

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.
NMSF078764
6. If Indian, Allottee or Tribe Name**SUBMIT IN TRIPLICATE - Other instructions on page 2**

1. Type of Well

☐ Oil Well ☒ Gas Well ☐ Other2. Name of Operator
LOGOS OPERATING LLC3a. Address
2010 AFTON PLACE
FARMINGTON, NM 874013b. Phone No. (include area code)
(505) 278-87204. Location of Well (Footage, Sec., T., R., M., or Survey Description)
SEC 30 T31N R05W NESW (K) 2260 FSL 966 FWL7. If Unit of CA/Agreement, Name and/or No.
NMNM078407E8. Well Name and No.
ROSA UNIT 664H9. API Well No.
30-039-3141810. Field and Pool or Exploratory Area
BASIN MANCOS11. 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 one 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 2612' FWL & 922' FSL to new bottom hole location 893' FSL & 1028' FEL

Original TD @ 18,321" MD 6992' TVD to new TD @ 19,984' MD 7017' TVD.

Original 5.5" casing Production @ 18,321" MD to new Production casing depth 19,984' MD

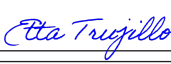
Original 5.5 Production cementing bbls and sacks have been updated per casing depth changes

Attached: New C102, Operation and Directional Drill plans.

14. I hereby certify that the foregoing is true and correct. Name (Printed/Typed)

Etta Trujillo

Title Regulatory Specialist

Signature 

Date 6/07/2022

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)

Received by OCD: 6/10/2022 8:08:16 AM

16221
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

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

Submit one copy to
Appropriate District Office

☒ AMENDED REPORT

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 664H
⁷ GRID No. 289408	⁸ Operator Name LOGOS OPERATING, LLC			⁹ Elevation 6394 '

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
K	30	31N	5W	3	2260	SOUTH	966	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
P	28	31N	5W		893	SOUTH	1028	EAST	RIO ARriba

12	Dedicated Acres 872.79	S/2 - Sections 28, 29, 30, T31N, R5W	13	Joint or Infill	14	Consolidation Code	15	Order No. R-13457
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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

Signature Etta Trujillo Date 6/7/2022
 Printed Name Etta Trujillo
 E-mail Address etrujillo@logosresourcesllc.com

18 SURVEYOR CERTIFICATION

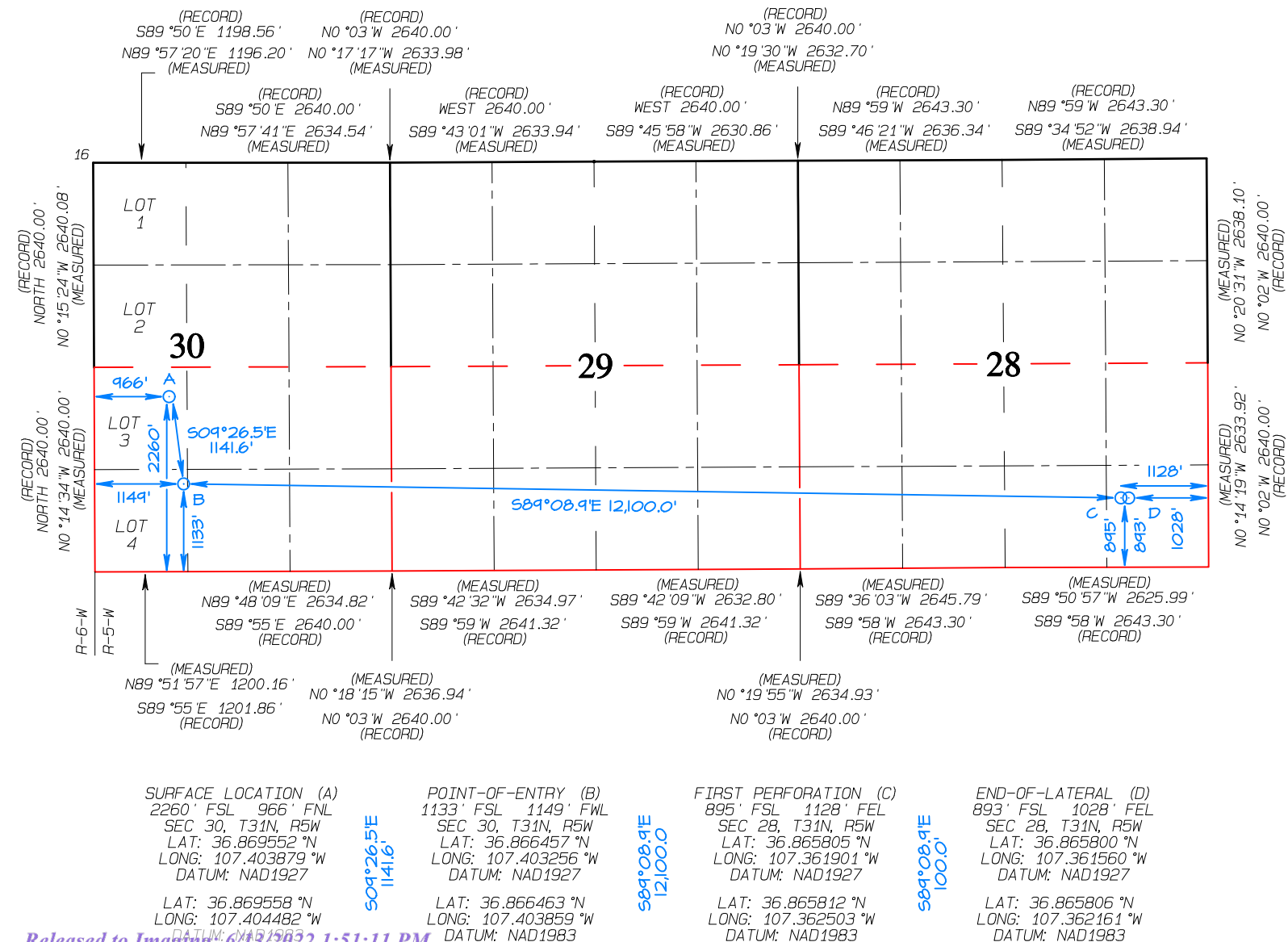
I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

Date Revised: JUNE 2, 2022
Survey Date: SEPTEMBER 3, 2015

Signature and Seal of Professional Surveyor



JASON C. EDWARDS
Certificate Number 15269





Logos Operating LLC

Rio Arriba, NM NAD83

Rosa Unit 30

Rosa Unit #664H

OH

Plan #5

Anticollision Report

02 June, 2022





Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Reference	Plan #5		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	Stations	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum centre distance of 2,500.00ft	Error Surface:	Pedal Curve
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program		Date	6/2/2022		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
0.00	19,984.07	Plan #5 (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 30						
Rosa Unit #658H - OH - OH	0.00	0.00	60.91			
Rosa Unit #658H - OH - OH	600.00	599.62	63.34	59.99	18.901	ES
Rosa Unit #658H - OH - OH	1,200.00	1,196.61	82.24	74.67	10.865	SF
Rosa Unit #658H - OH - Plan #4	1,000.00	1,000.00	60.91	53.92	8.709	CC, ES
Rosa Unit #658H - OH - Plan #4	1,200.00	1,198.74	68.13	59.75	8.133	SF
Rosa Unit #662H - OH - OH	0.00	0.00	45.14			
Rosa Unit #662H - OH - OH	1,000.00	1,000.01	49.71	43.42	7.903	ES
Rosa Unit #662H - OH - OH	1,200.00	1,199.28	54.64	46.99	7.147	SF
Rosa Unit #662H - OH - Plan #5	1,000.00	1,000.00	45.14	38.14	6.454	CC, ES
Rosa Unit #662H - OH - Plan #5	19,984.07	19,054.63	1,474.73	696.65	1.895	SF
Rosa Unit #665H - OH - OH	724.95	725.56	14.03	9.67	3.220	CC, ES, SF
Rosa Unit #665H - OH - Plan #10	755.54	756.12	6.33	1.14	1.219	Level 3, CC, ES, SF
Rosa Unit 146 - OH - OH	17,600.00	6,199.01	913.81	808.16	8.650	CC
Rosa Unit 146 - OH - OH	17,800.00	6,199.01	936.18	802.09	6.981	ES
Rosa Unit 146 - OH - OH	18,200.00	6,199.01	1,095.09	906.81	5.816	SF
Rosa Unit 162 - OH - OH	3,196.12	3,128.38	90.58	-17.29	0.840	Level 3, CC
Rosa Unit 162 - OH - OH	3,200.00	3,132.15	90.58	-17.41	0.839	Level 3, ES, SF
Rosa Unit 162B - OH - OH						Out of range
Rosa Unit 162C - OH - OH	8,271.41	7,022.66	201.87	-57.38	0.779	Level 3, CC, ES, SF
Rosa Unit 200A - OH - OH						Out of range
Rosa Unit 23-29 - OH - OH	11,300.00	5,935.01	1,127.90	1,017.53	10.219	CC
Rosa Unit 23-29 - OH - OH	11,400.00	5,935.01	1,131.61	1,017.07	9.879	ES
Rosa Unit 23-29 - OH - OH	12,200.00	5,935.01	1,437.95	1,229.68	6.904	SF
Rosa Unit 233 - OH - OH	2,979.14	2,911.02	365.65	241.87	2.954	CC
Rosa Unit 233 - OH - OH	3,200.00	3,124.75	369.86	236.49	2.773	ES
Rosa Unit 233 - OH - OH	3,300.00	3,221.52	374.48	236.78	2.720	SF
Rosa Unit 267 - OH - OH						Out of range



Lonestar Consulting, LLC

Anticollision Report



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Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #658H - OH - OH													Offset Site Error: 0.00 ft	
Survey Program: 459-MWD+HDGM		Reference Offset		Semi Major Axis		Offset Wellbore Centre			Rule Assigned: Distance				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	
0.00	0.00	0.00	0.00	0.00	0.00	-19.01	57.59	-19.84	60.91					
100.00	100.00	99.92	99.92	0.27	0.17	-19.21	57.59	-20.06	60.98	60.54	0.44	138.324		
200.00	200.00	199.83	199.82	0.63	0.34	-19.79	57.58	-20.72	61.19	60.22	0.97	63.117		
300.00	300.00	299.73	299.72	0.99	0.51	-20.76	57.56	-21.82	61.56	60.06	1.50	41.090		
400.00	400.00	399.62	399.60	1.35	0.68	-22.10	57.54	-23.36	62.10	60.07	2.03	30.641		
500.00	500.00	499.66	499.62	1.70	0.93	-23.81	57.45	-25.35	62.80	60.16	2.63	23.853		
600.00	600.00	599.62	599.55	2.06	1.29	-26.01	56.92	-27.78	63.34	59.99	3.35	18.901 ES		
700.00	700.00	699.22	699.11	2.42	1.65	-28.27	56.70	-30.49	64.38	60.32	4.07	15.824		
800.00	800.00	798.54	798.39	2.78	2.00	-30.23	57.19	-33.33	66.22	61.43	4.78	13.843		
900.00	900.00	898.07	897.87	3.14	2.36	-30.96	59.20	-35.52	69.07	63.57	5.49	12.570		
1,000.00	1,000.00	997.98	997.73	3.50	2.71	-30.85	61.96	-37.01	72.21	66.00	6.20	11.641		
1,100.00	1,099.98	1,098.06	1,097.76	3.84	3.06	116.20	65.18	-37.52	75.99	69.10	6.89	11.022		
1,200.00	1,199.84	1,196.61	1,196.23	4.17	3.40	120.34	69.08	-38.00	82.24	74.67	7.57	10.865 SF		
1,300.00	1,299.45	1,297.24	1,296.79	4.51	3.76	125.68	72.77	-38.52	90.61	82.35	8.26	10.964		
1,400.00	1,398.70	1,396.26	1,395.77	4.85	4.11	131.39	75.58	-39.00	101.11	92.15	8.96	11.285		
1,500.00	1,497.47	1,494.26	1,493.72	5.21	4.46	136.93	78.62	-39.82	115.29	105.64	9.66	11.937		
1,600.00	1,595.62	1,593.63	1,593.04	5.59	4.81	141.95	81.24	-41.22	132.65	122.28	10.37	12.791		
1,700.00	1,693.06	1,693.76	1,693.15	5.98	5.17	146.47	82.04	-42.82	151.86	140.78	11.09	13.697		
1,800.00	1,790.08	1,792.17	1,791.55	6.39	5.52	150.41	81.62	-44.42	172.12	160.33	11.79	14.594		
1,900.00	1,887.11	1,889.45	1,888.82	6.82	5.85	153.57	80.87	-45.75	192.70	180.21	12.49	15.428		
2,000.00	1,984.14	1,985.94	1,985.30	7.25	6.18	156.39	80.23	-45.98	214.06	200.88	13.18	16.246		
2,100.00	2,081.17	2,082.22	2,081.58	7.69	6.50	158.83	79.76	-45.62	236.14	222.29	13.86	17.043		
2,200.00	2,178.20	2,178.22	2,177.58	8.14	6.82	160.92	79.60	-44.81	259.01	244.47	14.54	17.819		
2,300.00	2,275.23	2,273.75	2,273.10	8.60	7.15	162.75	79.63	-43.56	282.47	267.25	15.22	18.564		
2,400.00	2,372.26	2,368.18	2,367.52	9.06	7.47	164.25	80.36	-42.25	306.87	290.97	15.90	19.305		
2,500.00	2,469.29	2,462.02	2,461.34	9.53	7.79	165.52	81.70	-40.73	332.13	315.55	16.58	20.038		
2,600.00	2,566.32	2,555.82	2,555.10	10.00	8.12	166.63	83.85	-38.79	358.46	341.20	17.26	20.772		
2,700.00	2,663.35	2,652.44	2,651.66	10.47	8.46	167.59	86.34	-36.93	385.10	367.14	17.96	21.442		
2,800.00	2,760.38	2,749.13	2,748.30	10.95	8.79	168.47	88.53	-34.84	411.64	392.98	18.67	22.054		
2,900.00	2,857.41	2,845.75	2,844.88	11.43	9.13	169.23	90.76	-32.83	438.27	418.90	19.37	22.624		
3,000.00	2,954.44	2,944.97	2,944.06	11.91	9.48	169.91	92.78	-31.01	464.62	444.52	20.10	23.116		
3,100.00	3,051.47	3,044.22	3,043.30	12.39	9.83	170.42	94.43	-30.20	490.27	469.44	20.83	23.537		
3,200.00	3,148.50	3,143.34	3,142.41	12.88	10.18	170.85	95.87	-29.76	515.62	494.06	21.56	23.914		
3,300.00	3,245.53	3,246.95	3,246.01	13.36	10.54	171.32	96.33	-29.20	540.17	517.85	22.32	24.206		
3,400.00	3,342.56	3,345.71	3,344.76	13.85	10.88	171.82	95.38	-28.34	563.66	540.63	23.03	24.471		
3,500.00	3,439.59	3,437.91	3,436.95	14.34	11.20	172.25	94.86	-27.42	587.59	563.87	23.71	24.778		
3,600.00	3,536.62	3,530.03	3,529.06	14.83	11.52	172.57	95.42	-26.71	612.45	588.05	24.40	25.101		
3,700.00	3,633.65	3,622.39	3,621.41	15.32	11.85	172.78	97.00	-26.62	637.96	612.87	25.09	25.427		
3,800.00	3,730.68	3,719.24	3,718.24	15.81	12.19	172.93	99.39	-26.83	663.99	638.18	25.81	25.723		
3,900.00	3,827.71	3,820.17	3,819.14	16.30	12.55	173.05	101.49	-27.44	689.51	662.94	26.56	25.957		
4,000.00	3,924.74	3,921.32	3,920.27	16.80	12.91	173.17	103.06	-28.36	714.45	687.13	27.32	26.155		
4,100.00	4,021.77	4,023.16	4,022.10	17.29	13.27	173.29	104.01	-29.48	738.77	710.70	28.07	26.319		
4,200.00	4,118.79	4,124.00	4,122.93	17.79	13.62	173.41	104.33	-30.74	762.50	733.69	28.81	26.463		
4,300.00	4,215.82	4,216.15	4,215.08	18.28	13.95	173.52	104.60	-31.83	786.24	756.74	29.51	26.647		
4,400.00	4,312.85	4,311.02	4,309.93	18.78	14.28	173.58	105.72	-33.31	810.57	780.35	30.22	26.825		
4,500.00	4,409.88	4,411.88	4,410.76	19.27	14.64	173.61	106.94	-35.15	834.80	803.83	30.97	26.957		
4,600.00	4,506.91	4,515.01	4,513.88	19.77	15.00	173.69	107.37	-36.89	858.41	826.68	31.73	27.054		
4,700.00	4,603.94	4,611.61	4,610.46	20.27	15.34	173.75	107.46	-38.64	881.70	849.25	32.45	27.170		
4,800.00	4,700.97	4,704.06	4,702.89	20.77	15.67	173.80	107.92	-40.40	905.29	872.14	33.15	27.310		
4,900.00	4,798.00	4,800.98	4,799.80	21.26	16.01	173.84	108.66	-42.11	929.17	895.29	33.87	27.430		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
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Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #658H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 459-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		
5,000.00	4,895.03	4,907.79	4,906.60	21.76	16.39	173.91	108.79	-43.88	952.54	917.88	34.66	27.482		
5,100.00	4,992.06	5,006.80	5,005.59	22.26	16.73	174.01	108.11	-45.30	975.36	939.96	35.39	27.558		
5,200.00	5,089.09	5,108.71	5,107.48	22.76	17.09	174.10	107.18	-46.98	997.86	961.72	36.14	27.609		
5,300.00	5,186.12	5,213.46	5,212.19	23.26	17.45	174.16	105.88	-49.49	1,019.73	982.82	36.91	27.627		
5,400.00	5,283.15	5,310.12	5,308.81	23.76	17.79	174.21	104.49	-51.97	1,041.37	1,003.73	37.63	27.672		
5,500.00	5,380.18	5,405.97	5,404.61	24.26	18.12	174.26	103.23	-54.46	1,063.09	1,024.74	38.35	27.721		
5,600.00	5,477.21	5,493.13	5,491.75	24.76	18.43	174.28	102.55	-56.68	1,085.30	1,046.28	39.02	27.816		
5,700.00	5,574.24	5,581.15	5,579.74	25.26	18.74	174.29	103.02	-58.79	1,108.67	1,068.98	39.69	27.934		
5,800.00	5,671.27	5,678.59	5,677.14	25.76	19.09	174.26	103.96	-61.53	1,132.22	1,091.80	40.42	28.009		
5,900.00	5,768.30	5,788.77	5,787.27	26.26	19.48	174.25	104.18	-64.65	1,155.10	1,113.86	41.24	28.012		
6,000.00	5,865.33	5,883.49	5,881.95	26.76	19.82	174.24	104.23	-67.60	1,177.73	1,135.78	41.95	28.073		
6,100.00	5,962.36	5,981.67	5,980.06	27.26	20.17	174.19	104.63	-71.23	1,200.39	1,157.70	42.69	28.118		
6,200.00	6,059.39	6,073.21	6,071.52	27.76	20.49	174.12	105.41	-75.05	1,223.20	1,179.81	43.39	28.190		
6,300.00	6,156.42	6,162.87	6,161.08	28.27	20.81	174.04	106.83	-78.72	1,246.66	1,202.58	44.08	28.283		
6,400.00	6,253.45	6,262.51	6,260.65	28.77	21.17	173.97	108.32	-82.48	1,270.21	1,225.38	44.83	28.334		
6,437.00	6,289.35	6,266.00	6,264.14	28.95	21.18	173.97	108.37	-82.61	1,279.33	1,234.45	44.88	28.506		
6,450.00	6,301.98	6,266.00	6,264.14	29.02	21.18	178.24	108.37	-82.61	1,282.70	1,237.82	44.88	28.580		
6,500.00	6,350.82	6,266.00	6,264.14	29.25	21.18	-161.83	108.37	-82.61	1,295.62	1,250.76	44.85	28.886		
6,550.00	6,399.83	6,266.00	6,264.14	29.45	21.18	-138.64	108.37	-82.61	1,308.38	1,263.61	44.77	29.225		
6,600.00	6,448.72	6,266.00	6,264.14	29.63	21.18	-117.91	108.37	-82.61	1,320.90	1,276.27	44.63	29.596		
6,650.00	6,497.18	6,266.00	6,264.14	29.78	21.18	-102.67	108.37	-82.61	1,333.13	1,288.69	44.44	29.996		
6,700.00	6,544.92	6,266.00	6,264.14	29.91	21.18	-92.12	108.37	-82.61	1,345.00	1,300.78	44.22	30.419		
6,750.00	6,591.63	6,266.00	6,264.14	30.03	21.18	-84.69	108.37	-82.61	1,356.43	1,312.48	43.95	30.862		
6,800.00	6,637.04	6,266.00	6,264.14	30.12	21.18	-79.26	108.37	-82.61	1,367.38	1,323.72	43.66	31.318		
6,850.00	6,680.86	6,266.00	6,264.14	30.21	21.18	-75.14	108.37	-82.61	1,377.78	1,334.43	43.36	31.779		
6,900.00	6,722.82	6,266.00	6,264.14	30.28	21.18	-71.91	108.37	-82.61	1,387.59	1,344.55	43.05	32.235		
6,950.00	6,762.67	6,266.00	6,264.14	30.33	21.18	-69.31	108.37	-82.61	1,396.76	1,354.02	42.75	32.676		
7,000.00	6,800.15	6,266.00	6,264.14	30.38	21.18	-67.19	108.37	-82.61	1,405.25	1,362.78	42.47	33.088		
7,050.00	6,835.04	6,266.00	6,264.14	30.42	21.18	-65.44	108.37	-82.61	1,413.01	1,370.78	42.23	33.457		
7,100.00	6,867.11	6,266.00	6,264.14	30.45	21.18	-63.99	108.37	-82.61	1,420.01	1,377.96	42.05	33.767		
7,150.00	6,896.19	6,266.00	6,264.14	30.48	21.18	-62.79	108.37	-82.61	1,426.22	1,384.28	41.94	34.004		
7,200.00	6,922.07	6,266.00	6,264.14	30.51	21.18	-61.79	108.37	-82.61	1,431.62	1,389.70	41.92	34.153		
7,250.00	6,944.62	6,266.00	6,264.14	30.55	21.18	-60.98	108.37	-82.61	1,436.16	1,394.17	41.99	34.203		
7,300.00	6,963.67	6,266.00	6,264.14	30.60	21.18	-60.34	108.37	-82.61	1,439.85	1,397.68	42.17	34.147		
7,350.00	6,979.13	6,266.00	6,264.14	30.69	21.18	-59.85	108.37	-82.61	1,442.66	1,400.20	42.45	33.983		
7,359.92	6,981.76	6,266.00	6,264.14	30.72	21.18	-59.77	108.37	-82.61	1,443.11	1,400.58	42.53	33.933		
7,400.00	6,990.88	6,266.00	6,264.14	30.83	21.18	-59.50	108.37	-82.61	1,444.57	1,401.72	42.85	33.712		
7,410.74	6,992.92	6,266.00	6,264.14	30.87	21.18	-59.44	108.37	-82.61	1,444.87	1,401.91	42.96	33.636		
7,450.00	6,998.87	6,266.00	6,264.14	31.05	21.18	-59.29	108.37	-82.61	1,445.59	1,402.23	43.36	33.341		
7,489.14	7,002.46	6,266.00	6,264.14	31.30	21.18	-59.21	108.37	-82.61	1,445.75	1,401.92	43.83	32.985		
7,500.00	7,003.04	6,266.00	6,264.14	31.38	21.18	-59.21	108.37	-82.61	1,445.70	1,401.73	43.97	32.882		
7,516.60	7,003.58	6,266.00	6,264.14	31.52	21.18	-59.21	108.37	-82.61	1,445.54	1,401.35	44.19	32.712		
7,520.93	7,003.65	6,266.00	6,264.14	31.56	21.18	-59.21	108.37	-82.61	1,445.48	1,401.23	44.25	32.667		
7,541.70	7,003.91	6,266.00	6,264.14	31.76	21.18	-59.21	108.37	-82.61	1,445.33	1,400.78	44.55	32.440		
7,600.00	7,004.65	6,266.00	6,264.14	32.42	21.18	-59.21	108.37	-82.61	1,446.51	1,401.10	45.41	31.857		
7,617.81	7,004.88	6,266.00	6,264.14	32.67	21.18	-59.21	108.37	-82.61	1,447.33	1,401.64	45.70	31.674		
7,700.00	7,005.93	6,266.00	6,264.14	33.89	21.18	-59.21	108.37	-82.61	1,453.97	1,406.97	47.00	30.932		
7,783.87	7,007.00	6,266.00	6,264.14	35.35	21.18	-59.21	108.37	-82.61	1,465.48	1,417.06	48.41	30.269		
7,800.00	7,007.19	6,266.00	6,264.14	35.65	21.18	-59.17	108.37	-82.61	1,468.26	1,419.57	48.69	30.155		
7,900.00	7,007.88	6,266.00	6,264.14	37.60	21.18	-58.86	108.37	-82.61	1,490.67	1,440.25	50.42	29.565		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #658H - OH - OH												Offset Site Error:	0.00 ft
Survey Program: 459-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)			
7,918.77	7,007.91	6,266.00	6,264.14	37.98	21.18	-58.78	108.37	-82.61	1,495.85	1,445.10	50.75	29.477	
8,000.00	7,007.97	6,266.00	6,264.14	39.70	21.18	-58.78	108.37	-82.61	1,520.89	1,468.76	52.13	29.173	
8,100.00	7,008.05	6,266.00	6,264.14	41.93	21.18	-58.78	108.37	-82.61	1,557.00	1,503.22	53.77	28.955	
8,200.00	7,008.12	6,266.00	6,264.14	44.27	21.18	-58.78	108.37	-82.61	1,598.55	1,543.24	55.31	28.901	
8,300.00	7,008.20	6,266.00	6,264.14	46.68	21.18	-58.78	108.37	-82.61	1,645.14	1,588.41	56.73	28.997	
8,400.00	7,008.27	6,266.00	6,264.14	49.16	21.18	-58.78	108.37	-82.61	1,696.35	1,638.32	58.03	29.230	
8,500.00	7,008.35	6,266.00	6,264.14	51.71	21.18	-58.78	108.37	-82.61	1,751.78	1,692.57	59.21	29.585	
8,600.00	7,008.42	6,266.00	6,264.14	54.30	21.18	-58.78	108.37	-82.61	1,811.04	1,750.77	60.27	30.050	
8,700.00	7,008.50	6,266.00	6,264.14	56.94	21.18	-58.78	108.37	-82.61	1,873.77	1,812.55	61.21	30.611	
8,800.00	7,008.58	6,266.00	6,264.14	59.62	21.18	-58.78	108.37	-82.61	1,939.62	1,877.57	62.05	31.257	
8,900.00	7,008.65	6,266.00	6,264.14	62.33	21.18	-58.78	108.37	-82.61	2,008.29	1,945.50	62.80	31.980	
9,000.00	7,008.73	6,266.00	6,264.14	65.07	21.18	-58.78	108.37	-82.61	2,079.51	2,016.05	63.46	32.770	
9,100.00	7,008.80	6,266.00	6,264.14	67.83	21.18	-58.78	108.37	-82.61	2,153.02	2,088.98	64.04	33.619	
9,200.00	7,008.88	6,266.00	6,264.14	70.61	21.18	-58.78	108.37	-82.61	2,228.59	2,164.04	64.56	34.521	
9,300.00	7,008.95	6,266.00	6,264.14	73.42	21.18	-58.78	108.37	-82.61	2,306.03	2,241.01	65.01	35.471	
9,400.00	7,009.03	6,266.00	6,264.14	76.24	21.18	-58.78	108.37	-82.61	2,385.14	2,319.72	65.41	36.462	
9,500.00	7,009.10	6,266.00	6,264.14	79.08	21.18	-58.78	108.37	-82.61	2,465.77	2,400.00	65.77	37.491	



