409026
Position Uncertainty:		0.00	ft	Slot Radius:	13.200	in

Well	Rosa Unit #652H - Slot A10 (652H Adjusted)					
Well Position	+N/-S	0.00 ft	Northing:	2,138,066.35 usft	Latitude:	36.874904
	+E/-W	0.00 ft	Easting:	2,847,305.45 usft	Longitude:	-107.408651
Position Uncertainty		0.00 ft	Wellhead Elevation:	0.00 ft	Ground Level:	6,372.00 ft
Grid Convergence:		0.25 °				

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM2021_FILE	3/6/2019	8.88	63.42	49,909.20000000

Design	Plan #9			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	270.68

Plan Survey Tool Program	Date	8/31/2022		
Depth From (ft)	Depth To (ft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	16,196.58 Plan #9 (OH)	MWD+HDGM	
			OWSG MWD + HDGM	



Lonestar Consulting, LLC
Planning Report



Database:	Grand Junction	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Company:	Logos Operating LLC	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site:	Rosa Unit 29	North Reference:	True
Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #9		

Plan Sections										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
350.00	0.00	0.00	350.00	0.00	0.00	0.00	0.00	0.00	0.00	
420.23	1.76	306.89	420.22	0.65	-0.86	2.50	2.50	0.00	306.89	
6,642.00	1.76	306.89	6,639.07	115.09	-153.32	0.00	0.00	0.00	0.00	
7,627.16	90.07	269.90	7,260.00	125.45	-790.51	9.00	8.96	-3.75	-37.00	Rosa 652H POE Rev
16,196.58	90.07	269.90	7,250.00	110.55	-9,359.91	0.00	0.00	0.00	0.00	Rosa 652H BHL Rev :



