

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.
NMSF078769
6. If Indian, Allottee or Tribe Name**SUBMIT IN TRIPLICATE - Other instructions on page 2**

1. Type of Well

☐ Oil Well ☒ Gas Well ☐ Other

2. Name of Operator

LOGOS OPERATING, LLC

3a. Address 2010 AFTON PLACE
FARMINGTON, NM 874013b. Phone No. (include area code)
(505) 278-8720

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)

SEC 19 T31N R05W NENW (C) 965 FNL 480 FWL

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

NMNM78407E

8. Well Name and No.

ROSA UNIT 649H

9. API Well No.

30-039-31410

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 bottom-hole location from 1377' FNL & 246' FEL to **new bottom-hole location 1620' FNL & 217' FEL**Original TD @ 20,286' MD 6,965' TVD to new **TD @ 20,308' MD 6,964' TVD**

Geology tops have been updated per changes.

Original KOP @ 6,322' MD 6,311' TVD to new **KOP @ 6,323' MD 6,308' TVD**Original Landing point @ 7,317' MD 6,942' TVD to new **Landing point @ 7,324' MD 6,942' TVD**Original 5.5" casing Production @ 20,286' MD to new **Production 5.5" casing @ 20,308' MD 6964' TVD**

The 5.5" production cementing bbls and 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 *Etta Trujillo*

Date 09/12/2022

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)

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

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

District III
1000 Rio Brazos Road, Aztec, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170

District IV
1220 S. St. Francis Drive, Santa Fe, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico
Energy, Minerals & Natural Resources Department

Form C-102
Revised August 1, 2011

Submit one copy to
Appropriate District Office

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

☒ AMENDED REPORT

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

Signature Etta Trujillo 9/12/2022
Date

Printed Name
Etta Trujillo
E-mail Address
etrujillo@logosresourcesllc.com

18 SURVEYOR CERTIFICATION

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

Date Revised: SEPTEMBER 12, 2022
Date of Survey: JANUARY 2, 2015

Signature and Seal of Professional Surveyor



Jason C. Edwards
Certificate Number 15269

WELL LOCATION AND ACREAGE DEDICATION PLAT

¹ API Number	² Pool Code 97232	³ Pool Name BASIN MANCOS
⁴ Property Code 320608	⁵ Property Name ROSA UNIT	⁶ Well Number 649H
⁷ GRID No. 289408	⁸ Operator Name LOGOS OPERATING, LLC	⁹ Elevation 6305'

¹⁰ Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
C	19	31N	5W	1	965	NORTH	480	WEST	RIO ARriba

¹¹ Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
H	21	31N	5W		1620	NORTH	217	EAST	RIO ARriba
¹² Dedicated Acres 872.01	N/2 - Sections 19, 20, 21, T31N, R5W					¹³ Joint or Infill	¹⁴ Consolidation Code	¹⁵ Order No. R-13457	

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

SURFACE LOCATION
965' FNL 480' FWL
SECTION 19, T31N, R5W
LAT: 36.889673°N
LONG: 107.405533°W
DATUM: NAD1927

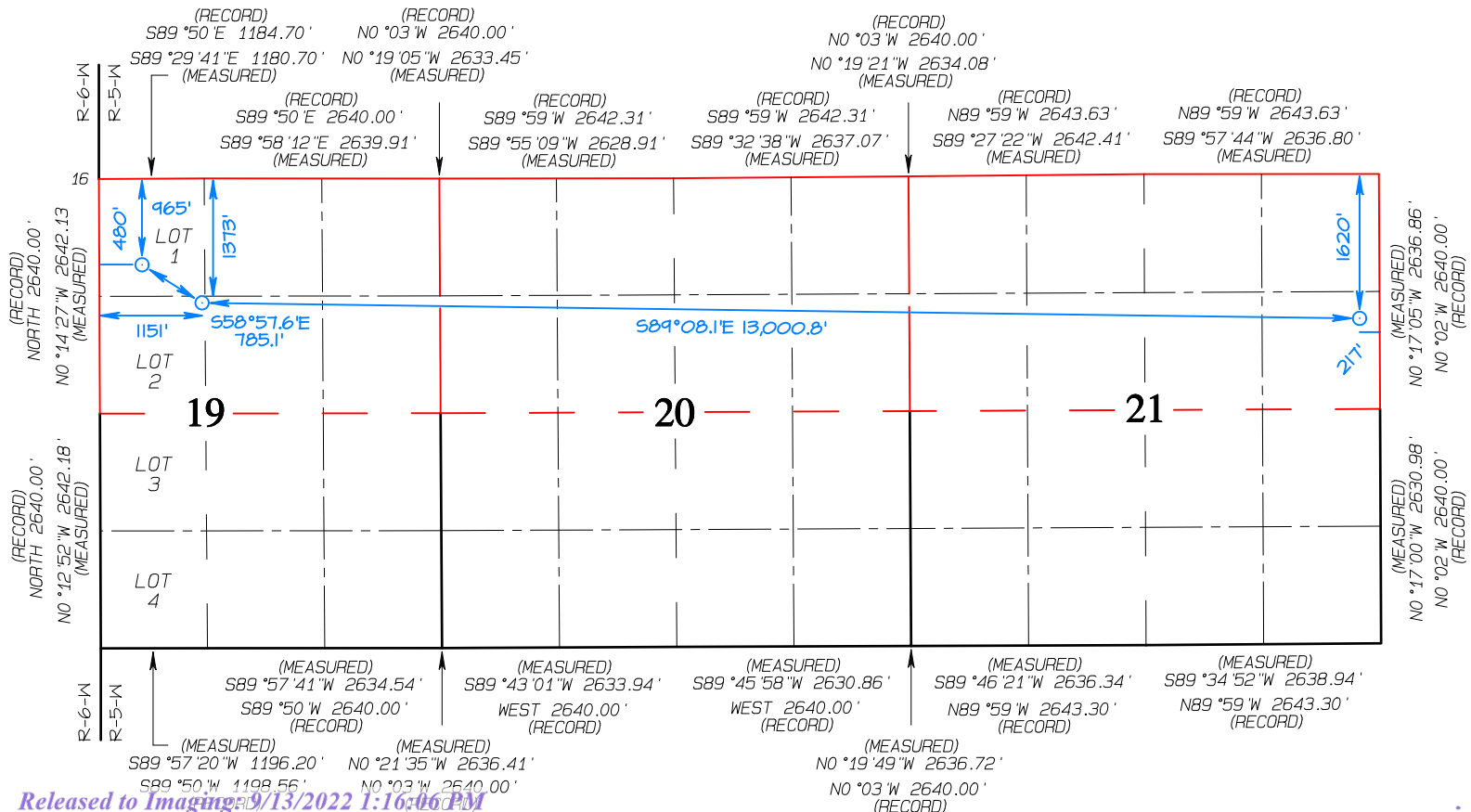
FIRST TAKE POINT
1373' FNL 1151' FWL
SECTION 19, T31N, R5W
LAT: 36.888553°N
LONG: 107.403239°W
DATUM: NAD1927

LAT: 36.889679°N
LONG: 107.406136°W
DATUM: NAD1983

LAT: 36.888559°N
LONG: 107.403842°W
DATUM: NAD1983

LAST TAKE POINT
1620' FNL 217' FEL
SECTION 21, T31N, R5W
LAT: 36.887844°N
LONG: 107.358793°W
DATUM: NAD1927

LAT: 36.887851°N
LONG: 107.359394°W
DATUM: NAD1983





LOGOS Operating, LLC Operations Plan

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

Date:	September 12, 2022	Pool:	Basin Mancos
Well Name:	Rosa Unit 649H	GL Elevation:	6,305'
Surface Location:	Sec 19, T31N, R5W 965 FNL, 480 FWL (36.889679° N, 107.406136° W – NAD83)	Measured Depth:	20,308' (KB)
Bottom Hole Location:	Sec 21, T31N, R5W 1620 FNL, 217 FEL (36.887851° N, 107.359394° W – NAD83)	County:	Rio Arriba

Lease Serial #NMSF078769, CA Serial #NMNM78407E

I. GEOLOGY

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

NAME	MD	TVD	NAME	MD	TVD
OJO ALAMO	2384	2380	*POINT LOOKOUT	5647	5637
KIRTLAND	2529	2525	*MANCOS	6145	6134
*FRUITLAND	3035	3030	KICKOFF POINT	6323	6308
*PICTURED CLIFFS	3350	3344	LANDING POINT	7324	6942
LEWIS	3464	3458			
CHACRA	4571	4563			
*CLIFF HOUSE	5372	5362			
MENEFEE	5419	5409	TD	20308	6964

* 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 returns prior to cementing. Notify Engineering of any mud losses. Mud weights of 6.5-13 ppg will be used as necessary to maintain sufficient overbalance of reservoir pressure.

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

ROSA UNIT 649H



times.

- 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.
- C. GeoHazards:** There are no Geohazards
- D. Maximum Anticipated Pressure:** $6964' \text{ TVD} \times 0.43 = 2995 \text{ psi}$
- E. H2S Concerns:** – There is no record of any naturally occurring H2S in any formation in the Rosa Unit. No H2S is anticipated in this formation or this well.

III. MATERIALS

A. CASING EQUIPMENT:

CASING TYPE	OHSIZE (IN)	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"	6,220'	9.625"	43.5 LBS	N-80 or equiv	LTC/BTC
PRODUCTION	8.5"	20,308'	5.5"	20 LBS	P-110 or equiv	LTC/BTC

NOTE: All casing depths are approximate, based on KB elevation (25') and will be based on 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.

ROSA UNIT 649H



C. CEMENTING:

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

1. 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. 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 cancelation 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	5,820	471	0.31318	1.3	209	37	1.15	182	15.8
Stage 1 Lead	4,621	1,199	0.31318	1.3	488	87	2.30	212	12.0
					698	124		394	
Stage 2 Tail	3,871	750	0.31318	1.3	305	54	1.73	177	13.2
Stage 2 Lead	3,086	785	0.31318	1.3	320	57	2.30	139	12.0
					625	111		315	
Stage 3 Tail	2,636	450	0.31318	1.3	183	33	1.73	106	13.2
Stage 3 Lead	320	2,316	0.31318	1.3	943	168	2.30	410	12.0
Stage 3 Lead	-	320	0.36268	1	116	21	2.30	50	12.0
					1,242	221		566	
All Stage Totals					2,565	457		1,276	

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	6,120	100	0.2531	1	25	5	1.53	17	13.2
Open Hole Lead	6,220	14,087	0.2291	1.15	3,722	663	1.53	2,433	13.2
					3,747	667		2,449	

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. Pressure test 5-1/2" casing to 1532 psi (0.22 psi/ft * 6,965' TVD) for 30 minutes. Increase pressure to Open RSI sleeves.

D. **STIMULATION**

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

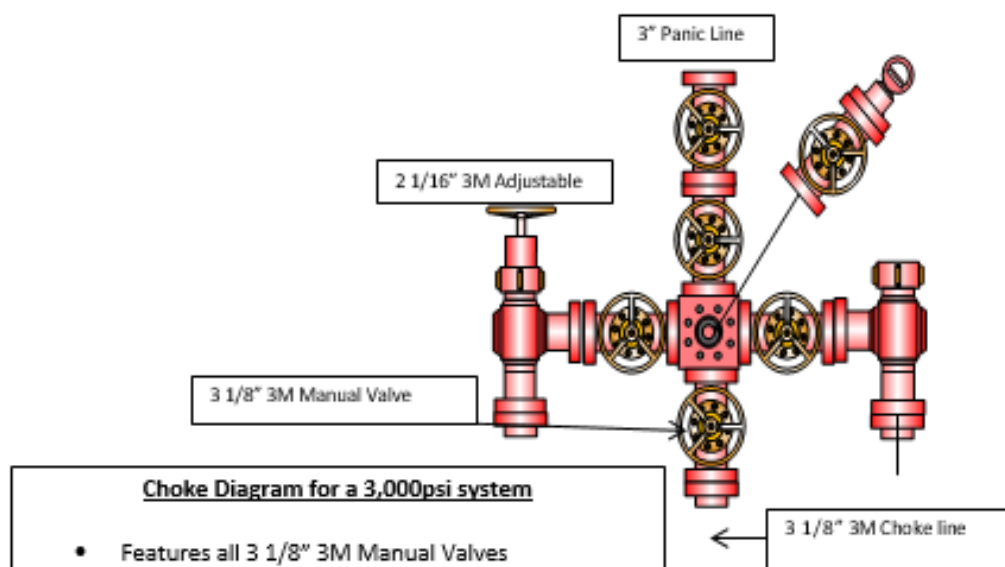
E. **PRODUCTION TUBING**

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.

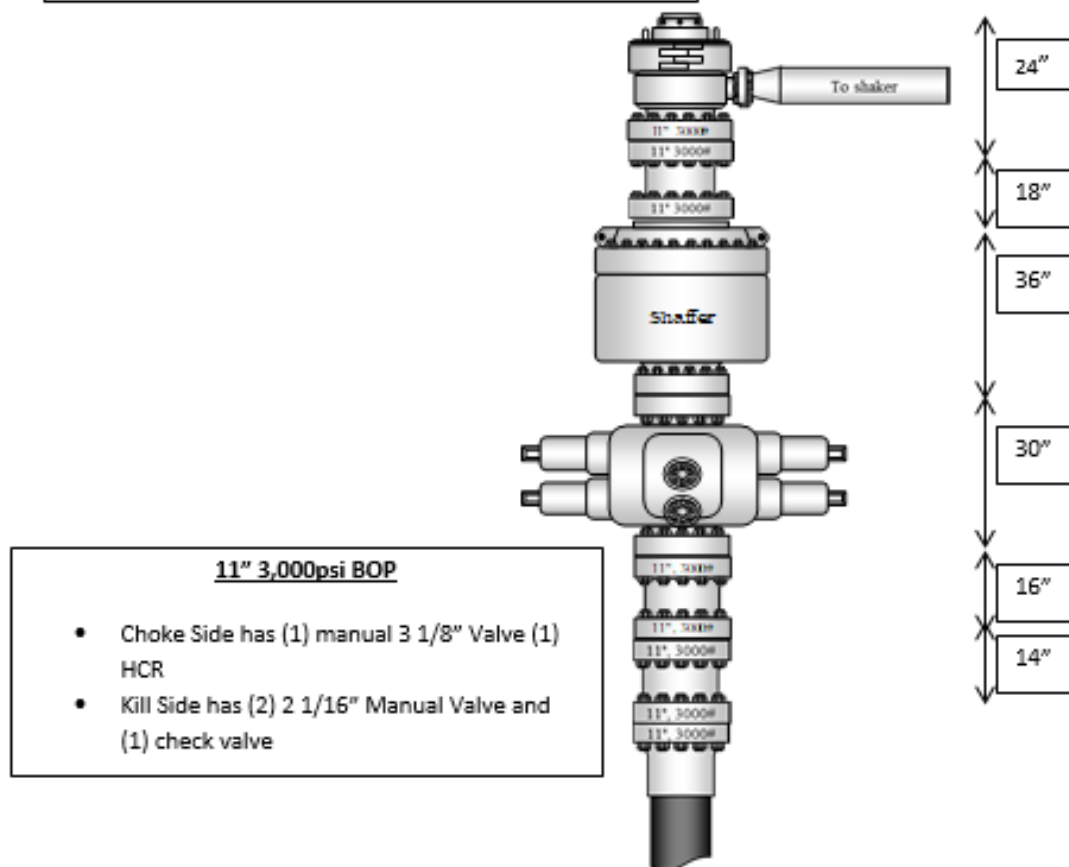


3M 11" B.O.P.E Diagram



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 649H



Logos Operating LLC

Rio Arriba, NM NAD83

Rosa Unit 27

Rosa Unit 649H

OH

Plan #6

Anticollision Report

08 September, 2022





Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Reference	Plan #6
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria
Interpolation Method:	Stations
Depth Range:	Unlimited
Results Limited by:	Maximum centre distance of 15,000.00ft
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	9/8/2022		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
393.00	6,220.00	Survey #1 - Surface MWD Survey (OH)	MWD+HDGM	OWSG MWD + HDGM	
6,220.00	20,307.73	Plan #6 (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 27						
Rosa Unit 183A - OH - OH	5,712.00	5,659.00	401.38	209.61	2.093	SF
Rosa Unit 183A - OH - OH	5,724.93	5,659.00	401.17	209.56	2.094	CC, ES
Rosa Unit 183C - OH - OH	9,692.02	6,944.41	922.86	621.02	3.057	CC
Rosa Unit 183C - OH - OH	9,700.00	6,944.42	922.89	620.80	3.055	ES
Rosa Unit 183C - OH - OH	9,800.00	6,944.60	929.15	624.43	3.049	SF
Rosa Unit 189 - OH - OH	18,807.25	7,246.01	273.61	-104.76	0.723	Level 3, CC, ES, SF
Rosa Unit 640H - OH - OH	0.00	0.51	31.38			
Rosa Unit 640H - OH - OH	393.00	393.22	32.63	31.18	22.443	ES
Rosa Unit 640H - OH - OH	673.00	671.69	38.16	35.44	14.036	SF
Rosa Unit 641H - OH - OH	398.85	399.10	45.15	43.67	30.581	CC, ES
Rosa Unit 641H - OH - OH	765.00	760.88	62.90	59.67	19.464	SF
Rosa Unit 642H - OH - OH	0.00	0.51	45.06			
Rosa Unit 642H - OH - OH	6,887.24	6,841.17	146.88	110.19	4.003	SF
Rosa Unit 643H - OH - OH	393.00	393.43	27.11	25.66	18.733	CC, ES
Rosa Unit 643H - OH - OH	1,077.00	1,072.38	57.92	52.82	11.356	SF
Rosa Unit 645H - OH - OH	434.13	434.52	59.99	58.44	38.714	CC
Rosa Unit 645H - OH - OH	483.00	483.35	60.09	58.20	31.791	ES
Rosa Unit 645H - OH - OH	855.00	848.96	85.10	80.60	18.895	SF
Rosa Unit 645H - OH - Plan #5	0.00	0.00	60.61			
Rosa Unit 645H - OH - Plan #5	393.00	392.99	61.23	59.25	30.906	ES
Rosa Unit 645H - OH - Plan #5	20,200.00	20,177.43	1,574.00	762.05	1.939	SF
Rosa Unit 647H - OH - OH	713.20	714.39	57.47	53.88	16.021	CC
Rosa Unit 647H - OH - OH	855.00	856.59	58.28	53.65	12.599	ES
Rosa Unit 647H - OH - OH	1,300.00	1,299.18	66.83	58.74	8.255	SF
Rosa Unit 647H - OH - Plan #6	0.00	0.00	59.94			
Rosa Unit 647H - OH - Plan #6	1,193.52	1,196.11	65.68	57.91	8.447	ES
Rosa Unit 647H - OH - Plan #6	17,600.00	17,778.68	1,125.33	468.68	1.714	SF
Rosa Unit 648H - OH - OH	0.00	0.51	44.94			
Rosa Unit 648H - OH - OH	17,204.45	18,271.08	534.49	-1.82	0.997	Level 3, ES, SF
Rosa Unit 649H - OH - OH	6,550.00	6,220.00	327.74	317.16	30.978	CC, ES, SF
Rosa Unit 85C - OH - OH	15,000.00	7,626.20	938.30	660.17	3.374	CC, ES
Rosa Unit 85C - OH - OH	15,100.00	7,628.94	942.94	661.43	3.350	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 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 183A - OH - OH													Offset Site Error:	0.00 ft
Survey Program:		129-INCLINOMETER					Rule Assigned:				Offset Well Error:	0.00 ft		
Reference	Offset	Semi Major Axis		Offset Wellbore Centre		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		
0.00	0.00	0.00	0.00	0.00	0.00	154.50	-645.82	308.02	716.16					
393.00	392.99	362.50	362.49	0.66	11.01	113.90	-645.82	308.02	716.24	704.57	11.67	61.379		
483.00	482.99	452.50	452.49	0.97	13.74	2.42	-645.82	308.02	715.78	701.07	14.72	48.642		
578.00	577.96	547.39	547.38	1.30	16.62	-11.05	-645.19	308.02	712.83	694.91	17.93	39.766		
673.00	672.85	641.37	641.36	1.64	19.48	-18.47	-645.27	308.02	708.54	687.43	21.11	33.560		
765.00	764.65	732.31	732.29	1.96	22.24	-18.30	-645.47	308.02	703.00	678.80	24.20	29.050		
855.00	854.37	821.20	821.18	2.29	24.94	-15.79	-645.80	308.02	696.46	669.24	27.22	25.586		
952.00	950.95	920.48	920.45	2.65	27.95	-11.38	-645.82	308.02	687.77	657.19	30.58	22.488		
1,077.00	1,075.26	1,044.79	1,044.76	3.13	31.73	-11.70	-645.82	308.02	674.89	640.08	34.81	19.388		
1,172.00	1,169.69	1,138.33	1,138.30	3.49	34.57	-24.43	-645.37	308.02	664.69	626.70	37.99	17.495		
1,300.00	1,297.07	1,264.35	1,264.31	3.97	38.40	-26.18	-645.71	308.02	653.54	611.26	42.28	15.457		
1,395.00	1,391.63	1,361.17	1,361.13	4.34	41.34	-28.17	-645.82	308.02	645.55	599.99	45.57	14.167		
1,490.00	1,486.24	1,455.78	1,455.74	4.70	44.21	-27.24	-645.82	308.02	637.97	589.18	48.79	13.077		
1,586.00	1,582.02	1,551.52	1,551.48	5.05	47.12	-18.66	-645.54	308.02	631.78	579.74	52.04	12.140		
1,681.00	1,676.87	1,645.93	1,645.89	5.40	49.98	-13.90	-645.58	308.02	626.77	571.52	55.25	11.345		
1,776.00	1,771.67	1,740.29	1,740.25	5.75	52.85	-8.39	-645.70	308.02	620.84	562.38	58.46	10.620		
1,872.00	1,867.43	1,836.98	1,836.93	6.11	55.79	-21.44	-645.82	308.02	614.37	552.63	61.74	9.951		
1,966.00	1,961.25	1,930.80	1,930.75	6.46	58.64	-38.13	-645.82	308.02	609.25	544.32	64.93	9.383		
2,061.00	2,056.10	2,025.65	2,025.60	6.81	61.52	-44.72	-645.82	308.02	605.29	537.14	68.15	8.881		
2,156.00	2,150.95	2,119.81	2,119.75	7.15	64.38	-47.79	-645.33	308.02	601.10	529.74	71.36	8.424		
2,252.00	2,246.71	2,214.71	2,214.66	7.50	67.26	-50.06	-645.53	308.02	596.85	522.27	74.59	8.002		
2,347.00	2,341.39	2,310.96	2,310.89	7.86	70.18	-52.56	-645.82	308.02	592.24	514.38	77.86	7.607		
2,442.00	2,436.07	2,405.64	2,405.57	8.21	73.06	-49.84	-645.82	308.02	587.39	506.30	81.08	7.244		
2,537.00	2,530.82	2,500.39	2,500.32	8.56	75.93	-41.84	-645.82	308.02	582.58	498.27	84.31	6.910		
2,632.00	2,625.64	2,594.73	2,594.66	8.92	78.80	-19.59	-645.30	308.02	577.24	489.72	87.52	6.595		
2,728.00	2,721.53	2,689.80	2,689.73	9.26	81.69	-1.09	-645.48	308.02	572.78	482.02	90.75	6.311		
2,823.00	2,816.43	2,786.02	2,785.93	9.60	84.61	18.54	-645.82	308.02	568.91	474.90	94.01	6.052		
2,918.00	2,911.32	2,880.91	2,880.82	9.94	87.49	21.29	-645.82	308.02	564.56	467.34	97.22	5.807		
3,013.00	3,006.17	2,975.76	2,975.67	10.28	90.37	10.77	-645.82	308.02	559.53	459.10	100.43	5.571		
3,109.00	3,101.98	3,071.26	3,071.17	10.63	93.27	4.98	-645.29	308.02	553.01	449.33	103.68	5.334		
3,204.00	3,196.73	3,165.24	3,165.15	10.98	96.12	11.30	-645.43	308.02	546.34	439.47	106.87	5.112		
3,299.00	3,291.42	3,259.19	3,259.10	11.33	98.98	-0.79	-645.72	308.02	538.92	428.86	110.06	4.897		
3,395.00	3,387.03	3,356.65	3,356.53	11.69	101.94	-14.37	-645.82	308.02	530.51	417.15	113.37	4.680		
3,490.00	3,481.56	3,451.17	3,451.06	12.06	104.81	-16.75	-645.82	308.02	521.39	404.81	116.58	4.472		
3,585.00	3,576.12	3,544.21	3,544.09	12.42	107.63	-26.85	-645.42	308.02	512.58	392.82	119.76	4.280		
3,680.00	3,670.84	3,640.48	3,640.34	12.78	110.56	-43.58	-645.82	308.02	506.92	383.89	123.03	4.120		
3,775.00	3,765.61	3,735.25	3,735.11	13.13	113.43	-49.76	-645.82	308.02	502.36	376.11	126.25	3.979		
3,871.00	3,861.42	3,831.06	3,830.92	13.48	116.34	-46.91	-645.82	308.02	498.39	368.88	129.51	3.848		
3,966.00	3,956.30	3,925.62	3,925.47	13.83	119.22	-38.91	-644.95	308.02	494.22	361.49	132.73	3.723		
4,061.00	4,051.20	4,019.61	4,019.46	14.17	122.07	-33.70	-645.13	308.02	490.89	354.95	135.93	3.611		
4,156.00	4,146.11	4,113.63	4,113.47	14.52	124.93	-25.21	-645.52	308.02	487.52	348.39	139.13	3.504		
4,251.00	4,241.00	4,210.69	4,210.50	14.86	127.87	-35.61	-645.82	308.02	483.87	341.45	142.42	3.397		
4,347.00	4,336.86	4,306.55	4,306.36	15.22	130.78	-38.84	-645.82	308.02	479.76	334.07	145.68	3.293		
4,442.00	4,431.69	4,401.39	4,401.19	15.57	133.66	-34.51	-645.82	308.02	475.29	326.38	148.91	3.192		
4,536.00	4,525.51	4,494.38	4,494.18	15.91	136.49	-39.55	-645.09	308.02	470.06	317.98	152.08	3.091		
4,632.00	4,621.31	4,589.27	4,589.07	16.27	139.37	-40.81	-645.42	308.02	465.59	310.27	155.32	2.998		
4,727.00	4,716.11	4,685.84	4,685.61	16.62	142.30	-37.01	-645.82	308.02	461.05	302.45	158.60	2.907		
4,821.00	4,809.89	4,779.62	4,779.39	16.97	145.15	-36.34	-645.82	308.02	455.88	294.08	161.79	2.818		
4,916.00	4,904.64	4,874.37	4,874.14	17.33	148.03	-34.09	-645.82	308.02	450.22	285.20	165.02	2.728		
5,011.00	4,999.37	4,968.40	4,968.15	17.69	150.88	-34.83	-645.12	308.02	443.85	275.62	168.23	2.638		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 183A - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 129-INCLINOMETER													Offset Well Error:	0.00 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Distance Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
5,109.00	5,097.08	5,065.21	5,064.96	18.06	153.82	-32.52	-645.46	308.02	437.76	266.22	171.53	2.552		
5,204.00	5,191.74	5,161.50	5,161.24	18.42	156.75	-34.94	-645.82	308.02	431.38	256.57	174.81	2.468		
5,299.00	5,286.40	5,256.16	5,255.90	18.78	159.62	-32.24	-645.82	308.02	424.71	246.68	178.04	2.386		
5,363.00	5,350.22	5,319.98	5,319.72	19.02	161.56	-32.84	-645.82	308.02	420.61	240.39	180.21	2.334		
5,458.00	5,444.99	5,414.75	5,414.49	19.37	164.44	-35.61	-645.82	308.02	415.17	231.72	183.44	2.263		
5,521.00	5,507.84	5,477.60	5,477.34	19.61	166.35	-35.61	-645.82	308.02	411.67	226.08	185.59	2.218		
5,585.00	5,571.69	5,541.46	5,541.19	19.84	168.29	-37.03	-645.82	308.02	408.17	220.41	187.76	2.174		
5,648.00	5,634.55	5,604.31	5,604.05	20.08	170.20	-38.50	-645.82	308.02	404.78	214.87	189.90	2.131		
5,712.00	5,698.39	5,659.00	5,658.72	20.32	171.86	-37.50	-645.82	308.02	401.38	209.61	191.77	2.093 SF		
5,724.93	5,711.29	5,659.00	5,658.72	20.37	171.86	-36.85	-645.82	308.02	401.17	209.56	191.61	2.094 CC, ES		
5,776.00	5,762.24	5,659.00	5,658.72	20.56	171.86	-34.23	-645.82	308.02	404.41	215.30	189.10	2.139		
5,839.00	5,825.12	5,659.00	5,658.72	20.79	171.86	-32.66	-645.82	308.02	417.22	234.93	182.29	2.289		
5,903.00	5,889.00	5,659.00	5,658.72	21.03	171.86	-32.44	-645.82	308.02	439.29	266.98	172.31	2.549		
5,966.00	5,951.88	5,659.00	5,658.72	21.26	171.86	-30.40	-645.82	308.02	468.43	307.58	160.84	2.912		
6,030.00	6,015.74	5,659.00	5,658.72	21.50	171.86	-29.65	-645.82	308.02	504.24	355.51	148.73	3.390		
6,093.00	6,078.59	5,659.00	5,658.72	21.74	171.86	-29.48	-645.82	308.02	544.44	407.29	137.15	3.970		
6,157.00	6,142.42	5,659.00	5,658.72	21.97	171.86	-21.07	-645.82	308.02	589.18	463.03	126.15	4.671		
6,220.00	6,205.25	5,659.00	5,658.72	22.21	171.86	-27.71	-645.82	308.02	636.33	520.04	116.29	5.472		
6,243.83	6,229.01	5,659.00	5,658.72	22.26	171.86	-32.50	-645.82	308.02	654.93	542.12	112.81	5.806		
6,300.00	6,285.05	5,659.00	5,658.72	22.27	171.86	-32.50	-645.82	308.02	700.16	594.93	105.22	6.654		
6,323.33	6,308.32	5,659.00	5,658.72	22.27	171.86	-32.50	-645.82	308.02	719.39	617.08	102.31	7.032		
6,350.00	6,334.92	5,659.00	5,658.72	22.28	171.86	-7.06	-645.82	308.02	741.47	642.42	99.05	7.486		
6,400.00	6,384.57	5,659.00	5,658.72	22.30	171.86	13.07	-645.82	308.02	782.47	689.46	93.00	8.413		
6,450.00	6,433.72	5,659.00	5,658.72	22.32	171.86	18.65	-645.82	308.02	822.84	735.80	87.03	9.454		
6,500.00	6,482.07	5,659.00	5,658.72	22.34	171.86	19.99	-645.82	308.02	862.44	781.27	81.16	10.626		
6,550.00	6,529.32	5,659.00	5,658.72	22.37	171.86	19.83	-645.82	308.02	901.15	825.71	75.43	11.946		
6,600.00	6,575.18	5,659.00	5,658.72	22.41	171.86	19.11	-645.82	308.02	938.86	868.97	69.89	13.434		
6,650.00	6,619.39	5,659.00	5,658.72	22.45	171.86	18.17	-645.82	308.02	975.47	910.88	64.59	15.103		
6,700.00	6,661.67	5,659.00	5,658.72	22.51	171.86	17.19	-645.82	308.02	1,010.89	951.26	59.63	16.953		
6,750.00	6,701.77	5,659.00	5,658.72	22.58	171.86	16.23	-645.82	308.02	1,045.04	989.91	55.13	18.957		
6,800.00	6,739.44	5,659.00	5,658.72	22.67	171.86	15.33	-645.82	308.02	1,077.84	1,026.61	51.23	21.038		
6,850.00	6,774.46	5,659.00	5,658.72	22.79	171.86	14.49	-645.82	308.02	1,109.22	1,061.08	48.14	23.040		
6,900.00	6,806.61	5,659.00	5,658.72	22.95	171.86	13.73	-645.82	308.02	1,139.12	1,093.06	46.07	24.728		
6,950.00	6,835.71	5,659.00	5,658.72	23.17	171.86	13.04	-645.82	308.02	1,167.48	1,122.29	45.19	25.837		
7,000.00	6,861.57	5,659.00	5,658.72	23.48	171.86	12.42	-645.82	308.02	1,194.24	1,148.64	45.60	26.190		
7,050.00	6,884.03	5,659.00	5,658.72	23.88	171.86	11.85	-645.82	308.02	1,219.34	1,172.08	47.26	25.798		
7,100.00	6,902.97	5,659.00	5,658.72	24.37	171.86	11.34	-645.82	308.02	1,242.75	1,192.72	50.02	24.843		
7,150.00	6,918.27	5,659.00	5,658.72	24.96	171.86	10.88	-645.82	308.02	1,264.42	1,210.75	53.67	23.559		
7,200.00	6,929.83	5,659.00	5,658.72	25.64	171.86	10.47	-645.82	308.02	1,284.30	1,226.31	57.99	22.148		
7,250.00	6,937.59	5,659.00	5,658.72	26.40	171.86	10.09	-645.82	308.02	1,302.37	1,239.57	62.80	20.738		
7,300.00	6,941.50	5,659.00	5,658.72	27.23	171.86	9.75	-645.82	308.02	1,318.59	1,250.62	67.97	19.400		
7,324.29	6,942.00	5,659.00	5,658.72	27.65	171.86	9.59	-645.82	308.02	1,325.79	1,255.22	70.57	18.787		
7,360.79	6,942.06	5,659.00	5,658.72	28.31	171.86	9.82	-645.82	308.02	1,336.70	1,262.18	74.51	17.939		
7,400.00	6,942.13	5,659.00	5,658.72	29.06	171.86	9.82	-645.82	308.02	1,349.38	1,270.65	78.72	17.141		
7,500.00	6,942.31	5,659.00	5,658.72	31.09	171.86	9.82	-645.82	308.02	1,386.22	1,296.99	89.23	15.535		
7,600.00	6,942.48	5,659.00	5,658.72	33.27	171.86	9.82	-645.82	308.02	1,429.12	1,329.94	99.18	14.409		
7,700.00	6,942.66	5,659.00	5,658.72	35.58	171.86	9.82	-645.82	308.02	1,477.56	1,369.15	108.41	13.629		
7,800.00	6,942.83	5,659.00	5,658.72	38.00	171.86	9.82	-645.82	308.02	1,531.00	1,414.15	116.85	13.102		
7,900.00	6,943.00	5,659.00	5,658.72	40.50	171.86	9.82	-645.82	308.02	1,588.94	1,464.45	124.50	12.763		
8,000.00	6,943.18	5,659.00	5,658.72	43.06	171.86	9.82	-645.82	308.02	1,650.92	1,519.54	131.38	12.566		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 183A - OH - OH													Offset Site Error:	0.00 ft
Survey Program:		129-INCLINOMETER					Rule Assigned:			Offset Well Error:		0.00 ft		
Reference	Vertical	Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (ft)	Separation Factor	Warning	
Measured Depth (ft)	Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)				
8,100.00	6,943.35	5,659.00	5,658.72	45.69	171.86	9.82	-645.82	308.02	1,716.48	1,578.94	137.54	12.480		
8,200.00	6,943.53	5,659.00	5,658.72	48.36	171.86	9.82	-645.82	308.02	1,785.24	1,642.19	143.05	12.480		
8,300.00	6,943.70	5,659.00	5,658.72	51.08	171.86	9.82	-645.82	308.02	1,856.85	1,708.88	147.97	12.549		
8,400.00	6,943.87	5,659.00	5,658.72	53.83	171.86	9.82	-645.82	308.02	1,930.98	1,778.63	152.35	12.675		
8,500.00	6,944.05	5,659.00	5,658.72	56.60	171.86	9.82	-645.82	308.02	2,007.35	1,851.09	156.26	12.846		
8,600.00	6,944.22	5,659.00	5,658.72	59.41	171.86	9.82	-645.82	308.02	2,085.72	1,925.97	159.75	13.056		
8,700.00	6,944.39	5,659.00	5,658.72	62.23	171.86	9.82	-645.82	308.02	2,165.88	2,003.00	162.88	13.298		
8,800.00	6,944.57	5,659.00	5,658.72	65.08	171.86	9.82	-645.82	308.02	2,247.62	2,081.95	165.68	13.566		
8,900.00	6,944.74	5,659.00	5,658.72	67.94	171.86	9.82	-645.82	308.02	2,330.79	2,162.60	168.19	13.858		
9,000.00	6,944.91	5,659.00	5,658.72	70.81	171.86	9.82	-645.82	308.02	2,415.24	2,244.79	170.45	14.170		
9,100.00	6,945.09	5,659.00	5,658.72	73.70	171.86	9.82	-645.82	308.02	2,500.83	2,328.34	172.49	14.499		
9,200.00	6,945.26	5,659.00	5,658.72	76.60	171.86	9.82	-645.82	308.02	2,587.46	2,413.13	174.33	14.842		
9,300.00	6,945.43	5,659.00	5,658.72	79.51	171.86	9.82	-645.82	308.02	2,675.02	2,499.02	176.00	15.199		
9,400.00	6,945.61	5,659.00	5,658.72	82.43	171.86	9.82	-645.82	308.02	2,763.42	2,585.91	177.52	15.567		
9,500.00	6,945.78	5,659.00	5,658.72	85.36	171.86	9.82	-645.82	308.02	2,852.59	2,673.70	178.90	15.946		
9,600.00	6,945.95	5,659.00	5,658.72	88.29	171.86	9.82	-645.82	308.02	2,942.46	2,762.30	180.16	16.333		
9,700.00	6,946.12	5,659.00	5,658.72	91.23	171.86	9.82	-645.82	308.02	3,032.96	2,851.65	181.31	16.728		
9,800.00	6,946.30	5,659.00	5,658.72	94.18	171.86	9.82	-645.82	308.02	3,124.04	2,941.67	182.37	17.130		
9,900.00	6,946.47	5,659.00	5,658.72	97.13	171.86	9.82	-645.82	308.02	3,215.65	3,032.31	183.34	17.539		
10,000.00	6,946.64	5,659.00	5,658.72	100.09	171.86	9.82	-645.82	308.02	3,307.75	3,123.51	184.24	17.954		
10,100.00	6,946.82	5,659.00	5,658.72	103.05	171.86	9.82	-645.82	308.02	3,400.29	3,215.23	185.06	18.374		
10,200.00	6,946.99	5,659.00	5,658.72	106.02	171.86	9.82	-645.82	308.02	3,493.24	3,307.41	185.83	18.798		
10,300.00	6,947.16	5,659.00	5,658.72	108.99	171.86	9.82	-645.82	308.02	3,586.58	3,400.04	186.54	19.227		
10,400.00	6,947.33	5,659.00	5,658.72	111.96	171.86	9.82	-645.82	308.02	3,680.26	3,493.06	187.20	19.660		
10,500.00	6,947.50	5,659.00	5,658.72	114.94	171.86	9.82	-645.82	308.02	3,774.27	3,586.45	187.81	20.096		
10,600.00	6,947.68	5,659.00	5,658.72	117.92	171.86	9.82	-645.82	308.02	3,868.58	3,680.19	188.39	20.535		
10,700.00	6,947.85	5,659.00	5,658.72	120.90	171.86	9.82	-645.82	308.02	3,963.16	3,774.24	188.93	20.977		
10,800.00	6,948.02	5,659.00	5,658.72	123.88	171.86	9.82	-645.82	308.02	4,058.01	3,868.58	189.43	21.422		
10,900.00	6,948.19	5,659.00	5,658.72	126.87	171.86	9.82	-645.82	308.02	4,153.10	3,963.19	189.90	21.870		
11,000.00	6,948.36	5,659.00	5,658.72	129.86	171.86	9.82	-645.82	308.02	4,248.41	4,058.06	190.35	22.319		
11,100.00	6,948.53	5,659.00	5,658.72	132.85	171.86	9.82	-645.82	308.02	4,343.93	4,153.17	190.77	22.771		
11,200.00	6,948.71	5,659.00	5,658.72	135.84	171.86	9.82	-645.82	308.02	4,439.66	4,248.50	191.16	23.225		
11,300.00	6,948.88	5,659.00	5,658.72	138.84	171.86	9.82	-645.82	308.02	4,535.56	4,344.03	191.54	23.680		
11,400.00	6,949.05	5,659.00	5,658.72	141.84	171.86	9.82	-645.82	308.02	4,631.64	4,439.75	191.89	24.137		
11,500.00	6,949.22	5,659.00	5,658.72	144.84	171.86	9.82	-645.82	308.02	4,727.88	4,535.66	192.23	24.595		
11,600.00	6,949.39	5,659.00	5,658.72	147.84	171.86	9.82	-645.82	308.02	4,824.28	4,631.73	192.55	25.055		
11,700.00	6,949.56	5,659.00	5,658.72	150.84	171.86	9.82	-645.82	308.02	4,920.82	4,727.97	192.85	25.516		
11,800.00	6,949.73	5,659.00	5,658.72	153.84	171.86	9.82	-645.82	308.02	5,017.49	4,824.35	193.14	25.978		
11,900.00	6,949.91	5,659.00	5,658.72	156.84	171.86	9.82	-645.82	308.02	5,114.29	4,920.87	193.42	26.442		
12,000.00	6,950.08	5,659.00	5,658.72	159.85	171.86	9.82	-645.82	308.02	5,211.22	5,017.53	193.68	26.906		
12,100.00	6,950.25	5,659.00	5,658.72	162.86	171.86	9.82	-645.82	308.02	5,308.25	5,114.31	193.94	27.371		
12,200.00	6,950.42	5,659.00	5,658.72	165.86	171.86	9.82	-645.82	308.02	5,405.40	5,211.21	194.18	27.836		
12,300.00	6,950.59	5,659.00	5,658.72	168.87	171.86	9.82	-645.82	308.02	5,502.65	5,308.23	194.42	28.303		
12,400.00	6,950.76	5,659.00	5,658.72	171.88	171.86	9.82	-645.82	308.02	5,599.99	5,405.34	194.64	28.770		
12,500.00	6,950.93	5,659.00	5,658.72	174.89	171.86	9.82	-645.82	308.02	5,697.43	5,502.56	194.86	29.238		
12,600.00	6,951.10	5,659.00	5,658.72	177.90	171.86	9.82	-645.82	308.02	5,794.95	5,599.88	195.07	29.707		
12,700.00	6,951.27	5,659.00	5,658.72	180.91	171.86	9.82	-645.82	308.02	5,892.56	5,697.28	195.28	30.175		
12,800.00	6,951.44	5,659.00	5,658.72	183.93	171.86	9.82	-645.82	308.02	5,990.24	5,794.77	195.47	30.645		
12,900.00	6,951.61	5,659.00	5,658.72	186.94	171.86	9.82	-645.82	308.02	6,088.00	5,892.34	195.66	31.115		
13,000.00	6,951.78	5,659.00	5,658.72	189.96	171.86	9.82	-645.82	308.02	6,185.83	5,989.98	195.85	31.585		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 183A - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 129-INCLINOMETER													Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Vertical	Semi Major Axis	Offset	Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning	
Measured	Depth	Measured	Depth	Reference	Offset	Tooface	+N/-S	+E/-W	Between	Between	Separation	Factor		
Depth	(ft)	Depth	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	Centres	Ellipses	(ft)			
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)			
13,100.00	6,951.95	5,659.00	5,658.72	192.97	171.86	9.82	-645.82	308.02	6,283.73	6,087.70	196.03	32.055		
13,200.00	6,952.12	5,659.00	5,658.72	195.99	171.86	9.82	-645.82	308.02	6,381.70	6,185.50	196.20	32.526		
13,300.00	6,952.29	5,659.00	5,658.72	199.00	171.86	9.82	-645.82	308.02	6,479.73	6,283.35	196.37	32.997		
13,400.00	6,952.46	5,659.00	5,658.72	202.02	171.86	9.82	-645.82	308.02	6,577.81	6,381.27	196.54	33.468		
13,500.00	6,952.63	5,659.00	5,658.72	205.04	171.86	9.82	-645.82	308.02	6,675.96	6,479.26	196.70	33.939		
13,600.00	6,952.80	5,659.00	5,658.72	208.05	171.86	9.82	-645.82	308.02	6,774.16	6,577.30	196.86	34.411		
13,700.00	6,952.97	5,659.00	5,658.72	211.07	171.86	9.82	-645.82	308.02	6,872.41	6,675.39	197.01	34.883		
13,800.00	6,953.14	5,659.00	5,658.72	214.09	171.86	9.82	-645.82	308.02	6,970.71	6,773.54	197.17	35.354		
13,900.00	6,953.31	5,659.00	5,658.72	217.11	171.86	9.82	-645.82	308.02	7,069.05	6,871.74	197.31	35.826		
14,000.00	6,953.48	5,659.00	5,658.72	220.13	171.86	9.82	-645.82	308.02	7,167.45	6,969.99	197.46	36.298		
14,100.00	6,953.65	5,659.00	5,658.72	223.15	171.86	9.82	-645.82	308.02	7,265.88	7,068.28	197.60	36.770		
14,200.00	6,953.82	5,659.00	5,658.72	226.17	171.86	9.82	-645.82	308.02	7,364.36	7,166.62	197.74	37.242		
14,300.00	6,953.99	5,659.00	5,658.72	229.19	171.86	9.82	-645.82	308.02	7,462.88	7,265.00	197.88	37.714		
14,400.00	6,954.15	5,659.00	5,658.72	232.21	171.86	9.82	-645.82	308.02	7,561.44	7,363.42	198.02	38.186		
14,500.00	6,954.32	5,659.00	5,658.72	235.23	171.86	9.82	-645.82	308.02	7,660.04	7,461.88	198.15	38.657		
14,600.00	6,954.49	5,659.00	5,658.72	238.25	171.86	9.82	-645.82	308.02	7,758.67	7,560.38	198.28	39.129		
14,700.00	6,954.66	5,659.00	5,658.72	241.28	171.86	9.82	-645.82	308.02	7,857.33	7,658.92	198.41	39.601		
14,800.00	6,954.83	5,659.00	5,658.72	244.30	171.86	9.82	-645.82	308.02	7,956.03	7,757.49	198.54	40.072		
14,900.00	6,955.00	5,659.00	5,658.72	247.32	171.86	9.82	-645.82	308.02	8,054.76	7,856.09	198.67	40.544		
15,000.00	6,955.17	5,659.00	5,658.72	250.34	171.86	9.82	-645.82	308.02	8,153.53	7,954.73	198.80	41.015		
15,100.00	6,955.34	5,659.00	5,658.72	253.37	171.86	9.82	-645.82	308.02	8,252.32	8,053.40	198.92	41.486		
15,200.00	6,955.50	5,659.00	5,658.72	256.39	171.86	9.82	-645.82	308.02	8,351.14	8,152.10	199.04	41.957		
15,300.00	6,955.67	5,659.00	5,658.72	259.42	171.86	9.81	-645.82	308.02	8,449.99	8,250.82	199.16	42.427		
15,400.00	6,955.84	5,659.00	5,658.72	262.44	171.86	9.81	-645.82	308.02	8,548.86	8,349.58	199.28	42.898		
15,500.00	6,956.01	5,659.00	5,658.72	265.46	171.86	9.81	-645.82	308.02	8,647.77	8,448.36	199.40	43.368		
15,600.00	6,956.18	5,659.00	5,658.72	268.49	171.86	9.81	-645.82	308.02	8,746.69	8,547.17	199.52	43.838		
15,700.00	6,956.34	5,659.00	5,658.72	271.51	171.86	9.81	-645.82	308.02	8,845.64	8,646.00	199.64	44.308		
15,800.00	6,956.51	5,659.00	5,658.72	274.54	171.86	9.81	-645.82	308.02	8,944.62	8,744.86	199.76	44.777		
15,900.00	6,956.68	5,659.00	5,658.72	277.56	171.86	9.81	-645.82	308.02	9,043.61	8,843.74	199.87	45.247		
16,000.00	6,956.85	5,659.00	5,658.72	280.59	171.86	9.81	-645.82	308.02	9,142.63	8,942.64	199.99	45.716		
16,100.00	6,957.02	5,659.00	5,658.72	283.62	171.86	9.81	-645.82	308.02	9,241.67	9,041.57	200.10	46.184		
16,200.00	6,957.18	5,659.00	5,658.72	286.64	171.86	9.81	-645.82	308.02	9,340.73	9,140.51	200.22	46.653		
16,300.00	6,957.35	5,659.00	5,658.72	289.67	171.86	9.81	-645.82	308.02	9,439.81	9,239.48	200.33	47.121		
16,400.00	6,957.52	5,659.00	5,658.72	292.70	171.86	9.81	-645.82	308.02	9,538.91	9,338.46	200.44	47.589		
16,500.00	6,957.69	5,659.00	5,658.72	295.72	171.86	9.81	-645.82	308.02	9,638.03	9,437.47	200.56	48.056		
16,600.00	6,957.85	5,659.00	5,658.72	298.75	171.86	9.81	-645.82	308.02	9,737.16	9,536.49	200.67	48.523		
16,700.00	6,958.02	5,659.00	5,658.72	301.78	171.86	9.81	-645.82	308.02	9,836.31	9,635.53	200.78	48.990		
16,800.00	6,958.19	5,659.00	5,658.72	304.80	171.86	9.81	-645.82	308.02	9,935.48	9,734.59	200.89	49.457		
16,900.00	6,958.35	5,659.00	5,658.72	307.83	171.86	9.81	-645.82	308.02	10,034.67	9,833.67	201.00	49.923		
17,000.00	6,958.52	5,659.00	5,658.72	310.86	171.86	9.81	-645.82	308.02	10,133.87	9,932.76	201.11	50.389		
17,100.00	6,958.69	5,659.00	5,658.72	313.88	171.86	9.81	-645.82	308.02	10,233.09	10,031.87	201.22	50.854		
17,200.00	6,958.86	5,659.00	5,658.72	316.91	171.86	9.81	-645.82	308.02	10,332.32	10,130.99	201.33	51.319		
17,300.00	6,959.02	5,659.00	5,658.72	319.94	171.86	9.81	-645.82	308.02	10,431.57	10,230.13	201.44	51.784		
17,400.00	6,959.19	5,659.00	5,658.72	322.97	171.86	9.81	-645.82	308.02	10,530.83	10,329.28	201.55	52.248		
17,500.00	6,959.36	5,659.00	5,658.72	326.00	171.86	9.81	-645.82	308.02	10,630.11	10,428.45	201.66	52.712		
17,600.00	6,959.52	5,659.00	5,658.72	329.02	171.86	9.81	-645.82	308.02	10,729.40	10,527.63	201.77	53.176		
17,700.00	6,959.69	5,659.00	5,658.72	332.05	171.86	9.81	-645.82	308.02	10,828.70	10,626.82	201.88	53.639		
17,800.00	6,959.85	5,659.00	5,658.72	335.08	171.86	9.81	-645.82	308.02	10,928.02	10,726.02	201.99	54.101		
17,900.00	6,960.02	5,659.00	5,658.72	338.11	171.86	9.81	-645.82	308.02	11,027.34	10,825.24	202.10	54.564		
18,000.00	6,960.19	5,659.00	5,658.72	341.14	171.86	9.81	-645.82	308.02	11,126.68	10,924.47	202.21	55.026		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 183A - OH - OH														Offset Site Error:	0.00 ft
Survey Program: 129-INCLINOMETER														Offset Well Error:	0.00 ft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (ft)	Separation Factor	Warning		
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)					
18,100.00	6,960.35	5,659.00	5,658.72	344.17	171.86	9.81	-645.82	308.02	11,226.03	11,023.71	202.32	55.487			
18,200.00	6,960.52	5,659.00	5,658.72	347.20	171.86	9.81	-645.82	308.02	11,325.40	11,122.97	202.43	55.948			
18,300.00	6,960.68	5,659.00	5,658.72	350.23	171.86	9.81	-645.82	308.02	11,424.77	11,222.23	202.54	56.409			
18,400.00	6,960.85	5,659.00	5,658.72	353.26	171.86	9.81	-645.82	308.02	11,524.15	11,321.51	202.64	56.869			
18,500.00	6,961.02	5,659.00	5,658.72	356.28	171.86	9.81	-645.82	308.02	11,623.55	11,420.80	202.75	57.329			
18,600.00	6,961.18	5,659.00	5,658.72	359.31	171.86	9.81	-645.82	308.02	11,722.95	11,520.09	202.86	57.788			
18,700.00	6,961.35	5,659.00	5,658.72	362.34	171.86	9.81	-645.82	308.02	11,822.37	11,619.40	202.97	58.247			
18,800.00	6,961.51	5,659.00	5,658.72	365.37	171.86	9.81	-645.82	308.02	11,921.79	11,718.71	203.08	58.705			
18,900.00	6,961.68	5,659.00	5,658.72	368.40	171.86	9.81	-645.82	308.02	12,021.23	11,818.04	203.19	59.163			
19,000.00	6,961.84	5,659.00	5,658.72	371.43	171.86	9.81	-645.82	308.02	12,120.67	11,917.37	203.30	59.620			
19,100.00	6,962.01	5,659.00	5,658.72	374.46	171.86	9.81	-645.82	308.02	12,220.12	12,016.72	203.41	60.077			
19,200.00	6,962.17	5,659.00	5,658.72	377.49	171.86	9.81	-645.82	308.02	12,319.59	12,116.07	203.52	60.534			
19,300.00	6,962.34	5,659.00	5,658.72	380.52	171.86	9.81	-645.82	308.02	12,419.06	12,215.43	203.62	60.990			
19,400.00	6,962.51	5,659.00	5,658.72	383.55	171.86	9.81	-645.82	308.02	12,518.54	12,314.80	203.73	61.446			
19,500.00	6,962.67	5,659.00	5,658.72	386.58	171.86	9.81	-645.82	308.02	12,618.02	12,414.18	203.84	61.901			
19,600.00	6,962.84	5,659.00	5,658.72	389.61	171.86	9.81	-645.82	308.02	12,717.52	12,513.57	203.95	62.355			
19,700.00	6,963.00	5,659.00	5,658.72	392.64	171.86	9.81	-645.82	308.02	12,817.02	12,612.96	204.06	62.810			
19,800.00	6,963.16	5,659.00	5,658.72	395.67	171.86	9.81	-645.82	308.02	12,916.53	12,712.36	204.17	63.263			
19,900.00	6,963.33	5,659.00	5,658.72	398.70	171.86	9.81	-645.82	308.02	13,016.05	12,811.77	204.28	63.716			
20,000.00	6,963.49	5,659.00	5,658.72	401.73	171.86	9.81	-645.82	308.02	13,115.58	12,911.18	204.39	64.169			
20,100.00	6,963.66	5,659.00	5,658.72	404.77	171.86	9.81	-645.82	308.02	13,215.11	13,010.61	204.50	64.621			
20,200.00	6,963.82	5,659.00	5,658.72	407.80	171.86	9.81	-645.82	308.02	13,314.65	13,110.04	204.61	65.073			
20,307.78	6,964.00	5,659.00	5,658.72	411.06	171.86	9.81	-645.82	308.02	13,421.94	13,217.21	204.73	65.559			