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #658H - OH - Plan #4													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)			
0.00	0.00	0.00	0.00	0.00	0.00	-19.01	57.59	-19.84	60.91					
100.00	100.00	100.00	100.00	0.27	0.27	-19.01	57.59	-19.84	60.91	60.37	0.54	112.530		
200.00	200.00	200.00	200.00	0.63	0.63	-19.01	57.59	-19.84	60.91	59.65	1.26	48.410		
300.00	300.00	300.00	300.00	0.99	0.99	-19.01	57.59	-19.84	60.91	58.94	1.98	30.839		
400.00	400.00	400.00	400.00	1.35	1.35	-19.01	57.59	-19.84	60.91	58.22	2.69	22.626		
500.00	500.00	500.00	500.00	1.70	1.70	-19.01	57.59	-19.84	60.91	57.50	3.41	17.868		
600.00	600.00	600.00	600.00	2.06	2.06	-19.01	57.59	-19.84	60.91	56.79	4.13	14.763		
700.00	700.00	700.00	700.00	2.42	2.42	-19.01	57.59	-19.84	60.91	56.07	4.84	12.577		
800.00	800.00	800.00	800.00	2.78	2.78	-19.01	57.59	-19.84	60.91	55.35	5.56	10.956		
900.00	900.00	900.00	900.00	3.14	3.14	-19.01	57.59	-19.84	60.91	54.63	6.28	9.704		
1,000.00	1,000.00	1,000.00	1,000.00	3.50	3.50	-19.01	57.59	-19.84	60.91	53.92	6.99	8.709 CC, ES		
1,100.00	1,099.98	1,098.94	1,098.93	3.84	3.85	127.02	58.69	-20.46	63.20	55.51	7.69	8.220		
1,200.00	1,199.84	1,198.74	1,198.72	4.17	4.21	130.17	60.17	-21.30	68.13	59.75	8.38	8.133 SF		
1,300.00	1,299.45	1,298.28	1,298.24	4.51	4.56	134.78	61.64	-22.13	75.65	66.58	9.07	8.341		
1,400.00	1,398.70	1,397.43	1,397.37	4.85	4.92	140.01	63.11	-22.95	86.24	76.47	9.77	8.828		
1,500.00	1,497.47	1,496.06	1,495.99	5.21	5.27	145.18	64.56	-23.78	100.23	89.76	10.47	9.574		
1,600.00	1,595.62	1,594.06	1,593.98	5.59	5.62	149.88	66.01	-24.60	117.85	106.68	11.17	10.549		
1,700.00	1,693.06	1,691.32	1,691.22	5.98	5.97	153.93	67.45	-25.41	139.15	127.28	11.87	11.719		
1,800.00	1,790.08	1,788.16	1,788.05	6.31	6.31	157.29	68.88	-26.22	162.56	149.99	12.57	12.928		
1,900.00	1,887.11	1,884.99	1,884.87	6.62	6.66	159.80	70.31	-27.02	186.37	173.10	13.27	14.040		
2,000.00	1,984.14	1,981.83	1,981.70	7.25	7.01	161.75	71.75	-27.83	210.45	196.47	13.98	15.056		
2,100.00	2,081.17	2,078.67	2,078.52	7.69	7.35	163.30	73.18	-28.64	234.70	220.02	14.68	15.985		
2,200.00	2,178.20	2,175.51	2,175.35	8.14	7.70	164.55	74.61	-29.45	259.09	243.70	15.39	16.834		
2,300.00	2,275.23	2,272.35	2,272.17	8.60	8.05	165.59	76.04	-30.26	283.57	267.47	16.10	17.613		
2,400.00	2,372.26	2,369.19	2,368.99	9.06	8.40	166.47	77.47	-31.06	308.13	291.32	16.81	18.328		
2,500.00	2,469.29	2,466.03	2,465.82	9.53	8.74	167.21	78.90	-31.87	332.75	315.22	17.53	18.986		
2,600.00	2,566.32	2,562.86	2,562.64	10.00	9.09	167.86	80.34	-32.68	357.41	339.17	18.24	19.593		
2,700.00	2,663.35	2,659.70	2,659.47	10.47	9.44	168.42	81.77	-33.49	382.11	363.15	18.96	20.155		
2,800.00	2,760.38	2,756.54	2,756.29	10.95	9.78	168.91	83.20	-34.30	406.84	387.16	19.68	20.676		
2,900.00	2,857.41	2,853.38	2,853.12	11.43	10.13	169.35	84.63	-35.11	431.59	411.20	20.40	21.161		
3,000.00	2,954.44	2,950.22	2,949.94	11.91	10.48	169.74	86.06	-35.91	456.37	435.25	21.12	21.612		
3,100.00	3,051.47	3,047.06	3,046.77	12.39	10.83	170.08	87.49	-36.72	481.16	459.32	21.84	22.034		
3,200.00	3,148.50	3,143.89	3,143.59	12.88	11.17	170.40	88.92	-37.53	505.97	483.41	22.56	22.428		
3,300.00	3,245.53	3,240.73	3,240.41	13.36	11.52	170.68	90.36	-38.34	530.79	507.51	23.28	22.798		
3,400.00	3,342.56	3,337.57	3,337.24	13.85	11.87	170.94	91.79	-39.15	555.62	531.61	24.01	23.145		
3,500.00	3,439.59	3,434.41	3,434.06	14.34	12.21	171.18	93.22	-39.96	580.46	555.73	24.73	23.472		
3,600.00	3,536.62	3,531.25	3,530.89	14.83	12.56	171.40	94.65	-40.76	605.31	579.86	25.46	23.780		
3,700.00	3,633.65	3,628.09	3,627.71	15.32	12.91	171.60	96.08	-41.57	630.17	603.99	26.18	24.070		
3,800.00	3,730.68	3,724.92	3,724.54	15.81	13.26	171.79	97.51	-42.38	655.03	628.13	26.91	24.345		
3,900.00	3,827.71	3,821.76	3,821.36	16.30	13.60	171.96	98.95	-43.19	679.91	652.27	27.63	24.605		
4,000.00	3,924.74	3,918.60	3,918.19	16.80	13.95	172.12	100.38	-44.00	704.78	676.42	28.36	24.851		
4,100.00	4,021.77	4,015.44	4,015.01	17.29	14.30	172.27	101.81	-44.80	729.66	700.58	29.09	25.085		
4,200.00	4,118.79	4,112.28	4,111.83	17.79	14.65	172.41	103.24	-45.61	754.55	724.73	29.82	25.307		
4,300.00	4,215.82	4,209.12	4,208.66	18.28	14.99	172.54	104.67	-46.42	779.44	748.89	30.54	25.519		
4,400.00	4,312.85	4,305.96	4,305.48	18.78	15.34	172.66	106.10	-47.23	804.33	773.06	31.27	25.720		
4,500.00	4,409.88	4,402.79	4,402.31	19.27	15.69	172.77	107.54	-48.04	829.23	797.22	32.00	25.913		
4,600.00	4,506.91	4,499.63	4,499.13	19.77	16.04	172.88	108.97	-48.85	854.12	821.39	32.73	26.096		
4,700.00	4,603.94	4,596.47	4,595.96	20.27	16.38	172.98	110.40	-49.65	879.03	845.57	33.46	26.271		
4,800.00	4,700.97	4,693.31	4,692.78	20.77	16.73	173.08	111.83	-50.46	903.93	869.74	34.19	26.439		
4,900.00	4,798.00	4,790.15	4,789.61	21.26	17.08	173.17	113.26	-51.27	928.84	893.92	34.92	26.600		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #658H - OH - Plan #4													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		
5,000.00	4,895.03	4,886.99	4,886.43	21.76	17.43	173.26	114.69	-52.08	953.74	918.09	35.65	26.753		
5,100.00	4,992.06	4,983.82	4,983.26	22.26	17.77	173.34	116.13	-52.89	978.65	942.27	36.38	26.901		
5,200.00	5,089.09	5,080.66	5,080.08	22.76	18.12	173.42	117.56	-53.70	1,003.57	966.46	37.11	27.042		
5,300.00	5,186.12	5,177.50	5,176.90	23.26	18.47	173.49	118.99	-54.50	1,028.48	990.64	37.84	27.178		
5,400.00	5,283.15	5,274.34	5,273.73	23.76	18.82	173.56	120.42	-55.31	1,053.39	1,014.82	38.57	27.309		
5,500.00	5,380.18	5,371.18	5,370.55	24.26	19.16	173.63	121.85	-56.12	1,078.31	1,039.01	39.30	27.435		
5,600.00	5,477.21	5,468.02	5,467.38	24.76	19.51	173.69	123.28	-56.93	1,103.23	1,063.19	40.04	27.556		
5,700.00	5,574.24	5,564.86	5,564.20	25.26	19.86	173.76	124.72	-57.74	1,128.15	1,087.38	40.77	27.672		
5,800.00	5,671.27	5,661.69	5,661.03	25.76	20.20	173.81	126.15	-58.55	1,153.07	1,111.57	41.50	27.785		
5,900.00	5,768.30	5,758.53	5,757.85	26.26	20.55	173.87	127.58	-59.35	1,177.99	1,135.76	42.23	27.893		
6,000.00	5,865.33	5,855.37	5,854.68	26.76	20.90	173.93	129.01	-60.16	1,202.91	1,159.95	42.96	27.998		
6,100.00	5,962.36	5,952.21	5,951.50	27.26	21.25	173.98	130.44	-60.97	1,227.84	1,184.14	43.70	28.099		
6,200.00	6,059.39	6,049.05	6,048.32	27.76	21.59	174.03	131.87	-61.78	1,252.76	1,208.33	44.43	28.196		
6,300.00	6,156.42	6,145.89	6,145.15	28.27	21.94	174.08	133.30	-62.59	1,277.69	1,232.52	45.16	28.291		
6,400.00	6,253.45	6,242.72	6,241.97	28.77	22.29	174.12	134.74	-63.39	1,302.61	1,256.72	45.90	28.382		
6,437.00	6,289.35	6,278.55	6,277.80	28.95	22.42	174.14	135.27	-63.69	1,311.84	1,265.67	46.17	28.415		
6,450.00	6,301.98	6,291.16	6,290.40	29.02	22.46	178.39	135.45	-63.80	1,315.01	1,268.75	46.26	28.425		
6,500.00	6,350.82	6,339.88	6,339.11	29.25	22.64	-161.93	136.17	-64.21	1,326.01	1,279.39	46.62	28.440		
6,550.00	6,399.83	6,388.33	6,387.75	29.45	24.41	-147.08	145.81	-209.21	1,332.91	1,284.68	48.23	27.635		
6,600.00	6,448.72	7,170.62	6,974.97	29.63	27.21	-141.83	155.46	-504.45	1,322.28	1,272.06	50.21	26.333		
6,650.00	6,497.18	7,181.53	6,977.81	29.78	27.34	-129.03	155.74	-514.99	1,311.03	1,260.05	50.99	25.714		
6,700.00	6,544.92	7,184.63	6,978.75	29.91	27.38	-120.41	155.82	-517.94	1,301.29	1,249.66	51.63	25.206		
6,750.00	6,591.63	7,201.56	6,983.79	30.03	27.58	-115.36	156.26	-534.08	1,293.05	1,240.67	52.38	24.688		
6,800.00	6,637.04	7,185.11	6,979.28	30.12	27.38	-110.63	155.83	-518.27	1,286.22	1,233.54	52.68	24.416		
6,850.00	6,680.86	7,165.89	6,973.49	30.21	27.15	-106.90	155.33	-499.95	1,280.85	1,227.97	52.88	24.221		
6,900.00	6,722.82	7,145.06	6,966.60	30.28	26.91	-103.83	154.79	-480.31	1,276.87	1,223.87	53.01	24.089		
6,950.00	6,762.67	7,123.23	6,958.69	30.33	26.67	-101.18	154.21	-459.96	1,274.23	1,221.14	53.08	24.004		
7,000.00	6,800.15	7,100.72	6,949.81	30.38	26.43	-98.83	153.61	-439.29	1,272.82	1,219.71	53.11	23.965		
7,036.80	6,826.09	7,083.85	6,942.68	30.41	26.28	-97.22	153.16	-424.01	1,272.52	1,219.39	53.13	23.951		
7,050.00	6,835.04	7,077.75	6,940.00	30.42	26.22	-96.67	152.99	-418.53	1,272.56	1,219.43	53.13	23.952		
7,052.25	6,836.54	7,076.71	6,939.54	30.42	26.21	-96.58	152.97	-417.60	1,272.57	1,219.44	53.13	23.952		
7,100.00	6,867.11	7,054.46	6,929.29	30.45	26.00	-94.67	152.37	-397.86	1,273.34	1,220.21	53.13	23.966		
7,150.00	6,896.19	7,030.93	6,917.72	30.48	25.80	-92.78	151.73	-377.38	1,275.05	1,221.90	53.15	23.989		
7,200.00	6,922.07	7,007.23	6,905.30	30.51	25.61	-90.98	151.09	-357.21	1,277.58	1,224.39	53.19	24.017		
7,250.00	6,944.62	6,983.40	6,892.07	30.55	25.43	-89.27	150.45	-337.41	1,280.81	1,227.52	53.28	24.038		
7,300.00	6,963.67	6,959.49	6,878.05	30.60	25.26	-87.63	149.81	-318.04	1,284.61	1,231.19	53.42	24.047		
7,350.00	6,979.13	6,935.51	6,863.27	30.69	25.10	-86.07	149.16	-299.17	1,288.86	1,235.24	53.62	24.037		
7,400.00	6,990.88	6,911.48	6,847.76	30.83	24.95	-84.59	148.52	-280.83	1,293.44	1,239.56	53.88	24.005		
7,450.00	6,998.87	6,887.41	6,831.55	31.05	24.81	-83.20	147.88	-263.06	1,298.23	1,244.03	54.21	23.949		
7,500.00	7,003.04	6,863.33	6,814.66	31.38	24.68	-81.90	147.24	-245.91	1,303.13	1,248.53	54.59	23.871		
7,520.93	7,003.65	6,850.00	6,805.04	31.56	24.61	-81.28	146.89	-236.69	1,305.18	1,250.46	54.73	23.849		
7,600.00	7,004.65	6,817.50	6,780.78	32.42	24.46	-80.20	146.05	-215.07	1,314.53	1,259.01	55.52	23.678		
7,700.00	7,005.93	6,778.34	6,750.15	33.89	24.28	-78.85	145.05	-190.73	1,331.21	1,274.61	56.61	23.516		
7,783.87	7,007.00	6,750.00	6,727.06	35.35	24.15	-77.84	144.34	-174.30	1,349.54	1,291.94	57.60	23.429		
7,800.00	7,007.19	6,750.00	6,727.06	35.65	24.15	-77.81	144.34	-174.30	1,353.58	1,295.72	57.86	23.395		
7,900.00	7,007.88	6,715.74	6,698.22	37.60	24.02	-76.28	143.50	-155.84	1,383.45	1,324.43	59.02	23.439		
7,918.77	7,007.91	6,700.00	6,684.64	37.98	23.95	-75.63	143.12	-147.88	1,390.08	1,330.95	59.13	23.510		
8,000.00	7,007.97	6,700.00	6,684.64	39.70	23.95	-75.63	143.12	-147.88	1,420.75	1,360.41	60.34	23.545		
8,100.00	7,008.05	6,667.97	6,656.43	41.93	23.83	-74.42	142.36	-132.74	1,463.06	1,401.67	61.40	23.829		
8,200.00	7,008.12	6,650.00	6,640.28	44.27	23.76	-73.74	141.95	-124.87	1,510.27	1,447.76	62.51	24.162		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #658H - OH - Plan #4													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)				
8,300.00	7,008.20	6,631.14	6,623.10	46.68	23.69	-73.02	141.52	-117.11	1,561.95	1,498.45	63.50	24.598		
8,400.00	7,008.27	6,615.78	6,608.94	49.16	23.63	-72.43	141.18	-111.17	1,617.77	1,553.36	64.42	25.114		
8,500.00	7,008.35	6,600.00	6,594.25	51.71	23.57	-71.82	140.83	-105.42	1,677.38	1,612.15	65.22	25.718		
8,600.00	7,008.42	6,600.00	6,594.25	54.30	23.57	-71.82	140.83	-105.42	1,740.51	1,674.44	66.07	26.345		
8,700.00	7,008.50	6,578.61	6,574.12	56.94	23.50	-70.99	140.38	-98.21	1,806.58	1,739.95	66.63	27.113		
8,800.00	7,008.58	6,568.53	6,564.55	59.62	23.46	-70.60	140.16	-95.05	1,875.56	1,808.36	67.21	27.907		
8,900.00	7,008.65	6,550.00	6,546.83	62.33	23.39	-69.88	139.78	-89.63	1,947.16	1,879.52	67.64	28.787		
9,000.00	7,008.73	6,550.00	6,546.83	65.07	23.39	-69.88	139.78	-89.63	2,020.91	1,952.76	68.15	29.654		
9,100.00	7,008.80	6,550.00	6,546.83	67.83	23.39	-69.88	139.78	-89.63	2,096.82	2,028.23	68.59	30.570		
9,200.00	7,008.88	6,550.00	6,546.83	70.61	23.39	-69.88	139.78	-89.63	2,174.69	2,105.72	68.97	31.530		
9,300.00	7,008.95	6,529.68	6,527.23	73.42	23.32	-69.10	139.37	-84.29	2,253.95	2,184.77	69.18	32.581		
9,400.00	7,009.03	6,523.63	6,521.37	76.24	23.30	-68.86	139.26	-82.82	2,334.88	2,265.44	69.44	33.626		
9,500.00	7,009.10	6,500.00	6,498.32	79.08	23.21	-67.95	138.80	-77.62	2,417.47	2,347.92	69.55	34.758		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #662H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 398-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)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
0.00	0.00	0.00	0.00	0.00	0.00	-27.33	40.10	-20.72	45.14					
100.00	100.00	99.92	99.92	0.27	0.17	-27.44	40.14	-20.84	45.22	44.79	0.44	103.034		
200.00	200.00	199.84	199.84	0.63	0.34	-27.78	40.25	-21.20	45.49	44.52	0.97	47.106		
300.00	300.00	299.76	299.76	0.99	0.50	-28.33	40.43	-21.79	45.93	44.44	1.49	30.776		
400.00	400.00	399.68	399.67	1.35	0.68	-29.09	40.68	-22.63	46.55	44.53	2.02	23.021		
500.00	500.00	499.80	499.79	1.70	1.03	-30.20	40.69	-23.68	47.08	44.34	2.74	17.189		
600.00	600.00	599.60	599.58	2.06	1.39	-31.53	40.73	-24.98	47.78	44.33	3.46	13.828		
700.00	700.00	699.70	699.66	2.42	1.75	-32.99	40.82	-26.50	48.67	44.50	4.17	11.662		
800.00	800.00	799.87	799.83	2.78	2.11	-33.56	40.87	-27.11	49.04	44.16	4.89	10.034		
900.00	900.00	899.85	899.82	3.14	2.45	-33.13	41.44	-27.04	49.48	43.89	5.59	8.848		
1,000.00	1,000.00	1,000.01	999.96	3.50	2.79	-30.96	42.62	-25.57	49.71	43.42	6.29	7.903 ES		
1,100.00	1,099.98	1,099.79	1,099.69	3.84	3.13	119.32	44.27	-22.95	50.70	43.73	6.97	7.273		
1,200.00	1,199.84	1,199.28	1,199.08	4.17	3.47	128.42	46.68	-19.49	54.64	46.99	7.65	7.147 SF		
1,300.00	1,299.45	1,298.03	1,297.71	4.51	3.82	138.82	49.53	-15.47	62.75	54.42	8.33	7.536		
1,400.00	1,398.70	1,395.96	1,395.53	4.85	4.16	147.35	53.02	-12.30	76.02	67.01	9.01	8.436		
1,500.00	1,497.47	1,492.42	1,491.83	5.21	4.51	153.98	57.54	-9.22	94.68	84.99	9.69	9.770		
1,600.00	1,595.62	1,589.05	1,588.26	5.59	4.85	158.82	63.10	-6.31	118.37	108.00	10.38	11.406		
1,700.00	1,693.06	1,686.60	1,685.64	5.98	5.20	161.86	68.54	-4.99	145.22	134.14	11.08	13.109		
1,800.00	1,790.08	1,785.80	1,784.75	6.39	5.56	164.05	72.81	-4.81	172.43	160.64	11.79	14.628		
1,900.00	1,887.11	1,882.41	1,881.31	6.82	5.90	165.57	75.96	-5.13	198.68	186.20	12.48	15.917		
2,000.00	1,984.14	1,976.59	1,975.42	7.25	6.24	166.65	79.50	-5.47	225.47	212.30	13.17	17.124		
2,100.00	2,081.17	2,069.76	2,068.47	7.69	6.57	167.36	84.17	-5.93	253.37	239.52	13.85	18.298		
2,200.00	2,178.20	2,165.60	2,164.16	8.14	6.92	167.89	89.64	-6.42	281.92	267.37	14.55	19.379		
2,300.00	2,275.23	2,263.65	2,262.09	8.60	7.27	168.62	94.29	-5.71	310.11	294.85	15.27	20.315		
2,400.00	2,372.26	2,357.86	2,356.21	9.06	7.61	169.52	97.87	-3.46	338.19	322.24	15.96	21.196		
2,500.00	2,469.29	2,449.13	2,447.33	9.53	7.93	170.42	101.65	-0.07	367.19	350.57	16.62	22.088		
2,600.00	2,566.32	2,545.13	2,543.14	10.00	8.28	171.24	106.14	3.84	396.88	379.55	17.33	22.902		
2,700.00	2,663.35	2,643.47	2,641.33	10.47	8.64	171.86	110.64	6.97	426.16	408.10	18.05	23.603		
2,800.00	2,760.38	2,747.11	2,744.87	10.95	9.01	172.32	114.66	8.96	454.32	435.50	18.82	24.143		
2,900.00	2,857.41	2,843.38	2,841.08	11.43	9.35	172.68	117.66	10.31	481.61	462.08	19.53	24.659		
3,000.00	2,954.44	2,940.83	2,938.48	11.91	9.70	173.02	120.52	11.71	508.78	488.53	20.25	25.121		
3,100.00	3,051.47	3,037.61	3,035.22	12.39	10.05	173.31	123.26	12.90	535.79	514.82	20.97	25.547		
3,200.00	3,148.50	3,133.23	3,130.80	12.88	10.39	173.52	126.16	13.74	562.81	541.12	21.69	25.952		
3,300.00	3,245.53	3,225.90	3,223.41	13.36	10.73	173.71	129.26	14.71	590.19	567.81	22.38	26.371		
3,400.00	3,342.56	3,318.00	3,315.42	13.85	11.06	173.89	132.96	16.05	618.31	595.24	23.07	26.801		
3,500.00	3,439.59	3,410.60	3,407.90	14.34	11.39	174.02	137.31	17.36	647.00	623.23	23.77	27.224		
3,600.00	3,536.62	3,502.37	3,499.55	14.83	11.73	174.11	142.09	18.57	676.07	651.62	24.45	27.646		
3,700.00	3,633.65	3,595.61	3,592.63	15.32	12.07	174.22	147.22	20.22	705.60	680.45	25.15	28.050		
3,800.00	3,730.68	3,692.04	3,688.90	15.81	12.42	174.40	152.12	22.84	735.24	709.36	25.88	28.412		
3,900.00	3,827.71	3,793.08	3,789.79	16.30	12.78	174.69	156.17	26.63	764.48	737.84	26.63	28.704		
4,000.00	3,924.74	3,905.92	3,902.52	16.80	13.18	175.03	158.89	30.48	792.23	764.77	27.46	28.847		
4,100.00	4,021.77	4,007.45	4,004.01	17.29	13.54	175.30	160.19	33.15	818.70	790.49	28.21	29.017		
4,200.00	4,118.79	4,105.87	4,102.39	17.79	13.89	175.55	161.10	35.60	844.81	815.87	28.94	29.187		
4,300.00	4,215.82	4,202.80	4,199.30	18.28	14.23	175.78	161.87	37.80	870.73	841.06	29.67	29.351		
4,400.00	4,312.85	4,295.89	4,292.35	18.78	14.56	175.98	162.86	39.97	896.91	866.54	30.36	29.538		
4,500.00	4,409.88	4,391.70	4,388.13	19.27	14.90	176.19	163.93	42.61	923.35	892.27	31.08	29.708		
4,600.00	4,506.91	4,490.80	4,487.18	19.77	15.25	176.42	164.68	45.52	949.60	917.79	31.82	29.845		
4,700.00	4,603.94	4,588.95	4,585.29	20.27	15.59	176.64	165.27	48.38	975.73	943.18	32.55	29.978		
4,800.00	4,700.97	4,689.62	4,685.92	20.77	15.94	176.86	165.50	51.24	1,001.53	968.24	33.29	30.082		
4,900.00	4,798.00	4,783.63	4,779.90	21.26	16.27	177.05	165.61	53.64	1,027.10	993.10	34.00	30.211		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #662H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 398-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)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
5,000.00	4,895.03	4,869.77	4,866.00	21.76	16.58	177.18	166.63	55.70	1,053.47	1,018.82	34.65	30.400		
5,100.00	4,992.06	4,961.07	4,957.25	22.26	16.91	177.25	168.94	57.44	1,080.67	1,045.33	35.35	30.575		
5,200.00	5,089.09	5,061.27	5,057.41	22.76	17.27	177.29	171.58	58.67	1,107.63	1,071.53	36.10	30.684		
5,300.00	5,186.12	5,150.28	5,146.38	23.26	17.59	177.33	174.12	59.93	1,134.86	1,098.08	36.78	30.859		
5,400.00	5,283.15	5,238.46	5,234.50	23.76	17.90	177.38	176.99	61.79	1,162.76	1,125.32	37.45	31.051		
5,500.00	5,380.18	5,331.32	5,327.26	24.26	18.24	177.44	180.38	63.93	1,191.10	1,152.95	38.15	31.222		
5,600.00	5,477.21	5,425.79	5,421.64	24.76	18.58	177.48	184.07	66.08	1,219.62	1,180.76	38.86	31.381		
5,700.00	5,574.24	5,523.87	5,519.62	25.26	18.94	177.51	188.02	68.07	1,248.13	1,208.53	39.61	31.514		
5,800.00	5,671.27	5,626.51	5,622.17	25.76	19.31	177.53	191.81	69.86	1,276.20	1,235.82	40.38	31.605		
5,900.00	5,768.30	5,720.44	5,716.03	26.26	19.65	177.56	195.06	71.64	1,304.17	1,263.08	41.09	31.738		
6,000.00	5,865.33	5,816.06	5,811.57	26.76	19.99	177.57	198.76	73.02	1,332.25	1,290.43	41.82	31.860		
6,100.00	5,962.36	5,916.55	5,911.95	27.26	20.35	177.51	203.43	73.03	1,360.20	1,317.63	42.57	31.951		
6,200.00	6,059.39	6,028.87	6,024.12	27.76	20.75	177.36	208.96	71.11	1,387.52	1,344.12	43.41	31.967		
6,300.00	6,156.42	6,149.88	6,144.99	28.27	21.17	177.19	213.50	67.64	1,413.26	1,368.98	44.28	31.914		
6,400.00	6,253.45	6,178.00	6,173.09	28.77	21.27	177.16	214.25	66.79	1,439.80	1,395.25	44.55	32.319		
6,437.00	6,289.35	6,178.00	6,173.09	28.95	21.27	177.16	214.25	66.79	1,451.16	1,406.62	44.55	32.576		
6,450.00	6,301.98	6,178.00	6,173.09	29.02	21.27	-178.52	214.25	66.79	1,455.29	1,410.75	44.54	32.674		
6,500.00	6,350.82	6,178.00	6,173.09	29.25	21.27	-158.40	214.25	66.79	1,470.83	1,426.34	44.49	33.061		
6,550.00	6,399.83	6,178.00	6,173.09	29.45	21.27	-135.06	214.25	66.79	1,485.79	1,441.40	44.39	33.471		
6,600.00	6,448.72	6,178.00	6,173.09	29.63	21.27	-114.23	214.25	66.79	1,500.11	1,455.85	44.25	33.900		
6,650.00	6,497.18	6,178.00	6,173.09	29.78	21.27	-98.93	214.25	66.79	1,513.70	1,469.63	44.07	34.346		
6,700.00	6,544.92	6,178.00	6,173.09	29.91	21.27	-88.34	214.25	66.79	1,526.51	1,482.65	43.86	34.805		
6,750.00	6,591.63	6,178.00	6,173.09	30.03	21.27	-80.92	214.25	66.79	1,538.48	1,494.86	43.62	35.274		
6,800.00	6,637.04	6,178.00	6,173.09	30.12	21.27	-75.52	214.25	66.79	1,549.55	1,506.20	43.35	35.745		
6,850.00	6,680.86	6,178.00	6,173.09	30.21	21.27	-71.46	214.25	66.79	1,559.68	1,516.61	43.07	36.212		
6,900.00	6,722.82	6,178.00	6,173.09	30.28	21.27	-68.31	214.25	66.79	1,568.83	1,526.04	42.79	36.666		
6,950.00	6,762.67	6,178.00	6,173.09	30.33	21.27	-65.82	214.25	66.79	1,576.95	1,534.44	42.51	37.096		
7,000.00	6,800.15	6,178.00	6,173.09	30.38	21.27	-63.83	214.25	66.79	1,584.00	1,541.75	42.25	37.488		
7,050.00	6,835.04	6,178.00	6,173.09	30.42	21.27	-62.23	214.25	66.79	1,589.97	1,547.94	42.03	37.830		
7,100.00	6,867.11	6,178.00	6,173.09	30.45	21.27	-60.94	214.25	66.79	1,594.83	1,552.97	41.85	38.104		
7,150.00	6,896.19	6,178.00	6,173.09	30.48	21.27	-59.92	214.25	66.79	1,598.55	1,556.81	41.74	38.296		
7,200.00	6,922.07	6,178.00	6,173.09	30.51	21.27	-59.13	214.25	66.79	1,601.13	1,559.42	41.70	38.392		
7,209.78	6,926.75	6,178.00	6,173.09	30.52	21.27	-59.00	214.25	66.79	1,601.50	1,559.78	41.71	38.395		
7,250.00	6,944.62	6,178.00	6,173.09	30.55	21.27	-58.54	214.25	66.79	1,602.55	1,560.79	41.75	38.380		
7,261.18	6,949.18	6,178.00	6,173.09	30.56	21.27	-58.43	214.25	66.79	1,602.70	1,560.92	41.78	38.356		
7,300.00	6,963.67	6,178.00	6,173.09	30.60	21.27	-58.13	214.25	66.79	1,602.80	1,560.90	41.90	38.251		
7,339.92	6,976.31	6,178.00	6,173.09	30.67	21.27	-57.92	214.25	66.79	1,602.16	1,560.07	42.10	38.057		
7,350.00	6,979.13	6,178.00	6,173.09	30.69	21.27	-57.88	214.25	66.79	1,601.89	1,559.73	42.15	38.001		
7,390.64	6,988.97	6,178.00	6,173.09	30.80	21.27	-57.80	214.25	66.79	1,600.29	1,557.85	42.44	37.707		
7,400.00	6,990.88	6,178.00	6,173.09	30.83	21.27	-57.80	214.25	66.79	1,599.81	1,557.30	42.51	37.633		
7,441.20	6,997.74	6,178.00	6,173.09	31.01	21.27	-57.84	214.25	66.79	1,597.24	1,554.35	42.89	37.242		
7,450.00	6,998.87	6,178.00	6,173.09	31.05	21.27	-57.86	214.25	66.79	1,596.59	1,553.62	42.97	37.153		
7,491.63	7,002.61	6,178.00	6,173.09	31.32	21.27	-58.03	214.25	66.79	1,593.03	1,549.59	43.44	36.673		
7,500.00	7,003.04	6,178.00	6,173.09	31.38	21.27	-58.08	214.25	66.79	1,592.22	1,548.69	43.54	36.572		
7,517.58	7,003.59	6,178.00	6,173.09	31.53	21.27	-58.18	214.25	66.79	1,590.42	1,546.66	43.76	36.346		
7,520.93	7,003.65	6,178.00	6,173.09	31.56	21.27	-58.21	214.25	66.79	1,590.06	1,546.26	43.80	36.302		
7,585.91	7,004.48	6,178.00	6,173.09	32.25	21.27	-58.21	214.25	66.79	1,584.36	1,539.66	44.70	35.444		
7,600.00	7,004.65	6,178.00	6,173.09	32.42	21.27	-58.21	214.25	66.79	1,583.48	1,538.58	44.90	35.269		
7,692.54	7,005.84	6,178.00	6,173.09	33.78	21.27	-58.21	214.25	66.79	1,580.77	1,534.43	46.34	34.114		
7,700.00	7,005.93	6,178.00	6,173.09	33.89	21.27	-58.21	214.25	66.79	1,580.78	1,534.33	46.45	34.029		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #662H - OH - OH													Offset Site Error:	0.00 ft
Survey Program:		398-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)				
7,717.41	7,006.15	6,178.00	6,173.09	34.19	21.27	-58.21	214.25	66.79	1,580.96	1,534.21	46.75	33.818		
7,783.87	7,007.00	6,178.00	6,173.09	35.35	21.27	-58.21	214.25	66.79	1,583.40	1,535.53	47.87	33.080		
7,787.02	7,007.04	6,178.00	6,173.09	35.41	21.27	-58.21	214.25	66.79	1,583.58	1,535.66	47.92	33.046		
7,800.00	7,007.19	6,178.00	6,173.09	35.65	21.27	-58.20	214.25	66.79	1,584.44	1,536.29	48.15	32.909		
7,900.00	7,007.88	6,178.00	6,173.09	37.60	21.27	-58.04	214.25	66.79	1,595.91	1,545.97	49.94	31.957		
7,918.77	7,007.91	6,178.00	6,173.09	37.98	21.27	-58.00	214.25	66.79	1,599.02	1,548.73	50.28	31.800		
8,000.00	7,007.97	6,178.00	6,173.09	39.70	21.27	-58.00	214.25	66.79	1,615.08	1,563.31	51.77	31.195		
8,100.00	7,008.05	6,178.00	6,173.09	41.93	21.27	-58.00	214.25	66.79	1,640.17	1,586.60	53.58	30.614		
