

Form 3160-3
(June 2015)UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

FORM APPROVED
OMB No. 1004-0137
Expires: January 31, 2018

1a. Type of work: ☒ DRILL ☐ REENTER		5. Lease Serial No. NMSF0078764
1b. Type of Well: ☐ Oil Well ☒ Gas Well ☐ Other		6. If Indian, Allottee or Tribe Name
1c. Type of Completion: ☐ Hydraulic Fracturing ☒ Single Zone ☐ Multiple Zone		7. If Unit or CA Agreement, Name and No. NMMN 078407E
2. Name of Operator LOGOS OPERATING LLC		8. Lease Name and Well No. ROSA UNIT
3a. Address 2010 AFTON PLACE, FARMINGTON, NM 87401		9. API Well No. 30-039-31418
3b. Phone No. (include area code) (505) 278-8720		10. Field and Pool, or Exploratory BASIN/BASIN MANCOS
4. Location of Well (Report location clearly and in accordance with any State requirements. *) At surface NESW / 2260 FSL / 966 FWL / LAT 36.869558 / LONG -107.404482 At proposed prod. zone SESW / 922 FSL / 2612 FWL / LAT 36.865895 / LONG -107.367746		11. Sec., T. R. M. or Blk. and Survey or Area SEC 30/T31N/R05W/NMP
14. Distance in miles and direction from nearest town or post office* 38 miles		12. County or Parish RIO ARRIBA
15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any) 922 feet		13. State NM
16. No of acres in lease 872.79		17. Spacing Unit dedicated to this well
18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft. 9 feet		20. BLM/BIA Bond No. in file FED: NMB001821
21. Elevations (Show whether DF, KDB, RT, GL, etc.) 6394 feet		22. Approximate date work will start* 09/01/2021
		23. Estimated duration 45 days
24. Attachments		

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

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

25. Signature (Electronic Submission)	Name (Printed/Typed) ETTA TRUJILLO / Ph: (505) 324-4145	Date 08/27/2021
Title Regulatory Specialist		
Approved by (Signature) (Electronic Submission)	Name (Printed/Typed) DAVE J MANKIEWICZ / Ph: (505) 564-7761	Date 03/18/2022
Title AFM-Minerals		
Office Farmington Field Office		

Application approval does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Conditions of approval, if any, are attached.

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

APPROVED WITH CONDITIONS

(Continued on page 2)

*(Instructions on page 2)

State of New Mexico
Energy, Minerals and Natural Resources Department

Submit Electronically
Via E-permitting

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

NATURAL GAS MANAGEMENT PLAN

This Natural Gas Management Plan must be submitted with each Application for Permit to Drill (APD) for a new or recompleted well.

Section 1 – Plan Description Effective May 25, 2021

I. Operator: LOGOS Operating, LLC **OGRID:** 289408 **Date:** 08 / 26 / 2021

II. Type: ☒ Original ☐ Amendment due to ☐ 19.15.27.9.D(6)(a) NMAC ☐ 19.15.27.9.D(6)(b) NMAC ☐ Other.

If Other, please describe: _____

III. Well(s): Provide the following information for each new or recompleted well or set of wells proposed to be drilled or proposed to be recompleted from a single well pad or connected to a central delivery point.

Well Name	API	ULSTR	Footages	Anticipated Oil BBL/D	Anticipated Gas MCF/D	Anticipated Produced Water BBL/D
Rosa Unit 664H	30-039-	K 30 T31N R5W	2260FSL 966FWL	N/A	12,462	2,400
Rosa Unit 662H	30-039-	K 30 T31N R5W	2300FSL 946FWL	N/A	12,462	2,400
Rosa Unit 665H	30-039-31358	K 30 T31N R5W	2247FSL 973FWL	N/A	10,865	1,800
Rosa Unit 658H	30-039-	K 30 T31N R5W	2317FSL 947FWL	N/A	10,865	1,800

IV. Central Delivery Point Name: A-59 [See 19.15.27.9(D)(1) NMAC]

V. Anticipated Schedule: Provide the following information for each new or recompleted well or set of wells proposed to be drilled or proposed to be recompleted from a single well pad or connected to a central delivery point.

Well Name	API	Spud Date	TD Reached Date	Completion Commencement Date	Initial Flow Back Date	First Production Date
Rosa Unit 664H	30-039-	2022	Pending	Pending	Pending	Pending
Rosa Unit 662H	30-039-	2022	Pending	Pending	Pending	Pending
Rosa Unit 665H	30-039-31358	8/25/2021	Pending	Pending	Pending	Pending
Rosa Unit 658H	30-039-	2022	Pending	Pending	Pending	Pending

VI. Separation Equipment: ☒ Attach a complete description of how Operator will size separation equipment to optimize gas capture.

VII. Operational Practices: ☒ Attach a complete description of the actions Operator will take to comply with the requirements of Subsection A through F of 19.15.27.8 NMAC.

VIII. Best Management Practices: ☒ Attach a complete description of Operator's best management practices to minimize venting during active and planned maintenance.

Section 3 - Certifications

Effective May 25, 2021

Operator certifies that, after reasonable inquiry and based on the available information at the time of submittal:

☒ Operator will be able to connect the well(s) to a natural gas gathering system in the general area with sufficient capacity to transport one hundred percent of the anticipated volume of natural gas produced from the well(s) commencing on the date of first production, taking into account the current and anticipated volumes of produced natural gas from other wells connected to the pipeline gathering system; or

☐ Operator will not be able to connect to a natural gas gathering system in the general area with sufficient capacity to transport one hundred percent of the anticipated volume of natural gas produced from the well(s) commencing on the date of first production, taking into account the current and anticipated volumes of produced natural gas from other wells connected to the pipeline gathering system.

If Operator checks this box, Operator will select one of the following:

Well Shut-In. ☐ Operator will shut-in and not produce the well until it submits the certification required by Paragraph (4) of Subsection D of 19.15.27.9 NMAC; or

Venting and Flaring Plan. ☐ Operator has attached a venting and flaring plan that evaluates and selects one or more of the potential alternative beneficial uses for the natural gas until a natural gas gathering system is available, including:

- (a) power generation on lease;
- (b) power generation for grid;
- (c) compression on lease;
- (d) liquids removal on lease;
- (e) reinjection for underground storage;
- (f) reinjection for temporary storage;
- (g) reinjection for enhanced oil recovery;
- (h) fuel cell production; and
- (i) other alternative beneficial uses approved by the division.

Section 4 - Notices

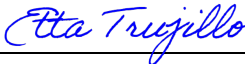
1. If, at any time after Operator submits this Natural Gas Management Plan and before the well is spud:

(a) Operator becomes aware that the natural gas gathering system it planned to connect the well(s) to has become unavailable or will not have capacity to transport one hundred percent of the production from the well(s), no later than 20 days after becoming aware of such information, Operator shall submit for OCD's approval a new or revised venting and flaring plan containing the information specified in Paragraph (5) of Subsection D of 19.15.27.9 NMAC; or

(b) Operator becomes aware that it has, cumulatively for the year, become out of compliance with its baseline natural gas capture rate or natural gas capture requirement, no later than 20 days after becoming aware of such information, Operator shall submit for OCD's approval a new or revised Natural Gas Management Plan for each well it plans to spud during the next 90 days containing the information specified in Paragraph (2) of Subsection D of 19.15.27.9 NMAC, and shall file an update for each Natural Gas Management Plan until Operator is back in compliance with its baseline natural gas capture rate or natural gas capture requirement.

2. OCD may deny or conditionally approve an APD if Operator does not make a certification, fails to submit an adequate venting and flaring plan which includes alternative beneficial uses for the anticipated volume of natural gas produced, or if OCD determines that Operator will not have adequate natural gas takeaway capacity at the time a well will be spud.

I certify that, after reasonable inquiry, the statements in and attached to this Natural Gas Management Plan are true and correct to the best of my knowledge and acknowledge that a false statement may be subject to civil and criminal penalties under the Oil and Gas Act.

Signature:	
Printed Name:	Etta Trujillo
Title:	Regulatory Specialist
E-mail Address:	etrujillo@logosresourcesllc.com
Date:	08/26/2021
Phone:	(505) 324-4154
OIL CONSERVATION DIVISION (Only applicable when submitted as a standalone form)	
Approved By:	
Title:	
Approval Date:	
Conditions of Approval:	

LOGOS Operating, LLC

VI. Separation Equipment

The operator will select separation equipment for the maximum anticipated throughput and pressure to optimize gas capture. Separation equipment is sized according to manufacturer's design specifications. Separation vessels are built following the A.S.M.E. section VII division 1 codes for pressure vessel design, fabrication, inspection, testing and certification. Anticipated well pressures and production rates are evaluated to select separation equipment according to the equipment's designed operating pressure and throughput.

After completion, the operator utilizes flowback equipment, including separators, to manage wellbore fluids and solids during the initial separation period. After the initial flowback period is complete the operator utilizes iterative facility separation equipment to ensure that optimal separation is achieved.

VII. Operational Practices 19.15.27.8 NMAC A through F

- A. The operator will maximize the recovery of natural gas and minimize the amount of gas vented or flared when technically and safely feasible as further described and detailed within the following subsections (B-F of 19.15.27.8). In all cases where natural gas venting and flaring requires regulatory reporting, reporting will be submitted accurately and within the required time frames.
- B. Venting and flaring during drilling operations:
 - a. New Drill HZ Gas Wells: The operator drills wells in the area by utilizing a balanced mud to safely drill the wellbore. This technique prevents gas from coming to surface during the drilling process. If there is an emergency or malfunction and natural gas does come to surface the natural gas will be captured and routed to sales if technically and safely feasible.
- C. Venting and flaring during completion or recompletion operations:
 - a. New Drill HZ Gas Wells: The operator's facilities are designed to handle the maximum throughput and pressures from the newly drilled and completed wellbores. The amount of gas vented and flared will be minimized when technically and safely feasible. During initial flowback and initial separation flowback the operator will utilize contracted flowback equipment, including separators, to manage wellbore fluids and solids. The initial flowback period will be minimized and flow will be sent to separation equipment as soon as possible to reduce the amount of gas that is vented to atmosphere. The natural gas will be utilized on site as needed for fuel gas and natural gas will be sold.
- D. Venting and flaring during production operations:
 - a. New Drill HZ Gas Wells: The operator's facilities are designed to handle the maximum throughput and pressures from producing wellbores. The amount of gas vented and flared will be minimized when technically and safely feasible.

Operations will effectively manage the following scenarios to minimize the quantity of natural gas that is vented or flared:

- (a) If there is an emergency or malfunction vented or flared natural gas will be reported, if required, and the emergency or malfunction will be resolved as soon as technically and safely feasible.
- (b) If the wellbore needs to be unloaded to atmosphere the operator will not vent the well after the well has achieved a stabilized rate and pressure. The operator will remain on site during unloading. Plunger lift systems will be optimized to reduce the amount of natural gas venting. Downhole maintenance, such as workovers, swabbing, etc. will only be conducted as needed and best management practices will be utilized to reduce venting of natural gas.
- (c) The operator will minimize the amount of time that natural gas is vented to atmosphere from gauging and sampling a storage tank or low-pressure vessel, automatic tank gauges will be the primary means of gauging. The formation is only anticipated to produce water and therefore tank emissions are anticipated to be negligible.
- (d) The operator will reduce the amount of time needed for loading out liquids from a storage tanks or other low-pressure vessels whenever feasible. Operations will always utilize the water transfer systems when available. Water loading emissions are anticipated to be negligible.
- (e) Equipment will be repaired and maintained routinely to minimize the venting or flaring of natural gas. Repairs and maintenance will be conducted in a manner that minimizes the amount of natural gas vented to atmosphere through the isolation of the equipment that is being repaired or maintained.
- (f) Electric controllers and pumps will be installed to replace pneumatic controllers whenever feasible. Pneumatic controllers and pumps will be inspected frequently to ensure that no excess gas is vented to atmosphere.
- (g) No dehydration or amine units are anticipated to be set on location.
- (h) Compressors, compressor engines, turbines, flanges, connectors, valves, storage tanks, and other low-pressure vessels and flanges will be routinely inspected to ensure that no excess venting occurs outside of normal operations.
- (i) Regulatory required testing, such as bradenhead and packer testing will be performed in a manner that minimizes the amount of natural gas vented to atmosphere.
- (j) If natural gas does not meet gathering pipeline specifications gas samples will be collected twice per week to determine when pipeline specification gas content has been achieved. During this time frame gas will be flared and not vented to atmosphere. Natural gas that meets pipeline specifications will be sold via pipeline and natural gas that can be utilized for fuel gas will be used during this time.
- (k) If pipeline, equipment, or facilities need purged of impurities gas losses will be minimized as much as technically and safely feasible.

E. Performance standards:

- a. The production facilities are designed to handle the maximum throughput and pressures from producing wellbores and will be designed to minimize waste. The amount of gas vented and flared will be minimized when technically and safely feasible.
- b. All tanks that are routed to a control device that is installed after 5/25/2021 will have an automatic gauging system to minimize the amount of vented natural gas.
- c. If a flare stack is installed or replaced after 5/25/2021 it will be equipped with an automatic ignitor or continuous pilot. The flare stack will be properly sized and designed to ensure proper combustion efficiency. The flare stack will be located 100 feet away from the nearest wellhead or storage tank.
- d. AVO inspections will be conducted weekly for the year after completion and for all wells producing greater than 60,000 cubic feet of natural gas daily. The AVO inspection will include all components, including flare stacks, thief hatches, closed vent systems, pumps, compressors, pressure relief devices, valves, lines, flanges, connectors, and associated pipeline to identify any leaks and releases by comprehensive auditory, visual, and olfactory inspection. The AVO inspection records will be maintained for 5 years which will be available at the department's request. Identified leaks will be repaired as soon as feasible to minimize the amount of vented natural gas.

F. Measurement or estimation of vented and flared natural gas.

- a. The volume of natural gas that is vented, flared or consumed for beneficial use will be measured when possible, or estimated, during drilling, completions, or production operations.
- b. Equipment will be installed to measure the volume of natural gas flared for all APD's issued after 5/25/2021 on facilities that will have an average daily gas rate greater than 60,000 cubic feet of natural gas. Measurement equipment will conform to API MPMS Chapter 14.10 regulations. The measurement equipment will not have a manifold that allows the diversion of natural gas around the metering element except for the sole purpose of inspecting and servicing the measurement equipment. If metering is not practical then the volume of gas will be estimated.



LOGOS Operating, LLC Operations Plan

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

Date:	August 12, 2021	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:	18,321' (GL)
Bottom Hole Location:	Sec 28, T31N, R5W 922 FSL, 2612 FWL (36.865895° N, 107.367746° 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	18,321'	6,992'

* 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

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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:** $6992' \text{ TVD} \times 0.43 = 3007 \text{ psi}$
- E. H2S Concerns:** There is no record of any naturally occurring H2S in any formation in the Rosa Unit. No H2S is anticipated in this formation or this well.

III. MATERIALS

A. CASING EQUIPMENT:

CASING TYPE	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"	18,321'	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.

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C. CEMENTING:

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

1. **SURFACE:** Casing shall be set at ~ 320' and cemented to surface. TOC at Surface.
263 sks of 15.8 ppg Type Neat G, 1.18 cuft/sk yield or equivalent 223 sks of 14.6 ppg Type III with 1.39 cuft/sk yield, 30% excess.
2. **INTERMEDIATE:** Intermediate casing shall be kept fluid filled while running in to the hole to meet BLM minimum collapse requirements. The intermediate casing will be cemented in 2 or 3 stages using DV/STAGE tools in order to reduce cement losses and maximize cement coverage. Operator proposes optional DV tools above anticipated loss circulation zones in the Mesaverde and in the Fruitland coal. If losses are not observed during the second stage a cancelation plug will be pumped and the remaining cement will be pumped during stage 2. If cement does not circulate to the DV tool(s) or to surface, a CBL will be run to determine TOC.

	Top (ft)	Footage (ft)	Cement (ft3/ft) Annular Capacity	Excess (30%)	Total (ft3)	Total (bbl)	Slurry Yield (ft3/sk)	Sacks Cement	Density (PPG)
Stage 1 Tail	5,896	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 (ft3/ft) Annular Capacity	Excess (15%)	Total (ft3)	Total (bbl)	Slurry Yield (ft3/sk)	Sacks Cement	Density (PPG)
Cased Lead	6,271	100	0.2531	1	25	5	1.56	16	13
Open Hole Lead	6,371	11,950	0.2291	1.15	3,159	563	1.56	2,025	13
					3,184	567		2,041	

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.

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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 * 6,997' 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.

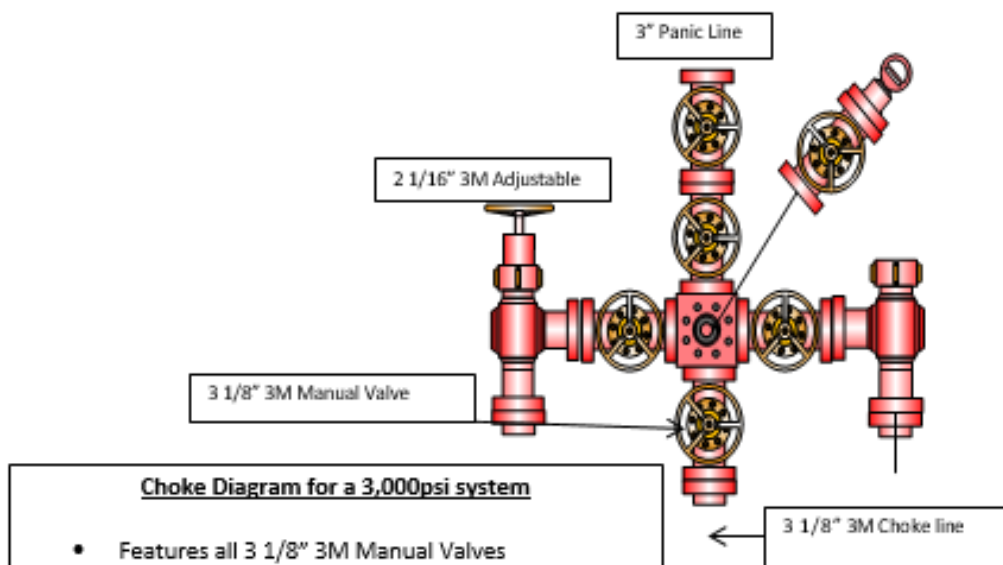
E. PRODUCTION TUBING

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.