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 183C - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 353-INCLINOMETER													Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Vertical	Reference	Semi Major Axis	Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning	
Measured	Depth	Measured	Depth	Reference	Offset	Toolface	+N/-S	+E/-W	Between	Between	Separation	Factor		
Depth	(ft)	Depth	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	Centres	Ellipses	(ft)			
0.00	0.00	0.00	0.00	0.00	0.00	114.73	-1,399.79	3,039.04	3,345.92					
393.00	392.99	390.55	390.49	0.66	11.86	74.03	-1,399.79	3,039.04	3,345.42	3,332.90	12.52	267.189		
483.00	482.99	480.55	480.49	0.97	14.59	-37.49	-1,399.79	3,039.04	3,344.81	3,329.24	15.57	214.868		
578.00	577.96	575.51	575.46	1.30	17.48	-50.95	-1,399.79	3,039.04	3,343.17	3,324.39	18.78	178.035		
673.00	672.85	664.34	664.24	1.64	20.17	-58.37	-1,398.09	3,039.04	3,339.90	3,318.09	21.81	153.148		
765.00	764.65	748.83	748.72	1.96	22.74	-58.13	-1,398.69	3,039.04	3,336.99	3,312.29	24.70	135.092		
855.00	854.37	852.06	851.87	2.29	25.88	-55.58	-1,399.79	3,039.04	3,333.50	3,305.33	28.16	118.364		
952.00	950.95	948.65	948.45	2.65	28.81	-51.16	-1,399.79	3,039.04	3,328.13	3,296.67	31.45	105.815		
1,077.00	1,075.26	1,072.95	1,072.76	3.13	32.58	-51.46	-1,399.79	3,039.04	3,319.88	3,284.19	35.69	93.014		
1,172.00	1,169.69	1,163.27	1,163.06	3.49	35.33	-63.96	-1,398.86	3,039.04	3,313.96	3,275.17	38.79	85.433		
1,300.00	1,297.07	1,284.84	1,284.62	3.97	39.02	-65.43	-1,399.50	3,039.04	3,308.79	3,265.83	42.96	77.016		
1,395.00	1,391.63	1,389.40	1,389.13	4.34	42.19	-67.20	-1,399.79	3,039.04	3,305.24	3,258.74	46.50	71.088		
1,490.00	1,486.24	1,484.01	1,483.74	4.70	45.07	-66.06	-1,399.79	3,039.04	3,301.84	3,252.11	49.73	66.401		
1,586.00	1,582.02	1,579.25	1,578.97	5.05	47.96	-57.37	-1,398.71	3,039.04	3,298.41	3,245.44	52.97	62.267		
1,681.00	1,676.87	1,669.94	1,669.65	5.40	50.71	-52.55	-1,398.89	3,039.04	3,295.46	3,239.39	56.07	58.770		
1,776.00	1,771.67	1,760.62	1,760.33	5.75	53.47	-47.04	-1,399.37	3,039.04	3,291.65	3,232.48	59.18	55.624		
1,872.00	1,867.43	1,865.32	1,864.93	6.11	56.65	-59.99	-1,399.79	3,039.04	3,287.75	3,225.04	62.71	52.427		
1,966.00	1,961.25	1,959.14	1,958.75	6.46	59.50	-76.48	-1,399.79	3,039.04	3,285.50	3,219.60	65.91	49.851		
2,061.00	2,056.10	2,053.69	2,053.28	6.81	62.37	-82.84	-1,398.25	3,039.04	3,283.95	3,214.82	69.12	47.508		
2,156.00	2,150.95	2,142.25	2,141.83	7.15	65.06	-85.59	-1,398.49	3,039.04	3,283.51	3,211.34	72.16	45.502		
2,239.41	2,234.16	2,220.01	2,219.58	7.46	67.42	-87.25	-1,399.06	3,039.04	3,283.39	3,208.56	74.83	43.877		
2,252.00	2,246.71	2,231.74	2,231.31	7.50	67.77	-87.45	-1,399.18	3,039.04	3,283.40	3,208.16	75.23	43.642		
2,347.00	2,341.39	2,339.39	2,338.89	7.86	71.04	-89.50	-1,399.79	3,039.04	3,283.40	3,204.54	78.86	41.637		
2,442.00	2,436.07	2,434.08	2,433.57	8.21	73.92	-86.35	-1,399.79	3,039.04	3,283.13	3,201.04	82.09	39.995		
2,537.00	2,530.82	2,528.59	2,528.08	8.56	76.79	-78.03	-1,398.74	3,039.04	3,281.82	3,196.51	85.31	38.468		
2,632.00	2,625.64	2,619.31	2,618.80	8.92	79.54	-55.59	-1,398.91	3,039.04	3,279.72	3,191.30	88.42	37.093		
2,728.00	2,721.53	2,711.09	2,710.56	9.26	82.33	-37.08	-1,399.38	3,039.04	3,276.72	3,185.17	91.55	35.790		
2,823.00	2,816.43	2,814.49	2,813.93	9.60	85.47	-17.57	-1,399.79	3,039.04	3,273.12	3,178.09	95.03	34.443		
2,918.00	2,911.32	2,909.38	2,908.82	9.94	88.35	-15.02	-1,399.79	3,039.04	3,268.68	3,170.43	98.24	33.271		
3,013.00	3,006.17	3,004.03	3,003.46	10.28	91.23	-25.73	-1,399.02	3,039.04	3,263.50	3,162.05	101.45	32.167		
3,109.00	3,101.98	3,096.68	3,096.11	10.63	94.04	-31.64	-1,399.15	3,039.04	3,258.19	3,153.57	104.61	31.145		
3,204.00	3,196.73	3,188.34	3,187.77	10.98	96.82	-25.51	-1,399.52	3,039.04	3,252.30	3,144.56	107.74	30.187		
3,299.00	3,291.42	3,289.52	3,288.92	11.33	99.90	-37.76	-1,399.79	3,039.04	3,245.85	3,134.70	111.16	29.201		
3,395.00	3,387.03	3,385.13	3,384.53	11.69	102.80	-51.29	-1,399.79	3,039.04	3,239.76	3,125.34	114.42	28.315		
3,490.00	3,481.56	3,478.87	3,478.26	12.06	105.65	-53.54	-1,399.06	3,039.04	3,233.71	3,116.08	117.62	27.492		
3,585.00	3,576.12	3,570.26	3,569.66	12.42	108.42	-63.32	-1,399.25	3,039.04	3,228.93	3,108.17	120.76	26.739		
3,680.00	3,670.84	3,661.85	3,661.24	12.78	111.20	-79.68	-1,399.67	3,039.04	3,226.68	3,102.79	123.89	26.044		
3,775.00	3,765.61	3,763.90	3,763.11	13.13	114.30	-85.42	-1,399.79	3,039.04	3,225.85	3,098.51	127.34	25.332		
3,871.00	3,861.42	3,859.71	3,858.92	13.48	117.21	-82.19	-1,399.79	3,039.04	3,225.23	3,094.63	130.60	24.695		
3,966.00	3,956.30	3,954.60	3,953.80	13.83	120.09	-73.86	-1,399.79	3,039.04	3,224.27	3,090.44	133.83	24.092		
4,061.00	4,051.20	4,049.50	4,048.70	14.17	122.97	-68.45	-1,399.79	3,039.04	3,222.88	3,085.82	137.06	23.514		
4,156.00	4,146.11	4,144.40	4,143.61	14.52	125.85	-59.81	-1,399.79	3,039.04	3,221.03	3,080.74	140.29	22.960		
4,251.00	4,241.00	4,239.29	4,238.50	14.86	128.74	-70.01	-1,399.79	3,039.04	3,219.13	3,075.61	143.52	22.430		
4,347.00	4,336.86	4,335.15	4,334.36	15.22	131.65	-72.95	-1,399.79	3,039.04	3,217.49	3,070.71	146.78	21.921		
4,442.00	4,431.69	4,429.99	4,429.19	15.57	134.53	-68.32	-1,399.79	3,039.04	3,215.64	3,065.63	150.01	21.436		
4,536.00	4,525.51	4,523.81	4,523.01	15.91	137.38	-72.98	-1,399.79	3,039.04	3,213.72	3,060.51	153.21	20.976		
4,632.00	4,621.31	4,619.61	4,618.81	16.27	140.28	-73.88	-1,399.79	3,039.04	3,211.94	3,055.47	156.47	20.527		
4,727.00	4,716.11	4,714.41	4,713.61	16.62	143.16	-69.73	-1,399.79	3,039.04	3,210.00	3,050.29	159.70	20.100		
4,821.00	4,809.89	4,808.18	4,807.39	16.97	146.01	-68.68	-1,399.79	3,039.04	3,207.70	3,044.80	162.90	19.691		
4,916.00	4,904.64	4,902.93	4,902.14	17.33	148.89	-66.06	-1,399.79	3,039.04	3,205.03	3,038.90	166.13	19.292		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 183C - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 353-INCLINOMETER													Offset Well Error:	0.00 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Distance Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
5,011.00	4,999.37	4,997.67	4,996.87	17.69	151.76	-66.34	-1,399.79	3,039.04	3,202.18	3,032.81	169.36	18.907		
5,109.00	5,097.08	5,095.37	5,094.58	18.06	154.73	-63.65	-1,399.79	3,039.04	3,198.94	3,026.24	172.70	18.523		
5,204.00	5,191.74	5,190.04	5,189.24	18.42	157.61	-65.63	-1,399.79	3,039.04	3,195.51	3,019.58	175.93	18.163		
5,299.00	5,286.40	5,284.70	5,283.90	18.78	160.48	-62.47	-1,399.79	3,039.04	3,192.01	3,012.84	179.16	17.816		
5,363.00	5,350.22	5,348.51	5,347.72	19.02	162.42	-62.80	-1,399.79	3,039.04	3,189.76	3,008.42	181.34	17.590		
5,458.00	5,444.99	5,443.28	5,442.49	19.37	165.30	-65.17	-1,399.79	3,039.04	3,186.87	3,002.30	184.57	17.266		
5,521.00	5,507.84	5,506.14	5,505.34	19.61	167.20	-64.89	-1,399.79	3,039.04	3,185.06	2,998.34	186.72	17.058		
5,585.00	5,571.69	5,569.99	5,569.19	19.84	169.14	-66.02	-1,399.79	3,039.04	3,183.25	2,994.36	188.89	16.852		
5,648.00	5,634.55	5,632.84	5,632.05	20.08	171.05	-67.19	-1,399.79	3,039.04	3,181.54	2,990.51	191.04	16.654		
5,712.00	5,698.39	5,696.69	5,695.89	20.32	172.99	-65.93	-1,399.79	3,039.04	3,179.77	2,986.56	193.21	16.457		
5,776.00	5,762.24	5,760.54	5,759.74	20.56	174.93	-62.71	-1,399.79	3,039.04	3,177.89	2,982.50	195.39	16.264		
5,839.00	5,825.12	5,823.42	5,822.62	20.79	176.84	-61.12	-1,399.79	3,039.04	3,176.02	2,978.49	197.53	16.079		
5,903.00	5,889.00	5,887.30	5,886.50	21.03	178.78	-61.00	-1,399.79	3,039.04	3,174.14	2,974.43	199.71	15.894		
5,966.00	5,951.88	5,950.17	5,949.38	21.26	180.69	-59.01	-1,399.79	3,039.04	3,172.14	2,970.29	201.85	15.715		
6,030.00	6,015.74	6,014.03	6,013.24	21.50	182.63	-58.36	-1,399.79	3,039.04	3,169.93	2,965.91	204.03	15.537		
6,093.00	6,078.59	6,076.88	6,076.09	21.74	184.54	-58.31	-1,399.79	3,039.04	3,167.65	2,961.48	206.17	15.364		
6,157.00	6,142.42	6,140.72	6,139.92	21.97	186.47	-49.46	-1,399.79	3,039.04	3,164.95	2,956.61	208.34	15.191		
6,220.00	6,205.25	6,203.55	6,202.75	22.21	188.38	-56.79	-1,399.79	3,039.04	3,162.16	2,951.68	210.49	15.023		
6,243.83	6,229.01	6,227.31	6,226.51	22.26	189.10	-61.80	-1,399.79	3,039.04	3,161.28	2,950.02	211.25	14.964		
6,300.00	6,285.05	6,283.35	6,282.55	22.27	190.81	-61.87	-1,399.79	3,039.04	3,159.43	2,946.46	212.97	14.835		
6,323.33	6,308.32	6,306.62	6,305.82	22.27	191.51	-61.89	-1,399.79	3,039.04	3,158.66	2,944.98	213.68	14.782		
6,350.00	6,334.92	6,333.21	6,332.42	22.28	192.32	-33.90	-1,399.79	3,039.04	3,157.25	2,942.76	214.49	14.720		
6,400.00	6,384.57	6,382.87	6,382.07	22.30	193.83	-9.30	-1,399.79	3,039.04	3,151.81	2,935.80	216.01	14.591		
6,450.00	6,433.72	6,432.02	6,431.22	22.32	195.32	0.37	-1,399.79	3,039.04	3,142.71	2,925.20	217.51	14.448		
6,500.00	6,482.07	6,480.37	6,479.57	22.34	196.79	5.44	-1,399.79	3,039.04	3,130.03	2,911.04	218.99	14.293		
6,550.00	6,529.32	6,527.61	6,526.82	22.37	198.22	8.74	-1,399.79	3,039.04	3,113.83	2,893.39	220.43	14.126		
6,600.00	6,575.18	6,573.48	6,572.68	22.41	199.62	11.25	-1,399.79	3,039.04	3,094.21	2,872.37	221.84	13.948		
6,650.00	6,619.39	6,617.69	6,616.89	22.45	200.96	13.42	-1,399.79	3,039.04	3,071.30	2,848.11	223.19	13.761		
6,700.00	6,661.67	6,659.97	6,659.17	22.51	202.24	15.47	-1,399.79	3,039.04	3,045.25	2,820.77	224.48	13.566		
6,750.00	6,701.77	6,700.07	6,699.27	22.58	203.46	17.57	-1,399.79	3,039.04	3,016.21	2,790.50	225.71	13.363		
6,800.00	6,739.44	6,737.74	6,736.94	22.67	204.60	19.84	-1,399.79	3,039.04	2,984.37	2,757.51	226.86	13.155		
6,850.00	6,774.46	6,772.76	6,771.96	22.79	205.67	22.41	-1,399.79	3,039.04	2,949.93	2,721.99	227.94	12.942		
6,900.00	6,806.61	6,804.91	6,804.11	22.95	206.64	25.39	-1,399.79	3,039.04	2,913.12	2,684.19	228.93	12.725		
6,950.00	6,835.71	6,834.00	6,833.21	23.17	207.53	28.94	-1,399.79	3,039.04	2,874.16	2,644.33	229.83	12.506		
7,000.00	6,861.57	6,859.86	6,859.07	23.48	208.31	33.24	-1,399.79	3,039.04	2,833.30	2,602.67	230.63	12.285		
7,050.00	6,884.03	6,882.33	6,881.53	23.88	208.99	38.51	-1,399.79	3,039.04	2,790.82	2,559.48	231.34	12.064		
7,100.00	6,902.97	6,901.27	6,900.47	24.37	209.57	45.00	-1,399.79	3,039.04	2,746.97	2,515.02	231.95	11.843		
7,150.00	6,918.27	6,916.57	6,915.77	24.96	210.03	52.92	-1,399.79	3,039.04	2,702.05	2,469.58	232.46	11.624		
7,200.00	6,929.83	6,928.13	6,927.33	25.64	210.38	62.35	-1,399.79	3,039.04	2,656.33	2,423.46	232.87	11.407		
7,250.00	6,937.59	6,935.89	6,935.09	26.40	210.62	73.04	-1,399.79	3,039.04	2,610.10	2,376.93	233.18	11.194		
7,300.00	6,941.50	6,939.80	6,939.00	27.23	210.74	84.33	-1,399.79	3,039.04	2,563.68	2,330.29	233.38	10.985		
7,324.29	6,942.00	6,940.30	6,939.50	27.65	210.75	89.75	-1,399.79	3,039.04	2,541.14	2,307.69	233.45	10.885		
7,360.79	6,942.06	6,940.36	6,939.56	28.31	210.76	89.75	-1,399.79	3,039.04	2,507.25	2,273.71	233.54	10.736		
7,400.00	6,942.13	6,940.43	6,939.63	29.06	210.76	89.75	-1,399.79	3,039.04	2,470.84	2,237.19	233.64	10.575		
7,500.00	6,942.31	6,940.60	6,939.81	31.09	210.76	89.76	-1,399.79	3,039.04	2,378.37	2,144.38	233.99	10.164		
7,600.00	6,942.48	6,940.78	6,939.98	33.27	210.77	89.77	-1,399.79	3,039.04	2,286.53	2,052.07	234.46	9.752		
7,700.00	6,942.66	6,940.95	6,940.16	35.58	210.77	89.78	-1,399.79	3,039.04	2,195.41	1,960.34	235.07	9.339		
7,800.00	6,942.83	6,941.13	6,940.33	38.00	210.78	89.80	-1,399.79	3,039.04	2,105.09	1,869.25	235.85	8.926		
7,900.00	6,943.00	6,941.30	6,940.50	40.50	210.78	89.81	-1,399.79	3,039.04	2,015.69	1,778.88	236.81	8.512		
8,000.00	6,943.18	6,941.48	6,940.68	43.06	210.79	89.82	-1,399.79	3,039.04	1,927.33	1,689.33	238.00	8.098		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 183C - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 353-INCLINOMETER													Offset Well Error:	0.00 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Distance Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
8,100.00	6,943.35	6,941.65	6,940.85	45.69	210.79	89.83	-1,399.79	3,039.04	1,840.16	1,600.74	239.42	7.686		
8,200.00	6,943.53	6,941.82	6,941.03	48.36	210.80	89.84	-1,399.79	3,039.04	1,754.37	1,513.25	241.12	7.276		
8,300.00	6,943.70	6,942.00	6,941.20	51.08	210.81	89.85	-1,399.79	3,039.04	1,670.15	1,427.03	243.12	6.870		
8,400.00	6,943.87	6,942.17	6,941.37	53.83	210.81	89.86	-1,399.79	3,039.04	1,587.76	1,342.32	245.44	6.469		
8,500.00	6,944.05	6,942.34	6,941.55	56.60	210.82	89.87	-1,399.79	3,039.04	1,507.51	1,259.39	248.12	6.076		
8,600.00	6,944.22	6,942.52	6,941.72	59.41	210.82	89.88	-1,399.79	3,039.04	1,429.75	1,178.56	251.19	5.692		
8,700.00	6,944.39	6,942.69	6,941.89	62.23	210.83	89.89	-1,399.79	3,039.04	1,354.91	1,100.24	254.67	5.320		
8,800.00	6,944.57	6,942.86	6,942.07	65.08	210.83	89.90	-1,399.79	3,039.04	1,283.50	1,024.93	258.57	4.964		
8,900.00	6,944.74	6,943.04	6,942.24	67.94	210.84	89.91	-1,399.79	3,039.04	1,216.13	953.23	262.90	4.626		
9,000.00	6,944.91	6,943.21	6,942.41	70.81	210.84	89.93	-1,399.79	3,039.04	1,153.50	885.86	267.64	4.310		
9,100.00	6,945.09	6,943.38	6,942.59	73.70	210.85	89.94	-1,399.79	3,039.04	1,096.43	823.69	272.74	4.020		
9,200.00	6,945.26	6,943.56	6,942.76	76.60	210.85	89.95	-1,399.79	3,039.04	1,045.83	767.73	278.10	3.761		
9,300.00	6,945.43	6,943.73	6,942.93	79.51	210.86	89.96	-1,399.79	3,039.04	1,002.67	719.10	283.57	3.536		
9,400.00	6,945.61	6,943.90	6,943.11	82.43	210.86	89.97	-1,399.79	3,039.04	967.96	679.00	288.96	3.350		
9,500.00	6,945.78	6,944.08	6,943.28	85.36	210.87	89.98	-1,399.79	3,039.04	942.62	648.61	294.01	3.206		
9,600.00	6,945.95	6,944.25	6,943.45	88.29	210.87	89.99	-1,399.79	3,039.04	927.43	628.97	298.47	3.107		
9,692.02	6,946.11	6,944.41	6,943.61	91.00	210.88	90.00	-1,399.79	3,039.04	922.86	621.02	301.84	3.057 CC		
9,700.00	6,946.12	6,944.42	6,943.62	91.23	210.88	90.00	-1,399.79	3,039.04	922.89	620.80	302.09	3.055 ES		
9,800.00	6,946.30	6,944.60	6,943.80	94.18	210.88	90.01	-1,399.79	3,039.04	929.15	624.43	304.72	3.049 SF		
9,900.00	6,946.47	6,944.77	6,943.97	97.13	210.89	90.02	-1,399.79	3,039.04	946.00	639.70	306.30	3.088		
10,000.00	6,946.64	6,944.94	6,944.14	100.09	210.89	90.03	-1,399.79	3,039.04	972.89	666.00	306.89	3.170		
10,100.00	6,946.82	6,945.11	6,944.32	103.05	210.90	90.04	-1,399.79	3,039.04	1,009.01	702.40	306.61	3.291		
10,200.00	6,946.99	6,945.28	6,944.49	106.02	210.91	90.05	-1,399.79	3,039.04	1,053.43	747.78	305.65	3.447		
10,300.00	6,947.16	6,945.46	6,944.66	108.99	210.91	90.07	-1,399.79	3,039.04	1,105.12	800.94	304.18	3.633		
10,400.00	6,947.33	6,945.63	6,944.83	111.96	210.92	90.08	-1,399.79	3,039.04	1,163.14	860.76	302.38	3.847		
10,500.00	6,947.50	6,945.80	6,945.00	114.94	210.92	90.09	-1,399.79	3,039.04	1,226.58	926.19	300.39	4.083		
10,600.00	6,947.68	6,945.97	6,945.18	117.92	210.93	90.10	-1,399.79	3,039.04	1,294.64	996.33	298.31	4.340		
10,700.00	6,947.85	6,946.15	6,945.35	120.90	210.93	90.11	-1,399.79	3,039.04	1,366.63	1,070.42	296.21	4.614		
10,800.00	6,948.02	6,946.32	6,945.52	123.88	210.94	90.12	-1,399.79	3,039.04	1,441.97	1,147.82	294.15	4.902		
10,900.00	6,948.19	6,946.49	6,945.69	126.87	210.94	90.13	-1,399.79	3,039.04	1,520.15	1,227.99	292.16	5.203		
11,000.00	6,948.36	6,946.66	6,945.86	129.86	210.95	90.14	-1,399.79	3,039.04	1,600.77	1,310.51	290.26	5.515		
11,100.00	6,948.53	6,946.83	6,946.03	132.85	210.95	90.15	-1,399.79	3,039.04	1,683.47	1,395.00	288.47	5.836		
11,200.00	6,948.71	6,947.00	6,946.21	135.84	210.96	90.16	-1,399.79	3,039.04	1,767.95	1,481.17	286.78	6.165		
11,300.00	6,948.88	6,947.18	6,946.38	138.84	210.96	90.17	-1,399.79	3,039.04	1,853.98	1,568.79	285.19	6.501		
11,400.00	6,949.05	6,947.35	6,946.55	141.84	210.97	90.18	-1,399.79	3,039.04	1,941.35	1,657.64	283.71	6.843		
11,500.00	6,949.22	6,947.52	6,946.72	144.84	210.97	90.19	-1,399.79	3,039.04	2,029.88	1,747.57	282.32	7.190		
11,600.00	6,949.39	6,947.69	6,946.89	147.84	210.98	90.20	-1,399.79	3,039.04	2,119.44	1,838.42	281.02	7.542		
11,700.00	6,949.56	6,947.86	6,947.06	150.84	210.98	90.21	-1,399.79	3,039.04	2,209.89	1,930.08	279.82	7.898		
11,800.00	6,949.73	6,948.03	6,947.23	153.84	210.99	90.22	-1,399.79	3,039.04	2,301.13	2,022.45	278.69	8.257		
11,900.00	6,949.91	6,948.20	6,947.41	156.84	210.99	90.23	-1,399.79	3,039.04	2,393.08	2,115.44	277.63	8.620		
12,000.00	6,950.08	6,948.37	6,947.58	159.85	211.00	90.24	-1,399.79	3,039.04	2,485.64	2,208.99	276.65	8.985		
12,100.00	6,950.25	6,948.54	6,947.75	162.86	211.00	90.26	-1,399.79	3,039.04	2,578.76	2,303.03	275.72	9.353		
12,200.00	6,950.42	6,948.71	6,947.92	165.86	211.01	90.27	-1,399.79	3,039.04	2,672.38	2,397.51	274.86	9.723		
12,300.00	6,950.59	6,948.89	6,948.09	168.87	211.01	90.28	-1,399.79	3,039.04	2,766.44	2,492.39	274.05	10.095		
12,400.00	6,950.76	6,949.06	6,948.26	171.88	211.02	90.29	-1,399.79	3,039.04	2,860.90	2,587.61	273.29	10.468		
12,500.00	6,950.93	6,949.23	6,948.43	174.89	211.02	90.30	-1,399.79	3,039.04	2,955.74	2,683.15	272.58	10.843		
12,600.00	6,951.10	6,949.40	6,948.60	177.90	211.03	90.31	-1,399.79	3,039.04	3,050.90	2,778.98	271.91	11.220		
12,700.00	6,951.27	6,949.57	6,948.77	180.91	211.04	90.32	-1,399.79	3,039.04	3,146.36	2,875.07	271.28	11.598		
12,800.00	6,951.44	6,949.74	6,948.94	183.93	211.04	90.33	-1,399.79	3,039.04	3,242.09	2,971.40	270.69	11.977		
12,900.00	6,951.61	6,949.91	6,949.11	186.94	211.05	90.34	-1,399.79	3,039.04	3,338.07	3,067.94	270.13	12.357		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 183C - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 353-INCLINOMETER													Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Vertical	Semi Major Axis	Offset	Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning	
Measured	Depth	Measured	Depth	Reference	Offset	Toolface	+N/-S	+E/-W	Between	Between	Separation	Factor		
Depth	(ft)	Depth	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	Centres	Ellipses	(ft)			
13,000.00	6,951.78	6,950.08	6,949.28	189.96	211.05	90.35	-1,399.79	3,039.04	3,434.29	3,164.68	269.60	12.738		
13,100.00	6,951.95	6,950.25	6,949.45	192.97	211.06	90.36	-1,399.79	3,039.04	3,530.71	3,261.61	269.11	13.120		
13,200.00	6,952.12	6,950.42	6,949.62	195.99	211.06	90.37	-1,399.79	3,039.04	3,627.33	3,358.69	268.64	13.503		
13,300.00	6,952.29	6,950.59	6,949.79	199.00	211.07	90.38	-1,399.79	3,039.04	3,724.13	3,455.93	268.19	13.886		
13,400.00	6,952.46	6,950.76	6,949.96	202.02	211.07	90.39	-1,399.79	3,039.04	3,821.09	3,553.32	267.77	14.270		
13,500.00	6,952.63	6,950.93	6,950.13	205.04	211.08	90.40	-1,399.79	3,039.04	3,918.20	3,650.83	267.37	14.654		
13,600.00	6,952.80	6,951.10	6,950.30	208.05	211.08	90.41	-1,399.79	3,039.04	4,015.46	3,748.46	267.00	15.039		
13,700.00	6,952.97	6,951.27	6,950.47	211.07	211.09	90.42	-1,399.79	3,039.04	4,112.84	3,846.20	266.64	15.425		
13,800.00	6,953.14	6,951.44	6,950.64	214.09	211.09	90.43	-1,399.79	3,039.04	4,210.35	3,944.05	266.30	15.811		
13,900.00	6,953.31	6,951.61	6,950.81	217.11	211.10	90.44	-1,399.79	3,039.04	4,307.98	4,042.00	265.98	16.197		
14,000.00	6,953.48	6,951.78	6,950.98	220.13	211.10	90.45	-1,399.79	3,039.04	4,405.71	4,140.03	265.67	16.583		
14,100.00	6,953.65	6,951.94	6,951.15	223.15	211.11	90.46	-1,399.79	3,039.04	4,503.54	4,238.15	265.38	16.970		
14,200.00	6,953.82	6,952.11	6,951.32	226.17	211.11	90.47	-1,399.79	3,039.04	4,601.46	4,336.35	265.11	17.357		
14,300.00	6,953.99	6,952.28	6,951.49	229.19	211.12	90.48	-1,399.79	3,039.04	4,699.47	4,434.63	264.85	17.744		
14,400.00	6,954.15	6,952.45	6,951.65	232.21	211.12	90.49	-1,399.79	3,039.04	4,797.57	4,532.97	264.60	18.132		
14,500.00	6,954.32	6,952.62	6,951.82	235.23	211.13	90.50	-1,399.79	3,039.04	4,895.74	4,631.38	264.36	18.519		
14,600.00	6,954.49	6,952.79	6,951.99	238.25	211.13	90.51	-1,399.79	3,039.04	4,993.98	4,729.84	264.13	18.907		
14,700.00	6,954.66	6,952.96	6,952.16	241.28	211.14	90.52	-1,399.79	3,039.04	5,092.29	4,828.37	263.92	19.295		
14,800.00	6,954.83	6,953.13	6,952.33	244.30	211.14	90.53	-1,399.79	3,039.04	5,190.67	4,926.95	263.72	19.683		
14,900.00	6,955.00	6,953.30	6,952.50	247.32	211.15	90.55	-1,399.79	3,039.04	5,289.10	5,025.58	263.52	20.071		
15,000.00	6,955.17	6,953.46	6,952.67	250.34	211.15	90.56	-1,399.79	3,039.04	5,387.60	5,124.26	263.34	20.459		
15,100.00	6,955.34	6,953.63	6,952.84	253.37	211.16	90.57	-1,399.79	3,039.04	5,486.14	5,222.98	263.16	20.847		
15,200.00	6,955.50	6,953.80	6,953.00	256.39	211.16	90.58	-1,399.79	3,039.04	5,584.74	5,321.75	262.99	21.235		
15,300.00	6,955.67	6,953.97	6,953.17	259.42	211.17	90.59	-1,399.79	3,039.04	5,683.39	5,420.56	262.83	21.624		
15,400.00	6,955.84	6,954.14	6,953.34	262.44	211.17	90.60	-1,399.79	3,039.04	5,782.09	5,519.41	262.68	22.012		
15,500.00	6,956.01	6,954.31	6,953.51	265.46	211.18	90.61	-1,399.79	3,039.04	5,880.83	5,618.29	262.54	22.400		
15,600.00	6,956.18	6,954.47	6,953.68	268.49	211.18	90.62	-1,399.79	3,039.04	5,979.61	5,717.21	262.40	22.788		
15,700.00	6,956.34	6,954.64	6,953.84	271.51	211.19	90.63	-1,399.79	3,039.04	6,078.43	5,816.16	262.27	23.176		
15,800.00	6,956.51	6,954.81	6,954.01	274.54	211.19	90.64	-1,399.79	3,039.04	6,177.29	5,915.15	262.15	23.564		
15,900.00	6,956.68	6,954.98	6,954.18	277.56	211.20	90.65	-1,399.79	3,039.04	6,276.19	6,014.16	262.03	23.952		
16,000.00	6,956.85	6,955.15	6,954.35	280.59	211.20	90.66	-1,399.79	3,039.04	6,375.12	6,113.20	261.91	24.340		
16,100.00	6,957.02	6,955.31	6,954.52	283.62	211.21	90.67	-1,399.79	3,039.04	6,474.08	6,212.27	261.81	24.728		
16,200.00	6,957.18	6,955.48	6,954.68	286.64	211.21	90.68	-1,399.79	3,039.04	6,573.07	6,311.37	261.71	25.116		
16,300.00	6,957.35	6,955.65	6,954.85	289.67	211.22	90.69	-1,399.79	3,039.04	6,672.10	6,410.49	261.61	25.504		
16,400.00	6,957.52	6,955.82	6,955.02	292.70	211.22	90.70	-1,399.79	3,039.04	6,771.15	6,509.63	261.52	25.891		
16,500.00	6,957.69	6,955.98	6,955.19	295.72	211.23	90.71	-1,399.79	3,039.04	6,870.23	6,608.80	261.43	26.279		
16,600.00	6,957.85	6,956.15	6,955.35	298.75	211.23	90.72	-1,399.79	3,039.04	6,969.34	6,707.98	261.35	26.666		
16,700.00	6,958.02	6,956.32	6,955.52	301.78	211.24	90.73	-1,399.79	3,039.04	7,068.47	6,807.19	261.28	27.054		
16,800.00	6,958.19	6,956.48	6,955.69	304.80	211.25	90.74	-1,399.79	3,039.04	7,167.62	6,906.42	261.20	27.441		
16,900.00	6,958.35	6,956.65	6,955.85	307.83	211.25	90.75	-1,399.79	3,039.04	7,266.80	7,005.67	261.14	27.828		
17,000.00	6,958.52	6,956.82	6,956.02	310.86	211.26	90.76	-1,399.79	3,039.04	7,366.00	7,104.93	261.07	28.215		
17,100.00	6,958.69	6,956.99	6,956.19	313.88	211.26	90.77	-1,399.79	3,039.04	7,465.23	7,204.22	261.01	28.601		
17,200.00	6,958.86	6,957.15	6,956.36	316.91	211.27	90.78	-1,399.79	3,039.04	7,564.47	7,303.52	260.95	28.988		
17,300.00	6,959.02	6,957.32	6,956.52	319.94	211.27	90.79	-1,399.79	3,039.04	7,663.73	7,402.83	260.90	29.374		
17,400.00	6,959.19	6,957.49	6,956.69	322.97	211.28	90.80	-1,399.79	3,039.04	7,763.01	7,502.16	260.85	29.760		
17,500.00	6,959.36	6,957.65	6,956.86	326.00	211.28	90.81	-1,399.79	3,039.04	7,862.31	7,601.51	260.80	30.146		
17,600.00	6,959.52	6,957.82	6,957.02	329.02	211.29	90.82	-1,399.79	3,039.04	7,961.63	7,700.87	260.76	30.532		
17,700.00	6,959.69	6,957.99	6,957.19	332.05	211.29	90.83	-1,399.79	3,039.04	8,060.97	7,800.24	260.72	30.918		
17,800.00	6,959.85	6,958.15	6,957.35	335.08	211.30	90.84	-1,399.79	3,039.04	8,160.32	7,899.63	260.69	31.303		
17,900.00	6,960.02	6,958.32	6,957.52	338.11	211.30	90.85	-1,399.79	3,039.04	8,259.68	7,999.03	260.65	31.689		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 183C - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 353-INCLINOMETER													Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Semi Major Axis	Highside	Offset Wellbore Centre	Distance	Rule Assigned:							
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
18,000.00	6,960.19	6,958.48	6,957.69	341.14	211.31	90.86	-1,399.79	3,039.04	8,359.06	8,098.44	260.62	32.074		
18,100.00	6,960.35	6,958.65	6,957.85	344.17	211.31	90.87	-1,399.79	3,039.04	8,458.46	8,197.87	260.59	32.459		
18,200.00	6,960.52	6,958.82	6,958.02	347.20	211.32	90.88	-1,399.79	3,039.04	8,557.87	8,297.30	260.57	32.843		
18,300.00	6,960.68	6,958.98	6,958.18	350.23	211.32	90.89	-1,399.79	3,039.04	8,657.29	8,396.75	260.54	33.228		
18,400.00	6,960.85	6,959.15	6,958.35	353.26	211.33	90.90	-1,399.79	3,039.04	8,756.73	8,496.20	260.52	33.612		
18,500.00	6,961.02	6,959.31	6,958.52	356.28	211.33	90.91	-1,399.79	3,039.04	8,856.18	8,595.67	260.51	33.996		
18,600.00	6,961.18	6,959.48	6,958.68	359.31	211.34	90.92	-1,399.79	3,039.04	8,955.64	8,695.15	260.49	34.380		
18,700.00	6,961.35	6,959.65	6,958.85	362.34	211.34	90.93	-1,399.79	3,039.04	9,055.11	8,794.63	260.48	34.763		
18,800.00	6,961.51	6,959.81	6,959.01	365.37	211.35	90.94	-1,399.79	3,039.04	9,154.60	8,894.13	260.47	35.147		
18,900.00	6,961.68	6,959.98	6,959.18	368.40	211.35	90.95	-1,399.79	3,039.04	9,254.09	8,993.63	260.46	35.530		
19,000.00	6,961.84	6,960.14	6,959.34	371.43	211.36	90.96	-1,399.79	3,039.04	9,353.60	9,093.15	260.45	35.913		
19,100.00	6,962.01	6,960.31	6,959.51	374.46	211.36	90.97	-1,399.79	3,039.04	9,453.12	9,192.67	260.45	36.295		
19,200.00	6,962.17	6,960.47	6,959.67	377.49	211.37	90.98	-1,399.79	3,039.04	9,552.64	9,292.20	260.45	36.678		
19,300.00	6,962.34	6,960.64	6,959.84	380.52	211.37	90.98	-1,399.79	3,039.04	9,652.18	9,391.73	260.45	37.060		
19,400.00	6,962.51	6,960.80	6,960.01	383.55	211.38	90.99	-1,399.79	3,039.04	9,751.73	9,491.28	260.45	37.442		
19,500.00	6,962.67	6,960.97	6,960.17	386.58	211.38	91.00	-1,399.79	3,039.04	9,851.28	9,590.83	260.45	37.824		
19,600.00	6,962.84	6,961.13	6,960.34	389.61	211.39	91.01	-1,399.79	3,039.04	9,950.85	9,690.39	260.46	38.205		
19,700.00	6,963.00	6,961.30	6,960.50	392.64	211.39	91.02	-1,399.79	3,039.04	10,050.42	9,789.95	260.47	38.586		
19,800.00	6,963.16	6,961.46	6,960.66	395.67	211.40	91.03	-1,399.79	3,039.04	10,150.00	9,889.53	260.48	38.967		
19,900.00	6,963.33	6,961.63	6,960.83	398.70	211.40	91.04	-1,399.79	3,039.04	10,249.59	9,989.10	260.49	39.348		
20,000.00	6,963.49	6,961.79	6,960.99	401.73	211.41	91.05	-1,399.79	3,039.04	10,349.19	10,088.69	260.50	39.728		
20,100.00	6,963.66	6,961.96	6,961.16	404.77	211.41	91.06	-1,399.79	3,039.04	10,448.80	10,188.28	260.51	40.108		
20,200.00	6,963.82	6,962.12	6,961.32	407.80	211.42	91.07	-1,399.79	3,039.04	10,548.41	10,287.88	260.53	40.488		
20,307.78	6,964.00	6,962.30	6,961.50	411.06	211.42	91.08	-1,399.79	3,039.04	10,655.78	10,395.23	260.55	40.897		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 189 - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 14-NS-GYRO-MS													Offset Well Error:	0.00 ft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Rule Assigned:		Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
0.00	0.00	406.76	406.69	0.00	1.03	92.29	-483.37	12,101.18	12,111.56					
393.00	392.99	743.89	743.72	0.66	1.92	51.53	-475.44	12,098.25	12,106.70	12,104.13	2.58	4,695.802		
483.00	482.99	800.00	799.81	0.97	2.06	-60.01	-473.88	12,098.00	12,105.65	12,102.61	3.04	3,986.360		
578.00	577.96	857.72	857.50	1.30	2.21	-73.44	-472.18	12,097.91	12,104.59	12,101.08	3.51	3,449.359		
673.00	672.85	900.00	899.76	1.64	2.32	-80.77	-470.91	12,098.01	12,103.77	12,099.82	3.95	3,065.042		
765.00	764.65	958.52	958.26	1.96	2.46	-80.47	-469.19	12,098.34	12,103.23	12,098.81	4.42	2,739.994		
855.00	854.37	1,014.78	1,014.49	2.29	2.59	-77.83	-467.67	12,098.87	12,102.61	12,097.73	4.88	2,480.929		
952.00	950.95	1,112.06	1,111.73	2.65	2.82	-73.33	-465.11	12,099.87	12,101.26	12,095.79	5.47	2,213.968		
1,077.00	1,075.26	1,223.39	1,223.02	3.13	3.08	-73.49	-462.18	12,101.04	12,098.69	12,092.49	6.20	1,950.346		
1,153.56	1,151.36	1,275.75	1,275.35	3.42	3.21	-83.36	-460.79	12,101.68	12,097.87	12,091.25	6.62	1,827.569		
1,172.00	1,169.69	1,300.00	1,299.59	3.49	3.26	-85.86	-460.14	12,102.01	12,097.92	12,091.18	6.75	1,792.874		
1,300.00	1,297.07	1,358.47	1,358.03	3.97	3.40	-87.22	-458.64	12,102.96	12,099.08	12,091.71	7.37	1,642.501		
1,395.00	1,391.63	1,412.81	1,412.35	4.34	3.52	-88.84	-457.34	12,104.07	12,100.62	12,092.77	7.85	1,541.823		
1,490.00	1,486.24	1,487.99	1,487.49	4.70	3.68	-87.67	-455.74	12,105.75	12,102.44	12,094.07	8.37	1,446.367		
1,586.00	1,582.02	1,605.27	1,604.73	5.05	3.91	-78.98	-453.85	12,108.37	12,103.88	12,094.92	8.96	1,350.493		
1,681.00	1,676.87	1,727.17	1,726.60	5.40	4.13	-74.13	-452.95	12,110.75	12,104.49	12,094.96	9.53	1,270.145		
1,776.00	1,771.67	1,800.00	1,799.42	5.75	4.26	-68.55	-452.68	12,112.11	12,104.26	12,094.26	10.00	1,209.835		
1,814.40	1,809.97	1,840.34	1,839.75	5.90	4.33	-73.48	-452.46	12,112.90	12,104.10	12,093.87	10.23	1,183.668		
1,872.00	1,867.43	1,879.18	1,878.58	6.11	4.41	-81.42	-452.14	12,113.72	12,104.43	12,093.91	10.52	1,151.109		
1,966.00	1,961.25	1,929.43	1,928.82	6.46	4.52	-97.85	-451.53	12,114.90	12,106.51	12,095.54	10.97	1,103.704		
2,061.00	2,056.10	2,000.00	1,999.34	6.81	4.67	-104.14	-450.05	12,116.96	12,110.17	12,098.69	11.47	1,055.390		
2,156.00	2,150.95	2,041.64	2,040.94	7.15	4.78	-106.80	-448.83	12,118.32	12,114.53	12,102.61	11.92	1,016.076		
2,252.00	2,246.71	2,238.84	2,237.84	7.50	5.29	-108.62	-439.78	12,123.95	12,119.22	12,106.44	12.79	947.874		
2,347.00	2,341.39	2,315.03	2,313.87	7.86	5.49	-110.56	-435.19	12,125.91	12,124.14	12,110.80	13.34	908.739		
2,442.00	2,436.07	2,400.00	2,398.62	8.21	5.72	-107.35	-429.52	12,128.15	12,129.04	12,115.11	13.92	871.195		
2,537.00	2,530.82	2,449.28	2,447.75	8.56	5.85	-98.96	-425.93	12,129.57	12,133.25	12,118.85	14.41	842.212		
2,632.00	2,625.64	2,500.00	2,498.29	8.92	5.98	-76.51	-422.02	12,131.26	12,136.13	12,121.24	14.89	814.951		
2,728.00	2,721.53	2,500.00	2,498.29	9.26	5.98	-58.00	-422.02	12,131.26	12,137.95	12,122.71	15.24	796.583		
2,823.00	2,816.43	2,500.00	2,498.29	9.60	5.98	-38.50	-422.02	12,131.26	12,139.39	12,123.82	15.57	779.569		
2,918.00	2,911.32	2,557.09	2,555.12	9.94	6.14	-35.95	-417.30	12,133.81	12,140.07	12,124.02	16.06	756.034		
3,013.00	3,006.17	2,600.00	2,597.79	10.28	6.25	-46.60	-413.49	12,136.39	12,141.50	12,124.99	16.51	735.481		
3,109.00	3,101.98	2,600.00	2,597.79	10.63	6.25	-52.42	-413.49	12,136.39	12,143.31	12,126.46	16.85	720.623		
3,204.00	3,196.73	2,600.00	2,597.79	10.98	6.25	-46.24	-413.49	12,136.39	12,145.29	12,128.10	17.19	706.471		
3,299.00	3,291.42	2,600.00	2,597.79	11.33	6.25	-58.31	-413.49	12,136.39	12,147.83	12,130.29	17.53	692.789		
3,395.00	3,387.03	2,655.00	2,652.41	11.69	6.39	-71.68	-408.52	12,140.55	12,151.67	12,133.63	18.03	673.786		
3,490.00	3,481.56	2,700.00	2,697.04	12.06	6.51	-73.73	-404.54	12,144.66	12,157.20	12,138.69	18.51	656.809		
3,585.00	3,576.12	2,700.00	2,697.04	12.42	6.51	-83.48	-404.54	12,144.66	12,163.99	12,145.13	18.86	644.901		
3,680.00	3,670.84	3,863.37	3,853.90	12.78	9.60	-100.66	-311.31	12,206.48	12,170.49	12,148.16	22.34	544.802		
3,775.00	3,765.61	4,020.28	4,010.70	13.13	10.01	-106.35	-305.67	12,207.33	12,172.56	12,149.46	23.10	526.956		
3,871.00	3,861.42	4,398.68	4,388.95	13.48	10.31	-103.11	-310.58	12,203.44	12,172.87	12,149.13	23.74	512.684		
3,966.00	3,956.30	4,515.52	4,505.64	13.83	10.31	-94.70	-316.00	12,200.87	12,171.56	12,147.48	24.09	505.345		
4,061.00	4,051.20	4,635.03	4,624.96	14.17	10.31	-89.21	-322.26	12,197.97	12,169.43	12,145.00	24.44	498.006		
4,156.00	4,146.11	4,724.41	4,714.20	14.52	10.32	-80.51	-326.52	12,195.74	12,166.71	12,141.91	24.79	490.697		
4,251.00	4,241.00	4,800.00	4,789.71	14.86	10.34	-90.64	-329.54	12,193.96	12,164.17	12,139.01	25.16	483.505		
4,347.00	4,336.86	4,859.45	4,849.11	15.22	10.36	-93.50	-331.53	12,192.70	12,162.34	12,136.81	25.53	476.385		
4,442.00	4,431.69	4,922.32	4,911.95	15.57	10.37	-88.79	-333.32	12,191.54	12,160.71	12,134.81	25.90	469.472		
4,536.00	4,525.51	5,000.00	4,989.59	15.91	10.40	-93.35	-335.34	12,190.32	12,159.34	12,133.06	26.28	462.686		
4,632.00	4,621.31	5,052.33	5,041.91	16.27	10.42	-94.16	-336.54	12,189.63	12,158.46	12,131.80	26.66	456.043		
4,727.00	4,716.11	5,120.34	5,109.90	16.62	10.45	-89.92	-337.79	12,188.89	12,157.64	12,130.60	27.05	449.524		
4,821.00	4,809.89	5,200.00	5,189.54	16.97	10.49	-88.78	-339.08	12,188.15	12,156.70	12,129.26	27.44	443.086		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 189 - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 14-NS-GYRO-MS													Offset Well Error:	0.00 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
4,916.00	4,904.64	5,287.07	5,276.60	17.33	10.54	-86.07	-340.44	12,187.42	12,155.60	12,127.75	27.84	436.607		
5,011.00	4,999.37	5,384.87	5,374.39	17.69	10.60	-86.26	-342.01	12,186.61	12,154.34	12,126.09	28.26	430.137		
5,109.00	5,097.08	5,470.24	5,459.74	18.06	10.66	-83.47	-343.37	12,185.93	12,152.87	12,124.19	28.68	423.692		
5,204.00	5,191.74	5,556.69	5,546.18	18.42	10.72	-85.34	-344.64	12,185.33	12,151.43	12,122.33	29.11	417.497		
5,299.00	5,286.40	5,659.05	5,648.53	18.78	10.80	-82.10	-346.03	12,184.63	12,149.92	12,120.38	29.54	411.241		
5,363.00	5,350.22	5,730.88	5,720.35	19.02	10.86	-82.38	-347.05	12,184.08	12,148.77	12,118.92	29.84	407.069		
5,458.00	5,444.99	5,839.59	5,829.04	19.37	10.95	-84.67	-348.71	12,183.18	12,147.24	12,116.94	30.30	400.963		
5,521.00	5,507.84	5,915.25	5,904.68	19.61	11.02	-84.34	-350.01	12,182.42	12,146.19	12,115.59	30.60	396.929		
5,585.00	5,571.69	5,965.38	5,954.81	19.84	11.07	-85.41	-350.85	12,181.94	12,145.19	12,114.30	30.89	393.190		
5,648.00	5,634.55	6,017.38	6,006.80	20.08	11.12	-86.52	-351.68	12,181.50	12,144.35	12,113.17	31.18	389.539		
5,712.00	5,698.39	6,076.51	6,065.92	20.32	11.18	-85.20	-352.57	12,181.03	12,143.52	12,112.04	31.48	385.797		
5,776.00	5,762.24	6,165.58	6,154.97	20.56	11.28	-81.93	-353.92	12,180.28	12,142.50	12,110.69	31.81	381.718		
5,839.00	5,825.12	6,252.45	6,241.83	20.79	11.38	-80.31	-355.33	12,179.33	12,141.19	12,109.05	32.14	377.743		
5,903.00	5,889.00	6,300.00	6,289.37	21.03	11.43	-80.13	-356.14	12,178.75	12,139.77	12,107.33	32.43	374.289		
5,966.00	5,951.88	6,355.88	6,345.23	21.26	11.50	-78.09	-357.13	12,178.12	12,138.31	12,105.58	32.73	370.808		
6,030.00	6,015.74	6,400.00	6,389.35	21.50	11.55	-77.38	-357.96	12,177.73	12,136.84	12,103.81	33.03	367.492		
6,093.00	6,078.59	6,447.51	6,436.85	21.74	11.61	-77.28	-358.81	12,177.38	12,135.42	12,102.10	33.32	364.213		
6,157.00	6,142.42	6,500.00	6,489.33	21.97	11.67	-68.38	-359.61	12,177.04	12,133.64	12,100.02	33.62	360.877		
6,220.00	6,205.25	6,555.12	6,544.44	22.21	11.74	-75.66	-360.32	12,176.72	12,131.84	12,097.92	33.93	357.571		
6,243.83	6,229.01	6,575.75	6,565.08	22.26	11.77	-80.64	-360.56	12,176.62	12,131.36	12,097.36	34.00	356.784		
6,300.00	6,285.05	6,624.80	6,614.12	22.27	11.83	-80.66	-361.07	12,176.38	12,130.45	12,096.37	34.08	355.958		
6,323.33	6,308.32	6,645.32	6,634.64	22.27	11.86	-80.66	-361.24	12,176.29	12,130.08	12,095.97	34.11	355.600		
6,350.00	6,334.92	6,668.77	6,658.09	22.28	11.89	-52.69	-361.40	12,176.19	12,129.11	12,094.96	34.15	355.169		
6,400.00	6,384.57	6,715.16	6,704.48	22.30	11.96	-28.23	-361.62	12,176.01	12,124.34	12,090.11	34.23	354.209		
6,450.00	6,433.72	6,767.50	6,756.82	22.32	12.03	-18.84	-361.83	12,175.80	12,115.71	12,081.39	34.32	352.993		
6,500.00	6,482.07	6,821.67	6,810.99	22.34	12.11	-14.18	-362.06	12,175.57	12,103.27	12,068.85	34.42	351.593		
6,550.00	6,529.32	6,879.07	6,868.39	22.37	12.20	-11.46	-362.25	12,175.29	12,087.07	12,052.54	34.54	349.975		
6,600.00	6,575.18	6,922.84	6,912.16	22.41	12.27	-9.70	-362.34	12,175.04	12,067.22	12,032.59	34.64	348.404		
6,650.00	6,619.39	6,958.12	6,947.44	22.45	12.33	-8.49	-362.38	12,174.87	12,043.90	12,009.17	34.73	346.821		
6,700.00	6,661.67	7,000.00	6,989.31	22.51	12.40	-7.62	-362.40	12,174.70	12,017.25	11,982.42	34.83	345.013		
6,750.00	6,701.77	7,031.09	7,020.41	22.58	12.46	-6.98	-362.39	12,174.58	11,987.40	11,952.48	34.92	343.260		
6,800.00	6,739.44	7,070.22	7,059.53	22.67	12.53	-6.51	-362.40	12,174.43	11,954.53	11,919.50	35.03	341.272		
6,850.00	6,774.46	7,106.27	7,095.58	22.79	12.59	-6.17	-362.41	12,174.29	11,918.82	11,883.69	35.13	339.258		
6,900.00	6,806.61	7,138.15	7,127.46	22.95	12.65	-5.94	-362.43	12,174.16	11,880.51	11,845.28	35.23	337.260		
6,950.00	6,835.71	7,166.97	7,156.28	23.17	12.70	-5.80	-362.46	12,174.05	11,839.82	11,804.50	35.32	335.257		
7,000.00	6,861.57	7,192.56	7,181.88	23.48	12.74	-5.75	-362.50	12,173.95	11,796.99	11,761.60	35.40	333.268		
7,050.00	6,884.03	7,213.03	7,202.34	23.88	12.78	-5.81	-362.54	12,173.87	11,752.30	11,716.83	35.47	331.334		
7,100.00	6,902.97	7,229.53	7,218.84	24.37	12.81	-6.01	-362.56	12,173.81	11,706.00	11,670.47	35.53	329.453		
7,150.00	6,918.27	7,242.84	7,232.15	24.96	12.83	-6.43	-362.58	12,173.76	11,658.38	11,622.80	35.58	327.629		
7,200.00	6,929.83	7,252.87	7,242.18	25.64	12.85	-7.31	-362.59	12,173.73	11,609.73	11,574.10	35.63	325.878		
7,250.00	6,937.59	7,259.55	7,248.87	26.40	12.86	-9.50	-362.60	12,173.70	11,560.34	11,524.68	35.66	324.213		
7,300.00	6,941.50	7,262.85	7,252.16	27.23	12.87	-20.69	-362.60	12,173.69	11,510.50	11,474.82	35.68	322.643		
7,324.29	6,942.00	7,263.22	7,252.54	27.65	12.87	-97.59	-362.60	12,173.69	11,486.21	11,450.53	35.68	321.915		
7,360.79	6,942.06	7,263.18	7,252.49	28.31	12.87	-93.54	-362.60	12,173.69	11,449.72	11,414.03	35.69	320.838		
7,400.00	6,942.13	7,263.13	7,252.44	29.06	12.87	-93.53	-362.60	12,173.69	11,410.52	11,374.82	35.69	319.672		
7,500.00	6,942.31	7,263.00	7,252.31	31.09	12.87	-93.51	-362.60	12,173.69	11,310.55	11,274.83	35.71	316.691		
7,600.00	6,942.48	7,262.87	7,252.18	33.27	12.87	-93.48	-362.60	12,173.69	11,210.58	11,174.84	35.74	313.701		
7,700.00	6,942.66	7,262.74	7,252.05	35.58	12.87	-93.46	-362.60	12,173.69	11,110.61	11,074.85	35.76	310.701		
7,800.00	6,942.83	7,262.61	7,251.92	38.00	12.87	-93.43	-362.60	12,173.69	11,010.64	10,974.85	35.78	307.692		
7,900.00	6,943.00	7,262.48	7,251.79	40.50	12.87	-93.41	-362.60	12,173.69	10,910.67	10,874.86	35.81	304.674		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 189 - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 14-NS-GYRO-MS													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		
8,000.00	6,943.18	7,262.35	7,251.66	43.06	12.87	-93.38	-362.60	12,173.70	10,810.70	10,774.86	35.84	301.648		
8,100.00	6,943.35	7,262.21	7,251.53	45.69	12.87	-93.36	-362.60	12,173.70	10,710.73	10,674.87	35.87	298.614		
8,200.00	6,943.53	7,262.08	7,251.40	48.36	12.87	-93.33	-362.60	12,173.70	10,610.77	10,574.87	35.90	295.572		
8,300.00	6,943.70	7,261.95	7,251.26	51.08	12.87	-93.31	-362.60	12,173.70	10,510.80	10,474.87	35.93	292.522		
8,400.00	6,943.87	7,261.82	7,251.13	53.83	12.87	-93.28	-362.60	12,173.70	10,410.84	10,374.87	35.97	289.465		
8,500.00	6,944.05	7,261.69	7,251.00	56.60	12.87	-93.25	-362.60	12,173.70	10,310.87	10,274.87	36.00	286.400		
8,600.00	6,944.22	7,261.55	7,250.87	59.41	12.87	-93.23	-362.60	12,173.70	10,210.91	10,174.87	36.04	283.329		
8,700.00	6,944.39	7,261.42	7,250.73	62.23	12.87	-93.20	-362.60	12,173.70	10,110.94	10,074.86	36.08	280.251		
8,800.00	6,944.57	7,261.29	7,250.60	65.08	12.87	-93.18	-362.60	12,173.70	10,010.98	9,974.86	36.12	277.166		
8,900.00	6,944.74	7,261.15	7,250.47	67.94	12.86	-93.15	-362.60	12,173.70	9,911.02	9,874.86	36.16	274.076		
9,000.00	6,944.91	7,261.02	7,250.33	70.81	12.86	-93.12	-362.60	12,173.70	9,811.06	9,774.85	36.21	270.980		
9,100.00	6,945.09	7,260.88	7,250.20	73.70	12.86	-93.10	-362.60	12,173.70	9,711.10	9,674.84	36.25	267.878		
9,200.00	6,945.26	7,260.75	7,250.06	76.60	12.86	-93.07	-362.60	12,173.70	9,611.14	9,574.84	36.30	264.770		
9,300.00	6,945.43	7,260.61	7,249.93	79.51	12.86	-93.04	-362.60	12,173.70	9,511.18	9,474.83	36.35	261.658		
9,400.00	6,945.61	7,260.48	7,249.79	82.43	12.86	-93.02	-362.60	12,173.70	9,411.22	9,374.82	36.40	258.540		
9,500.00	6,945.78	7,260.34	7,249.66	85.36	12.86	-92.99	-362.60	12,173.70	9,311.26	9,274.81	36.45	255.418		
9,600.00	6,945.95	7,260.21	7,249.52	88.29	12.86	-92.96	-362.60	12,173.70	9,211.31	9,174.79	36.51	252.292		
9,700.00	6,946.12	7,260.07	7,249.38	91.23	12.86	-92.94	-362.60	12,173.70	9,111.35	9,074.78	36.57	249.162		
9,800.00	6,946.30	7,259.93	7,249.25	94.18	12.86	-92.91	-362.60	12,173.70	9,011.40	8,974.77	36.63	246.028		
9,900.00	6,946.47	7,259.80	7,249.11	97.13	12.86	-92.88	-362.60	12,173.70	8,911.44	8,874.75	36.69	242.890		
10,000.00	6,946.64	7,259.66	7,248.97	100.09	12.86	-92.85	-362.60	12,173.70	8,811.49	8,774.74	36.75	239.749		
10,100.00	6,946.82	7,259.52	7,248.83	103.05	12.86	-92.83	-362.60	12,173.70	8,711.54	8,674.72	36.82	236.604		
10,200.00	6,946.99	7,259.38	7,248.69	106.02	12.86	-92.80	-362.60	12,173.70	8,611.59	8,574.70	36.89	233.457		
10,300.00	6,947.16	7,259.24	7,248.56	108.99	12.86	-92.77	-362.60	12,173.71	8,511.64	8,474.68	36.96	230.307		
10,400.00	6,947.33	7,259.10	7,248.42	111.96	12.86	-92.74	-362.60	12,173.71	8,411.69	8,374.66	37.03	227.155		
10,500.00	6,947.50	7,258.96	7,248.28	114.94	12.86	-92.72	-362.60	12,173.71	8,311.75	8,274.64	37.11	224.001		
10,600.00	6,947.68	7,258.82	7,248.14	117.92	12.86	-92.69	-362.59	12,173.71	8,211.80	8,174.62	37.18	220.844		
10,700.00	6,947.85	7,258.68	7,248.00	120.90	12.86	-92.66	-362.59	12,173.71	8,111.86	8,074.59	37.26	217.686		
10,800.00	6,948.02	7,258.54	7,247.86	123.88	12.86	-92.63	-362.59	12,173.71	8,011.92	7,974.57	37.35	214.526		
10,900.00	6,948.19	7,258.40	7,247.71	126.87	12.86	-92.60	-362.59	12,173.71	7,911.97	7,874.54	37.43	211.365		
11,000.00	6,948.36	7,258.26	7,247.57	129.86	12.86	-92.58	-362.59	12,173.71	7,812.04	7,774.51	37.52	208.203		
11,100.00	6,948.53	7,258.12	7,247.43	132.85	12.86	-92.55	-362.59	12,173.71	7,712.10	7,674.48	37.61	205.040		
11,200.00	6,948.71	7,257.98	7,247.29	135.84	12.86	-92.52	-362.59	12,173.71	7,612.16	7,574.45	37.71	201.877		
11,300.00	6,948.88	7,257.83	7,247.15	138.84	12.86	-92.49	-362.59	12,173.71	7,512.23	7,474.42	37.80	198.712		
11,400.00	6,949.05	7,257.69	7,247.00	141.84	12.86	-92.46	-362.59	12,173.71	7,412.29	7,374.39	37.91	195.548		
11,500.00	6,949.22	7,257.55	7,246.86	144.84	12.86	-92.43	-362.59	12,173.71	7,312.36	7,274.35	38.01	192.383		
11,600.00	6,949.39	7,257.41	7,246.72	147.84	12.86	-92.40	-362.59	12,173.71	7,212.43	7,174.32	38.12	189.219		
11,700.00	6,949.56	7,257.26	7,246.57	150.84	12.86	-92.38	-362.59	12,173.71	7,112.51	7,074.28	38.23	186.055		
11,800.00	6,949.73	7,257.12	7,246.43	153.84	12.86	-92.35	-362.59	12,173.71	7,012.58	6,974.24	38.34	182.891		
11,900.00	6,949.91	7,256.97	7,246.29	156.84	12.86	-92.32	-362.59	12,173.71	6,912.66	6,874.20	38.46	179.728		
12,000.00	6,950.08	7,256.83	7,246.14	159.85	12.86	-92.29	-362.59	12,173.71	6,812.74	6,774.16	38.58	176.565		
12,100.00	6,950.25	7,256.68	7,246.00	162.86	12.86	-92.26	-362.59	12,173.71	6,712.82	6,674.11	38.71	173.404		
12,200.00	6,950.42	7,256.54	7,245.85	165.86	12.86	-92.23	-362.59	12,173.71	6,612.91	6,574.06	38.84	170.244		
12,300.00	6,950.59	7,256.39	7,245.70	168.87	12.86	-92.20	-362.59	12,173.71	6,512.99	6,474.01	38.98	167.085		
12,400.00	6,950.76	7,256.24	7,245.56	171.88	12.86	-92.17	-362.59	12,173.72	6,413.08	6,373.96	39.12	163.928		
12,500.00	6,950.93	7,256.10	7,245.41	174.89	12.86	-92.14	-362.59	12,173.72	6,313.18	6,273.91	39.27	160.772		
12,600.00	6,951.10	7,255.95	7,245.26	177.90	12.86	-92.11	-362.59	12,173.72	6,213.27	6,173.85	39.42	157.618		
12,700.00	6,951.27	7,255.80	7,245.11	180.91	12.86	-92.08	-362.59	12,173.72	6,113.37	6,073.79	39.58	154.466		
12,800.00	6,951.44	7,255.65	7,244.97	183.93	12.86	-92.05	-362.59	12,173.72	6,013.47	5,973.73	39.74	151.316		
12,900.00	6,951.61	7,255.51	7,244.82	186.94	12.85	-92.02	-362.59	12,173.72	5,913.58	5,873.67	39.91	148.169		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 189 - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 14-NS-GYRO-MS													Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Vertical	Reference	Semi Major Axis	Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning	
Measured	Depth	Measured	Depth	Reference	Offset	Toolface	+N/-S	+E/-W	Between	Between	Separation	Factor		
Depth	(ft)	Depth	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	Centres	Ellipses	(ft)			
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)			
13,000.00	6,951.78	7,255.36	7,244.67	189.96	12.85	-91.99	-362.59	12,173.72	5,813.69	5,773.60	40.09	145.024		
13,100.00	6,951.95	7,255.21	7,244.52	192.97	12.85	-91.96	-362.59	12,173.72	5,713.80	5,673.53	40.27	141.882		
13,200.00	6,952.12	7,255.06	7,244.37	195.99	12.85	-91.93	-362.59	12,173.72	5,613.92	5,573.45	40.46	138.742		
13,300.00	6,952.29	7,254.91	7,244.22	199.00	12.85	-91.90	-362.59	12,173.72	5,514.04	5,473.38	40.66	135.606		
13,400.00	6,952.46	7,254.76	7,244.07	202.02	12.85	-91.87	-362.59	12,173.72	5,414.16	5,373.29	40.87	132.473		
13,500.00	6,952.63	7,254.61	7,243.92	205.04	12.85	-91.84	-362.59	12,173.72	5,314.29	5,273.21	41.09	129.343		
13,600.00	6,952.80	7,254.46	7,243.77	208.05	12.85	-91.81	-362.59	12,173.72	5,214.43	5,173.12	41.31	126.217		
13,700.00	6,952.97	7,254.30	7,243.62	211.07	12.85	-91.78	-362.59	12,173.72	5,114.57	5,073.02	41.55	123.095		
13,800.00	6,953.14	7,254.15	7,243.46	214.09	12.85	-91.75	-362.59	12,173.72	5,014.72	4,972.92	41.80	119.976		
13,900.00	6,953.31	7,254.00	7,243.31	217.11	12.85	-91.72	-362.59	12,173.72	4,914.87	4,872.81	42.06	116.862		
14,000.00	6,953.48	7,253.85	7,243.16	220.13	12.85	-91.68	-362.59	12,173.72	4,815.03	4,772.70	42.33	113.753		
14,100.00	6,953.65	7,253.69	7,243.01	223.15	12.85	-91.65	-362.59	12,173.72	4,715.19	4,672.58	42.61	110.649		
14,200.00	6,953.82	7,253.54	7,242.85	226.17	12.85	-91.62	-362.59	12,173.72	4,615.36	4,572.45	42.91	107.549		
14,300.00	6,953.99	7,253.39	7,242.70	229.19	12.85	-91.59	-362.59	12,173.72	4,515.54	4,472.31	43.23	104.456		
14,400.00	6,954.15	7,253.23	7,242.54	232.21	12.85	-91.56	-362.59	12,173.73	4,415.73	4,372.17	43.56	101.368		
14,500.00	6,954.32	7,253.08	7,242.39	235.23	12.85	-91.53	-362.59	12,173.73	4,315.93	4,272.02	43.91	98.286		
14,600.00	6,954.49	7,252.92	7,242.23	238.25	12.85	-91.49	-362.59	12,173.73	4,216.13	4,171.85	44.28	95.212		
14,700.00	6,954.66	7,252.77	7,242.08	241.28	12.85	-91.46	-362.59	12,173.73	4,116.35	4,071.68	44.67	92.145		
14,800.00	6,954.83	7,252.61	7,241.92	244.30	12.85	-91.43	-362.59	12,173.73	4,016.58	3,971.49	45.09	89.086		
14,900.00	6,955.00	7,252.45	7,241.77	247.32	12.85	-91.40	-362.59	12,173.73	3,916.82	3,871.29	45.53	86.035		
15,000.00	6,955.17	7,252.30	7,241.61	250.34	12.85	-91.37	-362.59	12,173.73	3,817.07	3,771.07	45.99	82.994		
15,100.00	6,955.34	7,252.14	7,241.45	253.37	12.85	-91.33	-362.59	12,173.73	3,717.33	3,670.84	46.49	79.963		
15,200.00	6,955.50	7,251.98	7,241.30	256.39	12.85	-91.30	-362.59	12,173.73	3,617.61	3,570.59	47.02	76.943		
15,300.00	6,955.67	7,251.82	7,241.14	259.42	12.85	-91.27	-362.59	12,173.73	3,517.90	3,470.32	47.58	73.935		
15,400.00	6,955.84	7,251.67	7,240.98	262.44	12.85	-91.24	-362.59	12,173.73	3,418.22	3,370.03	48.18	70.941		
15,500.00	6,956.01	7,251.51	7,240.82	265.46	12.85	-91.20	-362.59	12,173.73	3,318.55	3,269.72	48.83	67.961		
15,600.00	6,956.18	7,251.35	7,240.66	268.49	12.85	-91.17	-362.59	12,173.73	3,218.90	3,169.37	49.52	64.997		
15,700.00	6,956.34	7,251.19	7,240.50	271.51	12.85	-91.14	-362.59	12,173.73	3,119.27	3,069.00	50.27	62.050		
15,800.00	6,956.51	7,251.03	7,240.34	274.54	12.85	-91.11	-362.59	12,173.73	3,019.67	2,968.60	51.07	59.123		
15,900.00	6,956.68	7,250.87	7,240.18	277.56	12.85	-91.07	-362.59	12,173.73	2,920.10	2,868.15	51.94	56.217		
16,000.00	6,956.85	7,250.71	7,240.02	280.59	12.85	-91.04	-362.59	12,173.73	2,820.55	2,767.67	52.88	53.334		
16,100.00	6,957.02	7,250.54	7,239.86	283.62	12.85	-91.01	-362.59	12,173.73	2,721.04	2,667.13	53.91	50.478		
16,200.00	6,957.18	7,250.38	7,239.70	286.64	12.85	-90.97	-362.59	12,173.73	2,621.57	2,566.55	55.02	47.649		
16,300.00	6,957.35	7,250.22	7,239.53	289.67	12.85	-90.94	-362.59	12,173.74	2,522.13	2,465.90	56.23	44.853		
16,400.00	6,957.52	7,250.06	7,239.37	292.70	12.85	-90.91	-362.59	12,173.74	2,422.75	2,365.19	57.56	42.091		
16,500.00	6,957.69	7,249.89	7,239.21	295.72	12.84	-90.87	-362.59	12,173.74	2,323.42	2,264.40	59.02	39.367		
16,600.00	6,957.85	7,249.73	7,239.04	298.75	12.84	-90.84	-362.59	12,173.74	2,224.14	2,163.52	60.63	36.685		
16,700.00	6,958.02	7,249.57	7,238.88	301.78	12.84	-90.80	-362.59	12,173.74	2,124.94	2,062.53	62.41	34.050		
16,800.00	6,958.19	7,249.40	7,238.72	304.80	12.84	-90.77	-362.59	12,173.74	2,025.81	1,961.43	64.38	31.466		
16,900.00	6,958.35	7,249.24	7,238.55	307.83	12.84	-90.74	-362.59	12,173.74	1,926.78	1,860.19	66.58	28.938		
17,000.00	6,958.52	7,249.07	7,238.38	310.86	12.84	-90.70	-362.59	12,173.74	1,827.84	1,758.80	69.05	26.472		
17,100.00	6,958.69	7,248.91	7,238.22	313.88	12.84	-90.67	-362.59	12,173.74	1,729.04	1,657.21	71.83	24.073		
17,200.00	6,958.86	7,248.74	7,238.05	316.91	12.84	-90.63	-362.59	12,173.74	1,630.37	1,555.40	74.97	21.747		
17,300.00	6,959.02	7,248.57	7,237.89	319.94	12.84	-90.60	-362.59	12,173.74	1,531.88	1,453.33	78.55	19.502		
17,400.00	6,959.19	7,248.41	7,237.72	322.97	12.84	-90.56	-362.59	12,173.74	1,433.60	1,350.95	82.66	17.344		
17,500.00	6,959.36	7,248.24	7,237.55	326.00	12.84	-90.53	-362.59	12,173.74	1,335.58	1,248.17	87.40	15.281		
17,600.00	6,959.52	7,248.07	7,237.38	329.02	12.84	-90.49	-362.59	12,173.74	1,237.87	1,144.93	92.94	13.319		
17,700.00	6,959.69	7,247.90	7,237.21	332.05	12.84	-90.46	-362.59	12,173.74	1,140.56	1,041.11	99.45	11.469		
17,800.00	6,959.85	7,247.73	7,237.05	335.08	12.84	-90.42	-362.59	12,173.74	1,043.75	936.55	107.20	9.736		
17,900.00	6,960.02	7,247.56	7,236.88	338.11	12.84	-90.39	-362.59	12,173.74	947.61	831.07	116.55	8.131		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 189 - OH - OH														Offset Site Error:	0.00 ft
Survey Program: 14-NS-GYRO-MS														Offset Well Error:	0.00 ft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (ft)	Separation Factor	Warning		
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)					
18,000.00	6,960.19	7,247.39	7,236.71	341.14	12.84	-90.35	-362.58	12,173.74	852.36	724.39	127.97	6.661			
18,100.00	6,960.35	7,247.22	7,236.54	344.17	12.84	-90.32	-362.58	12,173.75	758.33	616.17	142.16	5.334			
18,200.00	6,960.52	7,247.05	7,236.37	347.20	12.84	-90.28	-362.58	12,173.75	666.05	505.94	160.11	4.160			
18,300.00	6,960.68	7,246.88	7,236.19	350.23	12.84	-90.24	-362.58	12,173.75	576.34	393.13	183.21	3.146			
18,400.00	6,960.85	7,246.71	7,236.02	353.26	12.84	-90.21	-362.58	12,173.75	490.63	277.28	213.34	2.300			
18,500.00	6,961.02	7,246.54	7,235.85	356.28	12.84	-90.17	-362.58	12,173.75	411.42	158.82	252.60	1.629			
18,600.00	6,961.18	7,246.37	7,235.68	359.31	12.84	-90.14	-362.58	12,173.75	343.24	41.99	301.26	1.139	Level 3		
18,700.00	6,961.35	7,246.19	7,235.50	362.34	12.84	-90.10	-362.58	12,173.75	293.88	-57.33	351.21	0.837	Level 3		
18,800.00	6,961.51	7,246.02	7,235.33	365.37	12.84	-90.06	-362.58	12,173.75	273.71	-104.38	378.09	0.724	Level 3		
18,807.25	6,961.53	7,246.01	7,235.32	365.59	12.84	-90.06	-362.58	12,173.75	273.61	-104.76	378.37	0.723	Level 3, CC, ES, SF		
18,900.00	6,961.68	7,245.84	7,235.16	368.40	12.84	-90.03	-362.58	12,173.75	288.90	-72.12	361.02	0.800	Level 3		
19,000.00	6,961.84	7,245.67	7,234.98	371.43	12.84	-89.99	-362.58	12,173.75	334.69	19.18	315.50	1.061	Level 3		
19,100.00	6,962.01	7,245.50	7,234.81	374.46	12.84	-89.95	-362.58	12,173.75	400.70	133.09	267.61	1.497	Level 3		
19,200.00	6,962.17	7,245.32	7,234.63	377.49	12.84	-89.92	-362.58	12,173.75	478.66	250.70	227.96	2.100			
19,300.00	6,962.34	7,245.14	7,234.46	380.52	12.84	-89.88	-362.58	12,173.75	563.62	366.38	197.24	2.858			
19,400.00	6,962.51	7,244.97	7,234.28	383.55	12.84	-89.84	-362.58	12,173.75	652.85	479.21	173.64	3.760			
19,500.00	6,962.67	7,244.79	7,234.10	386.58	12.84	-89.81	-362.58	12,173.75	744.82	589.51	155.31	4.796			
19,600.00	6,962.84	7,244.61	7,233.93	389.61	12.84	-89.77	-362.58	12,173.75	838.64	697.81	140.83	5.955			
19,700.00	6,963.00	7,244.44	7,233.75	392.64	12.84	-89.73	-362.58	12,173.75	933.73	804.55	129.18	7.228			
19,800.00	6,963.16	7,244.26	7,233.57	395.67	12.83	-89.69	-362.58	12,173.76	1,029.76	910.08	119.68	8.604			
19,900.00	6,963.33	7,244.08	7,233.39	398.70	12.83	-89.66	-362.58	12,173.76	1,126.48	1,014.67	111.81	10.075			
20,000.00	6,963.49	7,243.90	7,233.21	401.73	12.83	-89.62	-362.58	12,173.76	1,223.73	1,118.52	105.21	11.632			
20,100.00	6,963.66	7,243.72	7,233.03	404.77	12.83	-89.58	-362.58	12,173.76	1,321.38	1,221.77	99.61	13.266			
20,200.00	6,963.82	7,243.54	7,232.85	407.80	12.83	-89.54	-362.58	12,173.76	1,419.37	1,324.55	94.82	14.969			
20,307.78	6,964.00	7,243.34	7,232.66	411.06	12.83	-89.50	-362.58	12,173.76	1,525.27	1,434.88	90.38	16.876			

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 640H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 25-NS-GYRO-MS, 389-SDI MWD, 6481-SDI MWD, 7631-SDI MWD													Offset Well Error:	0.00 ft
Reference	Offset	Semi Major Axis	Reference	Offset	Highside	Offset Wellbore Centre		Distance		Minimum	Separation	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)	Separation (ft)			
0.00	0.00	0.51	0.51	0.00	0.00	86.14	2.11	31.31	31.38					
393.00	392.99	393.22	393.20	0.66	0.79	53.94	-1.28	33.71	32.63	31.18	1.45	22.443 ES		
483.00	482.99	483.05	483.02	0.97	0.85	-58.22	-1.19	34.77	33.10	31.28	1.82	18.187		
578.00	577.96	577.64	577.54	1.30	0.94	-80.35	1.68	36.67	34.31	32.07	2.24	15.294		
673.00	672.85	671.69	671.38	1.64	1.08	-102.58	7.29	39.13	38.16	35.44	2.72	14.036 SF		
765.00	764.65	762.14	761.49	1.96	1.25	-116.82	14.57	42.06	46.32	43.10	3.21	14.412		
855.00	854.37	849.84	848.71	2.29	1.44	-125.53	23.11	45.31	58.29	54.58	3.71	15.702		
952.00	950.95	942.75	940.85	2.65	1.68	-130.01	34.26	49.61	75.66	71.40	4.26	17.769		
1,077.00	1,075.26	1,062.19	1,058.79	3.13	2.04	-137.58	51.57	57.05	104.28	99.32	4.96	21.035		
1,172.00	1,169.69	1,152.43	1,147.75	3.49	2.34	-153.31	65.41	63.22	128.56	123.06	5.49	23.404		
1,300.00	1,297.07	1,273.13	1,266.39	3.97	2.77	-156.52	85.46	72.68	163.25	157.04	6.21	26.285		
1,395.00	1,391.63	1,364.73	1,356.32	4.34	3.09	-158.90	101.24	80.10	189.50	182.76	6.74	28.120		
1,490.00	1,486.24	1,456.85	1,446.79	4.70	3.39	-158.28	116.93	87.48	215.12	207.86	7.26	29.630		
1,586.00	1,582.02	1,551.13	1,539.51	5.05	3.71	-150.01	132.59	94.42	238.30	230.51	7.79	30.574		
1,681.00	1,676.87	1,639.20	1,625.96	5.40	4.04	-145.46	147.99	101.12	260.73	252.42	8.32	31.349		
1,776.00	1,771.67	1,733.85	1,718.85	5.75	4.39	-140.20	164.62	108.42	283.70	274.81	8.88	31.941		
1,872.00	1,867.43	1,824.37	1,807.66	6.11	4.73	-153.76	180.71	115.22	307.74	298.31	9.43	32.637		
1,966.00	1,961.25	1,915.94	1,897.48	6.46	5.08	-170.60	197.20	122.05	331.44	321.46	9.98	33.222		
2,061.00	2,056.10	2,006.85	1,986.62	6.81	5.43	-176.92	213.83	128.51	355.18	344.66	10.52	33.776		
2,156.00	2,150.95	2,101.32	2,079.30	7.15	5.79	-179.52	230.86	135.17	378.87	367.79	11.08	34.205		
2,252.00	2,246.71	2,194.56	2,170.85	7.50	6.13	178.92	247.10	142.30	403.63	392.00	11.63	34.701		
2,347.00	2,341.39	2,285.38	2,259.99	7.86	6.48	177.20	262.92	149.34	429.25	417.07	12.18	35.243		
2,442.00	2,436.07	2,376.73	2,349.65	8.21	6.84	-179.25	278.97	156.35	454.94	442.21	12.73	35.727		
2,537.00	2,530.82	2,469.26	2,440.49	8.56	7.19	-170.54	295.00	163.66	479.71	466.42	13.29	36.089		
2,632.00	2,625.64	2,559.67	2,529.22	8.92	7.55	-147.80	310.68	171.03	503.14	489.29	13.84	36.348		
2,728.00	2,721.53	2,650.84	2,618.62	9.26	7.91	-129.37	326.89	178.56	525.40	511.00	14.40	36.482		
2,823.00	2,816.43	2,743.42	2,709.38	9.60	8.28	-109.94	343.52	186.17	546.12	531.16	14.96	36.494		
2,918.00	2,911.32	2,837.26	2,801.36	9.94	8.65	-107.62	360.54	193.57	566.33	550.80	15.53	36.459		
3,013.00	3,006.17	2,936.83	2,899.13	10.28	9.02	-118.60	377.94	200.81	586.34	570.21	16.13	36.340		
3,109.00	3,101.98	3,032.95	2,993.67	10.63	9.37	-124.75	393.84	207.77	606.81	590.09	16.72	36.298		
3,204.00	3,196.73	3,123.32	3,082.51	10.98	9.71	-118.76	408.69	215.02	627.58	610.31	17.27	36.329		
3,299.00	3,291.42	3,213.06	3,170.68	11.33	10.06	-131.18	423.61	222.65	649.51	631.67	17.84	36.411		
3,395.00	3,387.03	3,302.49	3,258.41	11.69	10.41	-144.85	438.60	231.39	673.97	655.56	18.41	36.618		
3,490.00	3,481.56	3,391.42	3,345.56	12.06	10.77	-146.90	453.68	240.70	700.01	681.04	18.97	36.901		
3,585.00	3,576.12	3,482.24	3,434.56	12.42	11.13	-157.08	469.78	248.85	726.43	706.89	19.54	37.179		
3,680.00	3,670.84	3,581.40	3,531.85	12.78	11.51	-173.70	487.24	256.89	751.52	731.38	20.14	37.315		
3,775.00	3,765.61	3,681.34	3,630.16	13.13	11.88	-179.29	503.63	264.20	774.93	754.20	20.73	37.374		
3,871.00	3,861.42	3,772.66	3,720.04	13.48	12.21	-175.82	518.41	270.67	797.67	776.39	21.28	37.481		
3,966.00	3,956.30	3,858.63	3,804.56	13.83	12.54	-167.22	532.64	277.31	819.47	797.67	21.80	37.583		
4,061.00	4,051.20	3,944.13	3,888.47	14.17	12.87	-161.60	547.48	284.35	841.64	819.31	22.33	37.690		
4,156.00	4,146.11	4,036.45	3,978.95	14.52	13.24	-152.71	563.71	292.89	864.05	841.15	22.90	37.732		
4,251.00	4,241.00	4,130.82	4,071.50	14.86	13.61	-162.77	579.74	301.93	886.32	862.84	23.48	37.748		
4,347.00	4,336.86	4,216.72	4,155.68	15.22	13.96	-165.48	594.50	310.62	909.90	885.89	24.01	37.893		
4,442.00	4,431.69	4,305.56	4,242.59	15.57	14.33	-160.54	610.60	319.63	934.45	909.89	24.57	38.039		
4,536.00	4,525.51	4,417.04	4,351.88	15.91	14.76	-165.04	629.95	330.02	958.17	932.92	25.25	37.953		
4,632.00	4,621.31	4,510.23	4,443.55	16.27	15.11	-165.76	644.66	338.07	981.05	955.23	25.82	38.003		
4,727.00	4,716.11	4,591.55	4,523.34	16.62	15.43	-161.30	657.93	346.41	1,004.71	978.39	26.32	38.172		
4,821.00	4,809.89	4,682.34	4,612.32	16.97	15.79	-160.01	673.54	355.42	1,028.94	1,002.06	26.88	38.273		
4,916.00	4,904.64	4,773.75	4,702.01	17.33	16.15	-157.17	689.05	363.85	1,053.31	1,025.86	27.45	38.370		
5,011.00	4,999.37	4,859.84	4,786.37	17.69	16.49	-157.32	704.11	372.05	1,078.31	1,050.32	27.99	38.524		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 640H - OH - OH												Offset Site Error:	0.00 ft
Survey Program: 25-NS-GYRO-MS, 389-SDI MWD, 6481-SDI MWD, 7631-SDI MWD												Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Vertical	Reference	Semi Major Axis	Offset	Highside	Rule Assigned:					
Measured	Depth	Depth	Depth	Reference	Offset	Toolface	Offset Wellbore Centre	Distance	Between	Between	Minimum	Separation	Warning
Depth	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S	+E/-W	Centres	Ellipses	Separation	Factor	
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
5,109.00	5,097.08	4,964.44	4,888.89	18.06	16.91	-154.39	722.37	382.00	1,104.33	1,075.69	28.64	38.555	
5,204.00	5,191.74	5,061.06	4,983.82	18.42	17.29	-156.26	738.36	390.33	1,128.95	1,099.71	29.24	38.608	
5,299.00	5,286.40	5,136.20	5,057.56	18.78	17.59	-152.99	751.07	397.10	1,154.03	1,124.32	29.72	38.833	
5,363.00	5,350.22	5,183.01	5,103.34	19.02	17.78	-153.34	759.69	401.66	1,171.42	1,141.40	30.01	39.030	
5,458.00	5,444.99	5,276.11	5,194.29	19.37	18.17	-155.65	777.32	410.89	1,197.26	1,166.66	30.60	39.128	
5,521.00	5,507.84	5,341.06	5,257.79	19.61	18.43	-155.28	789.46	417.17	1,214.17	1,183.17	31.00	39.164	
5,585.00	5,571.69	5,407.13	5,322.43	19.84	18.70	-156.37	801.63	423.37	1,231.12	1,199.71	31.41	39.193	
5,648.00	5,634.55	5,472.68	5,386.62	20.08	18.96	-157.46	813.53	429.32	1,247.64	1,215.82	31.82	39.212	
5,712.00	5,698.39	5,540.76	5,453.34	20.32	19.23	-156.11	825.63	435.32	1,264.21	1,231.97	32.24	39.216	
5,776.00	5,762.24	5,602.02	5,513.42	20.56	19.47	-152.81	836.48	440.38	1,280.48	1,247.86	32.62	39.259	
5,839.00	5,825.12	5,660.17	5,570.44	20.79	19.70	-151.26	847.04	444.61	1,296.22	1,263.24	32.98	39.308	
5,903.00	5,889.00	5,716.65	5,625.79	21.03	19.93	-151.13	857.79	447.89	1,312.27	1,278.94	33.33	39.376	
5,966.00	5,951.88	5,775.00	5,682.93	21.26	20.16	-149.16	869.34	450.55	1,328.38	1,294.69	33.69	39.430	
6,030.00	6,015.74	5,847.12	5,753.54	21.50	20.44	-148.60	883.71	453.45	1,344.88	1,310.74	34.13	39.402	
6,093.00	6,078.59	5,965.29	5,869.76	21.74	20.86	-148.86	904.91	455.29	1,359.63	1,324.83	34.80	39.066	
6,157.00	6,142.42	6,105.80	6,008.76	21.97	21.26	-140.52	924.84	451.00	1,371.42	1,335.94	35.48	38.650	
6,220.00	6,205.25	6,301.79	6,203.43	22.21	21.60	-148.97	940.26	435.52	1,378.90	1,342.81	36.10	38.202	
6,243.83	6,229.01	6,339.07	6,240.52	22.26	21.63	-154.19	941.22	431.81	1,380.34	1,344.15	36.19	38.143	
6,300.00	6,285.05	6,426.89	6,327.97	22.27	21.70	-154.63	941.76	423.84	1,382.80	1,346.50	36.29	38.104	
6,323.33	6,308.32	6,447.07	6,348.08	22.27	21.72	-154.71	941.61	422.23	1,383.59	1,347.26	36.33	38.083	
6,350.00	6,334.92	6,472.78	6,373.70	22.28	21.72	-126.81	941.49	420.02	1,384.38	1,348.02	36.36	38.072	
6,400.00	6,384.57	6,524.64	6,424.94	22.30	21.70	-102.81	942.01	412.18	1,384.96	1,348.57	36.39	38.060	
6,450.00	6,433.72	6,552.12	6,451.72	22.32	21.69	-93.83	943.00	406.17	1,385.07	1,348.62	36.46	37.990	
6,500.00	6,482.07	6,577.77	6,476.56	22.34	21.68	-89.66	944.49	399.91	1,385.22	1,348.68	36.54	37.913	
6,550.00	6,529.32	6,631.96	6,528.68	22.37	21.67	-88.21	948.11	385.53	1,385.13	1,348.51	36.61	37.833	
6,600.00	6,575.18	6,710.75	6,602.89	22.41	21.62	-88.73	952.32	359.57	1,383.68	1,346.97	36.71	37.692	
6,650.00	6,619.39	6,736.56	6,626.32	22.45	21.61	-88.44	953.83	348.86	1,382.28	1,345.41	36.87	37.495	
6,700.00	6,661.67	6,753.01	6,640.92	22.51	21.60	-88.17	955.01	341.35	1,381.66	1,344.62	37.04	37.304	
6,709.00	6,669.06	6,756.63	6,644.09	22.52	21.59	-88.17	955.29	339.64	1,381.65	1,344.57	37.08	37.266	
6,750.00	6,701.77	6,772.30	6,657.73	22.58	21.58	-88.18	956.52	332.03	1,381.96	1,344.72	37.24	37.106	
6,800.00	6,739.44	6,786.68	6,670.10	22.67	21.58	-88.09	957.69	324.79	1,383.30	1,345.82	37.48	36.911	
6,850.00	6,774.46	6,796.66	6,678.60	22.79	21.57	-87.85	958.52	319.61	1,385.80	1,348.06	37.75	36.714	
6,900.00	6,806.61	6,802.41	6,683.45	22.95	21.57	-87.42	959.00	316.58	1,389.54	1,351.48	38.06	36.512	
6,950.00	6,835.71	6,804.56	6,685.27	23.17	21.56	-86.79	959.18	315.44	1,394.54	1,356.12	38.42	36.296	
7,000.00	6,861.57	6,803.67	6,684.52	23.48	21.56	-85.99	959.11	315.91	1,400.77	1,361.92	38.85	36.058	
7,050.00	6,884.03	6,800.20	6,681.59	23.88	21.57	-85.01	958.81	317.75	1,408.17	1,368.83	39.34	35.792	
7,100.00	6,902.97	6,794.53	6,676.79	24.37	21.57	-83.89	958.34	320.73	1,416.66	1,376.75	39.91	35.494	
7,150.00	6,918.27	6,784.01	6,667.82	24.96	21.58	-82.53	957.47	326.15	1,426.13	1,385.59	40.54	35.175	
7,200.00	6,929.83	6,784.01	6,667.82	25.64	21.58	-81.53	957.47	326.15	1,436.46	1,395.17	41.29	34.786	
7,250.00	6,937.59	6,767.44	6,653.52	26.40	21.59	-79.87	956.13	334.42	1,447.47	1,405.42	42.05	34.422	
7,300.00	6,941.50	6,753.01	6,640.92	27.23	21.60	-78.29	955.01	341.35	1,459.06	1,416.19	42.87	34.034	
7,324.29	6,942.00	6,753.01	6,640.92	27.65	21.60	-77.78	955.01	341.35	1,464.86	1,421.54	43.31	33.820	
7,360.79	6,942.06	6,753.01	6,640.92	28.31	21.60	-77.74	955.01	341.35	1,474.31	1,430.32	43.99	33.514	
7,400.00	6,942.13	6,739.56	6,629.01	29.06	21.60	-77.26	954.03	347.53	1,485.44	1,440.76	44.68	33.248	
7,500.00	6,942.31	6,723.01	6,614.10	31.09	21.62	-76.66	953.00	354.63	1,517.93	1,471.42	46.51	32.636	
7,600.00	6,942.48	6,710.74	6,602.88	33.27	21.62	-76.22	952.32	359.57	1,555.78	1,507.45	48.33	32.189	
7,700.00	6,942.66	6,692.01	6,585.56	35.58	21.64	-75.53	951.34	366.62	1,598.64	1,548.58	50.07	31.930	
7,800.00	6,942.83	6,682.21	6,576.41	38.00	21.64	-75.17	950.84	370.08	1,646.13	1,594.40	51.73	31.820	
7,900.00	6,943.00	6,662.01	6,557.35	40.50	21.65	-74.43	949.81	376.68	1,697.97	1,644.72	53.25	31.886	
8,000.00	6,943.18	6,655.47	6,551.13	43.06	21.66	-74.18	949.47	378.69	1,753.67	1,698.98	54.69	32.066	