8,200.00	7,008.12	6,178.00	6,173.09	44.27	21.27	-58.00	214.25	66.79	1,670.88	1,615.57	55.31	30.207		
8,300.00	7,008.20	6,178.00	6,173.09	46.68	21.27	-58.00	214.25	66.79	1,706.91	1,649.95	56.96	29.966		
8,400.00	7,008.27	6,178.00	6,173.09	49.16	21.27	-58.00	214.25	66.79	1,747.92	1,689.42	58.50	29.878		
8,500.00	7,008.35	6,178.00	6,173.09	51.71	21.27	-58.00	214.25	66.79	1,793.57	1,733.65	59.93	29.930		
8,600.00	7,008.42	6,178.00	6,173.09	54.30	21.27	-58.00	214.25	66.79	1,843.52	1,782.30	61.23	30.109		
8,700.00	7,008.50	6,178.00	6,173.09	56.94	21.27	-58.00	214.25	66.79	1,897.44	1,835.02	62.41	30.402		
8,800.00	7,008.58	6,178.00	6,173.09	59.62	21.27	-58.00	214.25	66.79	1,954.98	1,891.50	63.48	30.797		
8,900.00	7,008.65	6,178.00	6,173.09	62.33	21.27	-58.00	214.25	66.79	2,015.84	1,951.40	64.44	31.283		
9,000.00	7,008.73	6,178.00	6,173.09	65.07	21.27	-58.00	214.25	66.79	2,079.74	2,014.44	65.30	31.850		
9,100.00	7,008.80	6,178.00	6,173.09	67.83	21.27	-58.00	214.25	66.79	2,146.39	2,080.33	66.06	32.489		
9,200.00	7,008.88	6,178.00	6,173.09	70.61	21.27	-58.00	214.25	66.79	2,215.55	2,148.81	66.75	33.194		
9,300.00	7,008.95	6,178.00	6,173.09	73.42	21.27	-58.00	214.25	66.79	2,287.00	2,219.64	67.35	33.956		
9,400.00	7,009.03	6,178.00	6,173.09	76.24	21.27	-58.00	214.25	66.79	2,360.52	2,292.63	67.89	34.770		
9,500.00	7,009.10	6,178.00	6,173.09	79.08	21.27	-58.00	214.25	66.79	2,435.92	2,367.56	68.37	35.631		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #662H - OH - Plan #5													Offset Site Error:	0.00 ft
Survey Program: 0-MWD													Offset Well Error:	0.00 ft
Reference	Offset	Semi Major Axis	Offset	Highside	Offset Wellbore Centre	Distance	Rule Assigned:							Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor		
0.00	0.00	0.00	0.00	0.00	0.00	-27.33	40.10	-20.72	45.14					
100.00	100.00	100.00	100.00	0.27	0.27	-27.33	40.10	-20.72	45.14	44.60	0.54	83.387		
200.00	200.00	200.00	200.00	0.63	0.63	-27.33	40.10	-20.72	45.14	43.88	1.26	35.873		
300.00	300.00	300.00	300.00	0.99	0.99	-27.33	40.10	-20.72	45.14	43.16	1.98	22.852		
400.00	400.00	400.00	400.00	1.35	1.35	-27.33	40.10	-20.72	45.14	42.44	2.69	16.766		
500.00	500.00	500.00	500.00	1.70	1.70	-27.33	40.10	-20.72	45.14	41.73	3.41	13.240		
600.00	600.00	600.00	600.00	2.06	2.06	-27.33	40.10	-20.72	45.14	41.01	4.13	10.940		
700.00	700.00	700.00	700.00	2.42	2.42	-27.33	40.10	-20.72	45.14	40.29	4.84	9.320		
800.00	800.00	800.00	800.00	2.78	2.78	-27.33	40.10	-20.72	45.14	39.58	5.56	8.118		
900.00	900.00	900.00	900.00	3.14	3.14	-27.33	40.10	-20.72	45.14	38.86	6.28	7.191		
1,000.00	1,000.00	1,000.00	1,000.00	3.50	3.50	-27.33	40.10	-20.72	45.14	38.14	6.99	6.454 CC, ES		
1,100.00	1,099.98	1,099.98	1,099.98	3.84	3.86	119.59	40.10	-20.72	45.97	38.28	7.69	5.975		
1,200.00	1,199.84	1,199.84	1,199.84	4.17	4.21	124.89	40.10	-20.72	48.77	40.39	8.38	5.817		
1,300.00	1,299.45	1,298.03	1,298.01	4.51	4.56	133.41	41.56	-19.89	55.51	46.44	9.07	6.119		
1,400.00	1,398.70	1,396.38	1,396.28	4.85	4.92	142.93	45.05	-17.92	67.96	58.20	9.76	6.960		
1,500.00	1,497.47	1,494.41	1,494.22	5.21	5.27	150.57	48.61	-15.91	84.81	74.35	10.46	8.107		
1,600.00	1,595.62	1,591.69	1,591.42	5.59	5.61	156.36	52.13	-13.91	105.81	94.66	11.15	9.485		
1,700.00	1,693.06	1,688.11	1,687.75	5.98	5.96	160.67	55.63	-11.93	130.75	118.90	11.85	11.036		
1,800.00	1,790.08	1,784.05	1,783.61	6.39	6.30	163.92	59.10	-9.97	157.83	145.29	12.54	12.588		
1,900.00	1,887.11	1,879.99	1,879.47	6.82	6.65	166.21	62.58	-8.00	185.25	172.02	13.23	14.003		
2,000.00	1,984.14	1,975.94	1,975.33	7.25	6.99	167.91	66.06	-6.03	212.86	198.94	13.92	15.289		
2,100.00	2,081.17	2,071.88	2,071.19	7.69	7.34	169.22	69.53	-4.06	240.62	226.00	14.62	16.459		
2,200.00	2,178.20	2,167.82	2,167.05	8.14	7.68	170.26	73.01	-2.10	268.46	253.14	15.32	17.525		
2,300.00	2,275.23	2,263.76	2,262.91	8.60	8.03	171.11	76.49	-0.13	296.37	280.35	16.02	18.499		
2,400.00	2,372.26	2,359.71	2,358.77	9.06	8.38	171.81	79.96	1.84	324.33	307.60	16.73	19.392		
2,500.00	2,469.29	2,455.65	2,454.63	9.53	8.72	172.40	83.44	3.81	352.33	334.90	17.43	20.212		
2,600.00	2,566.32	2,551.59	2,550.49	10.00	9.07	172.90	86.92	5.77	380.35	362.21	18.14	20.968		
2,700.00	2,663.35	2,647.53	2,646.35	10.47	9.42	173.33	90.39	7.74	408.40	389.55	18.85	21.667		
2,800.00	2,760.38	2,743.48	2,742.21	10.95	9.76	173.71	93.87	9.71	436.47	416.91	19.56	22.314		
2,900.00	2,857.41	2,839.42	2,838.07	11.43	10.11	174.04	97.35	11.68	464.56	444.28	20.27	22.915		
3,000.00	2,954.44	2,935.36	2,933.93	11.91	10.46	174.34	100.82	13.64	492.65	471.67	20.99	23.475		
3,100.00	3,051.47	3,031.31	3,029.79	12.39	10.80	174.60	104.30	15.61	520.76	499.06	21.70	23.997		
3,200.00	3,148.50	3,127.25	3,125.65	12.88	11.15	174.83	107.78	17.58	548.88	526.46	22.42	24.485		
3,300.00	3,245.53	3,223.19	3,221.51	13.36	11.50	175.05	111.25	19.55	577.00	553.87	23.13	24.942		
3,400.00	3,342.56	3,319.13	3,317.37	13.85	11.85	175.24	114.73	21.51	605.13	581.28	23.85	25.372		
3,500.00	3,439.59	3,415.08	3,413.22	14.34	12.19	175.42	118.21	23.48	633.27	608.70	24.57	25.776		
3,600.00	3,536.62	3,511.02	3,509.08	14.83	12.54	175.58	121.68	25.45	661.41	636.12	25.29	26.156		
3,700.00	3,633.65	3,606.96	3,604.94	15.32	12.89	175.72	125.16	27.42	689.56	663.55	26.01	26.515		
3,800.00	3,730.68	3,702.90	3,700.80	15.81	13.24	175.86	128.64	29.38	717.71	690.98	26.73	26.854		
3,900.00	3,827.71	3,798.85	3,796.66	16.30	13.58	175.99	132.11	31.35	745.86	718.41	27.45	27.175		
4,000.00	3,924.74	3,894.79	3,892.52	16.80	13.93	176.10	135.59	33.32	774.02	745.85	28.17	27.479		
4,100.00	4,021.77	3,990.73	3,988.38	17.29	14.28	176.21	139.07	35.29	802.18	773.29	28.89	27.768		
4,200.00	4,118.79	4,086.68	4,084.24	17.79	14.63	176.31	142.54	37.25	830.34	800.73	29.61	28.042		
4,300.00	4,215.82	4,182.62	4,180.10	18.28	14.98	176.41	146.02	39.22	858.50	828.17	30.33	28.303		
4,400.00	4,312.85	4,278.56	4,275.96	18.78	15.32	176.50	149.50	41.19	886.67	855.61	31.05	28.552		
4,500.00	4,409.88	4,374.50	4,371.82	19.27	15.67	176.58	152.97	43.15	914.84	883.06	31.78	28.789		
4,600.00	4,506.91	4,470.45	4,467.68	19.77	16.02	176.66	156.45	45.12	943.00	910.50	32.50	29.015		
4,700.00	4,603.94	4,566.39	4,563.54	20.27	16.37	176.73	159.93	47.09	971.18	937.95	33.22	29.231		
4,800.00	4,700.97	4,662.33	4,659.40	20.77	16.72	176.80	163.41	49.06	999.35	965.40	33.95	29.437		
4,900.00	4,798.00	4,758.28	4,755.26	21.26	17.06	176.86	166.88	51.02	1,027.52	992.85	34.67	29.635		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #662H - OH - Plan #5													Offset Site Error: 0.00 ft	
Survey Program: 0-MWD				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		
5,000.00	4,895.03	4,854.22	4,851.12	21.76	17.41	176.93	170.36	52.99	1,055.70	1,020.30	35.40	29.824		
5,100.00	4,992.06	4,950.16	4,946.98	22.26	17.76	176.99	173.84	54.96	1,083.87	1,047.75	36.12	30.006		
5,200.00	5,089.09	5,046.10	5,042.84	22.76	18.11	177.04	177.31	56.93	1,112.05	1,075.20	36.85	30.180		
5,300.00	5,186.12	5,142.05	5,138.70	23.26	18.46	177.09	180.79	58.89	1,140.23	1,102.65	37.57	30.348		
5,400.00	5,283.15	5,237.99	5,234.56	23.76	18.81	177.15	184.27	60.86	1,168.40	1,130.11	38.30	30.509		
5,500.00	5,380.18	5,333.93	5,330.42	24.26	19.15	177.19	187.74	62.83	1,196.58	1,157.56	39.02	30.663		
5,600.00	5,477.21	5,429.87	5,426.28	24.76	19.50	177.24	191.22	64.80	1,224.76	1,185.02	39.75	30.812		
5,700.00	5,574.24	5,525.82	5,522.13	25.26	19.85	177.28	194.70	66.76	1,252.95	1,212.47	40.48	30.956		
5,800.00	5,671.27	5,621.76	5,617.99	25.76	20.20	177.33	198.17	68.73	1,281.13	1,239.93	41.20	31.094		
5,900.00	5,768.30	5,717.70	5,713.85	26.26	20.55	177.37	201.65	70.70	1,309.31	1,267.38	41.93	31.227		
6,000.00	5,865.33	5,813.65	5,809.71	26.76	20.89	177.40	205.13	72.67	1,337.49	1,294.84	42.65	31.356		
6,100.00	5,962.36	5,909.59	5,905.57	27.26	21.24	177.44	208.60	74.63	1,365.67	1,322.29	43.38	31.480		
6,200.00	6,059.39	6,005.53	6,001.43	27.76	21.59	177.48	212.08	76.60	1,393.86	1,349.75	44.11	31.600		
6,300.00	6,156.42	6,101.47	6,097.29	28.27	21.94	177.51	215.56	78.57	1,422.04	1,377.21	44.84	31.716		
6,400.00	6,253.45	6,197.42	6,193.15	28.77	22.29	177.54	219.03	80.54	1,450.23	1,404.66	45.56	31.828		
6,437.00	6,289.35	6,232.92	6,228.62	28.95	22.42	177.55	220.32	81.26	1,460.66	1,414.82	45.83	31.869		
6,450.00	6,301.98	6,245.41	6,241.10	29.02	22.46	-178.17	220.77	81.52	1,464.25	1,418.32	45.93	31.882		
6,500.00	6,350.82	6,293.76	6,289.42	29.25	22.64	-158.39	222.52	82.51	1,476.74	1,430.45	46.29	31.904		
6,550.00	6,399.83	6,342.38	6,337.99	29.45	22.81	-135.64	224.29	83.51	1,487.08	1,440.44	46.64	31.883		
6,600.00	6,448.72	6,390.95	6,386.52	29.63	22.99	-115.62	226.05	84.51	1,495.23	1,448.25	46.99	31.823		
6,650.00	6,497.18	6,415.00	6,410.54	29.78	23.08	-101.06	226.91	85.31	1,501.56	1,454.42	47.15	31.849		
6,700.00	6,544.92	6,450.00	6,445.40	29.91	23.21	-91.39	228.15	88.09	1,506.69	1,459.31	47.37	31.805		
6,750.00	6,591.63	6,450.00	6,445.40	30.03	23.21	-84.57	228.15	88.09	1,510.28	1,462.97	47.31	31.922		
6,800.00	6,637.04	6,480.45	6,475.57	30.12	23.32	-80.15	229.20	92.06	1,512.56	1,465.08	47.48	31.854		
6,850.00	6,680.86	6,500.00	6,494.82	30.21	23.39	-76.98	229.86	95.37	1,513.58	1,466.02	47.56	31.824		
6,897.03	6,720.38	6,522.68	6,517.03	30.27	23.48	-74.93	230.61	99.95	1,513.35	1,465.67	47.68	31.742		
6,900.00	6,722.82	6,523.98	6,518.29	30.28	23.48	-74.83	230.65	100.24	1,513.30	1,465.61	47.68	31.737		
6,950.00	6,762.67	6,550.00	6,543.53	30.33	23.58	-73.42	231.49	106.51	1,511.76	1,463.93	47.84	31.602		
7,000.00	6,800.15	6,567.34	6,560.19	30.38	23.65	-72.40	232.04	111.26	1,508.97	1,461.04	47.93	31.480		
7,050.00	6,835.04	6,600.00	6,591.21	30.42	23.77	-72.10	233.03	121.44	1,505.10	1,456.88	48.22	31.215		
7,100.00	6,867.11	6,600.00	6,591.21	30.45	23.77	-71.52	233.03	121.44	1,500.01	1,451.78	48.22	31.105		
7,150.00	6,896.19	6,631.87	6,620.94	30.48	23.90	-71.87	233.97	132.89	1,493.79	1,445.17	48.62	30.726		
7,200.00	6,922.07	6,650.00	6,637.57	30.51	23.97	-72.20	234.48	140.06	1,486.66	1,437.72	48.94	30.377		
7,250.00	6,944.62	6,674.38	6,659.62	30.55	24.07	-72.91	235.15	150.45	1,478.60	1,429.19	49.42	29.921		
7,300.00	6,963.67	6,700.00	6,682.34	30.60	24.17	-73.87	235.82	162.27	1,469.75	1,419.75	50.00	29.396		
7,350.00	6,979.13	6,716.26	6,696.50	30.69	24.24	-74.78	236.23	170.24	1,460.16	1,409.57	50.58	28.866		
7,400.00	6,990.88	6,736.89	6,714.18	30.83	24.33	-75.98	236.73	180.87	1,449.96	1,398.65	51.32	28.256		
7,450.00	6,998.87	6,750.00	6,725.22	31.05	24.39	-77.11	237.04	187.92	1,439.30	1,387.24	52.07	27.643		
7,500.00	7,003.04	6,777.34	6,747.78	31.38	24.52	-78.82	237.66	203.35	1,428.22	1,375.16	53.06	26.918		
7,520.93	7,003.65	6,785.64	6,754.50	31.56	24.56	-79.48	237.84	208.22	1,423.52	1,370.05	53.46	26.625		
7,600.00	7,004.65	6,818.99	6,780.83	32.42	24.73	-80.54	238.53	228.67	1,407.23	1,352.11	55.12	25.532		
7,700.00	7,005.93	6,868.03	6,817.52	33.89	25.00	-82.03	239.44	261.19	1,390.89	1,333.44	57.45	24.210		
7,783.28	7,006.99	6,915.74	6,850.71	35.34	25.29	-83.38	240.19	295.44	1,380.62	1,321.03	59.59	23.169		
7,783.87	7,007.00	6,916.11	6,850.95	35.35	25.29	-83.39	240.20	295.71	1,380.56	1,320.95	59.60	23.162		
7,799.70	7,007.19	6,925.97	6,857.48	35.64	25.36	-83.68	240.34	303.09	1,378.96	1,318.93	60.03	22.971		
7,800.00	7,007.19	6,926.16	6,857.61	35.65	25.36	-83.68	240.34	303.24	1,378.93	1,318.89	60.04	22.967		
7,890.89	7,007.86	6,987.88	6,895.80	37.42	25.82	-85.31	241.09	351.69	1,373.06	1,310.45	62.61	21.930		
7,900.00	7,007.88	6,994.57	6,899.65	37.60	25.87	-85.47	241.16	357.16	1,372.77	1,309.90	62.87	21.834		
7,916.17	7,007.91	7,006.67	6,906.47	37.93	25.97	-85.76	241.27	367.15	1,372.37	1,309.02	63.36	21.661		
7,918.77	7,007.91	7,008.64	6,907.56	37.98	25.99	-85.81	241.29	368.79	1,372.32	1,308.89	63.44	21.633		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #662H - OH - Plan #5													Offset Site Error: 0.00 ft	
Survey Program: 0-MWD								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)				
7,986.65	7,007.96	7,063.09	6,935.72	39.42	26.49	-86.98	241.70	415.38	1,371.65	1,306.09	65.56	20.922		
8,000.00	7,007.97	7,074.47	6,941.09	39.70	26.61	-87.21	241.76	425.40	1,371.64	1,305.65	65.99	20.785		
8,100.00	7,008.05	7,166.37	6,977.78	41.93	27.66	-88.74	241.98	509.58	1,372.30	1,302.86	69.44	19.762		
8,200.00	7,008.12	7,268.60	7,003.89	44.27	29.10	-89.82	241.62	608.30	1,373.56	1,300.27	73.29	18.740		
8,300.00	7,008.20	7,377.03	7,013.98	46.68	30.90	-90.24	240.55	716.12	1,374.54	1,297.01	77.53	17.730		
8,400.00	7,008.27	7,477.41	7,014.07	49.16	32.79	-90.24	239.21	816.49	1,375.17	1,293.27	81.90	16.791		
8,500.00	7,008.35	7,577.35	7,014.14	51.71	34.84	-90.24	237.89	916.43	1,375.81	1,289.31	86.49	15.906		
8,600.00	7,008.42	7,677.29	7,014.21	54.30	37.04	-90.24	236.56	1,016.36	1,376.45	1,285.16	91.29	15.078		
8,700.00	7,008.50	7,777.24	7,014.27	56.94	39.37	-90.24	235.25	1,116.30	1,377.09	1,280.83	96.26	14.306		
8,800.00	7,008.58	7,877.18	7,014.34	59.62	41.80	-90.24	233.93	1,216.24	1,377.74	1,276.37	101.37	13.591		
8,900.00	7,008.65	7,977.13	7,014.41	62.33	44.33	-90.24	232.62	1,316.17	1,378.39	1,271.79	106.60	12.930		
9,000.00	7,008.73	8,077.07	7,014.48	65.07	46.93	-90.24	231.32	1,416.11	1,379.05	1,267.11	111.94	12.320		
9,100.00	7,008.80	8,177.02	7,014.55	67.83	49.59	-90.24	230.01	1,516.04	1,379.71	1,262.34	117.36	11.756		
9,200.00	7,008.88	8,276.96	7,014.62	70.61	52.30	-90.24	228.72	1,615.98	1,380.37	1,257.51	122.86	11.235		
9,300.00	7,008.95	8,376.90	7,014.68	73.42	55.06	-90.24	227.42	1,715.91	1,381.04	1,252.61	128.43	10.754		
9,400.00	7,009.03	8,476.85	7,014.75	76.24	57.86	-90.24	226.13	1,815.85	1,381.71	1,247.66	134.05	10.308		
9,500.00	7,009.10	8,576.79	7,014.82	79.08	60.69	-90.24	224.84	1,915.79	1,382.38	1,242.67	139.72	9.894		
9,600.00	7,009.18	8,676.74	7,014.89	81.93	63.55	-90.24	223.56	2,015.72	1,383.06	1,237.63	145.43	9.510		
9,700.00	7,009.25	8,776.68	7,014.95	84.80	66.44	-90.24	222.28	2,115.66	1,383.75	1,232.57	151.18	9.153		
9,800.00	7,009.33	8,876.62	7,015.02	87.67	69.35	-90.24	221.01	2,215.59	1,384.43	1,227.47	156.96	8.820		
9,900.00	7,009.40	8,976.57	7,015.09	90.56	72.28	-90.24	219.74	2,315.53	1,385.12	1,222.35	162.78	8.509		
10,000.00	7,009.48	9,076.51	7,015.15	93.45	75.22	-90.23	218.47	2,415.46	1,385.82	1,217.20	168.62	8.219		
10,100.00	7,009.55	9,176.46	7,015.22	96.36	78.18	-90.23	217.21	2,515.40	1,386.52	1,212.04	174.48	7.947		
10,200.00	7,009.63	9,276.40	7,015.29	99.27	81.16	-90.23	215.95	2,615.33	1,387.22	1,206.85	180.37	7.691		
10,300.00	7,009.71	9,376.34	7,015.35	102.19	84.14	-90.23	214.69	2,715.27	1,387.93	1,201.66	186.27	7.451		
10,400.00	7,009.78	9,476.29	7,015.42	105.11	87.14	-90.23	213.44	2,815.21	1,388.64	1,196.44	192.19	7.225		
10,500.00	7,009.86	9,576.23	7,015.48	108.04	90.14	-90.23	212.19	2,915.14	1,389.35	1,191.22	198.13	7.012		
10,600.00	7,009.93	9,676.17	7,015.55	110.98	93.16	-90.23	210.95	3,015.08	1,390.07	1,185.99	204.08	6.811		
10,700.00	7,010.01	9,776.12	7,015.61	113.92	96.18	-90.23	209.71	3,115.01	1,390.79	1,180.74	210.04	6.621		
10,800.00	7,010.08	9,876.06	7,015.68	116.87	99.21	-90.23	208.47	3,214.95	1,391.52	1,175.49	216.02	6.442		
10,900.00	7,010.16	9,976.00	7,015.74	119.82	102.25	-90.23	207.24	3,314.88	1,392.24	1,170.24	222.01	6.271		
11,000.00	7,010.23	10,075.95	7,015.81	122.77	105.29	-90.23	206.01	3,414.82	1,392.98	1,164.97	228.01	6.109		
11,100.00	7,010.31	10,175.89	7,015.87	125.73	108.34	-90.23	204.79	3,514.76	1,393.72	1,159.70	234.01	5.956		
11,200.00	7,010.38	10,275.83	7,015.94	128.69	111.39	-90.23	203.56	3,614.69	1,394.46	1,154.43	240.03	5.810		
11,300.00	7,010.46	10,375.78	7,016.00	131.66	114.45	-90.23	202.35	3,714.63	1,395.20	1,149.15	246.05	5.670		
11,400.00	7,010.53	10,475.72	7,016.06	134.62	117.51	-90.23	201.13	3,814.56	1,395.95	1,143.87	252.08	5.538		
11,500.00	7,010.61	10,575.66	7,016.13	137.60	120.58	-90.23	199.93	3,914.50	1,396.70	1,138.58	258.12	5.411		
11,600.00	7,010.68	10,675.60	7,016.19	140.57	123.65	-90.23	198.72	4,014.43	1,397.46	1,133.30	264.16	5.290		
11,700.00	7,010.76	10,775.55	7,016.25	143.54	126.72	-90.23	197.52	4,114.37	1,398.22	1,128.01	270.21	5.175		
11,800.00	7,010.84	10,875.49	7,016.31	146.52	129.80	-90.22	196.32	4,214.30	1,398.99	1,122.72	276.27	5.064		
11,900.00	7,010.91	10,975.43	7,016.38	149.50	132.88	-90.22	195.13	4,314.24	1,399.75	1,117.43	282.33	4.958		
12,000.00	7,010.99	11,075.37	7,016.44	152.49	135.96	-90.22	193.94	4,414.18	1,400.53	1,112.13	288.39	4.856		
12,100.00	7,011.06	11,175.32	7,016.50	155.47	139.05	-90.22	192.75	4,514.11	1,401.30	1,106.84	294.46	4.759		
12,200.00	7,011.14	11,275.26	7,016.56	158.46	142.14	-90.22	191.57	4,614.05	1,402.08	1,101.55	300.54	4.665		
12,300.00	7,011.21	11,375.20	7,016.63	161.45	145.22	-90.22	190.39	4,713.98	1,402.87	1,096.25	306.61	4.575		
12,400.00	7,011.29	11,475.14	7,016.69	164.44	148.32	-90.22	189.22	4,813.92	1,403.66	1,090.96	312.70	4.489		
12,500.00	7,011.36	11,575.09	7,016.75	167.43	151.41	-90.22	188.05	4,913.85	1,404.45	1,085.67	318.78	4.406		
12,600.00	7,011.44	11,675.03	7,016.81	170.42	154.50	-90.22	186.88	5,013.79	1,405.24	1,080.37	324.87	4.326		
12,700.00	7,011.51	11,774.97	7,016.87	173.42	157.60	-90.22	185.72	5,113.72	1,406.04	1,075.08	330.96	4.248		
12,800.00	7,011.59	11,874.91	7,016.93	176.41	160.70	-90.22	184.56	5,213.66	1,406.85	1,069.79	337.05	4.174		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #662H - OH - Plan #5													Offset Site Error:	0.00 ft	
Survey Program:		0-MWD					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	Warning		
12,900.00	7,011.66	11,974.85	7,016.99	179.41	163.80	-90.22	183.41	5,313.59	1,407.65	1,064.50	343.15	4.102			
13,000.00	7,011.74	12,074.80	7,017.05	182.41	166.90	-90.22	182.26	5,413.53	1,408.46	1,059.21	349.25	4.033			
13,100.00	7,011.81	12,174.74	7,017.11	185.41	170.01	-90.22	181.11	5,513.46	1,409.28	1,053.93	355.35	3.966			
13,200.00	7,011.89	12,274.68	7,017.17	188.41	173.11	-90.21	179.97	5,613.40	1,410.10	1,048.64	361.46	3.901			
13,300.00	7,011.97	12,374.62	7,017.23	191.41	176.22	-90.21	178.83	5,713.34	1,410.92	1,043.36	367.57	3.839			
13,400.00	7,012.04	12,474.56	7,017.29	194.41	179.32	-90.21	177.69	5,813.27	1,411.75	1,038.07	373.68	3.778			
13,500.00	7,012.12	12,574.51	7,017.35	197.41	182.43	-90.21	176.56	5,913.21	1,412.58	1,032.79	379.79	3.719			
13,600.00	7,012.19	12,674.45	7,017.41	200.42	185.54	-90.21	175.43	6,013.14	1,413.41	1,027.51	385.90	3.663			
13,700.00	7,012.27	12,774.39	7,017.47	203.42	188.65	-90.21	174.31	6,113.08	1,414.25	1,022.24	392.01	3.608			
13,800.00	7,012.34	12,874.33	7,017.53	206.43	191.76	-90.21	173.19	6,213.01	1,415.09	1,016.96	398.13	3.554			
13,900.00	7,012.42	12,974.27	7,017.59	209.44	194.87	-90.21	172.08	6,312.95	1,415.94	1,011.69	404.25	3.503			
14,000.00	7,012.49	13,074.21	7,017.64	212.44	197.98	-90.21	170.96	6,412.88	1,416.79	1,006.42	410.37	3.452			
14,100.00	7,012.57	13,174.15	7,017.70	215.45	201.10	-90.21	169.86	6,512.82	1,417.64	1,001.15	416.49	3.404			
14,200.00	7,012.64	13,274.10	7,017.76	218.46	204.21	-90.21	168.75	6,612.75	1,418.50	995.89	422.61	3.356			
14,300.00	7,012.72	13,374.04	7,017.82	221.47	207.33	-90.21	167.65	6,712.69	1,419.36	990.62	428.74	3.311			
14,400.00	7,012.79	13,473.98	7,017.87	224.48	210.44	-90.21	166.55	6,812.62	1,420.23	985.36	434.87	3.266			
14,500.00	7,012.87	13,573.92	7,017.93	227.49	213.56	-90.20	165.46	6,912.56	1,421.10	980.11	440.99	3.223			
14,600.00	7,012.94	13,673.86	7,017.99	230.50	216.68	-90.20	164.37	7,012.49	1,421.97	974.85	447.12	3.180			
14,700.00	7,013.02	13,773.80	7,018.05	233.52	219.79	-90.20	163.29	7,112.43	1,422.85	969.60	453.25	3.139			
14,800.00	7,013.10	13,873.74	7,018.10	236.53	222.91	-90.20	162.21	7,212.36	1,423.73	964.35	459.38	3.099			
14,900.00	7,013.17	13,973.68	7,018.16	239.54	226.03	-90.20	161.13	7,312.30	1,424.62	959.10	465.51	3.060			
15,000.00	7,013.25	14,073.62	7,018.22	242.56	229.15	-90.20	160.06	7,412.23	1,425.50	953.86	471.65	3.022			
15,100.00	7,013.32	14,173.56	7,018.27	245.57	232.27	-90.20	158.99	7,512.17	1,426.40	948.62	477.78	2.985			
15,200.00	7,013.40	14,273.50	7,018.33	248.59	235.39	-90.20	157.92	7,612.10	1,427.29	943.38	483.91	2.949			
15,300.00	7,013.47	14,373.44	7,018.38	251.60	238.51	-90.20	156.86	7,712.04	1,428.19	938.14	490.05	2.914			
15,400.00	7,013.55	14,473.38	7,018.44	254.62	241.63	-90.20	155.81	7,811.97	1,429.10	932.91	496.19	2.880			
15,500.00	7,013.62	14,573.32	7,018.49	257.63	244.75	-90.20	154.75	7,911.91	1,430.01	927.68	502.32	2.847			
15,600.00	7,013.70	14,673.27	7,018.55	260.65	247.87	-90.19	153.70	8,011.84	1,430.92	922.46	508.46	2.814			
15,700.00	7,013.77	14,773.21	7,018.60	263.67	251.00	-90.19	152.66	8,111.77	1,431.84	917.23	514.60	2.782			
15,800.00	7,013.85	14,873.15	7,018.66	266.68	254.12	-90.19	151.61	8,211.71	1,432.76	912.01	520.74	2.751			
15,900.00	7,013.92	14,973.09	7,018.71	269.70	257.24	-90.19	150.58	8,311.64	1,433.68	906.80	526.88	2.721			
16,000.00	7,014.00	15,073.03	7,018.77	272.72	260.37	-90.19	149.54	8,411.58	1,434.61	901.58	533.02	2.691			
16,100.00	7,014.07	15,172.97	7,018.82	275.74	263.49	-90.19	148.51	8,511.51	1,435.54	896.37	539.17	2.663			
16,200.00	7,014.15	15,272.90	7,018.87	278.76	266.62	-90.19	147.49	8,611.45	1,436.48	891.17	545.31	2.634			
16,300.00	7,014.22	15,372.84	7,018.93	281.77	269.74	-90.19	146.46	8,711.38	1,437.41	885.96	551.45	2.607			
16,400.00	7,014.30	15,472.78	7,018.98	284.79	272.87	-90.19	145.44	8,811.32	1,438.36	880.76	557.60	2.580			
16,500.00	7,014.38	15,572.72	7,019.03	287.81	275.99	-90.19	144.43	8,911.25	1,439.31	875.56	563.74	2.553			
16,600.00	7,014.45	15,672.66	7,019.09	290.83	279.12	-90.18	143.42	9,011.19	1,440.26	870.37	569.89	2.527			
16,700.00	7,014.53	15,772.60	7,019.14	293.85	282.24	-90.18	142.41	9,111.12	1,441.21	865.18	576.03	2.502			
16,800.00	7,014.60	15,872.54	7,019.19	296.87	285.37	-90.18	141.41	9,211.05	1,442.17	859.99	582.18	2.477			
16,900.00	7,014.68	15,972.48	7,019.25	299.89	288.49	-90.18	140.41	9,310.99	1,443.13	854.81	588.32	2.453			
17,000.00	7,014.75	16,072.42	7,019.30	302.91	291.62	-90.18	139.41	9,410.92	1,444.10	849.63	594.47	2.429			
17,100.00	7,014.83	16,172.36	7,019.35	305.94	294.75	-90.18	138.42	9,510.86	1,445.07	844.45	600.62	2.406			
17,200.00	7,014.90	16,272.30	7,019.40	308.96	297.88	-90.18	137.43	9,610.79	1,446.04	839.28	606.77	2.383			
17,300.00	7,014.98	16,372.24	7,019.45	311.98	301.00	-90.18	136.45	9,710.72	1,447.02	834.11	612.92	2.361			
17,400.00	7,015.05	16,472.18	7,019.50	315.00	304.13	-90.18	135.47	9,810.66	1,448.01	828.94	619.07	2.339			
17,500.00	7,015.13	16,572.12	7,019.56	318.02	307.26	-90.18	134.50	9,910.59	1,448.99	823.78	625.22	2.318			
17,600.00	7,015.20	16,672.05	7,019.61	321.05	310.39	-90.17	133.52	10,010.53	1,449.98	818.62	631.37	2.297			
17,700.00	7,015.28	16,771.99	7,019.66	324.07	313.51	-90.17	132.56	10,110.46	1,450.98	813.46	637.52	2.276			
17,800.00	7,015.35	16,871.93	7,019.71	327.09	316.64	-90.17	131.59	10,210.39	1,451.97	808.31	643.67	2.256			