Lonestar Consulting, LLC

Planning Report



Database:	Grand Junction	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Company:	Logos Operating LLC	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site:	Rosa Unit 29	North Reference:	True
Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #9		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
350.00	0.00	0.00	350.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	1.25	306.89	400.00	0.33	-0.44	0.44	2.50	2.50	0.00
420.23	1.76	306.89	420.22	0.65	-0.86	0.87	2.50	2.50	0.00
500.00	1.76	306.89	499.95	2.11	-2.82	2.84	0.00	0.00	0.00
600.00	1.76	306.89	599.90	3.95	-5.27	5.31	0.00	0.00	0.00
700.00	1.76	306.89	699.86	5.79	-7.72	7.78	0.00	0.00	0.00
800.00	1.76	306.89	799.81	7.63	-10.17	10.26	0.00	0.00	0.00
900.00	1.76	306.89	899.76	9.47	-12.62	12.73	0.00	0.00	0.00
1,000.00	1.76	306.89	999.72	11.31	-15.07	15.20	0.00	0.00	0.00
1,100.00	1.76	306.89	1,099.67	13.15	-17.52	17.67	0.00	0.00	0.00
1,200.00	1.76	306.89	1,199.62	14.99	-19.97	20.14	0.00	0.00	0.00
1,300.00	1.76	306.89	1,299.58	16.83	-22.42	22.62	0.00	0.00	0.00
1,400.00	1.76	306.89	1,399.53	18.67	-24.87	25.09	0.00	0.00	0.00
1,500.00	1.76	306.89	1,499.48	20.51	-27.32	27.56	0.00	0.00	0.00
1,600.00	1.76	306.89	1,599.44	22.35	-29.77	30.03	0.00	0.00	0.00
1,700.00	1.76	306.89	1,699.39	24.19	-32.22	32.50	0.00	0.00	0.00
1,800.00	1.76	306.89	1,799.34	26.02	-34.67	34.98	0.00	0.00	0.00
1,900.00	1.76	306.89	1,899.29	27.86	-37.12	37.45	0.00	0.00	0.00
2,000.00	1.76	306.89	1,999.25	29.70	-39.57	39.92	0.00	0.00	0.00
2,100.00	1.76	306.89	2,099.20	31.54	-42.02	42.39	0.00	0.00	0.00
2,200.00	1.76	306.89	2,199.15	33.38	-44.47	44.86	0.00	0.00	0.00
2,300.00	1.76	306.89	2,299.11	35.22	-46.92	47.34	0.00	0.00	0.00
2,400.00	1.76	306.89	2,399.06	37.06	-49.37	49.81	0.00	0.00	0.00
2,500.00	1.76	306.89	2,499.01	38.90	-51.82	52.28	0.00	0.00	0.00
2,600.00	1.76	306.89	2,598.97	40.74	-54.27	54.75	0.00	0.00	0.00
2,700.00	1.76	306.89	2,698.92	42.58	-56.72	57.22	0.00	0.00	0.00
2,800.00	1.76	306.89	2,798.87	44.42	-59.17	59.69	0.00	0.00	0.00
2,900.00	1.76	306.89	2,898.82	46.26	-61.62	62.17	0.00	0.00	0.00
3,000.00	1.76	306.89	2,998.78	48.10	-64.08	64.64	0.00	0.00	0.00
3,100.00	1.76	306.89	3,098.73	49.94	-66.53	67.11	0.00	0.00	0.00
3,200.00	1.76	306.89	3,198.68	51.78	-68.98	69.58	0.00	0.00	0.00
3,300.00	1.76	306.89	3,298.64	53.62	-71.43	72.05	0.00	0.00	0.00
3,400.00	1.76	306.89	3,398.59	55.45	-73.88	74.53	0.00	0.00	0.00
3,500.00	1.76	306.89	3,498.54	57.29	-76.33	77.00	0.00	0.00	0.00
3,600.00	1.76	306.89	3,598.50	59.13	-78.78	79.47	0.00	0.00	0.00
3,700.00	1.76	306.89	3,698.45	60.97	-81.23	81.94	0.00	0.00	0.00
3,800.00	1.76	306.89	3,798.40	62.81	-83.68	84.41	0.00	0.00	0.00
3,900.00	1.76	306.89	3,898.36	64.65	-86.13	86.89	0.00	0.00	0.00
4,000.00	1.76	306.89	3,998.31	66.49	-88.58	89.36	0.00	0.00	0.00
4,100.00	1.76	306.89	4,098.26	68.33	-91.03	91.83	0.00	0.00	0.00
4,200.00	1.76	306.89	4,198.21	70.17	-93.48	94.30	0.00	0.00	0.00
4,300.00	1.76	306.89	4,298.17	72.01	-95.93	96.77	0.00	0.00	0.00
4,400.00	1.76	306.89	4,398.12	73.85	-98.38	99.25	0.00	0.00	0.00
4,500.00	1.76	306.89	4,498.07	75.69	-100.83	101.72	0.00	0.00	0.00
4,600.00	1.76	306.89	4,598.03	77.53	-103.28	104.19	0.00	0.00	0.00
4,700.00	1.76	306.89	4,697.98	79.37	-105.73	106.66	0.00	0.00	0.00
4,800.00	1.76	306.89	4,797.93	81.21	-108.18	109.13	0.00	0.00	0.00