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 640H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 25-NS-GYRO-MS, 389-SDI MWD, 6481-SDI MWD, 7631-SDI MWD													Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Vertical	Reference	Semi Major Axis	Offset	Highside	Rule Assigned:						
Measured Depth (ft)	Depth (ft)	Measured Depth (ft)	Depth (ft)	Reference (ft)	Offset (ft)	Toolface (°)	Offset Wellbore Centre	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning		
8,100.00	6,943.35	6,632.01	6,528.73	45.69	21.67	-73.31	948.11	385.52	1,812.95	1,757.00	55.95	32.403		
8,200.00	6,943.53	6,618.49	6,515.75	48.36	21.67	-72.81	947.25	389.25	1,875.40	1,818.28	57.12	32.832		
8,300.00	6,943.70	6,602.01	6,499.92	51.08	21.68	-72.20	946.13	393.66	1,940.72	1,882.56	58.17	33.365		
8,400.00	6,943.87	6,585.90	6,484.40	53.83	21.68	-71.60	945.03	397.85	2,008.69	1,949.59	59.11	33.984		
8,500.00	6,944.05	6,572.01	6,471.00	56.60	21.68	-71.09	944.11	401.36	2,079.09	2,019.13	59.96	34.676		
8,600.00	6,944.22	6,572.01	6,471.00	59.41	21.68	-71.09	944.11	401.36	2,151.75	2,090.99	60.76	35.414		
8,700.00	6,944.39	6,558.88	6,458.29	62.23	21.69	-70.61	943.34	404.57	2,226.38	2,164.94	61.44	36.235		
8,800.00	6,944.57	6,552.50	6,452.10	65.08	21.69	-70.37	943.02	406.08	2,302.91	2,240.83	62.07	37.100		
8,900.00	6,944.74	6,541.01	6,440.93	67.94	21.70	-69.95	942.52	408.72	2,381.14	2,318.51	62.63	38.021		
9,000.00	6,944.91	6,541.01	6,440.93	70.81	21.70	-69.95	942.52	408.72	2,460.84	2,397.69	63.15	38.970		
9,100.00	6,945.09	6,541.01	6,440.93	73.70	21.70	-69.95	942.52	408.72	2,541.98	2,478.37	63.61	39.961		
9,200.00	6,945.26	6,541.01	6,440.93	76.60	21.70	-69.95	942.52	408.72	2,624.42	2,560.39	64.03	40.988		
9,300.00	6,945.43	6,541.01	6,440.93	79.51	21.70	-69.95	942.52	408.72	2,708.05	2,643.64	64.41	42.047		
9,400.00	6,945.61	6,526.13	6,426.39	82.43	21.70	-69.41	942.05	411.89	2,792.51	2,727.78	64.73	43.143		
9,500.00	6,945.78	6,511.01	6,411.55	85.36	21.71	-68.87	941.76	414.74	2,878.23	2,813.22	65.02	44.269		
9,600.00	6,945.95	6,511.01	6,411.55	88.29	21.71	-68.87	941.76	414.74	2,964.62	2,899.32	65.30	45.403		
9,700.00	6,946.12	6,511.01	6,411.55	91.23	21.71	-68.87	941.76	414.74	3,051.83	2,986.29	65.55	46.558		
9,800.00	6,946.30	6,511.01	6,411.55	94.18	21.71	-68.87	941.76	414.74	3,139.81	3,074.03	65.78	47.733		
9,900.00	6,946.47	6,511.01	6,411.55	97.13	21.71	-68.87	941.76	414.74	3,228.49	3,162.50	65.99	48.925		
10,000.00	6,946.64	6,511.01	6,411.55	100.09	21.71	-68.87	941.76	414.74	3,317.81	3,251.64	66.18	50.134		
10,100.00	6,946.82	6,511.01	6,411.55	103.05	21.71	-68.87	941.76	414.74	3,407.73	3,341.38	66.35	51.358		
10,200.00	6,946.99	6,511.01	6,411.55	106.02	21.71	-68.87	941.76	414.74	3,498.19	3,431.68	66.51	52.595		
10,300.00	6,947.16	6,511.01	6,411.55	108.99	21.71	-68.87	941.76	414.74	3,589.16	3,522.50	66.66	53.845		
10,400.00	6,947.33	6,511.01	6,411.55	111.96	21.71	-68.87	941.76	414.74	3,680.60	3,613.81	66.79	55.105		
10,500.00	6,947.50	6,511.01	6,411.55	114.94	21.71	-68.87	941.76	414.74	3,772.47	3,705.56	66.92	56.376		
10,600.00	6,947.68	6,511.01	6,411.55	117.92	21.71	-68.87	941.76	414.74	3,864.75	3,797.72	67.03	57.656		
10,700.00	6,947.85	6,496.21	6,396.94	120.90	21.72	-68.34	941.60	417.13	3,957.15	3,890.01	67.14	58.941		
10,800.00	6,948.02	6,494.66	6,395.41	123.88	21.72	-68.28	941.59	417.36	4,050.09	3,982.86	67.24	60.236		
10,900.00	6,948.19	6,481.01	6,381.88	126.87	21.72	-67.80	941.51	419.12	4,143.53	4,076.20	67.33	61.542		
11,000.00	6,948.36	6,481.01	6,381.88	129.86	21.72	-67.80	941.51	419.12	4,237.06	4,169.65	67.42	62.849		
11,100.00	6,948.53	6,481.01	6,381.88	132.85	21.72	-67.80	941.51	419.12	4,330.89	4,263.39	67.50	64.162		
11,200.00	6,948.71	6,481.01	6,381.88	135.84	21.72	-67.79	941.51	419.12	4,424.98	4,357.40	67.58	65.481		
11,300.00	6,948.88	6,481.01	6,381.88	138.84	21.72	-67.79	941.51	419.12	4,519.33	4,451.68	67.65	66.804		
11,400.00	6,949.05	6,481.01	6,381.88	141.84	21.72	-67.79	941.51	419.12	4,613.91	4,546.19	67.72	68.133		
11,500.00	6,949.22	6,481.01	6,381.88	144.84	21.72	-67.79	941.51	419.12	4,708.72	4,640.93	67.79	69.465		
11,600.00	6,949.39	6,481.01	6,381.88	147.84	21.72	-67.79	941.51	419.12	4,803.74	4,735.89	67.85	70.802		
11,700.00	6,949.56	6,481.01	6,381.88	150.84	21.72	-67.79	941.51	419.12	4,898.96	4,831.05	67.91	72.141		
11,800.00	6,949.73	6,481.01	6,381.88	153.84	21.72	-67.79	941.51	419.12	4,994.36	4,926.40	67.96	73.484		
11,900.00	6,949.91	6,481.01	6,381.88	156.84	21.72	-67.79	941.51	419.12	5,089.94	5,021.92	68.02	74.830		
12,000.00	6,950.08	6,481.01	6,381.88	159.85	21.72	-67.79	941.51	419.12	5,185.69	5,117.62	68.07	76.179		
12,100.00	6,950.25	6,481.01	6,381.88	162.86	21.72	-67.79	941.51	419.12	5,281.59	5,213.47	68.12	77.530		
12,200.00	6,950.42	6,481.01	6,381.88	165.86	21.72	-67.79	941.51	419.12	5,377.65	5,309.48	68.17	78.883		
12,300.00	6,950.59	6,481.01	6,381.88	168.87	21.72	-67.79	941.51	419.12	5,473.84	5,405.62	68.22	80.237		
12,400.00	6,950.76	6,481.01	6,381.88	171.88	21.72	-67.79	941.51	419.12	5,570.17	5,501.91	68.27	81.594		
12,500.00	6,950.93	6,481.01	6,381.88	174.89	21.72	-67.79	941.51	419.12	5,666.63	5,598.32	68.31	82.951		
12,600.00	6,951.10	6,481.01	6,381.88	177.90	21.72	-67.79	941.51	419.12	5,763.21	5,694.85	68.36	84.310		
12,700.00	6,951.27	6,481.01	6,381.88	180.91	21.72	-67.79	941.51	419.12	5,859.90	5,791.50	68.40	85.670		
12,800.00	6,951.44	6,481.01	6,381.88	183.93	21.72	-67.79	941.51	419.12	5,956.70	5,888.26	68.44	87.031		
12,900.00	6,951.61	6,481.01	6,381.88	186.94	21.72	-67.79	941.51	419.12	6,053.61	5,985.12	68.49	88.393		
13,000.00	6,951.78	6,481.01	6,381.88	189.96	21.72	-67.79	941.51	419.12	6,150.61	6,082.08	68.53	89.755		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 640H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 25-NS-GYRO-MS, 389-SDI MWD, 6481-SDI MWD, 7631-SDI MWD													Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Vertical	Reference	Semi Major Axis	Offset	Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning
Measured	Depth	Depth	Depth	Reference	Offset	Reference	Toolface	+N/-S	+E/-W	Between	Between	Separation	Factor	
Depth	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	Centres	Ellipses	(ft)		
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
13,100.00	6,951.95	6,481.01	6,381.88	192.97	21.72	-67.79	941.51	419.12	6,247.71	6,179.14	68.57	91.118		
13,200.00	6,952.12	6,466.86	6,367.81	195.99	21.72	-67.29	941.49	420.60	6,344.74	6,276.13	68.61	92.478		
13,300.00	6,952.29	6,465.96	6,366.91	199.00	21.72	-67.26	941.50	420.69	6,441.99	6,373.34	68.65	93.840		
13,400.00	6,952.46	6,465.07	6,366.03	202.02	21.72	-67.23	941.50	420.77	6,539.33	6,470.64	68.69	95.203		
13,500.00	6,952.63	6,451.01	6,352.02	205.04	21.72	-66.73	941.58	421.94	6,636.88	6,568.15	68.73	96.565		
13,600.00	6,952.80	6,451.01	6,352.02	208.05	21.72	-66.73	941.58	421.94	6,734.35	6,665.58	68.77	97.927		
13,700.00	6,952.97	6,451.01	6,352.02	211.07	21.72	-66.73	941.58	421.94	6,831.90	6,763.09	68.81	99.288		
13,800.00	6,953.14	6,451.01	6,352.02	214.09	21.72	-66.73	941.58	421.94	6,929.51	6,860.66	68.85	100.648		
13,900.00	6,953.31	6,451.01	6,352.02	217.11	21.72	-66.73	941.58	421.94	7,027.19	6,958.30	68.89	102.009		
14,000.00	6,953.48	6,451.01	6,352.02	220.13	21.72	-66.73	941.58	421.94	7,124.94	7,056.01	68.93	103.368		
14,100.00	6,953.65	6,451.01	6,352.02	223.15	21.72	-66.73	941.58	421.94	7,222.74	7,153.78	68.97	104.727		
14,200.00	6,953.82	6,451.01	6,352.02	226.17	21.72	-66.73	941.58	421.94	7,320.61	7,251.60	69.01	106.085		
14,300.00	6,953.99	6,277.01	6,178.80	229.19	21.57	-60.88	939.37	438.06	7,418.47	7,349.59	68.88	107.697		
14,400.00	6,954.15	6,277.01	6,178.80	232.21	21.57	-60.88	939.37	438.06	7,516.24	7,447.31	68.92	109.050		
14,500.00	6,954.32	6,277.01	6,178.80	235.23	21.57	-60.88	939.37	438.06	7,614.06	7,545.10	68.97	110.402		
14,600.00	6,954.49	6,277.01	6,178.80	238.25	21.57	-60.88	939.37	438.06	7,711.94	7,642.94	69.01	111.754		
14,700.00	6,954.66	6,277.01	6,178.80	241.28	21.57	-60.88	939.37	438.06	7,809.88	7,740.83	69.05	113.104		
14,800.00	6,954.83	6,246.19	6,148.16	244.30	21.53	-59.89	937.88	441.07	7,907.71	7,838.69	69.02	114.575		
14,900.00	6,955.00	6,242.75	6,144.74	247.32	21.52	-59.77	937.68	441.38	8,005.71	7,936.66	69.05	115.939		
15,000.00	6,955.17	6,239.39	6,141.41	250.34	21.51	-59.67	937.47	441.69	8,103.75	8,034.67	69.08	117.302		
15,100.00	6,955.34	6,236.12	6,138.15	253.37	21.51	-59.56	937.27	441.98	8,201.84	8,132.72	69.12	118.663		
15,200.00	6,955.50	6,232.91	6,134.97	256.39	21.50	-59.46	937.06	442.27	8,299.97	8,230.82	69.15	120.023		
15,300.00	6,955.67	6,229.78	6,131.86	259.42	21.50	-59.36	936.85	442.54	8,398.14	8,328.95	69.19	121.382		
15,400.00	6,955.84	6,226.72	6,128.82	262.44	21.50	-59.26	936.64	442.81	8,496.35	8,427.13	69.22	122.740		
15,500.00	6,956.01	6,223.73	6,125.84	265.46	21.49	-59.16	936.43	443.07	8,594.60	8,525.34	69.26	124.096		
15,600.00	6,956.18	6,220.81	6,122.94	268.49	21.49	-59.07	936.22	443.31	8,692.89	8,623.59	69.29	125.450		
15,700.00	6,956.34	6,217.95	6,120.09	271.51	21.48	-58.98	936.01	443.55	8,791.21	8,721.88	69.33	126.803		
15,800.00	6,956.51	6,186.01	6,088.37	274.54	21.43	-57.96	933.33	446.05	8,889.71	8,820.44	69.27	128.335		
15,900.00	6,956.68	6,186.01	6,088.37	277.56	21.43	-57.96	933.33	446.05	8,988.07	8,918.76	69.32	129.669		
16,000.00	6,956.85	6,186.01	6,088.37	280.59	21.43	-57.96	933.33	446.05	9,086.47	9,017.11	69.36	131.002		
16,100.00	6,957.02	6,186.01	6,088.37	283.62	21.43	-57.96	933.33	446.05	9,184.91	9,115.50	69.41	132.334		
16,200.00	6,957.18	6,186.01	6,088.37	286.64	21.43	-57.96	933.33	446.05	9,283.38	9,213.92	69.45	133.663		
16,300.00	6,957.35	6,186.01	6,088.37	289.67	21.43	-57.96	933.33	446.05	9,381.88	9,312.38	69.50	134.991		
16,400.00	6,957.52	6,186.01	6,088.37	292.70	21.43	-57.96	933.33	446.05	9,480.41	9,410.86	69.55	136.316		
16,500.00	6,957.69	6,186.01	6,088.37	295.72	21.43	-57.96	933.33	446.05	9,578.97	9,509.38	69.59	137.640		
16,600.00	6,957.85	6,186.01	6,088.37	298.75	21.43	-57.96	933.33	446.05	9,677.56	9,607.92	69.64	138.961		
16,700.00	6,958.02	6,186.01	6,088.37	301.78	21.43	-57.96	933.33	446.05	9,776.19	9,706.50	69.69	140.280		
16,800.00	6,958.19	6,186.01	6,088.37	304.80	21.43	-57.96	933.33	446.05	9,874.83	9,805.10	69.74	141.598		
16,900.00	6,958.35	6,186.01	6,088.37	307.83	21.43	-57.96	933.33	446.05	9,973.51	9,903.72	69.79	142.913		
17,000.00	6,958.52	6,186.01	6,088.37	310.86	21.43	-57.96	933.33	446.05	10,072.21	10,002.37	69.84	144.226		
17,100.00	6,958.69	6,186.01	6,088.37	313.88	21.43	-57.96	933.33	446.05	10,170.94	10,101.05	69.89	145.536		
17,200.00	6,958.86	6,186.01	6,088.37	316.91	21.43	-57.96	933.33	446.05	10,269.69	10,199.75	69.94	146.845		
17,300.00	6,959.02	6,186.01	6,088.37	319.94	21.43	-57.96	933.33	446.05	10,368.47	10,298.48	69.99	148.151		
17,400.00	6,959.19	6,186.01	6,088.37	322.97	21.43	-57.96	933.33	446.05	10,467.26	10,397.23	70.04	149.454		
17,500.00	6,959.36	6,186.01	6,088.37	326.00	21.43	-57.96	933.33	446.05	10,566.09	10,496.00	70.09	150.756		
17,600.00	6,959.52	6,186.01	6,088.37	329.02	21.43	-57.96	933.33	446.05	10,664.93	10,594.79	70.14	152.055		
17,700.00	6,959.69	6,186.01	6,088.37	332.05	21.43	-57.96	933.33	446.05	10,763.79	10,693.60	70.19	153.351		
17,800.00	6,959.85	6,186.01	6,088.37	335.08	21.43	-57.96	933.33	446.05	10,862.68	10,792.44	70.24	154.645		
17,900.00	6,960.02	6,186.01	6,088.37	338.11	21.43	-57.96	933.33	446.05	10,961.58	10,891.29	70.30	155.937		
18,000.00	6,960.19	6,186.01	6,088.37	341.14	21.43	-57.96	933.33	446.05	11,060.51	10,990.16	70.35	157.226		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 640H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 25-NS-GYRO-MS, 389-SDI MWD, 6481-SDI MWD, 7631-SDI MWD													Offset Well Error:	0.00 ft
Reference													Rule Assigned:	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Semi Major Axis Offset	Highside Toolface (°)	Offset Wellbore Centre		Distance Between Centres (ft)		Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
18,100.00	6,960.35	6,186.01	6,088.37	344.17	21.43	-57.96	933.33	446.05	11,159.45	11,089.05	70.40	158.512		
18,200.00	6,960.52	6,186.01	6,088.37	347.20	21.43	-57.96	933.33	446.05	11,258.42	11,187.96	70.45	159.796		
18,300.00	6,960.68	6,186.01	6,088.37	350.23	21.43	-57.96	933.33	446.05	11,357.40	11,286.89	70.51	161.077		
18,400.00	6,960.85	6,186.01	6,088.37	353.26	21.43	-57.96	933.33	446.05	11,456.40	11,385.83	70.56	162.356		
18,500.00	6,961.02	6,186.01	6,088.37	356.28	21.43	-57.96	933.33	446.05	11,555.41	11,484.80	70.62	163.632		
18,600.00	6,961.18	6,186.01	6,088.37	359.31	21.43	-57.96	933.33	446.05	11,654.45	11,583.77	70.67	164.905		
18,700.00	6,961.35	6,152.39	6,054.99	362.34	21.36	-56.90	930.02	448.34	11,753.32	11,682.73	70.59	166.494		
18,800.00	6,961.51	6,150.69	6,053.30	365.37	21.36	-56.84	929.84	448.45	11,852.37	11,781.72	70.64	167.781		
18,900.00	6,961.68	6,149.01	6,051.63	368.40	21.35	-56.79	929.66	448.55	11,951.43	11,880.74	70.69	169.064		
19,000.00	6,961.84	6,147.35	6,049.99	371.43	21.35	-56.74	929.49	448.66	12,050.50	11,979.76	70.74	170.345		
19,100.00	6,962.01	6,145.72	6,048.37	374.46	21.35	-56.69	929.32	448.76	12,149.59	12,078.80	70.79	171.623		
19,200.00	6,962.17	6,144.11	6,046.77	377.49	21.34	-56.64	929.15	448.86	12,248.70	12,177.86	70.84	172.898		
19,300.00	6,962.34	6,142.52	6,045.20	380.52	21.34	-56.59	928.98	448.95	12,347.82	12,276.92	70.90	174.170		
19,400.00	6,962.51	6,140.96	6,043.64	383.55	21.33	-56.54	928.81	449.05	12,446.95	12,376.00	70.95	175.439		
19,500.00	6,962.67	6,139.41	6,042.11	386.58	21.33	-56.49	928.64	449.14	12,546.09	12,475.09	71.00	176.706		
19,600.00	6,962.84	6,137.89	6,040.60	389.61	21.33	-56.44	928.48	449.23	12,645.25	12,574.20	71.05	177.969		
19,700.00	6,963.00	6,136.39	6,039.11	392.64	21.32	-56.39	928.32	449.32	12,744.42	12,673.32	71.11	179.230		
19,800.00	6,963.16	6,134.91	6,037.64	395.67	21.32	-56.35	928.15	449.41	12,843.60	12,772.44	71.16	180.488		
19,900.00	6,963.33	6,133.44	6,036.19	398.70	21.32	-56.30	927.99	449.49	12,942.80	12,871.58	71.22	181.742		
20,000.00	6,963.49	6,132.00	6,034.76	401.73	21.31	-56.26	927.83	449.58	13,042.00	12,970.73	71.27	182.994		
20,100.00	6,963.66	6,130.58	6,033.35	404.77	21.31	-56.21	927.68	449.66	13,141.22	13,069.90	71.33	184.243		
20,200.00	6,963.82	6,095.01	5,998.07	407.80	21.23	-55.12	923.55	451.53	13,240.63	13,169.40	71.23	185.882		
20,307.78	6,964.00	6,095.01	5,998.07	411.06	21.23	-55.12	923.55	451.53	13,347.57	13,276.28	71.30	187.206		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 641H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 25-NS-GYRO-MS, 365-SDI MWD, 6367-SDI MWD, 7619-SDI MWD													Offset Well Error:	0.00 ft
Reference	Offset	Semi Major Axis	Reference	Offset	Highside	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	0.51	0.51	0.00	0.00	91.52	-1.22	45.94	45.95					
393.00	392.99	393.27	393.27	0.66	0.79	51.31	-0.23	46.31	45.15	43.70	1.45	31.066		
398.85	398.84	399.10	399.09	0.68	0.80	45.50	-0.18	46.34	45.15	43.67	1.48	30.581 CC, ES		
483.00	482.99	482.51	482.50	0.97	0.85	-62.01	0.96	47.35	45.61	43.79	1.83	24.978		
578.00	577.96	576.07	575.95	1.30	0.96	-81.12	3.55	50.74	48.54	46.27	2.27	21.409		
673.00	672.85	669.77	669.39	1.64	1.11	-97.14	7.98	56.12	54.71	51.97	2.75	19.914		
765.00	764.65	760.88	760.20	1.96	1.28	-105.25	12.86	61.76	62.90	59.67	3.23	19.464 SF		
855.00	854.37	849.91	848.91	2.29	1.46	-109.91	17.85	67.34	72.39	68.67	3.71	19.505		
952.00	950.95	945.76	944.42	2.65	1.66	-112.22	23.24	73.32	83.69	79.46	4.23	19.786		
1,077.00	1,075.26	1,069.48	1,067.71	3.13	1.93	-119.75	30.23	80.96	99.98	95.07	4.92	20.336		
1,172.00	1,169.69	1,162.97	1,160.88	3.49	2.15	-136.14	35.18	86.72	113.99	108.54	5.45	20.924		
1,300.00	1,297.07	1,289.28	1,286.77	3.97	2.44	-140.54	41.76	94.77	133.77	127.60	6.17	21.694		
1,395.00	1,391.63	1,382.47	1,379.61	4.34	2.67	-143.63	46.83	100.89	148.81	142.11	6.70	22.200		
1,490.00	1,486.24	1,476.37	1,473.18	4.70	2.90	-143.74	52.21	106.84	163.64	156.40	7.24	22.593		
1,586.00	1,582.02	1,571.46	1,567.93	5.05	3.13	-135.98	57.85	112.47	176.58	168.79	7.78	22.688		
1,681.00	1,676.87	1,666.47	1,662.61	5.40	3.36	-131.78	63.45	118.15	188.03	179.71	8.32	22.590		
1,776.00	1,771.67	1,762.21	1,758.07	5.75	3.58	-127.04	68.47	123.29	198.87	190.00	8.87	22.421		
1,872.00	1,867.43	1,857.06	1,852.68	6.11	3.81	-140.96	73.42	128.08	210.38	200.96	9.42	22.338		
1,966.00	1,961.25	1,950.11	1,945.44	6.46	4.03	-157.67	77.97	133.77	222.31	212.36	9.95	22.335		
2,061.00	2,056.10	2,043.91	2,038.94	6.81	4.26	-163.73	82.38	139.70	234.23	223.74	10.49	22.329		
2,156.00	2,150.95	2,137.21	2,131.91	7.15	4.49	-165.98	86.86	146.22	246.87	235.84	11.03	22.381		
2,252.00	2,246.71	2,232.20	2,226.54	7.50	4.73	-167.35	91.52	152.95	261.02	249.44	11.58	22.537		
2,347.00	2,341.39	2,326.33	2,320.34	7.86	4.97	-169.00	96.20	159.35	276.05	263.93	12.12	22.768		
2,442.00	2,436.07	2,420.18	2,413.88	8.21	5.20	-165.54	101.00	165.35	290.95	278.28	12.67	22.971		
2,537.00	2,530.82	2,509.40	2,502.76	8.56	5.43	-156.99	105.97	171.32	305.41	292.22	13.19	23.156		
2,632.00	2,625.64	2,599.95	2,592.79	8.92	5.68	-134.37	111.95	178.91	319.80	306.08	13.72	23.301		
2,728.00	2,721.53	2,694.99	2,687.25	9.26	5.95	-115.95	118.56	187.03	332.67	318.39	14.28	23.288		
2,823.00	2,816.43	2,789.19	2,780.89	9.60	6.21	-96.56	125.16	194.93	343.75	328.92	14.84	23.171		
2,918.00	2,911.32	2,883.07	2,874.20	9.94	6.47	-94.26	132.01	202.57	354.22	338.83	15.39	23.019		
3,013.00	3,006.17	2,978.16	2,968.73	10.28	6.73	-105.27	139.09	210.13	365.17	349.22	15.95	22.892		
3,109.00	3,101.98	3,073.98	3,064.01	10.63	7.00	-111.60	146.23	217.30	377.02	360.50	16.52	22.821		
3,204.00	3,196.73	3,172.70	3,162.24	10.98	7.26	-106.01	153.09	224.39	388.41	371.31	17.10	22.709		
3,299.00	3,291.42	3,260.43	3,249.49	11.33	7.49	-118.59	158.84	231.43	400.66	383.03	17.63	22.724		
3,395.00	3,387.03	3,355.43	3,343.86	11.69	7.76	-132.39	165.37	240.24	415.86	397.65	18.21	22.837		
3,490.00	3,481.56	3,447.64	3,435.45	12.06	8.03	-134.72	171.78	248.73	432.47	413.69	18.78	23.033		
3,585.00	3,576.12	3,545.24	3,532.43	12.42	8.30	-144.87	178.29	257.65	449.14	429.78	19.37	23.189		
3,680.00	3,670.84	3,644.12	3,630.79	12.78	8.57	-161.29	184.08	265.94	464.30	444.35	19.95	23.272		
3,775.00	3,765.61	3,741.02	3,727.26	13.13	8.82	-166.73	189.43	273.22	478.76	458.24	20.51	23.338		
3,871.00	3,861.42	3,844.75	3,830.68	13.48	9.08	-163.27	194.42	279.48	491.42	470.32	21.10	23.285		
3,966.00	3,956.30	3,941.53	3,927.27	13.83	9.30	-154.79	198.29	284.10	501.39	479.73	21.66	23.152		
4,061.00	4,051.20	4,034.59	4,020.13	14.17	9.52	-149.30	202.36	288.64	511.12	488.93	22.19	23.031		
4,156.00	4,146.11	4,131.10	4,116.46	14.52	9.75	-140.66	206.47	292.90	520.19	497.44	22.75	22.869		
4,251.00	4,241.00	4,222.22	4,207.40	14.86	9.96	-150.86	210.23	297.24	529.60	506.33	23.27	22.754		
4,347.00	4,336.86	4,315.53	4,300.45	15.22	10.18	-153.68	214.49	302.69	540.77	516.95	23.82	22.706		
4,442.00	4,431.69	4,406.15	4,390.83	15.57	10.40	-148.92	218.63	307.92	552.14	527.79	24.35	22.676		
4,536.00	4,525.51	4,498.65	4,482.99	15.91	10.64	-153.52	223.79	313.84	564.75	539.86	24.89	22.690		
4,632.00	4,621.31	4,592.79	4,576.85	16.27	10.87	-154.35	228.54	319.22	577.25	551.81	25.44	22.690		
4,727.00	4,716.11	4,684.90	4,668.62	16.62	11.11	-150.11	234.05	325.04	590.65	564.67	25.98	22.733		
4,821.00	4,809.89	4,777.82	4,761.23	16.97	11.34	-149.05	239.47	330.33	603.60	577.08	26.53	22.754		
4,916.00	4,904.64	4,873.69	4,856.73	17.33	11.58	-146.35	244.89	336.76	617.26	590.17	27.09	22.785		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 641H - OH - OH												Offset Site Error:	0.00 ft
Survey Program: 25-NS-GYRO-MS, 365-SDI MWD, 6367-SDI MWD, 7619-SDI MWD												Offset Well Error:	0.00 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Distance Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
5,011.00	4,999.37	4,964.28	4,946.99	17.69	11.82	-146.59	249.59	342.81	630.55	602.92	27.63	22.822	
5,109.00	5,097.08	5,065.77	5,048.05	18.06	12.08	-143.80	255.31	350.13	645.09	616.86	28.23	22.853	
5,204.00	5,191.74	5,151.86	5,133.84	18.42	12.30	-145.77	259.94	355.65	659.09	630.35	28.75	22.928	
5,299.00	5,286.40	5,238.60	5,220.13	18.78	12.54	-142.62	265.78	362.29	674.67	645.40	29.27	23.052	
5,363.00	5,350.22	5,302.34	5,283.52	19.02	12.71	-143.01	270.24	367.30	684.89	655.24	29.65	23.100	
5,458.00	5,444.99	5,400.37	5,381.06	19.37	12.98	-145.39	276.88	374.48	699.20	668.97	30.23	23.128	
5,521.00	5,507.84	5,466.24	5,446.63	19.61	13.15	-145.08	281.16	379.06	708.42	677.80	30.62	23.135	
5,585.00	5,571.69	5,542.54	5,522.66	19.84	13.34	-146.23	285.35	383.78	716.99	685.93	31.06	23.084	
5,648.00	5,634.55	5,600.82	5,580.78	20.08	13.49	-147.36	288.19	387.22	725.06	693.65	31.41	23.086	
5,712.00	5,698.39	5,660.39	5,640.13	20.32	13.64	-146.05	291.34	391.15	733.76	702.00	31.76	23.103	
5,776.00	5,762.24	5,722.70	5,702.20	20.56	13.80	-142.78	294.72	395.45	742.46	710.33	32.13	23.108	
5,839.00	5,825.12	5,788.71	5,767.97	20.79	13.97	-141.18	298.19	400.02	750.59	718.07	32.52	23.083	
5,903.00	5,889.00	5,854.90	5,833.93	21.03	14.13	-141.00	301.40	404.42	758.37	725.47	32.90	23.048	
5,966.00	5,951.88	5,919.17	5,898.00	21.26	14.29	-138.98	304.60	408.25	765.98	732.70	33.28	23.015	
6,030.00	6,015.74	5,987.78	5,966.43	21.50	14.46	-138.34	307.85	411.99	773.49	739.81	33.68	22.966	
6,093.00	6,078.59	6,050.17	6,028.68	21.74	14.61	-138.31	310.63	415.19	780.74	746.69	34.05	22.931	
6,157.00	6,142.42	6,118.98	6,097.34	21.97	14.77	-129.49	313.80	418.58	788.01	753.57	34.45	22.877	
6,220.00	6,205.25	6,205.38	6,183.63	22.21	14.96	-136.98	316.29	421.88	793.96	759.05	34.90	22.749	
6,243.83	6,229.01	6,240.31	6,218.55	22.26	15.03	-142.09	316.71	422.62	795.76	760.74	35.03	22.719	
6,300.00	6,285.05	6,313.27	6,291.51	22.27	15.13	-142.31	316.77	422.70	798.89	763.75	35.14	22.732	
6,323.33	6,308.32	6,340.53	6,318.76	22.27	15.15	-142.44	316.78	422.09	799.95	764.78	35.17	22.744	
6,350.00	6,334.92	6,371.61	6,349.82	22.28	15.17	-114.60	316.85	420.97	800.77	765.56	35.21	22.745	
6,400.00	6,384.57	6,427.66	6,405.78	22.30	15.15	-90.79	317.08	417.87	800.61	765.40	35.22	22.735	
6,450.00	6,433.72	6,478.82	6,456.80	22.32	15.14	-82.46	317.41	414.05	798.50	763.25	35.25	22.655	
6,500.00	6,482.07	6,526.47	6,504.30	22.34	15.12	-79.17	317.72	410.36	794.89	759.60	35.29	22.523	
6,550.00	6,529.32	6,576.48	6,554.17	22.37	15.10	-78.22	317.95	406.57	790.02	754.67	35.35	22.348	
6,600.00	6,575.18	6,634.57	6,611.84	22.41	15.08	-79.05	318.35	399.74	783.60	748.19	35.41	22.129	
6,650.00	6,619.39	6,685.81	6,662.24	22.45	15.04	-80.74	319.11	390.59	776.15	740.66	35.50	21.864	
6,700.00	6,661.67	6,735.51	6,710.63	22.51	15.00	-83.13	319.83	379.27	768.30	732.69	35.61	21.574	
6,750.00	6,701.77	6,776.68	6,750.14	22.58	14.95	-85.58	320.34	367.74	760.71	724.93	35.77	21.264	
6,800.00	6,739.44	6,804.50	6,776.48	22.67	14.92	-87.43	320.75	358.80	754.38	718.39	35.99	20.958	
6,850.00	6,774.46	6,826.14	6,796.78	22.79	14.90	-88.90	321.13	351.33	750.02	713.76	36.25	20.687	
6,900.00	6,806.61	6,841.97	6,811.55	22.95	14.88	-89.88	321.43	345.61	748.07	711.52	36.55	20.466	
6,911.15	6,813.37	6,844.85	6,814.22	23.00	14.87	-90.03	321.49	344.55	748.00	711.37	36.63	20.421	
6,950.00	6,835.71	6,853.16	6,821.94	23.17	14.86	-90.37	321.66	341.46	748.86	711.97	36.89	20.303	
7,000.00	6,861.57	6,860.25	6,828.50	23.48	14.86	-90.36	321.81	338.79	752.56	715.30	37.25	20.202	
7,050.00	6,884.03	6,864.01	6,831.98	23.88	14.85	-89.88	321.89	337.35	759.21	721.56	37.65	20.163	
7,100.00	6,902.97	6,863.78	6,831.76	24.37	14.85	-88.86	321.89	337.44	768.76	730.67	38.08	20.186	
7,150.00	6,918.27	6,860.01	6,828.28	24.96	14.86	-87.35	321.81	338.88	781.03	742.50	38.54	20.268	
7,200.00	6,929.83	6,853.95	6,822.67	25.64	14.86	-85.45	321.68	341.16	795.80	756.79	39.01	20.400	
7,250.00	6,937.59	6,845.30	6,814.64	26.40	14.87	-83.18	321.50	344.38	812.74	773.25	39.50	20.578	
7,300.00	6,941.50	6,834.35	6,804.45	27.23	14.89	-80.61	321.28	348.38	831.53	791.55	39.98	20.797	
7,324.29	6,942.00	6,830.01	6,800.40	27.65	14.89	-79.39	321.20	349.94	841.22	800.99	40.23	20.911	
7,360.79	6,942.06	6,819.23	6,790.32	28.31	14.90	-78.59	321.00	353.75	856.80	816.23	40.57	21.119	
7,400.00	6,942.13	6,809.92	6,781.58	29.06	14.92	-77.94	320.84	356.97	875.00	834.07	40.93	21.377	
7,500.00	6,942.31	6,789.48	6,762.30	31.09	14.94	-76.54	320.52	363.74	926.77	884.99	41.78	22.182	
7,600.00	6,942.48	6,769.01	6,742.83	33.27	14.96	-75.14	320.25	370.04	985.41	942.91	42.49	23.190	
7,700.00	6,942.66	6,756.95	6,731.28	35.58	14.98	-74.32	320.10	373.52	1,049.83	1,006.71	43.11	24.350	
7,800.00	6,942.83	6,739.01	6,714.01	38.00	15.00	-73.10	319.88	378.37	1,119.14	1,075.55	43.59	25.674	
7,900.00	6,943.00	6,730.47	6,705.75	40.50	15.00	-72.52	319.77	380.54	1,192.50	1,148.49	44.01	27.098	

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 641H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 25-NS-GYRO-MS, 365-SDI MWD, 6367-SDI MWD, 7619-SDI MWD													Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Vertical	Reference	Semi Major Axis	Offset	Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning
Measured	Depth	Depth	Depth	Reference	Offset	Toolface	Highside	+N/-S	+E/-W	Between	Between	Separation	Factor	
Depth	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	Toolface	(ft)	(ft)	Centres	Ellipses	(ft)		
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		
8,000.00	6,943.18	6,719.14	6,694.76	43.06	15.01	-71.76	319.61	383.28	1,269.28	1,224.95	44.33	28.634		
8,100.00	6,943.35	6,709.01	6,684.91	45.69	15.02	-71.08	319.46	385.61	1,348.92	1,304.34	44.59	30.254		
8,200.00	6,943.53	6,697.67	6,673.84	48.36	15.03	-70.32	319.29	388.10	1,430.95	1,386.17	44.79	31.949		
8,300.00	6,943.70	6,687.28	6,663.68	51.08	15.04	-69.63	319.13	390.28	1,514.99	1,470.04	44.95	33.701		
8,400.00	6,943.87	6,678.01	6,654.61	53.83	15.05	-69.02	318.98	392.16	1,600.74	1,555.65	45.09	35.503		
8,500.00	6,944.05	6,678.01	6,654.61	56.60	15.05	-69.02	318.98	392.16	1,688.01	1,642.79	45.22	37.329		
8,600.00	6,944.22	6,663.90	6,640.76	59.41	15.06	-68.10	318.76	394.85	1,776.45	1,731.16	45.29	39.220		
8,700.00	6,944.39	6,657.75	6,634.71	62.23	15.06	-67.70	318.67	395.95	1,866.05	1,820.68	45.37	41.127		
8,800.00	6,944.57	6,647.01	6,624.13	65.08	15.07	-67.01	318.51	397.78	1,956.62	1,911.19	45.43	43.070		
8,900.00	6,944.74	6,647.01	6,624.13	67.94	15.07	-67.01	318.51	397.78	2,047.98	2,002.49	45.49	45.016		
9,000.00	6,944.91	6,647.01	6,624.13	70.81	15.07	-67.01	318.51	397.78	2,140.12	2,094.57	45.55	46.983		
9,100.00	6,945.09	6,647.01	6,624.13	73.70	15.07	-67.01	318.51	397.78	2,232.93	2,187.33	45.60	48.970		
9,200.00	6,945.26	6,632.68	6,609.98	76.60	15.08	-66.09	318.33	400.03	2,326.19	2,280.57	45.62	50.991		
9,300.00	6,945.43	6,628.56	6,605.89	79.51	15.08	-65.83	318.29	400.64	2,420.02	2,374.37	45.65	53.009		
9,400.00	6,945.61	6,617.01	6,594.46	82.43	15.09	-65.10	318.18	402.24	2,514.36	2,468.68	45.67	55.051		
9,500.00	6,945.78	6,617.01	6,594.46	85.36	15.09	-65.10	318.18	402.24	2,609.02	2,563.31	45.71	57.083		
9,600.00	6,945.95	6,617.01	6,594.46	88.29	15.09	-65.10	318.18	402.24	2,704.06	2,658.33	45.74	59.125		
9,700.00	6,946.12	6,617.01	6,594.46	91.23	15.09	-65.10	318.18	402.24	2,799.46	2,753.69	45.76	61.174		
9,800.00	6,946.30	6,617.01	6,594.46	94.18	15.09	-65.10	318.18	402.24	2,895.16	2,849.37	45.79	63.230		
9,900.00	6,946.47	6,617.01	6,594.46	97.13	15.09	-65.10	318.18	402.24	2,991.14	2,945.33	45.81	65.291		
10,000.00	6,946.64	6,617.01	6,594.46	100.09	15.09	-65.10	318.18	402.24	3,087.38	3,041.55	45.84	67.357		
10,100.00	6,946.82	6,617.01	6,594.46	103.05	15.09	-65.10	318.18	402.24	3,183.85	3,138.00	45.86	69.427		
10,200.00	6,946.99	6,602.63	6,580.19	106.02	15.09	-64.21	318.07	404.02	3,280.37	3,234.49	45.87	71.508		
10,300.00	6,947.16	6,600.57	6,578.15	108.99	15.10	-64.08	318.06	404.25	3,377.19	3,331.30	45.90	73.582		
10,400.00	6,947.33	6,586.01	6,563.66	111.96	15.10	-63.19	317.99	405.73	3,474.32	3,428.41	45.91	75.671		
10,500.00	6,947.50	6,586.01	6,563.66	114.94	15.10	-63.19	317.99	405.73	3,571.44	3,525.50	45.94	77.745		
10,600.00	6,947.68	6,586.01	6,563.66	117.92	15.10	-63.19	317.99	405.73	3,668.72	3,622.76	45.96	79.820		
10,700.00	6,947.85	6,586.01	6,563.66	120.90	15.10	-63.19	317.99	405.73	3,766.14	3,720.15	45.99	81.895		
10,800.00	6,948.02	6,586.01	6,563.66	123.88	15.10	-63.19	317.99	405.73	3,863.69	3,817.68	46.01	83.970		
10,900.00	6,948.19	6,586.01	6,563.66	126.87	15.10	-63.19	317.99	405.73	3,961.37	3,915.33	46.04	86.045		
11,000.00	6,948.36	6,586.01	6,563.66	129.86	15.10	-63.19	317.99	405.73	4,059.15	4,013.09	46.06	88.118		
11,100.00	6,948.53	6,586.01	6,563.66	132.85	15.10	-63.19	317.99	405.73	4,157.05	4,110.95	46.09	90.191		
11,200.00	6,948.71	6,586.01	6,563.66	135.84	15.10	-63.19	317.99	405.73	4,255.04	4,208.92	46.12	92.262		
11,300.00	6,948.88	6,586.01	6,563.66	138.84	15.10	-63.19	317.99	405.73	4,353.12	4,306.97	46.15	94.332		
11,400.00	6,949.05	6,586.01	6,563.66	141.84	15.10	-63.19	317.99	405.73	4,451.29	4,405.11	46.18	96.399		
11,500.00	6,949.22	6,586.01	6,563.66	144.84	15.10	-63.19	317.99	405.73	4,549.53	4,503.33	46.21	98.464		
11,600.00	6,949.39	6,586.01	6,563.66	147.84	15.10	-63.19	317.99	405.73	4,647.86	4,601.62	46.24	100.526		
11,700.00	6,949.56	6,586.01	6,563.66	150.84	15.10	-63.19	317.99	405.73	4,746.25	4,699.98	46.27	102.586		
11,800.00	6,949.73	6,573.66	6,551.36	153.84	15.11	-62.44	317.94	406.80	4,844.63	4,798.34	46.30	104.640		
11,900.00	6,949.91	6,571.89	6,549.60	156.84	15.11	-62.33	317.93	406.95	4,943.13	4,896.80	46.33	106.692		
12,000.00	6,950.08	6,570.18	6,547.89	159.85	15.11	-62.23	317.92	407.09	5,041.69	4,995.32	46.36	108.741		
12,100.00	6,950.25	6,568.51	6,546.23	162.86	15.11	-62.13	317.92	407.22	5,140.29	5,093.90	46.40	110.785		
12,200.00	6,950.42	6,556.01	6,533.76	165.86	15.11	-61.39	317.87	408.15	5,239.01	5,192.57	46.43	112.825		
12,300.00	6,950.59	6,556.01	6,533.76	168.87	15.11	-61.39	317.87	408.15	5,337.70	5,291.23	46.47	114.861		
12,400.00	6,950.76	6,556.01	6,533.76	171.88	15.11	-61.39	317.87	408.15	5,436.44	5,389.93	46.51	116.893		
12,500.00	6,950.93	6,556.01	6,533.76	174.89	15.11	-61.39	317.87	408.15	5,535.22	5,488.68	46.55	118.921		
12,600.00	6,951.10	6,556.01	6,533.76	177.90	15.11	-61.39	317.87	408.15	5,634.05	5,587.47	46.58	120.945		
12,700.00	6,951.27	6,550.66	6,528.42	180.91	15.11	-61.07	317.85	408.55	5,732.91	5,686.29	46.62	122.962		
12,800.00	6,951.44	6,520.61	6,498.46	183.93	15.12	-59.34	317.68	410.82	5,831.81	5,785.14	46.67	124.963		
12,900.00	6,951.61	6,513.68	6,491.55	186.94	15.12	-58.95	317.64	411.35	5,930.70	5,883.99	46.71	126.966		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 641H - OH - OH												Offset Site Error:	0.00 ft
Survey Program: 25-NS-GYRO-MS, 365-SDI MWD, 6367-SDI MWD, 7619-SDI MWD												Offset Well Error:	0.00 ft
Reference	Offset	Semi Major Axis	Reference	Offset	Highside	Rule Assigned:							
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Tooface (")	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
13,000.00	6,951.78	6,506.77	6,484.66	189.96	15.13	-58.56	317.59	411.89	6,029.63	5,982.87	46.75	128.964	
13,100.00	6,951.95	6,499.89	6,477.80	192.97	15.13	-58.18	317.55	412.42	6,128.58	6,081.78	46.80	130.956	
13,200.00	6,952.12	6,493.02	6,470.96	195.99	15.13	-57.80	317.50	412.95	6,227.55	6,180.71	46.84	132.943	
13,300.00	6,952.29	6,486.18	6,464.13	199.00	15.13	-57.43	317.46	413.48	6,326.55	6,279.66	46.89	134.923	
13,400.00	6,952.46	6,479.36	6,457.33	202.02	15.14	-57.06	317.41	414.00	6,425.57	6,378.63	46.94	136.897	
13,500.00	6,952.63	6,472.56	6,450.55	205.04	15.14	-56.69	317.37	414.53	6,524.61	6,477.63	46.99	138.865	
13,600.00	6,952.80	6,465.78	6,443.79	208.05	15.14	-56.33	317.32	415.05	6,623.68	6,576.64	47.03	140.827	
13,700.00	6,952.97	6,459.02	6,437.05	211.07	15.14	-55.97	317.28	415.57	6,722.76	6,675.68	47.08	142.783	
13,800.00	6,953.14	6,449.01	6,427.08	214.09	15.15	-55.45	317.21	416.33	6,821.87	6,774.73	47.14	144.728	
13,900.00	6,953.31	6,449.01	6,427.08	217.11	15.15	-55.45	317.21	416.33	6,920.99	6,873.80	47.18	146.678	
14,000.00	6,953.48	6,449.01	6,427.08	220.13	15.15	-55.45	317.21	416.33	7,020.14	6,972.90	47.23	148.622	
14,100.00	6,953.65	6,449.01	6,427.08	223.15	15.15	-55.45	317.21	416.33	7,119.31	7,072.02	47.29	150.561	
14,200.00	6,953.82	6,449.01	6,427.08	226.17	15.15	-55.45	317.21	416.33	7,218.50	7,171.17	47.34	152.493	
14,300.00	6,953.99	6,449.01	6,427.08	229.19	15.15	-55.45	317.21	416.33	7,317.72	7,270.33	47.39	154.419	
14,400.00	6,954.15	6,449.01	6,427.08	232.21	15.15	-55.45	317.21	416.33	7,416.96	7,369.51	47.44	156.340	
14,500.00	6,954.32	6,449.01	6,427.08	235.23	15.15	-55.45	317.21	416.33	7,516.21	7,468.72	47.49	158.254	
14,600.00	6,954.49	6,449.01	6,427.08	238.25	15.15	-55.45	317.21	416.33	7,615.49	7,567.94	47.55	160.162	
14,700.00	6,954.66	6,449.01	6,427.08	241.28	15.15	-55.45	317.21	416.33	7,714.78	7,667.18	47.60	162.064	
14,800.00	6,954.83	6,449.01	6,427.08	244.30	15.15	-55.45	317.21	416.33	7,814.10	7,766.44	47.66	163.960	
14,900.00	6,955.00	6,449.01	6,427.08	247.32	15.15	-55.45	317.21	416.33	7,913.43	7,865.71	47.71	165.849	
15,000.00	6,955.17	6,449.01	6,427.08	250.34	15.15	-55.45	317.21	416.33	8,012.78	7,965.00	47.77	167.732	
15,100.00	6,955.34	6,449.01	6,427.08	253.37	15.15	-55.45	317.21	416.33	8,112.14	8,064.31	47.83	169.609	
15,200.00	6,955.50	6,449.01	6,427.08	256.39	15.15	-55.45	317.21	416.33	8,211.52	8,163.63	47.89	171.478	
15,300.00	6,955.67	6,449.01	6,427.08	259.42	15.15	-55.45	317.21	416.33	8,310.91	8,262.97	47.95	173.342	
15,400.00	6,955.84	6,449.01	6,427.08	262.44	15.15	-55.45	317.21	416.33	8,410.32	8,362.31	48.00	175.198	
15,500.00	6,956.01	6,449.01	6,427.08	265.46	15.15	-55.44	317.21	416.33	8,509.74	8,461.68	48.06	177.048	
15,600.00	6,956.18	6,449.01	6,427.08	268.49	15.15	-55.44	317.21	416.33	8,609.18	8,561.05	48.13	178.892	
15,700.00	6,956.34	6,449.01	6,427.08	271.51	15.15	-55.44	317.21	416.33	8,708.62	8,660.44	48.19	180.728	
15,800.00	6,956.51	6,449.01	6,427.08	274.54	15.15	-55.44	317.21	416.33	8,808.09	8,759.84	48.25	182.558	
15,900.00	6,956.68	6,449.01	6,427.08	277.56	15.15	-55.44	317.21	416.33	8,907.56	8,859.25	48.31	184.381	
16,000.00	6,956.85	6,415.98	6,394.13	280.59	15.15	-53.76	317.02	418.62	9,006.75	8,958.36	48.39	186.123	
16,100.00	6,957.02	6,414.75	6,392.89	283.62	15.15	-53.70	317.01	418.70	9,106.22	9,057.77	48.46	187.928	
16,200.00	6,957.18	6,413.53	6,391.68	286.64	15.15	-53.64	317.01	418.77	9,205.71	9,157.19	48.52	189.726	
16,300.00	6,957.35	6,412.34	6,390.49	289.67	15.15	-53.58	317.00	418.85	9,305.20	9,256.61	48.59	191.517	
16,400.00	6,957.52	6,411.17	6,389.32	292.70	15.16	-53.52	316.99	418.92	9,404.71	9,356.05	48.65	193.301	
16,500.00	6,957.69	6,410.01	6,388.17	295.72	15.16	-53.46	316.99	418.99	9,504.22	9,455.50	48.72	195.078	
16,600.00	6,957.85	6,408.88	6,387.04	298.75	15.16	-53.41	316.98	419.06	9,603.74	9,554.96	48.79	196.848	
16,700.00	6,958.02	6,407.76	6,385.92	301.78	15.16	-53.35	316.98	419.12	9,703.28	9,654.42	48.86	198.610	
16,800.00	6,958.19	6,406.67	6,384.83	304.80	15.16	-53.30	316.97	419.19	9,802.82	9,753.89	48.92	200.366	
16,900.00	6,958.35	6,405.59	6,383.75	307.83	15.16	-53.24	316.97	419.25	9,902.37	9,853.38	48.99	202.114	
17,000.00	6,958.52	6,404.52	6,382.69	310.86	15.16	-53.19	316.96	419.31	10,001.93	9,952.86	49.06	203.856	
17,100.00	6,958.69	6,403.48	6,381.65	313.88	15.16	-53.14	316.96	419.37	10,101.49	10,052.36	49.13	205.590	
17,200.00	6,958.86	6,402.45	6,380.62	316.91	15.16	-53.09	316.95	419.43	10,201.07	10,151.86	49.21	207.316	
17,300.00	6,959.02	6,401.44	6,379.61	319.94	15.16	-53.04	316.95	419.48	10,300.65	10,251.38	49.28	209.036	
17,400.00	6,959.19	6,367.01	6,345.23	322.97	15.17	-51.39	316.83	421.16	10,400.54	10,351.17	49.37	210.663	
17,500.00	6,959.36	6,367.01	6,345.23	326.00	15.17	-51.39	316.83	421.16	10,500.12	10,450.67	49.44	212.369	
17,600.00	6,959.52	6,367.01	6,345.23	329.02	15.17	-51.39	316.83	421.16	10,599.70	10,550.19	49.52	214.068	
17,700.00	6,959.69	6,367.01	6,345.23	332.05	15.17	-51.39	316.83	421.16	10,699.30	10,649.71	49.59	215.760	
17,800.00	6,959.85	6,367.01	6,345.23	335.08	15.17	-51.39	316.83	421.16	10,798.90	10,749.24	49.66	217.445	
17,900.00	6,960.02	6,367.01	6,345.23	338.11	15.17	-51.39	316.83	421.16	10,898.51	10,848.77	49.74	219.123	

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 641H - OH - OH												Offset Site Error:	0.00 ft
Survey Program: 25-NS-GYRO-MS, 365-SDI MWD, 6367-SDI MWD, 7619-SDI MWD												Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Semi Major Axis	Reference	Offset	Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning
Measured	Depth	Measured	Depth	Reference	Offset	Toolface	+N/-S	+E/-W	Between	Between	Separation	Factor	
Depth	(ft)	Depth	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	Centres	Ellipses	(ft)		
(ft)		(ft)	(ft)						(ft)	(ft)			
18,000.00	6,960.19	6,367.01	6,345.23	341.14	15.17	-51.39	316.83	421.16	10,998.13	10,948.32	49.81	220.793	
18,100.00	6,960.35	6,367.01	6,345.23	344.17	15.17	-51.39	316.83	421.16	11,097.75	11,047.87	49.89	222.456	
18,200.00	6,960.52	6,367.01	6,345.23	347.20	15.17	-51.39	316.83	421.16	11,197.38	11,147.42	49.96	224.112	
18,300.00	6,960.68	6,367.01	6,345.23	350.23	15.17	-51.38	316.83	421.16	11,297.02	11,246.98	50.04	225.760	
18,400.00	6,960.85	6,367.01	6,345.23	353.26	15.17	-51.38	316.83	421.16	11,396.66	11,346.55	50.12	227.401	
18,500.00	6,961.02	6,367.01	6,345.23	356.28	15.17	-51.38	316.83	421.16	11,496.31	11,446.12	50.19	229.035	
18,600.00	6,961.18	6,367.01	6,345.23	359.31	15.17	-51.38	316.83	421.16	11,595.97	11,545.70	50.27	230.662	
18,700.00	6,961.35	6,367.01	6,345.23	362.34	15.17	-51.38	316.83	421.16	11,695.63	11,645.28	50.35	232.281	
18,800.00	6,961.51	6,367.01	6,345.23	365.37	15.17	-51.38	316.83	421.16	11,795.30	11,744.87	50.43	233.893	
18,900.00	6,961.68	6,367.01	6,345.23	368.40	15.17	-51.38	316.83	421.16	11,894.97	11,844.46	50.51	235.497	
19,000.00	6,961.84	6,367.01	6,345.23	371.43	15.17	-51.38	316.83	421.16	11,994.65	11,944.06	50.59	237.095	
19,100.00	6,962.01	6,367.01	6,345.23	374.46	15.17	-51.38	316.83	421.16	12,094.33	12,043.66	50.67	238.685	
19,200.00	6,962.17	6,367.01	6,345.23	377.49	15.17	-51.38	316.83	421.16	12,194.02	12,143.27	50.75	240.268	
19,300.00	6,962.34	6,367.01	6,345.23	380.52	15.17	-51.38	316.83	421.16	12,293.72	12,242.88	50.83	241.843	
19,400.00	6,962.51	6,367.01	6,345.23	383.55	15.17	-51.38	316.83	421.16	12,393.42	12,342.50	50.92	243.411	
19,500.00	6,962.67	6,367.01	6,345.23	386.58	15.17	-51.38	316.83	421.16	12,493.12	12,442.12	51.00	244.972	
19,600.00	6,962.84	6,367.01	6,345.23	389.61	15.17	-51.38	316.83	421.16	12,592.83	12,541.75	51.08	246.526	
19,700.00	6,963.00	6,367.01	6,345.23	392.64	15.17	-51.38	316.83	421.16	12,692.54	12,641.38	51.16	248.072	
19,800.00	6,963.16	6,367.01	6,345.23	395.67	15.17	-51.38	316.83	421.16	12,792.26	12,741.01	51.25	249.611	
19,900.00	6,963.33	6,367.01	6,345.23	398.70	15.17	-51.38	316.83	421.16	12,891.98	12,840.65	51.33	251.143	
20,000.00	6,963.49	6,367.01	6,345.23	401.73	15.17	-51.38	316.83	421.16	12,991.71	12,940.29	51.42	252.667	
20,100.00	6,963.66	6,367.01	6,345.23	404.77	15.17	-51.38	316.83	421.16	13,091.44	13,039.93	51.50	254.184	
20,200.00	6,963.82	6,367.01	6,345.23	407.80	15.17	-51.38	316.83	421.16	13,191.17	13,139.58	51.59	255.694	
20,307.78	6,964.00	6,367.01	6,345.23	411.06	15.17	-51.38	316.83	421.16	13,298.67	13,246.99	51.68	257.314	

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 642H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 125-NS-GYRO-MS, 389-SDI MWD, 6382-SDI MWD, 7376-SDI MWD													Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Vertical	Reference	Semi Major Axis	Offset	Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning
Measured	Depth	Depth	Depth	Reference	Reference	Offset	Toolface	+N/-S	+E/-W	Between	Between	Separation	Factor	
Depth	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	Centres	Ellipses	(ft)		
0.00	0.00	0.51	0.51	0.00	0.00	102.81		-9.99	43.94	45.06				
393.00	392.99	393.08	393.06	0.66	0.73	67.38		-13.43	46.47	47.64	46.25	1.39	34.311	
483.00	482.99	482.23	482.18	0.97	0.78	-42.76		-15.08	47.60	48.66	46.90	1.76	27.692	
578.00	577.96	576.03	575.88	1.30	0.88	-55.77		-18.35	50.22	50.80	48.61	2.19	23.216	
673.00	672.85	669.88	669.51	1.64	1.03	-64.44		-22.77	54.99	54.62	51.96	2.67	20.494	
765.00	764.65	761.53	760.86	1.96	1.21	-66.44		-27.75	60.43	58.83	55.67	3.15	18.658	
855.00	854.37	851.41	850.44	2.29	1.40	-66.58		-32.82	65.79	62.46	58.82	3.65	17.134	
952.00	950.95	948.03	946.74	2.65	1.61	-66.03		-37.73	71.79	65.73	61.53	4.20	15.664	
1,077.00	1,075.26	1,072.69	1,070.96	3.13	1.89	-71.77		-44.22	80.04	69.97	65.03	4.94	14.173	
1,172.00	1,169.69	1,167.71	1,165.69	3.49	2.10	-88.81		-48.58	86.14	74.41	68.90	5.51	13.514	
1,300.00	1,297.07	1,295.24	1,292.84	3.97	2.39	-94.84		-54.37	94.08	82.44	76.16	6.28	13.120	
1,395.00	1,391.63	1,390.02	1,387.34	4.34	2.61	-99.11		-58.63	99.93	88.85	81.99	6.86	12.944	
1,490.00	1,486.24	1,484.75	1,481.79	4.70	2.84	-99.98		-62.88	105.76	95.36	87.92	7.45	12.808	
1,586.00	1,582.02	1,580.36	1,577.14	5.05	3.06	-92.15		-66.82	111.59	101.14	93.12	8.02	12.613	
1,681.00	1,676.87	1,674.51	1,671.04	5.40	3.29	-87.71		-70.06	117.66	106.47	97.89	8.58	12.410	
1,776.00	1,771.67	1,768.90	1,765.12	5.75	3.52	-82.68		-73.61	124.45	111.85	102.69	9.15	12.220	
1,872.00	1,867.43	1,864.60	1,860.48	6.11	3.76	-96.26		-77.43	131.53	117.84	108.09	9.74	12.095	
1,966.00	1,961.25	1,957.99	1,953.52	6.46	4.00	-112.83		-81.35	138.63	125.29	114.98	10.31	12.149	
2,061.00	2,056.10	2,053.14	2,048.31	6.81	4.24	-118.85		-85.11	145.91	133.80	122.92	10.88	12.300	
2,156.00	2,150.95	2,148.00	2,142.87	7.15	4.47	-121.37		-88.68	152.58	142.24	130.80	11.44	12.435	
2,252.00	2,246.71	2,244.17	2,238.74	7.50	4.71	-123.27		-92.37	159.28	151.54	139.52	12.01	12.612	
2,347.00	2,341.39	2,338.82	2,333.10	7.86	4.94	-125.60		-96.22	165.51	161.12	148.53	12.59	12.799	
2,442.00	2,436.07	2,433.26	2,427.25	8.21	5.18	-122.71		-100.11	171.79	170.68	157.51	13.16	12.966	
2,537.00	2,530.82	2,527.54	2,521.24	8.56	5.41	-114.54		-103.92	178.13	179.30	165.56	13.74	13.053	
2,632.00	2,625.64	2,623.47	2,616.86	8.92	5.65	-92.04		-108.19	184.54	185.85	171.53	14.32	12.981	
2,728.00	2,721.53	2,718.85	2,711.91	9.26	5.89	-73.03		-113.18	190.81	190.25	175.35	14.89	12.774	
2,823.00	2,816.43	2,814.29	2,807.01	9.60	6.13	-52.76		-118.15	197.14	193.30	177.84	15.46	12.507	
2,918.00	2,911.32	2,909.84	2,902.28	9.94	6.36	-49.66		-122.34	203.00	195.17	179.16	16.00	12.195	
3,013.00	3,006.17	3,005.14	2,997.37	10.28	6.58	-60.29		-125.53	208.40	196.77	180.22	16.56	11.884	
3,109.00	3,101.98	3,101.06	3,093.09	10.63	6.81	-66.41		-128.90	213.74	198.53	181.40	17.13	11.590	
3,204.00	3,196.73	3,194.54	3,186.29	10.98	7.04	-60.44		-132.99	219.64	200.36	182.66	17.70	11.320	
3,299.00	3,291.42	3,289.38	3,280.79	11.33	7.29	-72.80		-137.75	226.03	202.52	184.23	18.29	11.072	
3,395.00	3,387.03	3,384.62	3,375.65	11.69	7.54	-86.62		-142.93	232.86	206.51	187.61	18.90	10.928	
3,490.00	3,481.56	3,479.88	3,470.51	12.06	7.78	-89.36		-148.31	239.71	211.54	192.03	19.51	10.843	
3,585.00	3,576.12	3,575.03	3,565.27	12.42	8.02	-99.69		-153.73	246.40	217.28	197.17	20.11	10.803	
3,680.00	3,670.84	3,670.34	3,660.21	12.78	8.26	-116.09		-159.02	252.87	224.27	203.57	20.70	10.835	
3,775.00	3,765.61	3,765.08	3,754.64	13.13	8.50	-121.62		-163.77	258.93	232.12	210.85	21.27	10.912	
3,871.00	3,861.42	3,859.17	3,848.42	13.48	8.73	-118.15		-168.27	265.19	240.13	218.29	21.84	10.995	
3,966.00	3,956.30	3,954.54	3,943.43	13.83	8.97	-109.37		-172.61	272.07	247.60	225.19	22.41	11.050	
4,061.00	4,051.20	4,049.60	4,038.25	14.17	9.21	-103.70		-176.23	277.94	253.63	230.65	22.97	11.040	
4,156.00	4,146.11	4,141.83	4,130.11	14.52	9.45	-94.54		-180.88	284.64	259.85	236.32	23.53	11.044	
4,251.00	4,241.00	4,236.66	4,224.50	14.86	9.70	-104.15		-185.89	292.25	266.86	242.76	24.10	11.073	
4,347.00	4,336.86	4,332.60	4,320.07	15.22	9.95	-106.75		-190.41	299.44	274.22	249.54	24.68	11.111	
4,442.00	4,431.69	4,428.05	4,415.13	15.57	10.19	-101.88		-194.96	306.63	281.56	256.30	25.26	11.146	
4,536.00	4,525.51	4,522.21	4,508.98	15.91	10.43	-106.51		-198.77	313.25	288.58	262.75	25.83	11.172	
4,632.00	4,621.31	4,617.95	4,604.42	16.27	10.67	-107.44		-202.56	319.92	296.06	269.65	26.41	11.210	
4,727.00	4,716.11	4,712.58	4,698.72	16.62	10.91	-103.28		-206.61	326.59	303.31	276.32	26.99	11.238	
4,821.00	4,809.89	4,808.01	4,793.78	16.97	11.15	-102.09		-211.59	333.33	310.07	282.50	27.58	11.244	
4,916.00	4,904.64	4,901.05	4,886.47	17.33	11.39	-99.42		-216.42	339.79	316.66	288.51	28.15	11.247	
5,011.00	4,999.37	4,997.33	4,982.39	17.69	11.63	-99.72		-221.31	346.60	323.27	294.52	28.75	11.244	