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #662H - OH - Plan #5													Offset Site Error:	0.00 ft
Survey Program: 0-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		
17,900.00	7,015.43	16,971.87	7,019.76	330.11	319.77	-90.17	130.63	10,310.33	1,452.97	803.16	649.82	2.236		
18,000.00	7,015.51	17,071.81	7,019.81	333.14	322.90	-90.17	129.67	10,410.26	1,453.98	798.01	655.97	2.217		
18,100.00	7,015.58	17,171.75	7,019.86	336.16	326.03	-90.17	128.72	10,510.20	1,454.99	792.87	662.12	2.197		
18,200.00	7,015.66	17,271.69	7,019.91	339.18	329.16	-90.17	127.77	10,610.13	1,456.00	787.73	668.27	2.179		
18,300.00	7,015.73	17,371.62	7,019.96	342.21	332.29	-90.17	126.83	10,710.06	1,457.02	782.59	674.43	2.160		
18,400.00	7,015.81	17,471.56	7,020.01	345.23	335.42	-90.17	125.89	10,810.00	1,458.04	777.46	680.58	2.142		
18,500.00	7,015.88	17,571.50	7,020.06	348.26	338.55	-90.16	124.95	10,909.93	1,459.07	772.33	686.73	2.125		
18,600.00	7,015.96	17,671.44	7,020.10	351.28	341.68	-90.16	124.02	11,009.86	1,460.09	767.21	692.89	2.107		
18,700.00	7,016.03	17,771.38	7,020.15	354.30	344.81	-90.16	123.09	11,109.80	1,461.13	762.09	699.04	2.090		
18,800.00	7,016.11	17,871.31	7,020.20	357.33	347.94	-90.16	122.16	11,209.73	1,462.16	756.97	705.20	2.073		
18,900.00	7,016.18	17,971.25	7,020.25	360.35	351.07	-90.16	121.24	11,309.67	1,463.20	751.85	711.35	2.057		
19,000.00	7,016.26	18,071.19	7,020.30	363.38	354.20	-90.16	120.32	11,409.60	1,464.25	746.74	717.50	2.041		
19,100.00	7,016.33	18,171.13	7,020.35	366.40	357.33	-90.16	119.41	11,509.53	1,465.30	741.64	723.66	2.025		
19,200.00	7,016.41	18,271.06	7,020.39	369.43	360.46	-90.16	118.50	11,609.47	1,466.35	736.53	729.82	2.009		
19,300.00	7,016.48	18,371.00	7,020.44	372.45	363.59	-90.15	117.59	11,709.40	1,467.41	731.43	735.97	1.994		
19,400.00	7,016.56	18,470.94	7,020.49	375.48	366.72	-90.15	116.69	11,809.33	1,468.47	726.34	742.13	1.979		
19,500.00	7,016.64	18,570.88	7,020.54	378.51	369.85	-90.15	115.79	11,909.27	1,469.53	721.25	748.28	1.964		
19,600.00	7,016.71	18,670.81	7,020.58	381.53	372.98	-90.15	114.90	12,009.20	1,470.60	716.16	754.44	1.949		
19,700.00	7,016.79	18,770.75	7,020.63	384.56	376.11	-90.15	114.01	12,109.13	1,471.67	711.07	760.60	1.935		
19,800.00	7,016.86	18,870.69	7,020.68	387.58	379.24	-90.15	113.12	12,209.06	1,472.74	705.99	766.75	1.921		
19,900.00	7,016.94	18,970.62	7,020.72	390.61	382.37	-90.15	112.24	12,309.00	1,473.82	700.91	772.91	1.907		
19,984.07	7,017.00	19,054.63	7,020.76	393.15	385.01	-90.15	111.50	12,393.00	1,474.73	696.65	778.09	1.895 SF		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #665H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 401-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	2.88	17.50	0.88	17.52					
100.00	100.00	100.00	100.00	0.27	0.17	3.25	17.51	1.00	17.53	17.09	0.44	39.938		
200.00	200.00	199.99	199.99	0.63	0.34	4.38	17.52	1.34	17.57	16.61	0.97	18.193		
300.00	300.00	299.98	299.98	0.99	0.51	6.23	17.55	1.92	17.65	16.16	1.49	11.825		
400.00	400.00	399.97	399.97	1.35	0.67	8.80	17.58	2.72	17.79	15.77	2.02	8.811		
500.00	500.00	499.99	499.96	1.70	1.03	15.60	17.35	4.84	18.01	15.28	2.74	6.584		
600.00	600.00	600.52	600.38	2.06	1.39	29.86	14.66	8.41	16.91	13.45	3.46	4.892		
700.00	700.00	700.72	700.26	2.42	1.76	57.98	7.57	12.10	14.27	10.09	4.18	3.416		
724.95	724.95	725.56	724.95	2.51	1.85	68.85	5.06	13.09	14.03	9.67	4.36	3.220	CC, ES, SF	
800.00	800.00	799.78	798.50	2.78	2.13	104.35	-4.24	16.58	17.18	12.30	4.89	3.515		
900.00	900.00	897.30	894.46	3.14	2.52	132.32	-20.47	22.49	30.91	25.34	5.57	5.552		
1,000.00	1,000.00	993.02	987.68	3.50	2.94	144.08	-40.98	29.68	52.08	45.84	6.24	8.352		
1,100.00	1,099.98	1,088.59	1,080.07	3.84	3.38	-66.77	-63.80	38.35	76.39	69.49	6.90	11.065		
1,200.00	1,199.84	1,184.50	1,172.33	4.17	3.85	-66.25	-88.16	47.98	101.27	93.69	7.58	13.366		
1,300.00	1,299.45	1,282.38	1,266.45	4.51	4.34	-66.69	-113.57	56.65	124.67	116.38	8.29	15.034		
1,400.00	1,398.70	1,380.23	1,360.54	4.85	4.84	-67.93	-139.23	64.72	146.69	137.66	9.03	16.246		
1,500.00	1,497.47	1,479.24	1,455.98	5.21	5.34	-69.88	-164.49	72.21	166.62	156.82	9.80	16.995		
1,600.00	1,595.62	1,573.91	1,547.13	5.59	5.83	-72.32	-188.91	79.87	186.27	175.71	10.56	17.636		
1,700.00	1,693.06	1,675.09	1,644.34	5.98	6.36	-75.27	-215.67	88.23	206.06	194.62	11.44	18.018		
1,800.00	1,790.08	1,773.82	1,739.63	6.39	6.87	-78.27	-240.66	94.67	223.93	211.62	12.31	18.187		
1,900.00	1,887.11	1,874.30	1,836.67	6.82	7.38	-80.81	-266.04	100.79	241.97	228.75	13.22	18.298		
2,000.00	1,984.14	1,973.91	1,933.22	7.25	7.88	-83.21	-289.74	106.76	259.36	245.22	14.14	18.343		
2,100.00	2,081.17	2,070.19	2,026.69	7.69	8.36	-85.42	-311.98	113.09	277.14	262.10	15.04	18.431		
2,200.00	2,178.20	2,162.94	2,116.46	8.14	8.83	-87.24	-334.28	119.84	296.41	280.50	15.91	18.630		
2,300.00	2,275.23	2,265.47	2,215.61	8.60	9.36	-88.95	-359.30	127.38	316.23	299.34	16.89	18.728		
2,400.00	2,372.26	2,361.40	2,308.53	9.06	9.84	-90.39	-382.19	133.95	335.55	317.75	17.80	18.850		
2,500.00	2,469.29	2,460.83	2,404.86	9.53	10.35	-91.74	-405.86	140.90	355.15	336.39	18.75	18.936		
2,600.00	2,566.32	2,556.79	2,497.79	10.00	10.84	-92.89	-428.81	147.55	374.92	355.24	19.68	19.052		
2,700.00	2,663.35	2,655.26	2,593.24	10.47	11.34	-94.04	-451.93	154.75	394.94	374.31	20.63	19.144		
2,800.00	2,760.38	2,750.22	2,685.32	10.95	11.82	-95.12	-473.89	162.19	415.37	393.82	21.55	19.276		
2,900.00	2,857.41	2,848.67	2,780.74	11.43	12.32	-96.10	-496.90	169.91	436.06	413.56	22.50	19.378		
3,000.00	2,954.44	2,940.70	2,869.74	11.91	12.79	-96.87	-519.09	177.37	457.43	434.04	23.40	19.549		
3,100.00	3,051.47	3,035.97	2,961.73	12.39	13.29	-97.62	-542.29	185.95	479.79	455.46	24.33	19.721		
3,200.00	3,148.50	3,158.38	3,080.86	12.88	13.89	-98.75	-568.84	195.18	499.75	474.26	25.49	19.604		
3,300.00	3,245.53	3,268.76	3,189.33	13.36	14.38	-100.00	-588.48	200.67	515.90	489.39	26.51	19.458		
3,400.00	3,342.56	3,364.82	3,283.99	13.85	14.80	-101.16	-604.14	205.24	531.50	504.08	27.43	19.379		
3,500.00	3,439.59	3,456.39	3,374.03	14.34	15.21	-102.11	-620.13	210.16	548.30	519.99	28.31	19.369		
3,600.00	3,536.62	3,548.32	3,464.17	14.83	15.63	-102.94	-637.27	215.82	566.41	537.22	29.19	19.403		
3,700.00	3,633.65	3,641.10	3,554.92	15.32	16.07	-103.66	-655.48	222.14	585.57	555.49	30.08	19.466		
3,800.00	3,730.68	3,738.18	3,649.75	15.81	16.53	-104.35	-674.99	229.30	605.52	574.51	31.01	19.526		
3,900.00	3,827.71	3,840.22	3,749.61	16.30	17.01	-105.08	-694.69	236.48	624.97	593.00	31.98	19.545		
4,000.00	3,924.74	3,946.04	3,853.49	16.80	17.49	-105.93	-713.46	243.74	643.88	610.92	32.96	19.534		
4,100.00	4,021.77	4,045.05	3,950.93	17.29	17.93	-106.74	-730.05	249.56	661.67	627.78	33.89	19.525		
4,200.00	4,118.79	4,135.32	4,039.53	17.79	18.34	-107.35	-746.39	255.21	680.32	645.57	34.75	19.577		
4,300.00	4,215.82	4,227.62	4,129.63	18.28	18.78	-107.75	-765.44	261.38	700.14	664.51	35.64	19.647		
4,400.00	4,312.85	4,316.45	4,216.15	18.78	19.22	-108.07	-784.53	267.75	720.73	684.23	36.49	19.749		
4,500.00	4,409.88	4,404.38	4,301.51	19.27	19.66	-108.33	-804.25	275.33	742.92	705.57	37.35	19.893		
4,600.00	4,506.91	4,500.94	4,394.76	19.77	20.16	-108.46	-827.82	283.76	765.77	727.48	38.29	19.998		
4,700.00	4,603.94	4,607.20	4,497.13	20.27	20.72	-108.48	-855.08	292.11	788.16	748.82	39.34	20.035		
4,800.00	4,700.97	4,713.09	4,599.51	20.77	21.27	-108.55	-881.15	299.27	809.20	768.82	40.38	20.040		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #665H - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 401-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)				
4,900.00	4,798.00	4,812.42	4,695.54	21.26	21.78	-108.60	-905.75	305.41	829.74	788.39	41.35	20.065		
5,000.00	4,895.03	4,907.95	4,787.98	21.76	22.27	-108.67	-929.07	311.47	850.34	808.05	42.29	20.106		
5,100.00	4,992.06	5,008.07	4,885.08	22.26	22.78	-108.80	-952.55	318.18	871.03	827.76	43.27	20.131		
5,200.00	5,089.09	5,119.17	4,993.30	22.76	23.32	-109.07	-976.66	325.16	890.88	846.55	44.33	20.099		
5,300.00	5,186.12	5,235.35	5,107.14	23.26	23.86	-109.48	-999.10	331.05	908.97	863.57	45.39	20.024		
5,400.00	5,283.15	5,324.26	5,194.59	23.76	24.25	-109.89	-1,014.54	335.42	926.49	880.24	46.25	20.034		
5,500.00	5,380.18	5,410.38	5,279.03	24.26	24.65	-110.22	-1,030.62	340.51	945.31	898.23	47.08	20.081		
5,600.00	5,477.21	5,494.28	5,360.77	24.76	25.06	-110.39	-1,048.76	346.04	965.50	917.61	47.89	20.160		
5,700.00	5,574.24	5,581.00	5,444.67	25.26	25.50	-110.44	-1,069.65	352.66	987.25	938.50	48.75	20.253		
5,800.00	5,671.27	5,664.98	5,525.43	25.76	25.95	-110.39	-1,091.57	359.71	1,010.19	960.61	49.58	20.375		
5,900.00	5,768.30	5,754.66	5,611.25	26.26	26.45	-110.27	-1,116.36	367.58	1,033.91	983.43	50.48	20.483		
6,000.00	5,865.33	5,852.26	5,704.82	26.76	26.98	-110.20	-1,142.59	376.68	1,057.97	1,006.52	51.46	20.561		
6,100.00	5,962.36	5,866.00	5,718.01	27.26	27.06	-110.19	-1,146.23	377.96	1,085.17	1,033.77	51.40	21.113		
6,200.00	6,059.39	5,866.00	5,718.01	27.76	27.06	-110.19	-1,146.23	377.96	1,120.57	1,069.70	50.88	22.025		
6,300.00	6,156.42	5,866.00	5,718.01	28.27	27.06	-110.19	-1,146.23	377.96	1,163.52	1,113.41	50.11	23.217		
6,400.00	6,253.45	5,866.00	5,718.01	28.77	27.06	-110.19	-1,146.23	377.96	1,213.21	1,164.03	49.18	24.669		
6,437.00	6,289.35	5,866.00	5,718.01	28.95	27.06	-110.19	-1,146.23	377.96	1,233.15	1,184.34	48.80	25.267		
6,450.00	6,301.98	5,866.00	5,718.01	29.02	27.06	-106.40	-1,146.23	377.96	1,240.23	1,191.56	48.67	25.484		
6,500.00	6,350.82	5,866.00	5,718.01	29.25	27.06	-88.21	-1,146.23	377.96	1,266.36	1,218.26	48.10	26.329		
6,550.00	6,399.83	5,866.00	5,718.01	29.45	27.06	-66.66	-1,146.23	377.96	1,290.68	1,243.21	47.46	27.194		
6,600.00	6,448.72	5,866.00	5,718.01	29.63	27.06	-47.45	-1,146.23	377.96	1,313.14	1,266.38	46.76	28.082		
6,650.00	6,497.18	5,866.00	5,718.01	29.78	27.06	-33.63	-1,146.23	377.96	1,333.71	1,287.72	46.00	28.995		
6,700.00	6,544.92	5,866.00	5,718.01	29.91	27.06	-24.38	-1,146.23	377.96	1,352.35	1,307.18	45.18	29.934		
6,750.00	6,591.63	5,866.00	5,718.01	30.03	27.06	-18.16	-1,146.23	377.96	1,369.03	1,324.72	44.30	30.901		
6,800.00	6,637.04	5,866.00	5,718.01	30.12	27.06	-13.84	-1,146.23	377.96	1,383.70	1,340.32	43.38	31.896		
6,850.00	6,680.86	5,866.00	5,718.01	30.21	27.06	-10.72	-1,146.23	377.96	1,396.36	1,353.94	42.42	32.921		
6,900.00	6,722.82	5,866.00	5,718.01	30.28	27.06	-8.40	-1,146.23	377.96	1,406.97	1,365.56	41.41	33.977		
6,950.00	6,762.67	5,866.00	5,718.01	30.33	27.06	-6.62	-1,146.23	377.96	1,415.51	1,375.14	40.37	35.064		
7,000.00	6,800.15	5,866.00	5,718.01	30.38	27.06	-5.22	-1,146.23	377.96	1,421.98	1,382.68	39.30	36.183		
7,050.00	6,835.04	5,866.00	5,718.01	30.42	27.06	-4.09	-1,146.23	377.96	1,426.36	1,388.15	38.21	37.333		
7,100.00	6,867.11	5,866.00	5,718.01	30.45	27.06	-3.17	-1,146.23	377.96	1,428.64	1,391.54	37.10	38.512		
7,139.07	6,890.10	5,866.00	5,718.01	30.47	27.06	-2.55	-1,146.23	377.96	1,428.95	1,392.73	36.22	39.450		
7,150.00	6,896.19	5,866.00	5,718.01	30.48	27.06	-2.39	-1,146.23	377.96	1,428.81	1,392.84	35.98	39.714		
7,190.49	6,917.40	5,866.00	5,718.01	30.50	27.06	-1.85	-1,146.23	377.96	1,427.42	1,392.35	35.07	40.702		
7,200.00	6,922.07	5,866.00	5,718.01	30.51	27.06	-1.73	-1,146.23	377.96	1,426.89	1,392.03	34.86	40.935		
7,241.43	6,941.00	5,866.00	5,718.01	30.54	27.06	-1.25	-1,146.23	377.96	1,423.70	1,389.77	33.94	41.954		
7,250.00	6,944.62	5,866.00	5,718.01	30.55	27.06	-1.16	-1,146.23	377.96	1,422.87	1,389.12	33.75	42.164		
7,292.08	6,960.89	5,866.00	5,718.01	30.59	27.06	-0.73	-1,146.23	377.96	1,417.86	1,385.03	32.82	43.196		
7,300.00	6,963.67	5,866.00	5,718.01	30.60	27.06	-0.66	-1,146.23	377.96	1,416.75	1,384.10	32.65	43.389		
7,342.54	6,977.05	5,866.00	5,718.01	30.68	27.06	-0.27	-1,146.23	377.96	1,409.91	1,378.16	31.74	44.415		
7,350.00	6,979.13	5,866.00	5,718.01	30.69	27.06	-0.21	-1,146.23	377.96	1,408.55	1,376.97	31.59	44.592		
7,392.87	6,989.44	5,866.00	5,718.01	30.81	27.06	0.15	-1,146.23	377.96	1,399.88	1,369.17	30.71	45.589		
7,400.00	6,990.88	5,866.00	5,718.01	30.83	27.06	0.20	-1,146.23	377.96	1,398.29	1,367.73	30.56	45.750		
7,443.10	6,998.00	5,866.00	5,718.01	31.02	27.06	0.53	-1,146.23	377.96	1,387.80	1,358.08	29.72	46.692		
7,450.00	6,998.87	5,866.00	5,718.01	31.05	27.06	0.58	-1,146.23	377.96	1,385.98	1,356.39	29.59	46.836		
7,493.27	7,002.70	5,866.00	5,718.01	31.33	27.06	0.89	-1,146.23	377.96	1,373.69	1,344.88	28.80	47.692		
7,500.00	7,003.04	5,866.00	5,718.01	31.38	27.06	0.94	-1,146.23	377.96	1,371.64	1,342.95	28.69	47.816		
7,518.21	7,003.61	5,866.00	5,718.01	31.53	27.06	1.07	-1,146.23	377.96	1,365.92	1,337.54	28.38	48.135		
7,520.93	7,003.65	5,866.00	5,718.01	31.56	27.06	1.09	-1,146.23	377.96	1,365.04	1,336.71	28.33	48.181		
7,588.72	7,004.51	5,866.00	5,718.01	32.29	27.06	1.09	-1,146.23	377.96	1,344.64	1,317.39	27.25	49.337		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #665H - OH - OH													Offset Site Error: 0.00 ft	
Survey Program: 401-MWD+HDGM		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Rule Assigned: Distance				Offset Well Error: 0.00 ft	
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	Warning	
7,600.00	7,004.65	5,866.00	5,718.01	32.42	27.06	1.09	-1,146.23	377.96	1,341.55	1,314.46	27.09	49.526		
7,683.76	7,005.72	5,866.00	5,718.01	33.64	27.06	1.09	-1,146.23	377.96	1,321.37	1,295.35	26.02	50.786		
7,700.00	7,005.93	5,866.00	5,718.01	33.89	27.06	1.09	-1,146.23	377.96	1,318.04	1,292.19	25.84	50.998		
7,768.82	7,006.81	5,866.00	5,718.01	35.08	27.06	1.09	-1,146.23	377.96	1,306.07	1,280.80	25.27	51.680		
7,783.87	7,007.00	5,866.00	5,718.01	35.35	27.06	1.09	-1,146.23	377.96	1,303.92	1,278.74	25.18	51.783		
7,797.07	7,007.16	5,866.00	5,718.01	35.59	27.06	1.05	-1,146.23	377.96	1,302.17	1,277.06	25.11	51.855		
7,800.00	7,007.19	5,866.00	5,718.01	35.65	27.06	1.04	-1,146.23	377.96	1,301.80	1,276.70	25.10	51.868		
7,879.72	7,007.81	5,866.00	5,718.01	37.20	27.06	0.88	-1,146.23	377.96	1,293.83	1,268.92	24.91	51.939		
7,900.00	7,007.88	5,866.00	5,718.01	37.60	27.06	0.85	-1,146.23	377.96	1,292.49	1,267.57	24.92	51.866		
7,914.96	7,007.91	5,866.00	5,718.01	37.90	27.06	0.83	-1,146.23	377.96	1,291.68	1,266.73	24.94	51.782		
7,918.77	7,007.91	5,866.00	5,718.01	37.98	27.06	0.83	-1,146.23	377.96	1,291.49	1,266.54	24.95	51.758		
8,000.00	7,007.97	5,866.00	5,718.01	39.70	27.06	0.83	-1,146.23	377.96	1,290.26	1,264.90	25.35	50.888		
8,100.00	7,008.05	5,866.00	5,718.01	41.93	27.06	0.83	-1,146.23	377.96	1,295.74	1,269.33	26.42	49.052		
8,200.00	7,008.12	5,866.00	5,718.01	44.27	27.06	0.83	-1,146.23	377.96	1,308.87	1,280.86	28.01	46.734		
8,300.00	7,008.20	5,866.00	5,718.01	46.68	27.06	0.83	-1,146.23	377.96	1,329.41	1,299.43	29.98	44.349		
8,400.00	7,008.27	5,866.00	5,718.01	49.16	27.06	0.83	-1,146.23	377.96	1,357.02	1,324.86	32.16	42.192		
8,500.00	7,008.35	5,866.00	5,718.01	51.71	27.06	0.83	-1,146.23	377.96	1,391.29	1,356.87	34.43	40.413		
8,600.00	7,008.42	5,866.00	5,718.01	54.30	27.06	0.83	-1,146.23	377.96	1,431.74	1,395.08	36.66	39.052		
8,700.00	7,008.50	5,866.00	5,718.01	56.94	27.06	0.83	-1,146.23	377.96	1,477.86	1,439.06	38.80	38.089		
8,800.00	7,008.58	5,866.00	5,718.01	59.62	27.06	0.83	-1,146.23	377.96	1,529.14	1,488.34	40.80	37.479		
8,900.00	7,008.65	5,866.00	5,718.01	62.33	27.06	0.83	-1,146.23	377.96	1,585.07	1,542.43	42.64	37.175		
9,000.00	7,008.73	5,866.00	5,718.01	65.07	27.06	0.83	-1,146.23	377.96	1,645.19	1,600.88	44.31	37.128		
9,100.00	7,008.80	5,866.00	5,718.01	67.83	27.06	0.83	-1,146.23	377.96	1,709.04	1,663.22	45.82	37.298		
9,200.00	7,008.88	5,866.00	5,718.01	70.61	27.06	0.83	-1,146.23	377.96	1,776.24	1,729.06	47.18	37.651		
9,300.00	7,008.95	5,866.00	5,718.01	73.42	27.06	0.83	-1,146.23	377.96	1,846.40	1,798.01	48.39	38.158		
9,400.00	7,009.03	5,866.00	5,718.01	76.24	27.06	0.83	-1,146.23	377.96	1,919.22	1,869.75	49.47	38.794		
9,500.00	7,009.10	5,866.00	5,718.01	79.08	27.06	0.83	-1,146.23	377.96	1,994.39	1,943.95	50.44	39.541		
9,600.00	7,009.18	5,866.00	5,718.01	81.93	27.06	0.83	-1,146.23	377.96	2,071.66	2,020.36	51.30	40.383		
9,700.00	7,009.25	5,866.00	5,718.01	84.80	27.06	0.83	-1,146.23	377.96	2,150.80	2,098.73	52.07	41.305		
9,800.00	7,009.33	5,866.00	5,718.01	87.67	27.06	0.83	-1,146.23	377.96	2,231.62	2,178.86	52.76	42.298		
9,900.00	7,009.40	5,866.00	5,718.01	90.56	27.06	0.83	-1,146.23	377.96	2,313.94	2,260.57	53.38	43.351		
10,000.00	7,009.48	5,866.00	5,718.01	93.45	27.06	0.83	-1,146.23	377.96	2,397.61	2,343.68	53.93	44.456		
10,100.00	7,009.55	5,866.00	5,718.01	96.36	27.06	0.83	-1,146.23	377.96	2,482.48	2,428.05	54.43	45.608		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #665H - OH - Plan #10													Offset Site Error:	0.00 ft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	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	
0.00	0.00	0.00	0.00	0.00	0.00	2.88	17.50	0.88	17.52					
100.00	100.00	100.00	100.00	0.27	0.27	2.88	17.50	0.88	17.52	16.98	0.54	32.371		
200.00	200.00	200.00	200.00	0.63	0.63	2.88	17.50	0.88	17.52	16.26	1.26	13.926		
300.00	300.00	300.00	300.00	0.99	0.99	2.88	17.50	0.88	17.52	15.55	1.98	8.871		
400.00	400.00	400.00	400.00	1.35	1.35	2.88	17.50	0.88	17.52	14.83	2.69	6.509		
500.00	500.00	500.28	500.28	1.70	1.70	3.41	17.08	1.02	17.11	13.71	3.40	5.031		
600.00	600.00	600.72	600.65	2.06	2.03	8.79	13.74	2.12	13.91	9.82	4.09	3.399		
700.00	700.00	700.79	700.47	2.42	2.38	31.39	7.08	4.32	8.31	3.52	4.79	1.734		
755.54	755.54	756.12	755.54	2.62	2.57	71.71	1.99	6.01	6.33	1.14	5.19	1.219 Level 3, CC, ES, SF		
800.00	800.00	800.25	799.38	2.78	2.73	110.28	-2.80	7.59	8.12	2.62	5.49	1.477 Level 3		
900.00	900.00	898.87	897.04	3.14	3.09	143.07	-15.82	11.89	20.01	13.84	6.17	3.242		
1,000.00	1,000.00	996.43	993.12	3.50	3.47	151.64	-31.83	17.18	36.82	29.97	6.85	5.376		
1,100.00	1,099.98	1,092.93	1,087.55	3.84	3.87	-60.98	-50.71	23.42	56.39	48.89	7.50	7.515		
1,200.00	1,199.84	1,188.73	1,180.58	4.17	4.28	-61.57	-72.42	30.60	77.57	69.42	8.14	9.524		
1,300.00	1,299.45	1,286.46	1,275.17	4.51	4.73	-63.47	-95.73	38.30	98.47	89.62	8.84	11.136		
1,400.00	1,398.70	1,384.36	1,369.93	4.85	5.18	-66.15	-119.09	46.02	118.05	108.49	9.56	12.344		
1,500.00	1,497.47	1,482.30	1,464.73	5.21	5.64	-69.35	-142.45	53.74	136.65	126.33	10.31	13.251		
1,600.00	1,595.62	1,580.18	1,559.47	5.59	6.11	-72.93	-165.80	61.46	154.60	143.51	11.09	13.936		
1,700.00	1,693.06	1,677.86	1,654.02	5.98	6.59	-76.81	-189.10	69.16	172.33	160.41	11.92	14.463		
1,800.00	1,790.08	1,775.41	1,748.44	6.39	7.06	-80.76	-212.38	76.85	190.52	177.75	12.77	14.919		
1,900.00	1,887.11	1,872.96	1,842.86	6.82	7.55	-84.01	-235.65	84.54	209.44	195.80	13.65	15.349		
2,000.00	1,984.14	1,970.52	1,937.28	7.25	8.03	-86.73	-258.92	92.23	228.92	214.38	14.53	15.751		
2,100.00	2,081.17	2,068.07	2,031.70	7.69	8.51	-89.02	-282.19	99.92	248.81	233.38	15.43	16.122		
2,200.00	2,178.20	2,165.62	2,126.13	8.14	9.00	-90.97	-305.46	107.61	269.03	252.69	16.34	16.463		
2,300.00	2,275.23	2,263.17	2,220.55	8.60	9.49	-92.64	-328.74	115.30	289.51	272.26	17.26	16.777		
2,400.00	2,372.26	2,360.72	2,314.97	9.06	9.98	-94.10	-352.01	123.00	310.20	292.03	18.18	17.065		
2,500.00	2,469.29	2,458.27	2,409.39	9.53	10.47	-95.37	-375.28	130.69	331.06	311.96	19.10	17.331		
2,600.00	2,566.32	2,555.82	2,503.81	10.00	10.96	-96.50	-398.55	138.38	352.06	332.03	20.03	17.575		
2,700.00	2,663.35	2,653.37	2,598.23	10.47	11.45	-97.49	-421.82	146.07	373.17	352.20	20.96	17.800		
2,800.00	2,760.38	2,750.92	2,692.65	10.95	11.95	-98.38	-445.10	153.76	394.38	372.48	21.90	18.009		
2,900.00	2,857.41	2,848.47	2,787.07	11.43	12.44	-99.18	-468.37	161.45	415.67	392.83	22.84	18.202		
3,000.00	2,954.44	2,946.02	2,881.50	11.91	12.94	-99.91	-491.64	169.14	437.03	413.25	23.78	18.381		
3,100.00	3,051.47	3,043.57	2,975.92	12.39	13.43	-100.56	-514.91	176.83	458.45	433.73	24.72	18.548		
3,200.00	3,148.50	3,141.12	3,070.34	12.88	13.93	-101.16	-538.18	184.52	479.92	454.26	25.66	18.703		
3,300.00	3,245.53	3,238.67	3,164.76	13.36	14.42	-101.70	-561.46	192.21	501.44	474.84	26.60	18.848		
3,400.00	3,342.56	3,336.22	3,259.18	13.85	14.92	-102.20	-584.73	199.91	523.00	495.45	27.55	18.984		
3,500.00	3,439.59	3,433.77	3,353.60	14.34	15.42	-102.66	-608.00	207.60	544.59	516.10	28.50	19.111		
3,600.00	3,536.62	3,531.33	3,448.02	14.83	15.91	-103.09	-631.27	215.29	566.22	536.77	29.44	19.231		
3,700.00	3,633.65	3,628.88	3,542.45	15.32	16.41	-103.48	-654.54	222.98	587.87	557.48	30.39	19.343		
3,800.00	3,730.68	3,726.43	3,636.87	15.81	16.91	-103.85	-677.82	230.67	609.54	578.20	31.34	19.449		
3,900.00	3,827.71	3,823.98	3,731.29	16.30	17.41	-104.19	-701.09	238.36	631.24	598.95	32.29	19.549		
4,000.00	3,924.74	3,921.53	3,825.71	16.80	17.91	-104.51	-724.36	246.05	652.96	619.72	33.24	19.643		
4,100.00	4,021.77	4,019.08	3,920.13	17.29	18.40	-104.81	-747.63	253.74	674.70	640.51	34.19	19.733		
4,200.00	4,118.79	4,116.63	4,014.55	17.79	18.90	-105.09	-770.90	261.43	696.45	661.31	35.14	19.817		
4,300.00	4,215.82	4,214.18	4,108.97	18.28	19.40	-105.35	-794.18	269.12	718.22	682.12	36.10	19.897		
4,400.00	4,312.85	4,311.73	4,203.39	18.78	19.90	-105.60	-817.45	276.81	740.00	702.95	37.05	19.974		
4,500.00	4,409.88	4,409.28	4,297.82	19.27	20.40	-105.83	-840.72	284.51	761.80	723.79	38.00	20.046		
4,600.00	4,506.91	4,506.83	4,392.24	19.77	20.90	-106.05	-863.99	292.20	783.60	744.65	38.96	20.115		
4,700.00	4,603.94	4,604.38	4,486.66	20.27	21.40	-106.26	-887.26	299.89	805.42	765.51	39.91	20.181		
4,800.00	4,700.97	4,701.93	4,581.08	20.77	21.90	-106.46	-910.54	307.58	827.24	786.38	40.86	20.243		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #665H - OH - Plan #10													Offset Site Error:	0.00 ft
Survey Program:		0-MWD+HDGM				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		
4,900.00	4,798.00	4,799.48	4,675.50	21.26	22.40	-106.64	-933.81	315.27	849.08	807.26	41.82	20.303		
5,000.00	4,895.03	4,897.03	4,769.92	21.76	22.90	-106.82	-957.08	322.96	870.92	828.14	42.77	20.361		
5,100.00	4,992.06	4,994.58	4,864.34	22.26	23.40	-106.99	-980.35	330.65	892.77	849.04	43.73	20.415		
5,200.00	5,089.09	5,092.14	4,958.77	22.76	23.90	-107.15	-1,003.62	338.34	914.63	869.94	44.69	20.468		
5,300.00	5,186.12	5,189.69	5,053.19	23.26	24.40	-107.31	-1,026.90	346.03	936.49	890.85	45.64	20.518		
5,400.00	5,283.15	5,287.24	5,147.61	23.76	24.90	-107.45	-1,050.17	353.72	958.36	911.76	46.60	20.567		
5,500.00	5,380.18	5,384.79	5,242.03	24.26	25.40	-107.59	-1,073.44	361.41	980.24	932.68	47.55	20.613		
5,600.00	5,477.21	5,482.34	5,336.45	24.76	25.90	-107.73	-1,096.71	369.11	1,002.12	953.61	48.51	20.657		
5,700.00	5,574.24	5,579.89	5,430.87	25.26	26.40	-107.85	-1,119.98	376.80	1,024.00	974.53	49.47	20.700		
5,800.00	5,671.27	5,677.44	5,525.29	25.76	26.90	-107.98	-1,143.25	384.49	1,045.89	995.47	50.43	20.741		
5,900.00	5,768.30	5,774.99	5,619.72	26.26	27.40	-108.09	-1,166.53	392.18	1,067.79	1,016.40	51.38	20.781		
6,000.00	5,865.33	5,872.54	5,714.14	26.76	27.90	-108.21	-1,189.80	399.87	1,089.69	1,037.35	52.34	20.819		
6,100.00	5,962.36	5,970.09	5,808.56	27.26	28.40	-108.32	-1,213.07	407.56	1,111.59	1,058.29	53.30	20.856		
6,200.00	6,059.39	6,064.39	6,999.00	27.76	39.40	-56.87	-1,524.18	-664.71	1,095.26	1,062.02	33.24	32.954		
6,300.00	6,156.42	6,058.56	6,999.00	28.27	39.70	-54.95	-1,524.40	-678.89	1,002.49	967.57	34.91	28.715		
6,400.00	6,253.45	8,072.74	6,999.00	28.77	40.01	-52.98	-1,524.61	-693.06	911.03	874.11	36.91	24.680		
6,437.00	6,289.35	8,077.98	6,999.00	28.95	40.12	-52.24	-1,524.69	-698.30	877.60	839.84	37.75	23.245		
6,450.00	6,301.98	8,079.69	6,999.00	29.02	40.15	-45.67	-1,524.72	-700.01	865.90	827.84	38.06	22.749		
6,500.00	6,350.82	8,083.82	6,999.00	29.25	40.24	-17.12	-1,524.78	-704.13	821.03	781.74	39.29	20.896		
6,550.00	6,399.83	8,084.02	6,999.00	29.45	40.25	13.77	-1,524.78	-704.33	776.63	736.04	40.59	19.135		
6,600.00	6,448.72	8,080.29	6,999.00	29.63	40.17	40.84	-1,524.72	-700.61	733.10	691.15	41.95	17.474		
6,650.00	6,497.18	8,072.67	6,999.00	29.78	40.00	60.93	-1,524.61	-692.99	690.83	647.44	43.39	15.920		
6,700.00	6,544.92	8,061.20	6,999.00	29.91	39.76	74.93	-1,524.44	-681.52	650.21	605.30	44.91	14.478		
6,750.00	6,591.63	8,045.94	6,999.00	30.03	39.44	84.59	-1,524.20	-666.27	611.64	565.15	46.49	13.156		
6,800.00	6,637.04	8,027.00	6,999.00	30.12	39.04	91.23	-1,523.92	-647.33	575.49	527.37	48.12	11.959		
6,850.00	6,680.86	8,004.49	6,999.00	30.21	38.56	95.69	-1,523.58	-624.82	542.11	492.34	49.77	10.892		
6,900.00	6,722.82	7,978.54	6,999.00	30.28	38.03	98.54	-1,523.18	-598.87	511.80	460.37	51.43	9.951		
6,950.00	6,762.67	7,949.33	6,999.00	30.33	37.44	100.15	-1,522.74	-569.66	484.81	431.78	53.03	9.141		
7,000.00	6,800.15	7,917.02	6,999.00	30.38	36.80	100.77	-1,522.25	-537.36	461.30	406.77	54.53	8.460		
7,050.00	6,835.04	7,881.82	6,999.00	30.42	36.12	100.60	-1,521.72	-502.16	441.32	385.44	55.88	7.898		
7,100.00	6,867.11	7,843.94	6,999.00	30.45	35.42	99.83	-1,521.15	-464.29	424.80	367.76	57.04	7.447		
7,150.00	6,896.19	7,803.62	6,999.00	30.48	34.69	98.60	-1,520.54	-423.97	411.58	353.60	57.98	7.099		
7,200.00	6,922.07	7,761.11	6,999.00	30.51	33.99	97.07	-1,519.89	-381.46	401.36	342.63	58.73	6.834		
7,250.00	6,944.62	7,716.66	6,999.00	30.55	33.42	95.40	-1,519.22	-337.02	393.77	334.52	59.25	6.646		
7,300.00	6,963.67	7,670.56	6,999.00	30.60	33.16	93.72	-1,518.52	-290.93	388.41	328.78	59.63	6.513		
7,350.00	6,979.13	7,623.09	6,999.00	30.69	33.11	92.18	-1,517.80	-243.46	384.85	324.96	59.89	6.426		
7,400.00	6,990.88	7,574.53	6,999.00	30.83	33.11	90.89	-1,517.07	-194.91	382.72	322.66	60.06	6.372		
7,450.00	6,998.87	7,519.14	6,997.63	31.05	33.11	89.63	-1,515.89	-139.56	381.40	321.19	60.21	6.334		
7,499.35	7,003.01	7,463.15	6,991.65	31.38	33.12	88.21	-1,513.57	-83.96	380.07	319.64	60.44	6.289		
7,500.00	7,003.04	7,462.42	6,991.54	31.38	33.12	88.19	-1,513.53	-83.24	380.05	319.62	60.44	6.288		
7,519.51	7,003.63	7,440.59	6,987.89	31.54	33.12	87.60	-1,512.30	-61.74	379.52	318.97	60.55	6.268		
7,520.93	7,003.65	7,439.00	6,987.60	31.56	33.12	87.56	-1,512.20	-60.19	379.48	318.92	60.56	6.266		
7,587.85	7,004.50	7,366.51	6,970.25	32.28	33.12	84.76	-1,506.84	9.95	377.27	316.16	61.11	6.173		
7,600.00	7,004.65	7,353.85	6,966.43	32.42	33.12	84.15	-1,505.72	21.97	376.83	315.62	61.22	6.156		
7,676.83	7,005.63	7,278.02	6,938.76	33.54	33.10	79.70	-1,497.80	92.07	374.63	312.58	62.04	6.038		
7,700.00	7,005.93	7,256.68	6,929.52	33.89	33.09	78.22	-1,495.22	111.13	374.35	312.09	62.26	6.013		
7,713.44	7,006.10	7,244.64	6,924.04	34.12	33.09	77.34	-1,493.71	121.75	374.32	311.92	62.40	5.998		
7,783.87	7,007.00	7,185.59	6,894.38	35.35	33.05	72.59	-1,485.60	172.14	376.19	313.18	63.01	5.971		
7,800.00	7,007.19	7,173.01	6,887.48	35.65	33.04	71.50	-1,483.73	182.49	377.15	314.03	63.12	5.975		
7,900.00	7,007.88	7,100.01	6,843.65	37.60	32.96	64.67	-1,472.01	239.62	387.41	323.89	63.53	6.098		