Lonestar Consulting, LLC

Planning Report



Database:	Grand Junction	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Company:	Logos Operating LLC	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site:	Rosa Unit 29	North Reference:	True
Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #9		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
4,900.00	1.76	306.89	4,897.89	83.04	-110.63	111.61	0.00	0.00	0.00
5,000.00	1.76	306.89	4,997.84	84.88	-113.08	114.08	0.00	0.00	0.00
5,100.00	1.76	306.89	5,097.79	86.72	-115.53	116.55	0.00	0.00	0.00
5,200.00	1.76	306.89	5,197.75	88.56	-117.98	119.02	0.00	0.00	0.00
5,300.00	1.76	306.89	5,297.70	90.40	-120.43	121.49	0.00	0.00	0.00
5,400.00	1.76	306.89	5,397.65	92.24	-122.88	123.97	0.00	0.00	0.00
5,500.00	1.76	306.89	5,497.60	94.08	-125.34	126.44	0.00	0.00	0.00
5,600.00	1.76	306.89	5,597.56	95.92	-127.79	128.91	0.00	0.00	0.00
5,700.00	1.76	306.89	5,697.51	97.76	-130.24	131.38	0.00	0.00	0.00
5,800.00	1.76	306.89	5,797.46	99.60	-132.69	133.85	0.00	0.00	0.00
5,900.00	1.76	306.89	5,897.42	101.44	-135.14	136.33	0.00	0.00	0.00
6,000.00	1.76	306.89	5,997.37	103.28	-137.59	138.80	0.00	0.00	0.00
6,100.00	1.76	306.89	6,097.32	105.12	-140.04	141.27	0.00	0.00	0.00
6,200.00	1.76	306.89	6,197.28	106.96	-142.49	143.74	0.00	0.00	0.00
6,300.00	1.76	306.89	6,297.23	108.80	-144.94	146.21	0.00	0.00	0.00
6,400.00	1.76	306.89	6,397.18	110.64	-147.39	148.69	0.00	0.00	0.00
6,500.00	1.76	306.89	6,497.13	112.47	-149.84	151.16	0.00	0.00	0.00
6,600.00	1.76	306.89	6,597.09	114.31	-152.29	153.63	0.00	0.00	0.00
6,642.00	1.76	306.89	6,639.07	115.09	-153.32	154.67	0.00	0.00	0.00
6,700.00	6.71	278.93	6,696.90	116.15	-157.38	158.74	9.00	8.53	-48.22
6,800.00	15.66	273.67	6,794.90	117.92	-176.65	178.03	9.00	8.95	-5.25
6,900.00	24.64	272.21	6,888.68	119.59	-211.02	212.42	9.00	8.99	-1.47
7,000.00	33.64	271.49	6,975.94	121.12	-259.64	261.06	9.00	8.99	-0.72
7,100.00	42.63	271.05	7,054.51	122.46	-321.32	322.74	9.00	9.00	-0.44
7,200.00	51.63	270.74	7,122.47	123.59	-394.52	395.96	9.00	9.00	-0.31
7,300.00	60.63	270.50	7,178.15	124.47	-477.46	478.90	9.00	9.00	-0.24
7,400.00	69.63	270.29	7,220.17	125.09	-568.09	569.53	9.00	9.00	-0.20
7,500.00	78.62	270.11	7,247.49	125.43	-664.18	665.61	9.00	9.00	-0.18
7,600.00	87.62	269.95	7,259.45	125.48	-763.36	764.79	9.00	9.00	-0.17
7,627.16	90.07	269.90	7,260.00	125.45	-790.51	791.94	9.00	9.00	-0.17
7,700.00	90.07	269.90	7,259.92	125.32	-863.35	864.77	0.00	0.00	0.00
7,800.00	90.07	269.90	7,259.80	125.14	-963.35	964.76	0.00	0.00	0.00
7,900.00	90.07	269.90	7,259.68	124.97	-1,063.35	1,064.75	0.00	0.00	0.00
8,000.00	90.07	269.90	7,259.57	124.80	-1,163.35	1,164.74	0.00	0.00	0.00
8,100.00	90.07	269.90	7,259.45	124.62	-1,263.35	1,264.73	0.00	0.00	0.00
8,200.00	90.07	269.90	7,259.33	124.45	-1,363.35	1,364.72	0.00	0.00	0.00
8,300.00	90.07	269.90	7,259.21	124.28	-1,463.35	1,464.71	0.00	0.00	0.00
8,400.00	90.07	269.90	7,259.10	124.10	-1,563.35	1,564.70	0.00	0.00	0.00
8,500.00	90.07	269.90	7,258.98	123.93	-1,663.35	1,664.70	0.00	0.00	0.00
8,600.00	90.07	269.90	7,258.86	123.75	-1,763.35	1,764.69	0.00	0.00	0.00
8,700.00	90.07	269.90	7,258.75	123.58	-1,863.35	1,864.68	0.00	0.00	0.00
8,800.00	90.07	269.90	7,258.63	123.41	-1,963.35	1,964.67	0.00	0.00	0.00
8,900.00	90.07	269.90	7,258.51	123.23	-2,063.35	2,064.66	0.00	0.00	0.00
9,000.00	90.07	269.90	7,258.40	123.06	-2,163.35	2,164.65	0.00	0.00	0.00
9,100.00	90.07	269.90	7,258.28	122.89	-2,263.35	2,264.64	0.00	0.00	0.00
9,200.00	90.07	269.90	7,258.16	122.71	-2,363.35	2,364.63	0.00	0.00	0.00
9,300.00	90.07	269.90	7,258.05	122.54	-2,463.35	2,464.62	0.00	0.00	0.00
9,400.00	90.07	269.90	7,257.93	122.36	-2,563.35	2,564.61	0.00	0.00	0.00
9,500.00	90.07	269.90	7,257.81	122.19	-2,663.35	2,664.60	0.00	0.00	0.00
9,600.00	90.07	269.90	7,257.70	122.02	-2,763.35	2,764.59	0.00	0.00	0.00
9,700.00	90.07	269.90	7,257.58	121.84	-2,863.35	2,864.58	0.00	0.00	0.00