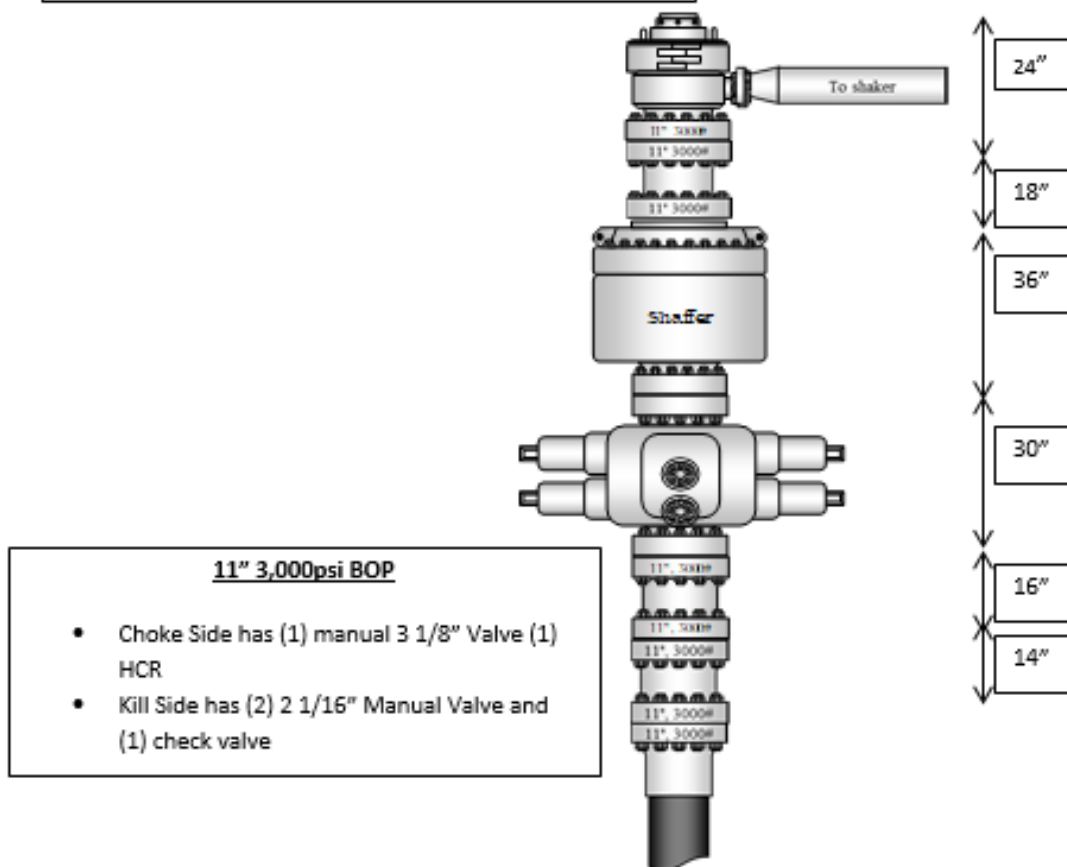


3M 11" B.O.P.E Diagram



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



Logos Opersting LLC

Rio Arriba, NM NAD83

Rosa Unit 30

Rosa Unit #664H

OH

Plan #2

Anticollision Report

05 July, 2021





Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM _16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Reference	Plan #2
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria
Interpolation Method:	Stations
Depth Range:	Unlimited
Results Limited by:	Maximum centre distance of 10,000.00ft
Warning Levels Evaluated at:	2.00 Sigma
Error Model:	ISCSWA
Scan Method:	Closest Approach 3D
Error Surface:	Pedal Curve
Casing Method:	Not applied

Survey Tool Program	Date	7/5/2021
From (ft)	To (ft)	Survey (Wellbore)
0.00	18,321.44	Plan #2 (OH)
		Tool Name
		MWD
		Description
		MWD - Standard

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 - Plan #2	1,000.00	1,000.00	60.91	53.74	8.496	CC
Rosa Unit #658H - OH - Plan #2	1,100.00	1,100.52	61.51	53.64	7.821	ES
Rosa Unit #658H - OH - Plan #2	1,200.00	1,200.45	64.18	55.64	7.515	SF
Rosa Unit #659H - OH - Plan #1	893.66	894.91	16.05	9.67	2.518	CC
Rosa Unit #659H - OH - Plan #1	900.00	901.19	16.07	9.65	2.504	ES, SF
Rosa Unit #660H - OH - Plan #1	798.28	798.82	8.04	2.36	1.417	Level 3, CC
Rosa Unit #660H - OH - Plan #1	800.00	800.53	8.04	2.35	1.414	Level 3, ES, SF
Rosa Unit #662H - OH - Plan #2	1,000.00	1,000.00	45.14	37.97	6.296	CC, ES
Rosa Unit #662H - OH - Plan #2	18,321.44	17,948.87	1,438.36	751.36	2.094	SF
Rosa Unit #663H - OH - Plan #1	760.90	761.26	27.65	22.24	5.108	CC
Rosa Unit #663H - OH - Plan #1	800.00	800.15	27.91	22.22	4.907	ES
Rosa Unit #663H - OH - Plan #1	18,321.44	18,133.59	697.91	27.42	1.041	Level 2, SF
Rosa Unit #665H - OH - Plan #2	1,000.00	1,000.00	17.52	10.35	2.444	CC
Rosa Unit #665H - OH - Plan #2	1,100.00	1,100.46	17.69	9.84	2.253	ES, SF
Sec 28 T31N R5W Offsets						
Rosa Unit #146 - OH - OH	17,567.80	6,199.00	914.40	808.90	8.667	CC
Rosa Unit #146 - OH - OH	17,700.00	6,199.00	923.91	802.21	7.592	ES
Rosa Unit #146 - OH - OH	18,200.00	6,199.00	1,111.67	920.36	5.811	SF
Rosa Unit #267 - OH - OH	16,908.86	2,780.00	4,332.35	4,246.11	50.239	CC
Rosa Unit #267 - OH - OH	17,000.00	2,780.00	4,333.31	4,246.00	49.632	ES
Rosa Unit #267 - OH - OH	18,321.44	2,780.00	4,556.82	4,440.47	39.166	SF
Sec 29 T31N R5W Offsets						
Rosa Unit #200A - OH - OH	14,098.31	3,248.00	3,870.23	3,806.00	60.263	CC
Rosa Unit #200A - OH - OH	14,200.00	3,248.00	3,871.56	3,805.82	58.887	ES
Rosa Unit #200A - OH - OH	16,700.00	3,248.00	4,663.42	4,536.83	36.840	SF
Rosa Unit #23 - OH - OH	11,279.27	5,935.00	1,127.59	1,017.23	10.217	CC
Rosa Unit #23 - OH - OH	11,300.00	5,935.00	1,127.78	1,016.95	10.176	ES
Rosa Unit #23 - OH - OH	12,200.00	5,935.00	1,455.75	1,243.86	6.870	SF

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

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						
Sec 30 T31N R5W Offsets						
Rosa Unit #162 - OH - OH	3,196.04	3,152.78	90.60	-18.55	0.830	Level 1, CC
Rosa Unit #162 - OH - OH	3,200.00	3,156.62	90.60	-18.68	0.829	Level 1, ES, SF
Rosa Unit #162B - OH - OH	1,760.19	1,822.78	2,729.94	2,668.23	44.236	CC
Rosa Unit #162B - OH - OH	3,100.00	3,122.25	2,756.13	2,648.44	25.593	ES
Rosa Unit #162B - OH - OH	3,800.00	3,720.00	2,785.36	2,656.00	21.531	SF
Rosa Unit #162C - OH - OH	8,242.80	7,022.12	201.26	-57.43	0.778	Level 1, CC, ES, SF
Rosa Unit #233 - OH - OH	2,600.00	2,540.00	358.62	271.61	4.122	ES, SF
Rosa Unit #233 - OH - OH	2,601.37	2,540.00	358.62	271.63	4.123	CC

Offset Design: Rosa Unit 30 - Rosa Unit #658H - OH - Plan #2

Survey Program: 0-MWD+HDGM														Offset Site Error: 0.00 ft					
Reference				Offset		Semi Major Axis				Offset Wellbore Centre				Rule Assigned:				Offset Well Error: 0.00 ft	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning						
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	0.36	0.36	-19.01	57.59	-19.84	60.91	60.19	0.72	84.960							
200.00	200.00	200.00	200.00	0.72	0.72	-19.01	57.59	-19.84	60.91	59.48	1.43	42.480							
300.00	300.00	300.00	300.00	1.08	1.08	-19.01	57.59	-19.84	60.91	58.76	2.15	28.320							
400.00	400.00	400.00	400.00	1.43	1.43	-19.01	57.59	-19.84	60.91	58.04	2.87	21.240							
500.00	500.00	500.00	500.00	1.79	1.79	-19.01	57.59	-19.84	60.91	57.33	3.58	16.992							
600.00	600.00	600.00	600.00	2.15	2.15	-19.01	57.59	-19.84	60.91	56.61	4.30	14.160							
700.00	700.00	700.00	700.00	2.51	2.51	-19.01	57.59	-19.84	60.91	55.89	5.02	12.137							
800.00	800.00	800.00	800.00	2.87	2.87	-19.01	57.59	-19.84	60.91	55.18	5.74	10.620							
900.00	900.00	900.00	900.00	3.23	3.23	-19.01	57.59	-19.84	60.91	54.46	6.45	9.440							
1,000.00	1,000.00	1,000.00	1,000.00	3.58	3.58	-19.01	57.59	-19.84	60.91	53.74	7.17	8.496 CC							
1,100.00	1,099.98	1,100.52	1,100.50	3.93	3.94	128.88	57.66	-18.08	61.51	53.64	7.86	7.821 ES							
1,200.00	1,199.84	1,200.45	1,200.29	4.26	4.28	137.04	57.85	-12.83	64.18	55.64	8.54	7.515 SF							
1,300.00	1,299.45	1,299.22	1,298.67	4.60	4.63	148.66	58.18	-4.24	71.20	61.97	9.23	7.717							
1,400.00	1,398.70	1,396.27	1,395.01	4.95	4.98	160.80	58.62	7.50	84.86	74.95	9.91	8.563							
1,500.00	1,497.47	1,491.10	1,488.70	5.31	5.33	171.15	59.17	22.12	106.23	95.65	10.58	10.042							
1,600.00	1,595.62	1,583.27	1,579.25	5.69	5.68	179.05	59.82	39.29	135.15	123.92	11.23	12.037							
1,700.00	1,693.06	1,672.36	1,666.21	6.10	6.04	-175.15	60.55	58.64	170.98	159.12	11.86	14.419							
1,800.00	1,790.08	1,760.72	1,751.88	6.53	6.40	-170.88	61.36	80.24	211.31	198.82	12.49	16.916							
1,900.00	1,887.11	1,851.05	1,839.36	6.98	6.80	-167.82	62.21	102.73	252.69	239.53	13.16	19.198							
2,000.00	1,984.14	1,941.38	1,926.84	7.44	7.20	-165.62	63.05	125.22	294.51	280.66	13.85	21.270							
2,100.00	2,081.17	2,031.71	2,014.32	7.91	7.61	-163.96	63.90	147.71	336.60	322.06	14.54	23.147							
2,200.00	2,178.20	2,122.04	2,101.80	8.38	8.02	-162.66	64.75	170.20	378.87	363.62	15.25	24.849							
2,300.00	2,275.23	2,212.37	2,189.28	8.87	8.44	-161.63	65.59	192.69	421.27	405.31	15.96	26.396							
2,400.00	2,372.26	2,302.70	2,276.76	9.36	8.87	-160.78	66.44	215.18	463.76	447.08	16.68	27.804							
2,500.00	2,469.29	2,393.03	2,364.25	9.85	9.30	-160.08	67.29	237.67	506.33	488.92	17.41	29.090							
2,600.00	2,566.32	2,483.35	2,451.73	10.36	9.74	-159.48	68.13	260.15	548.94	530.80	18.14	30.266							
2,700.00	2,663.35	2,573.68	2,539.21	10.86	10.18	-158.97	68.98	282.64	591.60	572.72	18.87	31.346							
2,800.00	2,760.38	2,664.01	2,626.69	11.37	10.62	-158.53	69.83	305.13	634.29	614.67	19.61	32.341							
2,900.00	2,857.41	2,754.34	2,714.17	11.88	11.06	-158.15	70.67	327.62	677.00	656.65	20.36	33.258							
3,000.00	2,954.44	2,844.67	2,801.65	12.39	11.51	-157.81	71.52	350.11	719.74	698.64	21.10	34.106							
3,100.00	3,051.47	2,935.00	2,889.13	12.91	11.96	-157.51	72.37	372.60	762.50	740.65	21.85	34.893							
3,200.00	3,148.50	3,025.33	2,976.61	13.42	12.41	-157.24	73.21	395.09	805.27	782.67	22.60	35.624							
3,300.00	3,245.53	3,115.66	3,064.09	13.94	12.86	-156.99	74.06	417.58	848.06	824.70	23.36	36.305							
3,400.00	3,342.56	3,205.99	3,151.57	14.46	13.32	-156.77	74.91	440.07	890.85	866.74	24.12	36.941							