Lonestar Consulting, LLC

Anticollision Report



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Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #665H - OH - Plan #10													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)				
7,918.77	7,007.91	7,090.60	6,837.54	37.98	32.95	63.75	-1,470.39	246.60	390.30	326.64	63.66	6.131		
8,000.00	7,007.97	7,043.60	6,805.57	39.70	32.89	58.97	-1,461.96	279.99	408.06	344.27	63.79	6.397		
8,100.00	7,008.05	7,000.01	6,773.86	41.93	32.81	54.44	-1,453.67	308.70	442.25	378.18	64.08	6.902		
8,200.00	7,008.12	6,950.01	6,735.22	44.27	32.72	49.28	-1,443.65	338.79	488.86	425.17	63.69	7.676		
8,300.00	7,008.20	6,918.67	6,709.87	46.68	32.65	46.11	-1,437.11	356.02	545.96	482.06	63.90	8.544		
8,400.00	7,008.27	6,900.01	6,694.40	49.16	32.61	44.28	-1,433.13	365.65	611.57	547.17	64.40	9.497		
8,500.00	7,008.35	6,863.94	6,663.73	51.71	32.52	40.84	-1,425.27	382.94	683.30	619.24	64.06	10.666		
8,600.00	7,008.42	6,850.01	6,651.64	54.30	32.49	39.56	-1,422.18	389.13	760.27	695.88	64.39	11.807		
8,700.00	7,008.50	6,823.14	6,627.96	56.94	32.41	37.16	-1,416.15	400.29	840.92	776.71	64.21	13.096		
8,800.00	7,008.58	6,800.01	6,607.22	59.62	32.35	35.19	-1,410.88	409.06	924.73	860.62	64.11	14.424		
8,900.00	7,008.65	6,800.01	6,607.22	62.33	32.35	35.19	-1,410.88	409.06	1,010.90	946.39	64.51	15.671		
9,000.00	7,008.73	6,778.72	6,587.86	65.07	32.28	33.45	-1,405.97	416.45	1,098.87	1,034.51	64.36	17.074		
9,100.00	7,008.80	6,767.04	6,577.15	67.83	32.24	32.53	-1,403.26	420.22	1,188.48	1,124.09	64.39	18.457		
9,200.00	7,008.88	6,750.01	6,561.40	70.61	32.19	31.22	-1,399.28	425.35	1,279.41	1,215.10	64.30	19.897		
9,300.00	7,008.95	6,750.01	6,561.40	73.42	32.19	31.22	-1,399.28	425.35	1,371.30	1,306.83	64.48	21.268		
9,400.00	7,009.03	6,750.01	6,561.40	76.24	32.19	31.22	-1,399.28	425.35	1,464.26	1,399.66	64.61	22.664		
9,500.00	7,009.10	6,730.67	6,543.36	79.08	32.12	29.80	-1,394.73	430.64	1,557.69	1,493.24	64.45	24.169		
9,600.00	7,009.18	6,723.51	6,536.65	81.93	32.10	29.28	-1,393.04	432.46	1,651.90	1,587.44	64.45	25.629		
9,700.00	7,009.25	6,700.01	6,514.48	84.80	32.01	27.66	-1,387.47	437.87	1,746.96	1,682.70	64.25	27.188		
9,800.00	7,009.33	6,700.01	6,514.48	87.67	32.01	27.66	-1,387.47	437.87	1,842.01	1,777.67	64.34	28.630		
9,900.00	7,009.40	6,700.01	6,514.48	90.56	32.01	27.66	-1,387.47	437.87	1,937.56	1,873.16	64.41	30.083		
10,000.00	7,009.48	6,700.01	6,514.48	93.45	32.01	27.66	-1,387.47	437.87	2,033.54	1,969.08	64.46	31.545		
10,100.00	7,009.55	6,700.01	6,514.48	96.36	32.01	27.66	-1,387.47	437.87	2,129.89	2,065.38	64.51	33.015		
10,200.00	7,009.63	6,700.01	6,514.48	99.27	32.01	27.66	-1,387.47	437.87	2,226.56	2,162.01	64.55	34.491		
10,300.00	7,009.71	6,700.01	6,514.48	102.19	32.01	27.66	-1,387.47	437.87	2,323.51	2,258.92	64.59	35.973		
10,400.00	7,009.78	6,700.01	6,514.48	105.11	32.01	27.66	-1,387.47	437.87	2,420.71	2,356.09	64.62	37.459		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit 146 - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 152-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	
15,300.00	7,013.47	6,199.01	6,192.18	251.60	188.20	4.03	-1,380.58	9,992.39	2,471.65	2,260.79	210.86	11.722		
15,400.00	7,013.55	6,199.01	6,192.18	254.62	188.20	4.03	-1,380.58	9,992.39	2,379.02	2,168.54	210.48	11.303		
15,500.00	7,013.62	6,199.01	6,192.18	257.63	188.20	4.03	-1,380.58	9,992.39	2,287.01	2,076.96	210.05	10.888		
15,600.00	7,013.70	6,199.01	6,192.18	260.65	188.20	4.03	-1,380.58	9,992.39	2,195.71	1,986.14	209.56	10.478		
15,700.00	7,013.77	6,199.01	6,192.18	263.67	188.20	4.03	-1,380.58	9,992.39	2,105.19	1,896.19	209.00	10.073		
15,800.00	7,013.85	6,199.01	6,192.18	266.68	188.20	4.03	-1,380.58	9,992.39	2,015.57	1,807.22	208.34	9.674		
15,900.00	7,013.92	6,199.01	6,192.18	269.70	188.20	4.03	-1,380.58	9,992.39	1,926.97	1,719.39	207.58	9.283		
16,000.00	7,014.00	6,199.01	6,192.18	272.72	188.20	4.03	-1,380.58	9,992.39	1,839.54	1,632.87	206.67	8.901		
16,100.00	7,014.07	6,199.01	6,192.18	275.74	188.20	4.03	-1,380.58	9,992.39	1,753.46	1,547.88	205.58	8.529		
16,200.00	7,014.15	6,199.01	6,192.18	278.76	188.20	4.03	-1,380.58	9,992.39	1,668.92	1,464.66	204.27	8.170		
16,300.00	7,014.22	6,199.01	6,192.18	281.77	188.20	4.03	-1,380.58	9,992.39	1,586.19	1,383.52	202.67	7.826		
16,400.00	7,014.30	6,199.01	6,192.18	284.79	188.20	4.03	-1,380.58	9,992.39	1,505.55	1,304.84	200.71	7.501		
16,500.00	7,014.38	6,199.01	6,192.18	287.81	188.20	4.03	-1,380.58	9,992.39	1,427.37	1,229.07	198.30	7.198		
16,600.00	7,014.45	6,199.01	6,192.18	290.83	188.20	4.03	-1,380.58	9,992.39	1,352.07	1,156.77	195.30	6.923		
16,699.75	7,014.53	6,199.01	6,192.18	293.85	188.20	4.03	-1,380.58	9,992.39	1,280.33	1,088.76	191.57	6.683		
16,700.00	7,014.53	6,199.01	6,192.18	293.85	188.20	4.03	-1,380.58	9,992.39	1,280.15	1,088.59	191.56	6.683		
16,797.85	7,014.60	6,199.01	6,192.18	296.81	188.20	4.03	-1,380.58	9,992.39	1,213.63	1,026.62	187.01	6.490		
16,800.00	7,014.60	6,199.01	6,192.18	296.87	188.20	4.03	-1,380.58	9,992.39	1,212.22	1,025.32	186.90	6.486		
16,895.88	7,014.67	6,199.01	6,192.18	299.77	188.20	4.03	-1,380.58	9,992.39	1,151.49	970.14	181.36	6.349		
16,900.00	7,014.68	6,199.01	6,192.18	299.89	188.20	4.03	-1,380.58	9,992.39	1,148.99	967.90	181.09	6.345		
16,993.79	7,014.75	6,199.01	6,192.18	302.73	188.20	4.03	-1,380.58	9,992.39	1,094.68	920.29	174.38	6.277		
17,000.00	7,014.75	6,199.01	6,192.18	302.91	188.20	4.03	-1,380.58	9,992.39	1,091.27	917.38	173.89	6.276		
17,091.58	7,014.82	6,199.01	6,192.18	305.68	188.20	4.03	-1,380.58	9,992.39	1,044.03	878.16	165.87	6.294		
17,100.00	7,014.83	6,199.01	6,192.18	305.94	188.20	4.03	-1,380.58	9,992.39	1,039.98	874.92	165.06	6.301		
17,189.22	7,014.89	6,199.01	6,192.18	308.63	188.20	4.03	-1,380.58	9,992.39	1,000.47	844.82	155.64	6.428		
17,200.00	7,014.90	6,199.01	6,192.18	308.96	188.20	4.03	-1,380.58	9,992.39	996.12	841.72	154.40	6.451		
17,286.68	7,014.97	6,199.01	6,192.18	311.58	188.20	4.03	-1,380.58	9,992.39	964.90	821.27	143.63	6.718		
17,300.00	7,014.98	6,199.01	6,192.18	311.98	188.20	4.03	-1,380.58	9,992.39	960.71	818.85	141.85	6.773		
17,383.97	7,015.04	6,199.01	6,192.18	314.52	188.20	4.03	-1,380.58	9,992.39	938.20	808.17	130.03	7.215		
17,400.00	7,015.05	6,199.01	6,192.18	315.00	188.20	4.03	-1,380.58	9,992.39	934.69	807.02	127.68	7.321		
17,481.07	7,015.11	6,199.01	6,192.18	317.45	188.20	4.03	-1,380.58	9,992.39	921.07	805.26	115.81	7.953		
17,500.00	7,015.13	6,199.01	6,192.18	318.02	188.20	4.03	-1,380.58	9,992.39	918.89	805.68	113.20	8.117		
17,600.00	7,015.20	6,199.01	6,192.18	321.05	188.20	4.03	-1,380.58	9,992.39	913.81	808.16	105.65	8.650 CC		
17,700.00	7,015.28	6,199.01	6,192.18	324.07	188.20	4.03	-1,380.58	9,992.39	919.64	802.79	116.85	7.870		
17,800.00	7,015.35	6,199.01	6,192.18	327.09	188.20	4.03	-1,380.58	9,992.39	936.18	802.09	134.10	6.981 ES		
17,900.00	7,015.43	6,199.01	6,192.18	330.11	188.20	4.03	-1,380.58	9,992.39	962.88	812.18	150.69	6.390		
18,000.00	7,015.51	6,199.01	6,192.18	333.14	188.20	4.03	-1,380.58	9,992.39	998.91	833.53	165.38	6.040		
18,100.00	7,015.58	6,199.01	6,192.18	336.16	188.20	4.03	-1,380.58	9,992.39	1,043.32	865.44	177.88	5.865		
18,200.00	7,015.66	6,199.01	6,192.18	339.18	188.20	4.03	-1,380.58	9,992.39	1,095.09	906.81	188.28	5.816 SF		
18,300.00	7,015.73	6,199.01	6,192.18	342.21	188.20	4.03	-1,380.58	9,992.39	1,153.22	956.44	196.78	5.861		
18,400.00	7,015.81	6,199.01	6,192.18	345.23	188.20	4.03	-1,380.58	9,992.39	1,216.80	1,013.16	203.65	5.975		
18,500.00	7,015.88	6,199.01	6,192.18	348.26	188.20	4.03	-1,380.58	9,992.39	1,285.03	1,075.86	209.17	6.143		
18,600.00	7,015.96	6,199.01	6,192.18	351.28	188.20	4.03	-1,380.58	9,992.39	1,357.21	1,143.61	213.59	6.354		
18,700.00	7,016.03	6,199.01	6,192.18	354.30	188.20	4.03	-1,380.58	9,992.39	1,432.73	1,215.60	217.12	6.599		
18,800.00	7,016.11	6,199.01	6,192.18	357.33	188.20	4.03	-1,380.58	9,992.39	1,511.09	1,291.15	219.95	6.870		
18,900.00	7,016.18	6,199.01	6,192.18	360.35	188.20	4.03	-1,380.58	9,992.39	1,591.88	1,369.68	222.20	7.164		
19,000.00	7,016.26	6,199.01	6,192.18	363.38	188.20	4.03	-1,380.58	9,992.39	1,674.75	1,450.74	224.01	7.476		
19,100.00	7,016.33	6,199.01	6,192.18	366.40	188.20	4.03	-1,380.58	9,992.39	1,759.40	1,533.94	225.46	7.804		
19,200.00	7,016.41	6,199.01	6,192.18	369.43	188.20	4.03	-1,380.58	9,992.39	1,845.58	1,618.96	226.62	8.144		
19,300.00	7,016.48	6,199.01	6,192.18	372.45	188.20	4.03	-1,380.58	9,992.39	1,933.10	1,705.54	227.56	8.495		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit 146 - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 152-INCLINOMETER													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		
19,400.00	7,016.56	6,199.01	6,192.18	375.48	188.20	4.03	-1,380.58	9,992.39	2,021.78	1,793.46	228.32	8.855		
19,500.00	7,016.64	6,199.01	6,192.18	378.51	188.20	4.03	-1,380.58	9,992.39	2,111.46	1,882.53	228.93	9.223		
19,600.00	7,016.71	6,199.01	6,192.18	381.53	188.20	4.03	-1,380.58	9,992.39	2,202.04	1,972.61	229.42	9.598		
19,700.00	7,016.79	6,199.01	6,192.18	384.56	188.20	4.03	-1,380.58	9,992.39	2,293.40	2,063.57	229.82	9.979		
19,800.00	7,016.86	6,199.01	6,192.18	387.58	188.20	4.03	-1,380.58	9,992.39	2,385.45	2,155.30	230.15	10.365		
19,900.00	7,016.94	6,199.01	6,192.18	390.61	188.20	4.03	-1,380.58	9,992.39	2,478.12	2,247.71	230.41	10.755		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit 162 - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 260-INCLINOMETER													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	-156.45	-418.53	-182.39	456.84					
100.00	100.00	83.51	83.51	0.27	2.54	-156.45	-418.53	-182.39	456.55	453.74	2.81	162.648		
200.00	200.00	183.51	183.51	0.63	5.57	-156.45	-418.53	-182.39	456.55	450.34	6.20	73.610		
300.00	300.00	283.52	283.51	0.99	8.61	-156.45	-418.53	-182.39	456.55	446.95	9.60	47.569		
400.00	400.00	383.52	383.51	1.35	11.65	-156.45	-418.53	-182.39	456.55	443.55	12.99	35.138		
500.00	500.00	483.52	483.51	1.70	14.68	-156.45	-418.53	-182.39	456.55	440.16	16.39	27.858		
541.61	541.61	525.11	525.10	1.85	15.95	-156.42	-417.96	-182.39	456.02	438.22	17.80	25.618		
600.00	600.00	583.10	583.09	2.06	17.71	-156.43	-417.99	-182.39	456.05	436.28	19.77	23.067		
700.00	700.00	682.41	682.40	2.42	20.72	-156.43	-418.17	-182.39	456.22	433.07	23.15	19.711		
800.00	800.00	781.73	781.72	2.78	23.74	-156.45	-418.51	-182.39	456.54	430.02	26.52	17.215		
900.00	900.00	883.55	883.51	3.14	26.83	-156.45	-418.53	-182.39	456.55	426.57	29.97	15.233		
1,000.00	1,000.00	983.55	983.51	3.50	29.87	-156.45	-418.53	-182.39	456.55	423.18	33.37	13.683		
1,100.00	1,099.98	1,082.98	1,082.93	3.84	32.89	-11.46	-417.75	-182.39	454.12	417.40	36.73	12.364		
1,200.00	1,199.84	1,181.77	1,181.73	4.17	35.89	-11.63	-418.01	-182.39	449.24	409.18	40.06	11.214		
1,300.00	1,299.45	1,283.04	1,282.96	4.51	38.96	-11.92	-418.53	-182.39	441.17	397.70	43.47	10.148		
1,400.00	1,398.70	1,382.29	1,382.21	4.85	41.98	-12.31	-418.53	-182.39	429.26	382.43	46.83	9.167		
1,500.00	1,497.47	1,481.06	1,480.98	5.21	44.98	-12.84	-418.53	-182.39	413.98	363.81	50.17	8.251		
1,600.00	1,595.62	1,578.64	1,578.56	5.59	47.94	-13.49	-417.78	-182.39	394.69	341.21	53.48	7.380		
1,700.00	1,693.06	1,675.20	1,675.12	5.98	50.87	-14.42	-418.06	-182.39	373.09	316.32	56.77	6.572		
1,800.00	1,790.08	1,773.73	1,773.60	6.39	53.87	-15.44	-418.53	-182.39	350.11	289.99	60.12	5.824		
1,900.00	1,887.11	1,870.76	1,870.63	6.82	56.81	-16.57	-418.53	-182.39	326.80	263.38	63.42	5.153		
2,000.00	1,984.14	1,967.79	1,967.66	7.25	59.76	-17.87	-418.53	-182.39	303.63	236.90	66.73	4.550		
2,100.00	2,081.17	2,064.15	2,064.00	7.69	62.69	-19.31	-417.59	-182.39	279.74	209.71	70.03	3.995		
2,200.00	2,178.20	2,160.36	2,160.20	8.14	65.61	-21.10	-418.01	-182.39	257.36	184.03	73.33	3.509		
2,300.00	2,275.23	2,258.93	2,258.75	8.60	68.60	-23.27	-418.53	-182.39	235.36	158.65	76.71	3.068		
2,400.00	2,372.26	2,355.96	2,355.78	9.06	71.55	-25.83	-418.53	-182.39	213.24	133.18	80.06	2.663		
2,500.00	2,469.29	2,452.99	2,452.80	9.53	74.49	-28.96	-418.53	-182.39	191.62	108.19	83.43	2.297		
2,600.00	2,566.32	2,549.79	2,549.59	10.00	77.43	-32.84	-417.71	-182.39	169.87	83.05	86.82	1.957		
2,700.00	2,663.35	2,646.50	2,646.30	10.47	80.37	-37.78	-417.96	-182.39	150.17	59.94	90.23	1.664		
2,800.00	2,760.38	2,743.31	2,743.10	10.95	83.31	-44.10	-418.44	-182.39	132.13	38.43	93.70	1.410 Level 3		
2,900.00	2,857.41	2,841.13	2,840.92	11.43	86.28	-52.36	-418.53	-182.39	115.80	18.53	97.26	1.191 Level 3		
3,000.00	2,954.44	2,938.16	2,937.95	11.91	89.23	-62.87	-418.53	-182.39	102.51	1.64	100.86	1.016 Level 3		
3,100.00	3,051.47	3,035.15	3,034.94	12.39	92.17	-75.87	-418.30	-182.39	93.52	-10.96	104.48	0.895 Level 3		
3,196.12	3,144.73	3,128.38	3,128.17	12.86	95.00	-89.80	-418.40	-182.39	90.58	-17.29	107.86	0.840 Level 3, CC		
3,200.00	3,148.50	3,132.15	3,131.93	12.88	95.12	-90.37	-418.40	-182.39	90.58	-17.41	107.99	0.839 Level 3, ES, SF		
3,300.00	3,245.53	3,229.28	3,229.04	13.36	98.07	-104.82	-418.53	-182.39	93.96	-17.37	111.33	0.844 Level 3		
3,400.00	3,342.56	3,326.31	3,326.07	13.85	101.01	-117.63	-418.53	-182.39	103.00	-11.49	114.50	0.900 Level 3		
3,500.00	3,439.59	3,423.34	3,423.10	14.34	103.96	-128.04	-418.53	-182.39	116.45	-1.16	117.61	0.990 Level 3		
3,600.00	3,536.62	3,520.44	3,520.18	14.83	106.91	-136.62	-417.46	-182.39	133.21	12.49	120.72	1.103 Level 3		
3,700.00	3,633.65	3,617.69	3,617.43	15.32	109.86	-142.71	-417.81	-182.39	151.81	27.92	123.89	1.225 Level 3		
3,800.00	3,730.68	3,715.07	3,714.80	15.81	112.82	-147.37	-418.49	-182.39	171.60	44.49	127.11	1.350 Level 3		
3,900.00	3,827.71	3,811.51	3,811.22	16.30	115.75	-151.19	-418.53	-182.39	192.54	62.24	130.31	1.478 Level 3		
4,000.00	3,924.74	3,908.53	3,908.25	16.80	118.69	-154.29	-418.53	-182.39	214.19	80.64	133.55	1.604		
4,100.00	4,021.77	4,005.56	4,005.28	17.29	121.64	-156.83	-418.53	-182.39	236.33	99.51	136.82	1.727		
4,200.00	4,118.79	4,102.59	4,102.31	17.79	124.59	-158.93	-418.53	-182.39	258.84	118.75	140.09	1.848		
4,300.00	4,215.82	4,199.63	4,199.34	18.28	127.53	-160.87	-417.49	-182.39	282.24	138.87	143.37	1.969		
4,400.00	4,312.85	4,296.83	4,296.53	18.78	130.48	-162.35	-417.53	-182.39	305.24	158.56	146.68	2.081		
4,500.00	4,409.88	4,394.06	4,393.77	19.27	133.43	-163.61	-417.66	-182.39	328.35	178.36	149.99	2.189		
4,600.00	4,506.91	4,491.34	4,491.04	19.77	136.39	-164.69	-417.88	-182.39	351.53	198.23	153.30	2.293		
4,700.00	4,603.94	4,588.64	4,588.35	20.27	139.34	-165.63	-418.19	-182.39	374.77	218.15	156.62	2.393		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit 162 - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 260-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)			
4,800.00	4,700.97	4,685.29	4,684.48	20.77	142.27	-166.45	-418.53	-182.39	398.06	238.14	159.92	2.489		
4,900.00	4,798.00	4,782.32	4,781.51	21.26	145.22	-167.22	-418.53	-182.39	421.65	258.42	163.23	2.583		
5,000.00	4,895.03	4,886.85	4,885.95	21.76	148.39	-167.98	-418.28	-182.39	445.54	278.74	166.80	2.671		
5,100.00	4,992.06	4,976.77	4,975.57	22.26	151.12	-168.52	-418.53	-182.39	469.02	299.15	169.87	2.761		
5,200.00	5,089.09	5,073.80	5,072.60	22.76	154.06	-169.08	-418.53	-182.39	492.78	319.59	173.19	2.845		
5,300.00	5,186.12	5,171.08	5,169.74	23.26	157.01	-169.94	-414.14	-182.39	519.68	343.17	176.51	2.944		
5,400.00	5,283.15	5,273.19	5,271.78	23.76	160.11	-170.36	-414.84	-182.39	543.06	363.05	180.01	3.017		
5,500.00	5,380.18	5,375.92	5,374.42	24.26	163.23	-170.65	-416.83	-182.39	565.60	382.08	183.52	3.082		
5,600.00	5,477.21	5,462.85	5,460.72	24.76	165.87	-170.87	-418.53	-182.39	588.16	401.66	186.51	3.154		
5,700.00	5,574.24	5,559.88	5,557.75	25.26	168.81	-171.23	-418.53	-182.39	612.08	422.25	189.83	3.224		
5,800.00	5,671.27	5,656.91	5,654.78	25.76	171.76	-171.56	-418.53	-182.39	636.01	442.86	193.16	3.293		
5,900.00	5,768.30	5,753.94	5,751.81	26.26	174.70	-171.87	-418.53	-182.39	659.97	463.49	196.48	3.359		
6,000.00	5,865.33	5,850.97	5,848.84	26.76	177.65	-172.15	-418.53	-182.39	683.94	484.13	199.81	3.423		
6,100.00	5,962.36	5,948.00	5,945.87	27.26	180.59	-172.42	-418.53	-182.39	707.93	504.79	203.13	3.485		
6,200.00	6,059.39	6,045.03	6,042.90	27.76	183.54	-172.67	-418.53	-182.39	731.93	525.46	206.46	3.545		
6,300.00	6,156.42	6,109.01	6,105.80	28.27	185.48	-172.82	-418.53	-182.39	756.71	548.30	208.40	3.631		
6,400.00	6,253.45	6,109.01	6,105.80	28.77	185.48	-172.82	-418.53	-182.39	790.91	585.23	205.68	3.845		
6,437.00	6,289.35	6,109.01	6,105.80	28.95	185.48	-172.82	-418.53	-182.39	806.35	602.30	204.05	3.952		
6,450.00	6,301.98	6,109.01	6,105.80	29.02	185.48	-168.41	-418.53	-182.39	812.02	608.61	203.41	3.992		
6,500.00	6,350.82	6,109.01	6,105.80	29.25	185.48	-147.95	-418.53	-182.39	833.86	633.25	200.61	4.157		
6,550.00	6,399.83	6,109.01	6,105.80	29.45	185.48	-124.25	-418.53	-182.39	855.63	658.29	197.34	4.336		
6,600.00	6,448.72	6,109.01	6,105.80	29.63	185.48	-103.04	-418.53	-182.39	877.20	683.54	193.66	4.530		
6,650.00	6,497.18	6,109.01	6,105.80	29.78	185.48	-87.35	-418.53	-182.39	898.47	708.82	189.65	4.738		
6,700.00	6,544.92	6,109.01	6,105.80	29.91	185.48	-76.38	-418.53	-182.39	919.33	733.97	185.36	4.960		
6,750.00	6,591.63	6,109.01	6,105.80	30.03	185.48	-68.56	-418.53	-182.39	939.67	758.81	180.87	5.195		
6,800.00	6,637.04	6,109.01	6,105.80	30.12	185.48	-62.77	-418.53	-182.39	959.42	783.18	176.24	5.444		
6,850.00	6,680.86	6,109.01	6,105.80	30.21	185.48	-58.31	-418.53	-182.39	978.49	806.94	171.54	5.704		
6,900.00	6,722.82	6,109.01	6,105.80	30.28	185.48	-54.77	-418.53	-182.39	996.80	829.95	166.85	5.974		
6,950.00	6,762.67	6,109.01	6,105.80	30.33	185.48	-51.88	-418.53	-182.39	1,014.28	852.04	162.24	6.252		
7,000.00	6,800.15	6,109.01	6,105.80	30.38	185.48	-49.49	-418.53	-182.39	1,030.88	873.10	157.78	6.534		
7,050.00	6,835.04	6,109.01	6,105.80	30.42	185.48	-47.49	-418.53	-182.39	1,046.53	892.98	153.55	6.816		
7,100.00	6,867.11	6,109.01	6,105.80	30.45	185.48	-45.80	-418.53	-182.39	1,061.19	911.56	149.62	7.092		
7,150.00	6,896.19	6,109.01	6,105.80	30.48	185.48	-44.36	-418.53	-182.39	1,074.79	928.71	146.08	7.357		
7,200.00	6,922.07	6,109.01	6,105.80	30.51	185.48	-43.15	-418.53	-182.39	1,087.31	944.32	142.99	7.604		
7,250.00	6,944.62	6,109.01	6,105.80	30.55	185.48	-42.12	-418.53	-182.39	1,098.70	958.28	140.42	7.824		
7,300.00	6,963.67	6,109.01	6,105.80	30.60	185.48	-41.27	-418.53	-182.39	1,108.93	970.51	138.43	8.011		
7,350.00	6,979.13	6,109.01	6,105.80	30.69	185.48	-40.56	-418.53	-182.39	1,117.97	980.92	137.05	8.158		
7,400.00	6,990.88	6,109.01	6,105.80	30.83	185.48	-40.00	-418.53	-182.39	1,125.78	989.46	136.32	8.258		
7,450.00	6,998.87	6,109.01	6,105.80	31.05	185.48	-39.57	-418.53	-182.39	1,132.36	996.10	136.25	8.311		
7,459.46	6,999.96	6,109.01	6,105.80	31.11	185.48	-39.51	-418.53	-182.39	1,133.46	997.14	136.32	8.315		
7,500.00	7,003.04	6,109.01	6,105.80	31.38	185.48	-39.27	-418.53	-182.39	1,137.67	1,000.82	136.85	8.313		
7,504.23	7,003.22	6,109.01	6,105.80	31.42	185.48	-39.25	-418.53	-182.39	1,138.06	1,001.13	136.93	8.311		
7,520.93	7,003.65	6,109.01	6,105.80	31.56	185.48	-39.18	-418.53	-182.39	1,139.52	1,002.23	137.29	8.300		
7,535.54	7,003.83	6,109.01	6,105.80	31.70	185.48	-39.18	-418.53	-182.39	1,140.82	1,003.16	137.66	8.287		
7,600.00	7,004.65	6,109.01	6,105.80	32.42	185.48	-39.18	-418.53	-182.39	1,148.78	1,009.16	139.62	8.228		
7,700.00	7,005.93	6,109.01	6,105.80	33.89	185.48	-39.18	-418.53	-182.39	1,168.07	1,024.39	143.68	8.130		
7,783.87	7,007.00	6,109.01	6,105.80	35.35	185.48	-39.18	-418.53	-182.39	1,190.51	1,042.73	147.78	8.056		
7,800.00	7,007.19	6,109.01	6,105.80	35.65	185.48	-39.09	-418.53	-182.39	1,195.47	1,046.84	148.62	8.044		
7,900.00	7,007.88	6,109.01	6,105.80	37.60	185.48	-38.40	-418.53	-182.39	1,231.25	1,076.98	154.28	7.981		
7,918.77	7,007.91	6,109.01	6,105.80	37.98	185.48	-38.25	-418.53	-182.39	1,238.90	1,083.50	155.39	7.973		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit 162 - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 260-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)				
8,000.00	7,007.97	6,109.01	6,105.80	39.70	185.48	-38.25	-418.53	-182.39	1,274.74	1,114.51	160.23	7.956		
8,100.00	7,008.05	6,109.01	6,105.80	41.93	185.48	-38.25	-418.53	-182.39	1,324.38	1,158.39	166.00	7.978		
8,200.00	7,008.12	6,109.01	6,105.80	44.27	185.48	-38.25	-418.53	-182.39	1,379.50	1,208.08	171.42	8.047		
8,300.00	7,008.20	6,109.01	6,105.80	46.68	185.48	-38.25	-418.53	-182.39	1,439.47	1,263.04	176.42	8.159		
8,400.00	7,008.27	6,109.01	6,105.80	49.16	185.48	-38.25	-418.53	-182.39	1,503.69	1,322.73	180.96	8.310		
8,500.00	7,008.35	6,109.01	6,105.80	51.71	185.48	-38.25	-418.53	-182.39	1,571.66	1,386.63	185.04	8.494		
8,600.00	7,008.42	6,109.01	6,105.80	54.30	185.48	-38.25	-418.53	-182.39	1,642.91	1,454.24	188.68	8.708		
8,700.00	7,008.50	6,109.01	6,105.80	56.94	185.48	-38.25	-418.53	-182.39	1,717.03	1,525.12	191.91	8.947		
8,800.00	7,008.58	6,109.01	6,105.80	59.62	185.48	-38.25	-418.53	-182.39	1,793.66	1,598.89	194.78	9.209		
8,900.00	7,008.65	6,109.01	6,105.80	62.33	185.48	-38.25	-418.53	-182.39	1,872.50	1,675.18	197.32	9.490		
9,000.00	7,008.73	6,109.01	6,105.80	65.07	185.48	-38.25	-418.53	-182.39	1,953.28	1,753.71	199.57	9.788		
9,100.00	7,008.80	6,109.01	6,105.80	67.83	185.48	-38.25	-418.53	-182.39	2,035.76	1,834.20	201.56	10.100		
9,200.00	7,008.88	6,109.01	6,105.80	70.61	185.48	-38.25	-418.53	-182.39	2,119.75	1,916.42	203.34	10.425		
9,300.00	7,008.95	6,109.01	6,105.80	73.42	185.48	-38.25	-418.53	-182.39	2,205.08	2,000.17	204.92	10.761		
9,400.00	7,009.03	6,109.01	6,105.80	76.24	185.48	-38.25	-418.53	-182.39	2,291.60	2,085.27	206.32	11.107		
9,500.00	7,009.10	6,109.01	6,105.80	79.08	185.48	-38.25	-418.53	-182.39	2,379.17	2,171.59	207.58	11.461		
9,600.00	7,009.18	6,109.01	6,105.80	81.93	185.48	-38.25	-418.53	-182.39	2,467.69	2,258.98	208.71	11.823		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit 162C - OH - OH												Offset Site Error:	0.00 ft
Survey Program: 290-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
0.00	0.00	13.51	13.51	0.00	0.41	153.50	-1,335.14	665.69	1,491.89				
100.00	100.00	113.51	113.51	0.27	3.45	153.50	-1,335.14	665.69	1,491.89	1,488.17	3.72	401.260	
200.00	200.00	213.51	213.51	0.63	6.48	153.50	-1,335.14	665.69	1,491.89	1,484.78	7.11	209.733	
300.00	300.00	313.53	313.51	0.99	9.52	153.50	-1,335.14	665.69	1,491.89	1,481.38	10.51	141.963	
400.00	400.00	413.53	413.51	1.35	12.56	153.50	-1,335.14	665.69	1,491.89	1,477.98	13.90	107.298	
500.00	500.00	513.53	513.51	1.70	15.59	153.50	-1,335.14	665.69	1,491.89	1,474.59	17.30	86.239	
552.40	552.40	565.84	565.82	1.89	17.18	153.48	-1,333.94	665.69	1,490.82	1,471.74	19.08	78.152	
600.00	600.00	611.51	611.48	2.06	18.57	153.48	-1,333.98	665.69	1,490.85	1,470.22	20.63	72.255	
700.00	700.00	707.45	707.42	2.42	21.48	153.48	-1,334.27	665.69	1,491.13	1,467.22	23.91	62.377	
800.00	800.00	803.40	803.36	2.78	24.40	153.49	-1,334.85	665.69	1,491.67	1,464.49	27.18	54.888	
900.00	900.00	913.72	913.51	3.14	27.75	153.50	-1,335.14	665.69	1,491.89	1,461.00	30.89	48.303	
1,000.00	1,000.00	1,013.72	1,013.51	3.50	30.78	153.50	-1,335.14	665.69	1,491.89	1,457.61	34.28	43.519	
1,100.00	1,099.98	1,110.15	1,109.90	3.84	33.71	-61.60	-1,333.13	665.69	1,489.26	1,451.71	37.55	39.659	
1,200.00	1,199.84	1,201.16	1,200.89	4.17	36.48	-61.79	-1,333.68	665.69	1,487.32	1,446.67	40.65	36.593	
1,300.00	1,299.45	1,313.34	1,312.96	4.51	39.88	-62.16	-1,335.14	665.69	1,484.46	1,440.07	44.39	33.440	
1,400.00	1,398.70	1,412.59	1,412.21	4.85	42.90	-62.68	-1,335.14	665.69	1,478.79	1,431.04	47.75	30.969	
1,500.00	1,497.47	1,511.36	1,510.98	5.21	45.90	-63.34	-1,335.14	665.69	1,471.62	1,420.51	51.11	28.795	
1,600.00	1,595.62	1,607.40	1,607.01	5.59	48.81	-64.16	-1,334.08	665.69	1,462.13	1,407.74	54.39	26.881	
1,700.00	1,693.06	1,700.76	1,700.36	5.98	51.65	-65.08	-1,334.39	665.69	1,452.58	1,394.96	57.61	25.212	
1,800.00	1,790.08	1,793.86	1,793.46	6.39	54.48	-65.88	-1,335.00	665.69	1,442.86	1,382.02	60.84	23.714	
1,900.00	1,887.11	1,901.08	1,900.63	6.82	57.73	-66.83	-1,335.14	665.69	1,433.01	1,368.49	64.52	22.212	
2,000.00	1,984.14	1,998.11	1,997.66	7.25	60.68	-67.70	-1,335.14	665.69	1,423.42	1,355.53	67.89	20.967	
2,100.00	2,081.17	2,093.68	2,093.21	7.69	63.58	-68.59	-1,334.07	665.69	1,413.28	1,342.06	71.22	19.843	
2,200.00	2,178.20	2,186.93	2,186.47	8.14	66.41	-69.45	-1,334.34	665.69	1,404.64	1,330.14	74.50	18.854	
2,300.00	2,275.23	2,280.32	2,279.84	8.60	69.25	-70.30	-1,334.92	665.69	1,396.61	1,318.82	77.79	17.955	
2,400.00	2,372.26	2,386.30	2,385.78	9.06	72.47	-71.30	-1,335.14	665.69	1,388.60	1,307.14	81.46	17.046	
2,500.00	2,469.29	2,483.33	2,482.80	9.53	75.41	-72.22	-1,335.14	665.69	1,380.82	1,295.95	84.87	16.270	
2,600.00	2,566.32	2,579.72	2,579.19	10.00	78.34	-73.18	-1,334.03	665.69	1,372.55	1,284.28	88.27	15.550	
2,700.00	2,663.35	2,673.37	2,672.83	10.47	81.19	-74.09	-1,334.23	665.69	1,365.72	1,274.13	91.58	14.912	
2,800.00	2,760.38	2,767.15	2,766.60	10.95	84.03	-74.99	-1,334.74	665.69	1,359.51	1,264.60	94.91	14.324	
2,900.00	2,857.41	2,871.55	2,870.92	11.43	87.20	-76.02	-1,335.14	665.69	1,353.59	1,255.02	98.56	13.733	
3,000.00	2,954.44	2,968.58	2,967.95	11.91	90.15	-76.99	-1,335.14	665.69	1,347.78	1,245.78	101.99	13.214	
3,100.00	3,051.47	3,065.61	3,064.98	12.39	93.10	-77.97	-1,335.14	665.69	1,342.38	1,236.95	105.43	12.733	
3,200.00	3,148.50	3,159.89	3,159.25	12.88	95.96	-78.96	-1,333.76	665.69	1,336.40	1,227.62	108.78	12.285	
3,300.00	3,245.53	3,253.45	3,252.79	13.36	98.80	-79.90	-1,334.20	665.69	1,332.18	1,220.07	112.11	11.883	
3,400.00	3,342.56	3,347.15	3,346.48	13.85	101.65	-80.84	-1,335.00	665.69	1,328.64	1,213.18	115.45	11.508	
3,500.00	3,439.59	3,453.88	3,453.10	14.34	104.89	-81.94	-1,335.14	665.69	1,324.99	1,205.80	119.19	11.117	
3,600.00	3,536.62	3,550.91	3,550.13	14.83	107.83	-82.95	-1,335.14	665.69	1,321.71	1,199.08	122.63	10.778	
3,700.00	3,633.65	3,643.24	3,642.43	15.32	110.64	-83.95	-1,334.05	665.69	1,318.17	1,192.23	125.93	10.467	
3,800.00	3,730.68	3,735.32	3,734.49	15.81	113.43	-84.89	-1,334.83	665.69	1,316.31	1,187.08	129.23	10.186	
3,900.00	3,827.71	3,842.19	3,841.22	16.30	116.68	-86.00	-1,335.14	665.69	1,314.51	1,181.54	132.97	9.886	
4,000.00	3,924.74	3,939.22	3,938.25	16.80	119.63	-87.02	-1,335.14	665.69	1,312.99	1,176.57	136.42	9.625	
4,100.00	4,021.77	4,036.25	4,035.28	17.29	122.57	-88.04	-1,335.14	665.69	1,311.92	1,172.06	139.86	9.380	
4,200.00	4,118.79	4,133.28	4,132.31	17.79	125.52	-89.07	-1,335.14	665.69	1,311.29	1,167.98	143.31	9.150	
4,290.74	4,206.84	4,221.33	4,220.36	18.24	128.19	-90.00	-1,335.14	665.69	1,311.10	1,164.67	146.43	8.954	
4,300.00	4,215.82	4,230.31	4,229.34	18.28	128.47	-90.09	-1,335.14	665.69	1,311.11	1,164.36	146.75	8.934	
4,400.00	4,312.85	4,327.34	4,326.37	18.78	131.41	-91.12	-1,335.14	665.69	1,311.37	1,161.18	150.19	8.731	
4,500.00	4,409.88	4,424.37	4,423.40	19.27	134.36	-92.15	-1,335.14	665.69	1,312.08	1,158.45	153.63	8.540	
4,600.00	4,506.91	4,521.40	4,520.43	19.77	137.31	-93.17	-1,335.14	665.69	1,313.24	1,156.17	157.07	8.361	
4,700.00	4,603.94	4,618.43	4,617.46	20.27	140.25	-94.19	-1,335.14	665.69	1,314.84	1,154.33	160.51	8.192	