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 642H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 125-NS-GYRO-MS, 389-SDI MWD, 6382-SDI MWD, 7376-SDI MWD													Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Vertical	Reference	Semi Major Axis	Offset	Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning
Measured	Depth	Depth	Depth	Reference	Offset	Offset	Toolface	+N/-S	+E/-W	Between	Between	Separation	Factor	
Depth	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	Centres	Ellipses	(ft)		
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
5,109.00	5,097.08	5,097.80	5,082.55	18.06	11.88	-97.15	-226.18	352.87	329.23	299.86	29.37	11.210		
5,204.00	5,191.74	5,188.49	5,172.93	18.42	12.11	-99.29	-230.53	358.77	335.31	305.36	29.95	11.197		
5,299.00	5,286.40	5,279.92	5,263.93	18.78	12.36	-96.17	-235.80	366.02	342.38	311.85	30.53	11.215		
5,363.00	5,350.22	5,344.17	5,327.81	19.02	12.53	-96.41	-239.87	371.45	347.18	316.25	30.94	11.223		
5,458.00	5,444.99	5,438.40	5,421.53	19.37	12.79	-98.52	-245.67	379.36	354.36	322.84	31.52	11.241		
5,521.00	5,507.84	5,501.09	5,483.89	19.61	12.96	-98.06	-249.36	384.67	359.28	327.37	31.91	11.258		
5,585.00	5,571.69	5,565.22	5,547.71	19.84	13.13	-99.09	-252.76	389.99	364.28	331.97	32.31	11.274		
5,648.00	5,634.55	5,629.06	5,611.27	20.08	13.30	-100.20	-255.73	395.05	369.16	336.45	32.70	11.288		
5,712.00	5,698.39	5,694.00	5,675.97	20.32	13.46	-98.94	-258.61	399.97	373.93	340.83	33.11	11.295		
5,776.00	5,762.24	5,758.57	5,740.28	20.56	13.63	-95.68	-261.79	404.76	378.34	344.84	33.50	11.293		
5,839.00	5,825.12	5,821.63	5,803.11	20.79	13.79	-94.08	-264.65	409.31	382.42	348.53	33.89	11.284		
5,903.00	5,889.00	5,887.94	5,869.20	21.03	13.96	-93.89	-267.62	413.86	386.26	351.97	34.29	11.264		
5,966.00	5,951.88	5,956.17	5,937.23	21.26	14.12	-91.85	-270.86	417.97	389.44	354.74	34.70	11.224		
6,030.00	6,015.74	6,028.31	6,009.24	21.50	14.29	-91.29	-273.92	420.90	391.43	356.32	35.11	11.149		
6,093.00	6,078.59	6,101.37	6,082.25	21.74	14.44	-91.52	-276.38	421.89	391.85	356.34	35.50	11.037		
6,157.00	6,142.42	6,164.31	6,145.18	21.97	14.55	-83.10	-277.60	421.84	391.26	355.38	35.88	10.904		
6,220.00	6,205.25	6,229.50	6,210.37	22.21	14.66	-91.03	-277.90	421.40	390.54	354.28	36.25	10.772		
6,243.83	6,229.01	6,254.64	6,235.50	22.26	14.70	-96.29	-277.91	421.05	390.32	353.97	36.35	10.737		
6,300.00	6,285.05	6,314.01	6,294.86	22.27	14.80	-96.97	-277.76	419.81	389.68	353.20	36.48	10.682		
6,323.33	6,308.32	6,338.88	6,319.72	22.27	14.84	-97.25	-277.74	419.13	389.28	352.75	36.53	10.656		
6,350.00	6,334.92	6,367.30	6,348.13	22.28	14.87	-69.66	-277.77	418.24	388.18	351.60	36.58	10.612		
6,400.00	6,384.57	6,422.00	6,402.79	22.30	14.87	-46.14	-278.00	416.23	383.04	346.44	36.61	10.463		
6,450.00	6,433.72	6,516.47	6,496.61	22.32	14.82	-39.33	-278.73	405.84	370.90	334.69	36.21	10.244		
6,500.00	6,482.07	6,590.23	6,568.51	22.34	14.74	-38.42	-278.84	389.48	350.57	314.82	35.75	9.805		
6,550.00	6,529.32	6,649.74	6,625.44	22.37	14.67	-40.64	-279.10	372.22	324.74	289.32	35.41	9.170		
6,600.00	6,575.18	6,699.83	6,672.64	22.41	14.60	-45.27	-280.15	355.47	294.88	259.70	35.18	8.381		
6,650.00	6,619.39	6,743.02	6,712.56	22.45	14.54	-52.73	-280.63	339.02	262.34	227.28	35.06	7.482		
6,700.00	6,661.67	6,775.60	6,741.93	22.51	14.49	-61.97	-279.94	324.97	228.86	193.57	35.28	6.486		
6,750.00	6,701.77	6,801.70	6,765.02	22.58	14.45	-72.06	-279.01	312.82	196.84	161.08	35.75	5.506		
6,800.00	6,739.44	6,822.61	6,783.16	22.67	14.42	-81.49	-278.25	302.47	169.42	133.06	36.36	4.660		
6,850.00	6,774.46	6,835.57	6,794.23	22.79	14.39	-87.64	-277.82	295.74	151.30	114.44	36.86	4.105		
6,887.24	6,798.69	6,841.17	6,798.97	22.90	14.39	-89.94	-277.63	292.76	146.88	110.19	36.69	4.003 SF		
6,900.00	6,806.61	6,842.44	6,800.05	22.95	14.38	-90.30	-277.59	292.07	147.43	110.96	36.48	4.042		
6,950.00	6,835.71	6,844.76	6,802.00	23.17	14.38	-89.82	-277.51	290.82	159.49	124.35	35.14	4.539		
7,000.00	6,861.57	6,843.50	6,800.94	23.48	14.38	-86.53	-277.55	291.50	184.47	150.78	33.69	5.476		
7,050.00	6,884.03	6,839.40	6,797.48	23.88	14.39	-80.86	-277.69	293.71	217.79	185.12	32.68	6.665		
7,100.00	6,902.97	6,829.01	6,788.65	24.37	14.41	-72.01	-278.04	299.17	255.95	224.04	31.92	8.019		
7,150.00	6,918.27	6,824.50	6,784.79	24.96	14.41	-64.86	-278.19	301.50	296.58	264.67	31.92	9.293		
7,200.00	6,929.83	6,814.13	6,775.85	25.64	14.43	-56.22	-278.55	306.74	338.44	306.55	31.90	10.610		
7,250.00	6,937.59	6,799.01	6,762.66	26.40	14.45	-47.63	-279.11	314.11	380.68	348.80	31.88	11.941		
7,300.00	6,941.50	6,789.16	6,753.98	27.23	14.47	-41.44	-279.48	318.75	422.67	390.47	32.20	13.126		
7,324.29	6,942.00	6,782.24	6,747.85	27.65	14.48	-38.54	-279.72	321.95	442.88	410.57	32.31	13.708		
7,360.79	6,942.06	6,768.01	6,735.15	28.31	14.50	-35.83	-280.17	328.35	473.47	441.11	32.36	14.630		
7,400.00	6,942.13	6,768.01	6,735.15	29.06	14.50	-35.83	-280.17	328.35	506.95	474.11	32.85	15.434		
7,500.00	6,942.31	6,738.01	6,707.98	31.09	14.55	-32.50	-280.66	341.06	594.19	561.04	33.15	17.925		
7,600.00	6,942.48	6,720.94	6,692.28	33.27	14.58	-30.87	-280.58	347.76	683.75	650.13	33.62	20.337		
7,700.00	6,942.66	6,707.01	6,679.34	35.58	14.60	-29.66	-280.33	352.91	775.04	741.02	34.02	22.781		
7,800.00	6,942.83	6,677.01	6,651.23	38.00	14.63	-27.36	-279.60	363.34	867.46	833.33	34.13	25.417		
7,900.00	6,943.00	6,663.44	6,638.42	40.50	14.65	-26.42	-279.32	367.84	960.64	926.23	34.41	27.921		
8,000.00	6,943.18	6,646.01	6,621.90	43.06	14.67	-25.28	-279.06	373.38	1,054.53	1,019.93	34.59	30.482		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 642H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 125-NS-GYRO-MS, 389-SDI MWD, 6382-SDI MWD, 7376-SDI MWD													Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Vertical	Semi Major Axis	Offset	Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning	
Measured	Depth	Depth	Depth	Reference	Reference	Toolface	+N/-S	+E/-W	Between	Between	Separation	Factor		
Depth	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	Centres	Ellipses	(ft)			
8,100.00	6,943.35	6,629.19	6,605.88	45.69	14.70	-24.25	-278.91	378.51	1,148.99	1,114.23	34.76	33.054		
8,200.00	6,943.53	6,616.01	6,593.29	48.36	14.71	-23.49	-278.85	382.38	1,243.94	1,209.01	34.93	35.612		
8,300.00	6,943.70	6,602.02	6,579.86	51.08	14.73	-22.72	-278.83	386.31	1,339.33	1,304.26	35.07	38.188		
8,400.00	6,943.87	6,586.01	6,564.43	53.83	14.75	-21.89	-278.85	390.58	1,435.15	1,399.96	35.19	40.786		
8,500.00	6,944.05	6,586.01	6,564.43	56.60	14.75	-21.89	-278.85	390.58	1,531.31	1,495.94	35.37	43.295		
8,600.00	6,944.22	6,571.38	6,550.27	59.41	14.77	-21.17	-278.89	394.25	1,627.75	1,592.29	35.47	45.897		
8,700.00	6,944.39	6,555.01	6,534.36	62.23	14.79	-20.42	-278.90	398.10	1,724.55	1,689.00	35.55	48.513		
8,800.00	6,944.57	6,555.01	6,534.36	65.08	14.79	-20.42	-278.90	398.10	1,821.49	1,785.81	35.68	51.047		
8,900.00	6,944.74	6,555.01	6,534.36	67.94	14.79	-20.42	-278.90	398.10	1,918.74	1,882.94	35.80	53.592		
9,000.00	6,944.91	6,543.10	6,522.74	70.81	14.80	-19.91	-278.89	400.71	2,016.13	1,980.25	35.88	56.191		
9,100.00	6,945.09	6,537.88	6,517.63	73.70	14.80	-19.69	-278.87	401.79	2,113.74	2,077.77	35.97	58.764		
9,200.00	6,945.26	6,525.01	6,505.01	76.60	14.82	-19.18	-278.80	404.30	2,211.59	2,175.55	36.04	61.367		
9,300.00	6,945.43	6,525.01	6,505.01	79.51	14.82	-19.18	-278.80	404.30	2,309.47	2,273.34	36.13	63.921		
9,400.00	6,945.61	6,525.01	6,505.01	82.43	14.82	-19.18	-278.80	404.30	2,407.52	2,371.31	36.22	66.477		
9,500.00	6,945.78	6,525.01	6,505.01	85.36	14.82	-19.18	-278.80	404.30	2,505.73	2,469.44	36.30	69.036		
9,600.00	6,945.95	6,525.01	6,505.01	88.29	14.82	-19.18	-278.80	404.30	2,604.08	2,567.71	36.37	71.595		
9,700.00	6,946.12	6,511.77	6,491.97	91.23	14.83	-18.67	-278.70	406.65	2,702.40	2,665.97	36.43	74.182		
9,800.00	6,946.30	6,508.11	6,488.36	94.18	14.83	-18.54	-278.67	407.26	2,800.89	2,764.39	36.50	76.743		
9,900.00	6,946.47	6,495.01	6,475.43	97.13	14.84	-18.08	-278.57	409.31	2,899.53	2,862.98	36.55	79.321		
10,000.00	6,946.64	6,495.01	6,475.43	100.09	14.84	-18.08	-278.57	409.31	2,998.14	2,961.51	36.62	81.865		
10,100.00	6,946.82	6,495.01	6,475.43	103.05	14.84	-18.08	-278.57	409.31	3,096.83	3,060.14	36.69	84.406		
10,200.00	6,946.99	6,495.01	6,475.43	106.02	14.84	-18.08	-278.57	409.31	3,195.61	3,158.85	36.75	86.944		
10,300.00	6,947.16	6,495.01	6,475.43	108.99	14.84	-18.07	-278.57	409.31	3,294.46	3,257.64	36.82	89.479		
10,400.00	6,947.33	6,495.01	6,475.43	111.96	14.84	-18.07	-278.57	409.31	3,393.37	3,356.49	36.88	92.009		
10,500.00	6,947.50	6,495.01	6,475.43	114.94	14.84	-18.07	-278.57	409.31	3,492.35	3,455.41	36.94	94.534		
10,600.00	6,947.68	6,495.01	6,475.43	117.92	14.84	-18.07	-278.57	409.31	3,591.39	3,554.38	37.00	97.055		
10,700.00	6,947.85	6,495.01	6,475.43	120.90	14.84	-18.07	-278.57	409.31	3,690.47	3,653.41	37.06	99.570		
10,800.00	6,948.02	6,481.41	6,461.96	123.88	14.85	-17.61	-278.46	411.19	3,789.45	3,752.33	37.12	102.081		
10,900.00	6,948.19	6,479.45	6,460.01	126.87	14.85	-17.55	-278.44	411.44	3,888.58	3,851.40	37.18	104.582		
11,000.00	6,948.36	6,477.57	6,458.15	129.86	14.85	-17.49	-278.43	411.68	3,987.75	3,950.51	37.24	107.076		
11,100.00	6,948.53	6,464.01	6,444.68	132.85	14.86	-17.06	-278.31	413.23	4,087.07	4,049.77	37.30	109.565		
11,200.00	6,948.71	6,464.01	6,444.68	135.84	14.86	-17.06	-278.31	413.23	4,186.28	4,148.91	37.36	112.042		
11,300.00	6,948.88	6,464.01	6,444.68	138.84	14.86	-17.06	-278.31	413.23	4,285.52	4,248.10	37.42	114.511		
11,400.00	6,949.05	6,464.01	6,444.68	141.84	14.86	-17.06	-278.31	413.23	4,384.80	4,347.31	37.49	116.974		
11,500.00	6,949.22	6,464.01	6,444.68	144.84	14.86	-17.06	-278.31	413.23	4,484.11	4,446.56	37.55	119.429		
11,600.00	6,949.39	6,464.01	6,444.68	147.84	14.86	-17.06	-278.31	413.23	4,583.45	4,545.84	37.61	121.876		
11,700.00	6,949.56	6,464.01	6,444.68	150.84	14.86	-17.06	-278.31	413.23	4,682.81	4,645.14	37.67	124.315		
11,800.00	6,949.73	6,464.01	6,444.68	153.84	14.86	-17.06	-278.31	413.23	4,782.21	4,744.48	37.73	126.746		
11,900.00	6,949.91	6,464.01	6,444.68	156.84	14.86	-17.06	-278.31	413.23	4,881.63	4,843.83	37.79	129.169		
12,000.00	6,950.08	6,464.01	6,444.68	159.85	14.86	-17.06	-278.31	413.23	4,981.07	4,943.21	37.85	131.583		
12,100.00	6,950.25	6,464.01	6,444.68	162.86	14.86	-17.06	-278.31	413.23	5,080.53	5,042.61	37.92	133.988		
12,200.00	6,950.42	6,464.01	6,444.68	165.86	14.86	-17.06	-278.31	413.23	5,180.02	5,142.03	37.98	136.385		
12,300.00	6,950.59	6,464.01	6,444.68	168.87	14.86	-17.06	-278.31	413.23	5,279.52	5,241.47	38.04	138.772		
12,400.00	6,950.76	6,464.01	6,444.68	171.88	14.86	-17.06	-278.31	413.23	5,379.04	5,340.93	38.11	141.151		
12,500.00	6,950.93	6,464.01	6,444.68	174.89	14.86	-17.06	-278.31	413.23	5,478.58	5,440.41	38.17	143.519		
12,600.00	6,951.10	6,464.01	6,444.68	177.90	14.86	-17.06	-278.31	413.23	5,578.14	5,539.90	38.24	145.879		
12,700.00	6,951.27	6,464.01	6,444.68	180.91	14.86	-17.06	-278.31	413.23	5,677.71	5,639.40	38.30	148.229		
12,800.00	6,951.44	6,464.01	6,444.68	183.93	14.86	-17.06	-278.31	413.23	5,777.29	5,738.93	38.37	150.569		
12,900.00	6,951.61	6,464.01	6,444.68	186.94	14.86	-17.06	-278.31	413.23	5,876.90	5,838.46	38.44	152.899		
13,000.00	6,951.78	6,464.01	6,444.68	189.96	14.86	-17.06	-278.31	413.23	5,976.51	5,938.01	38.50	155.220		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 642H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 125-NS-GYRO-MS, 389-SDI MWD, 6382-SDI MWD, 7376-SDI MWD													Offset Well Error:	0.00 ft
Reference													Rule Assigned:	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Semi Major Axis Offset	Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (ft)	Separation Factor	Warning	
							+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)				
13,100.00	6,951.95	6,464.01	6,444.68	192.97	14.86	-17.05	-278.31	413.23	6,076.14	6,037.56	38.57	157.530		
13,200.00	6,952.12	6,464.01	6,444.68	195.99	14.86	-17.05	-278.31	413.23	6,175.77	6,137.13	38.64	159.830		
13,300.00	6,952.29	6,464.01	6,444.68	199.00	14.86	-17.05	-278.31	413.23	6,275.42	6,236.72	38.71	162.120		
13,400.00	6,952.46	6,464.01	6,444.68	202.02	14.86	-17.05	-278.31	413.23	6,375.09	6,336.31	38.78	164.400		
13,500.00	6,952.63	6,449.85	6,430.58	205.04	14.86	-16.62	-278.19	414.54	6,474.57	6,435.72	38.86	166.629		
13,600.00	6,952.80	6,449.19	6,429.92	208.05	14.86	-16.61	-278.19	414.60	6,574.24	6,535.31	38.93	168.885		
13,700.00	6,952.97	6,448.54	6,429.28	211.07	14.86	-16.59	-278.18	414.65	6,673.91	6,634.91	39.00	171.130		
13,800.00	6,953.14	6,447.92	6,428.65	214.09	14.86	-16.57	-278.18	414.70	6,773.59	6,734.52	39.07	173.364		
13,900.00	6,953.31	6,434.01	6,414.78	217.11	14.87	-16.17	-278.08	415.62	6,873.44	6,834.29	39.15	175.554		
14,000.00	6,953.48	6,434.01	6,414.78	220.13	14.87	-16.17	-278.08	415.62	6,973.13	6,933.90	39.23	177.767		
14,100.00	6,953.65	6,434.01	6,414.78	223.15	14.87	-16.17	-278.08	415.62	7,072.82	7,033.52	39.30	179.970		
14,200.00	6,953.82	6,434.01	6,414.78	226.17	14.87	-16.17	-278.08	415.62	7,172.53	7,133.15	39.37	182.162		
14,300.00	6,953.99	6,434.01	6,414.78	229.19	14.87	-16.17	-278.08	415.62	7,272.24	7,232.79	39.45	184.343		
14,400.00	6,954.15	6,434.01	6,414.78	232.21	14.87	-16.17	-278.08	415.62	7,371.95	7,332.43	39.53	186.513		
14,500.00	6,954.32	6,434.01	6,414.78	235.23	14.87	-16.17	-278.08	415.62	7,471.68	7,432.08	39.60	188.672		
14,600.00	6,954.49	6,434.01	6,414.78	238.25	14.87	-16.17	-278.08	415.62	7,571.41	7,531.74	39.68	190.820		
14,700.00	6,954.66	6,434.01	6,414.78	241.28	14.87	-16.16	-278.08	415.62	7,671.15	7,631.40	39.76	192.957		
14,800.00	6,954.83	6,434.01	6,414.78	244.30	14.87	-16.16	-278.08	415.62	7,770.90	7,731.07	39.83	195.083		
14,900.00	6,955.00	6,434.01	6,414.78	247.32	14.87	-16.16	-278.08	415.62	7,870.65	7,830.74	39.91	197.198		
15,000.00	6,955.17	6,434.01	6,414.78	250.34	14.87	-16.16	-278.08	415.62	7,970.41	7,930.42	39.99	199.302		
15,100.00	6,955.34	6,434.01	6,414.78	253.37	14.87	-16.16	-278.08	415.62	8,070.18	8,030.11	40.07	201.395		
15,200.00	6,955.50	6,434.01	6,414.78	256.39	14.87	-16.16	-278.08	415.62	8,169.95	8,129.80	40.15	203.476		
15,300.00	6,955.67	6,434.01	6,414.78	259.42	14.87	-16.16	-278.08	415.62	8,269.73	8,229.49	40.23	205.547		
15,400.00	6,955.84	6,434.01	6,414.78	262.44	14.87	-16.16	-278.08	415.62	8,369.51	8,329.19	40.31	207.606		
15,500.00	6,956.01	6,434.01	6,414.78	265.46	14.87	-16.16	-278.08	415.62	8,469.29	8,428.90	40.40	209.654		
15,600.00	6,956.18	6,434.01	6,414.78	268.49	14.87	-16.16	-278.08	415.62	8,569.09	8,528.61	40.48	211.691		
15,700.00	6,956.34	6,434.01	6,414.78	271.51	14.87	-16.16	-278.08	415.62	8,668.88	8,628.32	40.56	213.716		
15,800.00	6,956.51	6,434.01	6,414.78	274.54	14.87	-16.16	-278.08	415.62	8,768.68	8,728.04	40.65	215.730		
15,900.00	6,956.68	6,434.01	6,414.78	277.56	14.87	-16.16	-278.08	415.62	8,868.49	8,827.76	40.73	217.733		
16,000.00	6,956.85	6,434.01	6,414.78	280.59	14.87	-16.16	-278.08	415.62	8,968.30	8,927.48	40.82	219.725		
16,100.00	6,957.02	6,434.01	6,414.78	283.62	14.87	-16.16	-278.08	415.62	9,068.11	9,027.21	40.90	221.706		
16,200.00	6,957.18	6,434.01	6,414.78	286.64	14.87	-16.16	-278.08	415.62	9,167.93	9,126.95	40.99	223.675		
16,300.00	6,957.35	6,434.01	6,414.78	289.67	14.87	-16.16	-278.08	415.62	9,267.76	9,226.68	41.07	225.633		
16,400.00	6,957.52	6,434.01	6,414.78	292.70	14.87	-16.16	-278.08	415.62	9,367.58	9,326.42	41.16	227.580		
16,500.00	6,957.69	6,434.01	6,414.78	295.72	14.87	-16.16	-278.08	415.62	9,467.41	9,426.16	41.25	229.516		
16,600.00	6,957.85	6,434.01	6,414.78	298.75	14.87	-16.16	-278.08	415.62	9,567.24	9,525.91	41.34	231.440		
16,700.00	6,958.02	6,434.01	6,414.78	301.78	14.87	-16.16	-278.08	415.62	9,667.08	9,625.65	41.43	233.353		
16,800.00	6,958.19	6,434.01	6,414.78	304.80	14.87	-16.16	-278.08	415.62	9,766.92	9,725.40	41.52	235.255		
16,900.00	6,958.35	6,434.01	6,414.78	307.83	14.87	-16.16	-278.08	415.62	9,866.76	9,825.16	41.61	237.146		
17,000.00	6,958.52	6,434.01	6,414.78	310.86	14.87	-16.16	-278.08	415.62	9,966.61	9,924.91	41.70	239.026		
17,100.00	6,958.69	6,434.01	6,414.78	313.88	14.87	-16.16	-278.08	415.62	10,066.46	10,024.67	41.79	240.895		
17,200.00	6,958.86	6,434.01	6,414.78	316.91	14.87	-16.16	-278.08	415.62	10,166.31	10,124.43	41.88	242.752		
17,300.00	6,959.02	6,434.01	6,414.78	319.94	14.87	-16.16	-278.08	415.62	10,266.17	10,224.20	41.97	244.599		
17,400.00	6,959.19	6,434.01	6,414.78	322.97	14.87	-16.16	-278.08	415.62	10,366.03	10,323.96	42.06	246.434		
17,500.00	6,959.36	6,434.01	6,414.78	326.00	14.87	-16.16	-278.08	415.62	10,465.89	10,423.73	42.16	248.258		
17,600.00	6,959.52	6,434.01	6,414.78	329.02	14.87	-16.16	-278.08	415.62	10,565.75	10,523.50	42.25	250.072		
17,700.00	6,959.69	6,434.01	6,414.78	332.05	14.87	-16.16	-278.08	415.62	10,665.62	10,623.27	42.34	251.874		
17,800.00	6,959.85	6,434.01	6,414.78	335.08	14.87	-16.16	-278.08	415.62	10,765.49	10,723.05	42.44	253.666		
17,900.00	6,960.02	6,434.01	6,414.78	338.11	14.87	-16.16	-278.08	415.62	10,865.36	10,822.82	42.53	255.447		
18,000.00	6,960.19	6,434.01	6,414.78	341.14	14.87	-16.16	-278.08	415.62	10,965.23	10,922.60	42.63	257.216		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 642H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 125-NS-GYRO-MS, 389-SDI MWD, 6382-SDI MWD, 7376-SDI MWD													Offset Well Error:	0.00 ft
Reference													Rule Assigned:	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre		Distance Between Centres (ft)		Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
18,100.00	6,960.35	6,434.01	6,414.78	344.17	14.87	-16.16	-278.08	415.62	11,065.10	11,022.38	42.73	258.975		
18,200.00	6,960.52	6,434.01	6,414.78	347.20	14.87	-16.16	-278.08	415.62	11,164.98	11,122.16	42.82	260.723		
18,300.00	6,960.68	6,434.01	6,414.78	350.23	14.87	-16.16	-278.08	415.62	11,264.86	11,221.94	42.92	262.461		
18,400.00	6,960.85	6,434.01	6,414.78	353.26	14.87	-16.16	-278.08	415.62	11,364.74	11,321.73	43.02	264.188		
18,500.00	6,961.02	6,434.01	6,414.78	356.28	14.87	-16.16	-278.08	415.62	11,464.63	11,421.51	43.12	265.904		
18,600.00	6,961.18	6,434.01	6,414.78	359.31	14.87	-16.16	-278.08	415.62	11,564.51	11,521.30	43.21	267.609		
18,700.00	6,961.35	6,434.01	6,414.78	362.34	14.87	-16.16	-278.08	415.62	11,664.40	11,621.09	43.31	269.304		
18,800.00	6,961.51	6,434.01	6,414.78	365.37	14.87	-16.16	-278.08	415.62	11,764.29	11,720.88	43.41	270.988		
18,900.00	6,961.68	6,434.01	6,414.78	368.40	14.87	-16.16	-278.08	415.62	11,864.18	11,820.67	43.51	272.662		
19,000.00	6,961.84	6,434.01	6,414.78	371.43	14.87	-16.16	-278.08	415.62	11,964.08	11,920.47	43.61	274.325		
19,100.00	6,962.01	6,434.01	6,414.78	374.46	14.87	-16.16	-278.08	415.62	12,063.97	12,020.26	43.71	275.978		
19,200.00	6,962.17	6,434.01	6,414.78	377.49	14.87	-16.15	-278.08	415.62	12,163.87	12,120.06	43.81	277.620		
19,300.00	6,962.34	6,434.01	6,414.78	380.52	14.87	-16.15	-278.08	415.62	12,263.77	12,219.85	43.92	279.252		
19,400.00	6,962.51	6,434.01	6,414.78	383.55	14.87	-16.15	-278.08	415.62	12,363.67	12,319.65	44.02	280.874		
19,500.00	6,962.67	6,420.15	6,400.94	386.58	14.87	-15.77	-277.99	416.31	12,463.50	12,419.37	44.13	282.416		
19,600.00	6,962.84	6,419.69	6,400.48	389.61	14.87	-15.76	-277.98	416.33	12,563.40	12,519.16	44.23	284.015		
19,700.00	6,963.00	6,419.24	6,400.03	392.64	14.87	-15.75	-277.98	416.35	12,663.30	12,618.96	44.34	285.604		
19,800.00	6,963.16	6,418.79	6,399.58	395.67	14.87	-15.73	-277.98	416.37	12,763.20	12,718.76	44.44	287.183		
19,900.00	6,963.33	6,418.35	6,399.14	398.70	14.87	-15.72	-277.98	416.39	12,863.10	12,818.55	44.55	288.751		
20,000.00	6,963.49	6,417.92	6,398.71	401.73	14.87	-15.71	-277.97	416.41	12,963.01	12,918.35	44.65	290.310		
20,100.00	6,963.66	6,417.49	6,398.28	404.77	14.87	-15.70	-277.97	416.43	13,062.91	13,018.15	44.76	291.859		
20,200.00	6,963.82	6,404.01	6,384.81	407.80	14.88	-15.35	-277.90	416.95	13,162.88	13,118.01	44.87	293.333		
20,307.78	6,964.00	6,404.01	6,384.81	411.06	14.88	-15.34	-277.90	416.95	13,270.56	13,225.57	44.99	294.983		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 643H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 25-NS-GYRO-MS, 379-SDI MWD, 6560-SDI MWD, 7715-SDI MWD													Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Vertical	Reference	Semi Major Axis	Offset	Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning
Measured	Depth	Depth	Depth	Reference	Offset	Reference	Toolface	+N/-S	+E/-W	Between	Between	Separation	Factor	
Depth	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	Centres	Ellipses	(ft)		
0.00	0.00	0.51	0.51	0.00	0.00	102.80		-6.66	29.32	30.07				
393.00	392.99	393.43	393.40	0.66	0.79	73.40		-9.70	25.93	27.11	25.66	1.45	18.733	CC, ES
483.00	482.99	482.76	482.69	0.97	0.85	-33.44		-12.25	26.10	27.80	25.97	1.82	15.234	
578.00	577.96	576.74	576.49	1.30	0.96	-43.21		-17.49	28.26	30.57	28.30	2.27	13.453	
673.00	672.85	671.02	670.40	1.64	1.13	-49.00		-24.93	32.11	34.84	32.08	2.76	12.634	
765.00	764.65	762.24	761.12	1.96	1.33	-48.40		-33.43	36.40	39.25	35.99	3.26	12.045	
855.00	854.37	851.16	849.26	2.29	1.56	-45.48		-43.65	41.98	44.88	41.10	3.78	11.886	
952.00	950.95	947.57	944.68	2.65	1.85	-41.09		-55.60	48.99	51.00	46.65	4.35	11.725	
1,077.00	1,075.26	1,072.38	1,068.08	3.13	2.24	-41.57		-71.80	58.24	57.92	52.82	5.10	11.356	SF
1,172.00	1,169.69	1,165.58	1,160.06	3.49	2.54	-54.30		-84.99	65.49	64.65	58.96	5.69	11.360	
1,300.00	1,297.07	1,291.65	1,283.96	3.97	3.02	-55.71		-104.98	77.40	78.74	72.23	6.51	12.086	
1,395.00	1,391.63	1,385.16	1,375.63	4.34	3.40	-56.91		-120.75	86.93	90.71	83.58	7.13	12.722	
1,490.00	1,486.24	1,479.05	1,467.55	4.70	3.79	-55.16		-137.13	96.82	103.58	95.84	7.74	13.388	
1,586.00	1,582.02	1,574.18	1,560.75	5.05	4.14	-45.27		-153.36	106.94	117.31	109.00	8.31	14.112	
1,681.00	1,676.87	1,668.82	1,653.46	5.40	4.50	-38.76		-169.45	117.03	131.20	122.33	8.87	14.793	
1,776.00	1,771.67	1,763.76	1,746.71	5.75	4.85	-32.06		-184.45	126.63	143.00	133.57	9.43	15.162	
1,872.00	1,867.43	1,859.55	1,840.74	6.11	5.20	-44.18		-199.77	136.57	155.08	145.07	10.01	15.490	
1,966.00	1,961.25	1,955.31	1,934.93	6.46	5.54	-59.88		-214.95	144.81	167.16	156.58	10.58	15.794	
2,061.00	2,056.10	2,051.09	2,029.32	6.81	5.85	-65.57		-229.40	152.18	179.57	168.43	11.15	16.112	
2,156.00	2,150.95	2,144.96	2,121.95	7.15	6.17	-67.95		-242.89	159.35	191.83	180.11	11.71	16.376	
2,252.00	2,246.71	2,240.12	2,215.78	7.50	6.50	-69.73		-256.77	166.94	204.35	192.04	12.31	16.600	
2,347.00	2,341.39	2,334.09	2,308.47	7.86	6.83	-72.06		-270.34	174.38	216.45	203.54	12.91	16.762	
2,442.00	2,436.07	2,428.25	2,401.33	8.21	7.16	-69.27		-283.88	182.10	228.66	215.14	13.52	16.913	
2,537.00	2,530.82	2,519.78	2,491.56	8.56	7.48	-61.19		-296.94	190.14	240.87	226.76	14.11	17.074	
2,632.00	2,625.64	2,611.96	2,582.20	8.92	7.84	-38.45		-311.60	198.42	253.46	238.78	14.68	17.264	
2,728.00	2,721.53	2,704.74	2,673.28	9.26	8.22	-19.19		-326.96	207.09	266.50	251.26	15.24	17.487	
2,823.00	2,816.43	2,800.09	2,766.79	9.60	8.59	1.51		-343.40	215.86	279.75	263.97	15.79	17.722	
2,918.00	2,911.32	2,892.54	2,857.52	9.94	8.94	5.30		-358.92	224.42	292.43	276.13	16.30	17.942	
3,013.00	3,006.17	2,993.03	2,956.31	10.28	9.31	-4.37		-374.47	234.33	304.17	287.30	16.87	18.029	
3,109.00	3,101.98	3,086.87	3,048.74	10.63	9.65	-9.61		-388.00	243.15	314.25	296.83	17.42	18.044	
3,204.00	3,196.73	3,183.60	3,144.04	10.98	10.00	-2.96		-401.88	252.27	323.42	305.44	17.98	17.989	
3,299.00	3,291.42	3,278.94	3,238.03	11.33	10.33	-14.52		-415.51	260.62	331.35	312.82	18.53	17.878	
3,395.00	3,387.03	3,371.80	3,329.47	11.69	10.67	-27.55		-429.57	268.51	339.50	320.39	19.10	17.772	
3,490.00	3,481.56	3,466.98	3,423.19	12.06	11.02	-29.70		-443.77	277.25	347.47	327.77	19.70	17.637	
3,585.00	3,576.12	3,564.31	3,519.09	12.42	11.36	-39.59		-457.93	285.90	355.77	335.46	20.31	17.518	
3,680.00	3,670.84	3,660.55	3,614.04	12.78	11.69	-56.02		-471.66	293.62	365.84	344.93	20.91	17.497	
3,775.00	3,765.61	3,753.79	3,705.97	13.13	12.02	-61.76		-485.36	300.96	377.61	356.11	21.50	17.566	
3,871.00	3,861.42	3,853.44	3,804.33	13.48	12.36	-58.75		-499.17	309.02	389.58	367.47	22.11	17.619	
3,966.00	3,956.30	3,955.23	3,905.01	13.83	12.68	-50.28		-512.62	315.56	400.05	377.34	22.71	17.618	
4,061.00	4,051.20	4,048.28	3,997.19	14.17	12.97	-44.59		-524.27	320.62	409.20	385.94	23.26	17.592	
4,156.00	4,146.11	4,141.65	4,089.54	14.52	13.27	-35.65		-536.68	326.51	419.15	395.34	23.81	17.601	
4,251.00	4,241.00	4,233.83	4,180.75	14.86	13.58	-45.46		-548.85	331.95	428.63	404.26	24.37	17.591	
4,347.00	4,336.86	4,327.97	4,273.79	15.22	13.89	-48.22		-561.54	338.70	439.18	414.24	24.94	17.610	
4,442.00	4,431.69	4,418.36	4,363.14	15.57	14.19	-43.54		-573.39	345.49	449.24	423.74	25.50	17.619	
4,536.00	4,525.51	4,506.43	4,450.01	15.91	14.51	-48.15		-585.67	353.24	460.36	434.31	26.05	17.673	
4,632.00	4,621.31	4,597.17	4,539.37	16.27	14.85	-49.04		-599.10	361.50	472.57	445.94	26.62	17.751	
4,727.00	4,716.11	4,689.61	4,630.24	16.62	15.21	-44.87		-613.51	370.35	485.29	458.08	27.21	17.837	
4,821.00	4,809.89	4,778.46	4,717.53	16.97	15.55	-43.67		-627.92	378.52	497.66	469.90	27.77	17.923	
4,916.00	4,904.64	4,869.04	4,806.27	17.33	15.92	-40.85		-643.96	387.10	510.90	482.56	28.34	18.029	
5,011.00	4,999.37	4,966.61	4,901.86	17.69	16.31	-40.88		-661.36	396.06	523.83	494.87	28.95	18.092	

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 643H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 25-NS-GYRO-MS, 379-SDI MWD, 6560-SDI MWD, 7715-SDI MWD													Offset Well Error:	0.00 ft
Reference													Rule Assigned:	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre		Distance Between Centres (ft)		Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
5,109.00	5,097.08	5,073.31	5,006.68	18.06	16.71	-38.03	-678.84	405.60	535.61	505.99	29.62	18.082		
5,204.00	5,191.74	5,165.59	5,097.50	18.42	17.05	-39.85	-693.26	413.26	545.57	515.37	30.20	18.063		
5,299.00	5,286.40	5,254.48	5,184.81	18.78	17.40	-36.57	-708.25	420.65	556.33	525.57	30.77	18.082		
5,363.00	5,350.22	5,318.29	5,247.41	19.02	17.65	-36.78	-719.33	426.17	564.30	533.13	31.17	18.104		
5,458.00	5,444.99	5,411.85	5,339.22	19.37	18.02	-38.86	-735.56	433.91	576.45	544.70	31.75	18.155		
5,521.00	5,507.84	5,473.59	5,399.76	19.61	18.26	-38.38	-746.47	439.21	584.90	552.77	32.14	18.201		
5,585.00	5,571.69	5,544.65	5,469.55	19.84	18.54	-39.35	-758.38	445.23	593.05	560.48	32.58	18.204		
5,648.00	5,634.55	5,607.51	5,531.39	20.08	18.77	-40.39	-768.37	450.51	600.68	567.71	32.97	18.220		
5,712.00	5,698.39	5,671.44	5,594.28	20.32	19.00	-39.04	-778.40	455.99	608.34	574.98	33.36	18.234		
5,776.00	5,762.24	5,735.84	5,657.67	20.56	19.23	-35.77	-788.36	461.56	615.89	582.13	33.76	18.243		
5,839.00	5,825.12	5,799.16	5,720.00	20.79	19.46	-34.11	-798.18	466.89	623.39	589.24	34.15	18.256		
5,903.00	5,889.00	5,867.51	5,787.30	21.03	19.71	-33.80	-808.77	472.33	630.89	596.33	34.56	18.255		
5,966.00	5,951.88	5,936.07	5,854.93	21.26	19.95	-31.67	-818.74	477.47	637.44	602.47	34.97	18.229		
6,030.00	6,015.74	6,003.65	5,921.69	21.50	20.17	-30.89	-828.10	482.34	643.45	608.08	35.37	18.191		
6,093.00	6,078.59	6,067.95	5,985.24	21.74	20.38	-30.73	-836.75	486.85	648.93	613.17	35.76	18.148		
6,157.00	6,142.42	6,145.07	6,061.55	21.97	20.63	-21.76	-846.85	491.64	653.72	617.53	36.19	18.063		
6,220.00	6,205.25	6,224.35	6,140.18	22.21	20.86	-28.78	-856.55	494.14	656.47	619.87	36.60	17.935		
6,243.83	6,229.01	6,252.28	6,167.92	22.26	20.93	-33.69	-859.78	494.65	657.30	620.60	36.71	17.907		
6,300.00	6,285.05	6,314.15	6,229.42	22.27	21.10	-33.54	-866.58	495.38	659.00	622.16	36.84	17.888		
6,323.33	6,308.32	6,338.79	6,253.92	22.27	21.16	-33.49	-869.15	495.67	659.61	622.72	36.89	17.879		
6,350.00	6,334.92	6,366.97	6,281.95	22.28	21.23	-5.44	-872.00	496.01	659.88	622.92	36.95	17.857		
6,400.00	6,384.57	6,423.23	6,337.95	22.30	21.37	19.55	-877.38	496.49	658.03	620.98	37.04	17.763		
6,450.00	6,433.72	6,478.23	6,392.74	22.32	21.49	29.93	-882.18	496.74	653.15	616.04	37.11	17.602		
6,500.00	6,482.07	6,543.22	6,457.54	22.34	21.62	36.28	-887.07	496.64	645.25	608.13	37.12	17.382		
6,550.00	6,529.32	6,631.35	6,545.04	22.37	21.67	42.54	-894.12	489.46	632.83	596.00	36.83	17.181		
6,600.00	6,575.18	6,721.42	6,633.46	22.41	21.65	49.70	-899.66	473.35	615.19	578.88	36.31	16.943		
6,650.00	6,619.39	6,783.69	6,693.70	22.45	21.61	56.46	-902.42	457.88	594.54	558.60	35.94	16.544		
6,700.00	6,661.67	6,829.41	6,737.05	22.51	21.57	62.87	-904.70	443.54	572.61	536.81	35.80	15.997		
6,750.00	6,701.77	6,861.62	6,767.11	22.58	21.54	68.50	-906.56	432.13	551.04	515.18	35.87	15.364		
6,800.00	6,739.44	6,889.65	6,792.92	22.67	21.52	73.76	-908.34	421.38	530.95	494.88	36.07	14.722		
6,850.00	6,774.46	6,910.55	6,811.90	22.79	21.50	78.13	-909.76	412.73	513.31	476.84	36.46	14.077		
6,900.00	6,806.61	6,924.44	6,824.35	22.95	21.49	81.36	-910.74	406.66	499.10	462.03	37.07	13.463		
6,950.00	6,835.71	6,932.59	6,831.61	23.17	21.48	83.49	-911.33	402.98	489.14	451.27	37.87	12.916		
7,000.00	6,861.57	6,936.07	6,834.69	23.48	21.47	84.59	-911.58	401.39	483.95	445.13	38.82	12.466		
7,026.17	6,873.76	6,936.30	6,834.89	23.68	21.47	84.77	-911.60	401.29	483.25	443.87	39.38	12.272		
7,050.00	6,884.03	6,935.65	6,834.32	23.88	21.47	84.72	-911.55	401.58	483.83	443.94	39.89	12.130		
7,100.00	6,902.97	6,931.95	6,831.04	24.37	21.48	83.97	-911.28	403.27	488.77	447.76	41.00	11.920		
7,150.00	6,918.27	6,925.01	6,824.87	24.96	21.49	82.38	-910.78	406.40	498.50	456.38	42.12	11.835		
7,200.00	6,929.83	6,917.09	6,817.78	25.64	21.49	80.24	-910.22	409.90	512.58	469.37	43.21	11.862		
7,250.00	6,937.59	6,906.91	6,808.62	26.40	21.50	77.46	-909.51	414.27	530.43	486.20	44.24	11.991		
7,300.00	6,941.50	6,895.01	6,797.82	27.23	21.51	74.17	-908.70	419.21	551.42	506.24	45.18	12.206		
7,324.29	6,942.00	6,888.85	6,792.20	27.65	21.52	72.44	-908.29	421.69	562.56	516.95	45.60	12.336		
7,360.79	6,942.06	6,879.33	6,783.47	28.31	21.53	71.59	-907.67	425.45	580.28	534.08	46.20	12.561		
7,400.00	6,942.13	6,869.70	6,774.59	29.06	21.53	70.61	-907.06	429.13	600.77	553.99	46.77	12.844		
7,500.00	6,942.31	6,845.76	6,752.34	31.09	21.55	68.19	-905.62	437.86	659.79	611.86	47.93	13.767		
7,600.00	6,942.48	6,824.63	6,732.55	33.27	21.57	66.10	-904.44	445.15	726.71	677.98	48.73	14.913		
7,700.00	6,942.66	6,803.01	6,712.12	35.58	21.59	64.00	-903.34	452.12	799.77	750.53	49.24	16.242		
7,800.00	6,942.83	6,791.55	6,701.21	38.00	21.60	62.91	-902.79	455.60	877.54	827.88	49.66	17.670		
7,900.00	6,943.00	6,772.01	6,682.49	40.50	21.61	61.08	-901.89	461.13	959.06	909.21	49.86	19.237		
8,000.00	6,943.18	6,772.01	6,682.49	43.06	21.61	61.08	-901.89	461.13	1,043.42	993.30	50.13	20.816		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 643H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 25-NS-GYRO-MS, 379-SDI MWD, 6560-SDI MWD, 7715-SDI MWD													Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Vertical	Reference	Semi Major Axis	Offset	Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning
Measured	Depth	Depth	Depth	Reference	Offset	Offset	Toolface	+N/-S	+E/-W	Between	Between	Separation	Factor	
Depth	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	Centres	Ellipses	(ft)		
8,100.00	6,943.35	6,754.53	6,665.63	45.69	21.63	59.49	-901.12	465.67	1,130.03	1,079.85	50.17	22.522		
8,200.00	6,943.53	6,742.01	6,653.50	48.36	21.63	58.37	-900.58	468.71	1,218.50	1,168.28	50.22	24.265		
8,300.00	6,943.70	6,733.55	6,645.28	51.08	21.64	57.62	-900.21	470.67	1,308.44	1,258.18	50.26	26.035		
8,400.00	6,943.87	6,723.50	6,635.49	53.83	21.64	56.75	-899.76	472.90	1,399.58	1,349.32	50.26	27.845		
8,500.00	6,944.05	6,712.01	6,624.27	56.60	21.65	55.76	-899.23	475.34	1,491.72	1,441.48	50.25	29.688		
8,600.00	6,944.22	6,712.01	6,624.27	59.41	21.65	55.76	-899.23	475.34	1,584.73	1,534.45	50.28	31.518		
8,700.00	6,944.39	6,695.33	6,607.95	62.23	21.66	54.37	-898.41	478.68	1,678.36	1,628.14	50.22	33.420		
8,800.00	6,944.57	6,682.01	6,594.89	65.08	21.66	53.27	-897.69	481.20	1,772.63	1,722.45	50.18	35.328		
8,900.00	6,944.74	6,682.01	6,594.89	67.94	21.66	53.27	-897.69	481.20	1,867.40	1,817.21	50.19	37.206		
9,000.00	6,944.91	6,670.44	6,583.53	70.81	21.66	52.34	-897.00	483.27	1,962.61	1,912.46	50.15	39.136		
9,100.00	6,945.09	6,663.03	6,576.24	73.70	21.67	51.75	-896.52	484.55	2,058.22	2,008.09	50.13	41.061		
9,200.00	6,945.26	6,651.01	6,564.42	76.60	21.67	50.81	-895.67	486.52	2,154.18	2,104.10	50.08	43.013		
9,300.00	6,945.43	6,651.01	6,564.42	79.51	21.67	50.81	-895.67	486.52	2,250.43	2,200.34	50.09	44.928		
9,400.00	6,945.61	6,651.01	6,564.42	82.43	21.67	50.81	-895.67	486.52	2,346.98	2,296.89	50.10	46.850		
9,500.00	6,945.78	6,640.34	6,553.91	85.36	21.67	49.99	-894.85	488.17	2,443.74	2,393.68	50.06	48.818		
9,600.00	6,945.95	6,636.01	6,549.63	88.29	21.67	49.65	-894.50	488.80	2,540.75	2,490.70	50.05	50.766		
9,700.00	6,946.12	6,631.93	6,545.61	91.23	21.67	49.35	-894.17	489.38	2,637.95	2,587.91	50.04	52.717		
9,800.00	6,946.30	6,621.01	6,534.84	94.18	21.66	48.52	-893.23	490.85	2,735.38	2,685.37	50.01	54.700		
9,900.00	6,946.47	6,621.01	6,534.84	97.13	21.66	48.52	-893.23	490.85	2,832.90	2,782.89	50.02	56.639		
10,000.00	6,946.64	6,621.01	6,534.84	100.09	21.66	48.52	-893.23	490.85	2,930.60	2,880.57	50.03	58.581		
10,100.00	6,946.82	6,621.01	6,534.84	103.05	21.66	48.52	-893.23	490.85	3,028.44	2,978.41	50.04	60.523		
10,200.00	6,946.99	6,621.01	6,534.84	106.02	21.66	48.52	-893.23	490.85	3,126.43	3,076.38	50.05	62.467		
10,300.00	6,947.16	6,621.01	6,534.84	108.99	21.66	48.52	-893.23	490.85	3,224.53	3,174.47	50.06	64.412		
10,400.00	6,947.33	6,621.01	6,534.84	111.96	21.66	48.52	-893.23	490.85	3,322.75	3,272.68	50.07	66.356		
10,500.00	6,947.50	6,621.01	6,534.84	114.94	21.66	48.52	-893.23	490.85	3,421.07	3,370.98	50.09	68.300		
10,600.00	6,947.68	6,608.38	6,522.35	117.92	21.66	47.59	-892.12	492.37	3,519.35	3,469.29	50.06	70.296		
10,700.00	6,947.85	6,606.61	6,520.59	120.90	21.66	47.46	-891.96	492.57	3,617.82	3,567.74	50.08	72.245		
10,800.00	6,948.02	6,604.92	6,518.91	123.88	21.66	47.34	-891.81	492.75	3,716.36	3,666.27	50.09	74.193		
10,900.00	6,948.19	6,591.01	6,505.13	126.87	21.66	46.35	-890.62	494.10	3,815.10	3,765.03	50.07	76.196		
11,000.00	6,948.36	6,591.01	6,505.13	129.86	21.66	46.35	-890.62	494.10	3,913.74	3,863.65	50.09	78.133		
11,100.00	6,948.53	6,591.01	6,505.13	132.85	21.66	46.35	-890.62	494.10	4,012.46	3,962.34	50.11	80.067		
11,200.00	6,948.71	6,591.01	6,505.13	135.84	21.66	46.35	-890.62	494.10	4,111.24	4,061.10	50.14	81.999		
11,300.00	6,948.88	6,591.01	6,505.13	138.84	21.66	46.35	-890.62	494.10	4,210.07	4,159.91	50.16	83.929		
11,400.00	6,949.05	6,591.01	6,505.13	141.84	21.66	46.35	-890.62	494.10	4,308.96	4,258.77	50.19	85.856		
11,500.00	6,949.22	6,591.01	6,505.13	144.84	21.66	46.35	-890.62	494.10	4,407.90	4,357.68	50.22	87.780		
11,600.00	6,949.39	6,591.01	6,505.13	147.84	21.66	46.35	-890.62	494.10	4,506.88	4,456.64	50.24	89.702		
11,700.00	6,949.56	6,591.01	6,505.13	150.84	21.66	46.35	-890.62	494.10	4,605.91	4,555.64	50.27	91.620		
11,800.00	6,949.73	6,591.01	6,505.13	153.84	21.66	46.35	-890.62	494.10	4,704.98	4,654.68	50.30	93.535		
11,900.00	6,949.91	6,591.01	6,505.13	156.84	21.66	46.35	-890.62	494.10	4,804.09	4,753.76	50.33	95.446		
12,000.00	6,950.08	6,591.01	6,505.13	159.85	21.66	46.35	-890.62	494.10	4,903.24	4,852.87	50.37	97.353		
12,100.00	6,950.25	6,591.01	6,505.13	162.86	21.66	46.35	-890.62	494.10	5,002.42	4,952.02	50.40	99.257		
12,200.00	6,950.42	6,591.01	6,505.13	165.86	21.66	46.35	-890.62	494.10	5,101.63	5,051.19	50.43	101.157		
12,300.00	6,950.59	6,591.01	6,505.13	168.87	21.66	46.34	-890.62	494.10	5,200.87	5,150.40	50.47	103.053		
12,400.00	6,950.76	6,591.01	6,505.13	171.88	21.66	46.34	-890.62	494.10	5,300.14	5,249.63	50.50	104.944		
12,500.00	6,950.93	6,591.01	6,505.13	174.89	21.66	46.34	-890.62	494.10	5,399.43	5,348.89	50.54	106.832		
12,600.00	6,951.10	6,591.01	6,505.13	177.90	21.66	46.34	-890.62	494.10	5,498.76	5,448.18	50.58	108.714		
12,700.00	6,951.27	6,591.01	6,505.13	180.91	21.66	46.34	-890.62	494.10	5,598.10	5,547.48	50.62	110.593		
12,800.00	6,951.44	6,591.01	6,505.13	183.93	21.66	46.34	-890.62	494.10	5,697.47	5,646.81	50.66	112.467		
12,900.00	6,951.61	6,591.01	6,505.13	186.94	21.66	46.34	-890.62	494.10	5,796.86	5,746.16	50.70	114.336		
13,000.00	6,951.78	6,591.01	6,505.13	189.96	21.66	46.34	-890.62	494.10	5,896.28	5,845.53	50.74	116.200		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 643H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 25-NS-GYRO-MS, 379-SDI MWD, 6560-SDI MWD, 7715-SDI MWD													Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Vertical	Semi Major Axis	Offset	Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning	
Measured Depth (ft)	Depth (ft)	Measured Depth (ft)	Depth (ft)	Reference (ft)	Offset (ft)	Tooface (")	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Separation (ft)	Factor		
13,100.00	6,951.95	6,591.01	6,505.13	192.97	21.66	46.34	-890.62	494.10	5,995.71	5,944.92	50.79	118.060		
13,200.00	6,952.12	6,591.01	6,505.13	195.99	21.66	46.34	-890.62	494.10	6,095.16	6,044.33	50.83	119.914		
13,300.00	6,952.29	6,591.01	6,505.13	199.00	21.66	46.34	-890.62	494.10	6,194.62	6,143.75	50.87	121.764		
13,400.00	6,952.46	6,591.01	6,505.13	202.02	21.66	46.34	-890.62	494.10	6,294.11	6,243.19	50.92	123.608		
13,500.00	6,952.63	6,591.01	6,505.13	205.04	21.66	46.34	-890.62	494.10	6,393.61	6,342.64	50.97	125.447		
13,600.00	6,952.80	6,576.80	6,491.01	208.05	21.65	45.36	-889.46	495.19	6,492.96	6,441.98	50.99	127.346		
13,700.00	6,952.97	6,576.19	6,490.40	211.07	21.65	45.32	-889.41	495.23	6,592.48	6,541.44	51.03	129.177		
13,800.00	6,953.14	6,575.61	6,489.82	214.09	21.65	45.27	-889.37	495.27	6,692.01	6,640.93	51.08	131.003		
13,900.00	6,953.31	6,575.03	6,489.25	217.11	21.65	45.24	-889.32	495.31	6,791.55	6,740.42	51.13	132.823		
14,000.00	6,953.48	6,574.47	6,488.69	220.13	21.65	45.20	-889.28	495.34	6,891.11	6,839.93	51.18	134.638		
14,100.00	6,953.65	6,560.01	6,474.29	223.15	21.64	44.24	-888.23	496.12	6,990.83	6,939.62	51.21	136.513		
14,200.00	6,953.82	6,560.01	6,474.29	226.17	21.64	44.23	-888.23	496.12	7,090.40	7,039.14	51.26	138.314		
14,300.00	6,953.99	6,560.01	6,474.29	229.19	21.64	44.23	-888.23	496.12	7,189.98	7,138.66	51.32	140.109		
14,400.00	6,954.15	6,560.01	6,474.29	232.21	21.64	44.23	-888.23	496.12	7,289.57	7,238.20	51.37	141.899		
14,500.00	6,954.32	6,560.01	6,474.29	235.23	21.64	44.23	-888.23	496.12	7,389.18	7,337.75	51.43	143.682		
14,600.00	6,954.49	6,560.01	6,474.29	238.25	21.64	44.23	-888.23	496.12	7,488.79	7,437.31	51.48	145.460		
14,700.00	6,954.66	6,560.01	6,474.29	241.28	21.64	44.23	-888.23	496.12	7,588.41	7,536.87	51.54	147.232		
14,800.00	6,954.83	6,560.01	6,474.29	244.30	21.64	44.23	-888.23	496.12	7,688.05	7,636.45	51.60	148.998		
14,900.00	6,955.00	6,560.01	6,474.29	247.32	21.64	44.23	-888.23	496.12	7,787.69	7,736.03	51.66	150.758		
15,000.00	6,955.17	6,560.01	6,474.29	250.34	21.64	44.23	-888.23	496.12	7,887.34	7,835.63	51.72	152.512		
15,100.00	6,955.34	6,560.01	6,474.29	253.37	21.64	44.23	-888.23	496.12	7,987.00	7,935.23	51.78	154.260		
15,200.00	6,955.50	6,560.01	6,474.29	256.39	21.64	44.23	-888.23	496.12	8,086.67	8,034.83	51.84	156.002		
15,300.00	6,955.67	6,560.01	6,474.29	259.42	21.64	44.23	-888.23	496.12	8,186.35	8,134.45	51.90	157.737		
15,400.00	6,955.84	6,560.01	6,474.29	262.44	21.64	44.23	-888.23	496.12	8,286.03	8,234.07	51.96	159.467		
15,500.00	6,956.01	6,560.01	6,474.29	265.46	21.64	44.23	-888.23	496.12	8,385.73	8,333.70	52.02	161.190		
15,600.00	6,956.18	6,560.01	6,474.29	268.49	21.64	44.23	-888.23	496.12	8,485.43	8,433.34	52.09	162.907		
15,700.00	6,956.34	6,560.01	6,474.29	271.51	21.64	44.23	-888.23	496.12	8,585.13	8,532.98	52.15	164.618		
15,800.00	6,956.51	6,560.01	6,474.29	274.54	21.64	44.23	-888.23	496.12	8,684.85	8,632.63	52.22	166.322		
15,900.00	6,956.68	6,560.01	6,474.29	277.56	21.64	44.23	-888.23	496.12	8,784.56	8,732.28	52.28	168.020		
16,000.00	6,956.85	6,560.01	6,474.29	280.59	21.64	44.23	-888.23	496.12	8,884.29	8,831.94	52.35	169.711		
16,100.00	6,957.02	6,560.01	6,474.29	283.62	21.64	44.23	-888.23	496.12	8,984.02	8,931.61	52.42	171.396		
16,200.00	6,957.18	6,560.01	6,474.29	286.64	21.64	44.23	-888.23	496.12	9,083.76	9,031.28	52.48	173.075		
16,300.00	6,957.35	6,560.01	6,474.29	289.67	21.64	44.23	-888.23	496.12	9,183.50	9,130.95	52.55	174.747		
16,400.00	6,957.52	6,560.01	6,474.29	292.70	21.64	44.23	-888.23	496.12	9,283.25	9,230.63	52.62	176.413		
16,500.00	6,957.69	6,560.01	6,474.29	295.72	21.64	44.23	-888.23	496.12	9,383.01	9,330.32	52.69	178.072		
16,600.00	6,957.85	6,560.01	6,474.29	298.75	21.64	44.23	-888.23	496.12	9,482.77	9,430.01	52.76	179.725		
16,700.00	6,958.02	6,560.01	6,474.29	301.78	21.64	44.22	-888.23	496.12	9,582.53	9,529.70	52.83	181.371		
16,800.00	6,958.19	6,560.01	6,474.29	304.80	21.64	44.22	-888.23	496.12	9,682.30	9,629.40	52.91	183.011		
16,900.00	6,958.35	6,560.01	6,474.29	307.83	21.64	44.22	-888.23	496.12	9,782.08	9,729.10	52.98	184.644		
17,000.00	6,958.52	6,560.01	6,474.29	310.86	21.64	44.22	-888.23	496.12	9,881.86	9,828.81	53.05	186.271		
17,100.00	6,958.69	6,560.01	6,474.29	313.88	21.64	44.22	-888.23	496.12	9,981.64	9,928.51	53.12	187.891		
17,200.00	6,958.86	6,560.01	6,474.29	316.91	21.64	44.22	-888.23	496.12	10,081.43	10,028.23	53.20	189.504		
17,300.00	6,959.02	6,560.01	6,474.29	319.94	21.64	44.22	-888.23	496.12	10,181.22	10,127.95	53.27	191.111		
17,400.00	6,959.19	6,560.01	6,474.29	322.97	21.64	44.22	-888.23	496.12	10,281.01	10,227.67	53.35	192.711		
17,500.00	6,959.36	6,560.01	6,474.29	326.00	21.64	44.22	-888.23	496.12	10,380.81	10,327.39	53.43	194.304		
17,600.00	6,959.52	6,560.01	6,474.29	329.02	21.64	44.22	-888.23	496.12	10,480.62	10,427.12	53.50	195.891		
17,700.00	6,959.69	6,560.01	6,474.29	332.05	21.64	44.22	-888.23	496.12	10,580.43	10,526.85	53.58	197.471		
17,800.00	6,959.85	6,560.01	6,474.29	335.08	21.64	44.22	-888.23	496.12	10,680.24	10,626.58	53.66	199.045		
17,900.00	6,960.02	6,560.01	6,474.29	338.11	21.64	44.22	-888.23	496.12	10,780.05	10,726.31	53.74	200.611		
18,000.00	6,960.19	6,560.01	6,474.29	341.14	21.64	44.22	-888.23	496.12	10,879.87	10,826.05	53.82	202.171		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 643H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 25-NS-GYRO-MS, 379-SDI MWD, 6560-SDI MWD, 7715-SDI MWD													Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Semi Major Axis	Offset	Highside	Rule Assigned:				Distance	Minimum	Separation	Warning	
Measured Depth (ft)	Depth (ft)	Depth (ft)	Depth (ft)	Reference (ft)	Offset (ft)	Toothface (")	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Separation (ft)	Factor		
18,100.00	6,960.35	6,560.01	6,474.29	344.17	21.64	44.22	-888.23	496.12	10,979.69	10,925.79	53.89	203.725		
18,200.00	6,960.52	6,560.01	6,474.29	347.20	21.64	44.22	-888.23	496.12	11,079.51	11,025.54	53.97	205.272		
18,300.00	6,960.68	6,560.01	6,474.29	350.23	21.64	44.22	-888.23	496.12	11,179.34	11,125.29	54.06	206.812		
18,400.00	6,960.85	6,560.01	6,474.29	353.26	21.64	44.22	-888.23	496.12	11,279.17	11,225.03	54.14	208.345		
18,500.00	6,961.02	6,560.01	6,474.29	356.28	21.64	44.22	-888.23	496.12	11,379.01	11,324.79	54.22	209.872		
18,600.00	6,961.18	6,560.01	6,474.29	359.31	21.64	44.22	-888.23	496.12	11,478.84	11,424.54	54.30	211.392		
18,700.00	6,961.35	6,560.01	6,474.29	362.34	21.64	44.21	-888.23	496.12	11,578.68	11,524.30	54.38	212.906		
18,800.00	6,961.51	6,560.01	6,474.29	365.37	21.64	44.21	-888.23	496.12	11,678.52	11,624.06	54.47	214.412		
18,900.00	6,961.68	6,560.01	6,474.29	368.40	21.64	44.21	-888.23	496.12	11,778.37	11,723.82	54.55	215.912		
19,000.00	6,961.84	6,560.01	6,474.29	371.43	21.64	44.21	-888.23	496.12	11,878.21	11,823.58	54.64	217.406		
19,100.00	6,962.01	6,560.01	6,474.29	374.46	21.64	44.21	-888.23	496.12	11,978.06	11,923.34	54.72	218.893		
19,200.00	6,962.17	6,560.01	6,474.29	377.49	21.64	44.21	-888.23	496.12	12,077.92	12,023.11	54.81	220.373		
19,300.00	6,962.34	6,560.01	6,474.29	380.52	21.64	44.21	-888.23	496.12	12,177.77	12,122.88	54.89	221.846		
19,400.00	6,962.51	6,560.01	6,474.29	383.55	21.64	44.21	-888.23	496.12	12,277.63	12,222.65	54.98	223.313		
19,500.00	6,962.67	6,560.01	6,474.29	386.58	21.64	44.21	-888.23	496.12	12,377.49	12,322.42	55.07	224.773		
19,600.00	6,962.84	6,560.01	6,474.29	389.61	21.64	44.21	-888.23	496.12	12,477.35	12,422.19	55.15	226.227		
19,700.00	6,963.00	6,560.01	6,474.29	392.64	21.64	44.21	-888.23	496.12	12,577.21	12,521.97	55.24	227.674		
19,800.00	6,963.16	6,560.01	6,474.29	395.67	21.64	44.21	-888.23	496.12	12,677.08	12,621.75	55.33	229.114		
19,900.00	6,963.33	6,560.01	6,474.29	398.70	21.64	44.21	-888.23	496.12	12,776.95	12,721.53	55.42	230.548		
20,000.00	6,963.49	6,560.01	6,474.29	401.73	21.64	44.21	-888.23	496.12	12,876.82	12,821.31	55.51	231.975		
20,100.00	6,963.66	6,560.01	6,474.29	404.77	21.64	44.21	-888.23	496.12	12,976.69	12,921.09	55.60	233.396		
20,200.00	6,963.82	6,560.01	6,474.29	407.80	21.64	44.21	-888.23	496.12	13,076.56	13,020.87	55.69	234.810		
20,307.78	6,964.00	6,560.01	6,474.29	411.06	21.64	44.20	-888.23	496.12	13,184.21	13,128.42	55.79	236.326		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 645H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 428-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		
0.00	0.00	0.00	0.00	0.00	0.00	-68.66	22.05	-56.45	60.61					
393.00	392.99	393.36	393.36	0.66	0.67	-111.29	21.36	-55.44	60.05	58.72	1.33	45.311		
434.13	434.12	434.52	434.51	0.80	0.75	-177.21	21.21	-55.21	59.99	58.44	1.55	38.714 CC		
483.00	482.99	483.35	483.34	0.97	0.92	137.61	21.55	-54.77	60.09	58.20	1.89	31.791 ES		
578.00	577.96	577.88	577.80	1.30	1.25	129.09	24.57	-53.23	61.38	58.83	2.55	24.100		
673.00	672.85	671.41	671.13	1.64	1.58	130.29	30.41	-51.42	65.52	62.30	3.21	20.400		
765.00	764.65	761.41	760.79	1.96	1.90	139.86	38.12	-49.84	73.41	69.54	3.86	19.000		
855.00	854.37	848.96	847.80	2.29	2.22	151.03	47.53	-47.97	85.10	80.60	4.50	18.895 SF		
952.00	950.95	941.09	939.01	2.65	2.57	163.61	60.20	-45.06	102.61	97.43	5.19	19.783		
1,077.00	1,075.26	1,061.06	1,057.29	3.13	3.05	171.43	79.71	-40.32	131.33	125.26	6.07	21.641		
1,172.00	1,169.69	1,152.78	1,147.70	3.49	3.42	163.27	94.71	-36.74	154.52	147.78	6.74	22.927		
1,300.00	1,297.07	1,276.01	1,269.21	3.97	3.92	166.60	114.68	-31.99	185.16	177.53	7.63	24.259		
1,395.00	1,391.63	1,367.69	1,359.56	4.34	4.30	167.58	129.85	-28.45	208.41	200.11	8.30	25.101		
1,490.00	1,486.24	1,460.01	1,450.54	4.70	4.68	171.11	144.97	-24.40	231.28	222.30	8.98	25.761		
1,586.00	1,582.02	1,554.49	1,543.65	5.05	5.07	-178.22	160.33	-19.83	252.45	242.78	9.67	26.118		
1,681.00	1,676.87	1,647.70	1,635.59	5.40	5.46	-171.97	174.95	-15.23	271.88	261.53	10.35	26.275		
1,776.00	1,771.67	1,739.30	1,725.97	5.75	5.83	-165.52	189.49	-11.97	292.48	281.46	11.02	26.536		
1,872.00	1,867.43	1,833.45	1,818.90	6.11	6.22	-178.15	204.45	-10.14	314.09	302.37	11.71	26.811		
1,966.00	1,961.25	1,927.18	1,911.52	6.46	6.60	165.86	218.81	-8.52	334.06	321.66	12.40	26.944		
2,061.00	2,056.10	2,023.07	2,006.35	6.81	6.99	160.25	232.95	-6.99	352.90	339.81	13.09	26.953		
2,156.00	2,150.95	2,119.81	2,102.17	7.15	7.38	158.24	246.15	-5.33	370.78	356.98	13.79	26.879		
2,252.00	2,246.71	2,216.13	2,197.65	7.50	7.76	157.14	258.68	-3.62	389.33	374.84	14.49	26.864		
2,347.00	2,341.39	2,311.25	2,292.03	7.86	8.14	155.87	270.41	-2.44	408.05	392.87	15.18	26.878		
2,442.00	2,436.07	2,404.01	2,384.11	8.21	8.50	159.82	281.62	-1.35	426.58	410.72	15.85	26.905		
2,537.00	2,530.82	2,493.84	2,473.22	8.56	8.86	168.91	292.85	0.33	445.02	428.51	16.51	26.953		
2,632.00	2,625.64	2,581.39	2,559.92	8.92	9.21	-167.94	304.72	3.17	463.57	446.42	17.15	27.026		
2,728.00	2,721.53	2,670.29	2,647.75	9.26	9.57	-149.03	317.89	6.79	482.16	464.36	17.80	27.083		
2,823.00	2,816.43	2,762.16	2,738.43	9.60	9.95	-129.21	332.09	10.91	499.99	481.51	18.47	27.064		
2,918.00	2,911.32	2,855.39	2,830.44	9.94	10.34	-126.54	346.61	14.94	517.62	498.47	19.16	27.021		
3,013.00	3,006.17	2,949.32	2,923.15	10.28	10.73	-137.25	361.28	18.21	535.96	516.11	19.85	27.005		
3,109.00	3,101.98	3,050.91	3,023.57	10.63	11.15	-143.20	376.35	21.24	554.88	534.29	20.59	26.944		
3,204.00	3,196.73	3,149.23	3,120.97	10.98	11.54	-137.10	389.51	23.95	572.79	551.48	21.31	26.874		
3,299.00	3,291.42	3,234.55	3,205.44	11.33	11.89	-149.48	401.37	26.12	592.13	570.18	21.95	26.981		
3,395.00	3,387.03	3,321.53	3,291.40	11.69	12.24	-163.17	414.46	28.17	614.31	591.72	22.59	27.192		
3,490.00	3,481.56	3,407.03	3,375.76	12.06	12.60	-165.26	428.21	29.99	638.51	615.28	23.23	27.490		
3,585.00	3,576.12	3,504.13	3,471.56	12.42	13.00	-175.20	443.97	31.89	662.67	638.72	23.95	27.672		
3,680.00	3,670.84	3,600.02	3,566.27	12.78	13.40	168.45	458.86	33.72	684.53	659.88	24.65	27.768		
3,775.00	3,765.61	3,705.53	3,670.68	13.13	13.83	163.02	473.96	35.17	704.45	679.03	25.42	27.716		
3,871.00	3,861.42	3,798.39	3,762.67	13.48	14.20	166.63	486.58	35.99	723.20	697.11	26.09	27.717		
3,966.00	3,956.30	3,898.41	3,861.82	13.83	14.60	175.26	499.76	36.85	740.33	713.52	26.82	27.608		
4,061.00	4,051.20	3,994.13	3,956.77	14.17	14.97	-179.12	511.80	37.97	756.57	729.06	27.51	27.501		
4,156.00	4,146.11	4,084.89	4,046.79	14.52	15.33	-170.26	523.27	39.59	772.77	744.60	28.17	27.428		
4,251.00	4,241.00	4,174.00	4,135.09	14.86	15.69	-179.69	534.92	42.14	789.68	760.85	28.83	27.392		
4,347.00	4,336.86	4,261.72	4,221.93	15.22	16.04	177.03	546.97	45.12	808.02	778.54	29.48	27.413		
4,442.00	4,431.69	4,347.52	4,306.77	15.57	16.39	-178.01	559.50	47.77	827.43	797.32	30.11	27.482		
4,536.00	4,525.51	4,450.05	4,408.16	15.91	16.81	177.54	574.48	50.36	846.95	816.09	30.86	27.446		
4,632.00	4,621.31	4,561.04	4,518.22	16.27	17.25	176.85	588.78	52.03	865.47	833.82	31.66	27.339		
4,727.00	4,716.11	4,675.42	4,631.95	16.62	17.69	-178.76	600.75	53.40	881.56	849.10	32.46	27.160		
4,821.00	4,809.89	4,764.66	4,720.77	16.97	18.03	-177.48	609.19	55.52	896.90	863.79	33.11	27.087		
4,916.00	4,904.64	4,840.00	4,795.63	17.33	18.32	-174.59	617.38	57.79	914.14	880.45	33.69	27.136		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 645H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 428-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		
5,011.00	4,999.37	4,908.19	4,863.18	17.69	18.59	-174.67	626.38	60.00	933.68	899.48	34.21	27.296		
5,109.00	5,097.08	4,984.03	4,938.04	18.06	18.91	-171.69	638.25	62.54	956.53	921.76	34.77	27.513		
5,204.00	5,191.74	5,083.44	5,036.07	18.42	19.32	-173.49	654.58	65.23	980.00	944.50	35.51	27.601		
5,299.00	5,286.40	5,170.47	5,121.97	18.78	19.68	-170.19	668.49	66.32	1,002.98	966.83	36.15	27.745		
5,363.00	5,350.22	5,234.21	5,184.84	19.02	19.95	-170.53	678.96	66.75	1,018.21	981.59	36.62	27.804		
5,458.00	5,444.99	5,337.75	5,287.09	19.37	20.38	-172.88	695.26	67.40	1,039.57	1,002.19	37.38	27.807		
5,521.00	5,507.84	5,407.33	5,355.90	19.61	20.66	-172.56	705.54	67.79	1,053.08	1,015.19	37.89	27.790		
5,585.00	5,571.69	5,477.32	5,425.20	19.84	20.94	-173.66	715.39	68.21	1,066.34	1,027.93	38.41	27.766		
5,648.00	5,634.55	5,549.94	5,497.17	20.08	21.23	-174.79	725.00	68.65	1,078.89	1,039.96	38.93	27.714		
5,712.00	5,698.39	5,625.05	5,571.72	20.32	21.52	-173.45	734.14	69.10	1,091.06	1,051.59	39.46	27.646		
5,776.00	5,762.24	5,697.64	5,643.86	20.56	21.80	-170.15	742.23	69.60	1,102.46	1,062.48	39.98	27.575		
5,839.00	5,825.12	5,768.88	5,714.71	20.79	22.08	-168.53	749.57	70.32	1,112.83	1,072.35	40.48	27.488		
5,903.00	5,889.00	5,762.00	5,707.87	21.03	22.05	-168.33	748.88	70.24	1,125.14	1,084.64	40.49	27.787		
5,966.00	5,951.88	5,762.00	5,707.87	21.26	22.05	-166.23	748.88	70.24	1,140.76	1,100.32	40.44	28.209		
6,030.00	6,015.74	5,762.00	5,707.87	21.50	22.05	-165.49	748.88	70.24	1,160.07	1,119.77	40.30	28.787		
6,093.00	6,078.59	5,762.00	5,707.87	21.74	22.05	-165.35	748.88	70.24	1,182.30	1,142.22	40.08	29.496		
6,157.00	6,142.42	5,762.00	5,707.87	21.97	22.05	-156.16	748.88	70.24	1,207.87	1,168.07	39.80	30.349		
6,220.00	6,205.25	5,762.00	5,707.87	22.21	22.05	-163.64	748.88	70.24	1,235.88	1,196.41	39.47	31.314		
6,243.83	6,229.01	5,762.00	5,707.87	22.26	22.05	-168.85	748.88	70.24	1,247.16	1,207.85	39.30	31.731		
6,300.00	6,285.05	5,762.00	5,707.87	22.27	22.05	-168.85	748.88	70.24	1,275.02	1,236.23	38.79	32.866		
6,323.33	6,308.32	5,762.00	5,707.87	22.27	22.05	-168.85	748.88	70.24	1,287.14	1,248.56	38.58	33.363		
6,350.00	6,334.92	5,762.00	5,707.87	22.28	22.05	-139.38	748.88	70.24	1,301.35	1,263.02	38.33	33.949		
6,400.00	6,384.57	5,762.00	5,707.87	22.30	22.05	-111.97	748.88	70.24	1,328.88	1,291.01	37.87	35.092		
6,450.00	6,433.72	5,762.00	5,707.87	22.32	22.05	-99.49	748.88	70.24	1,357.38	1,319.97	37.41	36.284		
6,500.00	6,482.07	5,762.00	5,707.87	22.34	22.05	-91.65	748.88	70.24	1,386.61	1,349.64	36.96	37.512		
6,550.00	6,529.32	5,762.00	5,707.87	22.37	22.05	-85.69	748.88	70.24	1,416.36	1,379.82	36.54	38.763		
6,600.00	6,575.18	5,762.00	5,707.87	22.41	22.05	-80.69	748.88	70.24	1,446.42	1,410.28	36.14	40.021		
6,650.00	6,619.39	5,762.00	5,707.87	22.45	22.05	-76.26	748.88	70.24	1,476.60	1,440.82	35.78	41.269		
6,700.00	6,661.67	5,762.00	5,707.87	22.51	22.05	-72.26	748.88	70.24	1,506.72	1,471.26	35.46	42.489		
6,750.00	6,701.77	5,762.00	5,707.87	22.58	22.05	-68.59	748.88	70.24	1,536.60	1,501.41	35.19	43.661		
6,800.00	6,739.44	5,762.00	5,707.87	22.67	22.05	-65.21	748.88	70.24	1,566.08	1,531.09	34.99	44.764		
6,850.00	6,774.46	5,762.00	5,707.87	22.79	22.05	-62.10	748.88	70.24	1,595.00	1,560.16	34.84	45.776		
6,900.00	6,806.61	5,762.00	5,707.87	22.95	22.05	-59.25	748.88	70.24	1,623.24	1,588.46	34.78	46.678		
6,950.00	6,835.71	5,762.00	5,707.87	23.17	22.05	-56.65	748.88	70.24	1,650.64	1,615.86	34.79	47.452		
7,000.00	6,861.57	5,762.00	5,707.87	23.48	22.05	-54.27	748.88	70.24	1,677.11	1,642.23	34.88	48.084		
7,050.00	6,884.03	5,762.00	5,707.87	23.88	22.05	-52.12	748.88	70.24	1,702.52	1,667.46	35.06	48.565		
7,100.00	6,902.97	5,762.00	5,707.87	24.37	22.05	-50.18	748.88	70.24	1,726.76	1,691.44	35.32	48.890		
7,150.00	6,918.27	5,762.00	5,707.87	24.96	22.05	-48.44	748.88	70.24	1,749.75	1,714.09	35.66	49.061		
7,200.00	6,929.83	5,762.00	5,707.87	25.64	22.05	-46.89	748.88	70.24	1,771.40	1,735.31	36.09	49.085		
7,250.00	6,937.59	5,762.00	5,707.87	26.40	22.05	-45.52	748.88	70.24	1,791.62	1,755.03	36.58	48.972		
7,300.00	6,941.50	5,762.00	5,707.87	27.23	22.05	-44.31	748.88	70.24	1,810.34	1,773.20	37.14	48.738		
7,324.29	6,942.00	5,762.00	5,707.87	27.65	22.05	-43.79	748.88	70.24	1,818.88	1,781.44	37.44	48.587		
7,360.79	6,942.06	5,762.00	5,707.87	28.31	22.05	-43.59	748.88	70.24	1,831.90	1,794.00	37.89	48.343		
7,400.00	6,942.13	5,762.00	5,707.87	29.06	22.05	-43.59	748.88	70.24	1,846.74	1,808.35	38.40	48.097		
7,500.00	6,942.31	5,762.00	5,707.87	31.09	22.05	-43.59	748.88	70.24	1,887.76	1,848.06	39.70	47.548		
7,600.00	6,942.48	5,762.00	5,707.87	33.27	22.05	-43.59	748.88	70.24	1,933.09	1,892.08	41.02	47.131		
7,700.00	6,942.66	5,762.00	5,707.87	35.58	22.05	-43.59	748.88	70.24	1,982.43	1,940.13	42.31	46.858		
7,800.00	6,942.83	5,762.00	5,707.87	38.00	22.05	-43.59	748.88	70.24	2,035.49	1,991.93	43.56	46.728		
7,900.00	6,943.00	5,762.00	5,707.87	40.50	22.05	-43.59	748.88	70.24	2,091.99	2,047.23	44.76	46.736		
8,000.00	6,943.18	5,762.00	5,707.87	43.06	22.05	-43.59	748.88	70.24	2,151.66	2,105.76	45.90	46.875		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 645H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 428-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		
8,100.00	6,943.35	5,762.00	5,707.87	45.69	22.05	-43.59	748.88	70.24	2,214.23	2,167.25	46.98	47.134		
8,200.00	6,943.53	5,762.00	5,707.87	48.36	22.05	-43.59	748.88	70.24	2,279.48	2,231.49	47.99	47.502		
8,300.00	6,943.70	5,762.00	5,707.87	51.08	22.05	-43.59	748.88	70.24	2,347.17	2,298.24	48.93	47.969		
8,400.00	6,943.87	5,762.00	5,707.87	53.83	22.05	-43.59	748.88	70.24	2,417.11	2,367.30	49.81	48.525		
8,500.00	6,944.05	5,762.00	5,707.87	56.60	22.05	-43.59	748.88	70.24	2,489.10	2,438.47	50.63	49.162		
8,600.00	6,944.22	5,762.00	5,707.87	59.41	22.05	-43.59	748.88	70.24	2,562.97	2,511.57	51.39	49.871		
8,700.00	6,944.39	5,762.00	5,707.87	62.23	22.05	-43.59	748.88	70.24	2,638.56	2,586.46	52.10	50.645		
8,800.00	6,944.57	5,762.00	5,707.87	65.08	22.05	-43.59	748.88	70.24	2,715.73	2,662.97	52.75	51.478		
8,900.00	6,944.74	5,762.00	5,707.87	67.94	22.05	-43.59	748.88	70.24	2,794.35	2,740.98	53.36	52.364		
9,000.00	6,944.91	5,762.00	5,707.87	70.81	22.05	-43.59	748.88	70.24	2,874.29	2,820.36	53.93	53.296		
9,100.00	6,945.09	5,762.00	5,707.87	73.70	22.05	-43.59	748.88	70.24	2,955.46	2,901.01	54.46	54.272		
9,200.00	6,945.26	5,762.00	5,707.87	76.60	22.05	-43.59	748.88	70.24	3,037.75	2,982.81	54.95	55.286		
9,300.00	6,945.43	5,762.00	5,707.87	79.51	22.05	-43.59	748.88	70.24	3,121.08	3,065.68	55.40	56.335		
9,400.00	6,945.61	5,762.00	5,707.87	82.43	22.05	-43.59	748.88	70.24	3,205.36	3,149.53	55.83	57.416		
9,500.00	6,945.78	5,762.00	5,707.87	85.36	22.05	-43.59	748.88	70.24	3,290.52	3,234.30	56.22	58.526		
9,600.00	6,945.95	5,762.00	5,707.87	88.29	22.05	-43.59	748.88	70.24	3,376.49	3,319.90	56.59	59.662		
9,700.00	6,946.12	5,762.00	5,707.87	91.23	22.05	-43.59	748.88	70.24	3,463.22	3,406.28	56.94	60.821		
9,800.00	6,946.30	5,762.00	5,707.87	94.18	22.05	-43.59	748.88	70.24	3,550.65	3,493.38	57.27	62.002		
9,900.00	6,946.47	5,762.00	5,707.87	97.13	22.05	-43.59	748.88	70.24	3,638.72	3,581.15	57.57	63.203		
10,000.00	6,946.64	5,762.00	5,707.87	100.09	22.05	-43.59	748.88	70.24	3,727.40	3,669.54	57.86	64.422		
10,100.00	6,946.82	5,762.00	5,707.87	103.05	22.05	-43.59	748.88	70.24	3,816.63	3,758.50	58.13	65.658		
10,200.00	6,946.99	5,762.00	5,707.87	106.02	22.05	-43.59	748.88	70.24	3,906.39	3,848.00	58.38	66.909		
10,300.00	6,947.16	5,762.00	5,707.87	108.99	22.05	-43.59	748.88	70.24	3,996.63	3,938.01	58.62	68.173		
10,400.00	6,947.33	5,762.00	5,707.87	111.96	22.05	-43.59	748.88	70.24	4,087.33	4,028.47	58.85	69.450		
10,500.00	6,947.50	5,762.00	5,707.87	114.94	22.05	-43.59	748.88	70.24	4,178.45	4,119.38	59.07	70.739		
10,600.00	6,947.68	5,762.00	5,707.87	117.92	22.05	-43.59	748.88	70.24	4,269.97	4,210.69	59.27	72.039		
10,700.00	6,947.85	5,762.00	5,707.87	120.90	22.05	-43.59	748.88	70.24	4,361.86	4,302.39	59.47	73.348		
10,800.00	6,948.02	5,762.00	5,707.87	123.88	22.05	-43.59	748.88	70.24	4,454.10	4,394.45	59.65	74.667		
10,900.00	6,948.19	5,762.00	5,707.87	126.87	22.05	-43.59	748.88	70.24	4,546.67	4,486.84	59.83	75.993		
11,000.00	6,948.36	5,762.00	5,707.87	129.86	22.05	-43.59	748.88	70.24	4,639.54	4,579.55	60.00	77.327		
11,100.00	6,948.53	5,762.00	5,707.87	132.85	22.05	-43.59	748.88	70.24	4,732.71	4,672.55	60.16	78.668		
11,200.00	6,948.71	5,762.00	5,707.87	135.84	22.05	-43.59	748.88	70.24	4,826.15	4,765.84	60.32	80.016		
11,300.00	6,948.88	5,762.00	5,707.87	138.84	22.05	-43.59	748.88	70.24	4,919.85	4,859.39	60.46	81.369		
11,400.00	6,949.05	5,762.00	5,707.87	141.84	22.05	-43.59	748.88	70.24	5,013.79	4,953.19	60.61	82.727		
11,500.00	6,949.22	5,762.00	5,707.87	144.84	22.05	-43.59	748.88	70.24	5,107.97	5,047.22	60.74	84.091		
11,600.00	6,949.39	5,762.00	5,707.87	147.84	22.05	-43.59	748.88	70.24	5,202.36	5,141.48	60.88	85.459		
11,700.00	6,949.56	5,762.00	5,707.87	150.84	22.05	-43.59	748.88	70.24	5,296.95	5,235.95	61.00	86.830		
11,800.00	6,949.73	5,762.00	5,707.87	153.84	22.05	-43.59	748.88	70.24	5,391.74	5,330.62	61.13	88.206		
11,900.00	6,949.91	5,762.00	5,707.87	156.84	22.05	-43.59	748.88	70.24	5,486.72	5,425.47	61.25	89.585		
12,000.00	6,950.08	5,762.00	5,707.87	159.85	22.05	-43.59	748.88	70.24	5,581.87	5,520.51	61.36	90.967		
12,100.00	6,950.25	5,762.00	5,707.87	162.86	22.05	-43.58	748.88	70.24	5,677.19	5,615.71	61.47	92.351		
12,200.00	6,950.42	5,762.00	5,707.87	165.86	22.05	-43.58	748.88	70.24	5,772.66	5,711.08	61.58	93.738		
12,300.00	6,950.59	5,762.00	5,707.87	168.87	22.05	-43.58	748.88	70.24	5,868.29	5,806.60	61.69	95.127		
12,400.00	6,950.76	5,762.00	5,707.87	171.88	22.05	-43.58	748.88	70.24	5,964.06	5,902.27	61.79	96.517		
12,500.00	6,950.93	5,762.00	5,707.87	174.89	22.05	-43.58	748.88	70.24	6,059.97	5,998.07	61.89	97.910		
12,600.00	6,951.10	5,762.00	5,707.87	177.90	22.05	-43.58	748.88	70.24	6,156.00	6,094.01	61.99	99.304		
12,700.00	6,951.27	5,762.00	5,707.87	180.91	22.05	-43.58	748.88	70.24	6,252.16	6,190.08	62.09	100.698		
12,800.00	6,951.44	5,762.00	5,707.87	183.93	22.05	-43.58	748.88	70.24	6,348.44	6,286.26	62.18	102.094		
12,900.00	6,951.61	5,762.00	5,707.87	186.94	22.05	-43.58	748.88	70.24	6,444.84	6,382.56	62.27	103.491		
13,000.00	6,951.78	5,762.00	5,707.87	189.96	22.05	-43.58	748.88	70.24	6,541.34	6,478.97	62.36	104.888		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 645H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 428-MWD+HDGM													Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Vertical	Semi Major Axis	Offset	Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning	
Measured	Depth	Measured	Depth	Reference	Reference	Toolface	+N/-S	+E/-W	Between	Between	Separation	Factor		
Depth	(ft)	Depth	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	Centres	Ellipses	(ft)			
13,100.00	6,951.95	5,762.00	5,707.87	192.97	22.05	-43.58	748.88	70.24	6,637.94	6,575.49	62.45	106.286		
13,200.00	6,952.12	5,762.00	5,707.87	195.99	22.05	-43.58	748.88	70.24	6,734.65	6,672.11	62.54	107.684		
13,300.00	6,952.29	5,762.00	5,707.87	199.00	22.05	-43.58	748.88	70.24	6,831.45	6,768.82	62.63	109.082		
13,400.00	6,952.46	5,762.00	5,707.87	202.02	22.05	-43.58	748.88	70.24	6,928.34	6,865.63	62.71	110.480		
13,500.00	6,952.63	5,762.00	5,707.87	205.04	22.05	-43.58	748.88	70.24	7,025.31	6,962.52	62.79	111.878		
13,600.00	6,952.80	5,762.00	5,707.87	208.05	22.05	-43.58	748.88	70.24	7,122.37	7,059.50	62.88	113.276		
13,700.00	6,952.97	5,762.00	5,707.87	211.07	22.05	-43.58	748.88	70.24	7,219.52	7,156.56	62.96	114.673		
13,800.00	6,953.14	5,762.00	5,707.87	214.09	22.05	-43.58	748.88	70.24	7,316.73	7,253.70	63.04	116.070		
13,900.00	6,953.31	5,762.00	5,707.87	217.11	22.05	-43.58	748.88	70.24	7,414.03	7,350.91	63.12	117.466		
14,000.00	6,953.48	5,762.00	5,707.87	220.13	22.05	-43.58	748.88	70.24	7,511.39	7,448.19	63.19	118.861		
14,100.00	6,953.65	5,762.00	5,707.87	223.15	22.05	-43.58	748.88	70.24	7,608.82	7,545.55	63.27	120.255		
14,200.00	6,953.82	5,762.00	5,707.87	226.17	22.05	-43.58	748.88	70.24	7,706.32	7,642.97	63.35	121.649		
14,300.00	6,953.99	5,762.00	5,707.87	229.19	22.05	-43.58	748.88	70.24	7,803.88	7,740.45	63.43	123.041		
14,400.00	6,954.15	5,762.00	5,707.87	232.21	22.05	-43.58	748.88	70.24	7,901.50	7,838.00	63.50	124.432		
14,500.00	6,954.32	5,762.00	5,707.87	235.23	22.05	-43.58	748.88	70.24	7,999.18	7,935.60	63.58	125.822		
14,600.00	6,954.49	5,762.00	5,707.87	238.25	22.05	-43.58	748.88	70.24	8,096.92	8,033.27	63.65	127.210		
14,700.00	6,954.66	5,762.00	5,707.87	241.28	22.05	-43.58	748.88	70.24	8,194.71	8,130.98	63.72	128.597		
14,800.00	6,954.83	5,762.00	5,707.87	244.30	22.05	-43.58	748.88	70.24	8,292.55	8,228.75	63.80	129.982		
14,900.00	6,955.00	5,762.00	5,707.87	247.32	22.05	-43.58	748.88	70.24	8,390.45	8,326.58	63.87	131.366		
15,000.00	6,955.17	5,762.00	5,707.87	250.34	22.05	-43.58	748.88	70.24	8,488.39	8,424.45	63.94	132.748		
15,100.00	6,955.34	5,762.00	5,707.87	253.37	22.05	-43.58	748.88	70.24	8,586.38	8,522.37	64.02	134.129		
15,200.00	6,955.50	5,762.00	5,707.87	256.39	22.05	-43.58	748.88	70.24	8,684.42	8,620.33	64.09	135.508		
15,300.00	6,955.67	5,762.00	5,707.87	259.42	22.05	-43.58	748.88	70.24	8,782.50	8,718.34	64.16	136.884		
15,400.00	6,955.84	5,762.00	5,707.87	262.44	22.05	-43.58	748.88	70.24	8,880.62	8,816.39	64.23	138.259		
15,500.00	6,956.01	5,762.00	5,707.87	265.46	22.05	-43.58	748.88	70.24	8,978.79	8,914.49	64.30	139.632		
15,600.00	6,956.18	5,762.00	5,707.87	268.49	22.05	-43.58	748.88	70.24	9,077.00	9,012.62	64.37	141.003		
15,700.00	6,956.34	5,762.00	5,707.87	271.51	22.05	-43.58	748.88	70.24	9,175.24	9,110.79	64.45	142.371		
15,800.00	6,956.51	5,762.00	5,707.87	274.54	22.05	-43.58	748.88	70.24	9,273.52	9,209.01	64.52	143.738		
15,900.00	6,956.68	5,762.00	5,707.87	277.56	22.05	-43.58	748.88	70.24	9,371.84	9,307.25	64.59	145.102		
16,000.00	6,956.85	5,762.00	5,707.87	280.59	22.05	-43.58	748.88	70.24	9,470.19	9,405.53	64.66	146.464		
16,100.00	6,957.02	5,762.00	5,707.87	283.62	22.05	-43.58	748.88	70.24	9,568.58	9,503.85	64.73	147.823		
16,200.00	6,957.18	5,762.00	5,707.87	286.64	22.05	-43.58	748.88	70.24	9,667.00	9,602.20	64.80	149.181		
16,300.00	6,957.35	5,762.00	5,707.87	289.67	22.05	-43.58	748.88	70.24	9,765.45	9,700.58	64.87	150.535		
16,400.00	6,957.52	5,762.00	5,707.87	292.70	22.05	-43.58	748.88	70.24	9,863.94	9,799.00	64.94	151.888		
16,500.00	6,957.69	5,762.00	5,707.87	295.72	22.05	-43.58	748.88	70.24	9,962.45	9,897.44	65.01	153.237		
16,600.00	6,957.85	5,762.00	5,707.87	298.75	22.05	-43.58	748.88	70.24	10,061.00	9,995.91	65.08	154.585		
16,700.00	6,958.02	5,762.00	5,707.87	301.78	22.05	-43.58	748.88	70.24	10,159.57	10,094.41	65.15	155.929		
16,800.00	6,958.19	5,762.00	5,707.87	304.80	22.05	-43.58	748.88	70.24	10,258.17	10,192.94	65.23	157.271		
16,900.00	6,958.35	5,762.00	5,707.87	307.83	22.05	-43.58	748.88	70.24	10,356.79	10,291.50	65.30	158.610		
17,000.00	6,958.52	5,762.00	5,707.87	310.86	22.05	-43.58	748.88	70.24	10,455.45	10,390.08	65.37	159.947		
17,100.00	6,958.69	5,762.00	5,707.87	313.88	22.05	-43.58	748.88	70.24	10,554.12	10,488.68	65.44	161.281		
17,200.00	6,958.86	5,762.00	5,707.87	316.91	22.05	-43.58	748.88	70.24	10,652.83	10,587.32	65.51	162.612		
17,300.00	6,959.02	5,762.00	5,707.87	319.94	22.05	-43.58	748.88	70.24	10,751.55	10,685.97	65.58	163.940		
17,400.00	6,959.19	5,762.00	5,707.87	322.97	22.05	-43.58	748.88	70.24	10,850.30	10,784.65	65.65	165.265		
17,500.00	6,959.36	5,762.00	5,707.87	326.00	22.05	-43.58	748.88	70.24	10,949.07	10,883.35	65.73	166.588		
17,600.00	6,959.52	5,762.00	5,707.87	329.02	22.05	-43.58	748.88	70.24	11,047.87	10,982.07	65.80	167.907		
17,700.00	6,959.69	5,762.00	5,707.87	332.05	22.05	-43.58	748.88	70.24	11,146.69	11,080.82	65.87	169.224		
17,800.00	6,959.85	5,762.00	5,707.87	335.08	22.05	-43.58	748.88	70.24	11,245.52	11,179.58	65.94	170.537		
17,900.00	6,960.02	5,762.00	5,707.87	338.11	22.05	-43.58	748.88	70.24	11,344.38	11,278.37	66.01	171.848		
18,000.00	6,960.19	5,762.00	5,707.87	341.14	22.05	-43.58	748.88	70.24	11,443.26	11,377.17	66.09	173.155		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 645H - OH - OH													Offset Site Error:	0.00 ft	
Survey Program:		428-MWD+HDGM					Rule Assigned:							Offset Well Error:	0.00 ft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (ft)	Separation Factor	Warning		
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)					
18,100.00	6,960.35	5,762.00	5,707.87	344.17	22.05	-43.58	748.88	70.24	11,542.15	11,475.99	66.16	174.460			
18,200.00	6,960.52	5,762.00	5,707.87	347.20	22.05	-43.58	748.88	70.24	11,641.07	11,574.84	66.23	175.761			
18,300.00	6,960.68	5,762.00	5,707.87	350.23	22.05	-43.58	748.88	70.24	11,740.00	11,673.70	66.31	177.059			
18,400.00	6,960.85	5,762.00	5,707.87	353.26	22.05	-43.58	748.88	70.24	11,838.95	11,772.57	66.38	178.354			
18,500.00	6,961.02	5,762.00	5,707.87	356.28	22.05	-43.57	748.88	70.24	11,937.92	11,871.47	66.45	179.646			
18,600.00	6,961.18	5,762.00	5,707.87	359.31	22.05	-43.57	748.88	70.24	12,036.91	11,970.38	66.53	180.935			
18,700.00	6,961.35	5,762.00	5,707.87	362.34	22.05	-43.57	748.88	70.24	12,135.91	12,069.31	66.60	182.221			
18,800.00	6,961.51	5,762.00	5,707.87	365.37	22.05	-43.57	748.88	70.24	12,234.93	12,168.26	66.67	183.503			
18,900.00	6,961.68	5,762.00	5,707.87	368.40	22.05	-43.57	748.88	70.24	12,333.96	12,267.22	66.75	184.782			
19,000.00	6,961.84	5,762.00	5,707.87	371.43	22.05	-43.57	748.88	70.24	12,433.01	12,366.19	66.82	186.058			
19,100.00	6,962.01	5,762.00	5,707.87	374.46	22.05	-43.57	748.88	70.24	12,532.08	12,465.18	66.90	187.330			
19,200.00	6,962.17	5,762.00	5,707.87	377.49	22.05	-43.57	748.88	70.24	12,631.16	12,564.19	66.97	188.599			
19,300.00	6,962.34	5,762.00	5,707.87	380.52	22.05	-43.57	748.88	70.24	12,730.25	12,663.21	67.05	189.865			
19,400.00	6,962.51	5,762.00	5,707.87	383.55	22.05	-43.57	748.88	70.24	12,829.36	12,762.24	67.12	191.128			
19,500.00	6,962.67	5,762.00	5,707.87	386.58	22.05	-43.57	748.88	70.24	12,928.48	12,861.28	67.20	192.387			
19,600.00	6,962.84	5,762.00	5,707.87	389.61	22.05	-43.57	748.88	70.24	13,027.62	12,960.34	67.28	193.643			
19,700.00	6,963.00	5,762.00	5,707.87	392.64	22.05	-43.57	748.88	70.24	13,126.77	13,059.42	67.35	194.895			
19,800.00	6,963.16	5,762.00	5,707.87	395.67	22.05	-43.57	748.88	70.24	13,225.93	13,158.50	67.43	196.144			
19,900.00	6,963.33	5,762.00	5,707.87	398.70	22.05	-43.57	748.88	70.24	13,325.10	13,257.60	67.51	197.389			
20,000.00	6,963.49	5,762.00	5,707.87	401.73	22.05	-43.57	748.88	70.24	13,424.29	13,356.71	67.58	198.632			
20,100.00	6,963.66	5,762.00	5,707.87	404.77	22.05	-43.57	748.88	70.24	13,523.49	13,455.83	67.66	199.870			
20,200.00	6,963.82	5,762.00	5,707.87	407.80	22.05	-43.57	748.88	70.24	13,622.70	13,554.96	67.74	201.105			
20,307.78	6,964.00	5,762.00	5,707.87	411.06	22.05	-43.57	748.88	70.24	13,729.64	13,661.82	67.82	202.433			