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #658H - OH - Plan #2												Offset Site Error:	0.00 ft
Survey Program: 0-MWD+HDGM												Offset Well Error:	0.00 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
7,450.00	6,976.51	7,826.60	6,991.92	31.71	42.45	-90.55	146.59	-93.98	1,279.86	1,207.32	72.54	17.644	
7,495.26	6,978.67	7,781.33	6,992.00	31.80	41.52	-90.57	145.57	-48.73	1,278.19	1,206.02	72.17	17.711	
7,500.00	6,978.73	7,776.46	6,991.99	31.81	41.42	-90.56	145.46	-43.86	1,277.98	1,205.84	72.13	17.717	
7,600.00	6,980.01	7,674.05	6,986.91	32.47	39.41	-90.28	143.06	58.37	1,273.50	1,201.96	71.55	17.800	
7,700.00	6,981.29	7,573.57	6,973.07	33.86	37.55	-89.60	140.59	157.82	1,268.95	1,197.65	71.30	17.798	
7,755.27	6,982.00	7,519.40	6,962.01	34.81	36.60	-89.06	139.22	210.83	1,266.50	1,195.19	71.31	17.761	
7,800.00	6,982.47	7,476.42	6,951.46	35.63	35.89	-88.58	138.11	252.48	1,264.95	1,193.55	71.40	17.716	
7,862.62	6,982.81	7,417.65	6,934.52	36.87	34.96	-87.81	136.57	308.73	1,264.13	1,192.50	71.64	17.646	
7,876.01	6,982.83	7,405.31	6,930.60	37.13	34.76	-87.63	136.24	320.42	1,264.17	1,192.48	71.69	17.633	
7,900.00	6,982.85	7,383.42	6,923.33	37.63	34.45	-87.30	135.66	341.06	1,264.34	1,192.51	71.83	17.601	
8,000.00	6,982.94	7,295.51	6,890.22	39.78	33.23	-85.80	133.30	422.44	1,265.87	1,193.32	72.55	17.448	
8,100.00	6,983.02	7,213.31	6,853.70	42.06	32.25	-84.15	131.07	496.03	1,269.17	1,195.66	73.51	17.264	
8,200.00	6,983.11	7,137.03	6,815.17	44.43	31.47	-82.41	128.98	561.81	1,274.84	1,200.20	74.64	17.080	
8,300.00	6,983.20	7,066.68	6,775.82	46.89	30.83	-80.66	127.04	620.09	1,283.45	1,207.62	75.84	16.924	
8,400.00	6,983.29	7,000.00	6,735.30	49.42	30.29	-78.86	125.21	672.99	1,295.51	1,218.49	77.02	16.820	
8,500.00	6,983.37	6,942.83	6,698.15	52.00	29.93	-77.24	123.65	716.41	1,311.41	1,233.16	78.25	16.758	
8,600.00	6,983.46	6,900.00	6,668.92	54.63	29.66	-75.97	122.49	747.70	1,331.55	1,252.09	79.46	16.758	
8,700.00	6,983.55	6,839.11	6,625.41	57.31	29.35	-74.11	120.85	790.24	1,355.92	1,275.54	80.38	16.870	
8,800.00	6,983.64	6,800.00	6,596.29	60.02	29.16	-72.88	119.81	816.33	1,384.84	1,303.55	81.29	17.035	
8,900.00	6,983.73	6,752.33	6,559.61	62.77	28.98	-71.36	118.55	846.76	1,418.21	1,336.22	81.99	17.297	
9,000.00	6,983.81	6,700.00	6,517.94	65.55	28.78	-69.65	117.18	878.37	1,456.12	1,373.68	82.45	17.661	
9,100.00	6,983.90	6,700.00	6,517.94	68.35	28.78	-69.65	117.18	878.37	1,498.33	1,415.13	83.19	18.010	
9,200.00	6,983.99	6,647.34	6,474.59	71.17	28.63	-67.92	115.83	908.23	1,544.26	1,460.89	83.37	18.523	
9,300.00	6,984.08	6,600.00	6,434.49	74.02	28.49	-66.35	114.64	933.35	1,594.50	1,511.06	83.44	19.110	
9,400.00	6,984.16	6,600.00	6,434.49	76.88	28.49	-66.35	114.64	933.35	1,648.06	1,564.29	83.77	19.673	
9,500.00	6,984.25	6,565.28	6,404.43	79.75	28.41	-65.20	113.78	950.70	1,705.11	1,621.37	83.74	20.363	
9,600.00	6,984.34	6,541.90	6,383.90	82.64	28.35	-64.42	113.21	961.88	1,765.36	1,681.66	83.70	21.092	
9,700.00	6,984.43	6,500.00	6,346.55	85.55	28.25	-63.04	112.20	980.84	1,828.76	1,745.30	83.45	21.914	
9,800.00	6,984.52	6,500.00	6,346.55	88.46	28.25	-63.04	112.20	980.84	1,894.35	1,810.89	83.46	22.698	
9,900.00	6,984.60	6,500.00	6,346.55	91.39	28.25	-63.04	112.20	980.84	1,962.85	1,879.45	83.39	23.538	
10,000.00	6,984.69	6,463.58	6,313.55	94.32	28.18	-61.84	111.34	996.20	2,033.17	1,950.11	83.07	24.476	
10,100.00	6,984.78	6,447.13	6,298.48	97.26	28.15	-61.30	110.96	1,002.80	2,105.77	2,022.93	82.84	25.420	
10,200.00	6,984.87	6,431.71	6,284.28	100.22	28.12	-60.80	110.60	1,008.78	2,180.25	2,097.65	82.60	26.397	
10,300.00	6,984.96	6,400.00	6,254.81	103.17	28.06	-59.77	109.88	1,020.48	2,256.62	2,174.38	82.24	27.439	
10,400.00	6,985.04	6,400.00	6,254.81	106.14	28.06	-59.77	109.88	1,020.48	2,334.23	2,252.17	82.06	28.445	
10,500.00	6,985.13	6,400.00	6,254.81	109.11	28.06	-59.77	109.88	1,020.48	2,413.48	2,331.62	81.86	29.482	
10,600.00	6,985.22	6,400.00	6,254.81	112.09	28.06	-59.77	109.88	1,020.48	2,494.23	2,412.58	81.65	30.546	
10,700.00	6,985.31	6,400.00	6,254.81	115.07	28.06	-59.77	109.88	1,020.48	2,576.33	2,494.89	81.44	31.636	
10,800.00	6,985.39	6,356.50	6,213.90	118.05	27.98	-58.38	108.91	1,035.20	2,658.57	2,577.54	81.03	32.809	
10,900.00	6,985.48	6,346.27	6,204.20	121.04	27.96	-58.05	108.69	1,038.44	2,742.45	2,661.67	80.78	33.950	
11,000.00	6,985.57	6,336.57	6,194.97	124.04	27.94	-57.75	108.47	1,041.43	2,827.26	2,746.74	80.53	35.108	
11,100.00	6,985.66	6,300.00	6,159.96	127.04	27.87	-56.60	107.69	1,051.98	2,913.37	2,833.20	80.17	36.341	
11,200.00	6,985.75	6,300.00	6,159.96	130.04	27.87	-56.60	107.69	1,051.98	2,999.62	2,919.64	79.98	37.507	
11,300.00	6,985.83	6,300.00	6,159.96	133.05	27.87	-56.60	107.69	1,051.98	3,086.70	3,006.91	79.78	38.688	
11,400.00	6,985.92	6,300.00	6,159.96	136.05	27.87	-56.60	107.69	1,051.98	3,174.54	3,094.95	79.59	39.884	
11,500.00	6,986.01	6,300.00	6,159.96	139.07	27.87	-56.60	107.69	1,051.98	3,263.08	3,183.67	79.41	41.093	
11,600.00	6,986.10	6,300.00	6,159.96	142.08	27.87	-56.60	107.69	1,051.98	3,352.27	3,273.04	79.22	42.313	
11,700.00	6,986.18	6,300.00	6,159.96	145.10	27.87	-56.60	107.69	1,051.98	3,442.05	3,363.00	79.05	43.545	
11,800.00	6,986.27	6,300.00	6,159.96	148.12	27.87	-56.60	107.69	1,051.98	3,532.38	3,453.51	78.87	44.787	
11,900.00	6,986.36	6,300.00	6,159.96	151.14	27.87	-56.60	107.69	1,051.98	3,623.21	3,544.52	78.70	46.038	
12,000.00	6,986.45	6,261.61	6,122.88	154.16	27.80	-55.42	106.89	1,061.86	3,713.72	3,635.30	78.42	47.356	
12,100.00	6,986.54	6,255.79	6,117.23	157.19	27.79	-55.24	106.77	1,063.25	3,805.21	3,726.96	78.25	48.630	

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #658H - OH - Plan #2													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	Warning	
12,200.00	6,986.62	6,250.21	6,111.80	160.21	27.78	-55.07	106.66	1,064.55	3,897.08	3,818.99	78.08	49.910		
12,300.00	6,986.71	6,244.85	6,106.58	163.24	27.77	-54.91	106.55	1,065.78	3,989.31	3,911.38	77.92	51.195		
12,400.00	6,986.80	6,239.70	6,101.56	166.28	27.76	-54.75	106.45	1,066.94	4,081.87	4,004.10	77.77	52.486		
12,500.00	6,986.89	6,200.00	6,062.72	169.31	27.69	-53.56	105.66	1,075.10	4,175.40	4,097.88	77.52	53.861		
12,600.00	6,986.98	6,200.00	6,062.72	172.34	27.69	-53.56	105.66	1,075.10	4,268.42	4,191.02	77.40	55.149		
12,700.00	6,987.06	6,200.00	6,062.72	175.38	27.69	-53.56	105.66	1,075.10	4,361.74	4,284.46	77.28	56.443		
12,800.00	6,987.15	6,200.00	6,062.72	178.41	27.69	-53.56	105.66	1,075.10	4,455.35	4,378.19	77.16	57.741		
12,900.00	6,987.24	6,200.00	6,062.72	181.45	27.69	-53.56	105.66	1,075.10	4,549.23	4,472.19	77.05	59.043		
13,000.00	6,987.33	6,200.00	6,062.72	184.49	27.69	-53.56	105.66	1,075.10	4,643.37	4,566.43	76.94	60.349		
13,100.00	6,987.41	6,200.00	6,062.72	187.53	27.69	-53.56	105.66	1,075.10	4,737.75	4,660.92	76.84	61.660		
13,200.00	6,987.50	6,200.00	6,062.72	190.57	27.69	-53.56	105.66	1,075.10	4,832.36	4,755.62	76.74	62.973		
13,300.00	6,987.59	6,200.00	6,062.72	193.62	27.69	-53.56	105.66	1,075.10	4,927.18	4,850.54	76.64	64.290		
13,400.00	6,987.68	6,200.00	6,062.72	196.66	27.69	-53.56	105.66	1,075.10	5,022.20	4,945.65	76.55	65.609		
13,500.00	6,987.77	6,200.00	6,062.72	199.71	27.69	-53.56	105.66	1,075.10	5,117.41	5,040.95	76.46	66.931		
13,600.00	6,987.85	6,200.00	6,062.72	202.75	27.69	-53.56	105.66	1,075.10	5,212.79	5,136.42	76.37	68.256		
13,700.00	6,987.94	6,200.00	6,062.72	205.80	27.69	-53.56	105.66	1,075.10	5,308.35	5,232.06	76.29	69.582		
13,800.00	6,988.03	6,200.00	6,062.72	208.85	27.69	-53.56	105.66	1,075.10	5,404.07	5,327.86	76.21	70.910		
13,900.00	6,988.12	6,200.00	6,062.72	211.89	27.69	-53.56	105.66	1,075.10	5,499.94	5,423.81	76.13	72.240		
14,000.00	6,988.20	6,200.00	6,062.72	214.94	27.69	-53.56	105.66	1,075.10	5,595.96	5,519.90	76.06	73.572		
14,100.00	6,988.29	6,200.00	6,062.72	217.99	27.69	-53.56	105.66	1,075.10	5,692.11	5,616.12	75.99	74.904		
14,200.00	6,988.38	6,200.00	6,062.72	221.04	27.69	-53.56	105.66	1,075.10	5,788.40	5,712.47	75.93	76.238		
14,300.00	6,988.47	6,200.00	6,062.72	224.10	27.69	-53.56	105.66	1,075.10	5,884.80	5,808.94	75.86	77.573		
14,400.00	6,988.56	6,200.00	6,062.72	227.15	27.69	-53.56	105.66	1,075.10	5,981.33	5,905.53	75.80	78.908		
14,500.00	6,988.64	6,200.00	6,062.72	230.20	27.69	-53.56	105.66	1,075.10	6,077.97	6,002.22	75.74	80.245		
14,600.00	6,988.73	6,200.00	6,062.72	233.25	27.69	-53.56	105.66	1,075.10	6,174.71	6,099.02	75.69	81.582		
14,700.00	6,988.82	6,200.00	6,062.72	236.31	27.69	-53.56	105.66	1,075.10	6,271.56	6,195.92	75.64	82.919		
14,800.00	6,988.91	6,157.04	6,020.40	239.36	27.60	-52.31	104.84	1,082.41	6,367.57	6,292.06	75.51	84.330		
14,900.00	6,989.00	6,154.73	6,018.11	242.42	27.60	-52.24	104.79	1,082.75	6,464.50	6,389.05	75.46	85.671		
15,000.00	6,989.08	6,152.47	6,015.89	245.47	27.59	-52.18	104.75	1,083.09	6,561.53	6,486.12	75.41	87.012		
15,100.00	6,989.17	6,150.28	6,013.72	248.53	27.59	-52.12	104.71	1,083.41	6,658.63	6,583.27	75.36	88.352		
15,200.00	6,989.26	6,148.14	6,011.60	251.58	27.58	-52.06	104.67	1,083.72	6,755.82	6,680.50	75.32	89.692		
15,300.00	6,989.35	6,146.06	6,009.54	254.64	27.58	-52.00	104.63	1,084.02	6,853.08	6,777.80	75.28	91.032		
15,400.00	6,989.43	6,144.03	6,007.53	257.70	27.58	-51.94	104.59	1,084.31	6,950.42	6,875.17	75.24	92.371		
15,500.00	6,989.52	6,100.00	5,963.84	260.76	27.49	-50.70	103.80	1,089.65	7,048.71	6,973.58	75.13	93.817		
15,600.00	6,989.61	6,100.00	5,963.84	263.81	27.49	-50.70	103.80	1,089.65	7,146.10	7,071.00	75.10	95.150		
15,700.00	6,989.70	6,100.00	5,963.84	266.87	27.49	-50.70	103.80	1,089.65	7,243.57	7,168.49	75.08	96.482		
15,800.00	6,989.79	6,100.00	5,963.84	269.93	27.49	-50.70	103.80	1,089.65	7,341.10	7,266.05	75.05	97.813		
15,900.00	6,989.87	6,100.00	5,963.84	272.99	27.49	-50.70	103.80	1,089.65	7,438.70	7,363.67	75.03	99.144		
16,000.00	6,989.96	6,100.00	5,963.84	276.05	27.49	-50.70	103.80	1,089.65	7,536.36	7,461.35	75.01	100.474		
16,100.00	6,990.05	6,100.00	5,963.84	279.11	27.49	-50.70	103.80	1,089.65	7,634.08	7,559.09	74.99	101.803		
16,200.00	6,990.14	6,100.00	5,963.84	282.17	27.49	-50.70	103.80	1,089.65	7,731.86	7,656.89	74.97	103.132		
16,300.00	6,990.22	6,100.00	5,963.84	285.23	27.49	-50.70	103.80	1,089.65	7,829.70	7,754.74	74.95	104.459		
16,400.00	6,990.31	6,100.00	5,963.84	288.29	27.49	-50.70	103.80	1,089.65	7,927.59	7,852.65	74.94	105.785		
16,500.00	6,990.40	6,100.00	5,963.84	291.35	27.49	-50.70	103.80	1,089.65	8,025.53	7,950.60	74.93	107.111		
16,600.00	6,990.49	6,100.00	5,963.84	294.42	27.49	-50.70	103.80	1,089.65	8,123.52	8,048.61	74.92	108.435		
16,700.00	6,990.58	6,100.00	5,963.84	297.48	27.49	-50.70	103.80	1,089.65	8,221.56	8,146.66	74.91	109.757		
16,800.00	6,990.66	6,100.00	5,963.84	300.54	27.49	-50.70	103.80	1,089.65	8,319.65	8,244.75	74.90	111.079		
16,900.00	6,990.75	6,100.00	5,963.84	303.60	27.49	-50.70	103.80	1,089.65	8,417.78	8,342.89	74.89	112.399		
17,000.00	6,990.84	6,100.00	5,963.84	306.67	27.49	-50.70	103.80	1,089.65	8,515.96	8,441.07	74.89	113.718		
17,100.00	6,990.93	6,100.00	5,963.84	309.73	27.49	-50.70	103.80	1,089.65	8,614.18	8,539.29	74.88	115.035		
17,200.00	6,991.02	6,100.00	5,963.84	312.79	27.49	-50.70	103.80	1,089.65	8,712.43	8,637.55	74.88	116.351		
17,300.00	6,991.10	6,100.00	5,963.84	315.86	27.49	-50.70	103.80	1,089.65	8,810.73	8,735.85	74.88	117.665		

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM _16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #658H - OH - Plan #2												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)			
17,400.00	6,991.19	6,100.00	5,963.84	318.92	27.49	-50.70	103.80	1,089.65	8,909.07	8,834.19	74.88	118.977	
17,500.00	6,991.28	6,100.00	5,963.84	321.98	27.49	-50.70	103.80	1,089.65	9,007.44	8,932.56	74.88	120.288	
17,600.00	6,991.37	6,100.00	5,963.84	325.05	27.49	-50.70	103.80	1,089.65	9,105.85	9,030.96	74.89	121.597	
17,700.00	6,991.45	6,100.00	5,963.84	328.11	27.49	-50.70	103.80	1,089.65	9,204.29	9,129.40	74.89	122.904	
17,800.00	6,991.54	6,100.00	5,963.84	331.18	27.49	-50.70	103.80	1,089.65	9,302.76	9,227.87	74.90	124.210	
17,900.00	6,991.63	6,100.00	5,963.84	334.24	27.49	-50.70	103.80	1,089.65	9,401.27	9,326.37	74.90	125.514	
18,000.00	6,991.72	6,100.00	5,963.84	337.31	27.49	-50.70	103.80	1,089.65	9,499.81	9,424.90	74.91	126.815	
18,100.00	6,991.81	6,100.00	5,963.84	340.37	27.49	-50.70	103.80	1,089.65	9,598.38	9,523.46	74.92	128.115	
18,200.00	6,991.89	6,100.00	5,963.84	343.44	27.49	-50.70	103.80	1,089.65	9,696.98	9,622.05	74.93	129.413	
18,300.00	6,991.98	6,100.00	5,963.84	346.50	27.49	-50.70	103.80	1,089.65	9,795.60	9,720.66	74.94	130.709	
18,321.44	6,992.00	6,100.00	5,963.84	347.16	27.49	-50.70	103.80	1,089.65	9,816.75	9,741.80	74.94	130.987	