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit 162C - OH - OH													Offset Site Error:	0.00 ft
Survey Program:		290-INCLINOMETER						Rule Assigned:					Offset Well Error:	0.00 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (ft)	Separation Factor	Warning	
							+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)				
4,800.00	4,700.97	4,715.46	4,714.48	20.77	143.20	-95.21	-1,335.14	665.69	1,316.88	1,152.94	163.94	8.033		
4,900.00	4,798.00	4,812.49	4,811.51	21.26	146.15	-96.23	-1,335.14	665.69	1,319.36	1,151.99	167.38	7.883		
5,000.00	4,895.03	4,909.52	4,908.54	21.76	149.09	-97.24	-1,335.14	665.69	1,322.28	1,151.48	170.81	7.741		
5,100.00	4,992.06	5,006.55	5,005.57	22.26	152.04	-98.24	-1,335.14	665.69	1,325.64	1,151.41	174.24	7.608		
5,200.00	5,089.09	5,103.58	5,102.60	22.76	154.99	-99.25	-1,335.14	665.69	1,329.43	1,151.77	177.66	7.483		
5,300.00	5,186.12	5,200.61	5,199.63	23.26	157.93	-100.24	-1,335.14	665.69	1,333.65	1,152.56	181.08	7.365		
5,400.00	5,283.15	5,297.63	5,296.66	23.76	160.88	-101.23	-1,335.14	665.69	1,338.29	1,153.78	184.50	7.253		
5,500.00	5,380.18	5,394.66	5,393.69	24.26	163.83	-102.22	-1,335.14	665.69	1,343.35	1,155.43	187.92	7.149		
5,600.00	5,477.21	5,491.69	5,490.72	24.76	166.77	-103.19	-1,335.14	665.69	1,348.82	1,157.49	191.33	7.050		
5,700.00	5,574.24	5,588.72	5,587.75	25.26	169.72	-104.16	-1,335.14	665.69	1,354.71	1,159.96	194.74	6.956		
5,800.00	5,671.27	5,685.75	5,684.78	25.76	172.67	-105.12	-1,335.14	665.69	1,361.00	1,162.85	198.15	6.869		
5,900.00	5,768.30	5,782.78	5,781.81	26.26	175.61	-106.07	-1,335.14	665.69	1,367.68	1,166.13	201.55	6.786		
6,000.00	5,865.33	5,879.81	5,878.84	26.76	178.56	-107.02	-1,335.14	665.69	1,374.77	1,169.81	204.95	6.708		
6,100.00	5,962.36	5,976.84	5,975.87	27.26	181.50	-107.95	-1,335.14	665.69	1,382.24	1,173.89	208.35	6.634		
6,200.00	6,059.39	6,073.87	6,072.90	27.76	184.45	-108.87	-1,335.14	665.69	1,390.09	1,178.34	211.74	6.565		
6,300.00	6,156.42	6,170.90	6,169.93	28.27	187.40	-109.79	-1,335.14	665.69	1,398.31	1,183.18	215.13	6.500		
6,400.00	6,253.45	6,267.93	6,266.96	28.77	190.34	-110.69	-1,335.14	665.69	1,406.90	1,188.38	218.52	6.438		
6,437.00	6,289.35	6,303.83	6,302.86	28.95	191.43	-111.02	-1,335.14	665.69	1,410.17	1,190.40	219.77	6.417		
6,450.00	6,301.98	6,316.46	6,315.49	29.02	191.82	-107.16	-1,335.14	665.69	1,411.21	1,191.00	220.21	6.408		
6,500.00	6,350.82	6,365.30	6,364.33	29.25	193.30	-88.72	-1,335.14	665.69	1,412.84	1,190.94	221.90	6.367		
6,550.00	6,399.83	6,414.32	6,413.34	29.45	194.79	-66.88	-1,335.14	665.69	1,410.74	1,187.16	223.58	6.310		
6,600.00	6,448.72	6,463.20	6,462.23	29.63	196.27	-47.35	-1,335.14	665.69	1,404.90	1,179.67	225.24	6.237		
6,650.00	6,497.18	6,511.67	6,510.69	29.78	197.75	-33.17	-1,335.14	665.69	1,395.34	1,168.48	226.86	6.151		
6,700.00	6,544.92	6,559.40	6,558.43	29.91	199.20	-23.52	-1,335.14	665.69	1,382.10	1,153.65	228.45	6.050		
6,750.00	6,591.63	6,606.12	6,605.15	30.03	200.61	-16.82	-1,335.14	665.69	1,365.25	1,135.26	229.99	5.936		
6,800.00	6,637.04	6,651.53	6,650.55	30.12	201.99	-11.95	-1,335.14	665.69	1,344.88	1,113.40	231.48	5.810		
6,850.00	6,680.86	6,695.35	6,694.37	30.21	203.32	-8.17	-1,335.14	665.69	1,321.11	1,088.20	232.91	5.672		
6,900.00	6,722.82	6,737.31	6,736.33	30.28	204.60	-5.06	-1,335.14	665.69	1,294.07	1,059.80	234.27	5.524		
6,950.00	6,762.67	6,777.15	6,776.18	30.33	205.81	-2.30	-1,335.14	665.69	1,263.92	1,028.37	235.55	5.366		
7,000.00	6,800.15	6,814.63	6,813.66	30.38	206.95	0.30	-1,335.14	665.69	1,230.85	994.10	236.75	5.199		
7,050.00	6,835.04	6,849.52	6,848.55	30.42	208.01	2.95	-1,335.14	665.69	1,195.06	957.20	237.86	5.024		
7,100.00	6,867.11	6,881.60	6,880.63	30.45	208.98	5.82	-1,335.14	665.69	1,156.77	917.89	238.88	4.842		
7,150.00	6,896.19	6,910.67	6,909.70	30.48	209.86	9.14	-1,335.14	665.69	1,116.22	876.42	239.80	4.655		
7,200.00	6,922.07	6,936.56	6,935.59	30.51	210.65	13.21	-1,335.14	665.69	1,073.68	833.07	240.61	4.462		
7,250.00	6,944.62	6,959.10	6,958.13	30.55	211.33	18.45	-1,335.14	665.69	1,029.42	788.10	241.32	4.266		
7,300.00	6,963.67	6,978.16	6,977.19	30.60	211.91	25.45	-1,335.14	665.69	983.73	741.81	241.91	4.066		
7,350.00	6,979.13	6,993.61	6,992.64	30.69	212.38	35.03	-1,335.14	665.69	936.92	694.53	242.40	3.865		
7,400.00	6,990.88	7,005.37	7,004.40	30.83	212.74	47.94	-1,335.14	665.69	889.33	646.56	242.77	3.663		
7,450.00	6,998.87	7,013.36	7,012.39	31.05	212.98	64.00	-1,335.14	665.69	841.28	598.25	243.03	3.462		
7,500.00	7,003.04	7,017.53	7,016.55	31.38	213.11	80.97	-1,335.14	665.69	793.14	549.95	243.19	3.261		
7,520.93	7,003.65	7,018.13	7,017.16	31.56	213.13	87.55	-1,335.14	665.69	773.05	529.83	243.23	3.178		
7,600.00	7,004.65	7,019.14	7,018.17	32.42	213.16	87.81	-1,335.14	665.69	697.65	454.29	243.36	2.867		
7,700.00	7,005.93	7,020.42	7,019.44	33.89	213.20	88.14	-1,335.14	665.69	603.63	359.98	243.65	2.477		
7,783.87	7,007.00	7,021.49	7,020.51	35.35	213.23	88.42	-1,335.14	665.69	526.47	282.39	244.08	2.157		
7,800.00	7,007.19	7,021.68	7,020.71	35.65	213.23	88.62	-1,335.14	665.69	511.85	267.65	244.20	2.096		
7,900.00	7,007.88	7,022.37	7,021.39	37.60	213.26	89.75	-1,335.14	665.69	422.70	177.50	245.20	1.724		
7,918.77	7,007.91	7,022.40	7,021.42	37.98	213.26	89.92	-1,335.14	665.69	406.34	160.88	245.46	1.655		
8,000.00	7,007.97	7,022.46	7,021.49	39.70	213.26	89.94	-1,335.14	665.69	338.26	91.19	247.07	1.369 Level 3		
8,100.00	7,008.05	7,022.53	7,021.56	41.93	213.26	89.96	-1,335.14	665.69	264.83	14.16	250.67	1.056 Level 3		
8,200.00	7,008.12	7,022.61	7,021.64	44.27	213.26	89.98	-1,335.14	665.69	214.13	-42.04	256.17	0.836 Level 3		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit 162C - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 290-INCLINOMETER													Offset Well Error:	0.00 ft
Reference	Vertical	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)	Factor		
8,271.41	7,008.18	7,022.66	7,021.69	45.99	213.26	90.00	-1,335.14	665.69	201.87	-57.38	259.25	0.779	Level 3, CC, ES, SF	
8,300.00	7,008.20	7,022.68	7,021.71	46.68	213.26	90.01	-1,335.14	665.69	203.89	-55.80	259.68	0.785	Level 3	
8,400.00	7,008.27	7,022.76	7,021.79	49.16	213.27	90.03	-1,335.14	665.69	239.35	-18.47	257.82	0.928	Level 3	
8,500.00	7,008.35	7,022.83	7,021.86	51.71	213.27	90.05	-1,335.14	665.69	304.97	50.64	254.33	1.199	Level 3	
8,600.00	7,008.42	7,022.91	7,021.94	54.30	213.27	90.07	-1,335.14	665.69	385.65	134.01	251.63	1.533		
8,700.00	7,008.50	7,022.99	7,022.01	56.94	213.27	90.09	-1,335.14	665.69	473.75	223.92	249.83	1.896		
8,800.00	7,008.58	7,023.06	7,022.09	59.62	213.28	90.11	-1,335.14	665.69	565.83	317.19	248.63	2.276		
8,900.00	7,008.65	7,023.14	7,022.16	62.33	213.28	90.13	-1,335.14	665.69	660.21	412.40	247.80	2.664		
9,000.00	7,008.73	7,023.21	7,022.24	65.07	213.28	90.16	-1,335.14	665.69	756.04	508.82	247.21	3.058		
9,100.00	7,008.80	7,023.29	7,022.31	67.83	213.28	90.18	-1,335.14	665.69	852.83	606.05	246.78	3.456		
9,200.00	7,008.88	7,023.36	7,022.39	70.61	213.29	90.20	-1,335.14	665.69	950.28	703.83	246.45	3.856		
9,300.00	7,008.95	7,023.44	7,022.46	73.42	213.29	90.22	-1,335.14	665.69	1,048.21	802.02	246.19	4.258		
9,400.00	7,009.03	7,023.51	7,022.54	76.24	213.29	90.24	-1,335.14	665.69	1,146.50	900.51	245.99	4.661		
9,500.00	7,009.10	7,023.59	7,022.62	79.08	213.29	90.26	-1,335.14	665.69	1,245.06	999.23	245.83	5.065		
9,600.00	7,009.18	7,023.66	7,022.69	81.93	213.29	90.28	-1,335.14	665.69	1,343.84	1,098.14	245.70	5.469		
9,700.00	7,009.25	7,023.74	7,022.77	84.80	213.30	90.31	-1,335.14	665.69	1,442.78	1,197.19	245.59	5.875		
9,800.00	7,009.33	7,023.81	7,022.84	87.67	213.30	90.33	-1,335.14	665.69	1,541.86	1,296.35	245.51	6.280		
9,900.00	7,009.40	7,023.89	7,022.92	90.56	213.30	90.35	-1,335.14	665.69	1,641.05	1,395.61	245.44	6.686		
10,000.00	7,009.48	7,023.96	7,022.99	93.45	213.30	90.37	-1,335.14	665.69	1,740.34	1,494.96	245.38	7.092		
10,100.00	7,009.55	7,024.04	7,023.07	96.36	213.31	90.39	-1,335.14	665.69	1,839.70	1,594.37	245.33	7.499		
10,200.00	7,009.63	7,024.12	7,023.14	99.27	213.31	90.41	-1,335.14	665.69	1,939.12	1,693.83	245.29	7.905		
10,300.00	7,009.71	7,024.19	7,023.22	102.19	213.31	90.43	-1,335.14	665.69	2,038.61	1,793.35	245.26	8.312		
10,400.00	7,009.78	7,024.27	7,023.29	105.11	213.31	90.46	-1,335.14	665.69	2,138.14	1,892.90	245.24	8.719		
10,500.00	7,009.86	7,024.34	7,023.37	108.04	213.32	90.48	-1,335.14	665.69	2,237.71	1,992.50	245.22	9.125		
10,600.00	7,009.93	7,024.42	7,023.44	110.98	213.32	90.50	-1,335.14	665.69	2,337.32	2,092.12	245.20	9.532		
10,700.00	7,010.01	7,024.49	7,023.52	113.92	213.32	90.52	-1,335.14	665.69	2,436.96	2,191.77	245.19	9.939		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit 23-29 - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 100-UNKNOWN													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		
9,100.00	7,008.80	5,935.01	5,935.01	67.83	237.40	14.50	-1,475.18	3,700.96	2,479.41	2,238.63	240.78	10.297		
9,200.00	7,008.88	5,935.01	5,935.01	70.61	237.40	14.50	-1,475.18	3,700.96	2,390.79	2,151.87	238.92	10.007		
9,300.00	7,008.95	5,935.01	5,935.01	73.42	237.40	14.50	-1,475.18	3,700.96	2,303.10	2,066.23	236.87	9.723		
9,400.00	7,009.03	5,935.01	5,935.01	76.24	237.40	14.50	-1,475.18	3,700.96	2,216.45	1,981.85	234.60	9.448		
9,500.00	7,009.10	5,935.01	5,935.01	79.08	237.40	14.50	-1,475.18	3,700.96	2,130.97	1,898.88	232.10	9.181		
9,600.00	7,009.18	5,935.01	5,935.01	81.93	237.40	14.50	-1,475.18	3,700.96	2,046.81	1,817.50	229.31	8.926		
9,700.00	7,009.25	5,935.01	5,935.01	84.80	237.40	14.50	-1,475.18	3,700.96	1,964.14	1,737.93	226.21	8.683		
9,800.00	7,009.33	5,935.01	5,935.01	87.67	237.40	14.50	-1,475.18	3,700.96	1,883.14	1,660.40	222.74	8.454		
9,900.00	7,009.40	5,935.01	5,935.01	90.56	237.40	14.50	-1,475.18	3,700.96	1,804.06	1,585.20	218.86	8.243		
10,000.00	7,009.48	5,935.01	5,935.01	93.45	237.40	14.50	-1,475.18	3,700.96	1,727.14	1,512.65	214.49	8.052		
10,100.00	7,009.55	5,935.01	5,935.01	96.36	237.40	14.50	-1,475.18	3,700.96	1,652.70	1,443.13	209.57	7.886		
10,200.00	7,009.63	5,935.01	5,935.01	99.27	237.40	14.50	-1,475.18	3,700.96	1,581.08	1,377.07	204.01	7.750		
10,298.72	7,009.70	5,935.01	5,935.01	102.15	237.40	14.50	-1,475.18	3,700.96	1,513.54	1,315.72	197.82	7.651		
10,300.00	7,009.71	5,935.01	5,935.01	102.19	237.40	14.50	-1,475.18	3,700.96	1,512.68	1,314.95	197.74	7.650		
10,397.11	7,009.78	5,935.01	5,935.01	105.03	237.40	14.50	-1,475.18	3,700.96	1,449.78	1,258.91	190.87	7.596		
10,400.00	7,009.78	5,935.01	5,935.01	105.11	237.40	14.50	-1,475.18	3,700.96	1,447.96	1,257.31	190.65	7.595		
10,495.44	7,009.85	5,935.01	5,935.01	107.91	237.40	14.50	-1,475.18	3,700.96	1,390.10	1,207.05	183.06	7.594		
10,500.00	7,009.86	5,935.01	5,935.01	108.04	237.40	14.50	-1,475.18	3,700.96	1,387.44	1,204.77	182.67	7.595		
10,593.69	7,009.93	5,935.01	5,935.01	110.79	237.40	14.50	-1,475.18	3,700.96	1,335.05	1,160.72	174.34	7.658		
10,600.00	7,009.93	5,935.01	5,935.01	110.98	237.40	14.50	-1,475.18	3,700.96	1,331.69	1,157.94	173.74	7.665		
10,691.85	7,010.00	5,935.01	5,935.01	113.68	237.40	14.50	-1,475.18	3,700.96	1,285.21	1,120.51	164.70	7.803		
10,700.00	7,010.01	5,935.01	5,935.01	113.92	237.40	14.50	-1,475.18	3,700.96	1,281.32	1,117.46	163.86	7.819		
10,789.91	7,010.07	5,935.01	5,935.01	116.57	237.40	14.50	-1,475.18	3,700.96	1,241.18	1,086.95	154.24	8.047		
10,800.00	7,010.08	5,935.01	5,935.01	116.87	237.40	14.50	-1,475.18	3,700.96	1,237.00	1,083.88	153.12	8.079		
10,887.85	7,010.15	5,935.01	5,935.01	119.46	237.40	14.50	-1,475.18	3,700.96	1,203.59	1,060.41	143.18	8.406		
10,900.00	7,010.16	5,935.01	5,935.01	119.82	237.40	14.50	-1,475.18	3,700.96	1,199.41	1,057.62	141.79	8.459		
10,985.68	7,010.22	5,935.01	5,935.01	122.35	237.40	14.50	-1,475.18	3,700.96	1,173.03	1,041.01	132.02	8.885		
11,000.00	7,010.23	5,935.01	5,935.01	122.77	237.40	14.50	-1,475.18	3,700.96	1,169.18	1,038.75	130.43	8.964		
11,083.40	7,010.30	5,935.01	5,935.01	125.24	237.40	14.50	-1,475.18	3,700.96	1,150.02	1,028.33	121.69	9.450		
11,100.00	7,010.31	5,935.01	5,935.01	125.73	237.40	14.50	-1,475.18	3,700.96	1,146.89	1,026.77	120.12	9.548		
11,181.02	7,010.37	5,935.01	5,935.01	128.13	237.40	14.50	-1,475.18	3,700.96	1,135.00	1,021.24	113.76	9.977		
11,200.00	7,010.38	5,935.01	5,935.01	128.69	237.40	14.50	-1,475.18	3,700.96	1,133.03	1,020.36	112.67	10.056		
11,278.48	7,010.44	5,935.01	5,935.01	131.02	237.40	14.50	-1,475.18	3,700.96	1,128.26	1,017.93	110.33	10.226		
11,300.00	7,010.46	5,935.01	5,935.01	131.66	237.40	14.50	-1,475.18	3,700.96	1,127.90	1,017.53	110.37	10.219 CC		
11,400.00	7,010.53	5,935.01	5,935.01	134.62	237.40	14.50	-1,475.18	3,700.96	1,131.61	1,017.07	114.54	9.879 ES		
11,500.00	7,010.61	5,935.01	5,935.01	137.60	237.40	14.50	-1,475.18	3,700.96	1,144.09	1,019.95	124.15	9.216		
11,600.00	7,010.68	5,935.01	5,935.01	140.57	237.40	14.50	-1,475.18	3,700.96	1,165.05	1,028.22	136.83	8.515		
11,700.00	7,010.76	5,935.01	5,935.01	143.54	237.40	14.50	-1,475.18	3,700.96	1,194.04	1,043.45	150.59	7.929		
11,800.00	7,010.84	5,935.01	5,935.01	146.52	237.40	14.50	-1,475.18	3,700.96	1,230.50	1,066.30	164.20	7.494		
11,900.00	7,010.91	5,935.01	5,935.01	149.50	237.40	14.50	-1,475.18	3,700.96	1,273.78	1,096.79	177.00	7.197		
12,000.00	7,010.99	5,935.01	5,935.01	152.49	237.40	14.50	-1,475.18	3,700.96	1,323.22	1,134.57	188.66	7.014		
12,100.00	7,011.06	5,935.01	5,935.01	155.47	237.40	14.50	-1,475.18	3,700.96	1,378.16	1,179.08	199.08	6.923		
12,200.00	7,011.14	5,935.01	5,935.01	158.46	237.40	14.50	-1,475.18	3,700.96	1,437.95	1,229.68	208.27	6.904 SF		
12,300.00	7,011.21	5,935.01	5,935.01	161.45	237.40	14.50	-1,475.18	3,700.96	1,502.03	1,285.72	216.32	6.944		
12,400.00	7,011.29	5,935.01	5,935.01	164.44	237.40	14.50	-1,475.18	3,700.96	1,569.87	1,346.55	223.32	7.030		
12,500.00	7,011.36	5,935.01	5,935.01	167.43	237.40	14.50	-1,475.18	3,700.96	1,641.01	1,411.60	229.40	7.153		
12,600.00	7,011.44	5,935.01	5,935.01	170.42	237.40	14.50	-1,475.18	3,700.96	1,715.02	1,480.35	234.67	7.308		
12,700.00	7,011.51	5,935.01	5,935.01	173.42	237.40	14.50	-1,475.18	3,700.96	1,791.56	1,552.31	239.25	7.488		
12,800.00	7,011.59	5,935.01	5,935.01	176.41	237.40	14.50	-1,475.18	3,700.96	1,870.32	1,627.10	243.22	7.690		
12,900.00	7,011.66	5,935.01	5,935.01	179.41	237.40	14.50	-1,475.18	3,700.96	1,951.02	1,704.35	246.67	7.910		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit 23-29 - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 100-UNKNOWN													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		
13,000.00	7,011.74	5,935.01	5,935.01	182.41	237.40	14.50	-1,475.18	3,700.96	2,033.44	1,783.76	249.68	8.144		
13,100.00	7,011.81	5,935.01	5,935.01	185.41	237.40	14.50	-1,475.18	3,700.96	2,117.37	1,865.07	252.31	8.392		
13,200.00	7,011.89	5,935.01	5,935.01	188.41	237.40	14.50	-1,475.18	3,700.96	2,202.65	1,948.04	254.61	8.651		
13,300.00	7,011.97	5,935.01	5,935.01	191.41	237.40	14.50	-1,475.18	3,700.96	2,289.12	2,032.48	256.64	8.920		
13,400.00	7,012.04	5,935.01	5,935.01	194.41	237.40	14.50	-1,475.18	3,700.96	2,376.65	2,118.22	258.42	9.197		
13,500.00	7,012.12	5,935.01	5,935.01	197.41	237.40	14.50	-1,475.18	3,700.96	2,465.13	2,205.12	260.00	9.481		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit 233 - OH - OH													Offset Site Error:	0.00 ft
Survey Program: 225-UNKNOWN													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	178.07	-549.08	18.48	549.71					
100.00	100.00	81.40	81.39	0.27	1.63	178.05	-549.08	18.73	549.40	547.50	1.90	289.103		
200.00	200.00	181.24	181.24	0.63	3.63	177.94	-549.08	19.75	549.44	545.18	4.26	129.044		
300.00	300.00	281.17	281.15	0.99	6.75	177.77	-549.08	21.41	549.50	541.76	7.74	70.987		
400.00	400.00	381.17	381.14	1.35	10.76	177.59	-549.08	23.06	549.57	537.47	12.10	45.409		
500.00	500.00	481.18	481.14	1.70	14.76	177.43	-549.08	24.63	549.64	533.17	16.46	33.383		
600.00	600.00	581.19	581.14	2.06	18.76	177.28	-549.08	26.11	549.70	528.88	20.83	26.394		
700.00	700.00	681.21	681.14	2.42	22.77	177.13	-549.08	27.51	549.77	524.58	25.19	21.826		
800.00	800.00	781.21	781.14	2.78	26.77	176.99	-549.08	28.83	549.84	520.29	29.55	18.607		
900.00	900.00	881.20	881.12	3.14	30.77	176.86	-549.08	30.14	549.91	516.00	33.91	16.216		
1,000.00	1,000.00	981.19	981.10	3.50	34.77	176.72	-549.08	31.45	549.98	511.71	38.27	14.371		
1,100.00	1,099.98	1,081.15	1,081.05	3.84	38.77	-38.54	-549.08	32.76	548.69	506.08	42.61	12.876		
1,200.00	1,199.84	1,180.96	1,180.85	4.17	42.77	-39.07	-549.08	34.07	544.70	497.76	46.94	11.604		
1,300.00	1,299.45	1,280.48	1,280.36	4.51	46.75	-39.88	-549.08	35.38	538.06	486.80	51.26	10.496		
1,400.00	1,398.70	1,379.58	1,379.46	4.85	50.72	-40.99	-549.08	36.76	528.88	473.31	55.57	9.517		
1,500.00	1,497.47	1,478.15	1,478.01	5.21	54.67	-42.44	-549.08	38.22	517.31	457.44	59.87	8.640		
1,600.00	1,595.62	1,576.07	1,575.92	5.59	58.59	-44.25	-549.08	39.76	503.52	439.37	64.15	7.849		
1,700.00	1,693.06	1,673.20	1,673.04	5.98	62.47	-46.48	-549.08	41.36	487.79	419.37	68.41	7.130		
1,800.00	1,790.08	1,769.97	1,769.79	6.39	66.35	-48.77	-549.08	43.03	471.57	398.89	72.67	6.489		
1,900.00	1,887.11	1,866.85	1,866.66	6.82	70.23	-51.21	-549.08	44.65	456.15	379.19	76.95	5.928		
2,000.00	1,984.14	1,963.76	1,963.55	7.25	74.11	-53.79	-549.08	46.18	441.59	360.35	81.25	5.435		
2,100.00	2,081.17	2,060.69	2,060.48	7.69	77.99	-56.53	-549.08	47.63	427.99	342.44	85.56	5.002		
2,200.00	2,178.20	2,157.65	2,157.43	8.14	81.87	-59.43	-549.08	49.00	415.42	325.54	89.88	4.622		
2,300.00	2,275.23	2,254.51	2,254.28	8.60	85.75	-62.47	-549.08	50.29	403.98	309.77	94.21	4.288		
2,400.00	2,372.26	2,351.08	2,350.84	9.06	89.61	-65.67	-549.08	51.66	393.83	295.28	98.55	3.996		
2,500.00	2,469.29	2,447.61	2,447.36	9.53	93.48	-69.04	-549.08	53.16	385.11	282.22	102.89	3.743		
2,600.00	2,566.32	2,544.11	2,543.85	10.00	97.34	-72.56	-549.08	54.78	377.93	270.69	107.24	3.524		
2,700.00	2,663.35	2,640.89	2,640.60	10.47	101.21	-76.20	-549.08	56.47	372.36	260.76	111.60	3.337		
2,800.00	2,760.38	2,737.66	2,737.36	10.95	105.09	-79.93	-549.08	58.16	368.43	252.46	115.97	3.177		
2,900.00	2,857.41	2,834.43	2,834.12	11.43	108.96	-83.72	-549.08	59.85	366.19	245.87	120.33	3.043		
2,979.14	2,934.20	2,911.02	2,910.70	11.81	112.03	-86.75	-549.08	61.18	365.65	241.87	123.78	2.954 CC		
3,000.00	2,954.44	2,931.20	2,930.88	11.91	112.84	-87.54	-549.08	61.54	365.69	241.00	124.69	2.933		
3,100.00	3,051.47	3,027.98	3,027.64	12.39	116.71	-91.35	-549.08	63.23	366.92	237.88	129.04	2.844		
3,200.00	3,148.50	3,124.75	3,124.39	12.88	120.59	-95.13	-549.08	64.91	369.86	236.49	133.37	2.773 ES		
3,300.00	3,245.53	3,221.52	3,221.15	13.36	124.46	-98.82	-549.08	66.60	374.48	236.78	137.70	2.720 SF		
3,400.00	3,342.56	3,324.00	3,323.62	13.85	128.76	-100.05	-549.08	67.17	386.11	248.72	137.39	2.810		
3,500.00	3,439.59	3,424.00	3,423.62	14.34	132.76	-100.05	-549.08	67.17	420.56	291.54	129.02	3.260		
3,600.00	3,536.62	3,524.00	3,523.62	14.83	136.76	-100.05	-549.08	67.17	473.98	356.47	117.51	4.033		
3,700.00	3,633.65	3,624.00	3,623.62	15.32	140.76	-100.05	-549.08	67.17	540.78	434.73	106.06	5.099		
3,800.00	3,730.68	3,724.00	3,723.62	15.81	144.76	-100.05	-549.08	67.17	616.63	520.61	96.03	6.421		
3,900.00	3,827.71	3,824.00	3,823.62	16.30	148.76	-100.05	-549.08	67.17	698.59	610.89	87.69	7.966		
4,000.00	3,924.74	3,924.00	3,923.62	16.80	152.76	-100.05	-549.08	67.17	784.74	703.84	80.90	9.700		
4,100.00	4,021.77	4,024.00	4,023.62	17.29	156.76	-100.05	-549.08	67.17	873.84	798.46	75.39	11.592		
4,200.00	4,118.79	4,124.00	4,123.62	17.79	160.76	-100.05	-549.08	67.17	965.09	894.19	70.89	13.613		
4,300.00	4,215.82	4,224.00	4,223.62	18.28	164.76	-100.05	-549.08	67.17	1,057.91	990.71	67.21	15.741		
4,400.00	4,312.85	4,324.00	4,323.62	18.78	168.76	-100.05	-549.08	67.17	1,151.94	1,087.78	64.16	17.953		
4,500.00	4,409.88	4,424.00	4,423.62	19.27	172.76	-100.05	-549.08	67.17	1,246.90	1,185.27	61.63	20.232		
4,600.00	4,506.91	4,524.00	4,523.62	19.77	176.76	-100.05	-549.08	67.17	1,342.59	1,283.08	59.51	22.562		
4,700.00	4,603.94	4,624.00	4,623.62	20.27	180.76	-100.05	-549.08	67.17	1,438.87	1,381.15	57.72	24.929		
4,800.00	4,700.97	4,724.00	4,723.62	20.77	184.76	-100.05	-549.08	67.17	1,535.62	1,479.42	56.20	27.323		