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 645H - OH - Plan #5													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		
0.00	0.00	0.00	0.00	0.00	0.00	-68.66	22.05	-56.45	60.61					
393.00	392.99	392.99	392.99	0.66	1.32	-110.99	22.05	-56.45	61.23	59.25	1.98	30.906 ES		
483.00	482.99	482.87	482.87	0.97	1.64	137.69	22.24	-56.42	61.88	59.26	2.62	23.650		
578.00	577.96	577.33	577.29	1.30	1.98	128.28	24.84	-55.94	63.96	60.67	3.28	19.485		
673.00	672.85	671.14	670.92	1.64	2.32	128.70	30.44	-54.91	68.48	64.52	3.95	17.317		
765.00	764.65	761.01	760.40	1.96	2.65	138.31	38.64	-53.40	76.42	71.82	4.61	16.581		
855.00	854.37	847.75	846.47	2.29	2.97	149.89	49.17	-51.47	88.68	83.43	5.25	16.898		
952.00	950.95	941.52	939.23	2.65	3.32	162.46	62.67	-48.98	106.72	100.78	5.94	17.977		
1,077.00	1,075.26	1,062.70	1,059.08	3.13	3.78	169.34	80.29	-45.74	133.81	126.99	6.82	19.612		
1,172.00	1,169.69	1,154.66	1,150.03	3.49	4.14	160.82	93.66	-43.28	155.41	147.92	7.49	20.748		
1,300.00	1,297.07	1,278.80	1,272.81	3.97	4.63	163.93	111.70	-39.97	183.89	175.50	8.39	21.917		
1,395.00	1,391.63	1,371.01	1,364.00	4.34	5.00	164.79	125.11	-37.50	205.17	196.11	9.06	22.643		
1,490.00	1,486.24	1,463.33	1,455.31	4.70	5.36	168.13	138.53	-35.03	226.27	216.54	9.73	23.247		
1,586.00	1,582.02	1,557.13	1,548.08	5.05	5.74	178.53	152.16	-32.53	245.81	235.40	10.41	23.607		
1,681.00	1,676.87	1,650.22	1,640.15	5.40	6.11	-175.45	165.70	-30.04	264.16	253.07	11.09	23.820		
1,776.00	1,771.67	1,743.17	1,732.08	5.75	6.48	-168.95	179.21	-27.55	283.40	271.63	11.77	24.075		
1,872.00	1,867.43	1,836.97	1,824.84	6.11	6.86	178.79	192.84	-25.04	303.49	291.03	12.46	24.358		
1,966.00	1,961.25	1,928.90	1,915.76	6.46	7.23	163.14	206.21	-22.59	322.44	309.31	13.13	24.558		
2,061.00	2,056.10	2,021.93	2,007.78	6.81	7.61	157.86	219.73	-20.10	340.78	326.97	13.81	24.684		
2,156.00	2,150.95	2,114.93	2,099.76	7.15	7.98	156.12	233.25	-17.61	359.23	344.75	14.48	24.804		
2,252.00	2,246.71	2,208.66	2,192.45	7.50	8.36	155.25	246.88	-15.11	379.00	363.83	15.17	24.987		
2,347.00	2,341.39	2,301.17	2,283.95	7.86	8.73	154.29	260.33	-12.63	399.55	383.71	15.84	25.217		
2,442.00	2,436.07	2,393.69	2,375.45	8.21	9.11	158.53	273.78	-10.16	420.22	403.70	16.52	25.436		
2,537.00	2,530.82	2,486.38	2,467.12	8.56	9.48	167.82	287.25	-7.68	440.46	423.27	17.20	25.612		
2,632.00	2,625.64	2,579.32	2,559.04	8.92	9.86	-169.00	300.76	-5.20	459.88	442.01	17.88	25.724		
2,728.00	2,721.53	2,673.55	2,652.24	9.26	10.24	-150.20	314.46	-2.68	478.18	459.62	18.57	25.756		
2,823.00	2,816.43	2,767.02	2,744.68	9.60	10.62	-130.54	328.05	-0.18	495.14	475.89	19.25	25.726		
2,918.00	2,911.32	2,860.55	2,837.18	9.94	11.00	-128.00	341.64	2.32	511.80	491.87	19.93	25.683		
3,013.00	3,006.17	2,953.95	2,929.55	10.28	11.38	-138.75	355.22	4.82	529.13	508.52	20.61	25.673		
3,109.00	3,101.98	3,048.11	3,022.68	10.63	11.77	-144.68	368.91	7.33	547.80	526.50	21.30	25.715		
3,204.00	3,196.73	3,141.17	3,114.72	10.98	12.14	-138.52	382.44	9.82	566.85	544.86	21.99	25.781		
3,299.00	3,291.42	3,234.03	3,206.56	11.33	12.52	-150.87	395.94	12.30	586.83	564.16	22.67	25.883		
3,395.00	3,387.03	3,327.54	3,299.05	11.69	12.90	-164.48	409.53	14.80	608.53	585.17	23.37	26.044		
3,490.00	3,481.56	3,419.78	3,390.27	12.06	13.28	-166.49	422.94	17.27	631.28	607.23	24.05	26.250		
3,585.00	3,576.12	3,512.04	3,481.52	12.42	13.65	-176.30	436.35	19.74	653.84	629.11	24.73	26.439		
3,680.00	3,670.84	3,604.66	3,573.12	12.78	14.03	-167.45	449.82	22.21	674.71	649.30	25.41	26.554		
3,775.00	3,765.61	3,697.41	3,664.85	13.13	14.41	162.13	463.30	24.69	694.79	668.71	26.09	26.634		
3,871.00	3,861.42	3,791.29	3,757.70	13.48	14.79	165.91	476.95	27.20	714.39	687.62	26.77	26.684		
3,966.00	3,956.30	3,884.43	3,849.82	13.83	15.17	174.69	490.49	29.69	732.78	705.33	27.45	26.692		
4,061.00	4,051.20	3,977.65	3,942.02	14.17	15.55	-179.56	504.04	32.18	750.86	722.72	28.14	26.687		
4,156.00	4,146.11	4,070.91	4,034.25	14.52	15.93	-170.62	517.60	34.68	768.84	740.02	28.82	26.677		
4,251.00	4,241.00	4,164.11	4,126.43	14.86	16.31	179.33	531.15	37.17	787.11	757.61	29.50	26.678		
4,347.00	4,336.86	4,258.16	4,219.44	15.22	16.69	176.64	544.82	39.68	806.19	775.99	30.19	26.699		
4,442.00	4,431.69	4,351.15	4,311.41	15.57	17.07	-178.41	558.34	42.17	825.50	794.63	30.88	26.734		
4,536.00	4,525.51	4,443.09	4,402.34	15.91	17.45	177.15	571.70	44.63	844.92	813.37	31.55	26.777		
4,632.00	4,621.31	4,536.92	4,495.14	16.27	17.83	176.52	585.34	47.14	865.02	832.78	32.24	26.827		
4,727.00	4,716.11	4,629.77	4,586.97	16.62	18.21	-179.00	598.84	49.62	885.02	852.09	32.93	26.878		
4,821.00	4,809.89	4,721.58	4,677.77	16.97	18.58	-177.70	612.19	52.07	905.07	871.47	33.60	26.934		
4,916.00	4,904.64	4,814.29	4,769.46	17.33	18.96	-174.80	625.66	54.55	925.73	891.45	34.29	27.000		
5,011.00	4,999.37	4,906.98	4,861.13	17.69	19.34	-174.88	639.14	57.03	946.52	911.55	34.97	27.067		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 645H - OH - Plan #5													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		
5,109.00	5,097.08	5,002.52	4,955.62	18.06	19.73	-171.91	653.03	59.58	968.29	932.61	35.68	27.142		
5,204.00	5,191.74	5,095.00	5,047.09	18.42	20.11	-173.71	666.47	62.05	989.97	953.61	36.36	27.228		
5,299.00	5,286.40	5,187.49	5,138.57	18.78	20.48	-170.33	679.92	64.53	1,011.64	974.60	37.04	27.310		
5,363.00	5,350.22	5,249.92	5,200.31	19.02	20.74	-170.59	688.99	66.20	1,025.71	988.21	37.50	27.350		
5,458.00	5,444.99	5,346.96	5,296.30	19.37	21.13	-172.83	703.01	68.77	1,045.92	1,007.70	38.22	27.368		
5,521.00	5,507.84	5,414.77	5,363.43	19.61	21.41	-172.42	712.40	70.50	1,058.89	1,020.18	38.71	27.353		
5,585.00	5,571.69	5,483.82	5,431.85	19.84	21.68	-173.45	721.56	72.19	1,071.68	1,032.46	39.22	27.328		
5,648.00	5,634.55	5,551.95	5,499.41	20.08	21.95	-174.52	730.20	73.77	1,083.93	1,044.22	39.71	27.296		
5,712.00	5,698.39	5,621.31	5,568.25	20.32	22.23	-173.13	738.59	75.32	1,096.08	1,055.87	40.21	27.258		
5,776.00	5,762.24	5,690.85	5,637.31	20.56	22.50	-169.78	746.60	76.79	1,107.75	1,067.04	40.71	27.209		
5,839.00	5,825.12	5,759.52	5,705.56	20.79	22.76	-168.13	754.10	78.17	1,118.53	1,077.32	41.20	27.146		
5,903.00	5,889.00	5,829.46	5,775.10	21.03	23.03	-167.92	761.32	79.50	1,128.94	1,087.24	41.70	27.071		
5,966.00	5,951.88	5,898.40	5,843.71	21.26	23.29	-165.84	768.03	80.73	1,138.97	1,096.78	42.19	26.994		
6,030.00	6,015.74	5,968.55	5,913.55	21.50	23.55	-165.12	774.44	81.91	1,148.93	1,106.24	42.69	26.914		
6,093.00	6,078.59	6,037.71	5,982.45	21.74	23.81	-165.01	780.35	83.00	1,158.51	1,115.33	43.18	26.832		
6,157.00	6,142.42	6,108.08	6,052.59	21.97	24.07	-156.05	785.94	84.03	1,167.90	1,124.22	43.67	26.743		
6,220.00	6,205.25	6,177.45	6,121.76	22.21	24.32	-163.41	791.04	84.96	1,176.90	1,132.74	44.16	26.653		
6,243.83	6,229.01	6,203.71	6,147.96	22.26	24.42	-168.47	792.87	85.30	1,180.22	1,135.92	44.30	26.642		
6,300.00	6,285.05	6,258.97	6,203.09	22.27	24.62	-168.48	796.66	86.00	1,187.92	1,143.42	44.50	26.695		
6,323.33	6,308.32	6,282.08	6,226.14	22.27	24.70	-168.48	798.24	86.29	1,191.12	1,146.53	44.58	26.716		
6,350.00	6,334.92	6,308.50	6,252.49	22.28	24.80	-140.21	800.06	86.62	1,194.76	1,150.07	44.68	26.739		
6,400.00	6,384.57	6,357.85	6,301.73	22.30	24.98	-115.33	803.44	87.24	1,201.47	1,156.60	44.87	26.778		
6,450.00	6,433.72	6,400.00	6,343.77	22.32	25.13	-105.63	806.35	87.95	1,208.09	1,163.07	45.02	26.832		
6,500.00	6,482.07	6,442.14	6,385.68	22.34	25.28	-100.69	809.48	90.87	1,214.91	1,169.72	45.19	26.885		
6,550.00	6,529.32	6,482.00	6,425.04	22.37	25.43	-97.67	812.68	96.20	1,221.95	1,176.60	45.35	26.944		
6,600.00	6,575.18	6,522.19	6,464.30	22.41	25.58	-95.63	816.13	104.06	1,229.19	1,183.66	45.53	26.999		
6,650.00	6,619.39	6,562.76	6,503.32	22.45	25.74	-94.13	819.83	114.52	1,236.59	1,190.87	45.72	27.046		
6,700.00	6,661.67	6,603.78	6,541.99	22.51	25.89	-92.99	823.78	127.60	1,244.14	1,198.20	45.94	27.080		
6,750.00	6,701.77	6,645.29	6,580.15	22.58	26.05	-92.09	827.96	143.37	1,251.79	1,205.59	46.20	27.094		
6,800.00	6,739.44	6,687.35	6,617.66	22.67	26.22	-91.36	832.38	161.87	1,259.51	1,213.01	46.51	27.083		
6,850.00	6,774.46	6,730.04	6,654.36	22.79	26.39	-90.76	837.03	183.16	1,267.27	1,220.41	46.87	27.040		
6,900.00	6,806.61	6,773.42	6,690.07	22.95	26.56	-90.28	841.91	207.28	1,275.04	1,227.74	47.30	26.957		
6,950.00	6,835.71	6,817.57	6,724.61	23.17	26.74	-89.88	847.00	234.30	1,282.78	1,234.97	47.82	26.827		
7,000.00	6,861.57	6,862.58	6,757.76	23.48	26.94	-89.56	852.29	264.25	1,290.46	1,242.02	48.43	26.644		
7,050.00	6,884.03	6,908.52	6,789.30	23.88	27.15	-89.31	857.78	297.19	1,298.03	1,248.87	49.16	26.405		
7,100.00	6,902.97	6,955.49	6,818.96	24.37	27.39	-89.13	863.46	333.16	1,305.45	1,255.44	50.01	26.105		
7,150.00	6,918.27	7,003.59	6,846.45	24.96	27.67	-89.02	869.30	372.18	1,312.69	1,261.71	50.99	25.745		
7,200.00	6,929.83	7,052.92	6,871.44	25.64	28.01	-88.96	875.28	414.26	1,319.71	1,267.60	52.11	25.326		
7,250.00	6,937.59	7,103.57	6,893.59	26.40	28.41	-88.97	881.38	459.39	1,326.46	1,273.09	53.37	24.854		
7,300.00	6,941.50	7,155.64	6,912.50	27.23	28.90	-89.03	887.57	507.49	1,332.88	1,278.11	54.77	24.335		
7,324.29	6,942.00	7,181.48	6,920.38	27.65	29.18	-89.08	890.60	531.91	1,335.88	1,280.37	55.51	24.066		
7,360.79	6,942.06	7,221.25	6,930.54	28.31	29.63	-89.52	895.18	570.08	1,340.51	1,283.84	56.67	23.654		
7,400.00	6,942.13	7,265.29	6,938.95	29.06	30.19	-89.88	900.13	613.02	1,345.64	1,287.63	58.01	23.196		
7,500.00	6,942.31	7,377.65	6,946.98	31.09	31.81	-90.21	912.04	724.34	1,358.01	1,296.27	61.74	21.994		
7,600.00	6,942.48	7,564.98	6,948.65	33.27	35.08	-90.26	925.28	911.15	1,366.86	1,299.56	67.30	20.310		
7,700.00	6,942.66	7,718.84	6,949.12	35.58	38.15	-90.27	927.34	1,064.99	1,369.66	1,296.95	72.71	18.838		
7,800.00	6,942.83	7,818.83	6,949.27	38.00	40.31	-90.27	927.23	1,164.97	1,371.29	1,293.94	77.36	17.727		
7,900.00	6,943.00	7,918.82	6,949.42	40.50	42.57	-90.27	927.11	1,264.96	1,372.92	1,290.74	82.19	16.705		
8,000.00	6,943.18	8,018.80	6,949.57	43.06	44.93	-90.27	927.00	1,364.95	1,374.55	1,287.38	87.17	15.768		
8,100.00	6,943.35	8,118.79	6,949.72	45.69	47.37	-90.27	926.88	1,464.93	1,376.19	1,283.90	92.28	14.912		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 645H - OH - Plan #5													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		
8,200.00	6,943.53	8,218.78	6,949.87	48.36	49.87	-90.27	926.77	1,564.92	1,377.82	1,280.31	97.51	14.131		
8,300.00	6,943.70	8,318.76	6,950.02	51.08	52.43	-90.26	926.66	1,664.91	1,379.45	1,276.63	102.82	13.416		
8,400.00	6,943.87	8,418.75	6,950.18	53.83	55.04	-90.26	926.54	1,764.89	1,381.08	1,272.87	108.21	12.763		
8,500.00	6,944.05	8,518.74	6,950.33	56.60	57.69	-90.26	926.43	1,864.88	1,382.71	1,269.04	113.67	12.164		
8,600.00	6,944.22	8,618.72	6,950.48	59.41	60.37	-90.26	926.31	1,964.87	1,384.34	1,265.15	119.19	11.615		
8,700.00	6,944.39	8,718.71	6,950.63	62.23	63.09	-90.26	926.20	2,064.85	1,385.97	1,261.22	124.75	11.110		
8,800.00	6,944.57	8,818.70	6,950.78	65.08	65.83	-90.26	926.08	2,164.84	1,387.60	1,257.23	130.36	10.644		
8,900.00	6,944.74	8,918.68	6,950.93	67.94	68.60	-90.26	925.97	2,264.83	1,389.23	1,253.22	136.01	10.214		
9,000.00	6,944.91	9,018.67	6,951.09	70.81	71.39	-90.26	925.85	2,364.81	1,390.86	1,249.16	141.70	9.816		
9,100.00	6,945.09	9,118.66	6,951.24	73.70	74.20	-90.25	925.74	2,464.80	1,392.49	1,245.08	147.41	9.446		
9,200.00	6,945.26	9,218.64	6,951.39	76.60	77.02	-90.25	925.62	2,564.79	1,394.12	1,240.97	153.15	9.103		
9,300.00	6,945.43	9,318.63	6,951.54	79.51	79.86	-90.25	925.51	2,664.77	1,395.75	1,236.84	158.92	8.783		
9,400.00	6,945.61	9,418.62	6,951.69	82.43	82.71	-90.25	925.40	2,764.76	1,397.38	1,232.68	164.70	8.484		
9,500.00	6,945.78	9,518.60	6,951.84	85.36	85.57	-90.25	925.28	2,864.75	1,399.01	1,228.51	170.51	8.205		
9,600.00	6,945.95	9,618.59	6,951.99	88.29	88.45	-90.25	925.17	2,964.73	1,400.64	1,224.32	176.33	7.943		
9,700.00	6,946.12	9,718.58	6,952.15	91.23	91.33	-90.25	925.05	3,064.72	1,402.28	1,220.11	182.16	7.698		
9,800.00	6,946.30	9,818.56	6,952.30	94.18	94.23	-90.25	924.94	3,164.70	1,403.91	1,215.89	188.02	7.467		
9,900.00	6,946.47	9,918.55	6,952.45	97.13	97.13	-90.25	924.82	3,264.69	1,405.54	1,211.66	193.88	7.250		
10,000.00	6,946.64	10,018.54	6,952.60	100.09	100.04	-90.24	924.71	3,364.68	1,407.17	1,207.41	199.76	7.044		
10,100.00	6,946.82	10,118.52	6,952.75	103.05	102.95	-90.24	924.59	3,464.66	1,408.80	1,203.16	205.64	6.851		
10,200.00	6,946.99	10,218.51	6,952.90	106.02	105.88	-90.24	924.48	3,564.65	1,410.43	1,198.89	211.54	6.667		
10,300.00	6,947.16	10,318.50	6,953.06	108.99	108.80	-90.24	924.37	3,664.64	1,412.06	1,194.61	217.44	6.494		
10,400.00	6,947.33	10,418.48	6,953.21	111.96	111.74	-90.24	924.25	3,764.62	1,413.69	1,190.33	223.36	6.329		
10,500.00	6,947.50	10,518.47	6,953.36	114.94	114.68	-90.24	924.14	3,864.61	1,415.32	1,186.04	229.28	6.173		
10,600.00	6,947.68	10,618.46	6,953.51	117.92	117.62	-90.24	924.02	3,964.60	1,416.95	1,181.74	235.21	6.024		
10,700.00	6,947.85	10,718.44	6,953.66	120.90	120.56	-90.24	923.91	4,064.58	1,418.58	1,177.44	241.14	5.883		
10,800.00	6,948.02	10,818.43	6,953.81	123.88	123.51	-90.24	923.79	4,164.57	1,420.21	1,173.13	247.08	5.748		
10,900.00	6,948.19	10,918.42	6,953.97	126.87	126.47	-90.23	923.68	4,264.56	1,421.84	1,168.81	253.03	5.619		
11,000.00	6,948.36	11,018.40	6,954.12	129.86	129.43	-90.23	923.56	4,364.54	1,423.47	1,164.49	258.98	5.496		
11,100.00	6,948.53	11,118.39	6,954.27	132.85	132.39	-90.23	923.45	4,464.53	1,425.10	1,160.16	264.94	5.379		
11,200.00	6,948.71	11,218.38	6,954.42	135.84	135.35	-90.23	923.34	4,564.52	1,426.74	1,155.83	270.90	5.267		
11,300.00	6,948.88	11,318.36	6,954.57	138.84	138.32	-90.23	923.22	4,664.50	1,428.37	1,151.50	276.87	5.159		
11,400.00	6,949.05	11,418.35	6,954.72	141.84	141.28	-90.23	923.11	4,764.49	1,430.00	1,147.16	282.84	5.056		
11,500.00	6,949.22	11,518.34	6,954.87	144.84	144.25	-90.23	922.99	4,864.48	1,431.63	1,142.82	288.81	4.957		
11,600.00	6,949.39	11,618.32	6,955.03	147.84	147.23	-90.23	922.88	4,964.46	1,433.26	1,138.47	294.79	4.862		
11,700.00	6,949.56	11,718.31	6,955.18	150.84	150.20	-90.23	922.76	5,064.45	1,434.89	1,134.12	300.77	4.771		
11,800.00	6,949.73	11,818.30	6,955.33	153.84	153.18	-90.22	922.65	5,164.44	1,436.52	1,129.77	306.75	4.683		
11,900.00	6,949.91	11,918.28	6,955.48	156.84	156.16	-90.22	922.53	5,264.42	1,438.15	1,125.41	312.74	4.599		
12,000.00	6,950.08	12,018.27	6,955.63	159.85	159.14	-90.22	922.42	5,364.41	1,439.78	1,121.05	318.73	4.517		
12,100.00	6,950.25	12,118.26	6,955.78	162.86	162.12	-90.22	922.30	5,464.39	1,441.41	1,116.69	324.72	4.439		
12,200.00	6,950.42	12,218.24	6,955.94	165.86	165.11	-90.22	922.19	5,564.38	1,443.04	1,112.33	330.72	4.363		
12,300.00	6,950.59	12,318.23	6,956.09	168.87	168.09	-90.22	922.08	5,664.37	1,444.67	1,107.96	336.71	4.291		
12,400.00	6,950.76	12,418.22	6,956.24	171.88	171.08	-90.22	921.96	5,764.35	1,446.30	1,103.59	342.71	4.220		
12,500.00	6,950.93	12,518.20	6,956.39	174.89	174.07	-90.22	921.85	5,864.34	1,447.93	1,099.22	348.71	4.152		
12,600.00	6,951.10	12,618.19	6,956.54	177.90	177.06	-90.22	921.73	5,964.33	1,449.56	1,094.85	354.72	4.087		
12,700.00	6,951.27	12,718.18	6,956.69	180.91	180.05	-90.22	921.62	6,064.31	1,451.20	1,090.47	360.72	4.023		
12,800.00	6,951.44	12,818.16	6,956.84	183.93	183.04	-90.21	921.50	6,164.30	1,452.83	1,086.10	366.73	3.962		
12,900.00	6,951.61	12,918.15	6,957.00	186.94	186.03	-90.21	921.39	6,264.29	1,454.46	1,081.72	372.74	3.902		
13,000.00	6,951.78	13,018.14	6,957.15	189.96	189.03	-90.21	921.27	6,364.27	1,456.09	1,077.34	378.75	3.844		
13,100.00	6,951.95	13,118.13	6,957.30	192.97	192.02	-90.21	921.16	6,464.26	1,457.72	1,072.96	384.76	3.789		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 645H - OH - Plan #5													Offset Site Error:	0.00 ft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 ft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (ft)	Separation Factor	Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)				
13,200.00	6,952.12	13,218.11	6,957.45	195.99	195.02	-90.21	921.05	6,564.25	1,459.35	1,068.57	390.77	3.735		
13,300.00	6,952.29	13,318.10	6,957.60	199.00	198.02	-90.21	920.93	6,664.23	1,460.98	1,064.19	396.79	3.682		
13,400.00	6,952.46	13,418.09	6,957.75	202.02	201.01	-90.21	920.82	6,764.22	1,462.61	1,059.80	402.81	3.631		
13,500.00	6,952.63	13,518.07	6,957.91	205.04	204.01	-90.21	920.70	6,864.21	1,464.24	1,055.42	408.82	3.582		
13,600.00	6,952.80	13,618.06	6,958.06	208.05	207.01	-90.21	920.59	6,964.19	1,465.87	1,051.03	414.84	3.534		
13,700.00	6,952.97	13,718.05	6,958.21	211.07	210.01	-90.21	920.47	7,064.18	1,467.50	1,046.64	420.86	3.487		
13,800.00	6,953.14	13,818.03	6,958.36	214.09	213.01	-90.21	920.36	7,164.17	1,469.13	1,042.25	426.88	3.442		
13,900.00	6,953.31	13,918.02	6,958.51	217.11	216.02	-90.20	920.24	7,264.15	1,470.76	1,037.86	432.91	3.397		
14,000.00	6,953.48	14,018.01	6,958.66	220.13	219.02	-90.20	920.13	7,364.14	1,472.39	1,033.46	438.93	3.355		
14,100.00	6,953.65	14,117.99	6,958.82	223.15	222.02	-90.20	920.02	7,464.13	1,474.02	1,029.07	444.95	3.313		
14,200.00	6,953.82	14,217.98	6,958.97	226.17	225.02	-90.20	919.90	7,564.11	1,475.66	1,024.68	450.98	3.272		
14,300.00	6,953.99	14,317.97	6,959.12	229.19	228.03	-90.20	919.79	7,664.10	1,477.29	1,020.28	457.01	3.233		
14,400.00	6,954.15	14,417.95	6,959.27	232.21	231.03	-90.20	919.67	7,764.08	1,478.92	1,015.88	463.03	3.194		
14,500.00	6,954.32	14,517.94	6,959.42	235.23	234.04	-90.20	919.56	7,864.07	1,480.55	1,011.49	469.06	3.156		
14,600.00	6,954.49	14,617.93	6,959.57	238.25	237.04	-90.20	919.44	7,964.06	1,482.18	1,007.09	475.09	3.120		
14,700.00	6,954.66	14,717.91	6,959.72	241.28	240.05	-90.20	919.33	8,064.04	1,483.81	1,002.69	481.12	3.084		
14,800.00	6,954.83	14,817.90	6,959.88	244.30	243.06	-90.20	919.21	8,164.03	1,485.44	998.29	487.15	3.049		
14,900.00	6,955.00	14,917.89	6,960.03	247.32	246.06	-90.20	919.10	8,264.02	1,487.07	993.89	493.18	3.015		
15,000.00	6,955.17	15,017.87	6,960.18	250.34	249.07	-90.19	918.98	8,364.00	1,488.70	989.49	499.21	2.982		
15,100.00	6,955.34	15,117.86	6,960.33	253.37	252.08	-90.19	918.87	8,463.99	1,490.33	985.09	505.25	2.950		
15,200.00	6,955.50	15,217.85	6,960.48	256.39	255.09	-90.19	918.76	8,563.98	1,491.96	980.68	511.28	2.918		
15,300.00	6,955.67	15,317.83	6,960.63	259.42	258.10	-90.19	918.64	8,663.96	1,493.59	976.28	517.31	2.887		
15,400.00	6,955.84	15,417.82	6,960.79	262.44	261.11	-90.19	918.53	8,763.95	1,495.22	971.88	523.35	2.857		
15,500.00	6,956.01	15,517.81	6,960.94	265.46	264.12	-90.19	918.41	8,863.94	1,496.85	967.47	529.38	2.828		
15,600.00	6,956.18	15,617.79	6,961.09	268.49	267.13	-90.19	918.30	8,963.92	1,498.49	963.07	535.42	2.799		
15,700.00	6,956.34	15,717.78	6,961.24	271.51	270.14	-90.19	918.18	9,063.91	1,500.12	958.66	541.45	2.771		
15,800.00	6,956.51	15,817.77	6,961.39	274.54	273.15	-90.19	918.07	9,163.90	1,501.75	954.26	547.49	2.743		
15,900.00	6,956.68	15,917.75	6,961.54	277.56	276.16	-90.19	917.95	9,263.88	1,503.38	949.85	553.53	2.716		
16,000.00	6,956.85	16,017.74	6,961.69	280.59	279.17	-90.19	917.84	9,363.87	1,505.01	945.44	559.57	2.690		
16,100.00	6,957.02	16,117.73	6,961.85	283.62	282.18	-90.19	917.73	9,463.86	1,506.64	941.03	565.60	2.664		
16,200.00	6,957.18	16,217.71	6,962.00	286.64	285.19	-90.18	917.61	9,563.84	1,508.27	936.63	571.64	2.638		
16,300.00	6,957.35	16,317.70	6,962.15	289.67	288.21	-90.18	917.50	9,663.83	1,509.90	932.22	577.68	2.614		
16,400.00	6,957.52	16,417.69	6,962.30	292.70	291.22	-90.18	917.38	9,763.82	1,511.53	927.81	583.72	2.589		
16,500.00	6,957.69	16,517.67	6,962.45	295.72	294.23	-90.18	917.27	9,863.80	1,513.16	923.40	589.76	2.566		
16,600.00	6,957.85	16,617.66	6,962.60	298.75	297.24	-90.18	917.15	9,963.79	1,514.79	918.99	595.80	2.542		
16,700.00	6,958.02	16,717.65	6,962.76	301.78	300.26	-90.18	917.04	10,063.78	1,516.42	914.58	601.84	2.520		
16,800.00	6,958.19	16,817.63	6,962.91	304.80	303.27	-90.18	916.92	10,163.76	1,518.05	910.17	607.88	2.497		
16,900.00	6,958.35	16,917.62	6,963.06	307.83	306.28	-90.18	916.81	10,263.75	1,519.68	905.76	613.93	2.475		
17,000.00	6,958.52	17,017.61	6,963.21	310.86	309.30	-90.18	916.70	10,363.73	1,521.31	901.35	619.97	2.454		
17,100.00	6,958.69	17,117.59	6,963.36	313.88	312.31	-90.18	916.58	10,463.72	1,522.95	896.93	626.01	2.433		
17,200.00	6,958.86	17,217.58	6,963.51	316.91	315.33	-90.18	916.47	10,563.71	1,524.58	892.52	632.05	2.412		
17,300.00	6,959.02	17,317.57	6,963.67	319.94	318.34	-90.18	916.35	10,663.69	1,526.21	888.11	638.10	2.392		
17,400.00	6,959.19	17,417.55	6,963.82	322.97	321.36	-90.18	916.24	10,763.68	1,527.84	883.70	644.14	2.372		
17,500.00	6,959.36	17,517.54	6,963.97	326.00	324.37	-90.17	916.12	10,863.67	1,529.47	879.28	650.18	2.352		
17,600.00	6,959.52	17,617.53	6,964.12	329.02	327.39	-90.17	916.01	10,963.65	1,531.10	874.87	656.23	2.333		
17,700.00	6,959.69	17,717.51	6,964.27	332.05	330.40	-90.17	915.89	11,063.64	1,532.73	870.46	662.27	2.314		
17,800.00	6,959.85	17,817.50	6,964.42	335.08	333.42	-90.17	915.78	11,163.63	1,534.36	866.04	668.32	2.296		
17,900.00	6,960.02	17,917.49	6,964.57	338.11	336.43	-90.17	915.67	11,263.61	1,535.99	861.63	674.36	2.278		
18,000.00	6,960.19	18,017.47	6,964.73	341.14	339.45	-90.17	915.55	11,363.60	1,537.62	857.21	680.41	2.260		
18,100.00	6,960.35	18,117.46	6,964.88	344.17	342.47	-90.17	915.44	11,463.59	1,539.25	852.80	686.45	2.242		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 645H - OH - Plan #5														Offset Site Error:	0.00 ft
Survey Program: 0-MWD+HDGM														Offset Well Error:	0.00 ft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (ft)	Separation Factor	Warning		
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)					
18,200.00	6,960.52	18,217.45	6,965.03	347.20	345.48	-90.17	915.32	11,563.57	1,540.88	848.39	692.50	2.225			
18,300.00	6,960.68	18,317.43	6,965.18	350.23	348.50	-90.17	915.21	11,663.56	1,542.51	843.97	698.54	2.208			
18,400.00	6,960.85	18,417.42	6,965.33	353.26	351.52	-90.17	915.09	11,763.55	1,544.14	839.55	704.59	2.192			
18,500.00	6,961.02	18,517.41	6,965.48	356.28	354.53	-90.17	914.98	11,863.53	1,545.78	835.14	710.64	2.175			
18,600.00	6,961.18	18,617.39	6,965.64	359.31	357.55	-90.17	914.86	11,963.52	1,547.41	830.72	716.68	2.159			
18,700.00	6,961.35	18,717.38	6,965.79	362.34	360.57	-90.17	914.75	12,063.51	1,549.04	826.31	722.73	2.143			
18,800.00	6,961.51	18,817.37	6,965.94	365.37	363.59	-90.17	914.63	12,163.49	1,550.67	821.89	728.78	2.128			
18,900.00	6,961.68	18,917.35	6,966.09	368.40	366.60	-90.16	914.52	12,263.48	1,552.30	817.47	734.83	2.112			
19,000.00	6,961.84	19,017.34	6,966.24	371.43	369.62	-90.16	914.41	12,363.47	1,553.93	813.06	740.87	2.097			
19,100.00	6,962.01	19,117.33	6,966.39	374.46	372.64	-90.16	914.29	12,463.45	1,555.56	808.64	746.92	2.083			
19,200.00	6,962.17	19,217.31	6,966.54	377.49	375.66	-90.16	914.18	12,563.44	1,557.19	804.22	752.97	2.068			
19,300.00	6,962.34	19,317.30	6,966.70	380.52	378.67	-90.16	914.06	12,663.42	1,558.82	799.80	759.02	2.054			
19,400.00	6,962.51	19,417.29	6,966.85	383.55	381.69	-90.16	913.95	12,763.41	1,560.45	795.39	765.07	2.040			
19,500.00	6,962.67	19,517.27	6,967.00	386.58	384.71	-90.16	913.83	12,863.40	1,562.08	790.97	771.11	2.026			
19,600.00	6,962.84	19,617.26	6,967.15	389.61	387.73	-90.16	913.72	12,963.38	1,563.71	786.55	777.16	2.012			
19,700.00	6,963.00	19,717.25	6,967.30	392.64	390.75	-90.16	913.60	13,063.37	1,565.34	782.13	783.21	1.999			
19,800.00	6,963.16	19,817.23	6,967.45	395.67	393.77	-90.16	913.49	13,163.36	1,566.97	777.71	789.26	1.985			
19,900.00	6,963.33	19,917.22	6,967.61	398.70	396.78	-90.16	913.38	13,263.34	1,568.61	773.29	795.31	1.972			
20,000.00	6,963.49	20,017.21	6,967.76	401.73	399.80	-90.16	913.26	13,363.33	1,570.24	768.88	801.36	1.959			
20,100.00	6,963.66	20,117.19	6,967.91	404.77	402.82	-90.16	913.15	13,463.32	1,571.87	764.46	807.41	1.947			
20,200.00	6,963.82	20,177.43	6,968.00	407.80	404.64	-90.16	913.08	13,523.55	1,574.00	762.05	811.95	1.939 SF			
20,307.78	6,964.00	20,177.43	6,968.00	411.06	404.64	-90.16	913.08	13,523.55	1,582.15	770.34	811.81	1.949			