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #659H - OH - Plan #1													Offset Site Error: 0.00 ft
Survey Program: 0-MWD													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)			
0.00	0.00	0.00	0.00	0.00	0.00	-10.52	31.03	-5.76	31.56				
100.00	100.00	100.00	100.00	0.36	0.36	-10.52	31.03	-5.76	31.56	30.84	0.72	44.020	
200.00	200.00	200.00	200.00	0.72	0.72	-10.52	31.03	-5.76	31.56	30.13	1.43	22.010	
300.00	300.00	300.00	300.00	1.08	1.08	-10.52	31.03	-5.76	31.56	29.41	2.15	14.673	
400.00	400.00	400.00	400.00	1.43	1.43	-10.52	31.03	-5.76	31.56	28.69	2.87	11.005	
500.00	500.00	500.00	500.00	1.79	1.79	-10.52	31.03	-5.76	31.56	27.98	3.58	8.804	
600.00	600.00	600.92	600.90	2.15	2.14	-8.79	29.69	-4.59	30.06	25.77	4.29	7.006	
700.00	700.00	701.58	701.42	2.51	2.48	-2.46	25.69	-1.10	25.75	20.76	4.99	5.165	
800.00	800.00	801.75	801.19	2.87	2.83	13.77	19.06	4.67	19.66	13.97	5.69	3.455	
893.66	893.66	894.91	893.66	3.20	3.17	48.92	10.54	12.10	16.05	9.67	6.37	2.518 CC	
900.00	900.00	901.19	899.88	3.23	3.19	52.02	9.89	12.67	16.07	9.65	6.42	2.504 ES, SF	
1,000.00	1,000.00	999.93	997.47	3.58	3.57	93.72	-1.47	22.57	22.76	15.66	7.10	3.204	
1,100.00	1,099.98	1,098.74	1,095.04	3.93	3.97	-105.56	-13.17	32.77	36.09	28.31	7.78	4.640	
1,200.00	1,199.84	1,197.55	1,192.63	4.26	4.37	-102.23	-24.87	42.97	51.23	42.77	8.46	6.054	
1,300.00	1,299.45	1,296.26	1,290.11	4.60	4.78	-103.23	-36.56	53.15	67.17	58.00	9.17	7.325	
1,400.00	1,398.70	1,394.74	1,387.37	4.95	5.19	-106.05	-48.22	63.32	84.04	74.14	9.90	8.488	
1,500.00	1,497.47	1,492.87	1,484.28	5.31	5.61	-109.68	-59.83	73.45	102.19	91.53	10.66	9.590	
1,600.00	1,595.62	1,590.53	1,580.73	5.69	6.02	-113.60	-71.40	83.53	122.03	110.59	11.44	10.671	
1,700.00	1,693.06	1,687.60	1,676.60	6.10	6.44	-117.55	-82.89	93.54	143.91	131.67	12.24	11.759	
1,800.00	1,790.08	1,784.34	1,772.14	6.53	6.85	-121.26	-94.35	103.53	167.25	154.20	13.05	12.813	
1,900.00	1,887.11	1,881.08	1,867.67	6.98	7.27	-124.06	-105.80	113.51	191.10	177.23	13.87	13.777	
2,000.00	1,984.14	1,977.82	1,963.21	7.44	7.69	-126.24	-117.26	123.50	215.29	200.59	14.69	14.651	
2,100.00	2,081.17	2,074.56	2,058.75	7.91	8.11	-127.98	-128.71	133.48	239.71	224.19	15.52	15.444	
2,200.00	2,178.20	2,171.30	2,154.29	8.38	8.54	-129.40	-140.16	143.47	264.30	247.95	16.35	16.164	
2,300.00	2,275.23	2,268.04	2,249.83	8.87	8.96	-130.58	-151.62	153.45	289.02	271.84	17.18	16.819	
2,400.00	2,372.26	2,364.78	2,345.37	9.36	9.38	-131.57	-163.07	163.44	313.84	295.82	18.02	17.416	
2,500.00	2,469.29	2,461.52	2,440.91	9.85	9.81	-132.42	-174.53	173.42	338.73	319.87	18.86	17.961	
2,600.00	2,566.32	2,558.26	2,536.44	10.36	10.23	-133.15	-185.98	183.41	363.69	343.99	19.70	18.461	
2,700.00	2,663.35	2,655.00	2,631.98	10.86	10.66	-133.79	-197.44	193.39	388.69	368.14	20.54	18.921	
2,800.00	2,760.38	2,751.73	2,727.52	11.37	11.08	-134.35	-208.89	203.38	413.73	392.34	21.39	19.344	
2,900.00	2,857.41	2,848.47	2,823.06	11.88	11.51	-134.85	-220.34	213.36	438.80	416.57	22.23	19.736	
3,000.00	2,954.44	2,945.21	2,918.60	12.39	11.93	-135.29	-231.80	223.34	463.90	440.82	23.08	20.099	
3,100.00	3,051.47	3,041.95	3,014.14	12.91	12.36	-135.69	-243.25	233.33	489.03	465.10	23.93	20.435	
3,200.00	3,148.50	3,138.69	3,109.68	13.42	12.79	-136.05	-254.71	243.31	514.17	489.39	24.78	20.749	
3,300.00	3,245.53	3,235.43	3,205.21	13.94	13.21	-136.37	-266.16	253.30	539.33	513.70	25.63	21.042	
3,400.00	3,342.56	3,332.17	3,300.75	14.46	13.64	-136.67	-277.62	263.28	564.51	538.03	26.48	21.315	
3,500.00	3,439.59	3,428.91	3,396.29	14.99	14.07	-136.94	-289.07	273.27	589.70	562.36	27.34	21.572	
3,600.00	3,536.62	3,525.65	3,491.83	15.51	14.50	-137.19	-300.52	283.25	614.90	586.71	28.19	21.812	
3,700.00	3,633.65	3,622.39	3,587.37	16.03	14.93	-137.42	-311.98	293.24	640.11	611.07	29.05	22.039	
3,800.00	3,730.68	3,719.13	3,682.91	16.56	15.35	-137.63	-323.43	303.22	665.33	635.43	29.90	22.252	
3,900.00	3,827.71	3,815.87	3,778.45	17.09	15.78	-137.82	-334.89	313.21	690.56	659.80	30.76	22.453	
4,000.00	3,924.74	3,912.61	3,873.98	17.61	16.21	-138.01	-346.34	323.19	715.79	684.18	31.61	22.643	
4,100.00	4,021.77	4,009.35	3,969.52	18.14	16.64	-138.18	-357.80	333.18	741.04	708.57	32.47	22.822	
4,200.00	4,118.79	4,106.09	4,065.06	18.67	17.07	-138.34	-369.25	343.16	766.28	732.96	33.33	22.993	
4,300.00	4,215.82	4,202.83	4,160.60	19.20	17.50	-138.48	-380.71	353.15	791.53	757.35	34.19	23.154	
4,400.00	4,312.85	4,299.56	4,256.14	19.73	17.93	-138.62	-392.16	363.13	816.79	781.75	35.04	23.308	
4,500.00	4,409.88	4,396.30	4,351.68	20.26	18.35	-138.75	-403.61	373.11	842.05	806.15	35.90	23.454	
4,600.00	4,506.91	4,493.04	4,447.21	20.79	18.78	-138.88	-415.07	383.10	867.32	830.55	36.76	23.593	
4,700.00	4,603.94	4,589.78	4,542.75	21.32	19.21	-139.00	-426.52	393.08	892.59	854.96	37.62	23.725	
4,800.00	4,700.97	4,686.52	4,638.29	21.86	19.64	-139.11	-437.98	403.07	917.86	879.38	38.48	23.852	
4,900.00	4,798.00	4,783.26	4,733.83	22.39	20.07	-139.21	-449.43	413.05	943.13	903.79	39.34	23.972	
5,000.00	4,895.03	4,880.00	4,829.37	22.92	20.50	-139.31	-460.89	423.04	968.41	928.21	40.20	24.088	

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #659H - OH - Plan #1													Offset Site Error: 0.00 ft
Survey Program: 0-MWD													Offset Well Error: 0.00 ft
Rule Assigned:													
Measured Depth (ft)	Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
5,100.00	4,992.06	4,976.74	4,924.91	23.46	20.93	-139.40	-472.34	433.02	993.69	952.63	41.06	24.199	
5,200.00	5,089.09	5,073.48	5,020.45	23.99	21.36	-139.49	-483.79	443.01	1,018.97	977.05	41.93	24.304	
5,300.00	5,186.12	5,170.22	5,115.98	24.52	21.79	-139.58	-495.25	452.99	1,044.26	1,001.47	42.79	24.406	
5,400.00	5,283.15	5,266.96	5,211.52	25.06	22.22	-139.66	-506.70	462.98	1,069.54	1,025.89	43.65	24.503	
5,500.00	5,380.18	5,363.70	5,307.06	25.59	22.65	-139.73	-518.16	472.96	1,094.83	1,050.32	44.51	24.597	
5,600.00	5,477.21	5,460.44	5,402.60	26.13	23.08	-139.81	-529.61	482.95	1,120.12	1,074.75	45.37	24.687	
5,700.00	5,574.24	5,557.18	5,498.14	26.66	23.51	-139.88	-541.07	492.93	1,145.41	1,099.18	46.24	24.773	
5,800.00	5,671.27	5,653.92	5,593.68	27.20	23.94	-139.95	-552.52	502.92	1,170.71	1,123.61	47.10	24.857	
5,900.00	5,768.30	5,750.66	5,689.22	27.73	24.37	-140.01	-563.98	512.90	1,196.00	1,148.04	47.96	24.937	
6,000.00	5,865.33	5,847.39	5,784.75	28.27	24.80	-140.07	-575.43	522.88	1,221.30	1,172.47	48.82	25.014	
6,100.00	5,962.36	5,943.15	5,875.00	28.80	25.22	-140.13	-586.88	532.86	1,246.59	1,197.74	49.68	25.091	
6,200.00	6,059.39	6,039.15	5,965.00	29.34	25.64	-140.19	-598.33	542.84	1,271.88	1,222.88	50.54	25.168	
6,300.00	6,156.42	6,135.15	6,055.00	29.87	26.06	-140.25	-609.78	552.82	1,296.92	1,247.92	51.40	25.245	
6,400.00	6,253.45	6,231.15	6,145.00	30.41	26.48	-140.31	-621.23	562.80	1,321.96	1,272.96	52.26	25.322	
6,412.00	6,265.09	6,242.38	6,150.00	30.48	26.53	-140.31	-623.18	562.80	1,321.96	1,272.96	52.26	25.322	
6,450.00	6,302.10	6,279.40	6,150.00	30.67	26.72	-140.31	-627.04	562.80	1,321.96	1,272.96	52.26	25.322	
6,500.00	6,351.06	6,327.25	6,150.00	30.90	26.95	-140.31	-630.90	562.80	1,321.96	1,272.96	52.26	25.322	
6,550.00	6,400.04	6,375.17	6,150.00	31.10	27.18	-140.31	-634.76	562.80	1,321.96	1,272.96	52.26	25.322	
6,600.00	6,448.74	6,423.18	6,150.00	31.27	27.41	-140.31	-638.62	562.80	1,321.96	1,272.96	52.26	25.322	
6,650.00	6,496.86	6,471.32	6,150.00	31.41	27.64	-140.31	-642.48	562.80	1,321.96	1,272.96	52.26	25.322	
6,700.00	6,544.10	6,518.65	6,150.00	31.53	27.87	-140.31	-646.34	562.80	1,321.96	1,272.96	52.26	25.322	
6,750.00	6,590.17	6,564.26	6,150.00	31.62	28.10	-140.31	-650.20	562.80	1,321.96	1,272.96	52.26	25.322	
6,800.00	6,634.80	6,608.24	6,150.00	31.70	28.33	-140.31	-654.06	562.80	1,321.96	1,272.96	52.26	25.322	
6,850.00	6,677.69	6,651.13	6,150.00	31.76	28.56	-140.31	-657.92	562.80	1,321.96	1,272.96	52.26	25.322	
6,900.00	6,718.59	6,692.02	6,150.00	31.79	28.79	-140.31	-661.78	562.80	1,321.96	1,272.96	52.26	25.322	
6,950.00	6,757.25	6,731.15	6,150.00	31.82	29.02	-140.31	-665.64	562.80	1,321.96	1,272.96	52.26	25.322	
7,000.00	6,793.42	6,767.32	6,150.00	31.83	29.25	-140.31	-669.50	562.80	1,321.96	1,272.96	52.26	25.322	
7,050.00	6,826.89	6,800.79	6,150.00	31.82	29.48	-140.31	-673.36	562.80	1,321.96	1,272.96	52.26	25.322	
7,100.00	6,857.45	6,831.35	6,150.00	31.81	29.71	-140.31	-677.22	562.80	1,321.96	1,272.96	52.26	25.322	
7,150.00	6,884.91	6,858.81	6,150.00	31.79	29.94	-140.31	-681.08	562.80	1,321.96	1,272.96	52.26	25.322	
7,200.00	6,909.09	6,883.00	6,150.00	31.76	30.17	-140.31	-684.94	562.80	1,321.96	1,272.96	52.26	25.322	
7,250.00	6,929.86	6,903.76	6,150.00	31.73	30.40	-140.31	-688.80	562.80	1,321.96	1,272.96	52.26	25.322	
7,300.00	6,947.08	6,920.98	6,150.00	31.70	30.63	-140.31	-692.66	562.80	1,321.96	1,272.96	52.26	25.322	
7,350.00	6,960.65	6,934.55	6,150.00	31.68	30.86	-140.31	-696.52	562.80	1,321.96	1,272.96	52.26	25.322	
7,400.00	6,970.48	6,944.38	6,150.00	31.68	31.09	-140.31	-700.38	562.80	1,321.96	1,272.96	52.26	25.322	
7,450.00	6,976.51	6,950.41	6,150.00	31.71	31.32	-140.31	-704.24	562.80	1,321.96	1,272.96	52.26	25.322	
7,495.26	6,978.67	6,952.57	6,150.00	31.80	30.94	-112.89	-726.61	-70.85	440.37	380.29	60.08	7.330	
7,500.00	6,978.73	6,952.63	6,150.00	31.81	30.88	-112.89	-726.69	-66.12	440.18	380.11	60.07	7.328	
7,600.00	6,980.01	6,953.91	6,143.28	32.47	29.68	-112.07	-727.88	50.68	434.69	374.48	60.21	7.220	
7,700.00	6,981.29	6,955.19	6,116.27	33.86	29.16	-108.55	-726.60	163.34	425.01	363.55	61.46	6.915	
7,755.27	6,982.00	6,955.90	6,094.94	34.81	29.07	-105.65	-725.01	218.07	418.90	356.44	62.46	6.706	
7,800.00	6,982.47	6,956.37	6,075.61	35.63	29.02	-102.99	-723.40	257.86	414.59	351.26	63.33	6.547	
7,876.01	6,982.83	6,956.73	6,040.53	37.13	28.98	-98.08	-720.25	316.36	410.77	346.08	64.69	6.350	
7,893.24	6,982.84	6,956.74	6,032.43	37.49	28.98	-96.94	-719.49	328.08	410.66	345.70	64.96	6.322	
7,900.00	6,982.85	6,956.75	6,029.25	37.63	28.97	-96.49	-719.19	332.54	410.68	345.61	65.06	6.312	
8,000.00	6,982.94	6,956.84	6,983.08	39.78	28.94	-90.03	-714.71	389.41	416.14	350.02	66.12	6.293	
8,100.00	6,983.02	6,956.92	6,940.30	42.06	28.91	-84.19	-710.38	432.06	433.40	367.07	66.33	6.534	
8,200.00	6,983.11	6,957.01	6,897.87	44.43	28.88	-78.65	-705.96	467.30	463.84	398.06	65.78	7.052	
8,300.00	6,983.20	6,957.10	6,868.60	46.89	28.85	-75.02	-702.86	488.24	506.78	441.73	65.06	7.790	
8,400.00	6,983.29	6,957.19	6,839.43	49.42	28.81	-71.57	-699.73	506.75	560.65	496.45	64.20	8.732	
8,500.00	6,983.37	6,957.27	6,814.16	52.00	28.78	-68.74	-696.99	521.07	623.36	559.92	63.44	9.825	
8,600.00	6,983.46	6,874.95	6,791.96	54.63	28.75	-66.36	-694.56	532.42	693.03	630.22	62.82	11.033	