Lonestar Consulting, LLC

Planning Report



Database:	Grand Junction	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Company:	Logos Operating LLC	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site:	Rosa Unit 29	North Reference:	True
Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #9		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
9,800.00	90.07	269.90	7,257.46	121.67	-2,963.35	2,964.58	0.00	0.00	0.00
9,900.00	90.07	269.90	7,257.35	121.49	-3,063.35	3,064.57	0.00	0.00	0.00
10,000.00	90.07	269.90	7,257.23	121.32	-3,163.34	3,164.56	0.00	0.00	0.00
10,100.00	90.07	269.90	7,257.11	121.15	-3,263.34	3,264.55	0.00	0.00	0.00
10,200.00	90.07	269.90	7,257.00	120.97	-3,363.34	3,364.54	0.00	0.00	0.00
10,300.00	90.07	269.90	7,256.88	120.80	-3,463.34	3,464.53	0.00	0.00	0.00
10,400.00	90.07	269.90	7,256.76	120.63	-3,563.34	3,564.52	0.00	0.00	0.00
10,500.00	90.07	269.90	7,256.65	120.45	-3,663.34	3,664.51	0.00	0.00	0.00
10,600.00	90.07	269.90	7,256.53	120.28	-3,763.34	3,764.50	0.00	0.00	0.00
10,700.00	90.07	269.90	7,256.41	120.10	-3,863.34	3,864.49	0.00	0.00	0.00
10,800.00	90.07	269.90	7,256.30	119.93	-3,963.34	3,964.48	0.00	0.00	0.00
10,900.00	90.07	269.90	7,256.18	119.76	-4,063.34	4,064.47	0.00	0.00	0.00
11,000.00	90.07	269.90	7,256.06	119.58	-4,163.34	4,164.46	0.00	0.00	0.00
11,100.00	90.07	269.90	7,255.95	119.41	-4,263.34	4,264.46	0.00	0.00	0.00
11,200.00	90.07	269.90	7,255.83	119.23	-4,363.34	4,364.45	0.00	0.00	0.00
11,300.00	90.07	269.90	7,255.71	119.06	-4,463.34	4,464.44	0.00	0.00	0.00
11,400.00	90.07	269.90	7,255.60	118.89	-4,563.34	4,564.43	0.00	0.00	0.00
11,500.00	90.07	269.90	7,255.48	118.71	-4,663.34	4,664.42	0.00	0.00	0.00
11,600.00	90.07	269.90	7,255.36	118.54	-4,763.34	4,764.41	0.00	0.00	0.00
11,700.00	90.07	269.90	7,255.25	118.37	-4,863.34	4,864.40	0.00	0.00	0.00
11,800.00	90.07	269.90	7,255.13	118.19	-4,963.34	4,964.39	0.00	0.00	0.00
11,900.00	90.07	269.90	7,255.01	118.02	-5,063.34	5,064.38	0.00	0.00	0.00
12,000.00	90.07	269.90	7,254.90	117.84	-5,163.34	5,164.37	0.00	0.00	0.00