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 647H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 392-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		
0.00	0.00	0.00	0.00	0.00	0.00	-77.19	13.29	-58.45	59.94					
393.00	392.99	393.57	393.56	0.66	0.67	-119.22	13.14	-56.56	58.94	57.61	1.32	44.489		
483.00	482.99	483.96	483.95	0.97	0.99	129.10	12.61	-55.45	58.35	56.39	1.96	29.757		
543.31	543.29	544.10	544.06	1.18	1.20	117.83	11.13	-54.84	58.12	55.74	2.38	24.414		
578.00	577.96	578.78	578.71	1.30	1.33	114.95	9.55	-54.70	58.19	55.57	2.62	22.189		
673.00	672.85	674.61	674.30	1.64	1.67	105.65	2.97	-53.73	57.66	54.36	3.30	17.480		
713.20	712.98	714.39	713.94	1.78	1.81	104.99	-0.31	-53.36	57.47	53.88	3.59	16.021 CC		
765.00	764.65	765.80	765.17	1.96	2.00	104.27	-4.65	-53.32	57.77	53.81	3.96	14.585		
855.00	854.37	856.59	855.54	2.29	2.34	105.34	-13.31	-52.90	58.28	53.65	4.63	12.599 ES		
952.00	950.95	953.62	951.89	2.65	2.71	107.28	-24.66	-51.92	59.05	53.69	5.36	11.021		
1,077.00	1,075.26	1,078.50	1,075.24	3.13	3.21	100.74	-44.07	-50.53	61.02	54.68	6.33	9.633		
1,172.00	1,169.69	1,172.89	1,167.81	3.49	3.61	80.82	-62.45	-49.48	62.59	55.50	7.09	8.823		
1,300.00	1,297.07	1,299.18	1,290.54	3.97	4.18	64.44	-92.11	-47.55	66.83	58.74	8.10	8.255 SF		
1,395.00	1,391.63	1,391.67	1,379.42	4.34	4.62	50.22	-117.59	-45.26	74.37	65.59	8.78	8.470		
1,490.00	1,486.24	1,482.92	1,466.23	4.70	5.09	39.94	-145.53	-42.47	87.21	77.81	9.40	9.277		
1,586.00	1,582.02	1,574.99	1,553.31	5.05	5.58	39.38	-175.32	-39.66	106.54	96.52	10.02	10.629		
1,681.00	1,676.87	1,666.43	1,639.72	5.40	6.08	37.74	-205.08	-36.92	129.16	118.49	10.67	12.108		
1,776.00	1,771.67	1,757.55	1,725.86	5.75	6.59	39.02	-234.69	-34.28	152.46	141.13	11.33	13.460		
1,872.00	1,867.43	1,849.56	1,812.75	6.11	7.10	23.48	-264.87	-32.08	176.28	164.27	12.00	14.684		
1,966.00	1,961.25	1,939.46	1,897.60	6.46	7.61	4.79	-294.53	-30.28	200.37	187.70	12.67	15.817		
2,061.00	2,056.10	2,030.00	1,982.98	6.81	8.13	-3.71	-324.63	-28.68	225.82	212.49	13.34	16.932		
2,156.00	2,150.95	2,120.18	2,067.95	7.15	8.65	-8.25	-354.80	-27.28	251.67	237.66	14.01	17.968		
2,252.00	2,246.71	2,212.11	2,154.46	7.50	9.19	-11.56	-385.89	-26.14	277.26	262.56	14.70	18.866		
2,347.00	2,341.39	2,305.60	2,242.55	7.86	9.74	-14.84	-417.17	-25.20	301.45	286.04	15.41	19.557		
2,442.00	2,436.07	2,402.15	2,333.83	8.21	10.29	-12.86	-448.62	-24.18	324.95	308.78	16.17	20.097		
2,537.00	2,530.82	2,499.68	2,426.62	8.56	10.84	-5.53	-478.60	-22.80	347.34	330.40	16.93	20.513		
2,632.00	2,625.64	2,593.91	2,516.52	8.92	11.37	16.17	-506.82	-21.66	370.09	352.43	17.66	20.952		
2,728.00	2,721.53	2,687.71	2,606.18	9.26	11.88	34.39	-534.37	-20.65	394.01	375.62	18.39	21.425		
2,823.00	2,816.43	2,780.12	2,694.48	9.60	12.39	53.87	-561.60	-20.82	419.08	399.97	19.11	21.935		
2,918.00	2,911.32	2,877.06	2,787.40	9.94	12.92	56.64	-589.24	-20.84	443.58	423.72	19.86	22.337		
3,013.00	3,006.17	2,972.50	2,879.09	10.28	13.43	46.15	-615.71	-19.81	466.62	446.03	20.59	22.658		
3,109.00	3,101.98	3,070.44	2,973.35	10.63	13.95	40.35	-642.23	-17.94	488.08	466.73	21.35	22.863		
3,204.00	3,196.73	3,168.21	3,067.69	10.98	14.46	46.42	-667.75	-15.22	507.79	485.69	22.10	22.977		
3,299.00	3,291.42	3,258.82	3,155.27	11.33	14.93	34.49	-690.93	-13.09	526.15	503.35	22.80	23.079		
3,395.00	3,387.03	3,340.90	3,234.26	11.69	15.37	21.31	-713.16	-11.43	544.55	521.13	23.43	23.246		
3,490.00	3,481.56	3,418.58	3,308.37	12.06	15.80	19.10	-736.30	-9.27	563.95	539.95	24.01	23.491		
3,585.00	3,576.12	3,513.95	3,399.06	12.42	16.34	9.36	-765.65	-6.01	584.40	559.64	24.76	23.606		
3,680.00	3,670.84	3,603.00	3,483.65	12.78	16.85	-7.06	-793.33	-3.10	606.68	581.24	25.44	23.846		
3,775.00	3,765.61	3,683.53	3,559.85	13.13	17.32	-13.04	-819.24	-0.81	630.75	604.71	26.04	24.223		
3,871.00	3,861.42	3,798.20	3,668.65	13.48	17.98	-10.42	-855.33	2.04	655.27	628.31	26.96	24.302		
3,966.00	3,956.30	3,897.69	3,763.81	13.83	18.53	-2.53	-884.26	4.68	678.25	650.51	27.73	24.455		
4,061.00	4,051.20	3,992.62	3,854.87	14.17	19.05	2.59	-910.95	7.19	700.66	672.20	28.46	24.616		
4,156.00	4,146.11	4,066.69	3,925.66	14.52	19.46	11.01	-932.67	8.92	724.38	695.36	29.02	24.961		
4,251.00	4,241.00	4,156.48	4,011.06	14.86	19.97	0.81	-960.31	11.00	749.24	719.52	29.71	25.215		
4,347.00	4,336.86	4,250.38	4,100.41	15.22	20.51	-2.24	-989.13	13.21	773.67	743.23	30.44	25.413		
4,442.00	4,431.69	4,336.62	4,182.42	15.57	21.00	2.23	-1,015.76	14.94	797.62	766.51	31.11	25.641		
4,536.00	4,525.51	4,427.26	4,268.44	15.91	21.53	-2.43	-1,044.26	16.78	821.57	789.75	31.81	25.825		
4,632.00	4,621.31	4,518.35	4,354.92	16.27	22.05	-3.41	-1,072.80	18.76	845.67	813.15	32.52	26.004		
4,727.00	4,716.11	4,616.54	4,448.11	16.62	22.62	0.57	-1,103.64	21.18	869.52	836.22	33.29	26.116		
4,821.00	4,809.89	4,713.11	4,540.07	16.97	23.17	1.52	-1,133.02	23.67	891.89	857.83	34.05	26.192		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 647H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 392-MWD+HDGM													Offset Well Error:	0.00 ft
Reference	Offset	Semi Major Axis		Offset Wellbore Centre		Rule Assigned:		Distance		Minimum	Separation	Warning		
Measured	Vertical	Measured	Vertical	Reference	Offset	Highside	+N/-S	+E/-W	Between	Between	Separation	Factor		
Depth	Depth	Depth	Depth	(ft)	(ft)	Toolface	(ft)	(ft)	Centres	Ellipses	(ft)			
(ft)	(ft)	(ft)	(ft)			(°)			(ft)	(ft)				
4,916.00	4,904.64	4,800.72	4,623.52	17.33	23.67	4.12	-1,159.65	25.30	914.10	879.37	34.73	26.320		
5,011.00	4,999.37	4,898.07	4,716.11	17.69	24.22	3.85	-1,189.64	27.11	936.60	901.10	35.49	26.387		
5,109.00	5,097.08	4,979.91	4,794.05	18.06	24.69	6.47	-1,214.46	29.97	959.08	922.95	36.12	26.550		
5,204.00	5,191.74	5,052.31	4,862.32	18.42	25.12	4.48	-1,238.30	33.47	982.68	946.02	36.67	26.802		
5,299.00	5,286.40	5,195.29	4,997.68	18.78	25.95	7.35	-1,283.70	40.74	1,005.63	967.80	37.83	26.583		
5,363.00	5,350.22	5,290.87	5,089.58	19.02	26.47	6.89	-1,309.51	45.42	1,018.23	979.68	38.55	26.413		
5,458.00	5,444.99	5,376.58	5,172.36	19.37	26.92	4.55	-1,331.56	48.30	1,036.35	997.14	39.21	26.429		
5,521.00	5,507.84	5,432.98	5,226.72	19.61	27.21	4.87	-1,346.55	49.25	1,048.94	1,009.29	39.65	26.455		
5,585.00	5,571.69	5,492.00	5,283.55	19.84	27.52	3.82	-1,362.48	49.91	1,062.01	1,021.91	40.11	26.480		
5,648.00	5,634.55	5,559.39	5,348.45	20.08	27.88	2.72	-1,380.60	50.61	1,074.80	1,034.18	40.62	26.459		
5,712.00	5,698.39	5,628.61	5,415.23	20.32	28.24	4.02	-1,398.81	51.58	1,087.33	1,046.18	41.15	26.426		
5,776.00	5,762.24	5,696.22	5,480.55	20.56	28.60	7.24	-1,416.23	52.60	1,099.60	1,057.94	41.66	26.395		
5,839.00	5,825.12	5,757.28	5,539.56	20.79	28.91	8.85	-1,431.87	53.65	1,111.94	1,069.81	42.13	26.394		
5,903.00	5,889.00	5,816.47	5,596.74	21.03	29.22	9.02	-1,447.12	54.84	1,124.71	1,082.13	42.58	26.411		
5,966.00	5,951.88	5,873.70	5,651.96	21.26	29.52	11.01	-1,462.09	56.22	1,137.39	1,094.36	43.03	26.434		
6,030.00	6,015.74	5,944.01	5,719.82	21.50	29.88	11.68	-1,480.38	58.05	1,150.01	1,106.46	43.56	26.401		
6,093.00	6,078.59	6,023.39	5,796.64	21.74	30.29	11.77	-1,500.27	60.09	1,161.70	1,117.56	44.14	26.316		
6,157.00	6,142.42	6,101.90	5,872.91	21.97	30.68	20.56	-1,518.79	62.09	1,172.54	1,127.83	44.71	26.223		
6,220.00	6,205.25	6,193.57	5,962.34	22.21	31.12	13.39	-1,538.83	64.27	1,182.01	1,136.67	45.34	26.071		
6,243.83	6,229.01	6,233.41	6,001.38	22.26	31.30	8.45	-1,546.74	65.09	1,185.07	1,139.53	45.54	26.020		
6,300.00	6,285.05	6,314.52	6,081.13	22.27	31.66	8.42	-1,561.40	66.74	1,191.40	1,145.55	45.86	25.982		
6,323.33	6,308.32	6,345.81	6,111.96	22.27	31.79	8.41	-1,566.64	67.42	1,193.72	1,147.75	45.97	25.967		
6,350.00	6,334.92	6,381.63	6,147.32	22.28	31.94	36.18	-1,572.38	68.24	1,196.17	1,150.06	46.10	25.946		
6,400.00	6,384.57	6,428.29	6,193.36	22.30	32.14	60.43	-1,579.81	69.32	1,200.61	1,154.33	46.29	25.939		
6,450.00	6,433.72	6,430.00	6,195.06	22.32	32.14	69.38	-1,580.08	69.36	1,205.90	1,159.59	46.30	26.043		
6,500.00	6,482.07	6,430.00	6,195.06	22.34	32.14	73.42	-1,580.08	69.36	1,213.07	1,166.80	46.27	26.218		
6,550.00	6,529.32	6,430.00	6,195.06	22.37	32.14	75.36	-1,580.08	69.36	1,222.05	1,175.86	46.19	26.456		
6,600.00	6,575.18	6,430.00	6,195.06	22.41	32.14	76.18	-1,580.08	69.36	1,232.75	1,186.66	46.09	26.748		
6,650.00	6,619.39	6,430.00	6,195.06	22.45	32.14	76.31	-1,580.08	69.36	1,245.06	1,199.09	45.97	27.083		
6,700.00	6,661.67	6,430.00	6,195.06	22.51	32.14	75.95	-1,580.08	69.36	1,258.86	1,213.00	45.86	27.448		
6,750.00	6,701.77	6,430.00	6,195.06	22.58	32.14	75.24	-1,580.08	69.36	1,274.03	1,228.25	45.78	27.830		
6,800.00	6,739.44	6,430.00	6,195.06	22.67	32.14	74.25	-1,580.08	69.36	1,290.41	1,244.68	45.74	28.214		
6,850.00	6,774.46	6,430.00	6,195.06	22.79	32.14	73.04	-1,580.08	69.36	1,307.88	1,262.12	45.76	28.583		
6,900.00	6,806.61	6,430.00	6,195.06	22.95	32.14	71.65	-1,580.08	69.36	1,326.27	1,280.42	45.85	28.925		
6,950.00	6,835.71	6,430.00	6,195.06	23.17	32.14	70.13	-1,580.08	69.36	1,345.46	1,299.42	46.04	29.225		
7,000.00	6,861.57	6,430.00	6,195.06	23.48	32.14	68.50	-1,580.08	69.36	1,365.28	1,318.96	46.32	29.474		
7,050.00	6,884.03	6,430.00	6,195.06	23.88	32.14	66.78	-1,580.08	69.36	1,385.59	1,338.89	46.71	29.665		
7,100.00	6,902.97	6,430.00	6,195.06	24.37	32.14	65.02	-1,580.08	69.36	1,406.26	1,359.06	47.20	29.795		
7,150.00	6,918.27	6,430.00	6,195.06	24.96	32.14	63.22	-1,580.08	69.36	1,427.15	1,379.36	47.78	29.866		
7,200.00	6,929.83	6,430.00	6,195.06	25.64	32.14	61.40	-1,580.08	69.36	1,448.11	1,399.65	48.46	29.881		
7,250.00	6,937.59	6,430.00	6,195.06	26.40	32.14	59.60	-1,580.08	69.36	1,469.03	1,419.81	49.22	29.845		
7,300.00	6,941.50	6,430.00	6,195.06	27.23	32.14	57.82	-1,580.08	69.36	1,489.79	1,439.74	50.05	29.769		
7,324.29	6,942.00	6,430.00	6,195.06	27.65	32.14	56.96	-1,580.08	69.36	1,499.78	1,449.31	50.46	29.719		
7,360.79	6,942.06	6,430.00	6,195.06	28.31	32.14	57.14	-1,580.08	69.36	1,514.92	1,463.81	51.11	29.641		
7,400.00	6,942.13	6,430.00	6,195.06	29.06	32.14	57.14	-1,580.08	69.36	1,531.79	1,479.99	51.80	29.570		
7,500.00	6,942.31	6,430.00	6,195.06	31.09	32.14	57.14	-1,580.08	69.36	1,578.44	1,524.88	53.56	29.469		
7,600.00	6,942.48	6,430.00	6,195.06	33.27	32.14	57.14	-1,580.08	69.36	1,629.89	1,574.62	55.27	29.490		
7,700.00	6,942.66	6,430.00	6,195.06	35.58	32.14	57.14	-1,580.08	69.36	1,685.71	1,628.82	56.89	29.631		
7,800.00	6,942.83	6,430.00	6,195.06	38.00	32.14	57.14	-1,580.08	69.36	1,745.48	1,687.06	58.41	29.882		
7,900.00	6,943.00	6,430.00	6,195.06	40.50	32.14	57.14	-1,580.08	69.36	1,808.80	1,748.98	59.82	30.236		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 647H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 392-MWD+HDGM													Offset Well Error:	0.00 ft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Rule Assigned:				Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
8,000.00	6,943.18	6,430.00	6,195.06	43.06	32.14	57.14	-1,580.08	69.36	1,875.32	1,814.20	61.12	30.682		
8,100.00	6,943.35	6,430.00	6,195.06	45.69	32.14	57.14	-1,580.08	69.36	1,944.71	1,882.40	62.31	31.209		
8,200.00	6,943.53	6,430.00	6,195.06	48.36	32.14	57.14	-1,580.08	69.36	2,016.67	1,953.28	63.40	31.809		
8,300.00	6,943.70	6,430.00	6,195.06	51.08	32.14	57.14	-1,580.08	69.36	2,090.94	2,026.56	64.39	32.474		
8,400.00	6,943.87	6,430.00	6,195.06	53.83	32.14	57.14	-1,580.08	69.36	2,167.28	2,102.00	65.29	33.195		
8,500.00	6,944.05	6,430.00	6,195.06	56.60	32.14	57.14	-1,580.08	69.36	2,245.48	2,179.38	66.11	33.967		
8,600.00	6,944.22	6,430.00	6,195.06	59.41	32.14	57.14	-1,580.08	69.36	2,325.35	2,258.50	66.85	34.783		
8,700.00	6,944.39	6,430.00	6,195.06	62.23	32.14	57.14	-1,580.08	69.36	2,406.73	2,339.20	67.53	35.639		
8,800.00	6,944.57	6,430.00	6,195.06	65.08	32.14	57.14	-1,580.08	69.36	2,489.46	2,421.31	68.15	36.530		
8,900.00	6,944.74	6,430.00	6,195.06	67.94	32.14	57.14	-1,580.08	69.36	2,573.42	2,504.71	68.71	37.453		
9,000.00	6,944.91	6,430.00	6,195.06	70.81	32.14	57.14	-1,580.08	69.36	2,658.49	2,589.26	69.23	38.403		
9,100.00	6,945.09	6,430.00	6,195.06	73.70	32.14	57.14	-1,580.08	69.36	2,744.56	2,674.86	69.70	39.378		
9,200.00	6,945.26	6,430.00	6,195.06	76.60	32.14	57.14	-1,580.08	69.36	2,831.55	2,761.42	70.13	40.375		
9,300.00	6,945.43	6,430.00	6,195.06	79.51	32.14	57.14	-1,580.08	69.36	2,919.38	2,848.85	70.53	41.393		
9,400.00	6,945.61	6,430.00	6,195.06	82.43	32.14	57.14	-1,580.08	69.36	3,007.96	2,937.07	70.89	42.429		
9,500.00	6,945.78	6,430.00	6,195.06	85.36	32.14	57.14	-1,580.08	69.36	3,097.24	3,026.01	71.23	43.481		
9,600.00	6,945.95	6,430.00	6,195.06	88.29	32.14	57.14	-1,580.08	69.36	3,187.16	3,115.61	71.54	44.548		
9,700.00	6,946.12	6,430.00	6,195.06	91.23	32.14	57.14	-1,580.08	69.36	3,277.66	3,205.83	71.83	45.628		
9,800.00	6,946.30	6,430.00	6,195.06	94.18	32.14	57.14	-1,580.08	69.36	3,368.70	3,296.59	72.10	46.720		
9,900.00	6,946.47	6,430.00	6,195.06	97.13	32.14	57.14	-1,580.08	69.36	3,460.23	3,387.88	72.35	47.824		
10,000.00	6,946.64	6,430.00	6,195.06	100.09	32.14	57.14	-1,580.08	69.36	3,552.22	3,479.63	72.59	48.937		
10,100.00	6,946.82	6,430.00	6,195.06	103.05	32.14	57.14	-1,580.08	69.36	3,644.63	3,571.82	72.81	50.059		
10,200.00	6,946.99	6,430.00	6,195.06	106.02	32.14	57.14	-1,580.08	69.36	3,737.43	3,664.42	73.01	51.190		
10,300.00	6,947.16	6,430.00	6,195.06	108.99	32.14	57.14	-1,580.08	69.36	3,830.60	3,757.39	73.20	52.328		
10,400.00	6,947.33	6,430.00	6,195.06	111.96	32.14	57.14	-1,580.08	69.36	3,924.10	3,850.71	73.38	53.473		
10,500.00	6,947.50	6,430.00	6,195.06	114.94	32.14	57.14	-1,580.08	69.36	4,017.91	3,944.36	73.56	54.624		
10,600.00	6,947.68	6,430.00	6,195.06	117.92	32.14	57.14	-1,580.08	69.36	4,112.02	4,038.30	73.72	55.781		
10,700.00	6,947.85	6,430.00	6,195.06	120.90	32.14	57.14	-1,580.08	69.36	4,206.39	4,132.52	73.87	56.944		
10,800.00	6,948.02	6,430.00	6,195.06	123.88	32.14	57.14	-1,580.08	69.36	4,301.03	4,227.01	74.01	58.111		
10,900.00	6,948.19	6,430.00	6,195.06	126.87	32.14	57.14	-1,580.08	69.36	4,395.89	4,321.74	74.15	59.282		
11,000.00	6,948.36	6,430.00	6,195.06	129.86	32.14	57.14	-1,580.08	69.36	4,490.99	4,416.70	74.28	60.457		
11,100.00	6,948.53	6,430.00	6,195.06	132.85	32.14	57.14	-1,580.08	69.36	4,586.29	4,511.88	74.41	61.636		
11,200.00	6,948.71	6,430.00	6,195.06	135.84	32.14	57.14	-1,580.08	69.36	4,681.78	4,607.26	74.53	62.819		
11,300.00	6,948.88	6,430.00	6,195.06	138.84	32.14	57.14	-1,580.08	69.36	4,777.46	4,702.82	74.64	64.004		
11,400.00	6,949.05	6,430.00	6,195.06	141.84	32.14	57.14	-1,580.08	69.36	4,873.32	4,798.57	74.75	65.192		
11,500.00	6,949.22	6,430.00	6,195.06	144.84	32.14	57.14	-1,580.08	69.36	4,969.34	4,894.48	74.86	66.382		
11,600.00	6,949.39	6,430.00	6,195.06	147.84	32.14	57.14	-1,580.08	69.36	5,065.51	4,990.55	74.96	67.574		
11,700.00	6,949.56	6,430.00	6,195.06	150.84	32.14	57.14	-1,580.08	69.36	5,161.83	5,086.77	75.06	68.769		
11,800.00	6,949.73	6,430.00	6,195.06	153.84	32.14	57.14	-1,580.08	69.36	5,258.28	5,183.12	75.16	69.965		
11,900.00	6,949.91	6,430.00	6,195.06	156.84	32.14	57.14	-1,580.08	69.36	5,354.86	5,279.62	75.25	71.163		
12,000.00	6,950.08	6,430.00	6,195.06	159.85	32.14	57.14	-1,580.08	69.36	5,451.57	5,376.24	75.34	72.362		
12,100.00	6,950.25	6,430.00	6,195.06	162.86	32.14	57.14	-1,580.08	69.36	5,548.40	5,472.97	75.42	73.562		
12,200.00	6,950.42	6,430.00	6,195.06	165.86	32.14	57.14	-1,580.08	69.36	5,645.33	5,569.82	75.51	74.764		
12,300.00	6,950.59	6,430.00	6,195.06	168.87	32.14	57.14	-1,580.08	69.36	5,742.37	5,666.78	75.59	75.966		
12,400.00	6,950.76	6,430.00	6,195.06	171.88	32.14	57.14	-1,580.08	69.36	5,839.51	5,763.84	75.67	77.169		
12,500.00	6,950.93	6,430.00	6,195.06	174.89	32.14	57.14	-1,580.08	69.36	5,936.75	5,861.00	75.75	78.373		
12,600.00	6,951.10	6,430.00	6,195.06	177.90	32.14	57.14	-1,580.08	69.36	6,034.07	5,958.25	75.83	79.577		
12,700.00	6,951.27	6,430.00	6,195.06	180.91	32.14	57.14	-1,580.08	69.36	6,131.49	6,055.58	75.90	80.781		
12,800.00	6,951.44	6,430.00	6,195.06	183.93	32.14	57.14	-1,580.08	69.36	6,228.98	6,153.00	75.98	81.986		
12,900.00	6,951.61	6,430.00	6,195.06	186.94	32.14	57.14	-1,580.08	69.36	6,326.55	6,250.50	76.05	83.191		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 647H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 392-MWD+HDGM													Offset Well Error:	0.00 ft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (ft)	Separation Factor	Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)				
13,000.00	6,951.78	6,430.00	6,195.06	189.96	32.14	57.14	-1,580.08	69.36	6,424.20	6,348.08	76.12	84.396		
13,100.00	6,951.95	6,430.00	6,195.06	192.97	32.14	57.14	-1,580.08	69.36	6,521.92	6,445.73	76.19	85.601		
13,200.00	6,952.12	6,430.00	6,195.06	195.99	32.14	57.14	-1,580.08	69.36	6,619.70	6,543.44	76.26	86.805		
13,300.00	6,952.29	6,430.00	6,195.06	199.00	32.14	57.14	-1,580.08	69.36	6,717.55	6,641.23	76.33	88.010		
13,400.00	6,952.46	6,430.00	6,195.06	202.02	32.14	57.14	-1,580.08	69.36	6,815.47	6,739.07	76.39	89.214		
13,500.00	6,952.63	6,430.00	6,195.06	205.04	32.14	57.14	-1,580.08	69.36	6,913.44	6,836.98	76.46	90.418		
13,600.00	6,952.80	6,430.00	6,195.06	208.05	32.14	57.14	-1,580.08	69.36	7,011.47	6,934.94	76.53	91.621		
13,700.00	6,952.97	6,430.00	6,195.06	211.07	32.14	57.14	-1,580.08	69.36	7,109.56	7,032.96	76.59	92.824		
13,800.00	6,953.14	6,430.00	6,195.06	214.09	32.14	57.14	-1,580.08	69.36	7,207.69	7,131.04	76.66	94.026		
13,900.00	6,953.31	6,430.00	6,195.06	217.11	32.14	57.14	-1,580.08	69.36	7,305.88	7,229.16	76.72	95.227		
14,000.00	6,953.48	6,430.00	6,195.06	220.13	32.14	57.14	-1,580.08	69.36	7,404.12	7,327.34	76.78	96.428		
14,100.00	6,953.65	6,430.00	6,195.06	223.15	32.14	57.14	-1,580.08	69.36	7,502.40	7,425.56	76.85	97.628		
14,200.00	6,953.82	6,430.00	6,195.06	226.17	32.14	57.14	-1,580.08	69.36	7,600.73	7,523.82	76.91	98.827		
14,300.00	6,953.99	6,430.00	6,195.06	229.19	32.14	57.14	-1,580.08	69.36	7,699.10	7,622.13	76.97	100.025		
14,400.00	6,954.15	6,430.00	6,195.06	232.21	32.14	57.14	-1,580.08	69.36	7,797.52	7,720.48	77.03	101.222		
14,500.00	6,954.32	6,430.00	6,195.06	235.23	32.14	57.14	-1,580.08	69.36	7,895.97	7,818.87	77.10	102.418		
14,600.00	6,954.49	6,430.00	6,195.06	238.25	32.14	57.14	-1,580.08	69.36	7,994.46	7,917.30	77.16	103.613		
14,700.00	6,954.66	6,430.00	6,195.06	241.28	32.14	57.14	-1,580.08	69.36	8,092.99	8,015.77	77.22	104.806		
14,800.00	6,954.83	6,430.00	6,195.06	244.30	32.14	57.14	-1,580.08	69.36	8,191.55	8,114.27	77.28	105.999		
14,900.00	6,955.00	6,430.00	6,195.06	247.32	32.14	57.14	-1,580.08	69.36	8,290.15	8,212.81	77.34	107.190		
15,000.00	6,955.17	6,430.00	6,195.06	250.34	32.14	57.14	-1,580.08	69.36	8,388.78	8,311.38	77.40	108.380		
15,100.00	6,955.34	6,430.00	6,195.06	253.37	32.14	57.13	-1,580.08	69.36	8,487.44	8,409.98	77.46	109.569		
15,200.00	6,955.50	6,430.00	6,195.06	256.39	32.14	57.13	-1,580.08	69.36	8,586.14	8,508.62	77.52	110.756		
15,300.00	6,955.67	6,430.00	6,195.06	259.42	32.14	57.13	-1,580.08	69.36	8,684.86	8,607.28	77.58	111.942		
15,400.00	6,955.84	6,430.00	6,195.06	262.44	32.14	57.13	-1,580.08	69.36	8,783.62	8,705.97	77.64	113.127		
15,500.00	6,956.01	6,430.00	6,195.06	265.46	32.14	57.13	-1,580.08	69.36	8,882.40	8,804.69	77.70	114.310		
15,600.00	6,956.18	6,430.00	6,195.06	268.49	32.14	57.13	-1,580.08	69.36	8,981.20	8,903.44	77.77	115.492		
15,700.00	6,956.34	6,430.00	6,195.06	271.51	32.14	57.13	-1,580.08	69.36	9,080.04	9,002.21	77.83	116.671		
15,800.00	6,956.51	6,430.00	6,195.06	274.54	32.14	57.13	-1,580.08	69.36	9,178.90	9,101.01	77.89	117.850		
15,900.00	6,956.68	6,430.00	6,195.06	277.56	32.14	57.13	-1,580.08	69.36	9,277.78	9,199.83	77.95	119.027		
16,000.00	6,956.85	6,430.00	6,195.06	280.59	32.14	57.13	-1,580.08	69.36	9,376.69	9,298.68	78.01	120.202		
16,100.00	6,957.02	6,430.00	6,195.06	283.62	32.14	57.13	-1,580.08	69.36	9,475.62	9,397.55	78.07	121.375		
16,200.00	6,957.18	6,430.00	6,195.06	286.64	32.14	57.13	-1,580.08	69.36	9,574.57	9,496.44	78.13	122.547		
16,300.00	6,957.35	6,430.00	6,195.06	289.67	32.14	57.13	-1,580.08	69.36	9,673.54	9,595.35	78.19	123.717		
16,400.00	6,957.52	6,430.00	6,195.06	292.70	32.14	57.13	-1,580.08	69.36	9,772.54	9,694.29	78.25	124.885		
16,500.00	6,957.69	6,430.00	6,195.06	295.72	32.14	57.13	-1,580.08	69.36	9,871.55	9,793.24	78.31	126.051		
16,600.00	6,957.85	6,430.00	6,195.06	298.75	32.14	57.13	-1,580.08	69.36	9,970.59	9,892.21	78.38	127.216		
16,700.00	6,958.02	6,430.00	6,195.06	301.78	32.14	57.13	-1,580.08	69.36	10,069.64	9,991.21	78.44	128.379		
16,800.00	6,958.19	6,430.00	6,195.06	304.80	32.14	57.13	-1,580.08	69.36	10,168.72	10,090.22	78.50	129.539		
16,900.00	6,958.35	6,430.00	6,195.06	307.83	32.14	57.13	-1,580.08	69.36	10,267.81	10,189.24	78.56	130.698		
17,000.00	6,958.52	6,430.00	6,195.06	310.86	32.14	57.13	-1,580.08	69.36	10,366.91	10,288.29	78.62	131.855		
17,100.00	6,958.69	6,430.00	6,195.06	313.88	32.14	57.13	-1,580.08	69.36	10,466.04	10,387.35	78.69	133.010		
17,200.00	6,958.86	6,430.00	6,195.06	316.91	32.14	57.13	-1,580.08	69.36	10,565.18	10,486.43	78.75	134.163		
17,300.00	6,959.02	6,430.00	6,195.06	319.94	32.14	57.13	-1,580.08	69.36	10,664.34	10,585.53	78.81	135.314		
17,400.00	6,959.19	6,430.00	6,195.06	322.97	32.14	57.13	-1,580.08	69.36	10,763.51	10,684.64	78.87	136.464		
17,500.00	6,959.36	6,430.00	6,195.06	326.00	32.14	57.13	-1,580.08	69.36	10,862.70	10,783.76	78.94	137.610		
17,600.00	6,959.52	6,430.00	6,195.06	329.02	32.14	57.13	-1,580.08	69.36	10,961.90	10,882.90	79.00	138.755		
17,700.00	6,959.69	6,430.00	6,195.06	332.05	32.14	57.13	-1,580.08	69.36	11,061.12	10,982.05	79.07	139.898		
17,800.00	6,959.85	6,430.00	6,195.06	335.08	32.14	57.13	-1,580.08	69.36	11,160.35	11,081.22	79.13	141.039		
17,900.00	6,960.02	6,430.00	6,195.06	338.11	32.14	57.13	-1,580.08	69.36	11,259.59	11,180.40	79.19	142.178		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 647H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 392-MWD+HDGM													Offset Well Error:	0.00 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Semi Major Axis 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	
18,000.00	6,960.19	6,430.00	6,195.06	341.14	32.14	57.13	-1,580.08	69.36	11,358.85	11,279.59	79.26	143.314		
18,100.00	6,960.35	6,430.00	6,195.06	344.17	32.14	57.13	-1,580.08	69.36	11,458.12	11,378.80	79.32	144.448		
18,200.00	6,960.52	6,430.00	6,195.06	347.20	32.14	57.13	-1,580.08	69.36	11,557.41	11,478.02	79.39	145.580		
18,300.00	6,960.68	6,430.00	6,195.06	350.23	32.14	57.13	-1,580.08	69.36	11,656.70	11,577.25	79.45	146.710		
18,400.00	6,960.85	6,430.00	6,195.06	353.26	32.14	57.13	-1,580.08	69.36	11,756.01	11,676.49	79.52	147.838		
18,500.00	6,961.02	6,430.00	6,195.06	356.28	32.14	57.13	-1,580.08	69.36	11,855.33	11,775.74	79.59	148.964		
18,600.00	6,961.18	6,430.00	6,195.06	359.31	32.14	57.13	-1,580.08	69.36	11,954.66	11,875.01	79.65	150.087		
18,700.00	6,961.35	6,430.00	6,195.06	362.34	32.14	57.12	-1,580.08	69.36	12,054.00	11,974.28	79.72	151.208		
18,800.00	6,961.51	6,430.00	6,195.06	365.37	32.14	57.12	-1,580.08	69.36	12,153.35	12,073.57	79.78	152.327		
18,900.00	6,961.68	6,430.00	6,195.06	368.40	32.14	57.12	-1,580.08	69.36	12,252.72	12,172.86	79.85	153.443		
19,000.00	6,961.84	6,430.00	6,195.06	371.43	32.14	57.12	-1,580.08	69.36	12,352.09	12,272.17	79.92	154.557		
19,100.00	6,962.01	6,430.00	6,195.06	374.46	32.14	57.12	-1,580.08	69.36	12,451.47	12,371.49	79.99	155.669		
19,200.00	6,962.17	6,430.00	6,195.06	377.49	32.14	57.12	-1,580.08	69.36	12,550.87	12,470.81	80.05	156.778		
19,300.00	6,962.34	6,430.00	6,195.06	380.52	32.14	57.12	-1,580.08	69.36	12,650.27	12,570.15	80.12	157.885		
19,400.00	6,962.51	6,430.00	6,195.06	383.55	32.14	57.12	-1,580.08	69.36	12,749.68	12,669.49	80.19	158.990		
19,500.00	6,962.67	6,430.00	6,195.06	386.58	32.14	57.12	-1,580.08	69.36	12,849.10	12,768.84	80.26	160.093		
19,600.00	6,962.84	6,430.00	6,195.06	389.61	32.14	57.12	-1,580.08	69.36	12,948.53	12,868.20	80.33	161.193		
19,700.00	6,963.00	6,430.00	6,195.06	392.64	32.14	57.12	-1,580.08	69.36	13,047.97	12,967.57	80.40	162.290		
19,800.00	6,963.16	6,430.00	6,195.06	395.67	32.14	57.12	-1,580.08	69.36	13,147.42	13,066.95	80.47	163.385		
19,900.00	6,963.33	6,430.00	6,195.06	398.70	32.14	57.12	-1,580.08	69.36	13,246.87	13,166.33	80.54	164.478		
20,000.00	6,963.49	6,430.00	6,195.06	401.73	32.14	57.12	-1,580.08	69.36	13,346.34	13,265.73	80.61	165.568		
20,100.00	6,963.66	6,430.00	6,195.06	404.77	32.14	57.12	-1,580.08	69.36	13,445.81	13,365.13	80.68	166.656		
20,200.00	6,963.82	6,430.00	6,195.06	407.80	32.14	57.12	-1,580.08	69.36	13,545.29	13,464.54	80.75	167.742		
20,307.78	6,964.00	6,430.00	6,195.06	411.06	32.14	57.12	-1,580.08	69.36	13,652.51	13,571.69	80.83	168.909		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 647H - OH - Plan #6													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		
0.00	0.00	0.00	0.00	0.00	0.00	-77.19	13.29	-58.45	59.94					
393.00	392.99	392.99	392.99	0.66	1.32	-119.43	13.29	-58.45	60.82	58.83	1.98	30.695		
483.00	482.99	482.99	482.99	0.97	1.64	129.16	13.29	-58.45	61.42	58.80	2.62	23.469		
578.00	577.96	578.14	578.14	1.30	1.98	117.54	13.15	-58.44	62.59	59.31	3.28	19.083		
673.00	672.85	673.77	673.73	1.64	2.30	111.83	10.63	-58.26	63.65	59.72	3.93	16.197		
765.00	764.65	766.45	766.24	1.96	2.61	112.54	5.14	-57.88	64.15	59.58	4.57	14.041		
855.00	854.37	857.09	856.50	2.29	2.92	114.09	-3.11	-57.30	64.37	59.16	5.21	12.358		
952.00	950.95	954.66	953.31	2.65	3.27	115.59	-15.17	-56.46	64.72	58.81	5.92	10.940		
1,077.00	1,075.26	1,079.99	1,076.98	3.13	3.74	108.64	-35.47	-55.04	65.59	58.73	6.86	9.559		
1,172.00	1,169.69	1,174.74	1,169.80	3.49	4.12	88.59	-54.39	-53.72	65.73	58.12	7.61	8.640		
1,193.52	1,191.09	1,196.11	1,190.64	3.57	4.21	86.23	-59.08	-53.39	65.68	57.91	7.78	8.447 ES		
1,300.00	1,297.07	1,301.10	1,292.53	3.97	4.66	72.00	-84.37	-51.62	67.50	58.89	8.61	7.842		
1,395.00	1,391.63	1,393.67	1,381.53	4.34	5.08	57.39	-109.74	-49.85	73.33	64.03	9.30	7.884		
1,490.00	1,486.24	1,485.61	1,469.14	4.70	5.52	46.39	-137.56	-47.90	84.55	74.62	9.94	8.508		
1,586.00	1,582.02	1,578.71	1,557.68	5.05	5.99	45.20	-166.26	-45.90	101.44	90.87	10.57	9.596		
1,681.00	1,676.87	1,670.53	1,645.01	5.40	6.46	42.96	-194.56	-43.92	121.70	110.50	11.21	10.859		
1,776.00	1,771.67	1,762.54	1,732.51	5.75	6.94	43.71	-222.92	-41.93	142.91	131.04	11.87	12.043		
1,872.00	1,867.43	1,855.68	1,821.09	6.11	7.43	27.61	-251.63	-39.93	164.32	151.77	12.55	13.098		
1,966.00	1,961.25	1,946.71	1,907.66	6.46	7.92	8.33	-279.70	-37.96	185.79	172.58	13.21	14.068		
2,061.00	2,056.10	2,038.48	1,994.95	6.81	8.41	-0.71	-307.99	-35.99	208.37	194.49	13.87	15.019		
2,156.00	2,150.95	2,130.25	2,082.22	7.15	8.91	-5.75	-336.28	-34.01	231.20	216.65	14.55	15.894		
2,252.00	2,246.71	2,223.23	2,170.66	7.50	9.42	-9.54	-364.94	-32.00	253.44	238.20	15.23	16.639		
2,347.00	2,341.39	2,315.45	2,258.36	7.86	9.93	-13.23	-393.37	-30.02	274.70	258.79	15.92	17.259		
2,442.00	2,436.07	2,407.68	2,346.07	8.21	10.44	-11.58	-421.80	-28.03	296.21	279.61	16.61	17.836		
2,537.00	2,530.82	2,499.81	2,433.70	8.56	10.95	-4.49	-450.20	-26.04	318.53	301.22	17.31	18.404		
2,632.00	2,625.64	2,591.77	2,521.15	8.92	11.46	16.93	-478.54	-24.06	342.00	323.99	18.01	18.988		
2,728.00	2,721.53	2,684.36	2,609.21	9.26	11.97	34.92	-507.09	-22.06	367.25	348.52	18.73	19.612		
2,823.00	2,816.43	2,775.66	2,696.04	9.60	12.49	54.03	-535.23	-20.10	393.47	374.04	19.43	20.251		
2,918.00	2,911.32	2,866.86	2,782.79	9.94	13.00	56.47	-563.35	-18.13	420.04	399.91	20.13	20.864		
3,013.00	3,006.17	2,958.26	2,869.71	10.28	13.51	45.83	-591.52	-16.16	445.97	425.13	20.84	21.402		
3,109.00	3,101.98	3,050.92	2,957.84	10.63	14.03	39.99	-620.09	-14.16	471.05	449.49	21.56	21.852		
3,204.00	3,196.73	3,142.76	3,045.18	10.98	14.55	46.06	-648.40	-12.18	495.35	473.08	22.27	22.241		
3,299.00	3,291.42	3,234.83	3,132.74	11.33	15.07	34.15	-676.78	-10.20	518.75	495.75	22.99	22.564		
3,395.00	3,387.03	3,328.26	3,221.60	11.69	15.59	20.97	-705.58	-8.18	540.79	517.07	23.72	22.800		
3,490.00	3,481.56	3,421.02	3,309.82	12.06	16.12	18.80	-734.17	-6.18	561.26	536.82	24.44	22.962		
3,585.00	3,576.12	3,513.75	3,398.01	12.42	16.64	9.20	-762.76	-4.19	581.84	556.67	25.17	23.120		
3,680.00	3,670.84	3,606.06	3,485.80	12.78	17.17	-7.13	-791.21	-2.20	603.95	578.07	25.88	23.336		
3,775.00	3,765.61	3,698.14	3,573.38	13.13	17.69	-13.12	-819.60	-0.21	626.78	600.19	26.59	23.574		
3,871.00	3,861.42	3,791.01	3,661.70	13.48	18.22	-10.35	-848.23	1.79	650.60	623.30	27.30	23.829		
3,966.00	3,956.30	3,882.67	3,748.87	13.83	18.74	-2.42	-876.48	3.77	675.27	647.26	28.01	24.108		
4,061.00	4,051.20	3,974.25	3,835.98	14.17	19.26	2.73	-904.72	5.74	700.31	671.59	28.72	24.385		
4,156.00	4,146.11	4,065.82	3,923.06	14.52	19.78	11.11	-932.94	7.71	725.48	696.05	29.43	24.652		
4,251.00	4,241.00	4,157.47	4,010.22	14.86	20.30	0.91	-961.19	9.69	750.37	720.23	30.14	24.896		
4,347.00	4,336.86	4,250.23	4,098.44	15.22	20.83	-2.12	-989.79	11.69	774.94	744.08	30.86	25.113		
4,442.00	4,431.69	4,342.13	4,185.85	15.57	21.35	2.32	-1,018.12	13.67	798.83	767.26	31.57	25.302		
4,536.00	4,525.51	4,433.15	4,272.41	15.91	21.87	-2.35	-1,046.18	15.63	822.18	789.90	32.28	25.471		
4,632.00	4,621.31	4,526.16	4,360.87	16.27	22.40	-3.34	-1,074.85	17.64	845.78	812.78	33.00	25.629		
4,727.00	4,716.11	4,618.23	4,448.43	16.62	22.92	0.67	-1,103.23	19.62	869.05	835.33	33.72	25.774		
4,821.00	4,809.89	4,709.40	4,535.14	16.97	23.44	1.66	-1,131.34	21.59	891.81	857.38	34.43	25.904		
4,916.00	4,904.64	4,801.65	4,622.88	17.33	23.97	4.23	-1,159.77	23.58	914.43	879.28	35.15	26.017		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 647H - OH - Plan #6													Offset Site Error:	0.00 ft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 ft
Rule Assigned:													Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
5,011.00	4,999.37	4,893.93	4,710.64	17.69	24.50	3.95	-1,188.22	25.56	936.93	901.06	35.87	26.122		
5,109.00	5,097.08	4,989.21	4,801.26	18.06	25.04	6.61	-1,217.59	27.62	959.82	923.20	36.61	26.216		
5,204.00	5,191.74	5,081.71	4,889.23	18.42	25.57	4.73	-1,246.10	29.61	981.42	944.09	37.34	26.287		
5,299.00	5,286.40	5,176.42	4,979.31	18.78	26.11	7.87	-1,275.28	31.65	1,003.03	964.95	38.08	26.341		
5,363.00	5,350.22	5,248.19	5,047.72	19.02	26.51	7.57	-1,296.93	33.17	1,017.69	979.04	38.64	26.334		
5,458.00	5,444.99	5,355.12	5,150.02	19.37	27.10	5.27	-1,328.01	35.34	1,038.97	999.50	39.48	26.317		
5,521.00	5,507.84	5,426.40	5,218.44	19.61	27.49	5.56	-1,347.92	36.73	1,052.43	1,012.41	40.03	26.292		
5,585.00	5,571.69	5,499.09	5,288.41	19.84	27.88	4.47	-1,367.57	38.11	1,065.54	1,024.96	40.58	26.256		
5,648.00	5,634.55	5,570.93	5,357.74	20.08	28.25	3.33	-1,386.34	39.42	1,077.84	1,036.71	41.13	26.208		
5,712.00	5,698.39	5,644.20	5,428.63	20.32	28.63	4.61	-1,404.82	40.71	1,089.65	1,047.98	41.67	26.147		
5,776.00	5,762.24	5,717.70	5,499.92	20.56	29.00	7.82	-1,422.67	41.96	1,100.97	1,058.75	42.22	26.078		
5,839.00	5,825.12	5,790.24	5,570.44	20.79	29.36	9.43	-1,439.61	43.14	1,111.85	1,069.10	42.75	26.008		
5,903.00	5,889.00	5,864.14	5,642.45	21.03	29.71	9.59	-1,456.18	44.30	1,122.45	1,079.17	43.29	25.931		
5,966.00	5,951.88	5,937.14	5,713.74	21.26	30.06	11.61	-1,471.87	45.40	1,132.14	1,088.33	43.81	25.842		
6,030.00	6,015.74	6,011.54	5,786.54	21.50	30.40	12.32	-1,487.16	46.47	1,141.21	1,096.88	44.34	25.739		
6,093.00	6,078.59	6,085.00	5,858.57	21.74	30.74	12.45	-1,501.56	47.47	1,149.39	1,104.53	44.85	25.625		
6,157.00	6,142.42	6,159.81	5,932.06	21.97	31.07	21.31	-1,515.52	48.45	1,157.02	1,111.65	45.37	25.500		
6,220.00	6,205.25	6,233.63	6,004.71	22.21	31.39	14.15	-1,528.59	49.36	1,163.79	1,117.91	45.88	25.366		
6,243.83	6,229.01	6,261.59	6,032.25	22.26	31.51	9.21	-1,533.35	49.70	1,166.18	1,120.16	46.03	25.338		
6,300.00	6,285.05	6,327.58	6,097.34	22.27	31.79	9.21	-1,544.20	50.46	1,171.59	1,125.32	46.27	25.320		
6,323.33	6,308.32	6,355.01	6,124.43	22.27	31.90	9.21	-1,548.55	50.76	1,173.69	1,127.32	46.37	25.311		
6,350.00	6,334.92	6,382.26	6,151.34	22.28	32.02	37.01	-1,552.80	51.06	1,176.02	1,129.55	46.47	25.305		
6,400.00	6,384.57	6,431.90	6,200.36	22.30	32.22	61.30	-1,560.55	51.60	1,180.36	1,133.70	46.67	25.293		
6,450.00	6,433.72	6,481.07	6,248.93	22.32	32.43	70.70	-1,568.22	52.14	1,184.68	1,137.81	46.87	25.278		
6,500.00	6,482.07	6,529.48	6,296.75	22.34	32.63	75.55	-1,575.78	52.66	1,189.02	1,141.94	47.07	25.259		
6,550.00	6,529.32	6,575.67	6,342.36	22.37	32.82	78.58	-1,583.00	53.37	1,193.47	1,146.18	47.29	25.239		
6,600.00	6,575.18	6,620.09	6,386.09	22.41	33.00	80.65	-1,590.09	56.53	1,198.19	1,150.68	47.51	25.219		
6,650.00	6,619.39	6,665.48	6,430.40	22.45	33.20	82.17	-1,597.50	62.92	1,203.21	1,155.44	47.76	25.191		
6,700.00	6,661.67	6,711.92	6,475.12	22.51	33.39	83.35	-1,605.21	72.76	1,208.49	1,160.45	48.04	25.153		
6,750.00	6,701.77	6,759.54	6,520.07	22.58	33.59	84.32	-1,613.21	86.23	1,214.02	1,165.66	48.37	25.101		
6,800.00	6,739.44	6,808.44	6,565.02	22.67	33.80	85.12	-1,621.47	103.58	1,219.77	1,171.04	48.74	25.028		
6,850.00	6,774.46	6,858.73	6,609.71	22.79	34.01	85.81	-1,629.98	125.01	1,225.70	1,176.54	49.17	24.930		
6,900.00	6,806.61	6,910.56	6,653.81	22.95	34.22	86.42	-1,638.69	150.78	1,231.77	1,182.11	49.66	24.802		
6,950.00	6,835.71	6,964.05	6,696.96	23.17	34.45	86.96	-1,647.56	181.09	1,237.94	1,187.69	50.25	24.638		
7,000.00	6,861.57	7,019.33	6,738.70	23.48	34.68	87.44	-1,656.55	216.18	1,244.14	1,193.22	50.92	24.432		
7,050.00	6,884.03	7,076.53	6,778.50	23.88	34.93	87.88	-1,665.57	256.23	1,250.33	1,198.62	51.71	24.179		
7,100.00	6,902.97	7,135.76	6,815.75	24.37	35.20	88.28	-1,674.54	301.36	1,256.43	1,203.81	52.62	23.877		
7,150.00	6,918.27	7,197.11	6,849.75	24.96	35.49	88.63	-1,683.36	351.63	1,262.38	1,208.71	53.67	23.522		
7,200.00	6,929.83	7,260.64	6,879.71	25.64	35.81	88.95	-1,691.88	406.98	1,268.10	1,213.23	54.88	23.108		
7,250.00	6,937.59	7,326.38	6,904.76	26.40	36.19	89.21	-1,699.98	467.18	1,273.52	1,217.27	56.25	22.640		
7,300.00	6,941.50	7,394.28	6,940.01	27.23	36.63	89.43	-1,707.46	531.83	1,278.55	1,220.76	57.79	22.125		
7,324.29	6,942.00	7,428.01	6,931.00	27.65	36.87	89.52	-1,710.83	564.65	1,280.83	1,222.23	58.60	21.857		
7,360.79	6,942.06	7,479.78	6,938.35	28.31	37.29	89.84	-1,715.50	615.67	1,283.73	1,223.83	59.90	21.432		
7,400.00	6,942.13	7,536.46	6,941.66	29.06	37.80	89.98	-1,719.91	672.07	1,286.10	1,224.70	61.40	20.947		
7,500.00	6,942.31	7,712.08	6,942.73	31.09	39.78	90.02	-1,728.40	847.44	1,289.68	1,223.77	65.91	19.567		
7,600.00	6,942.48	7,826.70	6,943.03	33.27	41.40	90.02	-1,728.67	962.06	1,288.11	1,217.87	70.24	18.338		
7,700.00	6,942.66	7,926.69	6,943.28	35.58	43.04	90.03	-1,728.78	1,062.05	1,286.47	1,211.80	74.67	17.228		
7,800.00	6,942.83	8,026.67	6,943.53	38.00	44.87	90.03	-1,728.88	1,162.03	1,284.84	1,205.52	79.32	16.199		
7,900.00	6,943.00	8,126.66	6,943.78	40.50	46.87	90.03	-1,728.99	1,262.02	1,283.20	1,199.06	84.14	15.250		
8,000.00	6,943.18	8,226.65	6,944.03	43.06	49.00	90.04	-1,729.10	1,362.00	1,281.56	1,192.44	89.12	14.381		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 647H - OH - Plan #6													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		
8,100.00	6,943.35	8,326.63	6,944.28	45.69	51.24	90.04	-1,729.21	1,461.99	1,279.92	1,185.70	94.22	13.585		
8,200.00	6,943.53	8,426.62	6,944.53	48.36	53.58	90.04	-1,729.31	1,561.98	1,278.28	1,178.86	99.43	12.856		
8,300.00	6,943.70	8,526.61	6,944.79	51.08	55.99	90.05	-1,729.42	1,661.96	1,276.65	1,171.92	104.73	12.190		
8,400.00	6,943.87	8,626.59	6,945.04	53.83	58.47	90.05	-1,729.53	1,761.95	1,275.01	1,164.90	110.11	11.580		
8,500.00	6,944.05	8,726.58	6,945.29	56.60	61.01	90.05	-1,729.64	1,861.94	1,273.37	1,157.82	115.55	11.020		
8,600.00	6,944.22	8,826.57	6,945.54	59.41	63.59	90.06	-1,729.74	1,961.92	1,271.73	1,150.68	121.05	10.505		
8,700.00	6,944.39	8,926.55	6,945.79	62.23	66.22	90.06	-1,729.85	2,061.91	1,270.10	1,143.49	126.61	10.032		
8,800.00	6,944.57	9,026.54	6,946.04	65.08	68.88	90.06	-1,729.96	2,161.89	1,268.46	1,136.25	132.21	9.594		
8,900.00	6,944.74	9,126.53	6,946.29	67.94	71.57	90.07	-1,730.07	2,261.88	1,266.82	1,128.98	137.85	9.190		
9,000.00	6,944.91	9,226.51	6,946.54	70.81	74.29	90.07	-1,730.17	2,361.87	1,265.18	1,121.67	143.52	8.816		
9,100.00	6,945.09	9,326.50	6,946.79	73.70	77.04	90.08	-1,730.28	2,461.85	1,263.55	1,114.33	149.22	8.468		
9,200.00	6,945.26	9,426.48	6,947.04	76.60	79.81	90.08	-1,730.39	2,561.84	1,261.91	1,106.96	154.95	8.144		
9,300.00	6,945.43	9,526.47	6,947.29	79.51	82.59	90.08	-1,730.50	2,661.82	1,260.27	1,099.57	160.70	7.842		
9,400.00	6,945.61	9,626.46	6,947.55	82.43	85.40	90.09	-1,730.60	2,761.81	1,258.63	1,092.15	166.48	7.560		
9,500.00	6,945.78	9,726.44	6,947.80	85.36	88.21	90.09	-1,730.71	2,861.80	1,256.99	1,084.72	172.27	7.297		
9,600.00	6,945.95	9,826.43	6,948.05	88.29	91.05	90.09	-1,730.82	2,961.78	1,255.36	1,077.27	178.08	7.049		
9,700.00	6,946.12	9,926.42	6,948.30	91.23	93.89	90.10	-1,730.93	3,061.77	1,253.72	1,069.81	183.91	6.817		
9,800.00	6,946.30	10,026.40	6,948.55	94.18	96.75	90.10	-1,731.03	3,161.76	1,252.08	1,062.33	189.76	6.598		
9,900.00	6,946.47	10,126.39	6,948.80	97.13	99.62	90.11	-1,731.14	3,261.74	1,250.44	1,054.83	195.61	6.392		
10,000.00	6,946.64	10,226.38	6,949.05	100.09	102.49	90.11	-1,731.25	3,361.73	1,248.81	1,047.33	201.48	6.198		
10,100.00	6,946.82	10,326.36	6,949.30	103.05	105.38	90.11	-1,731.36	3,461.71	1,247.17	1,039.81	207.36	6.015		
10,200.00	6,946.99	10,426.35	6,949.55	106.02	108.27	90.12	-1,731.46	3,561.70	1,245.53	1,032.28	213.25	5.841		
10,300.00	6,947.16	10,526.34	6,949.80	108.99	111.17	90.12	-1,731.57	3,661.69	1,243.89	1,024.75	219.15	5.676		
10,400.00	6,947.33	10,626.32	6,950.05	111.96	114.08	90.12	-1,731.68	3,761.67	1,242.26	1,017.20	225.05	5.520		
10,500.00	6,947.50	10,726.31	6,950.30	114.94	117.00	90.13	-1,731.79	3,861.66	1,240.62	1,009.65	230.97	5.371		
10,600.00	6,947.68	10,826.30	6,950.56	117.92	119.91	90.13	-1,731.89	3,961.65	1,238.98	1,002.09	236.89	5.230		
10,700.00	6,947.85	10,926.28	6,950.81	120.90	122.84	90.14	-1,732.00	4,061.63	1,237.34	994.52	242.82	5.096		
10,800.00	6,948.02	11,026.27	6,951.06	123.88	125.77	90.14	-1,732.11	4,161.62	1,235.71	986.95	248.76	4.968		
10,900.00	6,948.19	11,126.26	6,951.31	126.87	128.70	90.14	-1,732.21	4,261.60	1,234.07	979.37	254.70	4.845		
11,000.00	6,948.36	11,226.24	6,951.56	129.86	131.64	90.15	-1,732.32	4,361.59	1,232.43	971.79	260.64	4.728		
11,100.00	6,948.53	11,326.23	6,951.81	132.85	134.58	90.15	-1,732.43	4,461.58	1,230.79	964.20	266.60	4.617		
11,200.00	6,948.71	11,426.22	6,952.06	135.84	137.53	90.15	-1,732.54	4,561.56	1,229.15	956.60	272.55	4.510		
11,300.00	6,948.88	11,526.20	6,952.31	138.84	140.48	90.16	-1,732.64	4,661.55	1,227.52	949.00	278.51	4.407		
11,400.00	6,949.05	11,626.19	6,952.56	141.84	143.43	90.16	-1,732.75	4,761.53	1,225.88	941.40	284.48	4.309		
11,500.00	6,949.22	11,726.18	6,952.81	144.84	146.39	90.17	-1,732.86	4,861.52	1,224.24	933.79	290.45	4.215		
11,600.00	6,949.39	11,826.16	6,953.06	147.84	149.35	90.17	-1,732.97	4,961.51	1,222.60	926.18	296.42	4.125		
11,700.00	6,949.56	11,926.15	6,953.32	150.84	152.31	90.17	-1,733.07	5,061.49	1,220.97	918.57	302.40	4.038		
11,800.00	6,949.73	12,026.14	6,953.57	153.84	155.27	90.18	-1,733.18	5,161.48	1,219.33	910.95	308.38	3.954		
11,900.00	6,949.91	12,126.12	6,953.82	156.84	158.24	90.18	-1,733.29	5,261.47	1,217.69	903.33	314.36	3.874		
12,000.00	6,950.08	12,226.11	6,954.07	159.85	161.21	90.19	-1,733.40	5,361.45	1,216.05	895.71	320.35	3.796		
12,100.00	6,950.25	12,326.09	6,954.32	162.86	164.18	90.19	-1,733.50	5,461.44	1,214.42	888.08	326.34	3.721		
12,200.00	6,950.42	12,426.08	6,954.57	165.86	167.15	90.19	-1,733.61	5,561.42	1,212.78	880.45	332.33	3.649		
12,300.00	6,950.59	12,526.07	6,954.82	168.87	170.12	90.20	-1,733.72	5,661.41	1,211.14	872.82	338.32	3.580		
12,400.00	6,950.76	12,626.05	6,955.07	171.88	173.10	90.20	-1,733.83	5,761.40	1,209.50	865.19	344.32	3.513		
12,500.00	6,950.93	12,726.04	6,955.32	174.89	176.08	90.21	-1,733.93	5,861.38	1,207.87	857.55	350.31	3.448		
12,600.00	6,951.10	12,826.03	6,955.57	177.90	179.06	90.21	-1,734.04	5,961.37	1,206.23	849.92	356.31	3.385		
12,700.00	6,951.27	12,926.01	6,955.82	180.91	182.04	90.22	-1,734.15	6,061.36	1,204.59	842.28	362.32	3.325		
12,800.00	6,951.44	13,026.00	6,956.08	183.93	185.02	90.22	-1,734.26	6,161.34	1,202.95	834.63	368.32	3.266		
12,900.00	6,951.61	13,125.99	6,956.33	186.94	188.00	90.22	-1,734.36	6,261.33	1,201.32	826.99	374.33	3.209		
13,000.00	6,951.78	13,225.97	6,956.58	189.96	190.99	90.23	-1,734.47	6,361.31	1,199.68	819.35	380.33	3.154		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 647H - OH - Plan #6													Offset Site Error:	0.00 ft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 ft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (ft)	Separation Factor	Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)				
13,100.00	6,951.95	13,325.96	6,956.83	192.97	193.98	90.23	-1,734.58	6,461.30	1,198.04	811.70	386.34	3.101		
13,200.00	6,952.12	13,425.95	6,957.08	195.99	196.96	90.24	-1,734.69	6,561.29	1,196.40	804.05	392.35	3.049		
13,300.00	6,952.29	13,525.93	6,957.33	199.00	199.95	90.24	-1,734.79	6,661.27	1,194.77	796.40	398.37	2.999		
13,400.00	6,952.46	13,625.92	6,957.58	202.02	202.94	90.24	-1,734.90	6,761.26	1,193.13	788.75	404.38	2.951		
13,500.00	6,952.63	13,725.91	6,957.83	205.04	205.93	90.25	-1,735.01	6,861.24	1,191.49	781.10	410.39	2.903		
13,600.00	6,952.80	13,825.89	6,958.08	208.05	208.93	90.25	-1,735.12	6,961.23	1,189.85	773.44	416.41	2.857		
13,700.00	6,952.97	13,925.88	6,958.33	211.07	211.92	90.26	-1,735.22	7,061.22	1,188.22	765.79	422.43	2.813		
13,800.00	6,953.14	14,025.87	6,958.58	214.09	214.91	90.26	-1,735.33	7,161.20	1,186.58	758.13	428.45	2.769		
13,900.00	6,953.31	14,125.85	6,958.83	217.11	217.91	90.27	-1,735.44	7,261.19	1,184.94	750.48	434.47	2.727		
14,000.00	6,953.48	14,225.84	6,959.09	220.13	220.90	90.27	-1,735.54	7,361.18	1,183.30	742.82	440.49	2.686		
14,100.00	6,953.65	14,325.83	6,959.34	223.15	223.90	90.27	-1,735.65	7,461.16	1,181.67	735.16	446.51	2.646		
14,200.00	6,953.82	14,425.81	6,959.59	226.17	226.90	90.28	-1,735.76	7,561.15	1,180.03	727.50	452.53	2.608		
14,300.00	6,953.99	14,525.80	6,959.84	229.19	229.90	90.28	-1,735.87	7,661.13	1,178.39	719.84	458.56	2.570		
14,400.00	6,954.15	14,625.79	6,960.09	232.21	232.89	90.29	-1,735.97	7,761.12	1,176.76	712.17	464.58	2.533		
14,500.00	6,954.32	14,725.77	6,960.34	235.23	235.89	90.29	-1,736.08	7,861.11	1,175.12	704.51	470.61	2.497		
14,600.00	6,954.49	14,825.76	6,960.59	238.25	238.89	90.30	-1,736.19	7,961.09	1,173.48	696.85	476.63	2.462		
14,700.00	6,954.66	14,925.75	6,960.84	241.28	241.90	90.30	-1,736.30	8,061.08	1,171.84	689.18	482.66	2.428		
14,800.00	6,954.83	15,025.73	6,961.09	244.30	244.90	90.31	-1,736.40	8,161.06	1,170.21	681.52	488.69	2.395		
14,900.00	6,955.00	15,125.72	6,961.34	247.32	247.90	90.31	-1,736.51	8,261.05	1,168.57	673.85	494.72	2.362		
15,000.00	6,955.17	15,225.71	6,961.59	250.34	250.90	90.31	-1,736.62	8,361.04	1,166.93	666.18	500.75	2.330		
15,100.00	6,955.34	15,325.69	6,961.85	253.37	253.90	90.32	-1,736.73	8,461.02	1,165.29	658.51	506.78	2.299		
15,200.00	6,955.50	15,425.68	6,962.10	256.39	256.91	90.32	-1,736.83	8,561.01	1,163.66	650.84	512.81	2.269		
15,300.00	6,955.67	15,525.66	6,962.35	259.42	259.91	90.33	-1,736.94	8,661.00	1,162.02	643.18	518.84	2.240		
15,400.00	6,955.84	15,625.65	6,962.60	262.44	262.92	90.33	-1,737.05	8,760.98	1,160.38	635.51	524.88	2.211		
15,500.00	6,956.01	15,725.64	6,962.85	265.46	265.92	90.34	-1,737.16	8,860.97	1,158.74	627.84	530.91	2.183		
15,600.00	6,956.18	15,825.62	6,963.10	268.49	268.93	90.34	-1,737.26	8,960.95	1,157.11	620.16	536.94	2.155		
15,700.00	6,956.34	15,925.61	6,963.35	271.51	271.93	90.35	-1,737.37	9,060.94	1,155.47	612.49	542.98	2.128		
15,800.00	6,956.51	16,025.60	6,963.60	274.54	274.94	90.35	-1,737.48	9,160.93	1,153.83	604.82	549.01	2.102		
15,900.00	6,956.68	16,125.58	6,963.85	277.56	277.95	90.36	-1,737.59	9,260.91	1,152.20	597.15	555.05	2.076		
16,000.00	6,956.85	16,225.57	6,964.10	280.59	280.95	90.36	-1,737.69	9,360.90	1,150.56	589.47	561.08	2.051		
16,100.00	6,957.02	16,325.56	6,964.35	283.62	283.96	90.36	-1,737.80	9,460.89	1,148.92	581.80	567.12	2.026		
16,200.00	6,957.18	16,425.54	6,964.60	286.64	286.97	90.37	-1,737.91	9,560.87	1,147.28	574.13	573.16	2.002		
16,300.00	6,957.35	16,525.53	6,964.86	289.67	289.98	90.37	-1,738.02	9,660.86	1,145.65	566.45	579.19	1.978		
16,400.00	6,957.52	16,625.52	6,965.11	292.70	292.99	90.38	-1,738.12	9,760.84	1,144.01	558.78	585.23	1.955		
16,500.00	6,957.69	16,725.50	6,965.36	295.72	296.00	90.38	-1,738.23	9,860.83	1,142.37	551.10	591.27	1.932		
16,600.00	6,957.85	16,825.49	6,965.61	298.75	299.01	90.39	-1,738.34	9,960.82	1,140.73	543.43	597.31	1.910		
16,700.00	6,958.02	16,925.48	6,965.86	301.78	302.02	90.39	-1,738.45	10,060.80	1,139.10	535.75	603.35	1.888		
16,800.00	6,958.19	17,025.46	6,966.11	304.80	305.03	90.40	-1,738.55	10,160.79	1,137.46	528.07	609.39	1.867		
16,900.00	6,958.35	17,125.45	6,966.36	307.83	308.04	90.40	-1,738.66	10,260.77	1,135.82	520.39	615.43	1.846		
17,000.00	6,958.52	17,225.44	6,966.61	310.86	311.05	90.41	-1,738.77	10,360.76	1,134.19	512.72	621.47	1.825		
17,100.00	6,958.69	17,325.42	6,966.86	313.88	314.06	90.41	-1,738.88	10,460.75	1,132.55	505.04	627.51	1.805		
17,200.00	6,958.86	17,425.41	6,967.11	316.91	317.07	90.42	-1,738.98	10,560.73	1,130.91	497.36	633.55	1.785		
17,300.00	6,959.02	17,525.40	6,967.36	319.94	320.08	90.42	-1,739.09	10,660.72	1,129.27	489.68	639.59	1.766		
17,400.00	6,959.19	17,625.38	6,967.62	322.97	323.09	90.43	-1,739.20	10,760.71	1,127.64	482.00	645.63	1.747		
17,500.00	6,959.36	17,725.37	6,967.87	326.00	326.11	90.43	-1,739.30	10,860.69	1,126.00	474.32	651.68	1.728		
17,571.69	6,959.47	17,778.68	6,968.00	328.17	327.71	90.43	-1,739.36	10,914.00	1,124.98	469.26	655.72	1.716		
17,600.00	6,959.52	17,778.68	6,968.00	329.02	327.71	90.43	-1,739.36	10,914.00	1,125.33	468.68	656.65	1.714 SF		
17,700.00	6,959.69	17,778.68	6,968.00	332.05	327.71	90.43	-1,739.36	10,914.00	1,132.26	475.62	656.65	1.724		
17,800.00	6,959.85	17,778.68	6,968.00	335.08	327.71	90.43	-1,739.36	10,914.00	1,147.90	496.18	651.72	1.761		
17,900.00	6,960.02	17,778.68	6,968.00	338.11	327.71	90.43	-1,739.36	10,914.00	1,171.89	529.53	642.36	1.824		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 647H - OH - Plan #6														Offset Site Error:	0.00 ft
Survey Program: 0-MWD+HDGM														Offset Well Error:	0.00 ft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (ft)	Separation Factor	Warning		
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)					
18,000.00	6,960.19	17,778.68	6,968.00	341.14	327.71	90.43	-1,739.36	10,914.00	1,203.74	574.45	629.29	1.913			
18,100.00	6,960.35	17,778.68	6,968.00	344.17	327.71	90.43	-1,739.36	10,914.00	1,242.83	629.49	613.34	2.026			
18,200.00	6,960.52	17,778.68	6,968.00	347.20	327.71	90.43	-1,739.36	10,914.00	1,288.52	693.17	595.35	2.164			
18,300.00	6,960.68	17,778.68	6,968.00	350.23	327.71	90.43	-1,739.36	10,914.00	1,340.13	764.05	576.08	2.326			
18,400.00	6,960.85	17,778.68	6,968.00	353.26	327.71	90.43	-1,739.36	10,914.00	1,396.99	840.82	556.17	2.512			
18,500.00	6,961.02	17,778.68	6,968.00	356.28	327.71	90.43	-1,739.36	10,914.00	1,458.51	922.36	536.15	2.720			
18,600.00	6,961.18	17,778.68	6,968.00	359.31	327.71	90.43	-1,739.36	10,914.00	1,524.11	1,007.71	516.39	2.951			
18,700.00	6,961.35	17,778.68	6,968.00	362.34	327.71	90.43	-1,739.36	10,914.00	1,593.28	1,096.10	497.19	3.205			
18,800.00	6,961.51	17,778.68	6,968.00	365.37	327.71	90.43	-1,739.36	10,914.00	1,665.59	1,186.89	478.70	3.479			
18,900.00	6,961.68	17,778.68	6,968.00	368.40	327.71	90.43	-1,739.36	10,914.00	1,740.65	1,279.58	461.07	3.775			
19,000.00	6,961.84	17,778.68	6,968.00	371.43	327.71	90.43	-1,739.36	10,914.00	1,818.11	1,373.78	444.33	4.092			
19,100.00	6,962.01	17,778.68	6,968.00	374.46	327.71	90.43	-1,739.36	10,914.00	1,897.67	1,469.17	428.51	4.429			
19,200.00	6,962.17	17,778.68	6,968.00	377.49	327.71	90.43	-1,739.36	10,914.00	1,979.10	1,565.50	413.60	4.785			
19,300.00	6,962.34	17,778.68	6,968.00	380.52	327.71	90.43	-1,739.36	10,914.00	2,062.15	1,662.58	399.57	5.161			
19,400.00	6,962.51	17,778.68	6,968.00	383.55	327.71	90.43	-1,739.36	10,914.00	2,146.65	1,760.25	386.40	5.555			
19,500.00	6,962.67	17,778.68	6,968.00	386.58	327.71	90.43	-1,739.36	10,914.00	2,232.44	1,858.40	374.04	5.969			
19,600.00	6,962.84	17,778.68	6,968.00	389.61	327.71	90.43	-1,739.36	10,914.00	2,319.36	1,956.93	362.43	6.400			
19,700.00	6,963.00	17,778.68	6,968.00	392.64	327.71	90.43	-1,739.36	10,914.00	2,407.30	2,055.77	351.53	6.848			
19,800.00	6,963.16	17,778.68	6,968.00	395.67	327.71	90.43	-1,739.36	10,914.00	2,496.14	2,154.85	341.30	7.314			
19,900.00	6,963.33	17,778.68	6,968.00	398.70	327.71	90.43	-1,739.36	10,914.00	2,585.81	2,254.12	331.68	7.796			
20,000.00	6,963.49	17,778.68	6,968.00	401.73	327.71	90.43	-1,739.36	10,914.00	2,676.20	2,353.56	322.64	8.295			
20,100.00	6,963.66	17,778.68	6,968.00	404.77	327.71	90.43	-1,739.36	10,914.00	2,767.25	2,453.12	314.14	8.809			
20,200.00	6,963.82	17,778.68	6,968.00	407.80	327.71	90.43	-1,739.36	10,914.00	2,858.91	2,552.78	306.13	9.339			
20,307.78	6,964.00	17,778.68	6,968.00	411.06	327.71	90.43	-1,739.36	10,914.00	2,958.29	2,660.29	298.00	9.927			



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 648H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 25-NS-GYRO-MS, 390-SDI MWD, 6638-SDI MWD, 7777-SDI MWD													Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Vertical	Reference	Semi Major Axis	Offset	Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning
Measured	Depth	Depth	Depth	Reference	Reference	Offset	Tooface	+N/-S	+E/-W	Between	Between	Separation	Factor	
Depth	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	Centres	Ellipses	(ft)		
0.00	0.00	0.51	0.51	0.00	0.00	0.00	-77.18	9.97	-43.82	44.94				
393.00	392.99	393.66	393.64	0.66	0.79	-123.33	7.44	-45.48	47.06	45.62	1.45	32.545		
483.00	482.99	483.02	483.00	0.97	0.84	123.82	6.21	-45.87	47.89	46.08	1.81	26.430		
578.00	577.96	577.09	577.00	1.30	0.93	109.79	3.73	-48.05	50.80	48.56	2.24	22.705		
673.00	672.85	671.09	670.83	1.64	1.07	102.15	-0.51	-51.90	55.47	52.75	2.71	20.434		
765.00	764.65	761.78	761.07	1.96	1.26	101.02	-7.34	-57.53	61.84	58.62	3.22	19.189		
855.00	854.37	850.24	848.74	2.29	1.48	101.24	-16.62	-64.75	70.17	66.41	3.76	18.655		
952.00	950.95	945.48	942.73	2.65	1.77	102.92	-28.87	-74.09	81.63	77.25	4.38	18.645		
1,077.00	1,075.26	1,068.50	1,063.76	3.13	2.20	99.98	-46.46	-87.36	98.66	93.46	5.21	18.947		
1,172.00	1,169.69	1,161.80	1,155.26	3.49	2.55	85.62	-61.31	-97.96	111.41	105.55	5.85	19.031		
1,300.00	1,297.07	1,287.70	1,278.52	3.97	3.06	81.49	-81.88	-113.23	128.30	121.57	6.73	19.074		
1,395.00	1,391.63	1,381.48	1,370.15	4.34	3.45	77.56	-98.22	-124.65	141.08	133.71	7.37	19.144		
1,490.00	1,486.24	1,474.24	1,460.60	4.70	3.84	76.59	-115.24	-136.30	154.70	146.70	8.00	19.331		
1,586.00	1,582.02	1,568.95	1,552.89	5.05	4.24	82.96	-132.52	-148.66	170.19	161.57	8.61	19.757		
1,681.00	1,676.87	1,663.81	1,645.33	5.40	4.62	85.00	-150.57	-159.95	185.99	176.79	9.20	20.215		
1,776.00	1,771.67	1,756.41	1,735.52	5.75	5.02	88.17	-168.74	-170.53	202.38	192.58	9.80	20.658		
1,872.00	1,867.43	1,849.20	1,825.70	6.11	5.45	73.53	-187.54	-181.60	219.41	209.00	10.41	21.070		
1,966.00	1,961.25	1,941.87	1,915.70	6.46	5.88	55.37	-206.53	-192.85	235.38	224.37	11.01	21.386		
2,061.00	2,056.10	2,037.22	2,008.42	6.81	6.27	47.18	-225.78	-204.00	250.62	239.04	11.57	21.656		
2,156.00	2,150.95	2,131.87	2,100.66	7.15	6.64	42.81	-244.11	-214.69	264.95	252.83	12.13	21.851		
2,252.00	2,246.71	2,225.46	2,191.89	7.50	7.03	39.67	-262.03	-225.43	278.62	265.92	12.70	21.945		
2,347.00	2,341.39	2,318.69	2,282.65	7.86	7.44	36.65	-280.32	-236.45	291.80	278.52	13.28	21.976		
2,442.00	2,436.07	2,415.13	2,376.63	8.21	7.84	38.99	-298.61	-247.94	304.90	291.03	13.87	21.980		
2,537.00	2,530.82	2,509.24	2,468.55	8.56	8.22	46.72	-315.57	-258.89	318.41	303.95	14.45	22.030		
2,632.00	2,625.64	2,605.13	2,562.24	8.92	8.62	68.61	-332.59	-270.24	333.94	318.89	15.05	22.184		
2,728.00	2,721.53	2,700.63	2,655.71	9.26	8.99	86.72	-348.84	-281.10	351.02	335.38	15.64	22.442		
2,823.00	2,816.43	2,793.64	2,746.79	9.60	9.37	105.77	-364.33	-291.88	369.50	353.29	16.21	22.789		
2,918.00	2,911.32	2,887.32	2,838.53	9.94	9.74	107.92	-379.95	-302.67	388.84	372.05	16.79	23.158		
3,013.00	3,006.17	2,982.90	2,932.18	10.28	10.11	96.89	-395.86	-313.25	407.60	390.22	17.38	23.454		
3,109.00	3,101.98	3,081.20	3,028.62	10.63	10.48	90.81	-411.92	-323.40	425.14	407.15	17.99	23.630		
3,204.00	3,196.73	3,183.32	3,129.20	10.98	10.84	97.10	-426.34	-333.54	441.09	422.47	18.63	23.680		
3,299.00	3,291.42	3,267.01	3,211.66	11.33	11.14	85.26	-437.43	-342.48	456.77	437.59	19.19	23.806		
3,395.00	3,387.03	3,357.01	3,299.99	11.69	11.51	72.30	-450.58	-353.64	472.87	453.08	19.80	23.885		
3,490.00	3,481.56	3,443.80	3,384.94	12.06	11.87	70.57	-463.98	-365.35	488.74	468.34	20.40	23.958		
3,585.00	3,576.12	3,539.58	3,478.70	12.42	12.27	61.50	-478.84	-378.12	503.92	482.88	21.05	23.942		
3,680.00	3,670.84	3,641.62	3,578.76	12.78	12.66	45.49	-494.30	-390.75	517.51	495.82	21.69	23.856		
3,775.00	3,765.61	3,742.24	3,677.69	13.13	13.03	39.75	-508.87	-401.91	529.04	506.73	22.31	23.717		
3,871.00	3,861.42	3,838.04	3,772.02	13.48	13.37	42.99	-522.05	-412.24	540.50	517.61	22.89	23.615		
3,966.00	3,956.30	3,929.79	3,862.32	13.83	13.71	51.25	-534.63	-422.53	553.39	529.94	23.45	23.601		
4,061.00	4,051.20	4,023.23	3,954.24	14.17	14.07	56.53	-547.86	-432.86	567.08	543.06	24.02	23.609		
4,156.00	4,146.11	4,111.94	4,041.42	14.52	14.41	65.03	-560.77	-442.90	581.70	557.13	24.57	23.676		
4,251.00	4,241.00	4,202.47	4,130.18	14.86	14.78	54.72	-574.92	-453.85	597.29	572.15	25.13	23.764		
4,347.00	4,336.86	4,306.20	4,232.12	15.22	15.18	51.67	-590.27	-465.29	610.95	585.18	25.77	23.706		
4,442.00	4,431.69	4,393.13	4,317.52	15.57	15.51	56.26	-603.15	-475.19	624.62	598.30	26.32	23.731		
4,536.00	4,525.51	4,487.25	4,409.77	15.91	15.89	51.59	-618.10	-486.32	638.90	611.98	26.91	23.738		
4,632.00	4,621.31	4,588.14	4,508.94	16.27	16.28	50.65	-633.37	-496.89	651.57	624.03	27.54	23.656		
4,727.00	4,716.11	4,684.96	4,604.03	16.62	16.65	54.76	-648.43	-507.10	664.54	636.39	28.15	23.608		
4,821.00	4,809.89	4,780.10	4,697.66	16.97	17.00	55.80	-662.49	-516.40	676.41	647.66	28.75	23.531		
4,916.00	4,904.64	4,865.96	4,782.10	17.33	17.33	58.54	-675.01	-525.64	689.05	659.75	29.30	23.515		
5,011.00	4,999.37	4,964.28	4,878.65	17.69	17.71	58.42	-689.71	-537.00	702.59	672.66	29.93	23.472		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 648H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 25-NS-GYRO-MS, 390-SDI MWD, 6638-SDI MWD, 7777-SDI MWD													Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Vertical	Reference	Semi Major Axis	Offset	Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning
Measured	Depth	Measured	Depth	Reference	Reference	Offset	Toolface	+N/-S	+E/-W	Between	Between	Separation	Factor	
Depth	(ft)	Depth	(ft)	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	Centres	Ellipses	(ft)		
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
5,109.00	5,097.08	5,059.81	4,972.66	18.06	18.07	61.29	-703.22	-547.32	715.44	684.89	30.55	23.417		
5,204.00	5,191.74	5,141.80	5,053.14	18.42	18.40	59.53	-715.54	-556.95	728.89	697.79	31.10	23.436		
5,299.00	5,286.40	5,233.72	5,143.08	18.78	18.78	62.89	-730.69	-568.36	743.72	712.01	31.71	23.454		
5,363.00	5,350.22	5,300.87	5,208.85	19.02	19.05	62.70	-741.73	-576.27	753.73	721.58	32.15	23.448		
5,458.00	5,444.99	5,395.69	5,301.77	19.37	19.43	60.42	-757.10	-587.19	768.43	735.68	32.75	23.464		
5,521.00	5,507.84	5,456.45	5,361.33	19.61	19.66	60.75	-766.67	-594.46	778.21	745.07	33.14	23.483		
5,585.00	5,571.69	5,519.79	5,423.39	19.84	19.92	59.68	-776.87	-601.95	788.19	754.65	33.55	23.496		
5,648.00	5,634.55	5,582.03	5,484.33	20.08	20.17	58.49	-787.43	-608.92	797.93	763.99	33.94	23.507		
5,712.00	5,698.39	5,644.85	5,545.83	20.32	20.43	59.73	-798.28	-615.83	807.80	773.46	34.35	23.519		
5,776.00	5,762.24	5,705.62	5,605.28	20.56	20.68	62.94	-808.82	-622.63	817.99	783.25	34.74	23.547		
5,839.00	5,825.12	5,766.98	5,665.31	20.79	20.93	64.54	-819.48	-629.64	828.46	793.32	35.13	23.581		
5,903.00	5,889.00	5,832.62	5,729.50	21.03	21.21	64.59	-830.99	-637.04	839.20	803.65	35.55	23.606		
5,966.00	5,951.88	5,907.31	5,802.70	21.26	21.50	66.52	-843.61	-644.91	849.15	813.13	36.02	23.575		
6,030.00	6,015.74	5,984.24	5,878.30	21.50	21.79	67.13	-855.87	-652.11	858.31	821.82	36.49	23.522		
6,093.00	6,078.59	6,054.31	5,947.31	21.74	22.04	67.18	-866.52	-657.92	866.46	829.55	36.92	23.470		
6,157.00	6,142.42	6,127.33	6,019.31	21.97	22.29	76.00	-877.33	-663.45	874.52	837.16	37.36	23.408		
6,220.00	6,205.25	6,208.59	6,099.53	22.21	22.56	68.65	-889.45	-668.00	881.51	843.69	37.82	23.307		
6,243.83	6,229.01	6,244.70	6,135.21	22.26	22.67	63.61	-894.91	-669.12	883.53	845.57	37.96	23.275		
6,300.00	6,285.05	6,322.11	6,211.73	22.27	22.90	63.32	-906.62	-669.58	887.05	848.90	38.14	23.256		
6,323.33	6,308.32	6,352.58	6,241.86	22.27	22.98	63.20	-911.13	-669.27	888.17	849.96	38.21	23.246		
6,350.00	6,334.92	6,392.04	6,280.90	22.28	23.09	90.96	-916.82	-668.46	889.62	851.34	38.29	23.236		
6,400.00	6,384.57	6,471.53	6,359.61	22.30	23.28	115.13	-927.35	-665.07	893.50	855.07	38.42	23.253		
6,450.00	6,433.72	6,523.05	6,410.68	22.32	23.38	124.30	-933.53	-662.38	899.70	861.11	38.59	23.317		
6,500.00	6,482.07	6,574.85	6,462.10	22.34	23.49	128.78	-939.23	-659.73	908.72	869.95	38.77	23.438		
6,550.00	6,529.32	6,626.21	6,513.15	22.37	23.58	131.34	-944.35	-657.29	920.63	881.66	38.97	23.623		
6,600.00	6,575.18	6,671.21	6,557.83	22.41	23.62	132.81	-949.04	-654.91	935.50	896.35	39.14	23.900		
6,650.00	6,619.39	7,858.18	7,250.41	22.45	23.27	110.55	-1,069.30	131.53	911.40	881.28	30.12	30.257		
6,700.00	6,661.67	7,881.71	7,250.13	22.51	23.34	113.09	-1,069.60	155.06	880.46	849.36	31.10	28.315		
6,750.00	6,701.77	7,908.47	7,249.92	22.58	23.45	114.92	-1,069.96	181.81	852.13	820.03	32.10	26.547		
6,800.00	6,739.44	7,939.56	7,249.73	22.67	23.59	116.11	-1,070.42	212.90	826.52	793.33	33.19	24.901		
6,850.00	6,774.46	7,973.51	7,249.45	22.79	23.76	116.85	-1,071.05	246.83	803.68	769.34	34.33	23.408		
6,900.00	6,806.61	8,011.05	7,249.05	22.95	23.98	117.18	-1,071.90	284.36	783.63	748.10	35.53	22.058		
6,950.00	6,835.71	8,057.82	7,248.72	23.17	24.30	117.00	-1,072.59	331.13	766.10	729.27	36.83	20.801		
7,000.00	6,861.57	8,105.38	7,248.71	23.48	24.68	116.77	-1,072.62	378.68	750.81	712.65	38.15	19.678		
7,050.00	6,884.03	8,148.68	7,248.91	23.88	25.06	116.66	-1,072.45	421.99	737.91	698.36	39.55	18.657		
7,100.00	6,902.97	8,193.47	7,249.29	24.37	25.50	116.49	-1,072.27	466.78	727.44	686.46	40.98	17.750		
7,150.00	6,918.27	8,238.54	7,249.75	24.96	26.00	116.31	-1,072.21	511.84	719.33	676.83	42.50	16.926		
7,200.00	6,929.83	8,285.39	7,250.23	25.64	26.55	116.12	-1,072.34	558.69	713.51	669.47	44.04	16.201		
7,250.00	6,937.59	8,337.95	7,250.87	26.40	27.23	115.95	-1,072.35	611.24	709.66	664.01	45.65	15.547		
7,262.14	6,938.90	8,350.79	7,251.04	26.60	27.40	115.93	-1,072.31	624.09	708.99	662.95	46.04	15.401		
7,300.00	6,941.50	8,388.89	7,251.53	27.23	27.94	115.91	-1,072.13	662.18	707.58	660.35	47.24	14.980		
7,305.34	6,941.69	8,394.03	7,251.56	27.32	28.01	115.91	-1,072.12	667.32	707.48	660.07	47.41	14.923		
7,324.29	6,942.00	8,412.26	7,251.63	27.65	28.28	115.91	-1,072.15	685.55	707.29	659.28	48.01	14.732		
7,332.09	6,942.01	8,419.77	7,251.62	27.79	28.39	115.91	-1,072.18	693.06	707.27	659.01	48.26	14.654		
7,360.79	6,942.06	8,447.39	7,251.44	28.31	28.81	115.90	-1,072.40	720.68	707.05	657.86	49.19	14.373		
7,369.36	6,942.08	8,455.64	7,251.34	28.48	28.93	115.90	-1,072.50	728.93	706.96	657.48	49.48	14.289		
7,400.00	6,942.13	8,484.61	7,250.88	29.06	29.39	115.86	-1,072.93	757.89	706.66	656.13	50.52	13.987		
7,421.59	6,942.17	8,504.96	7,250.53	29.49	29.72	115.83	-1,073.30	778.23	706.49	655.20	51.29	13.774		
7,500.00	6,942.31	8,581.45	7,249.25	31.09	31.01	115.72	-1,074.96	854.70	706.15	652.03	54.12	13.048		
7,521.38	6,942.34	8,603.50	7,249.24	31.55	31.39	115.72	-1,075.26	876.74	706.06	651.13	54.93	12.855		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 648H - OH - OH												Offset Site Error:	0.00 ft
Survey Program: 25-NS-GYRO-MS, 390-SDI MWD, 6638-SDI MWD, 7777-SDI MWD												Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Vertical	Reference	Semi Major Axis	Offset	Highside	Offset Wellbore Centre		Distance		Minimum	Separation
Measured	Depth	Depth	Depth	Reference	Reference	Offset	Toolface	+N/-S	+E/-W	Between	Between	Separation	Factor
Depth	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	Centres	Ellipses	(ft)	Warning
7,600.00	6,942.48	8,686.00	7,250.70	33.27	32.86	115.86	-1,075.39	959.23	705.49	647.63	57.85	12.194	
7,621.88	6,942.52	8,709.34	7,251.08	33.78	33.29	115.90	-1,075.33	982.56	705.24	646.54	58.70	12.014	
7,700.00	6,942.66	8,790.79	7,251.99	35.58	34.82	116.02	-1,075.00	1,064.01	704.04	642.29	61.75	11.401	
7,722.28	6,942.69	8,813.82	7,252.20	36.12	35.26	116.05	-1,074.86	1,087.04	703.65	641.00	62.64	11.232	
7,800.00	6,942.83	8,894.32	7,252.34	38.00	36.85	116.12	-1,074.45	1,167.54	702.07	636.25	65.82	10.667	
7,822.55	6,942.87	8,913.02	7,252.18	38.56	37.22	116.12	-1,074.40	1,186.23	701.57	634.82	66.74	10.511	
7,900.00	6,943.00	8,986.96	7,251.36	40.50	38.73	116.08	-1,074.70	1,260.17	700.22	630.19	70.03	9.999	
7,922.13	6,943.04	9,008.58	7,251.11	41.06	39.17	116.06	-1,074.97	1,281.79	699.99	629.00	70.99	9.861	
8,000.00	6,943.18	9,103.71	7,250.10	43.06	41.16	116.06	-1,074.47	1,376.91	697.94	623.50	74.43	9.377	
8,023.25	6,943.22	9,124.35	7,249.90	43.67	41.60	116.06	-1,074.17	1,397.55	697.15	621.70	75.44	9.241	
8,100.00	6,943.35	9,193.21	7,249.24	45.69	43.07	116.06	-1,073.76	1,466.40	695.15	616.35	78.80	8.822	
8,122.30	6,943.39	9,214.58	7,249.05	46.29	43.54	116.06	-1,073.77	1,487.77	694.70	614.90	79.80	8.706	
8,200.00	6,943.53	9,293.76	7,248.47	48.36	45.26	116.05	-1,073.92	1,566.94	693.32	610.02	83.30	8.323	
8,223.10	6,943.57	9,323.26	7,248.43	48.99	45.91	116.07	-1,073.62	1,596.44	692.71	608.36	84.35	8.212	
8,300.00	6,943.70	9,410.14	7,248.98	51.08	47.82	116.26	-1,070.95	1,683.27	689.51	601.77	87.74	7.859	
8,324.06	6,943.74	9,434.61	7,249.21	51.74	48.36	116.32	-1,070.04	1,707.73	688.41	599.62	88.79	7.753	
8,400.00	6,943.87	9,509.88	7,249.75	53.83	50.04	116.50	-1,067.30	1,782.95	684.93	592.79	92.14	7.434	
8,423.97	6,943.92	9,533.42	7,249.74	54.49	50.56	116.54	-1,066.56	1,806.47	683.85	590.64	93.21	7.336	
8,500.00	6,944.05	9,610.31	7,249.48	56.60	52.30	116.65	-1,064.24	1,883.33	680.45	583.80	96.64	7.041	
8,524.08	6,944.09	9,634.81	7,249.45	57.28	52.85	116.69	-1,063.44	1,907.82	679.34	581.61	97.73	6.951	
8,600.00	6,944.22	9,708.58	7,248.82	59.41	54.54	116.76	-1,061.39	1,981.55	675.92	574.72	101.20	6.679	
8,623.85	6,944.26	9,729.02	7,248.41	60.08	55.01	116.75	-1,060.99	2,001.99	674.90	572.59	102.32	6.596	
8,700.00	6,944.39	9,801.07	7,246.54	62.23	56.68	116.68	-1,060.23	2,074.01	672.06	566.12	105.94	6.344	
8,723.14	6,944.43	9,822.32	7,245.90	62.89	57.17	116.64	-1,060.21	2,095.24	671.35	564.29	107.06	6.271	
8,800.00	6,944.57	9,899.17	7,243.69	65.08	58.96	116.52	-1,060.19	2,172.06	669.08	558.28	110.80	6.039	
8,822.99	6,944.61	9,921.24	7,243.12	65.74	59.48	116.49	-1,060.15	2,194.12	668.41	556.49	111.91	5.973	
8,900.00	6,944.74	9,991.90	7,241.27	67.94	61.14	116.37	-1,060.51	2,264.76	666.60	550.94	115.66	5.763	
8,922.16	6,944.78	10,011.56	7,240.75	68.58	61.60	116.33	-1,060.76	2,284.42	666.22	549.48	116.75	5.706	
9,000.00	6,944.91	10,078.33	7,239.35	70.81	63.19	116.20	-1,062.18	2,351.15	665.71	545.18	120.53	5.523	
9,004.45	6,944.92	10,082.15	7,239.29	70.94	63.28	116.19	-1,062.29	2,354.97	665.72	544.97	120.75	5.513	
9,100.00	6,945.09	10,174.98	7,238.29	73.70	65.49	116.06	-1,065.08	2,447.75	666.27	540.82	125.46	5.311	
9,120.88	6,945.12	10,197.15	7,238.17	74.31	66.02	116.04	-1,065.70	2,469.92	666.41	539.91	126.50	5.268	
9,200.00	6,945.26	10,283.97	7,237.39	76.60	68.10	115.96	-1,067.53	2,556.71	666.29	535.83	130.45	5.108	
9,221.60	6,945.30	10,305.99	7,237.21	77.23	68.63	115.94	-1,067.84	2,578.73	666.13	534.62	131.52	5.065	
9,300.00	6,945.43	10,385.72	7,237.15	79.51	70.54	115.95	-1,068.58	2,658.45	665.47	530.16	135.32	4.918	
9,321.65	6,945.47	10,407.60	7,237.25	80.14	71.07	115.96	-1,068.71	2,680.33	665.27	528.91	136.35	4.879	
9,400.00	6,945.61	10,490.77	7,237.79	82.43	73.07	116.04	-1,068.89	2,763.51	664.37	524.27	140.10	4.742	
9,422.50	6,945.65	10,516.49	7,237.84	83.09	73.69	116.07	-1,068.78	2,789.22	663.93	522.76	141.18	4.703	
9,500.00	6,945.78	10,600.85	7,237.42	85.36	75.72	116.11	-1,067.90	2,873.58	661.76	516.85	144.91	4.567	
9,523.37	6,945.82	10,625.62	7,237.13	86.04	76.31	116.11	-1,067.58	2,898.35	660.98	514.94	146.04	4.526	
9,600.00	6,945.95	10,702.61	7,235.77	88.29	78.17	116.08	-1,066.64	2,975.32	658.29	508.47	149.81	4.394	
9,623.40	6,945.99	10,725.87	7,235.25	88.98	78.73	116.06	-1,066.42	2,998.57	657.47	506.49	150.98	4.355	
9,700.00	6,946.12	10,796.81	7,234.08	91.23	80.45	116.03	-1,065.87	3,069.50	655.12	500.36	154.76	4.233	
9,722.69	6,946.16	10,821.02	7,233.95	91.90	81.04	116.04	-1,065.71	3,093.71	654.57	498.71	155.86	4.200	
9,800.00	6,946.30	10,892.05	7,233.62	94.18	82.76	116.06	-1,065.51	3,164.73	652.93	493.31	159.62	4.091	
9,822.30	6,946.34	10,913.60	7,233.45	94.84	83.29	116.06	-1,065.55	3,186.28	652.52	491.81	160.71	4.060	
9,900.00	6,946.47	10,991.77	7,233.38	97.13	85.19	116.10	-1,065.44	3,264.45	651.11	486.63	164.48	3.959	
9,922.43	6,946.51	11,016.10	7,233.56	97.79	85.79	116.13	-1,065.27	3,288.78	650.68	485.14	165.54	3.931	
10,000.00	6,946.64	11,107.16	7,234.12	100.09	88.00	116.30	-1,063.47	3,379.82	648.25	479.13	169.12	3.833	
10,100.00	6,946.82	11,220.15	7,233.90	103.05	90.74	116.54	-1,058.48	3,492.70	642.50	468.90	173.61	3.701	