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #659H - OH - Plan #1												Offset Site Error:	0.00 ft
Survey Program: 0-MWD												Offset Well Error:	0.00 ft
Measured Depth (ft)	Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
8,700.00	6,983.55	6,850.00	6,769.43	57.31	28.71	-64.07	-692.08	542.84	768.13	705.86	62.27	12.336	
8,800.00	6,983.64	6,834.91	6,755.61	60.02	28.69	-62.72	-690.54	548.71	847.41	785.48	61.92	13.685	
8,900.00	6,983.73	6,818.66	6,740.58	62.77	28.66	-61.29	-688.87	554.65	929.99	868.38	61.61	15.095	
9,000.00	6,983.81	6,800.00	6,723.15	65.55	28.63	-59.70	-686.92	561.01	1,015.21	953.89	61.31	16.557	
9,100.00	6,983.90	6,800.00	6,723.15	68.35	28.63	-59.70	-686.92	561.01	1,102.55	1,041.32	61.23	18.007	
9,200.00	6,983.99	6,780.38	6,704.63	71.17	28.59	-58.08	-684.83	567.13	1,191.43	1,130.45	60.98	19.537	
9,300.00	6,984.08	6,770.25	6,694.99	74.02	28.57	-57.27	-683.75	570.07	1,281.78	1,220.94	60.84	21.067	
9,400.00	6,984.16	6,750.00	6,675.60	76.88	28.53	-55.68	-681.55	575.47	1,373.41	1,312.75	60.65	22.644	
9,500.00	6,984.25	6,750.00	6,675.60	79.75	28.53	-55.68	-681.55	575.47	1,465.72	1,405.12	60.61	24.185	
9,600.00	6,984.34	6,750.00	6,675.60	82.64	28.53	-55.68	-681.55	575.47	1,558.99	1,498.43	60.56	25.744	
9,700.00	6,984.43	6,750.00	6,675.60	85.55	28.53	-55.68	-681.55	575.47	1,653.04	1,592.53	60.51	27.319	
9,800.00	6,984.52	6,750.00	6,675.60	88.46	28.53	-55.68	-681.55	575.47	1,747.75	1,687.29	60.46	28.907	
9,900.00	6,984.60	6,726.36	6,652.76	91.39	28.47	-53.91	-678.94	580.99	1,842.44	1,782.11	60.33	30.537	
10,000.00	6,984.69	6,721.01	6,647.57	94.32	28.46	-53.52	-678.35	582.12	1,937.91	1,877.62	60.28	32.146	
10,100.00	6,984.78	6,700.00	6,627.08	97.26	28.41	-52.03	-676.00	586.13	2,034.02	1,973.83	60.19	33.793	
10,200.00	6,984.87	6,700.00	6,627.08	100.22	28.41	-52.03	-676.00	586.13	2,130.08	2,069.91	60.17	35.401	
10,300.00	6,984.96	6,700.00	6,627.08	103.17	28.41	-52.03	-676.00	586.13	2,226.48	2,166.33	60.15	37.014	
10,400.00	6,985.04	6,700.00	6,627.08	106.14	28.41	-52.03	-676.00	586.13	2,323.19	2,263.06	60.13	38.633	
10,500.00	6,985.13	6,700.00	6,627.08	109.11	28.41	-52.03	-676.00	586.13	2,420.17	2,360.05	60.12	40.256	
10,600.00	6,985.22	6,700.00	6,627.08	112.09	28.41	-52.03	-676.00	586.13	2,517.38	2,457.27	60.11	41.882	
10,700.00	6,985.31	6,700.00	6,627.08	115.07	28.41	-52.03	-676.00	586.13	2,614.80	2,554.71	60.09	43.512	
10,800.00	6,985.39	6,700.00	6,627.08	118.05	28.41	-52.03	-676.00	586.13	2,712.42	2,652.33	60.08	45.143	
10,900.00	6,985.48	6,700.00	6,627.08	121.04	28.41	-52.03	-676.00	586.13	2,810.19	2,750.12	60.08	46.776	
11,000.00	6,985.57	6,700.00	6,627.08	124.04	28.41	-52.03	-676.00	586.13	2,908.12	2,848.05	60.07	48.411	
11,100.00	6,985.66	6,700.00	6,627.08	127.04	28.41	-52.03	-676.00	586.13	3,006.19	2,946.12	60.07	50.046	
11,200.00	6,985.75	6,678.97	6,606.45	130.04	28.35	-50.61	-673.62	589.47	3,103.96	3,043.93	60.04	51.702	
11,300.00	6,985.83	6,676.65	6,604.17	133.05	28.35	-50.46	-673.35	589.79	3,202.17	3,142.14	60.03	53.339	
11,400.00	6,985.92	6,674.44	6,602.00	136.05	28.34	-50.31	-673.10	590.10	3,300.48	3,240.44	60.03	54.976	
11,500.00	6,986.01	6,672.34	6,599.93	139.07	28.33	-50.17	-672.86	590.38	3,398.87	3,338.84	60.04	56.612	
11,600.00	6,986.10	6,650.00	6,577.89	142.08	28.27	-48.75	-670.30	592.94	3,497.74	3,437.72	60.02	58.279	
11,700.00	6,986.18	6,650.00	6,577.89	145.10	28.27	-48.75	-670.30	592.94	3,596.22	3,536.20	60.03	59.910	
11,800.00	6,986.27	6,650.00	6,577.89	148.12	28.27	-48.75	-670.30	592.94	3,694.79	3,634.75	60.04	61.541	
11,900.00	6,986.36	6,650.00	6,577.89	151.14	28.27	-48.75	-670.30	592.94	3,793.43	3,733.38	60.05	63.171	
12,000.00	6,986.45	6,650.00	6,577.89	154.16	28.27	-48.75	-670.30	592.94	3,892.15	3,832.08	60.06	64.799	
12,100.00	6,986.54	6,650.00	6,577.89	157.19	28.27	-48.75	-670.30	592.94	3,990.92	3,930.84	60.08	66.427	
12,200.00	6,986.62	6,650.00	6,577.89	160.21	28.27	-48.75	-670.30	592.94	4,089.76	4,029.66	60.10	68.053	
12,300.00	6,986.71	6,650.00	6,577.89	163.24	28.27	-48.75	-670.30	592.94	4,188.65	4,128.54	60.11	69.678	
12,400.00	6,986.80	6,650.00	6,577.89	166.28	28.27	-48.75	-670.30	592.94	4,287.60	4,227.46	60.13	71.302	
12,500.00	6,986.89	6,650.00	6,577.89	169.31	28.27	-48.75	-670.30	592.94	4,386.59	4,326.43	60.15	72.923	
12,600.00	6,986.98	6,650.00	6,577.89	172.34	28.27	-48.75	-670.30	592.94	4,485.62	4,425.45	60.17	74.543	
12,700.00	6,987.06	6,650.00	6,577.89	175.38	28.27	-48.75	-670.30	592.94	4,584.70	4,524.50	60.20	76.161	
12,800.00	6,987.15	6,650.00	6,577.89	178.41	28.27	-48.75	-670.30	592.94	4,683.82	4,623.60	60.22	77.777	
12,900.00	6,987.24	6,650.00	6,577.89	181.45	28.27	-48.75	-670.30	592.94	4,782.97	4,722.72	60.25	79.391	
13,000.00	6,987.33	6,650.00	6,577.89	184.49	28.27	-48.75	-670.30	592.94	4,882.16	4,821.89	60.27	81.002	
13,100.00	6,987.41	6,650.00	6,577.89	187.53	28.27	-48.75	-670.30	592.94	4,981.38	4,921.08	60.30	82.611	
13,200.00	6,987.50	6,650.00	6,577.89	190.57	28.27	-48.75	-670.30	592.94	5,080.63	5,020.30	60.33	84.218	
13,300.00	6,987.59	6,650.00	6,577.89	193.62	28.27	-48.75	-670.30	592.94	5,179.91	5,119.55	60.36	85.822	
13,400.00	6,987.68	6,650.00	6,577.89	196.66	28.27	-48.75	-670.30	592.94	5,279.22	5,218.83	60.39	87.423	
13,500.00	6,987.77	6,650.00	6,577.89	199.71	28.27	-48.75	-670.30	592.94	5,378.55	5,318.13	60.42	89.022	
13,600.00	6,987.85	6,650.00	6,577.89	202.75	28.27	-48.75	-670.30	592.94	5,477.91	5,417.46	60.45	90.618	
13,700.00	6,987.94	6,650.00	6,577.89	205.80	28.27	-48.75	-670.30	592.94	5,577.29	5,516.80	60.48	92.212	
13,800.00	6,988.03	6,650.00	6,577.89	208.85	28.27	-48.75	-670.30	592.94	5,676.69	5,616.17	60.52	93.802	

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #659H - OH - Plan #1													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				
13,900.00	6,988.12	6,650.00	6,577.89	211.89	28.27	-48.75	-670.30	592.94	5,776.11	5,715.56	60.55	95.389				
14,000.00	6,988.20	6,650.00	6,577.89	214.94	28.27	-48.75	-670.30	592.94	5,875.55	5,814.96	60.59	96.974				
14,100.00	6,988.29	6,650.00	6,577.89	217.99	28.27	-48.75	-670.30	592.94	5,975.01	5,914.39	60.63	98.555				
14,200.00	6,988.38	6,650.00	6,577.89	221.04	28.27	-48.75	-670.30	592.94	6,074.49	6,013.83	60.66	100.133				
14,300.00	6,988.47	6,650.00	6,577.89	224.10	28.27	-48.75	-670.30	592.94	6,173.99	6,113.28	60.70	101.708				
14,400.00	6,988.56	6,650.00	6,577.89	227.15	28.27	-48.75	-670.30	592.94	6,273.50	6,212.76	60.74	103.280				
14,500.00	6,988.64	6,650.00	6,577.89	230.20	28.27	-48.75	-670.30	592.94	6,373.03	6,312.24	60.78	104.848				
14,600.00	6,988.73	6,650.00	6,577.89	233.25	28.27	-48.75	-670.30	592.94	6,472.57	6,411.74	60.82	106.413				
14,700.00	6,988.82	6,650.00	6,577.89	236.31	28.27	-48.75	-670.30	592.94	6,572.12	6,511.25	60.87	107.975				
14,800.00	6,988.91	6,650.00	6,577.89	239.36	28.27	-48.75	-670.30	592.94	6,671.69	6,610.78	60.91	109.533				
14,900.00	6,989.00	6,650.00	6,577.89	242.42	28.27	-48.75	-670.30	592.94	6,771.27	6,710.32	60.95	111.087				
15,000.00	6,989.08	6,650.00	6,577.89	245.47	28.27	-48.75	-670.30	592.94	6,870.86	6,809.87	61.00	112.638				
15,100.00	6,989.17	6,650.00	6,577.89	248.53	28.27	-48.75	-670.30	592.94	6,970.47	6,909.42	61.05	114.185				
15,200.00	6,989.26	6,650.00	6,577.89	251.58	28.27	-48.75	-670.30	592.94	7,070.09	7,008.99	61.09	115.729				
15,300.00	6,989.35	6,650.00	6,577.89	254.64	28.27	-48.75	-670.30	592.94	7,169.71	7,108.57	61.14	117.269				
15,400.00	6,989.43	6,650.00	6,577.89	257.70	28.27	-48.75	-670.30	592.94	7,269.35	7,208.16	61.19	118.805				
15,500.00	6,989.52	6,650.00	6,577.89	260.76	28.27	-48.75	-670.30	592.94	7,369.00	7,307.76	61.24	120.337				
15,600.00	6,989.61	6,650.00	6,577.89	263.81	28.27	-48.75	-670.30	592.94	7,468.65	7,407.37	61.29	121.866				
15,700.00	6,989.70	6,650.00	6,577.89	266.87	28.27	-48.75	-670.30	592.94	7,568.32	7,506.98	61.34	123.390				
15,800.00	6,989.79	6,650.00	6,577.89	269.93	28.27	-48.75	-670.30	592.94	7,667.99	7,606.60	61.39	124.911				
15,900.00	6,989.87	6,650.00	6,577.89	272.99	28.27	-48.75	-670.30	592.94	7,767.67	7,706.24	61.44	126.428				
16,000.00	6,989.96	6,650.00	6,577.89	276.05	28.27	-48.75	-670.30	592.94	7,867.37	7,805.87	61.49	127.941				
16,100.00	6,990.05	6,650.00	6,577.89	279.11	28.27	-48.75	-670.30	592.94	7,967.06	7,905.52	61.55	129.450				
16,200.00	6,990.14	6,650.00	6,577.89	282.17	28.27	-48.75	-670.30	592.94	8,066.77	8,005.17	61.60	130.954				
16,300.00	6,990.22	6,650.00	6,577.89	285.23	28.27	-48.75	-670.30	592.94	8,166.48	8,104.83	61.65	132.455				
16,400.00	6,990.31	6,650.00	6,577.89	288.29	28.27	-48.75	-670.30	592.94	8,266.20	8,204.49	61.71	133.952				
16,500.00	6,990.40	6,626.71	6,554.83	291.35	28.20	-47.34	-667.61	594.77	8,365.47	8,303.73	61.75	135.483				
16,600.00	6,990.49	6,626.31	6,554.43	294.42	28.20	-47.32	-667.56	594.80	8,465.19	8,403.39	61.80	136.973				
16,700.00	6,990.58	6,625.92	6,554.04	297.48	28.19	-47.29	-667.52	594.82	8,564.91	8,503.05	61.86	138.458				
16,800.00	6,990.66	6,625.53	6,553.66	300.54	28.19	-47.27	-667.47	594.84	8,664.64	8,602.73	61.92	139.939				
16,900.00	6,990.75	6,625.15	6,553.28	303.60	28.19	-47.25	-667.43	594.86	8,764.38	8,702.40	61.98	141.416				
17,000.00	6,990.84	6,624.79	6,552.92	306.67	28.19	-47.23	-667.39	594.88	8,864.12	8,802.08	62.04	142.889				
17,100.00	6,990.93	6,624.42	6,552.56	309.73	28.19	-47.21	-667.34	594.91	8,963.87	8,901.77	62.10	144.357				
17,200.00	6,991.02	6,624.07	6,552.21	312.79	28.19	-47.19	-667.30	594.93	9,063.62	9,001.46	62.16	145.821				
17,300.00	6,991.10	6,623.72	6,551.87	315.86	28.19	-47.17	-667.26	594.94	9,163.38	9,101.16	62.22	147.281				
17,400.00	6,991.19	6,600.00	6,528.32	318.92	28.11	-45.82	-664.50	595.83	9,263.60	9,201.34	62.26	148.795				
17,500.00	6,991.28	6,600.00	6,528.32	321.98	28.11	-45.82	-664.50	595.83	9,363.35	9,301.03	62.32	150.246				
17,600.00	6,991.37	6,600.00	6,528.32	325.05	28.11	-45.82	-664.50	595.83	9,463.11	9,400.73	62.38	151.692				
17,700.00	6,991.45	6,600.00	6,528.32	328.11	28.11	-45.82	-664.50	595.83	9,562.88	9,500.43	62.45	153.134				
17,800.00	6,991.54	6,600.00	6,528.32	331.18	28.11	-45.82	-664.50	595.83	9,662.65	9,600.13	62.51	154.572				
17,900.00	6,991.63	6,600.00	6,528.32	334.24	28.11	-45.82	-664.50	595.83	9,762.42	9,699.84	62.58	156.005				
18,000.00	6,991.72	6,600.00	6,528.32	337.31	28.11	-45.82	-664.50	595.83	9,862.20	9,799.55	62.64	157.434				
18,100.00	6,991.81	6,600.00	6,528.32	340.37	28.11	-45.82	-664.50	595.83	9,961.98	9,899.27	62.71	158.858				

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #660H - OH - Plan #1												Offset Site Error:	0.00 ft
Survey Program: 0-MWD												Offset Well Error:	0.00 ft
Measured Depth (ft)	Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance 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	17.52	0.00	N/A	
100.00	100.00	100.00	100.00	0.36	0.36	2.88	17.50	0.88	17.52	16.81	0.72	24.440	
200.00	200.00	200.00	200.00	0.72	0.72	2.88	17.50	0.88	17.52	16.09	1.43	12.220	
300.00	300.00	300.00	300.00	1.08	1.08	2.88	17.50	0.88	17.52	15.37	2.15	8.147	
400.00	400.00	400.00	400.00	1.43	1.43	2.88	17.50	0.88	17.52	14.65	2.87	6.110	
500.00	500.00	500.00	500.00	1.79	1.79	2.88	17.50	0.88	17.52	13.94	3.58	4.888	
600.00	600.00	600.51	600.48	2.15	2.14	5.78	15.89	1.61	15.98	11.70	4.29	3.728	
700.00	700.00	700.76	700.60	2.51	2.47	18.84	11.10	3.79	11.74	6.76	4.98	2.358	
798.28	798.28	798.82	798.28	2.86	2.81	65.58	3.32	7.32	8.04	2.36	5.67	1.417	Level 3, CC
800.00	800.00	800.53	799.98	2.87	2.82	66.85	3.16	7.39	8.04	2.35	5.69	1.414	Level 3, ES, SF
900.00	900.00	899.57	898.28	3.23	3.18	122.32	-7.83	12.38	14.75	8.39	6.36	2.318	
1,000.00	1,000.00	997.67	995.17	3.58	3.55	139.32	-21.76	18.71	29.10	22.07	7.03	4.137	
1,100.00	1,099.98	1,094.75	1,090.49	3.93	3.95	-70.99	-38.51	26.31	47.02	39.34	7.69	6.118	
1,200.00	1,199.84	1,190.83	1,184.15	4.26	4.37	-70.97	-57.98	35.15	67.16	58.83	8.32	8.068	
1,300.00	1,299.45	1,287.11	1,277.35	4.60	4.83	-72.50	-80.02	45.16	89.06	80.07	8.99	9.903	
1,400.00	1,398.70	1,384.65	1,371.63	4.95	5.30	-74.99	-102.73	55.47	110.56	100.84	9.72	11.375	
1,500.00	1,497.47	1,482.16	1,465.90	5.31	5.79	-78.04	-125.45	65.78	131.51	121.03	10.48	12.549	
1,600.00	1,595.62	1,579.54	1,560.04	5.69	6.29	-81.44	-148.13	76.08	152.28	140.99	11.28	13.498	
1,700.00	1,693.06	1,676.65	1,653.92	6.10	6.80	-85.07	-170.75	86.35	173.23	161.10	12.13	14.278	
1,800.00	1,790.08	1,773.60	1,747.65	6.53	7.31	-88.76	-193.33	96.61	194.81	181.79	13.02	14.959	
1,900.00	1,887.11	1,870.55	1,841.37	6.98	7.82	-91.71	-215.92	106.86	217.01	203.08	13.93	15.575	
2,000.00	1,984.14	1,967.50	1,935.09	7.44	8.34	-94.11	-238.50	117.11	239.66	224.80	14.86	16.128	
2,100.00	2,081.17	2,064.45	2,028.82	7.91	8.86	-96.10	-261.08	127.37	262.65	246.85	15.80	16.625	
2,200.00	2,178.20	2,161.40	2,122.54	8.38	9.39	-97.77	-283.66	137.62	285.89	269.14	16.75	17.072	
2,300.00	2,275.23	2,258.35	2,216.26	8.87	9.91	-99.19	-306.25	147.87	309.32	291.62	17.70	17.474	
2,400.00	2,372.26	2,355.30	2,309.99	9.36	10.44	-100.41	-328.83	158.13	332.91	314.25	18.66	17.837	
2,500.00	2,469.29	2,452.25	2,403.71	9.85	10.97	-101.47	-351.41	168.38	356.63	337.00	19.63	18.167	
2,600.00	2,566.32	2,549.20	2,497.43	10.36	11.51	-102.40	-373.99	178.63	380.45	359.84	20.60	18.466	
2,700.00	2,663.35	2,646.15	2,591.16	10.86	12.04	-103.22	-396.58	188.89	404.34	382.77	21.58	18.738	
2,800.00	2,760.38	2,743.10	2,684.88	11.37	12.57	-103.94	-419.16	199.14	428.31	405.75	22.56	18.987	
2,900.00	2,857.41	2,840.05	2,778.60	11.88	13.11	-104.59	-441.74	209.39	452.34	428.80	23.54	19.216	
3,000.00	2,954.44	2,937.00	2,872.33	12.39	13.64	-105.18	-464.32	219.65	476.41	451.89	24.52	19.427	
3,100.00	3,051.47	3,033.95	2,966.05	12.91	14.18	-105.70	-486.91	229.90	500.53	475.02	25.51	19.621	
3,200.00	3,148.50	3,130.90	3,059.77	13.42	14.72	-106.18	-509.49	240.15	524.69	498.19	26.50	19.800	
3,300.00	3,245.53	3,227.84	3,153.50	13.94	15.25	-106.62	-532.07	250.41	548.87	521.38	27.49	19.967	
3,400.00	3,342.56	3,324.79	3,247.22	14.46	15.79	-107.02	-554.65	260.66	573.09	544.61	28.48	20.122	
3,500.00	3,439.59	3,421.74	3,340.95	14.99	16.33	-107.39	-577.24	270.91	597.33	567.85	29.47	20.266	
3,600.00	3,536.62	3,518.69	3,434.67	15.51	16.87	-107.73	-599.82	281.17	621.58	591.12	30.47	20.401	
3,700.00	3,633.65	3,615.64	3,528.39	16.03	17.41	-108.04	-622.40	291.42	645.86	614.40	31.46	20.527	
3,800.00	3,730.68	3,712.59	3,622.12	16.56	17.95	-108.34	-644.98	301.67	670.16	637.70	32.46	20.645	
3,900.00	3,827.71	3,809.54	3,715.84	17.09	18.49	-108.61	-667.57	311.93	694.47	661.01	33.46	20.756	
4,000.00	3,924.74	3,906.49	3,809.56	17.61	19.03	-108.86	-690.15	322.18	718.79	684.34	34.46	20.861	
4,100.00	4,021.77	4,003.44	3,903.29	18.14	19.57	-109.09	-712.73	332.43	743.13	707.67	35.46	20.959	
4,200.00	4,118.79	4,100.39	3,997.01	18.67	20.11	-109.32	-735.31	342.69	767.48	731.02	36.46	21.052	
4,300.00	4,215.82	4,197.34	4,090.73	19.20	20.65	-109.52	-757.90	352.94	791.84	754.38	37.46	21.140	
4,400.00	4,312.85	4,294.29	4,184.46	19.73	21.20	-109.72	-780.48	363.19	816.20	777.74	38.46	21.223	
4,500.00	4,409.88	4,391.24	4,278.18	20.26	21.74	-109.90	-803.06	373.45	840.58	801.12	39.46	21.302	
4,600.00	4,506.91	4,488.19	4,371.90	20.79	22.28	-110.08	-825.64	383.70	864.96	824.50	40.46	21.377	
4,700.00	4,603.94	4,585.14	4,465.63	21.32	22.82	-110.24	-848.23	393.95	889.35	847.89	41.47	21.448	
4,800.00	4,700.97	4,682.09	4,559.35	21.86	23.36	-110.40	-870.81	404.21	913.75	871.28	42.47	21.516	
4,900.00	4,798.00	4,779.04	4,653.07	22.39	23.91	-110.54	-893.39	414.46	938.15	894.68	43.47	21.580	
5,000.00	4,895.03	4,875.99	4,746.80	22.92	24.45	-110.68	-915.97	424.71	962.56	918.08	44.48	21.642	