12,100.00	90.07	269.90	7,254.78	117.67	-5,263.34	5,264.36	0.00	0.00	0.00
12,200.00	90.07	269.90	7,254.66	117.50	-5,363.34	5,364.35	0.00	0.00	0.00
12,300.00	90.07	269.90	7,254.55	117.32	-5,463.34	5,464.34	0.00	0.00	0.00
12,400.00	90.07	269.90	7,254.43	117.15	-5,563.34	5,564.34	0.00	0.00	0.00
12,500.00	90.07	269.90	7,254.31	116.97	-5,663.34	5,664.33	0.00	0.00	0.00
12,600.00	90.07	269.90	7,254.20	116.80	-5,763.34	5,764.32	0.00	0.00	0.00
12,700.00	90.07	269.90	7,254.08	116.63	-5,863.34	5,864.31	0.00	0.00	0.00
12,800.00	90.07	269.90	7,253.96	116.45	-5,963.34	5,964.30	0.00	0.00	0.00
12,900.00	90.07	269.90	7,253.85	116.28	-6,063.34	6,064.29	0.00	0.00	0.00
13,000.00	90.07	269.90	7,253.73	116.11	-6,163.34	6,164.28	0.00	0.00	0.00
13,100.00	90.07	269.90	7,253.61	115.93	-6,263.34	6,264.27	0.00	0.00	0.00
13,200.00	90.07	269.90	7,253.50	115.76	-6,363.34	6,364.26	0.00	0.00	0.00
13,300.00	90.07	269.90	7,253.38	115.58	-6,463.34	6,464.25	0.00	0.00	0.00
13,400.00	90.07	269.90	7,253.26	115.41	-6,563.34	6,564.24	0.00	0.00	0.00
13,500.00	90.07	269.90	7,253.15	115.24	-6,663.34	6,664.23	0.00	0.00	0.00
13,600.00	90.07	269.90	7,253.03	115.06	-6,763.34	6,764.22	0.00	0.00	0.00
13,700.00	90.07	269.90	7,252.91	114.89	-6,863.34	6,864.22	0.00	0.00	0.00
13,800.00	90.07	269.90	7,252.80	114.72	-6,963.34	6,964.21	0.00	0.00	0.00
13,900.00	90.07	269.90	7,252.68	114.54	-7,063.34	7,064.20	0.00	0.00	0.00
14,000.00	90.07	269.90	7,252.56	114.37	-7,163.34	7,164.19	0.00	0.00	0.00
14,100.00	90.07	269.90	7,252.45	114.19	-7,263.34	7,264.18	0.00	0.00	0.00
14,200.00	90.07	269.90	7,252.33	114.02	-7,363.34	7,364.17	0.00	0.00	0.00
14,300.00	90.07	269.90	7,252.21	113.85	-7,463.34	7,464.16	0.00	0.00	0.00
14,400.00	90.07	269.90	7,252.10	113.67	-7,563.34	7,564.15	0.00	0.00	0.00
14,500.00	90.07	269.90	7,251.98	113.50	-7,663.34	7,664.14	0.00	0.00	0.00
14,600.00	90.07	269.90	7,251.86	113.32	-7,763.33	7,764.13	0.00	0.00	0.00
14,700.00	90.07	269.90	7,251.75	113.15	-7,863.33	7,864.12	0.00	0.00	0.00
14,800.00	90.07	269.90	7,251.63	112.98	-7,963.33	7,964.11	0.00	0.00	0.00