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 648H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 25-NS-GYRO-MS, 390-SDI MWD, 6638-SDI MWD, 7777-SDI MWD													Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Vertical	Reference	Semi Major Axis	Offset	Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning
Measured	Depth	Depth	Depth	Reference	Reference	Offset	Toolface	+N/-S	+E/-W	Between	Between	Separation	Factor	
Depth	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	Centres	Ellipses	(ft)		
10,200.00	6,946.99	11,319.07	7,234.37	106.02	93.14	116.84	-1,053.39	3,591.48	636.48	458.40	178.08	3.574		
10,300.00	6,947.16	11,418.91	7,233.03	108.99	95.56	116.97	-1,048.92	3,691.21	630.24	447.47	182.78	3.448		
10,325.01	6,947.20	11,443.09	7,232.56	109.73	96.15	116.99	-1,047.96	3,715.36	628.73	444.75	183.99	3.417		
10,400.00	6,947.33	11,513.23	7,231.05	111.96	97.87	117.00	-1,045.57	3,785.45	624.50	436.83	187.67	3.328		
10,424.31	6,947.37	11,535.78	7,230.52	112.68	98.42	117.00	-1,044.97	3,807.99	623.27	434.39	188.88	3.300		
10,500.00	6,947.50	11,613.63	7,229.18	114.94	100.32	117.03	-1,042.69	3,885.79	619.47	426.95	192.52	3.218		
10,524.51	6,947.55	11,639.40	7,229.10	115.67	100.96	117.08	-1,041.64	3,911.54	618.15	424.51	193.63	3.192		
10,600.00	6,947.68	11,707.52	7,228.84	117.92	102.63	117.20	-1,039.24	3,979.61	614.42	417.23	197.19	3.116		
10,623.67	6,947.72	11,731.02	7,228.61	118.62	103.20	117.22	-1,038.70	4,003.11	613.44	415.12	198.32	3.093		
10,700.00	6,947.85	11,806.17	7,228.38	120.90	105.05	117.33	-1,036.79	4,078.23	610.37	408.47	201.89	3.023		
10,723.53	6,947.89	11,823.02	7,228.50	121.60	105.46	117.37	-1,036.25	4,095.07	609.43	406.43	203.00	3.002		
10,800.00	6,948.02	11,893.90	7,229.09	123.88	107.21	117.53	-1,034.73	4,165.93	607.06	400.57	206.49	2.940		
10,822.15	6,948.06	11,913.02	7,229.24	124.54	107.68	117.56	-1,034.61	4,185.05	606.65	399.13	207.52	2.923		
10,900.00	6,948.19	11,984.65	7,229.74	126.87	109.45	117.64	-1,034.79	4,256.68	605.81	394.62	211.18	2.869		
10,934.45	6,948.25	12,014.73	7,229.91	127.90	110.20	117.66	-1,035.14	4,286.75	605.70	392.88	212.81	2.846		
11,000.00	6,948.36	12,066.75	7,229.95	129.86	111.49	117.62	-1,036.80	4,338.74	606.51	390.57	215.94	2.809		
11,004.45	6,948.37	12,070.28	7,229.94	129.99	111.58	117.61	-1,036.97	4,342.27	606.62	390.47	216.15	2.806		
11,100.00	6,948.53	12,165.38	7,229.64	132.85	113.95	117.42	-1,042.19	4,437.23	609.57	388.38	221.20	2.756		
11,104.45	6,948.54	12,170.28	7,229.65	132.98	114.07	117.41	-1,042.41	4,442.12	609.69	388.25	221.44	2.753		
11,200.00	6,948.71	12,264.24	7,230.04	135.84	116.42	117.32	-1,046.57	4,535.99	612.07	385.79	226.28	2.705		
11,204.45	6,948.71	12,268.52	7,230.06	135.98	116.52	117.32	-1,046.77	4,540.26	612.19	385.69	226.51	2.703		
11,300.00	6,948.88	12,370.13	7,229.95	138.84	119.06	117.17	-1,051.41	4,641.77	614.47	382.88	231.59	2.653		
11,304.45	6,948.89	12,375.11	7,229.91	138.97	119.18	117.16	-1,051.62	4,646.74	614.55	382.71	231.84	2.651		
11,400.00	6,949.05	12,480.45	7,229.67	141.84	121.81	117.08	-1,054.66	4,752.03	615.34	378.51	236.83	2.598		
11,421.14	6,949.09	12,502.50	7,229.65	142.47	122.36	117.07	-1,055.09	4,774.08	615.36	377.46	237.90	2.587		
11,500.00	6,949.22	12,584.95	7,229.39	144.84	124.41	117.04	-1,056.45	4,856.52	615.12	373.24	241.88	2.543		
11,521.60	6,949.26	12,607.61	7,229.30	145.48	124.97	117.04	-1,056.74	4,879.18	614.97	372.00	242.96	2.531		
11,600.00	6,949.39	12,688.87	7,229.05	147.84	127.00	117.04	-1,057.41	4,960.44	614.15	367.30	246.86	2.488		
11,621.94	6,949.43	12,711.41	7,229.05	148.49	127.56	117.05	-1,057.49	4,982.98	613.87	365.94	247.92	2.476		
11,700.00	6,949.56	12,790.32	7,229.19	150.84	129.52	117.10	-1,057.60	5,061.88	612.74	361.07	251.68	2.435		
11,722.04	6,949.60	12,812.46	7,229.21	151.50	130.07	117.11	-1,057.62	5,084.02	612.42	359.68	252.74	2.423		
11,800.00	6,949.73	12,890.10	7,229.22	153.84	132.01	117.16	-1,057.74	5,161.67	611.26	354.75	256.51	2.383		
11,821.98	6,949.77	12,911.96	7,229.20	154.50	132.55	117.17	-1,057.80	5,183.52	610.95	353.37	257.58	2.372		
11,900.00	6,949.91	12,985.00	7,229.11	156.84	134.37	117.18	-1,058.34	5,256.56	610.14	348.75	261.40	2.334		
11,921.42	6,949.94	13,006.03	7,229.09	157.49	134.90	117.18	-1,058.62	5,277.59	610.04	347.58	262.46	2.324		
12,000.00	6,950.08	13,081.04	7,228.87	159.85	136.77	117.15	-1,059.97	5,352.58	609.90	343.51	266.39	2.289		
12,004.45	6,950.08	13,085.34	7,228.85	159.98	136.88	117.14	-1,060.06	5,356.89	609.91	343.29	266.62	2.288		
12,100.00	6,950.25	13,172.26	7,228.40	162.86	139.05	117.05	-1,062.57	5,443.77	610.59	339.12	271.47	2.249		
12,104.45	6,950.25	13,176.27	7,228.38	162.99	139.15	117.05	-1,062.73	5,447.78	610.65	338.96	271.69	2.248		
12,200.00	6,950.42	13,271.23	7,228.14	165.86	141.53	116.93	-1,066.40	5,542.66	612.28	335.58	276.69	2.213		
12,204.45	6,950.43	13,275.72	7,228.14	166.00	141.64	116.92	-1,066.56	5,547.15	612.35	335.42	276.93	2.211		
12,300.00	6,950.59	13,361.50	7,228.20	168.87	143.79	116.82	-1,070.41	5,632.84	614.65	332.91	281.74	2.182		
12,304.45	6,950.60	13,365.47	7,228.20	169.01	143.89	116.81	-1,070.63	5,636.81	614.79	332.83	281.96	2.180		
12,400.00	6,950.76	13,468.33	7,228.36	171.88	146.47	116.67	-1,075.68	5,739.54	617.50	330.32	287.18	2.150		
12,404.45	6,950.77	13,473.48	7,228.38	172.02	146.60	116.67	-1,075.89	5,744.69	617.59	330.17	287.42	2.149		
12,500.00	6,950.93	13,579.26	7,229.40	174.89	149.25	116.71	-1,078.40	5,850.43	618.44	326.22	292.22	2.116		
12,504.45	6,950.94	13,583.60	7,229.45	175.03	149.36	116.71	-1,078.47	5,854.77	618.46	326.03	292.43	2.115		
12,600.00	6,951.10	13,677.57	7,230.47	177.90	151.71	116.78	-1,080.23	5,948.71	618.96	321.94	297.02	2.084		
12,604.45	6,951.11	13,681.99	7,230.53	178.04	151.82	116.78	-1,080.31	5,953.14	618.99	321.76	297.23	2.083		
12,700.00	6,951.27	13,784.69	7,232.52	180.91	154.39	116.95	-1,081.60	6,055.80	619.36	317.73	301.63	2.053		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 648H - OH - OH											Offset Site Error:	0.00 ft
Survey Program: 25-NS-GYRO-MS, 390-SDI MWD, 6638-SDI MWD, 7777-SDI MWD											Offset Well Error:	0.00 ft
Reference	Offset	Semi Major Axis	Reference	Offset	Highside	Rule Assigned:						
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Toothface (")	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor
12,721.53	6,951.31	13,808.61	7,233.25	181.56	154.99	117.03	-1,081.46	6,079.72	619.19	316.68	302.51	2.047
12,800.00	6,951.44	13,891.13	7,233.21	183.93	157.05	117.27	-1,080.83	6,162.21	618.23	312.40	305.83	2.021
12,822.12	6,951.48	13,914.36	7,235.62	184.59	157.63	117.33	-1,080.61	6,185.43	617.86	311.08	306.78	2.014
12,900.00	6,951.61	13,995.45	7,236.89	186.94	159.65	117.53	-1,079.58	6,266.51	616.27	306.15	310.13	1.987
12,922.56	6,951.65	14,018.26	7,237.12	187.62	160.22	117.57	-1,079.29	6,289.31	615.76	304.64	311.12	1.979
13,000.00	6,951.78	14,092.98	7,237.25	189.96	162.09	117.65	-1,078.68	6,364.03	614.01	299.26	314.75	1.951
13,021.99	6,951.82	14,112.35	7,237.15	190.62	162.57	117.66	-1,078.73	6,383.40	613.65	297.81	315.83	1.943
13,100.00	6,951.95	14,184.40	7,236.41	192.97	164.38	117.59	-1,079.84	6,455.43	613.06	293.21	319.85	1.917
13,121.46	6,951.99	14,206.30	7,236.24	193.62	164.93	117.57	-1,080.21	6,477.33	612.95	292.00	320.96	1.910
13,200.00	6,952.12	14,286.26	7,236.03	195.99	166.93	117.56	-1,081.19	6,557.28	612.44	287.56	324.88	1.885
13,221.63	6,952.16	14,308.21	7,235.86	196.64	167.48	117.55	-1,081.49	6,579.23	612.27	286.28	325.99	1.878
13,300.00	6,952.29	14,389.39	7,234.78	199.00	169.52	117.46	-1,082.64	6,660.39	611.50	281.38	330.12	1.852
13,321.99	6,952.33	14,412.53	7,234.53	199.66	170.10	117.45	-1,082.84	6,683.53	611.20	279.95	331.25	1.845
13,400.00	6,952.46	14,500.54	7,233.61	202.02	172.30	117.43	-1,082.78	6,771.54	609.52	274.39	335.13	1.819
13,423.25	6,952.50	14,527.34	7,233.18	202.72	172.97	117.42	-1,082.46	6,798.34	608.73	272.47	336.26	1.810
13,500.00	6,952.63	14,602.30	7,232.18	205.04	174.84	117.43	-1,081.40	6,873.28	606.04	265.98	340.06	1.782
13,523.30	6,952.67	14,626.16	7,231.97	205.74	175.44	117.44	-1,081.04	6,897.14	605.25	264.08	341.17	1.774
13,600.00	6,952.80	14,709.43	7,231.04	208.05	177.52	117.49	-1,079.25	6,980.38	602.15	257.43	344.72	1.747
13,623.81	6,952.84	14,731.24	7,230.76	208.77	178.06	117.51	-1,078.72	7,002.18	601.10	255.21	345.89	1.738
13,700.00	6,952.97	14,802.31	7,229.84	211.07	179.84	117.53	-1,077.43	7,073.23	598.18	248.51	349.67	1.711
13,723.11	6,953.01	14,824.59	7,229.59	211.77	180.39	117.54	-1,077.12	7,095.51	597.41	246.60	350.81	1.703
13,800.00	6,953.14	14,900.15	7,229.14	214.09	182.28	117.59	-1,076.13	7,171.06	595.05	240.58	354.47	1.679
13,823.25	6,953.18	14,925.54	7,229.02	214.79	182.92	117.61	-1,075.73	7,196.45	594.29	238.76	355.53	1.672
13,900.00	6,953.31	15,005.90	7,228.36	217.11	184.92	117.69	-1,073.99	7,276.78	591.28	232.23	359.05	1.647
13,923.54	6,953.35	15,028.59	7,228.23	217.82	185.49	117.71	-1,073.46	7,299.47	590.35	230.20	360.15	1.639
14,000.00	6,953.48	15,100.84	7,228.13	220.13	187.29	117.82	-1,071.88	7,371.70	587.58	223.92	363.66	1.616
14,022.80	6,953.52	15,121.79	7,228.19	220.82	187.82	117.86	-1,071.51	7,392.65	586.89	222.19	364.69	1.609
14,100.00	6,953.65	15,196.72	7,228.59	223.15	189.69	117.99	-1,070.56	7,467.58	584.96	216.82	368.14	1.589
14,122.77	6,953.69	15,220.36	7,228.64	223.84	190.28	118.02	-1,070.28	7,491.21	584.37	215.22	369.15	1.583
14,200.00	6,953.82	15,292.94	7,228.27	226.17	192.10	118.06	-1,069.73	7,563.78	582.43	209.57	372.87	1.562
14,222.03	6,953.85	15,312.16	7,227.93	226.83	192.58	118.03	-1,069.92	7,583.00	582.08	208.03	374.04	1.556
14,300.00	6,953.99	15,383.48	7,225.92	229.19	194.38	117.82	-1,071.76	7,654.26	581.56	203.01	378.55	1.536
14,326.68	6,954.03	15,408.88	7,225.23	230.00	195.01	117.74	-1,072.56	7,679.65	581.53	201.42	380.11	1.530
14,400.00	6,954.15	15,481.06	7,223.75	232.21	196.83	117.56	-1,074.80	7,751.77	581.66	197.34	384.32	1.513
14,404.45	6,954.16	15,485.52	7,223.70	232.35	196.94	117.55	-1,074.92	7,756.24	581.67	197.10	384.57	1.513
14,500.00	6,954.32	15,576.95	7,223.23	235.23	199.24	117.46	-1,077.24	7,847.63	582.04	192.50	389.55	1.494 Level 3
14,504.45	6,954.33	15,581.06	7,223.21	235.37	199.35	117.46	-1,077.36	7,851.74	582.08	192.31	389.78	1.493 Level 3
14,600.00	6,954.49	15,675.92	7,222.97	238.25	201.73	117.35	-1,080.58	7,946.54	583.29	188.44	394.86	1.477 Level 3
14,604.45	6,954.50	15,680.55	7,222.98	238.39	201.85	117.35	-1,080.72	7,951.18	583.34	188.25	395.09	1.476 Level 3
14,700.00	6,954.66	15,774.92	7,223.51	241.28	204.23	117.34	-1,083.26	8,045.51	584.33	184.47	399.85	1.461 Level 3
14,704.45	6,954.67	15,779.22	7,223.56	241.41	204.33	117.34	-1,083.38	8,049.81	584.38	184.32	400.06	1.461 Level 3
14,800.00	6,954.83	15,875.30	7,224.76	244.30	206.75	117.39	-1,085.93	8,145.84	585.63	180.97	404.66	1.447 Level 3
14,804.45	6,954.84	15,879.82	7,224.80	244.43	206.87	117.39	-1,086.05	8,150.37	585.68	180.81	404.88	1.447 Level 3
14,900.00	6,955.00	15,987.28	7,224.97	247.32	209.57	117.38	-1,088.24	8,257.80	585.93	176.15	409.79	1.430 Level 3
14,921.89	6,955.04	16,011.42	7,224.76	247.98	210.18	117.36	-1,088.51	8,281.93	585.71	174.78	410.93	1.425 Level 3
15,000.00	6,955.17	16,097.59	7,223.34	250.34	212.34	117.28	-1,088.93	8,368.10	584.18	169.12	415.06	1.407 Level 3
15,022.95	6,955.21	16,122.63	7,222.81	251.04	212.97	117.25	-1,088.87	8,393.12	583.54	167.27	416.27	1.402 Level 3
15,100.00	6,955.34	16,209.33	7,220.57	253.37	215.14	117.15	-1,088.00	8,479.79	580.69	160.43	420.26	1.382 Level 3
15,124.55	6,955.38	16,237.76	7,219.56	254.11	215.85	117.10	-1,087.45	8,508.20	579.47	157.94	421.53	1.375 Level 3
15,200.00	6,955.50	16,310.97	7,216.79	256.39	217.68	116.98	-1,085.78	8,581.33	575.42	149.65	425.76	1.351 Level 3

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 648H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 25-NS-GYRO-MS, 390-SDI MWD, 6638-SDI MWD, 7777-SDI MWD													Offset Well Error:	0.00 ft
Rule Assigned:														
Measured Reference	Vertical	Measured	Vertical	Reference	Semi Major Axis	Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning	
Depth	Depth	Depth	Depth	Reference	Offset	Toolface	+N/-S	+E/-W	Between	Between	Separation	Factor		
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	Centres	Ellipses	(ft)			
15,224.17	6,955.54	16,333.31	7,216.09	257.12	218.24	116.95	-1,085.34	8,603.66	574.26	147.15	427.11	1.345	Level 3	
15,300.00	6,955.67	16,417.01	7,213.43	259.42	220.33	116.85	-1,083.40	8,687.29	570.37	139.41	430.97	1.323	Level 3	
15,400.00	6,955.84	16,516.34	7,209.75	262.44	222.81	116.73	-1,080.19	8,786.50	564.19	127.80	436.39	1.293	Level 3	
15,500.00	6,956.01	16,618.41	7,206.07	265.46	225.36	116.61	-1,076.95	8,888.46	558.11	116.41	441.70	1.264	Level 3	
15,525.26	6,956.05	16,642.66	7,205.12	266.23	225.96	116.57	-1,076.18	8,912.68	556.53	113.40	443.13	1.256	Level 3	
15,600.00	6,956.18	16,714.56	7,202.40	268.49	227.76	116.47	-1,074.10	8,984.49	552.12	104.77	447.35	1.234	Level 3	
15,624.82	6,956.22	16,738.72	7,201.61	269.24	228.36	116.44	-1,073.42	9,008.63	550.72	102.02	448.70	1.227	Level 3	
15,700.00	6,956.34	16,811.68	7,200.00	271.51	230.19	116.44	-1,071.17	9,081.54	546.68	94.15	452.53	1.208	Level 3	
15,724.49	6,956.39	16,835.06	7,199.52	272.26	230.77	116.44	-1,070.51	9,104.90	545.43	91.65	453.78	1.202	Level 3	
15,800.00	6,956.51	16,905.98	7,197.47	274.54	232.55	116.36	-1,069.14	9,175.78	541.92	83.93	457.99	1.183	Level 3	
15,823.63	6,956.55	16,926.89	7,196.74	275.25	233.07	116.31	-1,068.97	9,196.68	541.00	81.59	459.41	1.178	Level 3	
15,900.00	6,956.68	16,995.28	7,194.12	277.56	234.79	116.09	-1,069.35	9,265.01	538.82	74.65	464.17	1.161	Level 3	
15,922.44	6,956.72	17,016.36	7,193.34	278.24	235.32	116.02	-1,069.63	9,286.08	538.37	72.79	465.58	1.156	Level 3	
16,000.00	6,956.85	17,090.98	7,191.17	280.59	237.20	115.80	-1,070.80	9,360.65	537.19	66.93	470.27	1.142	Level 3	
16,022.13	6,956.89	17,114.00	7,190.73	281.26	237.78	115.76	-1,071.06	9,383.67	536.87	65.35	471.52	1.139	Level 3	
16,100.00	6,957.02	17,194.97	7,190.05	283.62	239.81	115.74	-1,071.23	9,464.64	535.45	59.96	475.50	1.126	Level 3	
16,122.70	6,957.05	17,218.57	7,189.78	284.30	240.41	115.73	-1,071.21	9,488.23	534.96	58.29	476.66	1.122	Level 3	
16,200.00	6,957.18	17,295.12	7,188.44	286.64	242.33	115.65	-1,071.24	9,564.77	533.12	52.26	480.87	1.109	Level 3	
16,222.45	6,957.22	17,316.44	7,188.10	287.32	242.87	115.63	-1,071.31	9,586.09	532.66	50.57	482.09	1.105	Level 3	
16,300.00	6,957.35	17,390.30	7,187.16	289.67	244.72	115.56	-1,071.82	9,659.94	531.44	45.17	486.27	1.093	Level 3	
16,321.86	6,957.39	17,411.16	7,186.94	290.33	245.25	115.54	-1,072.04	9,680.80	531.19	43.75	487.44	1.090	Level 3	
16,400.00	6,957.52	17,485.91	7,186.34	292.70	247.13	115.48	-1,073.09	9,755.54	530.62	39.02	491.60	1.079	Level 3	
16,421.31	6,957.55	17,506.32	7,186.22	293.34	247.64	115.47	-1,073.44	9,775.95	530.55	37.83	492.73	1.077	Level 3	
16,500.00	6,957.69	17,583.89	7,186.10	295.72	249.60	115.44	-1,074.85	9,853.50	530.49	33.69	496.80	1.068	Level 3	
16,521.14	6,957.72	17,604.95	7,186.18	296.36	250.13	115.45	-1,075.19	9,874.56	530.49	32.65	497.84	1.066	Level 3	
16,600.00	6,957.85	17,685.22	7,186.47	298.75	252.15	115.47	-1,076.41	9,954.82	530.39	28.64	501.75	1.057	Level 3	
16,652.75	6,957.94	17,736.47	7,186.35	300.35	253.44	115.45	-1,077.26	10,006.07	530.26	25.78	504.47	1.051	Level 3	
16,700.00	6,958.02	17,780.50	7,186.33	301.78	254.55	115.44	-1,078.22	10,050.08	530.40	23.51	506.89	1.046	Level 3	
16,704.45	6,958.03	17,784.64	7,186.34	301.91	254.66	115.43	-1,078.32	10,054.22	530.43	23.31	507.12	1.046	Level 3	
16,800.00	6,958.19	17,884.73	7,185.68	304.80	257.18	115.31	-1,080.92	10,154.27	530.84	18.38	512.46	1.036	Level 3	
16,841.77	6,958.26	17,925.51	7,184.87	306.07	258.21	115.21	-1,081.98	10,195.04	530.77	15.81	514.96	1.031	Level 3	
16,900.00	6,958.35	17,983.04	7,183.73	307.83	259.66	115.06	-1,083.72	10,252.52	530.91	12.42	518.50	1.024	Level 3	
16,921.13	6,958.39	18,003.37	7,183.36	308.47	260.17	115.01	-1,084.35	10,272.84	530.99	11.23	519.76	1.022	Level 3	
17,000.00	6,958.52	18,084.71	7,182.26	310.86	262.22	114.86	-1,086.26	10,354.15	530.92	6.58	524.34	1.013	Level 3	
17,009.24	6,958.54	18,093.02	7,182.17	311.14	262.43	114.85	-1,086.45	10,362.46	530.92	6.06	524.85	1.012	Level 3	
17,100.00	6,958.69	18,174.62	7,181.09	313.88	264.49	114.67	-1,089.21	10,444.00	531.70	1.70	530.00	1.003	Level 3	
17,104.45	6,958.70	18,178.61	7,181.03	314.02	264.59	114.66	-1,089.38	10,447.99	531.78	1.52	530.26	1.003	Level 3	
17,200.00	6,958.86	18,266.63	7,179.65	316.91	266.81	114.36	-1,094.22	10,535.87	534.34	-1.67	536.01	0.997	Level 3	
17,204.45	6,958.86	18,271.08	7,179.58	317.05	266.92	114.35	-1,094.49	10,540.30	534.49	-1.82	536.30	0.997	Level 3, ES, SF	
17,300.00	6,959.02	18,294.04	7,179.21	319.94	267.50	114.26	-1,095.89	10,563.22	542.45	8.70	533.74	1.016	Level 3	
17,304.45	6,959.03	18,294.04	7,179.21	320.08	267.50	114.26	-1,095.89	10,563.22	543.20	10.01	533.19	1.019	Level 3	
17,400.00	6,959.19	18,294.04	7,179.21	322.97	267.50	114.26	-1,095.89	10,563.22	567.65	53.37	514.27	1.104	Level 3	
17,404.45	6,959.20	18,294.04	7,179.21	323.10	267.50	114.26	-1,095.89	10,563.22	569.15	56.04	513.11	1.109	Level 3	
17,500.00	6,959.36	18,294.04	7,179.21	326.00	267.50	114.26	-1,095.89	10,563.22	608.44	124.55	483.89	1.257	Level 3	
17,600.00	6,959.52	18,294.04	7,179.21	329.02	267.50	114.26	-1,095.89	10,563.22	661.95	213.27	448.68	1.475	Level 3	
17,700.00	6,959.69	18,294.04	7,179.21	332.05	267.50	114.26	-1,095.89	10,563.22	725.36	312.22	413.14	1.756		
17,800.00	6,959.85	18,294.04	7,179.21	335.08	267.50	114.26	-1,095.89	10,563.22	796.32	416.52	379.80	2.097		
17,900.00	6,960.02	18,294.04	7,179.21	338.11	267.50	114.26	-1,095.89	10,563.22	872.98	523.27	349.71	2.496		
18,000.00	6,960.19	18,294.04	7,179.21	341.14	267.50	114.26	-1,095.89	10,563.22	953.98	630.88	323.10	2.953		
18,100.00	6,960.35	18,294.04	7,179.21	344.17	267.50	114.26	-1,095.89	10,563.22	1,038.29	738.52	299.77	3.464		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 648H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 25-NS-GYRO-MS, 390-SDI MWD, 6638-SDI MWD, 7777-SDI MWD													Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Semi Major Axis	Reference	Offset	Highside	Rule Assigned:							Warning
Measured Depth (ft)	Depth (ft)	Measured Depth (ft)	Depth (ft)	Reference (ft)	Offset (ft)	Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
18,200.00	6,960.52	18,294.04	7,179.21	347.20	267.50	114.26	-1,095.89	10,563.22	1,125.18	845.79	279.38	4.027		
18,300.00	6,960.68	18,294.04	7,179.21	350.23	267.50	114.26	-1,095.89	10,563.22	1,214.08	952.53	261.55	4.642		
18,400.00	6,960.85	18,294.04	7,179.21	353.26	267.50	114.26	-1,095.89	10,563.22	1,304.60	1,058.69	245.91	5.305		
18,500.00	6,961.02	18,294.04	7,179.21	356.28	267.50	114.26	-1,095.89	10,563.22	1,396.41	1,164.27	232.14	6.015		
18,600.00	6,961.18	18,294.04	7,179.21	359.31	267.50	114.26	-1,095.89	10,563.22	1,489.27	1,269.31	219.96	6.771		
18,700.00	6,961.35	18,294.04	7,179.21	362.34	267.50	114.26	-1,095.89	10,563.22	1,583.00	1,373.85	209.15	7.569		
18,800.00	6,961.51	18,294.04	7,179.21	365.37	267.50	114.26	-1,095.89	10,563.22	1,677.46	1,477.95	199.51	8.408		
18,900.00	6,961.68	18,294.04	7,179.21	368.40	267.50	114.26	-1,095.89	10,563.22	1,772.53	1,581.66	190.87	9.287		
19,000.00	6,961.84	18,294.04	7,179.21	371.43	267.50	114.26	-1,095.89	10,563.22	1,868.11	1,685.01	183.09	10.203		
19,100.00	6,962.01	18,294.04	7,179.21	374.46	267.50	114.26	-1,095.89	10,563.22	1,964.13	1,788.05	176.08	11.155		
19,200.00	6,962.17	18,294.04	7,179.21	377.49	267.50	114.26	-1,095.89	10,563.22	2,060.53	1,890.81	169.71	12.141		
19,300.00	6,962.34	18,294.04	7,179.21	380.52	267.50	114.26	-1,095.89	10,563.22	2,157.26	1,993.33	163.93	13.160		
19,400.00	6,962.51	18,294.04	7,179.21	383.55	267.50	114.26	-1,095.89	10,563.22	2,254.27	2,095.62	158.65	14.209		
19,500.00	6,962.67	18,294.04	7,179.21	386.58	267.50	114.26	-1,095.89	10,563.22	2,351.53	2,197.72	153.82	15.288		
19,600.00	6,962.84	18,294.04	7,179.21	389.61	267.50	114.26	-1,095.89	10,563.22	2,449.02	2,299.63	149.38	16.394		
19,700.00	6,963.00	18,294.04	7,179.21	392.64	267.50	114.26	-1,095.89	10,563.22	2,546.70	2,401.39	145.30	17.527		
19,800.00	6,963.16	18,294.04	7,179.21	395.67	267.50	114.26	-1,095.89	10,563.22	2,644.55	2,503.01	141.54	18.685		
19,900.00	6,963.33	18,294.04	7,179.21	398.70	267.50	114.26	-1,095.89	10,563.22	2,742.55	2,604.50	138.05	19.866		
20,000.00	6,963.49	18,294.04	7,179.21	401.73	267.50	114.26	-1,095.89	10,563.22	2,840.70	2,705.87	134.83	21.069		
20,100.00	6,963.66	18,294.04	7,179.21	404.77	267.50	114.26	-1,095.89	10,563.22	2,938.97	2,807.14	131.83	22.294		
20,200.00	6,963.82	18,294.04	7,179.21	407.80	267.50	114.26	-1,095.89	10,563.22	3,037.36	2,908.31	129.04	23.538		
20,307.78	6,964.00	18,294.04	7,179.21	411.06	267.50	114.26	-1,095.89	10,563.22	3,143.51	3,017.26	126.25	24.899		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 649H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 393-MWD+HDGM													Offset Well Error:	0.00 ft
Reference													Rule Assigned:	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Semi Major Axis Offset	Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (ft)	Separation Factor	Warning	
							+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)				
6,243.83	6,229.01	6,220.00	6,205.25	0.05	22.21	128.04	-382.21	45.08	23.83	14.37	9.45	2.520		
6,300.00	6,285.05	6,220.00	6,205.25	0.06	22.21	128.04	-382.21	45.08	80.00	70.44	9.56	8.367		
6,323.33	6,308.32	6,220.00	6,205.25	0.06	22.21	128.04	-382.21	45.08	103.33	93.72	9.61	10.755		
6,350.00	6,334.92	6,220.00	6,205.25	0.08	22.21	-52.84	-382.21	45.08	129.99	120.33	9.66	13.453		
6,400.00	6,384.57	6,220.00	6,205.25	0.15	22.21	-27.95	-382.21	45.08	179.88	170.09	9.78	18.383		
6,450.00	6,433.72	6,220.00	6,205.25	0.28	22.21	-18.46	-382.21	45.08	229.52	219.57	9.96	23.050		
6,500.00	6,482.07	6,220.00	6,205.25	0.47	22.21	-13.75	-382.21	45.08	278.84	268.63	10.21	27.315		
6,550.00	6,529.32	6,220.00	6,205.25	0.69	22.21	-10.98	-382.21	45.08	327.74	317.16	10.58	30.978 CC, ES, SF		
6,600.00	6,575.18	6,220.00	6,205.25	0.95	22.21	-9.17	-382.21	45.08	376.15	364.77	11.38	33.055		
6,650.00	6,619.39	6,220.00	6,205.25	1.24	22.21	-7.92	-382.21	45.08	423.99	412.00	11.99	35.365		
6,700.00	6,661.67	6,220.00	6,205.25	1.55	22.21	-7.00	-382.21	45.08	471.20	458.62	12.58	37.466		
6,750.00	6,701.77	6,220.00	6,205.25	1.88	22.21	-6.30	-382.21	45.08	517.69	504.53	13.16	39.335		
6,800.00	6,739.44	6,220.00	6,205.25	2.22	22.21	-5.76	-382.21	45.08	563.40	549.66	13.74	41.010		
6,850.00	6,774.46	6,220.00	6,205.25	2.58	22.21	-5.34	-382.21	45.08	608.26	593.96	14.30	42.538		
6,900.00	6,806.61	6,220.00	6,205.25	2.96	22.21	-5.00	-382.21	45.08	652.21	637.37	14.83	43.965		
6,950.00	6,835.71	6,220.00	6,205.25	3.36	22.21	-4.73	-382.21	45.08	695.16	679.83	15.33	45.337		
7,000.00	6,861.57	6,220.00	6,205.25	3.78	22.21	-4.51	-382.21	45.08	737.07	721.29	15.78	46.704		
7,050.00	6,884.03	6,220.00	6,205.25	4.23	22.21	-4.34	-382.21	45.08	777.86	761.70	16.16	48.125		
7,100.00	6,902.97	6,220.00	6,205.25	4.71	22.21	-4.20	-382.21	45.08	817.47	801.03	16.45	49.709		
7,150.00	6,918.27	6,220.00	6,205.25	5.23	22.21	-4.10	-382.21	45.08	855.85	839.37	16.48	51.928		
7,200.00	6,929.83	6,220.00	6,205.25	5.80	22.21	-4.02	-382.21	45.08	892.94	876.95	15.98	55.864		
7,250.00	6,937.59	6,220.00	6,205.25	6.42	22.21	-3.97	-382.21	45.08	928.67	912.54	16.13	57.579		
7,300.00	6,941.50	6,220.00	6,205.25	7.09	22.21	-3.95	-382.21	45.08	963.00	946.65	16.35	58.894		
7,324.29	6,942.00	6,220.00	6,205.25	7.43	22.21	-3.95	-382.21	45.08	979.16	962.71	16.45	59.516		
7,360.79	6,942.06	6,220.00	6,205.25	7.98	22.21	-3.29	-382.21	45.08	1,003.56	986.95	16.61	60.425		
7,400.00	6,942.13	6,220.00	6,205.25	8.61	22.21	-3.29	-382.21	45.08	1,030.58	1,013.53	17.05	60.455		
7,500.00	6,942.31	6,220.00	6,205.25	10.39	22.21	-3.29	-382.21	45.08	1,102.82	1,084.77	18.05	61.094		
7,600.00	6,942.48	6,220.00	6,205.25	12.38	22.21	-3.29	-382.21	45.08	1,179.11	1,160.31	18.81	62.699		
7,700.00	6,942.66	6,220.00	6,205.25	14.54	22.21	-3.29	-382.21	45.08	1,258.74	1,239.33	19.40	64.870		
7,800.00	6,942.83	6,220.00	6,205.25	16.85	22.21	-3.29	-382.21	45.08	1,341.09	1,321.21	19.88	67.458		
7,900.00	6,943.00	6,220.00	6,205.25	19.27	22.21	-3.29	-382.21	45.08	1,425.70	1,405.44	20.26	70.369		
8,000.00	6,943.18	6,220.00	6,205.25	21.78	22.21	-3.29	-382.21	45.08	1,512.19	1,491.63	20.56	73.542		
8,100.00	6,943.35	6,220.00	6,205.25	24.36	22.21	-3.29	-382.21	45.08	1,600.26	1,579.46	20.80	76.933		
8,200.00	6,943.53	6,220.00	6,205.25	27.00	22.21	-3.29	-382.21	45.08	1,689.66	1,668.67	20.99	80.512		
8,300.00	6,943.70	6,220.00	6,205.25	29.68	22.21	-3.29	-382.21	45.08	1,780.18	1,759.05	21.13	84.255		
8,400.00	6,943.87	6,220.00	6,205.25	32.41	22.21	-3.29	-382.21	45.08	1,871.67	1,850.44	21.23	88.148		
8,500.00	6,944.05	6,220.00	6,205.25	35.17	22.21	-3.29	-382.21	45.08	1,963.99	1,942.69	21.30	92.186		
8,600.00	6,944.22	6,220.00	6,205.25	37.96	22.21	-3.29	-382.21	45.08	2,057.03	2,035.68	21.34	96.371		
8,700.00	6,944.39	6,220.00	6,205.25	40.77	22.21	-3.29	-382.21	45.08	2,150.69	2,129.34	21.35	100.733		
8,800.00	6,944.57	6,220.00	6,205.25	43.61	22.21	-3.29	-382.21	45.08	2,244.90	2,223.60	21.29	105.421		
8,900.00	6,944.74	6,220.00	6,205.25	46.46	22.21	-3.29	-382.21	45.08	2,339.59	2,318.17	21.42	109.219		
9,000.00	6,944.91	6,220.00	6,205.25	49.33	22.21	-3.29	-382.21	45.08	2,434.70	2,413.09	21.61	112.666		
9,100.00	6,945.09	6,220.00	6,205.25	52.21	22.21	-3.29	-382.21	45.08	2,530.19	2,508.44	21.75	116.332		
9,200.00	6,945.26	6,220.00	6,205.25	55.10	22.21	-3.29	-382.21	45.08	2,626.02	2,604.16	21.86	120.117		
9,300.00	6,945.43	6,220.00	6,205.25	58.01	22.21	-3.29	-382.21	45.08	2,722.15	2,700.19	21.95	123.990		
9,400.00	6,945.61	6,220.00	6,205.25	60.92	22.21	-3.29	-382.21	45.08	2,818.55	2,796.51	22.03	127.939		
9,500.00	6,945.78	6,220.00	6,205.25	63.85	22.21	-3.29	-382.21	45.08	2,915.18	2,893.09	22.09	131.954		
9,600.00	6,945.95	6,220.00	6,205.25	66.78	22.21	-3.29	-382.21	45.08	3,012.04	2,989.90	22.14	136.033		
9,700.00	6,946.12	6,220.00	6,205.25	69.72	22.21	-3.29	-382.21	45.08	3,109.10	3,086.92	22.18	140.173		
9,800.00	6,946.30	6,220.00	6,205.25	72.66	22.21	-3.29	-382.21	45.08	3,206.34	3,184.13	22.21	144.376		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 649H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 393-MWD+HDGM													Offset Well Error:	0.00 ft
Reference	Vertical	Offset	Vertical	Semi Major Axis	Offset	Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning	
Measured	Depth	Measured	Depth	Reference	Offset	Toolface	+N/-S	+E/-W	Between	Between	Separation	Factor		
Depth	(ft)	Depth	(ft)	(ft)	(ft)	(°)	(ft)	(ft)	Centres	Ellipses	(ft)			
9,900.00	6,946.47	6,220.00	6,205.25	75.61	22.21	-3.29	-382.21	45.08	3,303.74	3,281.52	22.23	148.642		
10,000.00	6,946.64	6,220.00	6,205.25	78.56	22.21	-3.29	-382.21	45.08	3,401.30	3,379.06	22.23	152.976		
10,100.00	6,946.82	6,220.00	6,205.25	81.52	22.21	-3.29	-382.21	45.08	3,498.99	3,476.76	22.23	157.384		
10,200.00	6,946.99	6,220.00	6,205.25	84.49	22.21	-3.29	-382.21	45.08	3,596.81	3,574.59	22.22	161.877		
10,300.00	6,947.16	6,220.00	6,205.25	87.46	22.21	-3.29	-382.21	45.08	3,694.74	3,672.55	22.19	166.473		
10,400.00	6,947.33	6,220.00	6,205.25	90.43	22.21	-3.29	-382.21	45.08	3,792.79	3,770.63	22.15	171.207		
10,500.00	6,947.50	6,220.00	6,205.25	93.40	22.21	-3.29	-382.21	45.08	3,890.93	3,868.84	22.09	176.160		
10,600.00	6,947.68	6,220.00	6,205.25	96.38	22.21	-3.29	-382.21	45.08	3,989.16	3,967.21	21.95	181.740		
10,700.00	6,947.85	6,220.00	6,205.25	99.36	22.21	-3.29	-382.21	45.08	4,087.49	4,065.40	22.09	185.042		
10,800.00	6,948.02	6,220.00	6,205.25	102.35	22.21	-3.29	-382.21	45.08	4,185.89	4,163.67	22.21	188.431		
10,900.00	6,948.19	6,220.00	6,205.25	105.33	22.21	-3.29	-382.21	45.08	4,284.36	4,262.05	22.31	192.011		
11,000.00	6,948.36	6,220.00	6,205.25	108.32	22.21	-3.29	-382.21	45.08	4,382.90	4,360.51	22.40	195.680		
11,100.00	6,948.53	6,220.00	6,205.25	111.31	22.21	-3.29	-382.21	45.08	4,481.51	4,459.04	22.47	199.403		
11,200.00	6,948.71	6,220.00	6,205.25	114.31	22.21	-3.29	-382.21	45.08	4,580.18	4,557.64	22.54	203.165		
11,300.00	6,948.88	6,220.00	6,205.25	117.30	22.21	-3.29	-382.21	45.08	4,678.90	4,656.30	22.61	206.958		
11,400.00	6,949.05	6,220.00	6,205.25	120.30	22.21	-3.29	-382.21	45.08	4,777.68	4,755.02	22.67	210.779		
11,500.00	6,949.22	6,220.00	6,205.25	123.29	22.21	-3.29	-382.21	45.08	4,876.51	4,853.79	22.72	214.625		
11,600.00	6,949.39	6,220.00	6,205.25	126.29	22.21	-3.29	-382.21	45.08	4,975.38	4,952.61	22.77	218.500		
11,700.00	6,949.56	6,220.00	6,205.25	129.29	22.21	-3.29	-382.21	45.08	5,074.30	5,051.49	22.82	222.407		
11,800.00	6,949.73	6,220.00	6,205.25	132.30	22.21	-3.29	-382.21	45.08	5,173.26	5,150.41	22.85	226.362		
11,900.00	6,949.91	6,220.00	6,205.25	135.30	22.21	-3.29	-382.21	45.08	5,272.26	5,249.38	22.88	230.436		
12,000.00	6,950.08	6,220.00	6,205.25	138.31	22.21	-3.29	-382.21	45.08	5,371.30	5,348.43	22.87	234.884		
12,100.00	6,950.25	6,220.00	6,205.25	141.31	22.21	-3.29	-382.21	45.08	5,470.37	5,447.48	22.89	238.974		
12,200.00	6,950.42	6,220.00	6,205.25	144.32	22.21	-3.29	-382.21	45.08	5,569.48	5,546.56	22.92	243.031		
12,300.00	6,950.59	6,220.00	6,205.25	147.33	22.21	-3.29	-382.21	45.08	5,668.61	5,645.67	22.94	247.083		
12,400.00	6,950.76	6,220.00	6,205.25	150.34	22.21	-3.29	-382.21	45.08	5,767.78	5,744.81	22.97	251.145		
12,500.00	6,950.93	6,220.00	6,205.25	153.35	22.21	-3.29	-382.21	45.08	5,866.97	5,843.98	22.99	255.222		
12,600.00	6,951.10	6,220.00	6,205.25	156.36	22.21	-3.29	-382.21	45.08	5,966.19	5,943.19	23.01	259.320		
12,700.00	6,951.27	6,220.00	6,205.25	159.37	22.21	-3.29	-382.21	45.08	6,065.44	6,042.42	23.02	263.444		
12,800.00	6,951.44	6,220.00	6,205.25	162.38	22.21	-3.29	-382.21	45.08	6,164.71	6,141.67	23.04	267.598		
12,900.00	6,951.61	6,220.00	6,205.25	165.39	22.21	-3.29	-382.21	45.08	6,264.00	6,240.96	23.05	271.785		
13,000.00	6,951.78	6,220.00	6,205.25	168.41	22.21	-3.29	-382.21	45.08	6,363.32	6,340.27	23.05	276.010		
13,100.00	6,951.95	6,220.00	6,205.25	171.42	22.21	-3.29	-382.21	45.08	6,462.66	6,439.60	23.06	280.278		
13,200.00	6,952.12	6,220.00	6,205.25	174.44	22.21	-3.29	-382.21	45.08	6,562.02	6,538.96	23.06	284.594		
13,300.00	6,952.29	6,220.00	6,205.25	177.45	22.21	-3.29	-382.21	45.08	6,661.39	6,638.34	23.05	288.963		
13,400.00	6,952.46	6,220.00	6,205.25	180.47	22.21	-3.29	-382.21	45.08	6,760.79	6,737.74	23.04	293.392		
13,500.00	6,952.63	6,220.00	6,205.25	183.49	22.21	-3.29	-382.21	45.08	6,860.20	6,837.17	23.03	297.889		
13,600.00	6,952.80	6,220.00	6,205.25	186.50	22.21	-3.29	-382.21	45.08	6,959.63	6,936.62	23.01	302.464		
13,700.00	6,952.97	6,220.00	6,205.25	189.52	22.21	-3.29	-382.21	45.08	7,059.08	7,036.09	22.98	307.128		
13,800.00	6,953.14	6,220.00	6,205.25	192.54	22.21	-3.29	-382.21	45.08	7,158.54	7,135.59	22.95	311.897		
13,900.00	6,953.31	6,220.00	6,205.25	195.56	22.21	-3.29	-382.21	45.08	7,258.01	7,235.10	22.91	316.791		
14,000.00	6,953.48	6,220.00	6,205.25	198.58	22.21	-3.29	-382.21	45.08	7,357.50	7,334.64	22.86	321.838		
14,100.00	6,953.65	6,220.00	6,205.25	201.60	22.21	-3.29	-382.21	45.08	7,457.01	7,434.21	22.80	327.081		
14,200.00	6,953.82	6,220.00	6,205.25	204.62	22.21	-3.29	-382.21	45.08	7,556.52	7,533.80	22.72	332.589		
14,300.00	6,953.99	6,220.00	6,205.25	207.64	22.21	-3.29	-382.21	45.08	7,656.05	7,633.43	22.62	338.492		
14,400.00	6,954.15	6,220.00	6,205.25	210.66	22.21	-3.29	-382.21	45.08	7,755.59	7,733.12	22.47	345.125		
14,500.00	6,954.32	6,220.00	6,205.25	213.68	22.21	-3.29	-382.21	45.08	7,855.15	7,832.95	22.19	353.926		
14,600.00	6,954.49	6,220.00	6,205.25	216.70	22.21	-3.29	-382.21	45.08	7,954.71	7,932.20	22.51	353.317		
14,700.00	6,954.66	6,220.00	6,205.25	219.72	22.21	-3.29	-382.21	45.08	8,054.29	8,031.60	22.69	354.965		
14,800.00	6,954.83	6,220.00	6,205.25	222.75	22.21	-3.29	-382.21	45.08	8,153.87	8,131.04	22.83	357.079		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 649H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 393-MWD+HDGM													Offset Well Error:	0.00 ft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (ft)	Separation Factor	Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)				
14,900.00	6,955.00	6,220.00	6,205.25	225.77	22.21	-3.29	-382.21	45.08	8,253.47	8,230.50	22.96	359.406		
15,000.00	6,955.17	6,220.00	6,205.25	228.79	22.21	-3.29	-382.21	45.08	8,353.07	8,329.99	23.08	361.850		
15,100.00	6,955.34	6,220.00	6,205.25	231.82	22.21	-3.29	-382.21	45.08	8,452.69	8,429.49	23.20	364.363		
15,200.00	6,955.50	6,220.00	6,205.25	234.84	22.21	-3.29	-382.21	45.08	8,552.31	8,529.00	23.31	366.916		
15,300.00	6,955.67	6,220.00	6,205.25	237.86	22.21	-3.29	-382.21	45.08	8,651.94	8,628.53	23.42	369.493		
15,400.00	6,955.84	6,220.00	6,205.25	240.89	22.21	-3.29	-382.21	45.08	8,751.58	8,728.06	23.52	372.081		
15,500.00	6,956.01	6,220.00	6,205.25	243.91	22.21	-3.29	-382.21	45.08	8,851.23	8,827.61	23.62	374.673		
15,600.00	6,956.18	6,220.00	6,205.25	246.94	22.21	-3.29	-382.21	45.08	8,950.89	8,927.16	23.73	377.262		
15,700.00	6,956.34	6,220.00	6,205.25	249.96	22.21	-3.29	-382.21	45.08	9,050.55	9,026.73	23.83	379.843		
15,800.00	6,956.51	6,220.00	6,205.25	252.99	22.21	-3.29	-382.21	45.08	9,150.22	9,126.30	23.93	382.414		
15,900.00	6,956.68	6,220.00	6,205.25	256.01	22.21	-3.29	-382.21	45.08	9,249.90	9,225.87	24.03	384.971		
16,000.00	6,956.85	6,220.00	6,205.25	259.04	22.21	-3.29	-382.21	45.08	9,349.59	9,325.46	24.13	387.513		
16,100.00	6,957.02	6,220.00	6,205.25	262.06	22.21	-3.29	-382.21	45.08	9,449.28	9,425.05	24.23	390.038		
16,200.00	6,957.18	6,220.00	6,205.25	265.09	22.21	-3.29	-382.21	45.08	9,548.98	9,524.65	24.33	392.544		
16,300.00	6,957.35	6,220.00	6,205.25	268.12	22.21	-3.29	-382.21	45.08	9,648.68	9,624.26	24.43	395.031		
16,400.00	6,957.52	6,220.00	6,205.25	271.14	22.21	-3.29	-382.21	45.08	9,748.39	9,723.87	24.52	397.497		
16,500.00	6,957.69	6,220.00	6,205.25	274.17	22.21	-3.29	-382.21	45.08	9,848.11	9,823.49	24.62	399.942		
16,600.00	6,957.85	6,220.00	6,205.25	277.19	22.21	-3.29	-382.21	45.08	9,947.83	9,923.11	24.72	402.366		
16,700.00	6,958.02	6,220.00	6,205.25	280.22	22.21	-3.29	-382.21	45.08	10,047.56	10,022.74	24.82	404.768		
16,800.00	6,958.19	6,220.00	6,205.25	283.25	22.21	-3.29	-382.21	45.08	10,147.29	10,122.37	24.92	407.147		
16,900.00	6,958.35	6,220.00	6,205.25	286.28	22.21	-3.29	-382.21	45.08	10,247.03	10,222.01	25.02	409.504		
17,000.00	6,958.52	6,220.00	6,205.25	289.30	22.21	-3.29	-382.21	45.08	10,346.77	10,321.65	25.12	411.837		
17,100.00	6,958.69	6,220.00	6,205.25	292.33	22.21	-3.29	-382.21	45.08	10,446.52	10,421.30	25.22	414.148		
17,200.00	6,958.86	6,220.00	6,205.25	295.36	22.21	-3.29	-382.21	45.08	10,546.28	10,520.95	25.33	416.436		
17,300.00	6,959.02	6,220.00	6,205.25	298.39	22.21	-3.29	-382.21	45.08	10,646.03	10,620.61	25.43	418.701		
17,400.00	6,959.19	6,220.00	6,205.25	301.41	22.21	-3.29	-382.21	45.08	10,745.80	10,720.27	25.53	420.942		
17,500.00	6,959.36	6,220.00	6,205.25	304.44	22.21	-3.29	-382.21	45.08	10,845.56	10,819.93	25.63	423.160		
17,600.00	6,959.52	6,220.00	6,205.25	307.47	22.21	-3.29	-382.21	45.08	10,945.33	10,919.60	25.73	425.355		
17,700.00	6,959.69	6,220.00	6,205.25	310.50	22.21	-3.29	-382.21	45.08	11,045.11	11,019.27	25.83	427.528		
17,800.00	6,959.85	6,220.00	6,205.25	313.53	22.21	-3.29	-382.21	45.08	11,144.89	11,118.95	25.94	429.677		
17,900.00	6,960.02	6,220.00	6,205.25	316.56	22.21	-3.29	-382.21	45.08	11,244.67	11,218.63	26.04	431.803		
18,000.00	6,960.19	6,220.00	6,205.25	319.58	22.21	-3.29	-382.21	45.08	11,344.46	11,318.31	26.14	433.906		
18,100.00	6,960.35	6,220.00	6,205.25	322.61	22.21	-3.29	-382.21	45.08	11,444.25	11,418.00	26.25	435.987		
18,200.00	6,960.52	6,220.00	6,205.25	325.64	22.21	-3.29	-382.21	45.08	11,544.04	11,517.69	26.35	438.045		
18,300.00	6,960.68	6,220.00	6,205.25	328.67	22.21	-3.29	-382.21	45.08	11,643.84	11,617.38	26.46	440.081		
18,400.00	6,960.85	6,220.00	6,205.25	331.70	22.21	-3.29	-382.21	45.08	11,743.64	11,717.08	26.56	442.095		
18,500.00	6,961.02	6,220.00	6,205.25	334.73	22.21	-3.29	-382.21	45.08	11,843.44	11,816.77	26.67	444.086		
18,600.00	6,961.18	6,220.00	6,205.25	337.76	22.21	-3.29	-382.21	45.08	11,943.25	11,916.48	26.78	446.056		
18,700.00	6,961.35	6,220.00	6,205.25	340.79	22.21	-3.29	-382.21	45.08	12,043.06	12,016.18	26.88	448.003		
18,800.00	6,961.51	6,220.00	6,205.25	343.82	22.21	-3.29	-382.21	45.08	12,142.88	12,115.89	26.99	449.930		
18,900.00	6,961.68	6,220.00	6,205.25	346.85	22.21	-3.29	-382.21	45.08	12,242.69	12,215.60	27.10	451.834		
19,000.00	6,961.84	6,220.00	6,205.25	349.88	22.21	-3.29	-382.21	45.08	12,342.51	12,315.31	27.20	453.718		
19,100.00	6,962.01	6,220.00	6,205.25	352.91	22.21	-3.29	-382.21	45.08	12,442.34	12,415.02	27.31	455.581		
19,200.00	6,962.17	6,220.00	6,205.25	355.94	22.21	-3.29	-382.21	45.08	12,542.16	12,514.74	27.42	457.422		
19,300.00	6,962.34	6,220.00	6,205.25	358.97	22.21	-3.29	-382.21	45.08	12,641.99	12,614.46	27.53	459.243		
19,400.00	6,962.51	6,220.00	6,205.25	362.00	22.21	-3.29	-382.21	45.08	12,741.82	12,714.18	27.64	461.044		
19,500.00	6,962.67	6,220.00	6,205.25	365.03	22.21	-3.29	-382.21	45.08	12,841.65	12,813.91	27.75	462.825		
19,600.00	6,962.84	6,220.00	6,205.25	368.06	22.21	-3.29	-382.21	45.08	12,941.49	12,913.63	27.86	464.585		
19,700.00	6,963.00	6,220.00	6,205.25	371.09	22.21	-3.29	-382.21	45.08	13,041.33	13,013.36	27.97	466.326		
19,800.00	6,963.16	6,220.00	6,205.25	374.12	22.21	-3.29	-382.21	45.08	13,141.17	13,113.09	28.08	468.046		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 649H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 393-MWD+HDGM													Offset Well Error:	0.00 ft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Rule Assigned:		Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
19,900.00	6,963.33	6,220.00	6,205.25	377.15	22.21	-3.29	-382.21	45.08	13,241.01	13,212.83	28.19	469.748		
20,000.00	6,963.49	6,220.00	6,205.25	380.18	22.21	-3.29	-382.21	45.08	13,340.86	13,312.56	28.30	471.430		
20,100.00	6,963.66	6,220.00	6,205.25	383.21	22.21	-3.29	-382.21	45.08	13,440.71	13,412.30	28.41	473.093		
20,200.00	6,963.82	6,220.00	6,205.25	386.24	22.21	-3.29	-382.21	45.08	13,540.56	13,512.04	28.52	474.738		
20,307.78	6,964.00	6,220.00	6,205.25	389.51	22.21	-3.29	-382.21	45.08	13,648.18	13,619.54	28.64	476.489		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 85C - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 355-MWD													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	70.93	70.92	0.00	0.12	88.21	242.87	7,782.35	7,786.25					
393.00	392.99	355.00	354.93	0.66	0.62	47.46	246.41	7,786.90	7,791.05	7,789.77	1.27	6,112.938		
483.00	482.99	539.00	538.87	0.97	1.26	-64.05	246.16	7,789.52	7,791.84	7,789.61	2.23	3,492.614		
578.00	577.96	591.42	591.22	1.30	1.45	-77.44	243.51	7,790.18	7,792.17	7,789.43	2.74	2,845.264		
673.00	672.85	630.00	629.70	1.64	1.58	-84.72	240.90	7,790.89	7,793.09	7,789.88	3.21	2,429.727		
765.00	764.65	662.98	662.53	1.96	1.70	-84.37	237.90	7,791.79	7,794.74	7,791.09	3.65	2,132.850		
855.00	854.37	763.25	761.96	2.29	2.08	-81.66	225.42	7,794.92	7,796.34	7,791.99	4.36	1,789.880		
952.00	950.95	873.00	869.49	2.65	2.53	-77.00	203.88	7,798.41	7,797.23	7,792.06	5.17	1,508.799		
1,077.00	1,075.26	926.15	920.81	3.13	2.77	-77.02	190.22	7,800.38	7,798.03	7,792.14	5.89	1,324.934		
1,172.00	1,169.69	965.00	957.92	3.49	2.97	-89.28	178.84	7,802.08	7,800.34	7,793.90	6.44	1,211.186		
1,300.00	1,297.07	1,062.44	1,049.46	3.97	3.51	-90.47	145.92	7,807.22	7,806.15	7,798.68	7.47	1,044.855		
1,395.00	1,391.63	1,103.79	1,087.46	4.34	3.77	-91.95	129.81	7,809.51	7,811.08	7,802.99	8.08	966.209		
1,490.00	1,486.24	1,117.00	1,099.54	4.70	3.85	-90.75	124.50	7,810.32	7,816.85	7,808.32	8.53	916.859		
1,586.00	1,582.02	1,148.00	1,127.79	5.05	4.06	-82.01	111.93	7,812.47	7,823.00	7,813.91	9.08	861.309		
1,681.00	1,676.87	1,179.00	1,155.95	5.40	4.27	-77.04	99.20	7,814.94	7,829.33	7,819.69	9.64	812.456		
1,776.00	1,771.67	1,210.00	1,184.02	5.75	4.49	-71.30	86.33	7,817.69	7,835.76	7,825.57	10.20	768.388		
1,872.00	1,867.43	1,230.04	1,202.12	6.11	4.63	-84.09	77.96	7,819.63	7,843.41	7,832.72	10.69	733.694		
1,966.00	1,961.25	1,256.38	1,225.87	6.46	4.83	-100.49	66.92	7,822.37	7,853.33	7,842.11	11.22	700.015		
2,061.00	2,056.10	1,274.00	1,241.72	6.81	4.96	-106.73	59.46	7,824.30	7,865.28	7,853.60	11.68	673.262		
2,156.00	2,150.95	1,306.00	1,270.39	7.15	5.20	-109.26	45.74	7,828.09	7,878.53	7,866.28	12.25	642.947		
2,252.00	2,246.71	1,320.71	1,283.48	7.50	5.31	-110.82	39.32	7,829.97	7,893.47	7,880.77	12.70	621.329		
2,347.00	2,341.39	1,337.00	1,297.91	7.86	5.44	-112.65	32.08	7,832.18	7,909.79	7,896.63	13.16	600.863		
2,442.00	2,436.07	1,377.85	1,333.73	8.21	5.78	-109.29	13.33	7,838.01	7,926.83	7,913.00	13.83	573.352		
2,537.00	2,530.82	1,447.39	1,394.05	8.56	6.37	-100.71	-19.78	7,848.05	7,943.39	7,928.65	14.74	538.929		
2,632.00	2,625.64	1,479.76	1,421.86	8.92	6.66	-78.22	-35.63	7,852.87	7,958.82	7,943.48	15.34	518.661		
2,728.00	2,721.53	1,508.97	1,446.80	9.26	6.92	-59.74	-50.16	7,857.35	7,973.54	7,957.61	15.92	500.700		
2,823.00	2,816.43	1,528.00	1,462.94	9.60	7.10	-40.23	-59.77	7,860.41	7,987.85	7,971.44	16.40	486.927		
2,918.00	2,911.32	1,560.00	1,489.86	9.94	7.40	-37.53	-76.23	7,865.73	8,002.11	7,985.11	17.00	470.593		
3,013.00	3,006.17	1,592.00	1,516.56	10.28	7.71	-47.93	-92.94	7,871.34	8,017.08	7,999.47	17.61	455.205		
3,109.00	3,101.98	1,602.18	1,525.01	10.63	7.81	-53.62	-98.31	7,873.20	8,033.04	8,015.02	18.02	445.741		
3,204.00	3,196.73	1,634.42	1,551.55	10.98	8.13	-47.32	-115.61	7,879.18	8,049.14	8,030.50	18.64	431.730		
3,299.00	3,291.42	1,671.74	1,581.77	11.33	8.52	-59.09	-136.35	7,886.22	8,065.82	8,046.49	19.33	417.284		
3,395.00	3,387.03	1,706.71	1,609.53	11.69	8.89	-72.16	-156.55	7,892.88	8,084.53	8,064.52	20.01	404.000		
3,490.00	3,481.56	1,733.92	1,630.80	12.06	9.19	-73.94	-172.67	7,898.15	8,104.55	8,083.94	20.62	393.095		
3,585.00	3,576.12	1,751.00	1,644.06	12.42	9.38	-83.79	-182.89	7,901.54	8,126.31	8,105.20	21.11	384.909		
3,680.00	3,670.84	1,783.00	1,668.69	12.78	9.75	-100.20	-202.24	7,908.08	8,150.77	8,129.00	21.76	374.493		
3,775.00	3,765.61	1,820.41	1,697.01	13.13	10.19	-105.64	-225.40	7,915.86	8,177.31	8,154.83	22.48	363.789		
3,871.00	3,861.42	1,878.00	1,740.24	13.48	10.88	-102.36	-261.52	7,927.85	8,204.61	8,181.19	23.43	350.232		
3,966.00	3,956.30	1,878.00	1,740.24	13.83	10.88	-94.05	-261.52	7,927.85	8,231.70	8,208.00	23.70	347.311		
4,061.00	4,051.20	1,929.37	1,778.52	14.17	11.50	-88.37	-293.88	7,939.13	8,259.01	8,234.43	24.57	336.098		
4,156.00	4,146.11	2,178.68	1,962.71	14.52	14.61	-78.60	-453.59	7,991.18	8,285.80	8,257.98	27.82	297.837		
4,251.00	4,241.00	2,225.00	1,996.73	14.86	15.19	-88.40	-483.67	8,000.30	8,312.03	8,283.38	28.65	290.140		
4,347.00	4,336.86	2,268.84	2,029.01	15.22	15.74	-90.96	-511.99	8,009.13	8,339.63	8,310.19	29.45	283.204		
4,442.00	4,431.69	2,352.00	2,091.17	15.57	16.78	-85.83	-564.56	8,026.05	8,367.06	8,336.36	30.70	272.515		
4,536.00	4,525.51	5,101.49	4,512.00	15.91	35.99	-85.39	-1,458.78	8,319.94	8,373.89	8,324.56	49.33	169.746		
4,632.00	4,621.31	5,206.26	4,616.75	16.27	36.19	-86.22	-1,460.69	8,321.21	8,374.84	8,324.95	49.89	167.861		
4,727.00	4,716.11	5,309.94	4,720.40	16.62	36.38	-82.00	-1,462.45	8,322.38	8,375.49	8,325.05	50.45	166.029		
4,821.00	4,809.89	5,412.49	4,822.94	16.97	36.58	-80.88	-1,464.06	8,323.45	8,375.71	8,324.71	51.00	164.242		
4,916.00	4,904.64	5,510.51	4,920.94	17.33	36.77	-78.17	-1,465.49	8,324.40	8,375.56	8,324.01	51.55	162.468		
5,011.00	4,999.37	5,605.34	5,015.75	17.69	36.95	-78.38	-1,466.87	8,325.32	8,375.23	8,323.12	52.11	160.730		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 85C - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 355-MWD													Offset Well Error:	0.00 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
5,109.00	5,097.08	5,703.14	5,113.54	18.06	37.15	-75.60	-1,468.29	8,326.26	8,374.64	8,321.95	52.68	158.966		
5,204.00	5,191.74	5,797.91	5,208.30	18.42	37.33	-77.49	-1,469.67	8,327.18	8,373.88	8,320.64	53.24	157.281		
5,299.00	5,286.40	5,892.69	5,303.05	18.78	37.52	-74.26	-1,471.05	8,328.09	8,373.03	8,319.23	53.80	155.628		
5,363.00	5,350.22	5,956.57	5,366.93	19.02	37.65	-74.55	-1,471.97	8,328.71	8,372.46	8,318.28	54.18	154.525		
5,458.00	5,444.99	6,051.43	5,461.77	19.37	37.85	-76.85	-1,473.35	8,329.62	8,371.93	8,317.18	54.74	152.929		
5,521.00	5,507.84	6,114.34	5,524.67	19.61	37.98	-76.52	-1,474.27	8,330.23	8,371.67	8,316.55	55.12	151.890		
5,585.00	5,571.69	6,178.25	5,588.57	19.84	38.11	-77.60	-1,475.20	8,330.85	8,371.43	8,315.94	55.49	150.851		
5,648.00	5,634.55	6,241.16	5,651.47	20.08	38.24	-78.72	-1,476.11	8,331.46	8,371.28	8,315.41	55.87	149.841		
5,712.00	5,698.39	6,305.06	5,715.37	20.32	38.38	-77.41	-1,477.04	8,332.07	8,371.10	8,314.85	56.25	148.817		
5,776.00	5,762.24	6,368.97	5,779.27	20.56	38.51	-74.15	-1,477.97	8,332.69	8,370.77	8,314.14	56.63	147.806		
5,839.00	5,825.12	6,431.90	5,842.18	20.79	38.65	-72.53	-1,478.88	8,333.30	8,370.36	8,313.35	57.01	146.826		
5,903.00	5,889.00	6,495.83	5,906.11	21.03	38.79	-72.36	-1,479.81	8,333.92	8,369.93	8,312.54	57.39	145.845		
5,966.00	5,951.88	6,558.76	5,969.03	21.26	38.92	-70.33	-1,480.73	8,334.53	8,369.37	8,311.61	57.77	144.880		
6,030.00	6,015.74	6,622.68	6,032.94	21.50	39.06	-69.63	-1,481.66	8,335.14	8,368.66	8,310.51	58.15	143.909		
6,093.00	6,078.59	6,685.59	6,095.84	21.74	39.20	-69.54	-1,482.57	8,335.75	8,367.87	8,309.33	58.53	142.961		
6,157.00	6,142.42	6,749.49	6,159.73	21.97	39.34	-60.65	-1,483.50	8,336.37	8,366.68	8,307.76	58.92	142.005		
6,220.00	6,205.25	6,812.39	6,222.62	22.21	39.48	-67.93	-1,484.41	8,336.98	8,365.38	8,306.08	59.30	141.065		
6,243.83	6,229.01	6,836.18	6,246.40	22.26	39.53	-72.92	-1,484.76	8,337.20	8,365.08	8,305.67	59.40	140.815		
6,300.00	6,285.05	6,892.27	6,302.49	22.27	39.66	-72.94	-1,485.58	8,337.75	8,364.57	8,305.02	59.55	140.466		
6,323.33	6,308.32	6,915.56	6,325.77	22.27	39.71	-72.95	-1,485.91	8,337.97	8,364.36	8,304.75	59.61	140.321		
6,350.00	6,334.92	6,942.19	6,352.40	22.28	39.77	-44.98	-1,486.30	8,338.23	8,363.57	8,303.89	59.68	140.145		
6,400.00	6,384.57	6,991.93	6,402.13	22.30	39.88	-20.46	-1,487.02	8,338.71	8,359.14	8,299.34	59.81	139.767		
6,450.00	6,433.72	7,008.00	6,418.20	22.32	39.92	-10.96	-1,487.26	8,338.86	8,350.96	8,291.09	59.87	139.488		
6,500.00	6,482.07	7,064.71	6,474.90	22.34	40.06	-6.14	-1,488.19	8,339.48	8,338.99	8,278.96	60.02	138.931		
6,550.00	6,529.32	7,097.69	6,507.87	22.37	40.13	-3.19	-1,488.83	8,339.91	8,323.44	8,263.32	60.12	138.438		
6,600.00	6,575.18	7,129.78	6,539.95	22.41	40.21	-1.14	-1,489.52	8,340.37	8,304.36	8,244.14	60.22	137.892		
6,650.00	6,619.39	7,160.81	6,570.96	22.45	40.29	0.43	-1,490.26	8,340.86	8,281.86	8,221.54	60.32	137.297		
6,700.00	6,661.67	7,190.58	6,600.72	22.51	40.36	1.75	-1,491.03	8,341.37	8,256.06	8,195.65	60.42	136.654		
6,750.00	6,701.77	7,225.00	6,635.12	22.58	40.44	2.96	-1,491.99	8,342.01	8,227.12	8,166.60	60.52	135.939		
6,800.00	6,739.44	7,225.00	6,635.12	22.67	40.44	4.11	-1,491.99	8,342.01	8,195.22	8,134.68	60.55	135.353		
6,850.00	6,774.46	7,271.16	6,681.25	22.79	40.56	5.33	-1,493.40	8,342.95	8,160.45	8,099.76	60.69	134.467		
6,900.00	6,806.61	7,294.50	6,704.57	22.95	40.62	6.67	-1,494.16	8,343.45	8,123.12	8,062.35	60.77	133.672		
6,950.00	6,835.71	7,315.76	6,725.82	23.17	40.68	8.21	-1,494.89	8,343.94	8,083.40	8,022.55	60.84	132.854		
7,000.00	6,861.57	7,334.82	6,744.86	23.48	40.73	10.10	-1,495.57	8,344.39	8,041.52	7,980.61	60.91	132.021		
7,050.00	6,884.03	7,351.55	6,761.57	23.88	40.77	12.52	-1,496.18	8,344.80	7,997.74	7,936.77	60.97	131.177		
7,100.00	6,902.97	7,365.85	6,775.85	24.37	40.81	15.78	-1,496.72	8,345.15	7,952.30	7,891.28	61.02	130.328		
7,150.00	6,918.27	7,377.61	6,787.61	24.96	40.84	20.49	-1,497.18	8,345.46	7,905.48	7,844.42	61.06	129.479		
7,200.00	6,929.83	7,386.77	6,796.75	25.64	40.87	27.76	-1,497.54	8,345.69	7,857.55	7,796.46	61.08	128.636		
7,250.00	6,937.59	7,393.25	6,803.23	26.40	40.88	39.96	-1,497.79	8,345.87	7,808.79	7,747.69	61.10	127.803		
7,300.00	6,941.50	7,397.00	6,806.97	27.23	40.89	61.28	-1,497.94	8,345.97	7,759.51	7,698.41	61.11	126.986		
7,324.29	6,942.00	7,397.82	6,807.79	27.65	40.90	75.72	-1,497.98	8,345.99	7,735.47	7,674.36	61.10	126.594		
7,360.79	6,942.06	7,398.58	6,808.55	28.31	40.90	74.34	-1,498.01	8,346.01	7,699.28	7,638.18	61.10	126.010		
7,400.00	6,942.13	7,399.40	6,809.37	29.06	40.90	74.38	-1,498.04	8,346.03	7,660.38	7,599.28	61.10	125.378		
7,500.00	6,942.31	7,401.50	6,811.47	31.09	40.91	74.51	-1,498.12	8,346.09	7,561.19	7,500.09	61.10	123.756		
7,600.00	6,942.48	7,403.62	6,813.58	33.27	40.91	74.63	-1,498.21	8,346.14	7,462.01	7,400.91	61.10	122.119		
7,700.00	6,942.66	7,405.75	6,815.71	35.58	40.92	74.75	-1,498.30	8,346.20	7,362.86	7,301.74	61.12	120.466		
7,800.00	6,942.83	7,407.89	6,817.85	38.00	40.92	74.88	-1,498.38	8,346.26	7,263.73	7,202.58	61.14	118.796		
7,900.00	6,943.00	7,410.05	6,820.01	40.50	40.93	75.00	-1,498.47	8,346.32	7,164.62	7,103.44	61.18	117.109		
8,000.00	6,943.18	7,412.22	6,822.18	43.06	40.93	75.13	-1,498.56	8,346.38	7,065.54	7,004.31	61.22	115.404		
8,100.00	6,943.35	7,414.41	6,824.36	45.69	40.94	75.26	-1,498.65	8,346.44	6,966.48	6,905.20	61.28	113.681		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 85C - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 355-MWD													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		
8,200.00	6,943.53	7,416.61	6,826.56	48.36	40.95	75.38	-1,498.74	8,346.50	6,867.45	6,806.10	61.35	111.940		
8,300.00	6,943.70	7,418.82	6,828.77	51.08	40.95	75.51	-1,498.83	8,346.56	6,768.45	6,707.02	61.43	110.181		
8,400.00	6,943.87	7,450.00	6,859.91	53.83	41.03	77.35	-1,500.16	8,347.44	6,669.56	6,607.96	61.60	108.279		
8,500.00	6,944.05	7,450.00	6,859.91	56.60	41.03	77.35	-1,500.16	8,347.44	6,570.60	6,508.90	61.70	106.492		
8,600.00	6,944.22	7,450.00	6,859.91	59.41	41.03	77.35	-1,500.16	8,347.44	6,471.67	6,409.85	61.82	104.686		
8,700.00	6,944.39	7,450.00	6,859.91	62.23	41.03	77.35	-1,500.16	8,347.44	6,372.78	6,310.83	61.96	102.860		
8,800.00	6,944.57	7,450.00	6,859.91	65.08	41.03	77.35	-1,500.16	8,347.44	6,273.93	6,211.82	62.11	101.014		
8,900.00	6,944.74	7,450.00	6,859.91	67.94	41.03	77.35	-1,500.16	8,347.44	6,175.11	6,112.83	62.28	99.148		
9,000.00	6,944.91	7,450.00	6,859.91	70.81	41.03	77.35	-1,500.16	8,347.44	6,076.33	6,013.85	62.47	97.262		
9,100.00	6,945.09	7,450.00	6,859.91	73.70	41.03	77.35	-1,500.16	8,347.44	5,977.59	5,914.90	62.69	95.357		
9,200.00	6,945.26	7,450.00	6,859.91	76.60	41.03	77.35	-1,500.16	8,347.44	5,878.89	5,815.97	62.92	93.431		
9,300.00	6,945.43	7,450.00	6,859.91	79.51	41.03	77.35	-1,500.16	8,347.44	5,780.24	5,717.06	63.18	91.487		
9,400.00	6,945.61	7,450.00	6,859.91	82.43	41.03	77.35	-1,500.16	8,347.44	5,681.63	5,618.17	63.47	89.524		
9,500.00	6,945.78	7,450.00	6,859.91	85.36	41.03	77.35	-1,500.16	8,347.44	5,583.08	5,519.30	63.78	87.542		
9,600.00	6,945.95	7,450.00	6,859.91	88.29	41.03	77.35	-1,500.16	8,347.44	5,484.57	5,420.46	64.11	85.543		
9,700.00	6,946.12	7,451.79	6,861.69	91.23	41.04	77.45	-1,500.24	8,347.49	5,386.12	5,321.64	64.49	83.522		
9,800.00	6,946.30	7,454.93	6,864.83	94.18	41.05	77.64	-1,500.38	8,347.58	5,287.73	5,222.84	64.90	81.480		
9,900.00	6,946.47	7,458.08	6,867.97	97.13	41.06	77.83	-1,500.51	8,347.67	5,189.40	5,124.06	65.34	79.424		
10,000.00	6,946.64	7,461.22	6,871.11	100.09	41.06	78.01	-1,500.65	8,347.77	5,091.13	5,025.31	65.82	77.354		
10,100.00	6,946.82	7,464.37	6,874.25	103.05	41.07	78.20	-1,500.79	8,347.86	4,992.93	4,926.60	66.33	75.274		
10,200.00	6,946.99	7,467.51	6,877.39	106.02	41.08	78.39	-1,500.93	8,347.95	4,894.80	4,827.91	66.88	73.183		
10,300.00	6,947.16	7,470.65	6,880.53	108.99	41.09	78.58	-1,501.06	8,348.04	4,796.74	4,729.26	67.48	71.083		
10,400.00	6,947.33	7,473.80	6,883.67	111.96	41.10	78.76	-1,501.20	8,348.13	4,698.76	4,630.64	68.12	68.976		
10,500.00	6,947.50	7,476.94	6,886.81	114.94	41.11	78.95	-1,501.34	8,348.22	4,600.87	4,532.06	68.81	66.864		
10,600.00	6,947.68	7,480.09	6,889.95	117.92	41.12	79.14	-1,501.47	8,348.31	4,503.07	4,433.52	69.55	64.748		
10,700.00	6,947.85	7,483.23	6,893.09	120.90	41.13	79.33	-1,501.61	8,348.40	4,405.36	4,335.02	70.34	62.632		
10,800.00	6,948.02	7,486.37	6,896.23	123.88	41.13	79.51	-1,501.75	8,348.49	4,307.76	4,236.58	71.18	60.516		
10,900.00	6,948.19	7,489.52	6,899.37	126.87	41.14	79.70	-1,501.89	8,348.59	4,210.27	4,138.18	72.09	58.403		
11,000.00	6,948.36	7,492.66	6,902.51	129.86	41.15	79.89	-1,502.02	8,348.68	4,112.89	4,039.83	73.06	56.296		
11,100.00	6,948.53	7,495.81	6,905.65	132.85	41.16	80.08	-1,502.16	8,348.77	4,015.64	3,941.55	74.09	54.197		
11,200.00	6,948.71	7,498.95	6,908.79	135.84	41.17	80.27	-1,502.30	8,348.86	3,918.53	3,843.33	75.20	52.107		
11,300.00	6,948.88	7,502.09	6,911.93	138.84	41.18	80.46	-1,502.43	8,348.95	3,821.57	3,745.18	76.39	50.030		
11,400.00	6,949.05	7,505.24	6,915.07	141.84	41.19	80.65	-1,502.57	8,349.04	3,724.76	3,647.11	77.65	47.968		
11,500.00	6,949.22	7,508.38	6,918.21	144.84	41.20	80.84	-1,502.71	8,349.13	3,628.12	3,549.12	79.00	45.924		
11,600.00	6,949.39	7,511.52	6,921.34	147.84	41.20	81.03	-1,502.84	8,349.22	3,531.67	3,451.22	80.45	43.899		
11,700.00	6,949.56	7,514.67	6,924.48	150.84	41.21	81.22	-1,502.98	8,349.31	3,435.42	3,353.42	81.99	41.898		
11,800.00	6,949.73	7,518.81	6,928.62	153.84	41.22	81.46	-1,503.16	8,349.43	3,339.38	3,255.73	83.65	39.920		
11,900.00	6,949.91	7,522.95	6,932.76	156.84	41.23	81.70	-1,503.33	8,349.55	3,243.58	3,158.16	85.42	37.971		
12,000.00	6,950.08	7,526.74	6,936.54	159.85	41.24	81.94	-1,503.50	8,349.66	3,148.04	3,060.72	87.32	36.052		
12,100.00	6,950.25	7,530.69	6,940.49	162.86	41.26	82.18	-1,503.67	8,349.77	3,052.78	2,963.43	89.35	34.166		
12,200.00	6,950.42	7,534.59	6,944.38	165.86	41.27	82.42	-1,503.84	8,349.88	2,957.83	2,866.30	91.53	32.315		
12,300.00	6,950.59	7,538.44	6,948.23	168.87	41.28	82.65	-1,504.00	8,349.99	2,863.21	2,769.35	93.87	30.503		
12,400.00	6,950.76	7,542.24	6,952.02	171.88	41.29	82.88	-1,504.16	8,350.09	2,768.98	2,672.60	96.38	28.731		
12,500.00	6,950.93	7,546.09	6,955.77	174.89	41.30	83.11	-1,504.31	8,350.20	2,675.15	2,576.08	99.07	27.002		
12,600.00	6,951.10	7,549.69	6,959.46	177.90	41.31	83.34	-1,504.46	8,350.30	2,581.79	2,479.81	101.97	25.318		
12,700.00	6,951.27	7,553.35	6,963.11	180.91	41.32	83.56	-1,504.61	8,350.40	2,488.93	2,383.83	105.10	23.681		
12,800.00	6,951.44	7,556.96	6,966.72	183.93	41.33	83.78	-1,504.76	8,350.49	2,396.65	2,288.18	108.47	22.095		
12,900.00	6,951.61	7,560.52	6,970.28	186.94	41.34	83.99	-1,504.90	8,350.59	2,305.01	2,192.89	112.11	20.560		
13,000.00	6,951.78	7,564.04	6,973.79	189.96	41.34	84.21	-1,505.04	8,350.68	2,214.08	2,098.03	116.05	19.079		
13,100.00	6,951.95	7,567.51	6,977.26	192.97	41.35	84.42	-1,505.18	8,350.78	2,123.97	2,003.66	120.31	17.654		