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #660H - OH - Plan #1													Offset Site Error: 0.00 ft
Survey Program: 0-MWD													Offset Well Error: 0.00 ft
Rule Assigned:													
Measured Depth (ft)	Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
8,600.00	6,983.46	6,868.20	6,663.86	54.63	34.89	37.49	-1,376.02	528.02	637.32	570.06	67.25	9.477	
8,700.00	6,983.55	6,850.00	6,648.00	57.31	34.85	35.73	-1,372.37	536.17	716.97	649.53	67.44	10.632	
8,800.00	6,983.64	6,825.91	6,626.68	60.02	34.80	33.50	-1,367.45	546.24	800.03	732.73	67.30	11.888	
8,900.00	6,983.73	6,800.00	6,603.35	62.77	34.74	31.24	-1,362.05	556.14	885.89	818.82	67.07	13.208	
9,000.00	6,983.81	6,800.00	6,603.35	65.55	34.74	31.24	-1,362.05	556.14	973.71	906.20	67.51	14.424	
9,100.00	6,983.90	6,780.15	6,585.23	68.35	34.68	29.60	-1,357.84	563.06	1,063.20	995.84	67.36	15.784	
9,200.00	6,983.99	6,768.17	6,574.20	71.17	34.65	28.64	-1,355.27	566.95	1,154.10	1,086.73	67.37	17.131	
9,300.00	6,984.08	6,750.00	6,557.33	74.02	34.60	27.25	-1,351.34	572.45	1,246.17	1,178.93	67.24	18.533	
9,400.00	6,984.16	6,750.00	6,557.33	76.88	34.60	27.25	-1,351.34	572.45	1,339.05	1,271.62	67.42	19.860	
9,500.00	6,984.25	6,750.00	6,557.33	79.75	34.60	27.25	-1,351.34	572.45	1,432.88	1,365.32	67.56	21.209	
9,600.00	6,984.34	6,731.00	6,539.54	82.64	34.54	25.86	-1,347.18	577.66	1,527.10	1,459.71	67.38	22.663	
9,700.00	6,984.43	6,723.71	6,532.68	85.55	34.52	25.35	-1,345.57	579.52	1,622.01	1,554.63	67.38	24.072	
9,800.00	6,984.52	6,700.00	6,510.22	88.46	34.45	23.74	-1,340.30	585.00	1,717.71	1,650.55	67.16	25.578	
9,900.00	6,984.60	6,700.00	6,510.22	91.39	34.45	23.74	-1,340.30	585.00	1,813.33	1,746.09	67.24	26.967	
10,000.00	6,984.69	6,700.00	6,510.22	94.32	34.45	23.74	-1,340.30	585.00	1,909.40	1,842.08	67.31	28.365	
10,100.00	6,984.78	6,700.00	6,510.22	97.26	34.45	23.74	-1,340.30	585.00	2,005.85	1,938.48	67.37	29.772	
10,200.00	6,984.87	6,700.00	6,510.22	100.22	34.45	23.74	-1,340.30	585.00	2,102.64	2,035.21	67.42	31.186	
10,300.00	6,984.96	6,700.00	6,510.22	103.17	34.45	23.74	-1,340.30	585.00	2,199.71	2,132.24	67.47	32.605	
10,400.00	6,985.04	6,700.00	6,510.22	106.14	34.45	23.74	-1,340.30	585.00	2,297.03	2,229.53	67.50	34.029	
10,500.00	6,985.13	6,700.00	6,510.22	109.11	34.45	23.74	-1,340.30	585.00	2,394.58	2,327.04	67.53	35.457	
10,600.00	6,985.22	6,678.72	6,489.91	112.09	34.37	22.39	-1,335.52	589.18	2,491.87	2,424.50	67.37	36.990	
10,700.00	6,985.31	6,675.25	6,486.59	115.07	34.36	22.17	-1,334.73	589.80	2,589.63	2,522.26	67.37	38.441	
10,800.00	6,985.39	6,671.99	6,483.46	118.05	34.34	21.97	-1,333.99	590.36	2,687.53	2,620.16	67.37	39.892	
10,900.00	6,985.48	6,650.00	6,462.32	121.04	34.26	20.68	-1,329.00	593.72	2,785.91	2,718.70	67.21	41.451	
11,000.00	6,985.57	6,650.00	6,462.32	124.04	34.26	20.68	-1,329.00	593.72	2,883.96	2,816.72	67.24	42.889	
11,100.00	6,985.66	6,650.00	6,462.32	127.04	34.26	20.68	-1,329.00	593.72	2,982.14	2,914.87	67.27	44.328	
11,200.00	6,985.75	6,650.00	6,462.32	130.04	34.26	20.68	-1,329.00	593.72	3,080.44	3,013.14	67.31	45.768	
11,300.00	6,985.83	6,650.00	6,462.32	133.05	34.26	20.68	-1,329.00	593.72	3,178.85	3,111.51	67.33	47.210	
11,400.00	6,985.92	6,650.00	6,462.32	136.05	34.26	20.68	-1,329.00	593.72	3,277.35	3,209.99	67.36	48.652	
11,500.00	6,986.01	6,650.00	6,462.32	139.07	34.26	20.68	-1,329.00	593.72	3,375.94	3,308.55	67.39	50.095	
11,600.00	6,986.10	6,650.00	6,462.32	142.08	34.26	20.68	-1,329.00	593.72	3,474.61	3,407.19	67.42	51.537	
11,700.00	6,986.18	6,650.00	6,462.32	145.10	34.26	20.68	-1,329.00	593.72	3,573.36	3,505.91	67.45	52.980	
11,800.00	6,986.27	6,650.00	6,462.32	148.12	34.26	20.68	-1,329.00	593.72	3,672.17	3,604.69	67.47	54.423	
11,900.00	6,986.36	6,650.00	6,462.32	151.14	34.26	20.68	-1,329.00	593.72	3,771.04	3,703.54	67.50	55.866	
12,000.00	6,986.45	6,650.00	6,462.32	154.16	34.26	20.68	-1,329.00	593.72	3,869.98	3,802.45	67.53	57.308	
12,100.00	6,986.54	6,650.00	6,462.32	157.19	34.26	20.68	-1,329.00	593.72	3,968.96	3,901.40	67.56	58.749	
12,200.00	6,986.62	6,650.00	6,462.32	160.21	34.26	20.68	-1,329.00	593.72	4,068.00	4,000.41	67.59	60.190	
12,300.00	6,986.71	6,650.00	6,462.32	163.24	34.26	20.68	-1,329.00	593.72	4,167.08	4,099.46	67.62	61.629	
12,400.00	6,986.80	6,650.00	6,462.32	166.28	34.26	20.68	-1,329.00	593.72	4,266.20	4,198.56	67.64	63.068	
12,500.00	6,986.89	6,650.00	6,462.32	169.31	34.26	20.68	-1,329.00	593.72	4,365.37	4,297.69	67.67	64.505	
12,600.00	6,986.98	6,650.00	6,462.32	172.34	34.26	20.68	-1,329.00	593.72	4,464.57	4,396.87	67.70	65.942	
12,700.00	6,987.06	6,650.00	6,462.32	175.38	34.26	20.68	-1,329.00	593.72	4,563.81	4,496.07	67.74	67.377	
12,800.00	6,987.15	6,650.00	6,462.32	178.41	34.26	20.68	-1,329.00	593.72	4,663.08	4,595.31	67.77	68.810	
12,900.00	6,987.24	6,650.00	6,462.32	181.45	34.26	20.68	-1,329.00	593.72	4,762.38	4,694.58	67.80	70.242	
13,000.00	6,987.33	6,650.00	6,462.32	184.49	34.26	20.68	-1,329.00	593.72	4,861.71	4,793.87	67.83	71.673	
13,100.00	6,987.41	6,650.00	6,462.32	187.53	34.26	20.68	-1,329.00	593.72	4,961.06	4,893.20	67.87	73.102	
13,200.00	6,987.50	6,627.77	6,440.84	190.57	34.17	19.44	-1,323.91	596.35	5,060.01	4,992.25	67.76	74.681	
13,300.00	6,987.59	6,626.72	6,439.82	193.62	34.17	19.38	-1,323.67	596.45	5,159.37	5,091.59	67.78	76.115	
13,400.00	6,987.68	6,625.70	6,438.84	196.66	34.16	19.33	-1,323.44	596.55	5,258.76	5,190.94	67.81	77.547	
13,500.00	6,987.77	6,624.72	6,437.89	199.71	34.16	19.28	-1,323.21	596.65	5,358.16	5,290.32	67.84	78.977	
13,600.00	6,987.85	6,623.77	6,436.97	202.75	34.15	19.23	-1,322.99	596.74	5,457.59	5,389.71	67.88	80.405	
13,700.00	6,987.94	6,622.85	6,436.07	205.80	34.15	19.18	-1,322.78	596.83	5,557.04	5,489.13	67.91	81.831	

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #660H - OH - Plan #1													Offset Site Error: 0.00 ft	
Survey Program: 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	
13,800.00	6,988.03	6,600.00	6,413.91	208.85	34.05	18.00	-1,317.51	598.55	5,656.92	5,589.12	67.81	83.429		
13,900.00	6,988.12	6,600.00	6,413.91	211.89	34.05	18.00	-1,317.51	598.55	5,756.37	5,688.52	67.85	84.845		
14,000.00	6,988.20	6,600.00	6,413.91	214.94	34.05	18.00	-1,317.51	598.55	5,855.84	5,787.95	67.89	86.259		
14,100.00	6,988.29	6,600.00	6,413.91	217.99	34.05	18.00	-1,317.51	598.55	5,955.32	5,887.39	67.93	87.671		
14,200.00	6,988.38	6,600.00	6,413.91	221.04	34.05	18.00	-1,317.51	598.55	6,054.82	5,986.85	67.97	89.080		
14,300.00	6,988.47	6,600.00	6,413.91	224.10	34.05	18.00	-1,317.51	598.55	6,154.34	6,086.33	68.01	90.488		
14,400.00	6,988.56	6,600.00	6,413.91	227.15	34.05	18.00	-1,317.51	598.55	6,253.88	6,185.82	68.06	91.892		
14,500.00	6,988.64	6,600.00	6,413.91	230.20	34.05	18.00	-1,317.51	598.55	6,353.42	6,285.32	68.10	93.295		
14,600.00	6,988.73	6,600.00	6,413.91	233.25	34.05	18.00	-1,317.51	598.55	6,452.99	6,384.84	68.15	94.695		
14,700.00	6,988.82	6,600.00	6,413.91	236.31	34.05	18.00	-1,317.51	598.55	6,552.56	6,484.37	68.19	96.092		
14,800.00	6,988.91	6,600.00	6,413.91	239.36	34.05	18.00	-1,317.51	598.55	6,652.15	6,583.91	68.24	97.487		
14,900.00	6,989.00	6,600.00	6,413.91	242.42	34.05	18.00	-1,317.51	598.55	6,751.75	6,683.47	68.28	98.879		
15,000.00	6,989.08	6,600.00	6,413.91	245.47	34.05	18.00	-1,317.51	598.55	6,851.36	6,783.03	68.33	100.268		
15,100.00	6,989.17	6,600.00	6,413.91	248.53	34.05	18.00	-1,317.51	598.55	6,950.99	6,882.61	68.38	101.655		
15,200.00	6,989.26	6,600.00	6,413.91	251.58	34.05	18.00	-1,317.51	598.55	7,050.62	6,982.19	68.43	103.039		
15,300.00	6,989.35	6,600.00	6,413.91	254.64	34.05	18.00	-1,317.51	598.55	7,150.26	7,081.79	68.48	104.420		
15,400.00	6,989.43	6,600.00	6,413.91	257.70	34.05	18.00	-1,317.51	598.55	7,249.92	7,181.39	68.53	105.798		
15,500.00	6,989.52	6,600.00	6,413.91	260.76	34.05	18.00	-1,317.51	598.55	7,349.58	7,281.01	68.58	107.174		
15,600.00	6,989.61	6,600.00	6,413.91	263.81	34.05	18.00	-1,317.51	598.55	7,449.25	7,380.63	68.63	108.547		
15,700.00	6,989.70	6,600.00	6,413.91	266.87	34.05	18.00	-1,317.51	598.55	7,548.94	7,480.26	68.68	109.916		
15,800.00	6,989.79	6,600.00	6,413.91	269.93	34.05	18.00	-1,317.51	598.55	7,648.62	7,579.89	68.73	111.283		
15,900.00	6,989.87	6,600.00	6,413.91	272.99	34.05	18.00	-1,317.51	598.55	7,748.32	7,679.54	68.78	112.647		
16,000.00	6,989.96	6,600.00	6,413.91	276.05	34.05	18.00	-1,317.51	598.55	7,848.03	7,779.19	68.84	114.008		
16,100.00	6,990.05	6,600.00	6,413.91	279.11	34.05	18.00	-1,317.51	598.55	7,947.74	7,878.85	68.89	115.366		
16,200.00	6,990.14	6,600.00	6,413.91	282.17	34.05	18.00	-1,317.51	598.55	8,047.46	7,978.51	68.95	116.721		
16,300.00	6,990.22	6,600.00	6,413.91	285.23	34.05	18.00	-1,317.51	598.55	8,147.19	8,078.18	69.00	118.072		
16,400.00	6,990.31	6,600.00	6,413.91	288.29	34.05	18.00	-1,317.51	598.55	8,246.92	8,177.86	69.06	119.421		
16,500.00	6,990.40	6,600.00	6,413.91	291.35	34.05	18.00	-1,317.51	598.55	8,346.66	8,277.54	69.11	120.766		
16,600.00	6,990.49	6,600.00	6,413.91	294.42	34.05	18.00	-1,317.51	598.55	8,446.40	8,377.23	69.17	122.108		
16,700.00	6,990.58	6,600.00	6,413.91	297.48	34.05	18.00	-1,317.51	598.55	8,546.16	8,476.93	69.23	123.447		
16,800.00	6,990.66	6,600.00	6,413.91	300.54	34.05	18.00	-1,317.51	598.55	8,645.91	8,576.63	69.29	124.783		
16,900.00	6,990.75	6,600.00	6,413.91	303.60	34.05	18.00	-1,317.51	598.55	8,745.68	8,676.33	69.35	126.115		
17,000.00	6,990.84	6,600.00	6,413.91	306.67	34.05	18.00	-1,317.51	598.55	8,845.44	8,776.04	69.41	127.445		
17,100.00	6,990.93	6,600.00	6,413.91	309.73	34.05	18.00	-1,317.51	598.55	8,945.22	8,875.75	69.47	128.771		
17,200.00	6,991.02	6,600.00	6,413.91	312.79	34.05	18.00	-1,317.51	598.55	9,045.00	8,975.47	69.53	130.093		
17,300.00	6,991.10	6,600.00	6,413.91	315.86	34.05	18.00	-1,317.51	598.55	9,144.78	9,075.19	69.59	131.412		
17,400.00	6,991.19	6,600.00	6,413.91	318.92	34.05	18.00	-1,317.51	598.55	9,244.57	9,174.92	69.65	132.728		
17,500.00	6,991.28	6,600.00	6,413.91	321.98	34.05	18.00	-1,317.51	598.55	9,344.36	9,274.65	69.71	134.041		
17,600.00	6,991.37	6,600.00	6,413.91	325.05	34.05	18.00	-1,317.51	598.55	9,444.16	9,374.38	69.78	135.350		
17,700.00	6,991.45	6,600.00	6,413.91	328.11	34.05	18.00	-1,317.51	598.55	9,543.96	9,474.12	69.84	136.656		
17,800.00	6,991.54	6,600.00	6,413.91	331.18	34.05	18.00	-1,317.51	598.55	9,643.76	9,573.86	69.90	137.958		
17,900.00	6,991.63	6,600.00	6,413.91	334.24	34.05	18.00	-1,317.51	598.55	9,743.57	9,673.60	69.97	139.257		
18,000.00	6,991.72	6,600.00	6,413.91	337.31	34.05	18.00	-1,317.51	598.55	9,843.39	9,773.35	70.03	140.552		
18,100.00	6,991.81	6,600.00	6,413.91	340.37	34.05	18.00	-1,317.51	598.55	9,943.20	9,873.10	70.10	141.844		