Lonestar Consulting, LLC

Planning Report



Database:	Grand Junction	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Company:	Logos Operating LLC	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site:	Rosa Unit 29	North Reference:	True
Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #9		

Planned Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
14,900.00	90.07	269.90	7,251.51	112.80	-8,063.33	8,064.10	0.00	0.00	0.00	
15,000.00	90.07	269.90	7,251.40	112.63	-8,163.33	8,164.09	0.00	0.00	0.00	
15,100.00	90.07	269.90	7,251.28	112.46	-8,263.33	8,264.09	0.00	0.00	0.00	
15,200.00	90.07	269.90	7,251.16	112.28	-8,363.33	8,364.08	0.00	0.00	0.00	
15,300.00	90.07	269.90	7,251.05	112.11	-8,463.33	8,464.07	0.00	0.00	0.00	
15,400.00	90.07	269.90	7,250.93	111.93	-8,563.33	8,564.06	0.00	0.00	0.00	
15,500.00	90.07	269.90	7,250.81	111.76	-8,663.33	8,664.05	0.00	0.00	0.00	
15,600.00	90.07	269.90	7,250.70	111.59	-8,763.33	8,764.04	0.00	0.00	0.00	
15,700.00	90.07	269.90	7,250.58	111.41	-8,863.33	8,864.03	0.00	0.00	0.00	
15,800.00	90.07	269.90	7,250.46	111.24	-8,963.33	8,964.02	0.00	0.00	0.00	
15,900.00	90.07	269.90	7,250.35	111.06	-9,063.33	9,064.01	0.00	0.00	0.00	
16,000.00	90.07	269.90	7,250.23	110.89	-9,163.33	9,164.00	0.00	0.00	0.00	
16,100.00	90.07	269.90	7,250.11	110.72	-9,263.33	9,263.99	0.00	0.00	0.00	
16,196.58	90.07	269.90	7,250.00	110.55	-9,359.91	9,360.56	0.00	0.00	0.00	

Design Targets										
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude	
- hit/miss target										
- Shape										
Rosa 652H BHL Rev 3	0.00	0.00	7,250.00	110.55	-9,359.91	2,138,135.27	2,837,945.16	36.8752042	-107.4406521	
- plan hits target center										
- Point										
Rosa 652H FPerf	0.00	0.00	7,250.00	110.78	-9,185.85	2,138,136.28	2,838,119.22	36.8752050	-107.4400570	
- plan misses target center by 0.21ft at 16022.52ft MD (7250.20 TVD, 110.85 N, -9185.85 E)										
- Point										
Rosa 652H POE Rev 3	0.00	0.00	7,260.00	125.45	-790.51	2,138,188.28	2,846,514.39	36.8752494	-107.4113540	
- plan hits target center										
- Point										

Formations						
Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)	
2,501.99	2,501.00	Ojo Alamo		0.00	0.00	
2,630.05	2,629.00	Kirtland		0.00	0.00	
3,077.26	3,076.00	Fruitland		0.00	0.00	
3,415.42	3,414.00	Pictured Cliffs		0.00	0.00	
3,514.46	3,513.00	Lewis		0.00	0.00	
4,601.97	4,600.00	Chacra		0.00	0.00	
5,429.36	5,427.00	Cliff House		0.00	0.00	
5,474.38	5,472.00	Menefee		0.00	0.00	
5,663.47	5,661.00	Point Lookout		0.00	0.00	
6,165.71	6,163.00	Mancos		0.00	0.00	



Lonestar Consulting, LLC
Planning Report



Database:	Grand Junction	Local Co-ordinate Reference:	Well Rosa Unit #652H - Slot A10 (652H Adjusted)
Company:	Logos Operating LLC	TVD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6372' & RKB 24.5' @ 6396.50ft (Ensign 223)
Site:	Rosa Unit 29	North Reference:	True
Well:	Rosa Unit #652H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #9		

Plan Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
400.00	400.00	0.33	-0.44	Start Build 2.00	
488.88	488.84	1.91	-2.54	Start 6153.39 hold at 488.88 MD	
6,642.27	6,639.34	115.09	-153.33	Start DLS 9.00 TFO -36.85	
7,626.46	7,260.00	125.45	-789.81	Start 200.00 hold at 7626.46 MD	
7,826.46	7,259.77	125.10	-989.81	Start DLS 2.00 TFO 0.00	
7,923.86	7,259.65	124.93	-1,087.21	Start 8276.82 hold at 7923.86 MD	
16,200.65				TD at 16200.68	

District I
1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone:(575) 748-1283 Fax:(575) 748-9720
District III
1000 Rio Brazos Rd., Aztec, NM 87410
Phone:(505) 334-6178 Fax:(505) 334-6170
District IV
1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 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

CONDITIONS

Action 147574

CONDITIONS

Operator: LOGOS OPERATING, LLC 2010 Afton Place Farmington, NM 87401	OGRID: 289408
	Action Number: 147574
	Action Type: [C-103] NOI Change of Plans (C-103A)

CONDITIONS

Created By	Condition	Condition Date
kpickford	Adhere to previous NMOCD Conditions of Approval	10/5/2022