Lonestar Consulting, LLC

Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit 233 - OH - OH														Offset Site Error:	0.00 ft
Survey Program: 225-UNKNOWN														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			
4,900.00	4,798.00	3,254.00	3,253.62	21.26	125.76	-100.05	-549.08	67.17	1,632.76	1,577.85	54.91	29.736			
5,000.00	4,895.03	3,254.00	3,253.62	21.76	125.76	-100.05	-549.08	67.17	1,730.23	1,676.43	53.80	32.158			
5,100.00	4,992.06	3,254.00	3,253.62	22.26	125.76	-100.05	-549.08	67.17	1,827.97	1,775.12	52.86	34.585			
5,200.00	5,089.09	3,254.00	3,253.62	22.76	125.76	-100.05	-549.08	67.17	1,925.95	1,873.91	52.04	37.010			
5,300.00	5,186.12	3,254.00	3,253.62	23.26	125.76	-100.05	-549.08	67.17	2,024.12	1,972.79	51.34	39.429			
5,400.00	5,283.15	3,254.00	3,253.62	23.76	125.76	-100.05	-549.08	67.17	2,122.46	2,071.74	50.73	41.839			
5,500.00	5,380.18	3,254.00	3,253.62	24.26	125.76	-100.05	-549.08	67.17	2,220.96	2,170.75	50.21	44.237			
5,600.00	5,477.21	3,254.00	3,253.62	24.76	125.76	-100.05	-549.08	67.17	2,319.58	2,269.82	49.75	46.620			
5,700.00	5,574.24	3,254.00	3,253.62	25.26	125.76	-100.05	-549.08	67.17	2,418.31	2,368.94	49.37	48.987			



Lonestar Consulting, LLC

Anticollision Report

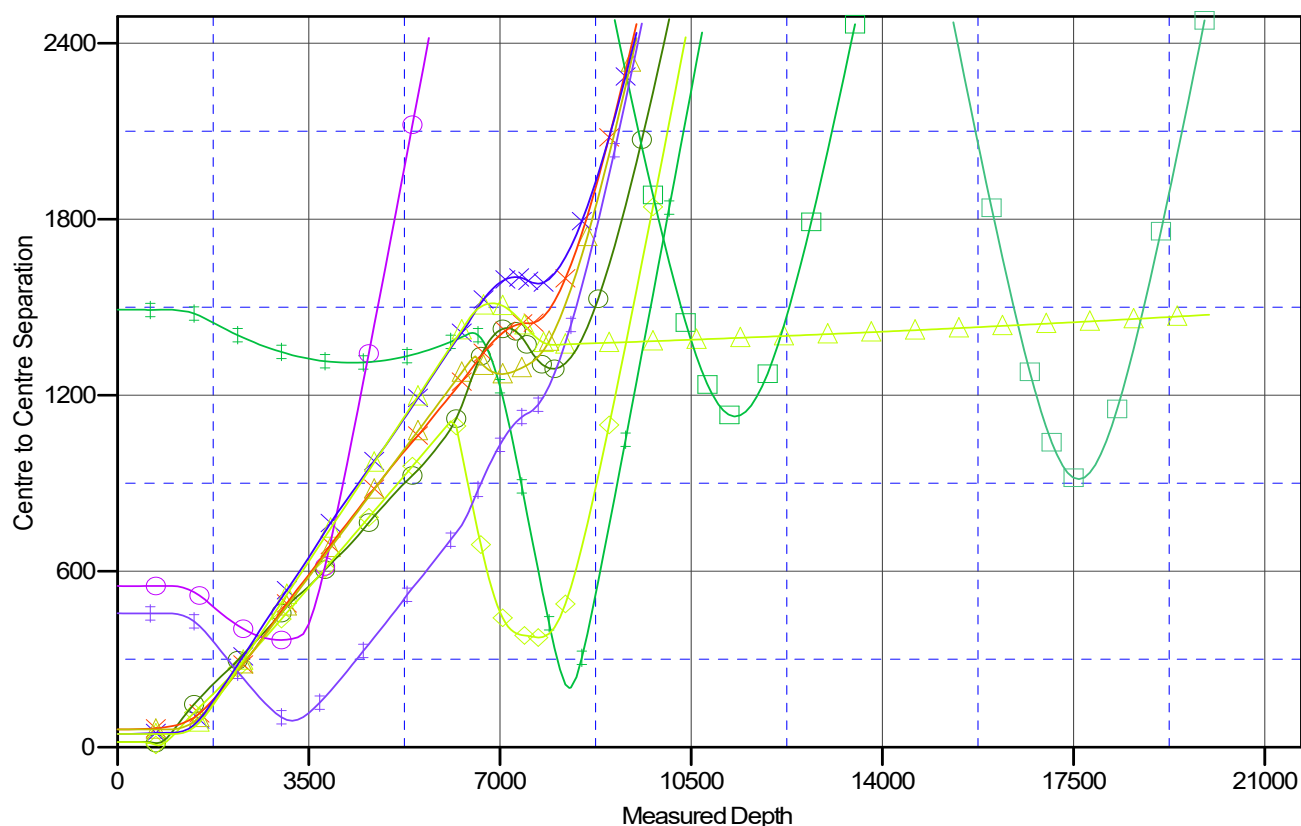


Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Reference Depths are relative to GL 6394' & RKB 24.5' @ 6418.50ft (E)
 Offset Depths are relative to Offset Datum
 Central Meridian is -107.8333334

Coordinates are relative to: Rosa Unit #664H - Slot B5 (664H)
 Coordinate System is US State Plane 1983, New Mexico Western Zone
 Grid Convergence at Surface is: 0.26°

Ladder Plot



LEGEND

Rosa Unit162C/OH/OH V0	Rosa Unit233, OH/OH V0	Rosa Unit162, OH/OH V0
Rosa Unit146, OH/OH V0	Rosa Unit23-29, OH/OH V0	Rosa Unit662H, OH/OH V0
Rosa Unit665H, OH/OH V0	Rosa Unit658H, OH/OH V0	Rosa Unit662H, OH/Plan#5 V0
Rosa Unit665H, OH/Plan#10 V0	Rosa Unit658H, OH/Plan#4 V0	



Lonestar Consulting, LLC

Anticollision Report

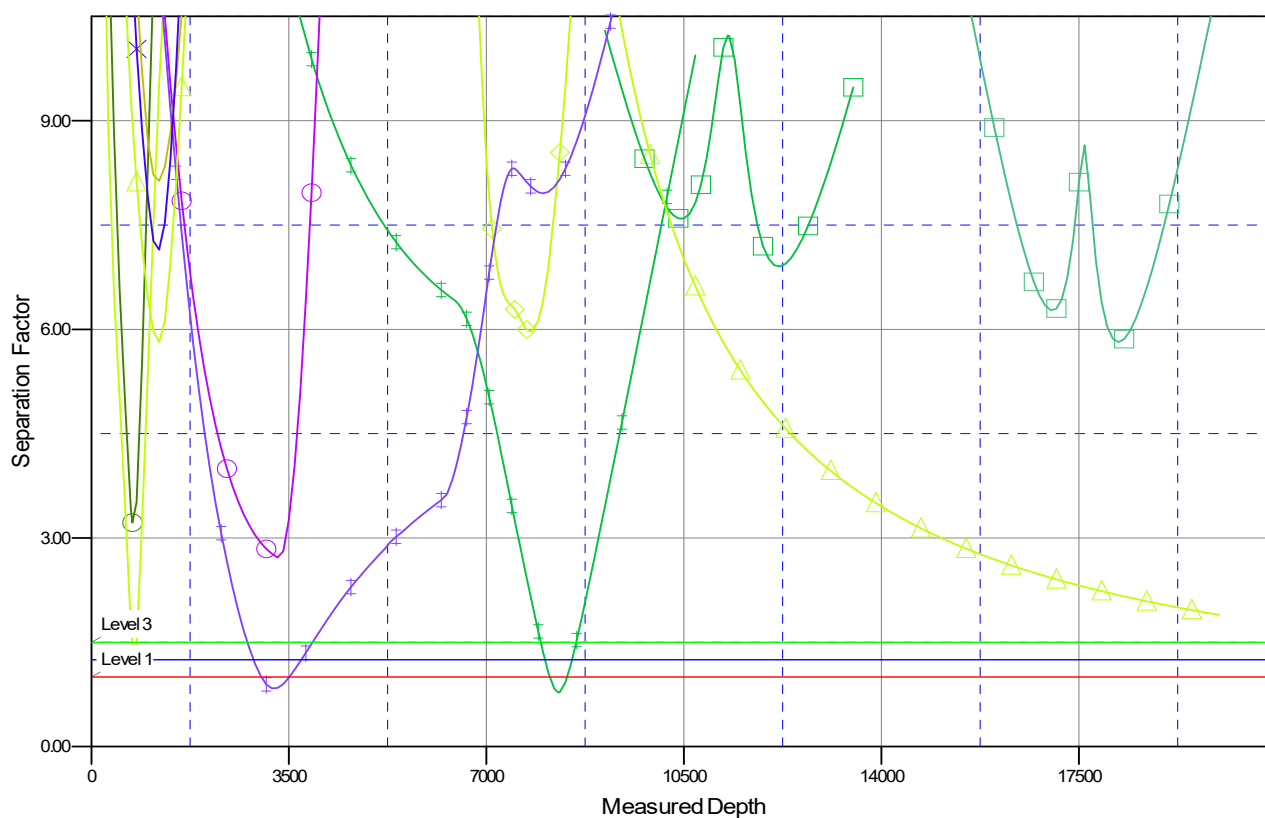


Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site Error:	0.00 ft	North Reference:	True
Reference Well:	Rosa Unit #664H	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 #5	Offset TVD Reference:	Offset Datum

Reference Depths are relative to GL 6394' & RKB 24.5' @ 6418.50ft (E)
 Offset Depths are relative to Offset Datum
 Central Meridian is -107.8333334

Coordinates are relative to: Rosa Unit #664H - Slot B5 (664H)
 Coordinate System is US State Plane 1983, New Mexico Western Zone
 Grid Convergence at Surface is: 0.26°

Separation Factor Plot



LEGEND

Rosa Unit#664H OH Plan #5 V0	Rosa Unit#665H OH Plan #4 V0	Rosa Unit#665H OH Plan #10 V0
Rosa Unit#665H OH Plan #1 V0	Rosa Unit#665H OH Plan #1 V0	Rosa Unit#665H OH Plan #1 V0
Rosa Unit#665H OH Plan #2 V0	Rosa Unit#665H OH Plan #2 V0	Rosa Unit#665H OH Plan #2 V0
Rosa Unit#665H OH Plan #3 V0	Rosa Unit#665H OH Plan #3 V0	Rosa Unit#665H OH Plan #3 V0
Rosa Unit#665H OH Plan #4 V0	Rosa Unit#665H OH Plan #4 V0	Rosa Unit#665H OH Plan #4 V0
Rosa Unit#665H OH Plan #5 V0	Rosa Unit#665H OH Plan #5 V0	Rosa Unit#665H OH Plan #5 V0
Rosa Unit#665H OH Plan #6 V0	Rosa Unit#665H OH Plan #6 V0	Rosa Unit#665H OH Plan #6 V0
Rosa Unit#665H OH Plan #7 V0	Rosa Unit#665H OH Plan #7 V0	Rosa Unit#665H OH Plan #7 V0
Rosa Unit#665H OH Plan #8 V0	Rosa Unit#665H OH Plan #8 V0	Rosa Unit#665H OH Plan #8 V0
Rosa Unit#665H OH Plan #9 V0	Rosa Unit#665H OH Plan #9 V0	Rosa Unit#665H OH Plan #9 V0
Rosa Unit#665H OH Plan #10 V0	Rosa Unit#665H OH Plan #10 V0	Rosa Unit#665H OH Plan #10 V0
Rosa Unit#665H OH Plan #11 V0	Rosa Unit#665H OH Plan #11 V0	Rosa Unit#665H OH Plan #11 V0
Rosa Unit#665H OH Plan #12 V0	Rosa Unit#665H OH Plan #12 V0	Rosa Unit#665H OH Plan #12 V0
Rosa Unit#665H OH Plan #13 V0	Rosa Unit#665H OH Plan #13 V0	Rosa Unit#665H OH Plan #13 V0
Rosa Unit#665H OH Plan #14 V0	Rosa Unit#665H OH Plan #14 V0	Rosa Unit#665H OH Plan #14 V0
Rosa Unit#665H OH Plan #15 V0	Rosa Unit#665H OH Plan #15 V0	Rosa Unit#665H OH Plan #15 V0
Rosa Unit#665H OH Plan #16 V0	Rosa Unit#665H OH Plan #16 V0	Rosa Unit#665H OH Plan #16 V0
Rosa Unit#665H OH Plan #17 V0	Rosa Unit#665H OH Plan #17 V0	Rosa Unit#665H OH Plan #17 V0
Rosa Unit#665H OH Plan #18 V0	Rosa Unit#665H OH Plan #18 V0	Rosa Unit#665H OH Plan #18 V0
Rosa Unit#665H OH Plan #19 V0	Rosa Unit#665H OH Plan #19 V0	Rosa Unit#665H OH Plan #19 V0
Rosa Unit#665H OH Plan #20 V0	Rosa Unit#665H OH Plan #20 V0	Rosa Unit#665H OH Plan #20 V0

Released to Imaging: 6/13/2022 1:51:11 PM



Company: Logos Operating LLC
Project: Rio Arriba, NM NAD83
Site: Rosa Unit 30
Well: Rosa Unit #664H
Wellbore: OH
Design: Plan #5

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 #664H

GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.00	0.00	2136125.13	2848533.64	36.8695578	-107.4044821 B5 (664H)

Plan: Plan #5 (Rosa Unit #664H/OH)

Created By: Janie Collins Date: 15:54, June 02 2022



Azimuths to True North
Magnetic North: 8.2°

Magnetic Field
Strength: 49575.0 nT
Dip Angle: 63.8°
Date: 6/2/2022
Model: HDGM2022

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
664H POE Rev 2	7007.00	-1126.80	182.19	2134999.16	2848720.90	36.8664628	-107.4038592
664H BHL Rev 2	7017.00	-1363.17	12380.05	2134817.58	2860919.67	36.8658060	-107.3621610
664H FPerf	7017.00	-1361.03	12280.00	2134819.27	2860819.61	36.8658120	-107.3625030

SECTION DETAILS

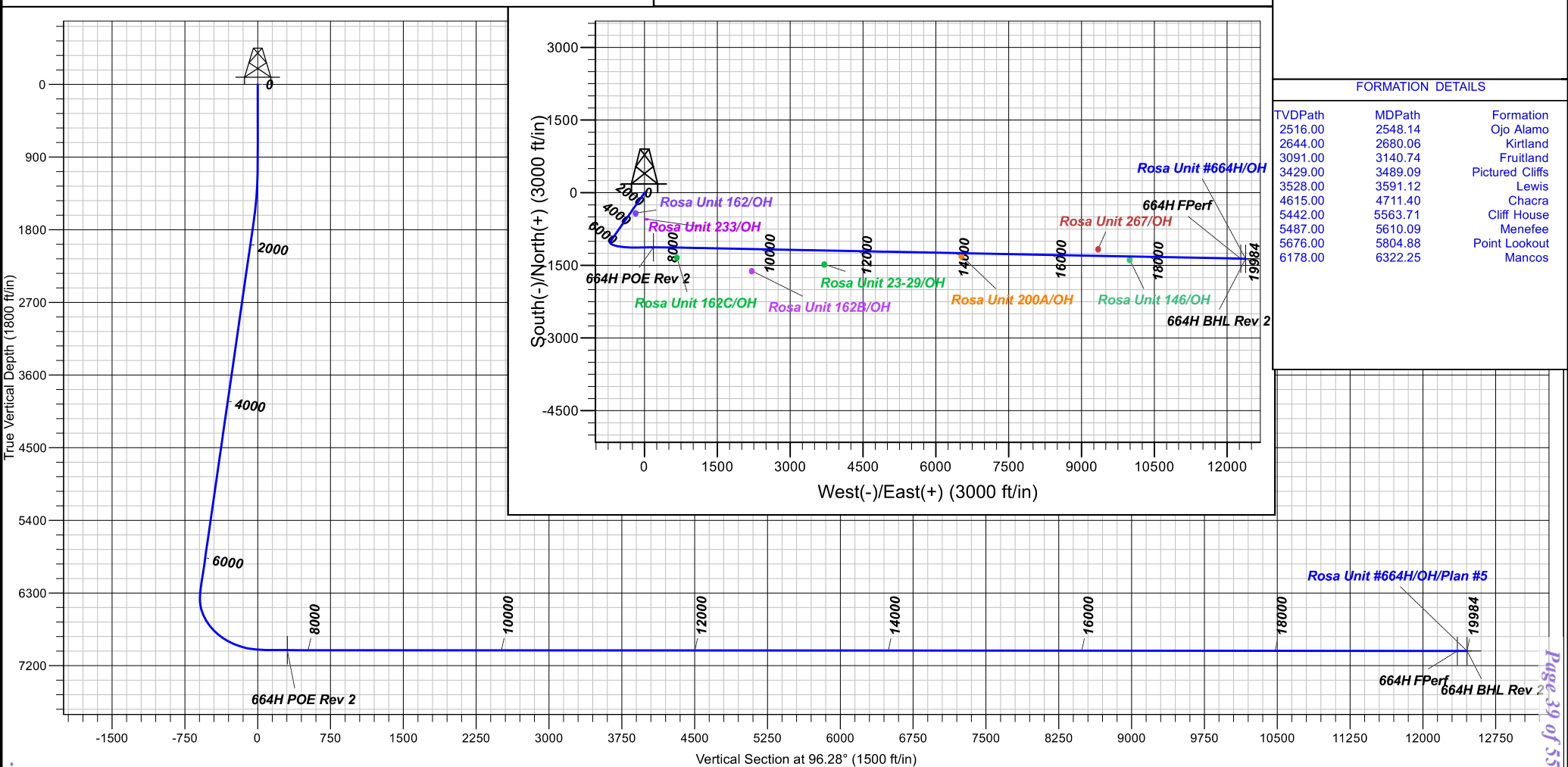
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1000.00	0.00	0.00	1000.00	0.00	0.00	0.00	0.00	0.00
1700.00	14.00	215.00	1693.06	-69.71	-48.81	2.00	215.00	-40.89
6437.00	14.00	215.00	6289.35	-1008.44	-706.12	0.00	0.00	-591.50
7520.93	89.27	88.52	7003.65	-1133.61	-80.63	9.00	-125.81	-43.93
7783.87	89.27	88.52	7007.00	-1126.80	182.19	0.00	0.00	304.43
7918.77	89.96	91.12	7007.91	-1126.38	317.08	2.00	75.24	438.45
19984.07	89.96	91.12	7017.00	-1363.17	12380.05	0.00	0.00	12454.87

CASING DETAILS

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

FORMATION DETAILS

TVDPath	MDPath	Formation
2516.00	2548.14	Ojo Alamo
2644.00	2680.06	Kirtland
3091.00	3140.74	Fruitland
3429.00	3489.09	Pictured Cliffs
3528.00	3591.12	Lewis
4615.00	4711.40	Chacra
5442.00	5563.71	Cliff House
5487.00	5610.09	Menefee
5676.00	5804.88	Point Lookout
6178.00	6322.25	Mancos





Logos Operating LLC

Rio Arriba, NM NAD83

Rosa Unit 30

Rosa Unit #664H - Slot B5 (664H)

OH

Plan: Plan #5

Standard Planning Report

02 June, 2022





Lonestar Consulting, LLC Planning Report



Database:	Grand Junction	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Company:	Logos Operating LLC	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site:	Rosa Unit 30	North Reference:	True
Well:	Rosa Unit #664H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #5		

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 30				
Site Position:		Northing:	2,136,112.13 usft	Latitude:	36.8695220
From:	Lat/Long	Easting:	2,848,540.75 usft	Longitude:	-107.4044580
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in		

Well	Rosa Unit #664H - Slot B5 (664H)					
Well Position	+N/-S	0.00 ft	Northing:	2,136,125.13 usft	Latitude:	36.8695578
	+E/-W	0.00 ft	Easting:	2,848,533.65 usft	Longitude:	-107.4044821
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	6,394.00 ft
Grid Convergence:		0.26 °				

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM2022	6/2/2022	8.58	63.32	49,575.00000000

Design	Plan #5			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	96.28

Plan Survey Tool Program	Date	6/2/2022		
Depth From (ft)	Depth To (ft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	19,984.07 Plan #5 (OH)	MWD+HDGM	
			OWSG MWD + HDGM	



Lonestar Consulting, LLC
Planning Report



Database:	Grand Junction	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Company:	Logos Operating LLC	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site:	Rosa Unit 30	North Reference:	True
Well:	Rosa Unit #664H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #5		

Plan Sections										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,700.00	14.00	215.00	1,693.06	-69.71	-48.81	2.00	2.00	0.00	215.00	
6,437.00	14.00	215.00	6,289.35	-1,008.44	-706.12	0.00	0.00	0.00	0.00	
7,520.93	89.27	88.52	7,003.65	-1,133.61	-80.63	9.00	6.94	-11.67	-125.81	
7,783.87	89.27	88.52	7,007.00	-1,126.80	182.19	0.00	0.00	0.00	0.00	664H POE Rev 2
7,918.77	89.96	91.12	7,007.91	-1,126.38	317.08	2.00	0.51	1.93	75.24	
19,984.07	89.96	91.12	7,017.00	-1,363.17	12,380.05	0.00	0.00	0.00	0.00	664H BHL Rev 2



Lonestar Consulting, LLC

Planning Report



Database:	Grand Junction	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Company:	Logos Operating LLC	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site:	Rosa Unit 30	North Reference:	True
Well:	Rosa Unit #664H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #5		

Planned Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00	
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00	
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00	
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00	
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,100.00	2.00	215.00	1,099.98	-1.43	-1.00	-0.84	2.00	2.00	0.00	
1,200.00	4.00	215.00	1,199.84	-5.72	-4.00	-3.35	2.00	2.00	0.00	
1,300.00	6.00	215.00	1,299.45	-12.86	-9.00	-7.54	2.00	2.00	0.00	
1,400.00	8.00	215.00	1,398.70	-22.84	-15.99	-13.40	2.00	2.00	0.00	
1,500.00	10.00	215.00	1,497.47	-35.65	-24.96	-20.91	2.00	2.00	0.00	
1,600.00	12.00	215.00	1,595.63	-51.28	-35.91	-30.08	2.00	2.00	0.00	
1,700.00	14.00	215.00	1,693.06	-69.71	-48.81	-40.89	2.00	2.00	0.00	
1,800.00	14.00	215.00	1,790.09	-89.52	-62.69	-52.51	0.00	0.00	0.00	
1,900.00	14.00	215.00	1,887.12	-109.34	-76.56	-64.13	0.00	0.00	0.00	
2,000.00	14.00	215.00	1,984.15	-129.16	-90.44	-75.76	0.00	0.00	0.00	
2,100.00	14.00	215.00	2,081.18	-148.98	-104.31	-87.38	0.00	0.00	0.00	
2,200.00	14.00	215.00	2,178.21	-168.79	-118.19	-99.01	0.00	0.00	0.00	
2,300.00	14.00	215.00	2,275.24	-188.61	-132.07	-110.63	0.00	0.00	0.00	
2,400.00	14.00	215.00	2,372.27	-208.43	-145.94	-122.25	0.00	0.00	0.00	
2,500.01	14.00	215.00	2,469.30	-228.24	-159.82	-133.88	0.00	0.00	0.00	
2,600.01	14.00	215.00	2,566.33	-248.06	-173.69	-145.50	0.00	0.00	0.00	
2,700.01	14.00	215.00	2,663.36	-267.88	-187.57	-157.12	0.00	0.00	0.00	
2,800.01	14.00	215.00	2,760.39	-287.70	-201.45	-168.75	0.00	0.00	0.00	
2,900.01	14.00	215.00	2,857.42	-307.51	-215.32	-180.37	0.00	0.00	0.00	
3,000.01	14.00	215.00	2,954.45	-327.33	-229.20	-192.00	0.00	0.00	0.00	
3,100.01	14.00	215.00	3,051.48	-347.15	-243.08	-203.62	0.00	0.00	0.00	
3,200.01	14.00	215.00	3,148.51	-366.96	-256.95	-215.24	0.00	0.00	0.00	
3,300.01	14.00	215.00	3,245.53	-386.78	-270.83	-226.87	0.00	0.00	0.00	
3,400.01	14.00	215.00	3,342.56	-406.60	-284.70	-238.49	0.00	0.00	0.00	
3,500.01	14.00	215.00	3,439.59	-426.42	-298.58	-250.12	0.00	0.00	0.00	
3,600.01	14.00	215.00	3,536.62	-446.23	-312.46	-261.74	0.00	0.00	0.00	
3,700.01	14.00	215.00	3,633.65	-466.05	-326.33	-273.36	0.00	0.00	0.00	
3,800.01	14.00	215.00	3,730.68	-485.87	-340.21	-284.99	0.00	0.00	0.00	
3,900.01	14.00	215.00	3,827.71	-505.68	-354.08	-296.61	0.00	0.00	0.00	
4,000.01	14.00	215.00	3,924.74	-525.50	-367.96	-308.23	0.00	0.00	0.00	
4,100.01	14.00	215.00	4,021.77	-545.32	-381.84	-319.86	0.00	0.00	0.00	
4,200.01	14.00	215.00	4,118.80	-565.14	-395.71	-331.48	0.00	0.00	0.00	
4,300.01	14.00	215.00	4,215.83	-584.95	-409.59	-343.11	0.00	0.00	0.00	
4,400.01	14.00	215.00	4,312.86	-604.77	-423.46	-354.73	0.00	0.00	0.00	
4,500.01	14.00	215.00	4,409.89	-624.59	-437.34	-366.35	0.00	0.00	0.00	
4,600.01	14.00	215.00	4,506.92	-644.40	-451.22	-377.98	0.00	0.00	0.00	
4,700.01	14.00	215.00	4,603.95	-664.22	-465.09	-389.60	0.00	0.00	0.00	
4,800.01	14.00	215.00	4,700.98	-684.04	-478.97	-401.22	0.00	0.00	0.00	
4,900.01	14.00	215.00	4,798.01	-703.86	-492.84	-412.85	0.00	0.00	0.00	
5,000.01	14.00	215.00	4,895.04	-723.67	-506.72	-424.47	0.00	0.00	0.00	
5,100.01	14.00	215.00	4,992.07	-743.49	-520.60	-436.10	0.00	0.00	0.00	