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #662H - OH - Plan #2													Offset Site Error: 0.00 ft
Survey Program: 0-MWD													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)			
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	0.36	0.36	-27.33	40.10	-20.72	45.14	44.42	0.72	62.957	
200.00	200.00	200.00	200.00	0.72	0.72	-27.33	40.10	-20.72	45.14	43.70	1.43	31.479	
300.00	300.00	300.00	300.00	1.08	1.08	-27.33	40.10	-20.72	45.14	42.99	2.15	20.986	
400.00	400.00	400.00	400.00	1.43	1.43	-27.33	40.10	-20.72	45.14	42.27	2.87	15.739	
500.00	500.00	500.00	500.00	1.79	1.79	-27.33	40.10	-20.72	45.14	41.55	3.58	12.591	
600.00	600.00	600.00	600.00	2.15	2.15	-27.33	40.10	-20.72	45.14	40.84	4.30	10.493	
700.00	700.00	700.00	700.00	2.51	2.51	-27.33	40.10	-20.72	45.14	40.12	5.02	8.994	
800.00	800.00	800.00	800.00	2.87	2.87	-27.33	40.10	-20.72	45.14	39.40	5.74	7.870	
900.00	900.00	900.00	900.00	3.23	3.23	-27.33	40.10	-20.72	45.14	38.68	6.45	6.995	
1,000.00	1,000.00	1,000.00	1,000.00	3.58	3.58	-27.33	40.10	-20.72	45.14	37.97	7.17	6.296	CC, ES
1,100.00	1,099.98	1,098.75	1,098.73	3.93	3.93	118.18	40.78	-22.28	47.28	39.42	7.86	6.016	
1,200.00	1,199.84	1,197.21	1,197.06	4.26	4.28	119.45	42.80	-26.95	53.74	45.21	8.53	6.299	
1,300.00	1,299.45	1,295.59	1,295.08	4.60	4.63	121.07	46.10	-34.56	64.41	55.19	9.21	6.991	
1,400.00	1,398.70	1,394.64	1,393.70	4.95	4.99	123.90	49.75	-43.00	77.61	67.70	9.92	7.828	
1,500.00	1,497.47	1,493.27	1,491.90	5.31	5.35	127.57	53.39	-51.40	93.05	82.42	10.63	8.753	
1,600.00	1,595.62	1,591.36	1,589.57	5.69	5.71	131.46	57.01	-59.75	111.05	99.70	11.36	9.779	
1,700.00	1,693.06	1,688.79	1,686.58	6.10	6.07	135.25	60.61	-68.05	131.89	119.80	12.09	10.909	
1,800.00	1,790.08	1,785.85	1,783.22	6.53	6.43	138.67	64.19	-76.31	154.47	141.64	12.83	12.042	
1,900.00	1,887.11	1,882.91	1,879.86	6.98	6.80	141.21	67.77	-84.58	177.44	163.88	13.57	13.079	
2,000.00	1,884.14	1,879.97	1,876.51	7.44	7.16	143.17	71.35	-92.84	200.67	186.36	14.31	14.023	
2,100.00	2,081.17	2,077.03	2,073.15	7.91	7.53	144.72	74.94	-101.11	224.08	209.02	15.06	14.881	
2,200.00	2,178.20	2,174.09	2,169.79	8.38	7.89	145.98	78.52	-109.37	247.61	231.80	15.81	15.662	
2,300.00	2,275.23	2,271.15	2,266.43	8.87	8.26	147.02	82.10	-117.64	271.24	254.67	16.56	16.376	
2,400.00	2,372.26	2,368.21	2,363.08	9.36	8.63	147.89	85.68	-125.90	294.93	277.61	17.32	17.029	
2,500.00	2,469.29	2,465.28	2,459.72	9.85	9.00	148.64	89.26	-134.17	318.68	300.61	18.08	17.628	
2,600.00	2,566.32	2,562.34	2,556.36	10.36	9.37	149.28	92.84	-142.44	342.48	323.64	18.84	18.179	
2,700.00	2,663.35	2,659.40	2,653.00	10.86	9.74	149.84	96.43	-150.70	366.31	346.71	19.60	18.687	
2,800.00	2,760.38	2,756.46	2,749.64	11.37	10.11	150.33	100.01	-158.97	390.17	369.80	20.37	19.157	
2,900.00	2,857.41	2,853.52	2,846.29	11.88	10.48	150.76	103.59	-167.23	414.05	392.92	21.13	19.592	
3,000.00	2,954.44	2,950.58	2,942.93	12.39	10.86	151.14	107.17	-175.50	437.96	416.06	21.90	19.997	
3,100.00	3,051.47	3,047.64	3,039.57	12.91	11.23	151.49	110.75	-183.76	461.88	439.21	22.67	20.374	
3,200.00	3,148.50	3,144.70	3,136.21	13.42	11.60	151.80	114.34	-192.03	485.81	462.37	23.44	20.726	
3,300.00	3,245.53	3,241.77	3,232.86	13.94	11.97	152.08	117.92	-200.29	509.76	485.55	24.21	21.055	
3,400.00	3,342.56	3,338.83	3,329.50	14.46	12.35	152.34	121.50	-208.56	533.72	508.73	24.98	21.364	
3,500.00	3,439.59	3,435.89	3,426.14	14.99	12.72	152.58	125.08	-216.83	557.68	531.93	25.75	21.654	
3,600.00	3,536.62	3,532.95	3,522.78	15.51	13.09	152.79	128.66	-225.09	581.66	555.13	26.53	21.926	
3,700.00	3,633.65	3,630.01	3,619.42	16.03	13.47	152.99	132.24	-233.36	605.64	578.34	27.30	22.183	
3,800.00	3,730.68	3,727.07	3,716.07	16.56	13.84	153.18	135.83	-241.62	629.63	601.55	28.08	22.425	
3,900.00	3,827.71	3,824.13	3,812.71	17.09	14.22	153.35	139.41	-249.89	653.62	624.77	28.85	22.654	
4,000.00	3,924.74	3,921.19	3,909.35	17.61	14.59	153.50	142.99	-258.15	677.62	647.99	29.63	22.870	
4,100.00	4,021.77	4,018.25	4,005.99	18.14	14.96	153.65	146.57	-266.42	701.63	671.22	30.41	23.076	
4,200.00	4,118.79	4,115.32	4,102.64	18.67	15.34	153.79	150.15	-274.68	725.63	694.45	31.18	23.271	
4,300.00	4,215.82	4,212.38	4,199.28	19.20	15.71	153.92	153.73	-282.95	749.65	717.69	31.96	23.456	
4,400.00	4,312.85	4,309.44	4,295.92	19.73	16.09	154.04	157.32	-291.21	773.66	740.92	32.74	23.632	
4,500.00	4,409.88	4,406.50	4,392.56	20.26	16.46	154.15	160.90	-299.48	797.68	764.16	33.52	23.800	
4,600.00	4,506.91	4,503.56	4,489.20	20.79	16.84	154.26	164.48	-307.75	821.70	787.40	34.29	23.960	
4,700.00	4,603.94	4,600.62	4,585.85	21.32	17.21	154.36	168.06	-316.01	845.72	810.65	35.07	24.113	
4,800.00	4,700.97	4,697.68	4,682.49	21.86	17.59	154.45	171.64	-324.28	869.75	833.89	35.85	24.258	
4,900.00	4,798.00	4,794.74	4,779.13	22.39	17.96	154.54	175.23	-332.54	893.77	857.14	36.63	24.398	
5,000.00	4,895.03	4,891.80	4,875.77	22.92	18.34	154.63	178.81	-340.81	917.80	880.39	37.41	24.532	
5,100.00	4,992.06	4,988.87	4,972.42	23.46	18.71	154.71	182.39	-349.07	941.84	903.64	38.19	24.659	

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #662H - OH - Plan #2													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			
5,200.00	5,089.09	5,085.93	5,069.06	23.99	19.09	154.79	185.97	-357.34	965.87	926.89	38.97	24.782			
5,300.00	5,186.12	5,182.99	5,165.70	24.52	19.46	154.86	189.55	-365.60	989.90	950.15	39.76	24.900			
5,400.00	5,283.15	5,280.05	5,262.34	25.06	19.84	154.93	193.13	-373.87	1,013.94	973.40	40.54	25.013			
5,500.00	5,380.18	5,377.11	5,358.98	25.59	20.22	155.00	196.72	-382.13	1,037.98	996.66	41.32	25.122			
5,600.00	5,477.21	5,474.17	5,455.63	26.13	20.59	155.06	200.30	-390.40	1,062.02	1,019.92	42.10	25.226			
5,700.00	5,574.24	5,571.23	5,552.27	26.66	20.97	155.12	203.88	-398.67	1,086.06	1,043.17	42.88	25.327			
5,800.00	5,671.27	5,668.29	5,648.91	27.20	21.34	155.18	207.46	-406.93	1,110.10	1,066.43	43.66	25.424			
5,900.00	5,768.30	5,765.35	5,745.55	27.73	21.72	155.23	211.04	-415.20	1,134.14	1,089.69	44.45	25.517			
6,000.00	5,865.33	5,862.42	5,842.20	28.27	22.09	155.29	214.63	-423.46	1,158.18	1,112.95	45.23	25.607			
6,100.00	5,962.36	5,959.48	5,938.84	28.80	22.47	155.34	218.21	-431.73	1,182.22	1,136.21	46.01	25.694			
6,200.00	6,059.39	6,056.54	6,035.48	29.34	22.85	155.39	221.79	-439.99	1,206.27	1,159.48	46.79	25.778			
6,300.00	6,156.42	6,153.60	6,132.12	29.87	23.22	155.44	225.37	-448.26	1,230.32	1,182.74	47.58	25.859			
6,400.00	6,253.45	6,250.66	6,228.76	30.41	23.60	155.48	228.95	-456.52	1,254.36	1,206.00	48.36	25.938			
6,412.00	6,265.09	6,262.31	6,240.36	30.48	23.64	155.49	229.38	-457.52	1,257.25	1,208.79	48.45	25.947			
6,450.00	6,302.10	6,299.23	6,277.13	30.67	23.79	169.07	230.74	-460.66	1,266.17	1,217.42	48.75	25.973			
6,500.00	6,351.06	6,340.05	6,317.80	30.90	23.94	-168.96	232.25	-463.77	1,277.31	1,228.25	49.07	26.031			
6,550.00	6,400.04	6,375.84	6,353.54	31.10	24.07	-146.63	233.54	-464.61	1,288.09	1,238.77	49.32	26.117			
6,600.00	6,448.74	6,411.75	6,389.41	31.27	24.18	-128.93	234.81	-463.42	1,298.47	1,248.93	49.54	26.208			
6,650.00	6,496.86	6,450.00	6,427.47	31.41	24.29	-116.60	236.14	-459.94	1,308.42	1,258.66	49.76	26.294			
6,700.00	6,544.10	6,484.11	6,461.19	31.53	24.38	-108.12	237.28	-454.90	1,317.88	1,267.95	49.93	26.395			
6,750.00	6,590.17	6,520.65	6,496.95	31.62	24.47	-102.17	238.47	-447.52	1,326.82	1,276.72	50.10	26.482			
6,800.00	6,634.80	6,557.50	6,532.52	31.70	24.56	-97.85	239.62	-438.00	1,335.20	1,284.93	50.27	26.560			
6,850.00	6,677.69	6,600.00	6,572.79	31.76	24.65	-94.69	240.88	-424.49	1,342.99	1,292.53	50.47	26.612			
6,900.00	6,718.59	6,632.27	6,602.71	31.79	24.71	-92.20	241.80	-412.46	1,350.13	1,299.52	50.61	26.677			
6,950.00	6,757.25	6,670.29	6,637.14	31.82	24.79	-90.35	242.82	-396.35	1,356.64	1,305.84	50.80	26.704			
7,000.00	6,793.42	6,708.82	6,670.97	31.83	24.86	-88.93	243.79	-377.97	1,362.48	1,311.45	51.02	26.703			
7,050.00	6,826.89	6,750.00	6,705.84	31.82	24.94	-87.91	244.75	-356.09	1,367.63	1,316.34	51.29	26.664			
7,100.00	6,857.45	6,787.58	6,736.37	31.81	25.02	-87.12	245.55	-334.20	1,372.07	1,320.48	51.59	26.595			
7,150.00	6,884.91	6,827.94	6,767.65	31.79	25.11	-86.62	246.34	-308.73	1,375.81	1,323.84	51.97	26.475			
7,200.00	6,909.09	6,869.04	6,797.79	31.76	25.21	-86.35	247.05	-280.81	1,378.83	1,326.41	52.42	26.304			
7,250.00	6,929.86	6,910.94	6,826.60	31.73	25.34	-86.28	247.67	-250.39	1,381.13	1,328.17	52.96	26.080			
7,300.00	6,947.08	6,953.72	6,853.89	31.70	25.49	-86.39	248.21	-217.46	1,382.71	1,329.12	53.59	25.801			
7,350.00	6,960.65	6,997.46	6,879.43	31.68	25.69	-86.68	248.66	-181.97	1,383.57	1,329.24	54.33	25.465			
7,400.00	6,970.48	7,042.24	6,903.00	31.68	25.94	-87.13	249.00	-143.91	1,383.73	1,328.54	55.19	25.074			
7,450.00	6,976.51	7,088.15	6,924.33	31.71	26.25	-87.75	249.22	-103.26	1,383.19	1,327.03	56.15	24.632			
7,495.26	6,978.67	7,130.76	6,941.47	31.80	26.59	-88.43	249.31	-64.26	1,382.10	1,324.97	57.13	24.193			
7,500.00	6,978.73	7,135.29	6,943.13	31.81	26.63	-88.50	249.32	-60.05	1,381.96	1,324.72	57.24	24.145			
7,600.00	6,980.01	7,236.00	6,972.31	32.47	27.64	-89.66	249.08	36.24	1,379.17	1,319.40	59.77	23.074			
7,700.00	6,981.29	7,343.61	6,986.32	33.86	29.03	-90.19	248.16	142.79	1,376.22	1,313.39	62.82	21.906			
7,755.27	6,982.00	7,401.32	6,987.03	34.81	29.87	-90.18	247.41	200.49	1,374.35	1,309.69	64.66	21.254			
7,800.00	6,982.47	7,446.03	6,987.07	35.63	30.61	-90.18	246.82	245.20	1,373.16	1,306.92	66.24	20.730			
7,857.27	6,982.79	7,503.30	6,987.12	36.76	31.56	-90.18	246.06	302.46	1,372.61	1,304.28	68.32	20.090			
7,876.01	6,982.83	7,522.03	6,987.14	37.13	31.90	-90.18	245.81	321.19	1,372.67	1,303.63	69.04	19.882			
7,900.00	6,982.85	7,546.03	6,987.16	37.63	32.35	-90.18	245.49	345.18	1,372.82	1,302.84	69.98	19.618			
8,000.00	6,982.94	7,646.02	6,987.26	39.78	34.27	-90.18	244.16	445.17	1,373.44	1,299.40	74.04	18.549			
8,100.00	6,983.02	7,746.02	6,987.35	42.06	36.36	-90.18	242.82	545.16	1,374.07	1,295.69	78.38	17.530			
8,200.00	6,983.11	7,846.02	6,987.45	44.43	38.57	-90.18	241.49	645.15	1,374.70	1,291.75	82.95	16.572			
8,300.00	6,983.20	7,946.02	6,987.54	46.89	40.90	-90.18	240.16	745.14	1,375.33	1,287.61	87.72	15.678			
8,400.00	6,983.29	8,046.02	6,987.64	49.42	43.32	-90.18	238.83	845.13	1,375.96	1,283.30	92.65	14.851			
8,500.00	6,983.37	8,146.01	6,987.73	52.00	45.82	-90.18	237.50	945.12	1,376.58	1,278.86	97.72	14.087			
8,600.00	6,983.46	8,246.01	6,987.83	54.63	48.39	-90.18	236.16	1,045.11	1,377.21	1,274.30	102.91	13.382			
8,700.00	6,983.55	8,346.01	6,987.92	57.31	51.01	-90.18	234.83	1,145.10	1,377.84	1,269.64	108.20	12.734			