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 85C - OH - OH													Offset Site Error: 0.00 ft		
Survey Program: 355-MWD				Offset		Semi Major Axis		Offset Wellbore Centre		Rule Assigned:				Offset Well Error: 0.00 ft	
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		
13,200.00	6,952.12	7,570.95	6,980.69	195.99	41.36	84.63	-1,505.32	8,350.87	2,034.77	1,909.84	124.93	16.287			
13,300.00	6,952.29	7,574.34	6,984.08	199.00	41.37	84.83	-1,505.45	8,350.95	1,946.62	1,816.68	129.94	14.981			
13,400.00	6,952.46	7,577.68	6,987.42	202.02	41.38	85.04	-1,505.58	8,351.04	1,859.67	1,724.28	135.38	13.736			
13,500.00	6,952.63	7,580.99	6,990.73	205.04	41.39	85.24	-1,505.71	8,351.13	1,774.08	1,632.78	141.30	12.555			
13,600.00	6,952.80	7,584.26	6,993.99	208.05	41.40	85.44	-1,505.83	8,351.21	1,690.08	1,542.34	147.74	11.440			
13,700.00	6,952.97	7,587.49	6,997.22	211.07	41.41	85.64	-1,505.96	8,351.29	1,607.89	1,453.16	154.73	10.391			
13,800.00	6,953.14	7,590.68	7,000.40	214.09	41.42	85.83	-1,506.08	8,351.37	1,527.83	1,365.50	162.33	9.412			
13,900.00	6,953.31	7,593.83	7,003.55	217.11	41.42	86.02	-1,506.20	8,351.45	1,450.24	1,279.68	170.57	8.502			
14,000.00	6,953.48	7,596.95	7,006.67	220.13	41.43	86.21	-1,506.31	8,351.53	1,375.54	1,196.07	179.47	7.664			
14,100.00	6,953.65	7,600.03	7,009.74	223.15	41.44	86.40	-1,506.43	8,351.60	1,304.23	1,115.19	189.04	6.899			
14,200.00	6,953.82	7,603.07	7,012.78	226.17	41.45	86.59	-1,506.54	8,351.68	1,236.89	1,037.64	199.25	6.208			
14,300.00	6,953.99	7,606.08	7,015.79	229.19	41.46	86.77	-1,506.65	8,351.75	1,174.21	964.18	210.03	5.591			
14,400.00	6,954.15	7,609.05	7,018.76	232.21	41.47	86.95	-1,506.76	8,351.83	1,116.97	895.74	221.23	5.049			
14,500.00	6,954.32	7,611.99	7,021.69	235.23	41.47	87.13	-1,506.87	8,351.90	1,066.05	833.42	232.63	4.583			
14,600.00	6,954.49	7,614.90	7,024.60	238.25	41.48	87.31	-1,506.97	8,351.97	1,022.39	778.49	243.90	4.192			
14,700.00	6,954.66	7,617.77	7,027.47	241.28	41.49	87.48	-1,507.08	8,352.03	986.95	732.34	254.61	3.876			
14,800.00	6,954.83	7,620.61	7,030.30	244.30	41.50	87.66	-1,507.18	8,352.10	960.66	696.41	264.25	3.635			
14,900.00	6,955.00	7,623.42	7,033.11	247.32	41.50	87.83	-1,507.28	8,352.17	944.27	672.01	272.26	3.468			
14,990.61	6,955.15	7,625.94	7,035.63	250.06	41.51	87.98	-1,507.37	8,352.23	938.41	660.72	277.68	3.379			
15,000.00	6,955.17	7,626.20	7,035.89	250.34	41.51	88.00	-1,507.38	8,352.23	938.30	660.17	278.13	3.374 CC, ES			
15,100.00	6,955.34	7,628.94	7,038.63	253.37	41.52	88.16	-1,507.47	8,352.30	942.94	661.43	281.51	3.350 SF			
15,200.00	6,955.50	7,631.66	7,041.34	256.39	41.53	88.33	-1,507.57	8,352.36	958.06	675.76	282.29	3.394			
15,300.00	6,955.67	7,634.35	7,044.03	259.42	41.53	88.49	-1,507.66	8,352.42	983.15	702.54	280.62	3.504			
15,400.00	6,955.84	7,637.00	7,046.68	262.44	41.54	88.66	-1,507.75	8,352.48	1,017.50	740.66	276.84	3.675			
15,500.00	6,956.01	7,639.63	7,049.31	265.46	41.55	88.82	-1,507.84	8,352.54	1,060.18	788.76	271.43	3.906			
15,600.00	6,956.18	7,642.23	7,051.91	268.49	41.55	88.98	-1,507.93	8,352.60	1,110.26	845.39	264.87	4.192			
15,700.00	6,956.34	7,644.81	7,054.48	271.51	41.56	89.13	-1,508.02	8,352.66	1,166.76	909.15	257.61	4.529			
15,800.00	6,956.51	7,647.35	7,057.02	274.54	41.57	89.29	-1,508.10	8,352.72	1,228.81	978.80	250.02	4.915			
15,900.00	6,956.68	7,649.87	7,059.54	277.56	41.58	89.44	-1,508.19	8,352.77	1,295.62	1,053.26	242.36	5.346			
16,000.00	6,956.85	7,652.36	7,062.03	280.59	41.58	89.59	-1,508.27	8,352.83	1,366.47	1,131.64	234.84	5.819			
16,100.00	6,957.02	7,654.83	7,064.49	283.62	41.59	89.74	-1,508.35	8,352.88	1,440.79	1,213.22	227.57	6.331			
16,200.00	6,957.18	7,657.27	7,066.93	286.64	41.60	89.89	-1,508.43	8,352.94	1,518.05	1,297.41	220.64	6.880			
16,300.00	6,957.35	7,659.68	7,069.34	289.67	41.60	90.04	-1,508.51	8,352.99	1,597.83	1,383.74	214.09	7.463			
16,400.00	6,957.52	7,662.07	7,071.73	292.70	41.61	90.19	-1,508.59	8,353.04	1,679.78	1,471.84	207.93	8.078			
16,500.00	6,957.69	7,664.43	7,074.09	295.72	41.61	90.33	-1,508.67	8,353.09	1,763.58	1,561.41	202.17	8.723			
16,600.00	6,957.85	7,666.78	7,076.43	298.75	41.62	90.47	-1,508.74	8,353.14	1,848.99	1,652.21	196.78	9.396			
16,700.00	6,958.02	7,669.09	7,078.75	301.78	41.63	90.61	-1,508.81	8,353.19	1,935.80	1,744.04	191.76	10.095			
16,800.00	6,958.19	7,671.39	7,081.04	304.80	41.63	90.75	-1,508.89	8,353.24	2,023.82	1,836.75	187.07	10.818			
16,900.00	6,958.35	7,673.66	7,083.31	307.83	41.64	90.89	-1,508.96	8,353.29	2,112.91	1,930.20	182.71	11.564			
17,000.00	6,958.52	7,675.90	7,085.56	310.86	41.65	91.03	-1,509.03	8,353.33	2,202.93	2,024.29	178.64	12.332			
17,100.00	6,958.69	7,678.13	7,087.78	313.88	41.65	91.16	-1,509.10	8,353.38	2,293.77	2,118.93	174.84	13.119			
17,200.00	6,958.86	7,680.33	7,089.98	316.91	41.66	91.30	-1,509.17	8,353.43	2,385.35	2,214.05	171.30	13.925			
17,300.00	6,959.02	7,682.51	7,092.16	319.94	41.66	91.43	-1,509.24	8,353.47	2,477.58	2,309.59	167.98	14.749			
17,400.00	6,959.19	7,684.67	7,094.32	322.97	41.67	91.56	-1,509.30	8,353.51	2,570.38	2,405.50	164.88	15.589			
17,500.00	6,959.36	7,686.81	7,096.46	326.00	41.67	91.69	-1,509.37	8,353.56	2,663.70	2,501.73	161.98	16.445			
17,600.00	6,959.52	7,688.93	7,098.57	329.02	41.68	91.82	-1,509.43	8,353.60	2,757.49	2,598.24	159.25	17.315			
17,700.00	6,959.69	7,691.03	7,100.67	332.05	41.69	91.95	-1,509.50	8,353.64	2,851.71	2,695.01	156.69	18.199			
17,800.00	6,959.85	7,693.10	7,102.74	335.08	41.69	92.07	-1,509.56	8,353.69	2,946.30	2,792.01	154.29	19.096			
17,900.00	6,960.02	7,695.16	7,104.80	338.11	41.70	92.20	-1,509.62	8,353.73	3,041.23	2,889.20	152.03	20.005			
18,000.00	6,960.19	7,697.20	7,106.84	341.14	41.70	92.32	-1,509.68	8,353.77	3,136.48	2,986.59	149.89	20.925			

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 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 27 - Rosa Unit 85C - OH - OH														Offset Site Error:	0.00 ft
Survey Program: 355-MWD														Offset Well Error:	0.00 ft
Reference	Offset	Semi Major Axis		Offset Wellbore Centre		Distance		Rule Assigned:							
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		
18,100.00	6,960.35	7,707.00	7,116.63	344.17	41.73	92.92	-1,509.97	8,353.96	3,232.02	3,084.10	147.93	21.848			
18,200.00	6,960.52	7,707.00	7,116.63	347.20	41.73	92.92	-1,509.97	8,353.96	3,327.82	3,181.80	146.02	22.791			
18,300.00	6,960.68	7,707.00	7,116.63	350.23	41.73	92.92	-1,509.97	8,353.96	3,423.85	3,279.64	144.21	23.742			
18,400.00	6,960.85	7,707.00	7,116.63	353.26	41.73	92.92	-1,509.97	8,353.96	3,520.10	3,377.60	142.50	24.703			
18,500.00	6,961.02	7,707.12	7,116.76	356.28	41.73	92.92	-1,509.97	8,353.96	3,616.55	3,475.68	140.87	25.672			
18,600.00	6,961.18	7,709.48	7,119.11	359.31	41.74	93.07	-1,510.04	8,354.01	3,713.20	3,573.85	139.35	26.647			
18,700.00	6,961.35	7,711.86	7,121.48	362.34	41.74	93.21	-1,510.11	8,354.05	3,810.01	3,672.11	137.90	27.628			
18,800.00	6,961.51	7,714.25	7,123.88	365.37	41.75	93.36	-1,510.18	8,354.10	3,906.99	3,770.46	136.53	28.617			
18,900.00	6,961.68	7,716.67	7,126.30	368.40	41.75	93.50	-1,510.25	8,354.15	4,004.11	3,868.89	135.22	29.611			
19,000.00	6,961.84	7,719.11	7,128.73	371.43	41.76	93.65	-1,510.33	8,354.20	4,101.37	3,967.39	133.98	30.612			
19,100.00	6,962.01	7,721.57	7,131.19	374.46	41.77	93.80	-1,510.40	8,354.24	4,198.75	4,065.96	132.79	31.618			
19,200.00	6,962.17	7,724.05	7,133.67	377.49	41.78	93.95	-1,510.48	8,354.29	4,296.26	4,164.59	131.67	32.630			
19,300.00	6,962.34	7,726.56	7,136.17	380.52	41.78	94.10	-1,510.55	8,354.34	4,393.87	4,263.28	130.59	33.646			
19,400.00	6,962.51	7,729.08	7,138.70	383.55	41.79	94.25	-1,510.63	8,354.39	4,491.59	4,362.03	129.56	34.667			
19,500.00	6,962.67	7,731.63	7,141.25	386.58	41.80	94.40	-1,510.70	8,354.45	4,589.41	4,460.82	128.58	35.692			
19,600.00	6,962.84	7,734.20	7,143.82	389.61	41.80	94.56	-1,510.78	8,354.50	4,687.31	4,559.67	127.65	36.721			
19,700.00	6,963.00	7,736.80	7,146.41	392.64	41.81	94.72	-1,510.86	8,354.55	4,785.31	4,658.55	126.75	37.753			
19,800.00	6,963.16	7,739.42	7,149.03	395.67	41.82	94.87	-1,510.94	8,354.60	4,883.38	4,757.48	125.90	38.789			
19,900.00	6,963.33	7,742.06	7,151.67	398.70	41.82	95.03	-1,511.03	8,354.66	4,981.53	4,856.45	125.08	39.828			
20,000.00	6,963.49	7,744.73	7,154.33	401.73	41.83	95.19	-1,511.11	8,354.71	5,079.75	4,955.45	124.29	40.870			
20,100.00	6,963.66	7,747.42	7,157.02	404.77	41.84	95.35	-1,511.19	8,354.77	5,178.03	5,054.49	123.54	41.914			
20,200.00	6,963.82	7,750.14	7,159.74	407.80	41.85	95.52	-1,511.28	8,354.83	5,276.38	5,153.56	122.82	42.961			
20,307.78	6,964.00	7,753.09	7,162.69	411.06	41.85	95.69	-1,511.37	8,354.89	5,382.45	5,260.37	122.07	44.092			

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



Lonestar Consulting, LLC

Anticollision Report

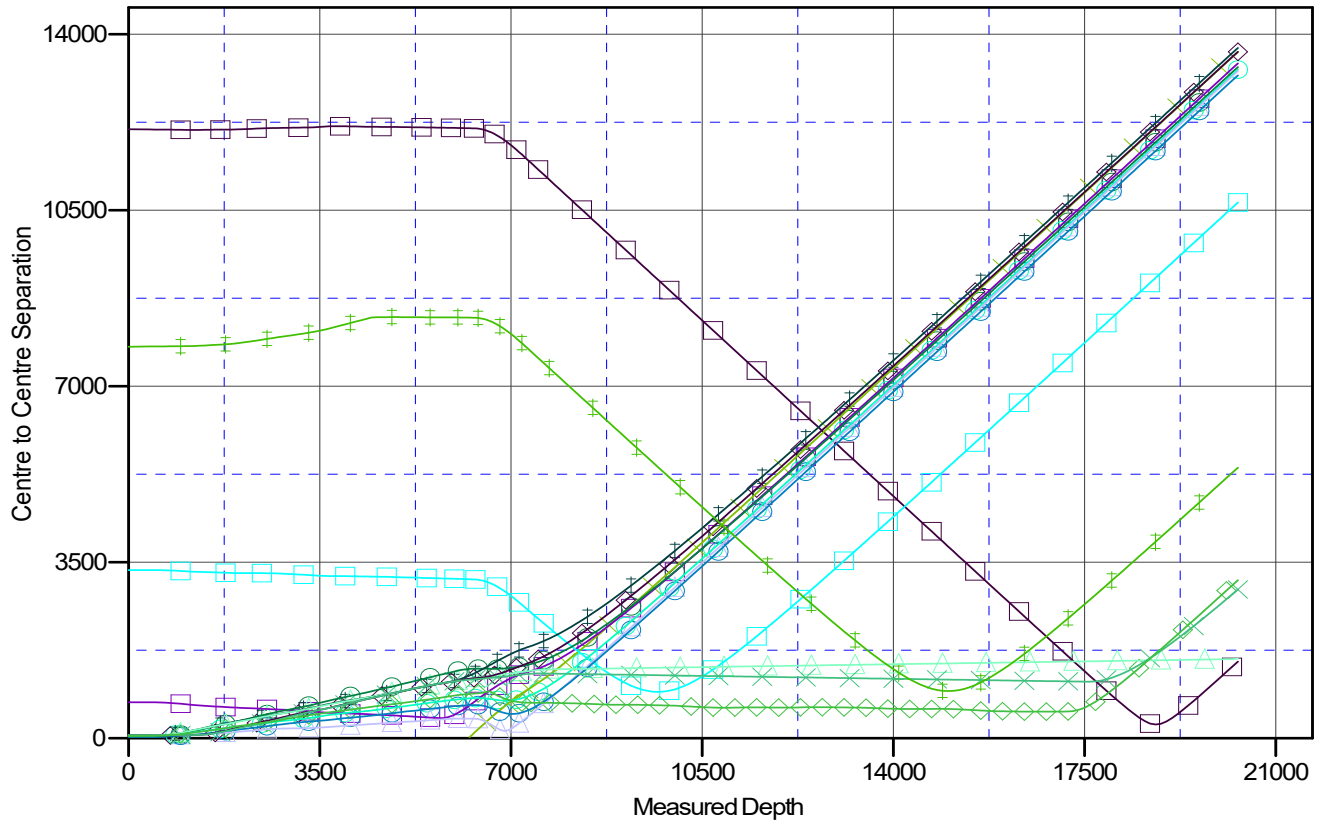


Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Reference Depths are relative to GL 6305' & RKB 24.5' @ 6329.50ft (E
Offset Depths are relative to Offset Datum
Central Meridian is -107.8333334

Coordinates are relative to: Rosa Unit 649H - Slot A4
Coordinate System is US State Plane 1983, New Mexico Western Zone
Grid Convergence at Surface is: 0.26°

Ladder Plot



LEGEND

Rosa Unit189.OH.OH V0	Rosa Unit641.H.OH.OH V0	Rosa Unit647.H.OH.OH V0
Rosa Unit649H.OH.OH V0	Rosa Unit642.H.OH.OH V0	Rosa Unit647H.OH.P6 n.#6 V0
Rosa Unit183A.OH.OH V0	Rosa Unit643.H.OH.OH V0	Rosa Unit648H.OH.OH V0
Rosa Unit183C.OH.OH V0	Rosa Unit645.H.OH.OH V0	Rosa Unit65C.OH.OH V0
Rosa Unit640H.OH.OH V0	Rosa Unit645H.OH.P6 n.#5 V0	

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



Lonestar Consulting, LLC

Anticollision Report

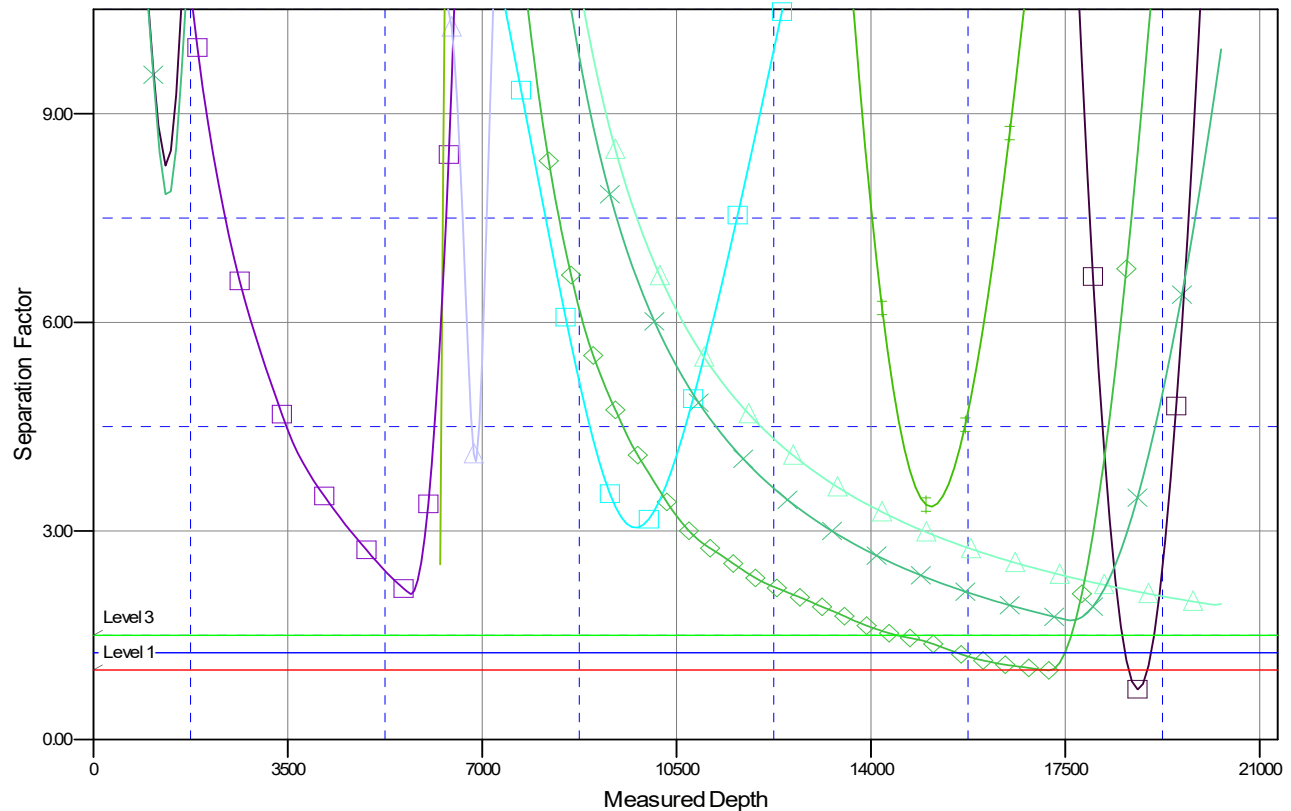


Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit 649H - Slot A4
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Reference Site:	Rosa Unit 27	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit 649H	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 #6	Offset TVD Reference:	Offset Datum

Reference Depths are relative to GL 6305' & RKB 24.5' @ 6329.50ft (E)
 Offset Depths are relative to Offset Datum
 Central Meridian is -107.8333334

Coordinates are relative to: Rosa Unit 649H - Slot A4
 Coordinate System is US State Plane 1983, New Mexico Western Zone
 Grid Convergence at Surface is: 0.26°

Separation Factor Plot



LEGEND

Rosa Unit189.OH.OH V0	Rosa Unit641.HO.HO V0	Rosa Unit647.HO.HO V0
Rosa Unit649H.OH.OH V0	Rosa Unit642.HO.HO V0	Rosa Unit647H.OH.Pls n#6 V0
Rosa Unit183A.OH.OH V0	Rosa Unit643.HO.HO V0	Rosa Unit648.HO.HO V0
Rosa Unit183C.OH.OH V0	Rosa Unit645.HO.HO V0	Rosa Unit650.CO.HO V0
Rosa Unit640H.OH.OH V0	Rosa Unit645H.OH.Pls n#5 V0	

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

Released to Imaging: 9/13/2022 1:16:06 PM



Company: Logos Operating LLC
Project: Rio Arriba, NM NAD83
Site: Rosa Unit 27
Well: Rosa Unit 649H
Wellbore: OH
Design: Plan #6

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



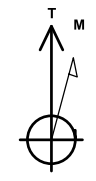
WELL DETAILS: Rosa Unit 649H

GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	
0.00	0.00	2143448.37	2848017.09	36.8896790	-107.4061360	A4

Plan: Plan #6 (Rosa Unit 649H/OH)

Created By: Janie Collins Date: 17:46, September 08 2022



Azimuths to True North
Magnetic North: 8.91°

Magnetic Field
Strength: 49563.03
Dip Angle: 63.03°
Date: 8/25/2022
Model: HDGM2022

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
649H BHL Rev 4	6964.00	-662.34	13669.27	2142847.22	2861689.16	36.8878505	-107.3593943
649H POE Rev 3	6942.00	-407.83	670.91	2143043.54	2848689.81	36.8885588	-107.4038418

SECTION DETAILS

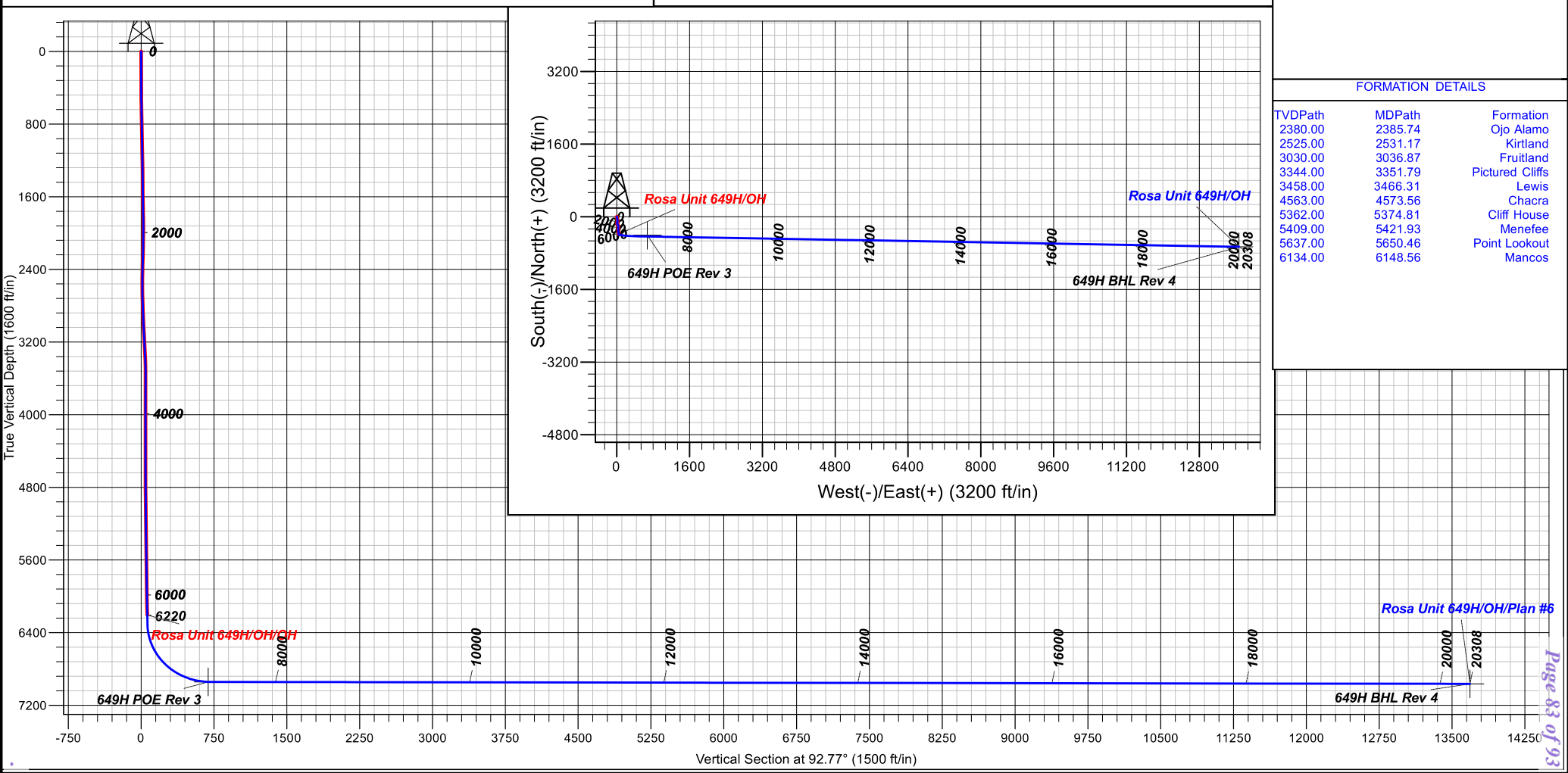
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect
6220.00	4.31	165.49	6205.25	-382.21	45.08	0.00	0.00	63.52
6243.83	4.00	170.49	6229.01	-383.90	45.44	2.00	133.03	63.97
6323.33	4.00	170.49	6308.32	-389.37	46.36	0.00	0.00	65.15
7324.29	89.90	90.27	6942.00	-435.98	687.77	8.91	-80.25	708.07
7360.79	89.90	91.00	6942.06	-436.38	724.27	2.00	90.00	744.54
20307.78	89.91	91.00	6964.00	-662.34	13669.27	0.00	0.00	13685.31

CASING DETAILS

TVD	MD	Name
-----	----	------

FORMATION DETAILS

TVDPath	MDPath	Formation
2380.00	2385.74	Ojo Alamo
2525.00	2531.17	Kirtland
3030.00	3036.87	Fruitland
3344.00	3351.79	Pictured Cliffs
3458.00	3466.31	Lewis
4563.00	4573.56	Chacra
5362.00	5374.81	Cliff House
5409.00	5421.93	Menefee
5637.00	5650.46	Point Lookout
6134.00	6148.56	Mancos



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Logos Operating LLC

Rio Arriba, NM NAD83

Rosa Unit 27

Rosa Unit 649H - Slot A4

OH

Plan: Plan #6

Standard Planning Report

08 September, 2022





Lonestar Consulting, LLC Planning Report



Database:	Grand Junction	Local Co-ordinate Reference:	Well Rosa Unit 649H - Slot A4
Company:	Logos Operating LLC	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site:	Rosa Unit 27	North Reference:	True
Well:	Rosa Unit 649H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #6		

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 27				
Site Position:		Northing:	2,143,451.58 usft	Latitude:	36.8896880
From:	Lat/Long	Easting:	2,848,002.44 usft	Longitude:	-107.4061860
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in		

Well	Rosa Unit 649H - Slot A4					
Well Position	+N/-S	0.00 ft	Northing:	2,143,448.37 usft	Latitude:	36.8896790
	+E/-W	0.00 ft	Easting:	2,848,017.09 usft	Longitude:	-107.4061360
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	6,305.00 ft
Grid Convergence:		0.26 °				

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM2022	8/25/2022	8.58	63.33	49,563.40000000

Design	Plan #6				
Audit Notes:					
Version:		Phase:	PLAN	Tie On Depth:	6,220.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00	92.77	

Plan Survey Tool Program	Date	9/8/2022			
Depth From (ft)	Depth To (ft)	Survey (Wellbore)	Tool Name	Remarks	
1	393.00	6,220.00	Survey #1 - Surface MWD Surve	MWD+HDGM OWSG MWD + HDGM	
2	6,220.00	20,307.73	Plan #6 (OH)	MWD+HDGM OWSG MWD + HDGM	



Lonestar Consulting, LLC
Planning Report



Database:	Grand Junction	Local Co-ordinate Reference:	Well Rosa Unit 649H - Slot A4
Company:	Logos Operating LLC	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site:	Rosa Unit 27	North Reference:	True
Well:	Rosa Unit 649H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #6		

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
6,220.00	4.31	165.49	6,205.25	-382.21	45.08	0.00	0.00	0.00	0.00	
6,243.83	4.00	170.49	6,229.01	-383.90	45.44	2.00	-1.30	20.99	133.03	
6,323.33	4.00	170.49	6,308.32	-389.37	46.36	0.00	0.00	0.00	0.00	
7,324.29	89.90	90.27	6,942.00	-435.98	687.77	8.91	8.58	-8.01	-80.25	
7,360.79	89.90	91.00	6,942.06	-436.38	724.27	2.00	0.00	2.00	90.00	
20,307.78	89.91	91.00	6,964.00	-662.34	13,669.27	0.00	0.00	0.00	0.00	649H BHL Rev 4



Lonestar Consulting, LLC

Planning Report



Database:	Grand Junction	Local Co-ordinate Reference:	Well Rosa Unit 649H - Slot A4
Company:	Logos Operating LLC	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site:	Rosa Unit 27	North Reference:	True
Well:	Rosa Unit 649H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #6		

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)
6,220.00	4.31	165.49	6,205.25	-382.21	45.08	63.52	0.00	0.00	0.00
6,243.83	4.00	170.49	6,229.01	-383.90	45.44	63.97	2.00	-1.30	20.99
6,300.00	4.00	170.49	6,285.05	-387.76	46.09	64.80	0.00	0.00	0.00
6,323.33	4.00	170.49	6,308.32	-389.37	46.36	65.15	0.00	0.00	0.00
6,400.00	8.48	117.80	6,384.57	-394.65	51.80	70.84	8.91	5.84	-68.72
6,500.00	16.88	103.39	6,482.07	-401.46	72.49	91.84	8.91	8.40	-14.41
6,600.00	25.62	98.52	6,575.18	-408.04	108.07	127.69	8.91	8.74	-4.87
6,700.00	34.45	96.03	6,661.67	-414.23	157.69	177.55	8.91	8.83	-2.50
6,800.00	43.31	94.46	6,739.44	-419.87	220.14	240.20	8.91	8.86	-1.57
6,900.00	52.19	93.33	6,806.61	-424.84	293.91	314.13	8.91	8.87	-1.13
7,000.00	61.07	92.45	6,861.57	-429.01	377.24	397.56	8.91	8.88	-0.88
7,100.00	69.96	91.70	6,902.97	-432.28	468.09	488.46	8.91	8.89	-0.74
7,200.00	78.85	91.04	6,929.83	-434.57	564.28	584.65	8.91	8.89	-0.66
7,300.00	87.74	90.42	6,941.50	-435.83	663.49	683.81	8.91	8.89	-0.62
7,324.29	89.90	90.27	6,942.00	-435.98	687.77	708.07	8.91	8.89	-0.61
7,360.79	89.90	91.00	6,942.06	-436.38	724.27	744.54	2.00	0.00	2.00
7,400.00	89.90	91.00	6,942.13	-437.07	763.48	783.73	0.00	0.00	0.00
7,500.00	89.90	91.00	6,942.31	-438.81	863.46	883.69	0.00	0.00	0.00
7,600.00	89.90	91.00	6,942.48	-440.56	963.44	983.64	0.00	0.00	0.00
7,700.00	89.90	91.00	6,942.66	-442.30	1,063.43	1,083.59	0.00	0.00	0.00
7,800.00	89.90	91.00	6,942.83	-444.05	1,163.41	1,183.54	0.00	0.00	0.00
7,900.00	89.90	91.00	6,943.00	-445.79	1,263.40	1,283.49	0.00	0.00	0.00
8,000.00	89.90	91.00	6,943.18	-447.54	1,363.38	1,383.45	0.00	0.00	0.00
8,100.00	89.90	91.00	6,943.35	-449.29	1,463.37	1,483.40	0.00	0.00	0.00
8,200.00	89.90	91.00	6,943.53	-451.03	1,563.35	1,583.35	0.00	0.00	0.00
8,300.00	89.90	91.00	6,943.70	-452.78	1,663.34	1,683.30	0.00	0.00	0.00
8,400.00	89.90	91.00	6,943.87	-454.52	1,763.32	1,783.25	0.00	0.00	0.00
8,500.00	89.90	91.00	6,944.05	-456.27	1,863.31	1,883.21	0.00	0.00	0.00
8,600.00	89.90	91.00	6,944.22	-458.01	1,963.29	1,983.16	0.00	0.00	0.00
8,700.00	89.90	91.00	6,944.39	-459.76	2,063.28	2,083.11	0.00	0.00	0.00
8,800.00	89.90	91.00	6,944.57	-461.50	2,163.26	2,183.06	0.00	0.00	0.00
8,900.00	89.90	91.00	6,944.74	-463.25	2,263.25	2,283.01	0.00	0.00	0.00
9,000.00	89.90	91.00	6,944.91	-464.99	2,363.23	2,382.96	0.00	0.00	0.00
9,100.00	89.90	91.00	6,945.09	-466.74	2,463.21	2,482.92	0.00	0.00	0.00
9,200.00	89.90	91.00	6,945.26	-468.48	2,563.20	2,582.87	0.00	0.00	0.00
9,300.00	89.90	91.00	6,945.43	-470.23	2,663.18	2,682.82	0.00	0.00	0.00
9,400.00	89.90	91.00	6,945.61	-471.97	2,763.17	2,782.77	0.00	0.00	0.00
9,500.00	89.90	91.00	6,945.78	-473.72	2,863.15	2,882.72	0.00	0.00	0.00
9,600.00	89.90	91.00	6,945.95	-475.46	2,963.14	2,982.68	0.00	0.00	0.00
9,700.00	89.90	91.00	6,946.12	-477.21	3,063.12	3,082.63	0.00	0.00	0.00
9,800.00	89.90	91.00	6,946.30	-478.95	3,163.11	3,182.58	0.00	0.00	0.00
9,900.00	89.90	91.00	6,946.47	-480.70	3,263.09	3,282.53	0.00	0.00	0.00
10,000.00	89.90	91.00	6,946.64	-482.44	3,363.08	3,382.48	0.00	0.00	0.00
10,100.00	89.90	91.00	6,946.82	-484.19	3,463.06	3,482.44	0.00	0.00	0.00
10,200.00	89.90	91.00	6,946.99	-485.94	3,563.05	3,582.39	0.00	0.00	0.00
10,300.00	89.90	91.00	6,947.16	-487.68	3,663.03	3,682.34	0.00	0.00	0.00
10,400.00	89.90	91.00	6,947.33	-489.43	3,763.01	3,782.29	0.00	0.00	0.00
10,500.00	89.90	91.00	6,947.50	-491.17	3,863.00	3,882.24	0.00	0.00	0.00
10,600.00	89.90	91.00	6,947.68	-492.92	3,962.98	3,982.20	0.00	0.00	0.00
10,700.00	89.90	91.00	6,947.85	-494.66	4,062.97	4,082.15	0.00	0.00	0.00
10,800.00	89.90	91.00	6,948.02	-496.41	4,162.95	4,182.10	0.00	0.00	0.00
10,900.00	89.90	91.00	6,948.19	-498.15	4,262.94	4,282.05	0.00	0.00	0.00



Lonestar Consulting, LLC

Planning Report



Database:	Grand Junction	Local Co-ordinate Reference:	Well Rosa Unit 649H - Slot A4
Company:	Logos Operating LLC	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site:	Rosa Unit 27	North Reference:	True
Well:	Rosa Unit 649H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #6		

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)	
11,000.00	89.90	91.00	6,948.36	-499.90	4,362.92	4,382.00	0.00	0.00	0.00	
11,100.00	89.90	91.00	6,948.53	-501.64	4,462.91	4,481.96	0.00	0.00	0.00	
11,200.00	89.90	91.00	6,948.71	-503.39	4,562.89	4,581.91	0.00	0.00	0.00	
11,300.00	89.90	91.00	6,948.88	-505.13	4,662.88	4,681.86	0.00	0.00	0.00	
11,400.00	89.90	91.00	6,949.05	-506.88	4,762.86	4,781.81	0.00	0.00	0.00	
11,500.00	89.90	91.00	6,949.22	-508.62	4,862.85	4,881.76	0.00	0.00	0.00	
11,600.00	89.90	91.00	6,949.39	-510.37	4,962.83	4,981.71	0.00	0.00	0.00	
11,700.00	89.90	91.00	6,949.56	-512.11	5,062.81	5,081.67	0.00	0.00	0.00	
11,800.00	89.90	91.00	6,949.73	-513.86	5,162.80	5,181.62	0.00	0.00	0.00	
11,900.00	89.90	91.00	6,949.91	-515.60	5,262.78	5,281.57	0.00	0.00	0.00	
12,000.00	89.90	91.00	6,950.08	-517.35	5,362.77	5,381.52	0.00	0.00	0.00	
12,100.00	89.90	91.00	6,950.25	-519.09	5,462.75	5,481.47	0.00	0.00	0.00	
12,200.00	89.90	91.00	6,950.42	-520.84	5,562.74	5,581.43	0.00	0.00	0.00	
12,300.00	89.90	91.00	6,950.59	-522.59	5,662.72	5,681.38	0.00	0.00	0.00	
12,400.00	89.90	91.00	6,950.76	-524.33	5,762.71	5,781.33	0.00	0.00	0.00	
12,500.00	89.90	91.00	6,950.93	-526.08	5,862.69	5,881.28	0.00	0.00	0.00	
12,600.00	89.90	91.00	6,951.10	-527.82	5,962.68	5,981.23	0.00	0.00	0.00	
12,700.00	89.90	91.00	6,951.27	-529.57	6,062.66	6,081.19	0.00	0.00	0.00	
12,800.00	89.90	91.00	6,951.44	-531.31	6,162.65	6,181.14	0.00	0.00	0.00	
12,900.00	89.90	91.00	6,951.61	-533.06	6,262.63	6,281.09	0.00	0.00	0.00	
13,000.00	89.90	91.00	6,951.78	-534.80	6,362.61	6,381.04	0.00	0.00	0.00	
13,100.00	89.90	91.00	6,951.95	-536.55	6,462.60	6,480.99	0.00	0.00	0.00	
13,200.00	89.90	91.00	6,952.12	-538.29	6,562.58	6,580.95	0.00	0.00	0.00	
13,300.00	89.90	91.00	6,952.29	-540.04	6,662.57	6,680.90	0.00	0.00	0.00	
13,400.00	89.90	91.00	6,952.46	-541.78	6,762.55	6,780.85	0.00	0.00	0.00	
13,500.00	89.90	91.00	6,952.63	-543.53	6,862.54	6,880.80	0.00	0.00	0.00	
13,600.00	89.90	91.00	6,952.80	-545.27	6,962.52	6,980.75	0.00	0.00	0.00	
13,700.00	89.90	91.00	6,952.97	-547.02	7,062.51	7,080.71	0.00	0.00	0.00	
13,800.00	89.90	91.00	6,953.14	-548.76	7,162.49	7,180.66	0.00	0.00	0.00	
13,900.00	89.90	91.00	6,953.31	-550.51	7,262.48	7,280.61	0.00	0.00	0.00	
14,000.00	89.90	91.00	6,953.48	-552.25	7,362.46	7,380.56	0.00	0.00	0.00	
14,100.00	89.90	91.00	6,953.65	-554.00	7,462.45	7,480.51	0.00	0.00	0.00	
14,200.00	89.90	91.00	6,953.82	-555.74	7,562.43	7,580.46	0.00	0.00	0.00	
14,300.00	89.90	91.00	6,953.99	-557.49	7,662.41	7,680.42	0.00	0.00	0.00	
14,400.00	89.90	91.00	6,954.15	-559.24	7,762.40	7,780.37	0.00	0.00	0.00	
14,500.00	89.90	91.00	6,954.32	-560.98	7,862.38	7,880.32	0.00	0.00	0.00	
14,600.00	89.90	91.00	6,954.49	-562.73	7,962.37	7,980.27	0.00	0.00	0.00	
14,700.00	89.90	91.00	6,954.66	-564.47	8,062.35	8,080.22	0.00	0.00	0.00	
14,800.00	89.90	91.00	6,954.83	-566.22	8,162.34	8,180.18	0.00	0.00	0.00	
14,900.00	89.90	91.00	6,955.00	-567.96	8,262.32	8,280.13	0.00	0.00	0.00	
15,000.00	89.90	91.00	6,955.17	-569.71	8,362.31	8,380.08	0.00	0.00	0.00	
15,100.00	89.90	91.00	6,955.34	-571.45	8,462.29	8,480.03	0.00	0.00	0.00	
15,200.00	89.90	91.00	6,955.50	-573.20	8,562.28	8,579.98	0.00	0.00	0.00	
15,300.00	89.90	91.00	6,955.67	-574.94	8,662.26	8,679.94	0.00	0.00	0.00	
15,400.00	89.90	91.00	6,955.84	-576.69	8,762.25	8,779.89	0.00	0.00	0.00	
15,500.00	89.90	91.00	6,956.01	-578.43	8,862.23	8,879.84	0.00	0.00	0.00	
15,600.00	89.90	91.00	6,956.18	-580.18	8,962.21	8,979.79	0.00	0.00	0.00	
15,700.00	89.90	91.00	6,956.34	-581.92	9,062.20	9,079.74	0.00	0.00	0.00	
15,800.00	89.90	91.00	6,956.51	-583.67	9,162.18	9,179.70	0.00	0.00	0.00	
15,900.00	89.90	91.00	6,956.68	-585.41	9,262.17	9,279.65	0.00	0.00	0.00	
16,000.00	89.90	91.00	6,956.85	-587.16	9,362.15	9,379.60	0.00	0.00	0.00	
16,100.00	89.90	91.00	6,957.02	-588.90	9,462.14	9,479.55	0.00	0.00	0.00	



Lonestar Consulting, LLC

Planning Report



Database:	Grand Junction	Local Co-ordinate Reference:	Well Rosa Unit 649H - Slot A4
Company:	Logos Operating LLC	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site:	Rosa Unit 27	North Reference:	True
Well:	Rosa Unit 649H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #6		

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)
16,200.00	89.90	91.00	6,957.18	-590.65	9,562.12	9,579.50	0.00	0.00	0.00
16,300.00	89.90	91.00	6,957.35	-592.39	9,662.11	9,679.46	0.00	0.00	0.00
16,400.00	89.90	91.00	6,957.52	-594.14	9,762.09	9,779.41	0.00	0.00	0.00
16,500.00	89.90	91.00	6,957.69	-595.89	9,862.08	9,879.36	0.00	0.00	0.00
16,600.00	89.90	91.00	6,957.85	-597.63	9,962.06	9,979.31	0.00	0.00	0.00
16,700.00	89.90	91.00	6,958.02	-599.38	10,062.05	10,079.26	0.00	0.00	0.00
16,800.00	89.90	91.00	6,958.19	-601.12	10,162.03	10,179.22	0.00	0.00	0.00
16,900.00	89.90	91.00	6,958.35	-602.87	10,262.02	10,279.17	0.00	0.00	0.00
17,000.00	89.90	91.00	6,958.52	-604.61	10,362.00	10,379.12	0.00	0.00	0.00
17,100.00	89.90	91.00	6,958.69	-606.36	10,461.98	10,479.07	0.00	0.00	0.00
17,200.00	89.90	91.00	6,958.86	-608.10	10,561.97	10,579.02	0.00	0.00	0.00
17,300.00	89.90	91.00	6,959.02	-609.85	10,661.95	10,678.97	0.00	0.00	0.00
17,400.00	89.90	91.00	6,959.19	-611.59	10,761.94	10,778.93	0.00	0.00	0.00
17,500.00	89.90	91.00	6,959.36	-613.34	10,861.92	10,878.88	0.00	0.00	0.00
17,600.00	89.90	91.00	6,959.52	-615.08	10,961.91	10,978.83	0.00	0.00	0.00
17,700.00	89.90	91.00	6,959.69	-616.83	11,061.89	11,078.78	0.00	0.00	0.00
17,800.00	89.90	91.00	6,959.85	-618.57	11,161.88	11,178.73	0.00	0.00	0.00
17,900.00	89.90	91.00	6,960.02	-620.32	11,261.86	11,278.69	0.00	0.00	0.00
18,000.00	89.90	91.00	6,960.19	-622.06	11,361.85	11,378.64	0.00	0.00	0.00
18,100.00	89.90	91.00	6,960.35	-623.81	11,461.83	11,478.59	0.00	0.00	0.00
18,200.00	89.90	91.00	6,960.52	-625.55	11,561.82	11,578.54	0.00	0.00	0.00
18,300.00	89.90	91.00	6,960.68	-627.30	11,661.80	11,678.49	0.00	0.00	0.00
18,400.00	89.90	91.00	6,960.85	-629.04	11,761.78	11,778.45	0.00	0.00	0.00
18,500.00	89.91	91.00	6,961.02	-630.79	11,861.77	11,878.40	0.00	0.00	0.00
18,600.00	89.91	91.00	6,961.18	-632.54	11,961.75	11,978.35	0.00	0.00	0.00
18,700.00	89.91	91.00	6,961.35	-634.28	12,061.74	12,078.30	0.00	0.00	0.00
18,800.00	89.91	91.00	6,961.51	-636.03	12,161.72	12,178.25	0.00	0.00	0.00
18,900.00	89.91	91.00	6,961.68	-637.77	12,261.71	12,278.21	0.00	0.00	0.00
19,000.00	89.91	91.00	6,961.84	-639.52	12,361.69	12,378.16	0.00	0.00	0.00
19,100.00	89.91	91.00	6,962.01	-641.26	12,461.68	12,478.11	0.00	0.00	0.00
19,200.00	89.91	91.00	6,962.17	-643.01	12,561.66	12,578.06	0.00	0.00	0.00
19,300.00	89.91	91.00	6,962.34	-644.75	12,661.65	12,678.01	0.00	0.00	0.00
19,400.00	89.91	91.00	6,962.51	-646.50	12,761.63	12,777.97	0.00	0.00	0.00
19,500.00	89.91	91.00	6,962.67	-648.24	12,861.62	12,877.92	0.00	0.00	0.00
19,600.00	89.91	91.00	6,962.84	-649.99	12,961.60	12,977.87	0.00	0.00	0.00
19,700.00	89.91	91.00	6,963.00	-651.73	13,061.58	13,077.82	0.00	0.00	0.00
19,800.00	89.91	91.00	6,963.16	-653.48	13,161.57	13,177.77	0.00	0.00	0.00
19,900.00	89.91	91.00	6,963.33	-655.22	13,261.55	13,277.72	0.00	0.00	0.00
20,000.00	89.91	91.00	6,963.49	-656.97	13,361.54	13,377.68	0.00	0.00	0.00
20,100.00	89.91	91.00	6,963.66	-658.71	13,461.52	13,477.63	0.00	0.00	0.00
20,200.00	89.91	91.00	6,963.82	-660.46	13,561.51	13,577.58	0.00	0.00	0.00
20,300.00	89.91	91.00	6,963.99	-662.20	13,661.49	13,677.53	0.00	0.00	0.00
20,307.78	89.91	91.00	6,964.00	-662.34	13,669.27	13,685.31	0.00	0.00	0.00



Lonestar Consulting, LLC

Planning Report



Database:	Grand Junction	Local Co-ordinate Reference:	Well Rosa Unit 649H - Slot A4
Company:	Logos Operating LLC	TVD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6305' & RKB 24.5' @ 6329.50ft (Ensign T223)
Site:	Rosa Unit 27	North Reference:	True
Well:	Rosa Unit 649H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #6		

Design Targets									
Target Name									
- hit/miss target	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- Shape	(°)	(°)	(ft)	(ft)	(ft)	(usft)	(usft)		
649H POE Rev 3	0.00	0.00	6,942.00	-407.83	670.91	2,143,043.54	2,848,689.81	36.8885587	-107.4038418
- plan misses target center by 28.05ft at 7307.26ft MD (6941.75 TVD, -435.88 N, 670.74 E)									
- Point									
649H BHL Rev 4	0.00	0.00	6,964.00	-662.34	13,669.27	2,142,847.22	2,861,689.16	36.8878505	-107.3593943
- plan hits target center									
- Point									

Formations						
Measured Depth	Vertical Depth	Name	Lithology	Dip	Dip Direction	
(ft)	(ft)			(°)	(°)	
2,385.74	2,380.00	Ojo Alamo		0.00	0.00	
2,531.17	2,525.00	Kirtland		0.00	0.00	
3,036.87	3,030.00	Fruitland		0.00	0.00	
3,351.79	3,344.00	Pictured Cliffs		0.00	0.00	
3,466.31	3,458.00	Lewis		0.00	0.00	
4,573.56	4,563.00	Chacra		0.00	0.00	
5,374.81	5,362.00	Cliff House		0.00	0.00	
5,421.93	5,409.00	Menefee		0.00	0.00	
5,650.46	5,637.00	Point Lookout		0.00	0.00	
6,148.56	6,134.00	Mancos		0.00	0.00	

Plan Annotations					
Measured Depth	Vertical Depth	Local Coordinates		Comment	
(ft)	(ft)	+N/-S (ft)	+E/-W (ft)		
450.00				Start Build 2.00	
632.92				Start 5689.39 hold at 632.92 MD	
6,322.31	6,307.31	-389.30	46.34	Start DLS 9.00 TFO -84.45	
7,317.25	6,941.95	-435.94	680.73	Start 12969.12 hold at 7317.25 MD	
20,286.37	6,964.62	-661.97	13,647.86	TD at 20286.36	

Well Name: ROSA UNIT	Well Location: T31N / R5W / SEC 19 / NENW /	County or Parish/State: RIO ARRIBA / NM
Well Number: 649H	Type of Well: CONVENTIONAL GAS WELL	Allottee or Tribe Name:
Lease Number: NMSF078769	Unit or CA Name: ROSA UNIT-MANCOS PA	Unit or CA Number: NMNM78407E
US Well Number: 300393141000X1	Well Status: Temporarily Abandoned	Operator: LOGOS OPERATING LLC

Notice of Intent

Sundry ID: 2692041

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

Date Sundry Submitted: 09/12/2022 Time Sundry Submitted: 04:13

Date proposed operation will begin: 09/12/2022

Procedure Description: LOGOS Operating request a change in plans for the following: Original bottom-hole location from 1377' FNL & 246' FEL to new bottom-hole location 1620' FNL & 217' FEL Original TD @ 20,286' MD 6,965' TVD to new TD @ 20,308' MD 6,964' TVD Geology tops have been updated per changes. Original KOP @ 6,322' MD 6,311' TVD to new KOP @ 6,323' MD 6,308' TVD Original Landing point @ 7,317' MD 6,942' TVD to new Landing point @ 7,324' MD 6,942' TVD Original 5.5" casing Production @ 20,286' MD to new Production 5.5" casing @ 20,308' MD 6964' TVD The 5.5" production cementing bbls and 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_649H_Change_in_Plans_BHL_PROD_20220912_20220912161255.pdf

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Page 92 of 93

Well Name: ROSA UNIT	Well Location: T31N / R5W / SEC 19 / NENW /	County or Parish/State: RIO ARRIBA / NM
Well Number: 649H	Type of Well: CONVENTIONAL GAS WELL	Allottee or Tribe Name:
Lease Number: NMSF078769	Unit or CA Name: ROSA UNIT-MANCOS PA	Unit or CA Number: NMNM78407E
US Well Number: 300393141000X1	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 12, 2022 04:13 PM
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: 09/12/2022
Signature: Kenneth Rennick	

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 142707

CONDITIONS

Operator: LOGOS OPERATING, LLC 2010 Afton Place Farmington, NM 87401	OGRID: 289408
	Action Number: 142707
	Action Type: [C-103] NOI Change of Plans (C-103A)

CONDITIONS

Created By	Condition	Condition Date
kpickford	Adhere to previous NMOCD Conditions of Approval	9/13/2022