Lonestar Consulting, LLC

Planning Report



Database:	Grand Junction	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Company:	Logos Operating LLC	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site:	Rosa Unit 30	North Reference:	True
Well:	Rosa Unit #664H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #5		

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)
5,200.01	14.00	215.00	5,089.10	-763.31	-534.47	-447.72	0.00	0.00	0.00
5,300.01	14.00	215.00	5,186.13	-783.12	-548.35	-459.34	0.00	0.00	0.00
5,400.01	14.00	215.00	5,283.16	-802.94	-562.23	-470.97	0.00	0.00	0.00
5,500.01	14.00	215.00	5,380.19	-822.76	-576.10	-482.59	0.00	0.00	0.00
5,600.01	14.00	215.00	5,477.22	-842.58	-589.98	-494.21	0.00	0.00	0.00
5,700.01	14.00	215.00	5,574.25	-862.39	-603.85	-505.84	0.00	0.00	0.00
5,800.01	14.00	215.00	5,671.28	-882.21	-617.73	-517.46	0.00	0.00	0.00
5,900.01	14.00	215.00	5,768.31	-902.03	-631.61	-529.09	0.00	0.00	0.00
6,000.01	14.00	215.00	5,865.34	-921.84	-645.48	-540.71	0.00	0.00	0.00
6,100.01	14.00	215.00	5,962.37	-941.66	-659.36	-552.33	0.00	0.00	0.00
6,200.01	14.00	215.00	6,059.40	-961.48	-673.23	-563.96	0.00	0.00	0.00
6,300.01	14.00	215.00	6,156.43	-981.30	-687.11	-575.58	0.00	0.00	0.00
6,400.01	14.00	215.00	6,253.46	-1,001.11	-700.99	-587.20	0.00	0.00	0.00
6,437.00	14.00	215.00	6,289.35	-1,008.44	-706.12	-591.50	0.00	0.00	0.00
6,500.01	11.61	191.54	6,350.83	-1,020.91	-711.76	-595.75	9.00	-3.79	-37.23
6,600.01	12.96	148.73	6,448.73	-1,040.40	-707.94	-589.82	9.00	1.35	-42.82
6,700.01	19.00	123.89	6,544.93	-1,059.10	-688.56	-568.51	9.00	6.04	-24.84
6,800.01	26.72	111.79	6,637.05	-1,076.56	-654.09	-532.34	9.00	7.72	-12.10
6,900.01	35.03	104.96	6,722.83	-1,092.34	-605.39	-482.20	9.00	8.30	-6.83
7,000.01	43.58	100.51	6,800.16	-1,106.06	-543.65	-419.32	9.00	8.55	-4.45
7,100.01	52.26	97.28	6,867.12	-1,117.38	-470.39	-345.27	9.00	8.68	-3.23
7,200.01	61.00	94.74	6,922.08	-1,126.02	-387.41	-261.85	9.00	8.75	-2.54
7,300.01	69.79	92.59	6,963.68	-1,131.77	-296.77	-171.12	9.00	8.79	-2.14
7,400.01	78.60	90.68	6,990.89	-1,134.48	-200.69	-75.32	9.00	8.81	-1.91
7,500.02	87.42	88.89	7,003.04	-1,134.09	-101.53	23.20	9.00	8.82	-1.80
7,520.93	89.27	88.52	7,003.65	-1,133.61	-80.63	43.93	9.01	8.83	-1.77
7,600.02	89.27	88.52	7,004.66	-1,131.57	-1.58	122.28	0.00	0.00	0.00
7,700.02	89.27	88.52	7,005.93	-1,128.98	98.38	221.35	0.00	0.00	0.00
7,783.87	89.27	88.52	7,007.00	-1,126.80	182.19	304.43	0.00	0.00	0.00
7,800.02	89.35	88.83	7,007.19	-1,126.43	198.34	320.43	2.00	0.51	1.93
7,900.02	89.86	90.76	7,007.88	-1,126.07	298.33	419.78	2.00	0.51	1.93
7,918.77	89.96	91.12	7,007.91	-1,126.38	317.08	438.45	2.00	0.51	1.94
8,000.02	89.96	91.12	7,007.97	-1,127.98	398.31	519.37	0.00	0.00	0.00
8,100.02	89.96	91.12	7,008.05	-1,129.94	498.29	618.97	0.00	0.00	0.00
8,200.02	89.96	91.12	7,008.12	-1,131.90	598.27	718.56	0.00	0.00	0.00
8,300.02	89.96	91.12	7,008.20	-1,133.86	698.25	818.16	0.00	0.00	0.00
8,400.02	89.96	91.12	7,008.27	-1,135.83	798.23	917.75	0.00	0.00	0.00
8,500.02	89.96	91.12	7,008.35	-1,137.79	898.21	1,017.35	0.00	0.00	0.00
8,600.02	89.96	91.12	7,008.42	-1,139.75	998.20	1,116.94	0.00	0.00	0.00
8,700.02	89.96	91.12	7,008.50	-1,141.71	1,098.18	1,216.54	0.00	0.00	0.00
8,800.02	89.96	91.12	7,008.58	-1,143.68	1,198.16	1,316.13	0.00	0.00	0.00
8,900.02	89.96	91.12	7,008.65	-1,145.64	1,298.14	1,415.73	0.00	0.00	0.00
9,000.02	89.96	91.12	7,008.73	-1,147.60	1,398.12	1,515.32	0.00	0.00	0.00
9,100.02	89.96	91.12	7,008.80	-1,149.56	1,498.10	1,614.92	0.00	0.00	0.00
9,200.02	89.96	91.12	7,008.88	-1,151.53	1,598.08	1,714.51	0.00	0.00	0.00
9,300.02	89.96	91.12	7,008.95	-1,153.49	1,698.06	1,814.11	0.00	0.00	0.00
9,400.02	89.96	91.12	7,009.03	-1,155.45	1,798.04	1,913.70	0.00	0.00	0.00
9,500.02	89.96	91.12	7,009.10	-1,157.41	1,898.02	2,013.30	0.00	0.00	0.00
9,600.02	89.96	91.12	7,009.18	-1,159.38	1,998.00	2,112.89	0.00	0.00	0.00
9,700.02	89.96	91.12	7,009.25	-1,161.34	2,097.99	2,212.49	0.00	0.00	0.00
9,800.02	89.96	91.12	7,009.33	-1,163.30	2,197.97	2,312.08	0.00	0.00	0.00
9,900.02	89.96	91.12	7,009.40	-1,165.26	2,297.95	2,411.68	0.00	0.00	0.00



Lonestar Consulting, LLC

Planning Report



Database:	Grand Junction	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Company:	Logos Operating LLC	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site:	Rosa Unit 30	North Reference:	True
Well:	Rosa Unit #664H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #5		

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)
10,000.02	89.96	91.12	7,009.48	-1,167.23	2,397.93	2,511.27	0.00	0.00	0.00
10,100.02	89.96	91.12	7,009.55	-1,169.19	2,497.91	2,610.87	0.00	0.00	0.00
10,200.02	89.96	91.12	7,009.63	-1,171.15	2,597.89	2,710.46	0.00	0.00	0.00
10,300.02	89.96	91.12	7,009.71	-1,173.11	2,697.87	2,810.06	0.00	0.00	0.00
10,400.02	89.96	91.12	7,009.78	-1,175.08	2,797.85	2,909.65	0.00	0.00	0.00
10,500.02	89.96	91.12	7,009.86	-1,177.04	2,897.83	3,009.25	0.00	0.00	0.00
10,600.02	89.96	91.12	7,009.93	-1,179.00	2,997.81	3,108.84	0.00	0.00	0.00
10,700.02	89.96	91.12	7,010.01	-1,180.97	3,097.79	3,208.44	0.00	0.00	0.00
10,800.02	89.96	91.12	7,010.08	-1,182.93	3,197.78	3,308.03	0.00	0.00	0.00
10,900.02	89.96	91.12	7,010.16	-1,184.89	3,297.76	3,407.63	0.00	0.00	0.00
11,000.02	89.96	91.12	7,010.23	-1,186.85	3,397.74	3,507.22	0.00	0.00	0.00
11,100.02	89.96	91.12	7,010.31	-1,188.82	3,497.72	3,606.82	0.00	0.00	0.00
11,200.02	89.96	91.12	7,010.38	-1,190.78	3,597.70	3,706.41	0.00	0.00	0.00
11,300.02	89.96	91.12	7,010.46	-1,192.74	3,697.68	3,806.01	0.00	0.00	0.00
11,400.02	89.96	91.12	7,010.53	-1,194.70	3,797.66	3,905.61	0.00	0.00	0.00
11,500.02	89.96	91.12	7,010.61	-1,196.67	3,897.64	4,005.20	0.00	0.00	0.00
11,600.02	89.96	91.12	7,010.68	-1,198.63	3,997.62	4,104.80	0.00	0.00	0.00
11,700.02	89.96	91.12	7,010.76	-1,200.59	4,097.60	4,204.39	0.00	0.00	0.00
11,800.02	89.96	91.12	7,010.84	-1,202.55	4,197.58	4,303.99	0.00	0.00	0.00
11,900.02	89.96	91.12	7,010.91	-1,204.52	4,297.57	4,403.58	0.00	0.00	0.00
12,000.02	89.96	91.12	7,010.99	-1,206.48	4,397.55	4,503.18	0.00	0.00	0.00
12,100.02	89.96	91.12	7,011.06	-1,208.44	4,497.53	4,602.77	0.00	0.00	0.00
12,200.02	89.96	91.12	7,011.14	-1,210.40	4,597.51	4,702.37	0.00	0.00	0.00
12,300.02	89.96	91.12	7,011.21	-1,212.37	4,697.49	4,801.96	0.00	0.00	0.00
12,400.03	89.96	91.12	7,011.29	-1,214.33	4,797.47	4,901.56	0.00	0.00	0.00
12,500.03	89.96	91.12	7,011.36	-1,216.29	4,897.45	5,001.15	0.00	0.00	0.00
12,600.03	89.96	91.12	7,011.44	-1,218.25	4,997.43	5,100.75	0.00	0.00	0.00
12,700.03	89.96	91.12	7,011.51	-1,220.22	5,097.41	5,200.34	0.00	0.00	0.00
12,800.03	89.96	91.12	7,011.59	-1,222.18	5,197.39	5,299.94	0.00	0.00	0.00
12,900.03	89.96	91.12	7,011.66	-1,224.14	5,297.37	5,399.53	0.00	0.00	0.00
13,000.03	89.96	91.12	7,011.74	-1,226.10	5,397.36	5,499.13	0.00	0.00	0.00
13,100.03	89.96	91.12	7,011.81	-1,228.07	5,497.34	5,598.72	0.00	0.00	0.00
13,200.03	89.96	91.12	7,011.89	-1,230.03	5,597.32	5,698.32	0.00	0.00	0.00
13,300.03	89.96	91.12	7,011.97	-1,231.99	5,697.30	5,797.91	0.00	0.00	0.00
13,400.03	89.96	91.12	7,012.04	-1,233.95	5,797.28	5,897.51	0.00	0.00	0.00
13,500.03	89.96	91.12	7,012.12	-1,235.92	5,897.26	5,997.10	0.00	0.00	0.00
13,600.03	89.96	91.12	7,012.19	-1,237.88	5,997.24	6,096.70	0.00	0.00	0.00
13,700.03	89.96	91.12	7,012.27	-1,239.84	6,097.22	6,196.29	0.00	0.00	0.00
13,800.03	89.96	91.12	7,012.34	-1,241.81	6,197.20	6,295.89	0.00	0.00	0.00
13,900.03	89.96	91.12	7,012.42	-1,243.77	6,297.18	6,395.48	0.00	0.00	0.00
14,000.03	89.96	91.12	7,012.49	-1,245.73	6,397.16	6,495.08	0.00	0.00	0.00
14,100.03	89.96	91.12	7,012.57	-1,247.69	6,497.15	6,594.67	0.00	0.00	0.00
14,200.03	89.96	91.12	7,012.64	-1,249.66	6,597.13	6,694.27	0.00	0.00	0.00
14,300.03	89.96	91.12	7,012.72	-1,251.62	6,697.11	6,793.86	0.00	0.00	0.00
14,400.03	89.96	91.12	7,012.79	-1,253.58	6,797.09	6,893.46	0.00	0.00	0.00
14,500.03	89.96	91.12	7,012.87	-1,255.54	6,897.07	6,993.05	0.00	0.00	0.00
14,600.03	89.96	91.12	7,012.94	-1,257.51	6,997.05	7,092.65	0.00	0.00	0.00
14,700.03	89.96	91.12	7,013.02	-1,259.47	7,097.03	7,192.24	0.00	0.00	0.00
14,800.03	89.96	91.12	7,013.10	-1,261.43	7,197.01	7,291.84	0.00	0.00	0.00
14,900.03	89.96	91.12	7,013.17	-1,263.39	7,296.99	7,391.43	0.00	0.00	0.00
15,000.03	89.96	91.12	7,013.25	-1,265.36	7,396.97	7,491.03	0.00	0.00	0.00
15,100.03	89.96	91.12	7,013.32	-1,267.32	7,496.95	7,590.62	0.00	0.00	0.00



Lonestar Consulting, LLC

Planning Report



Database:	Grand Junction	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Company:	Logos Operating LLC	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site:	Rosa Unit 30	North Reference:	True
Well:	Rosa Unit #664H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #5		

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)
15,200.03	89.96	91.12	7,013.40	-1,269.28	7,596.94	7,690.22	0.00	0.00	0.00
15,300.03	89.96	91.12	7,013.47	-1,271.24	7,696.92	7,789.81	0.00	0.00	0.00
15,400.03	89.96	91.12	7,013.55	-1,273.21	7,796.90	7,889.41	0.00	0.00	0.00
15,500.03	89.96	91.12	7,013.62	-1,275.17	7,896.88	7,989.00	0.00	0.00	0.00
15,600.03	89.96	91.12	7,013.70	-1,277.13	7,996.86	8,088.60	0.00	0.00	0.00
15,700.03	89.96	91.12	7,013.77	-1,279.09	8,096.84	8,188.19	0.00	0.00	0.00
15,800.03	89.96	91.12	7,013.85	-1,281.06	8,196.82	8,287.79	0.00	0.00	0.00
15,900.03	89.96	91.12	7,013.92	-1,283.02	8,296.80	8,387.38	0.00	0.00	0.00
16,000.03	89.96	91.12	7,014.00	-1,284.98	8,396.78	8,486.98	0.00	0.00	0.00
16,100.03	89.96	91.12	7,014.07	-1,286.94	8,496.76	8,586.57	0.00	0.00	0.00
16,200.03	89.96	91.12	7,014.15	-1,288.91	8,596.74	8,686.17	0.00	0.00	0.00
16,300.03	89.96	91.12	7,014.23	-1,290.87	8,696.73	8,785.76	0.00	0.00	0.00
16,400.03	89.96	91.12	7,014.30	-1,292.83	8,796.71	8,885.36	0.00	0.00	0.00
16,500.03	89.96	91.12	7,014.38	-1,294.79	8,896.69	8,984.95	0.00	0.00	0.00
16,600.03	89.96	91.12	7,014.45	-1,296.76	8,996.67	9,084.55	0.00	0.00	0.00
16,700.03	89.96	91.12	7,014.53	-1,298.72	9,096.65	9,184.14	0.00	0.00	0.00
16,800.03	89.96	91.12	7,014.60	-1,300.68	9,196.63	9,283.74	0.00	0.00	0.00
16,900.03	89.96	91.12	7,014.68	-1,302.65	9,296.61	9,383.33	0.00	0.00	0.00
17,000.03	89.96	91.12	7,014.75	-1,304.61	9,396.59	9,482.93	0.00	0.00	0.00
17,100.03	89.96	91.12	7,014.83	-1,306.57	9,496.57	9,582.52	0.00	0.00	0.00
17,200.03	89.96	91.12	7,014.90	-1,308.53	9,596.55	9,682.12	0.00	0.00	0.00
17,300.03	89.96	91.12	7,014.98	-1,310.50	9,696.53	9,781.71	0.00	0.00	0.00
17,400.04	89.96	91.12	7,015.05	-1,312.46	9,796.52	9,881.31	0.00	0.00	0.00
17,500.04	89.96	91.12	7,015.13	-1,314.42	9,896.50	9,980.90	0.00	0.00	0.00
17,600.04	89.96	91.12	7,015.20	-1,316.38	9,996.48	10,080.50	0.00	0.00	0.00
17,700.04	89.96	91.12	7,015.28	-1,318.35	10,096.46	10,180.09	0.00	0.00	0.00
17,800.04	89.96	91.12	7,015.35	-1,320.31	10,196.44	10,279.69	0.00	0.00	0.00
17,900.04	89.96	91.12	7,015.43	-1,322.27	10,296.42	10,379.28	0.00	0.00	0.00
18,000.04	89.96	91.12	7,015.51	-1,324.23	10,396.40	10,478.88	0.00	0.00	0.00
18,100.04	89.96	91.12	7,015.58	-1,326.20	10,496.38	10,578.48	0.00	0.00	0.00
18,200.04	89.96	91.12	7,015.66	-1,328.16	10,596.36	10,678.07	0.00	0.00	0.00
18,300.04	89.96	91.12	7,015.73	-1,330.12	10,696.34	10,777.67	0.00	0.00	0.00
18,400.04	89.96	91.12	7,015.81	-1,332.08	10,796.32	10,877.26	0.00	0.00	0.00
18,500.04	89.96	91.12	7,015.88	-1,334.05	10,896.31	10,976.86	0.00	0.00	0.00
18,600.04	89.96	91.12	7,015.96	-1,336.01	10,996.29	11,076.45	0.00	0.00	0.00
18,700.04	89.96	91.12	7,016.03	-1,337.97	11,096.27	11,176.05	0.00	0.00	0.00
18,800.04	89.96	91.12	7,016.11	-1,339.93	11,196.25	11,275.64	0.00	0.00	0.00
18,900.04	89.96	91.12	7,016.18	-1,341.90	11,296.23	11,375.24	0.00	0.00	0.00
19,000.04	89.96	91.12	7,016.26	-1,343.86	11,396.21	11,474.83	0.00	0.00	0.00
19,100.04	89.96	91.12	7,016.33	-1,345.82	11,496.19	11,574.43	0.00	0.00	0.00
19,200.04	89.96	91.12	7,016.41	-1,347.78	11,596.17	11,674.02	0.00	0.00	0.00
19,300.04	89.96	91.12	7,016.48	-1,349.75	11,696.15	11,773.62	0.00	0.00	0.00
19,400.04	89.96	91.12	7,016.56	-1,351.71	11,796.13	11,873.21	0.00	0.00	0.00
19,500.04	89.96	91.12	7,016.64	-1,353.67	11,896.11	11,972.81	0.00	0.00	0.00
19,600.04	89.96	91.12	7,016.71	-1,355.64	11,996.10	12,072.40	0.00	0.00	0.00
19,700.04	89.96	91.12	7,016.79	-1,357.60	12,096.08	12,172.00	0.00	0.00	0.00
19,800.04	89.96	91.12	7,016.86	-1,359.56	12,196.06	12,271.59	0.00	0.00	0.00
19,900.04	89.96	91.12	7,016.94	-1,361.52	12,296.04	12,371.19	0.00	0.00	0.00
19,984.07	89.96	91.12	7,017.00	-1,363.17	12,380.05	12,454.87	0.00	0.00	0.00



Lonestar Consulting, LLC

Planning Report



Database:	Grand Junction	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Company:	Logos Operating LLC	TVD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6394' & RKB 24.5' @ 6418.50ft (Ensign T223)
Site:	Rosa Unit 30	North Reference:	True
Well:	Rosa Unit #664H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #5		

Design Targets									
Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
664H POE Rev 2 - plan hits target center - Point	0.00	0.00	7,007.00	-1,126.80	182.19	2,134,999.16	2,848,720.90	36.8664627	-107.4038593
664H FPerf - plan misses target center by 0.19ft at 19884.00ft MD (7016.92 TVD, -1361.21 N, 12280.00 E) - Point	0.00	0.00	7,017.00	-1,361.03	12,280.00	2,134,819.26	2,860,819.62	36.8658120	-107.3625030
664H BHL Rev 2 - plan hits target center - Point	0.00	0.00	7,017.00	-1,363.17	12,380.05	2,134,817.57	2,860,919.67	36.8658060	-107.3621610

Formations					
Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,548.14	2,516.00	Ojo Alamo		0.00	0.00
2,680.06	2,644.00	Kirtland		0.00	0.00
3,140.74	3,091.00	Fruitland		0.00	0.00
3,489.09	3,429.00	Pictured Cliffs		0.00	0.00
3,591.12	3,528.00	Lewis		0.00	0.00
4,711.40	4,615.00	Chacra		0.00	0.00
5,563.71	5,442.00	Cliff House		0.00	0.00
5,610.09	5,487.00	Menefee		0.00	0.00
5,804.88	5,676.00	Point Lookout		0.00	0.00
6,322.25	6,178.00	Mancos		0.00	0.00

Plan Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,000.00	1,000.00	0.00	0.00	Start Build 2.00
1,700.00	1,693.06	-69.71	-48.81	Start 4737.00 hold at 1700.00 MD
6,437.00	6,289.35	-1,008.44	-706.12	Start DLS 9.00 TFO -125.81
7,520.93	7,003.65	-1,133.61	-80.63	Start 262.93 hold at 7520.93 MD
7,783.87	7,007.00	-1,126.80	182.19	POE @ 7783' MD
7,783.87	7,007.00	-1,126.80	182.20	36.8664628 / -107.4038592
7,918.77	7,007.91	-1,126.38	317.08	Start 12065.30 hold at 7918.77 MD
19,884.00	7,016.92	-1,361.21	12,280.00	First Perf @ 19,884' MD
19,884.00	7,016.92	-1,361.21	12,280.00	36.8658115 / -107.3625030
19,984.07	7,017.00	-1,363.17	12,380.05	TD at 19984.07



LOGOS Operating, LLC Operations Plan

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

Date:	June 2, 2022	Pool:	Basin Mancos
Well Name:	Rosa Unit 664H	GL Elevation:	6,394'
Surface Location:	Sec 30, T31N, R5W 2260 FSL, 966 FWL (36.869558° N, 107.404482° W – NAD83)	Measured Depth:	19,984' (KB)
Bottom Hole Location:	Sec 28, T31N, R5W 893 FSL, 1028 FEL (36.865806° N, 107.362161° W – NAD83)	County:	Rio Arriba

Lease Serial # NMSF0078764, CA Serial # NMNM78407E

I. GEOLOGY

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

NAME	MD	TVD	NAME	MD	TVD
OJO ALAMO	2,522'	2,491'	*POINT LOOKOUT	5,796'	5,667'
KIRTLAND	2,654'	2,619'	*MANCOS	6,296'	6,153'
*FRUITLAND	3,129'	3,080'	KICKOFF POINT	6,412'	6,265'
*PICTURED CLIFFS	3,468'	3,409'	LANDING POINT	7,495'	6,979'
LEWIS	3,565'	3,503'			
CHACRA	4,686'	4,590'			
*CLIFF HOUSE	5,538'	5,417'			
MENEFEE	5,587'	5,465'	TD (KB)	19,984'	7,017'

* 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 8-3/4" curve and lateral portion of the wellbore. Treat for lost circulation as necessary. Obtain 100% returns prior to cementing. Notify Engineering of any mud losses. Mud weights of 8.8-13 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 664H



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:** 7017' TVD x 0.43 = 3017 psi

III. MATERIALS

A. CASING EQUIPMENT:

CASING TYPE	OH SIZE (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"	6,371'	9.625"	43.5 LBS	N-80, L-80, P-110	LTC/BTC
PRODUCTION	8.5"	19,984'	5.5"	20 LBS	P-110 or equiv	LTC/BTC

NOTE: All casing depths are approximate, based on GL elevation 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 RSI (Sliding Sleeve) positioned inside the applicable production area. Centralizer program will be determined by wellbore conditions. Production casing to be pressure tested during completion operations with frac stack installed.

C. CEMENTING:

ROSA UNIT 664H



(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 cuf/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 (ft ³ /ft) Annular Capacity	Excess (30%)	Total (ft ³)	Total (bbl)	Slurry Yield (ft ³ /sk)	Sacks Cement	Density (PPG)
Stage 1 Tail	5,896	475	0.31318	1.3	211	38	1.15	183	15.8
Stage 1 Lead	4,737	1,159	0.31318	1.3	472	84	2.30	205	12.3
					683	122		389	
Stage 2 Tail	3,748	989	0.31318	1.3	403	72	1.50	268	13.5
Stage 2 Lead	3,181	567	0.31318	1.3	231	41	2.30	100	12.3
					634	113		369	
Stage 3 Tail	2,501	680	0.31318	1.3	277	49	1.99	139	12.8
Stage 3 Lead	320	2,181	0.31318	1.3	888	158	2.53	351	12
Stage 3 Lead	-	320	0.36268	1	116	21	2.53	46	12
					1,281	228		536	
All Stage Totals					2,597	463		1,293	

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 (ft ³ /ft) Annular Capacity	Excess (15%)	Total (ft ³)	Total (bbl)	Slurry Yield (ft ³ /sk)	Sacks Cement	Density (PPG)
Cased Lead	6,271	100	0.2531	1	25	5	1.56	16	13
Open Hole Lead	6,371	13,613	0.2291	1.15	3,597	641	1.56	2,306	13
					3,622	645		2,322	

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. With frac stack installed on wellhead, pressure test 5-1/2" casing to ~1550 psi (0.22 psi/ft * 7,017' 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.

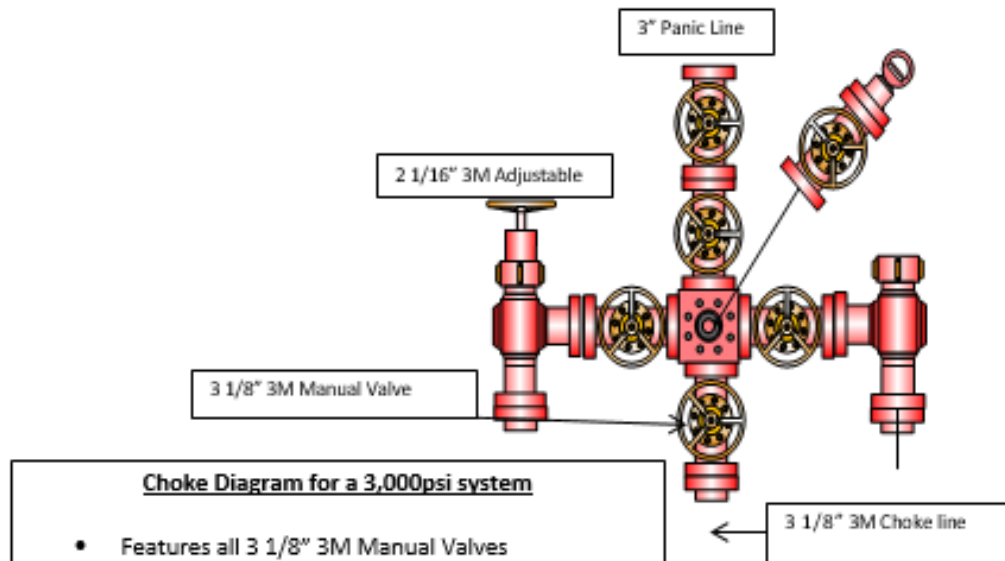
E. PRODUCTION TUBING

2-7/8", 6.5#, J-55, EUE tubing will be run once volumes and pressures dictate.

*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.

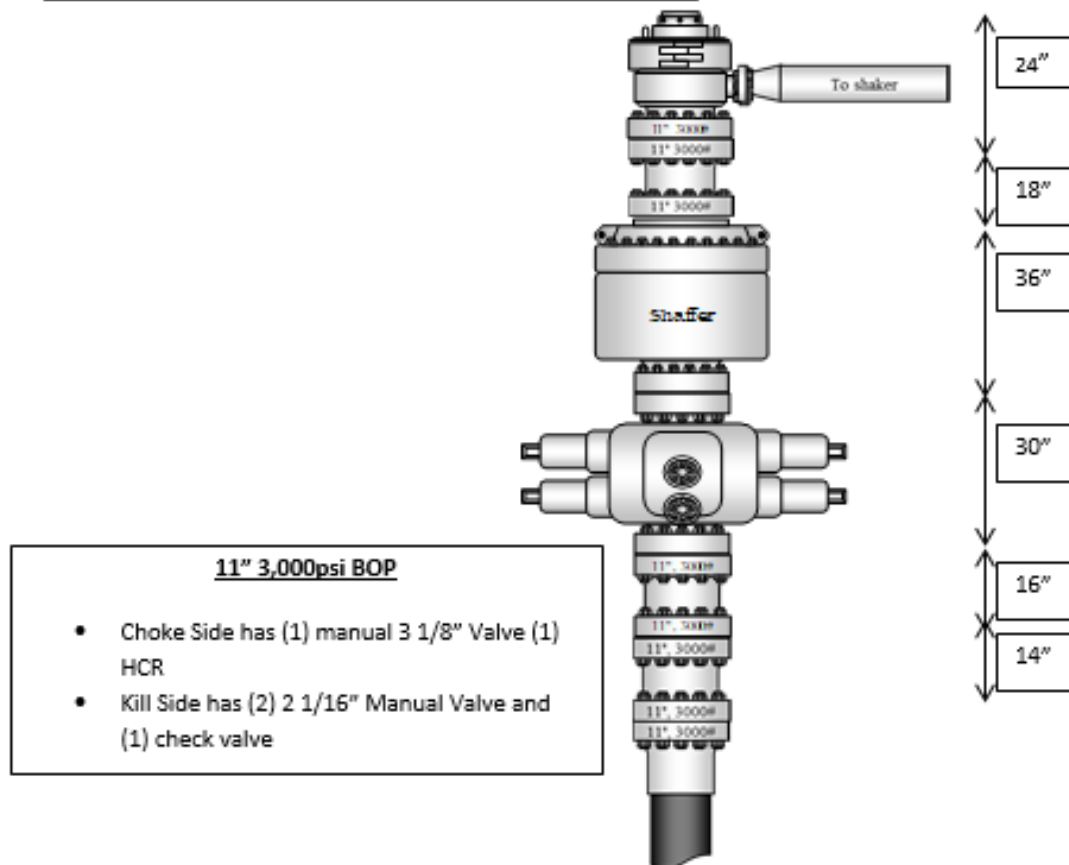


3M 11" B.O.P.E Diagram



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 664H

Well Name: ROSA UNIT	Well Location: T31N / R05W / SEC 30 / NESW / 36.869558 / -107.404482	County or Parish/State: RIO ARRIBA / NM
Well Number: 664H	Type of Well: CONVENTIONAL GAS WELL	Allottee or Tribe Name:
Lease Number: NMSF0078764	Unit or CA Name:	Unit or CA Number: NMNM078407E
US Well Number: 300393141800X1	Well Status: Drilling Well	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: JUN 07, 2022 10:40 AM
Name: LOGOS OPERATING LLC	
Title: Regulatory Specialist	
Street Address: 2010 AFTON PLACE	
City: Farmington	State: NM
Phone: (505) 324-4154	
Email address: ETRUJILLO@LOGOSRESOURCESLLC.COM	

Field

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

BLM Point of Contact

BLM POC Name: KENNETH G RENNICK	BLM POC Title: Petroleum Engineer
BLM POC Phone: 5055647742	BLM POC Email Address: krennick@blm.gov
Disposition: Approved	Disposition Date: 06/07/2022
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 115734

CONDITIONS

Operator: LOGOS OPERATING, LLC 2010 Afton Place Farmington, NM 87401	OGRID: 289408
	Action Number: 115734
	Action Type: [C-103] NOI Change of Plans (C-103A)

CONDITIONS

Created By	Condition	Condition Date
kpickford	Adhere to previous NMOCD Conditions of Approval	6/13/2022