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #662H - OH - Plan #2												Offset Site Error:	0.00 ft
Survey Program: 0-MWD												Offset Well Error:	0.00 ft
Measured Depth (ft)	Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
8,800.00	6,983.64	8,446.01	6,988.02	60.02	53.68	-90.18	233.50	1,245.09	1,378.47	1,264.89	113.58	12.137	
8,900.00	6,983.73	8,546.01	6,988.11	62.77	56.39	-90.18	232.17	1,345.07	1,379.10	1,260.06	119.03	11.586	
9,000.00	6,983.81	8,646.00	6,988.20	65.55	59.14	-90.18	230.84	1,445.06	1,379.72	1,255.17	124.55	11.078	
9,100.00	6,983.90	8,746.00	6,988.30	68.35	61.91	-90.18	229.50	1,545.05	1,380.35	1,250.22	130.13	10.608	
9,200.00	6,983.99	8,846.00	6,988.39	71.17	64.72	-90.18	228.17	1,645.04	1,380.98	1,245.23	135.75	10.173	
9,300.00	6,984.08	8,946.00	6,988.49	74.02	67.55	-90.18	226.84	1,745.03	1,381.61	1,240.19	141.42	9.770	
9,400.00	6,984.16	9,046.00	6,988.58	76.88	70.39	-90.18	225.51	1,845.02	1,382.23	1,235.11	147.13	9.395	
9,500.00	6,984.25	9,145.99	6,988.68	79.75	73.26	-90.18	224.18	1,945.01	1,382.86	1,229.99	152.87	9.046	
9,600.00	6,984.34	9,245.99	6,988.77	82.64	76.14	-90.18	222.84	2,045.00	1,383.49	1,224.85	158.64	8.721	
9,700.00	6,984.43	9,345.99	6,988.87	85.55	79.04	-90.18	221.51	2,144.99	1,384.12	1,219.68	164.44	8.417	
9,800.00	6,984.52	9,445.99	6,988.96	88.46	81.95	-90.18	220.18	2,244.98	1,384.75	1,214.48	170.27	8.133	
9,900.00	6,984.60	9,545.99	6,989.06	91.39	84.87	-90.18	218.85	2,344.97	1,385.37	1,209.26	176.11	7.866	
10,000.00	6,984.69	9,645.98	6,989.15	94.32	87.80	-90.18	217.52	2,444.95	1,386.00	1,204.02	181.98	7.616	
10,100.00	6,984.78	9,745.98	6,989.24	97.26	90.75	-90.18	216.19	2,544.94	1,386.63	1,198.77	187.86	7.381	
10,200.00	6,984.87	9,845.98	6,989.34	100.22	93.69	-90.18	214.85	2,644.93	1,387.26	1,193.49	193.76	7.159	
10,300.00	6,984.96	9,945.98	6,989.43	103.17	96.65	-90.19	213.52	2,744.92	1,387.88	1,188.20	199.68	6.951	
10,400.00	6,985.04	10,045.98	6,989.53	106.14	99.62	-90.19	212.19	2,844.91	1,388.51	1,182.90	205.61	6.753	
10,500.00	6,985.13	10,145.97	6,989.62	109.11	102.59	-90.19	210.86	2,944.90	1,389.14	1,177.59	211.55	6.566	
10,600.00	6,985.22	10,245.97	6,989.72	112.09	105.56	-90.19	209.53	3,044.89	1,389.77	1,172.26	217.51	6.390	
10,700.00	6,985.31	10,345.97	6,989.81	115.07	108.55	-90.19	208.19	3,144.88	1,390.40	1,166.92	223.47	6.222	
10,800.00	6,985.39	10,445.97	6,989.91	118.05	111.53	-90.19	206.86	3,244.87	1,391.02	1,161.58	229.45	6.063	
10,900.00	6,985.48	10,545.97	6,990.00	121.04	114.53	-90.19	205.53	3,344.86	1,391.65	1,156.22	235.43	5.911	
11,000.00	6,985.57	10,645.96	6,990.10	124.04	117.52	-90.19	204.20	3,444.85	1,392.28	1,150.86	241.42	5.767	
11,100.00	6,985.66	10,745.96	6,990.19	127.04	120.52	-90.19	202.87	3,544.84	1,392.91	1,145.49	247.42	5.630	
11,200.00	6,985.75	10,845.96	6,990.28	130.04	123.52	-90.19	201.53	3,644.82	1,393.54	1,140.11	253.43	5.499	
11,300.00	6,985.83	10,945.96	6,990.38	133.05	126.53	-90.19	200.20	3,744.81	1,394.16	1,134.72	259.44	5.374	
11,400.00	6,985.92	11,045.96	6,990.47	136.05	129.54	-90.19	198.87	3,844.80	1,394.79	1,129.33	265.46	5.254	
11,500.00	6,986.01	11,145.95	6,990.57	139.07	132.55	-90.19	197.54	3,944.79	1,395.42	1,123.93	271.49	5.140	
11,600.00	6,986.10	11,245.95	6,990.66	142.08	135.57	-90.19	196.21	4,044.78	1,396.05	1,118.53	277.52	5.030	
11,700.00	6,986.18	11,345.95	6,990.76	145.10	138.59	-90.19	194.87	4,144.77	1,396.67	1,113.12	283.55	4.926	
11,800.00	6,986.27	11,445.95	6,990.85	148.12	141.61	-90.19	193.54	4,244.76	1,397.30	1,107.71	289.59	4.825	
11,900.00	6,986.36	11,545.95	6,990.95	151.14	144.63	-90.19	192.21	4,344.75	1,397.93	1,102.29	295.64	4.728	
12,000.00	6,986.45	11,645.94	6,991.04	154.16	147.66	-90.19	190.88	4,444.74	1,398.56	1,096.87	301.69	4.636	
12,100.00	6,986.54	11,745.94	6,991.14	157.19	150.68	-90.19	189.55	4,544.73	1,399.19	1,091.44	307.74	4.547	
12,200.00	6,986.62	11,845.94	6,991.23	160.21	153.71	-90.19	188.21	4,644.72	1,399.81	1,086.01	313.80	4.461	
12,300.00	6,986.71	11,945.94	6,991.32	163.24	156.74	-90.19	186.88	4,744.70	1,400.44	1,080.58	319.86	4.378	
12,400.00	6,986.80	12,045.94	6,991.42	166.28	159.78	-90.19	185.55	4,844.69	1,401.07	1,075.15	325.92	4.299	
12,500.00	6,986.89	12,145.94	6,991.51	169.31	162.81	-90.19	184.22	4,944.68	1,401.70	1,069.71	331.99	4.222	
12,600.00	6,986.98	12,245.93	6,991.61	172.34	165.84	-90.19	182.89	5,044.67	1,402.33	1,064.26	338.06	4.148	
12,700.00	6,987.06	12,345.93	6,991.70	175.38	168.88	-90.19	181.56	5,144.66	1,402.95	1,058.82	344.13	4.077	
12,800.00	6,987.15	12,445.93	6,991.80	178.41	171.92	-90.19	180.22	5,244.65	1,403.58	1,053.37	350.21	4.008	
12,900.00	6,987.24	12,545.93	6,991.89	181.45	174.96	-90.19	178.89	5,344.64	1,404.21	1,047.92	356.29	3.941	
13,000.00	6,987.33	12,645.93	6,991.99	184.49	178.00	-90.19	177.56	5,444.63	1,404.84	1,042.47	362.37	3.877	
13,100.00	6,987.41	12,745.92	6,992.08	187.53	181.04	-90.19	176.23	5,544.62	1,405.46	1,037.01	368.45	3.815	
13,200.00	6,987.50	12,845.92	6,992.18	190.57	184.08	-90.19	174.90	5,644.61	1,406.09	1,031.56	374.54	3.754	
13,300.00	6,987.59	12,945.92	6,992.27	193.62	187.13	-90.19	173.56	5,744.60	1,406.72	1,026.10	380.62	3.696	
13,400.00	6,987.68	13,045.92	6,992.36	196.66	190.17	-90.19	172.23	5,844.58	1,407.35	1,020.63	386.71	3.639	
13,500.00	6,987.77	13,145.92	6,992.46	199.71	193.22	-90.19	170.90	5,944.57	1,407.98	1,015.17	392.80	3.584	
13,600.00	6,987.85	13,245.91	6,992.55	202.75	196.26	-90.19	169.57	6,044.56	1,408.60	1,009.71	398.90	3.531	
13,700.00	6,987.94	13,345.91	6,992.65	205.80	199.31	-90.19	168.24	6,144.55	1,409.23	1,004.24	404.99	3.480	
13,800.00	6,988.03	13,445.91	6,992.74	208.85	202.36	-90.19	166.90	6,244.54	1,409.86	998.77	411.09	3.430	
13,900.00	6,988.12	13,545.91	6,992.84	211.89	205.41	-90.19	165.57	6,344.53	1,410.49	993.30	417.19	3.381	

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #662H - OH - Plan #2												Offset Site Error: 0.00 ft	
Survey Program: 0-MWD				Reference				Rule Assigned:				Offset Well Error: 0.00 ft	
Measured Depth (ft)		Vertical Depth (ft)		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
14,000.00	6,988.20	13,645.91	6,992.93	214.94	208.45	-90.19	164.24	6,444.52	1,411.12	987.83	423.28	3.334	
14,100.00	6,988.29	13,745.90	6,993.03	217.99	211.51	-90.19	162.91	6,544.51	1,411.74	982.36	429.38	3.288	
14,200.00	6,988.38	13,845.90	6,993.12	221.04	214.56	-90.19	161.58	6,644.50	1,412.37	976.88	435.49	3.243	
14,300.00	6,988.47	13,945.90	6,993.22	224.10	217.61	-90.19	160.24	6,744.49	1,413.00	971.41	441.59	3.200	
14,400.00	6,988.56	14,045.90	6,993.31	227.15	220.66	-90.19	158.91	6,844.48	1,413.63	965.93	447.69	3.158	
14,500.00	6,988.64	14,145.90	6,993.40	230.20	223.71	-90.19	157.58	6,944.47	1,414.25	960.45	453.80	3.116	
14,600.00	6,988.73	14,245.89	6,993.50	233.25	226.77	-90.19	156.25	7,044.45	1,414.88	954.97	459.91	3.076	
14,700.00	6,988.82	14,345.89	6,993.59	236.31	229.82	-90.19	154.92	7,144.44	1,415.51	949.49	466.02	3.037	
14,800.00	6,988.91	14,445.89	6,993.69	239.36	232.87	-90.19	153.58	7,244.43	1,416.14	944.01	472.12	2.999	
14,900.00	6,989.00	14,545.89	6,993.78	242.42	235.93	-90.19	152.25	7,344.42	1,416.77	938.53	478.24	2.962	
15,000.00	6,989.08	14,645.89	6,993.88	245.47	238.98	-90.19	150.92	7,444.41	1,417.39	933.05	484.35	2.926	
15,100.00	6,989.17	14,745.88	6,993.97	248.53	242.04	-90.19	149.59	7,544.40	1,418.02	927.56	490.46	2.891	
15,200.00	6,989.26	14,845.88	6,994.07	251.58	245.10	-90.19	148.26	7,644.39	1,418.65	922.08	496.57	2.857	
15,300.00	6,989.35	14,945.88	6,994.16	254.64	248.15	-90.19	146.93	7,744.38	1,419.28	916.59	502.69	2.823	
15,400.00	6,989.43	15,045.88	6,994.26	257.70	251.21	-90.19	145.59	7,844.37	1,419.90	911.10	508.80	2.791	
15,500.00	6,989.52	15,145.88	6,994.35	260.76	254.27	-90.20	144.26	7,944.36	1,420.53	905.62	514.92	2.759	
15,600.00	6,989.61	15,245.87	6,994.44	263.81	257.32	-90.20	142.93	8,044.35	1,421.16	900.13	521.03	2.728	
15,700.00	6,989.70	15,345.87	6,994.54	266.87	260.38	-90.20	141.60	8,144.33	1,421.79	894.64	527.15	2.697	
15,800.00	6,989.79	15,445.87	6,994.63	269.93	263.44	-90.20	140.27	8,244.32	1,422.42	889.15	533.27	2.667	
15,900.00	6,989.87	15,545.87	6,994.73	272.99	266.50	-90.20	138.93	8,344.31	1,423.04	883.66	539.39	2.638	
16,000.00	6,989.96	15,645.87	6,994.82	276.05	269.56	-90.20	137.60	8,444.30	1,423.67	878.17	545.51	2.610	
16,100.00	6,990.05	15,745.86	6,994.92	279.11	272.62	-90.20	136.27	8,544.29	1,424.30	872.67	551.63	2.582	
16,200.00	6,990.14	15,845.86	6,995.01	282.17	275.68	-90.20	134.94	8,644.28	1,424.93	867.18	557.75	2.555	
16,300.00	6,990.22	15,945.86	6,995.11	285.23	278.74	-90.20	133.61	8,744.27	1,425.56	861.69	563.87	2.528	
16,400.00	6,990.31	16,045.86	6,995.20	288.29	281.80	-90.20	132.27	8,844.26	1,426.18	856.19	569.99	2.502	
16,500.00	6,990.40	16,145.86	6,995.30	291.35	284.86	-90.20	130.94	8,944.25	1,426.81	850.70	576.11	2.477	
16,600.00	6,990.49	16,245.85	6,995.39	294.42	287.92	-90.20	129.61	9,044.24	1,427.44	845.20	582.24	2.452	
16,700.00	6,990.58	16,345.85	6,995.48	297.48	290.98	-90.20	128.28	9,144.23	1,428.07	839.71	588.36	2.427	
16,800.00	6,990.66	16,445.85	6,995.58	300.54	294.04	-90.20	126.95	9,244.21	1,428.69	834.21	594.48	2.403	
16,900.00	6,990.75	16,545.85	6,995.67	303.60	297.11	-90.20	125.61	9,344.20	1,429.32	828.72	600.61	2.380	
17,000.00	6,990.84	16,645.85	6,995.77	306.67	300.17	-90.20	124.28	9,444.19	1,429.95	823.22	606.73	2.357	
17,100.00	6,990.93	16,745.84	6,995.86	309.73	303.23	-90.20	122.95	9,544.18	1,430.58	817.72	612.86	2.334	
17,200.00	6,991.02	16,845.84	6,995.96	312.79	306.29	-90.20	121.62	9,644.17	1,431.21	812.22	618.98	2.312	
17,300.00	6,991.10	16,945.84	6,996.05	315.86	309.36	-90.20	120.29	9,744.16	1,431.83	806.72	625.11	2.291	
17,400.00	6,991.19	17,045.84	6,996.15	318.92	312.42	-90.20	118.96	9,844.15	1,432.46	801.22	631.24	2.269	
17,500.00	6,991.28	17,145.84	6,996.24	321.98	315.48	-90.20	117.62	9,944.14	1,433.09	795.72	637.37	2.248	
17,600.00	6,991.37	17,245.83	6,996.34	325.05	318.54	-90.20	116.29	10,044.13	1,433.72	790.22	643.49	2.228	
17,700.00	6,991.45	17,345.83	6,996.43	328.11	321.61	-90.20	114.96	10,144.12	1,434.35	784.72	649.62	2.208	
17,800.00	6,991.54	17,445.83	6,996.52	331.18	324.67	-90.20	113.63	10,244.11	1,434.97	779.22	655.75	2.188	
17,900.00	6,991.63	17,545.83	6,996.62	334.24	327.74	-90.20	112.30	10,344.10	1,435.60	773.72	661.88	2.169	
18,000.00	6,991.72	17,645.83	6,996.71	337.31	330.80	-90.20	110.96	10,444.08	1,436.23	768.22	668.01	2.150	
18,100.00	6,991.81	17,745.82	6,996.81	340.37	333.86	-90.20	109.63	10,544.07	1,436.86	762.72	674.14	2.131	
18,200.00	6,991.89	17,845.82	6,996.90	343.44	336.93	-90.20	108.30	10,644.06	1,437.48	757.22	680.27	2.113	
18,300.00	6,991.98	17,945.82	6,997.00	346.50	339.99	-90.20	106.97	10,744.05	1,438.11	751.71	686.40	2.095	
18,321.44	6,992.00	17,948.87	6,997.00	347.16	340.09	-90.20	106.93	10,747.10	1,438.36	751.36	687.01	2.094 SF	

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #663H - OH - Plan #1													Offset Site Error: 0.00 ft
Survey Program: 0-MWD													Offset Well Error: 0.00 ft
Rule Assigned:													
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.00	0.00	0.00	0.00	0.00	0.00	-27.67	26.66	-13.98	30.10				
100.00	100.00	100.00	100.00	0.36	0.36	-27.67	26.66	-13.98	30.10	29.39	0.72	41.988	
200.00	200.00	200.00	200.00	0.72	0.72	-27.67	26.66	-13.98	30.10	28.67	1.43	20.994	
300.00	300.00	300.00	300.00	1.08	1.08	-27.67	26.66	-13.98	30.10	27.95	2.15	13.996	
400.00	400.00	400.00	400.00	1.43	1.43	-27.67	26.66	-13.98	30.10	27.24	2.87	10.497	
500.00	500.00	500.00	500.00	1.79	1.79	-27.67	26.66	-13.98	30.10	26.52	3.58	8.398	
600.00	600.00	600.38	600.36	2.15	2.14	-30.82	25.29	-15.09	29.45	25.17	4.29	6.869	
700.00	700.00	700.51	700.34	2.51	2.48	-40.94	21.21	-18.40	28.08	23.10	4.98	5.635	
760.90	760.90	761.26	760.90	2.73	2.69	-50.97	17.41	-21.48	27.65	22.24	5.41	5.108 CC	
800.00	800.00	800.15	799.60	2.87	2.82	-58.80	14.46	-23.87	27.91	22.22	5.69	4.907 ES	
900.00	900.00	899.33	898.09	3.23	3.18	-80.22	5.38	-31.23	31.75	25.35	6.39	4.965	
1,000.00	1,000.00	998.58	996.59	3.58	3.55	-95.95	-4.05	-38.88	39.24	32.14	7.10	5.527	
1,100.00	1,099.98	1,098.02	1,095.29	3.93	3.93	40.04	-13.51	-46.54	47.35	39.56	7.79	6.080	
1,200.00	1,199.84	1,197.77	1,194.28	4.26	4.32	35.85	-22.99	-54.23	53.41	44.93	8.47	6.304	
1,300.00	1,299.45	1,297.70	1,293.46	4.60	4.71	34.44	-32.49	-61.93	56.77	47.60	9.17	6.191	
1,400.00	1,398.70	1,397.69	1,392.70	4.95	5.11	35.13	-41.99	-69.64	57.28	47.40	9.88	5.796	
1,500.00	1,497.47	1,497.62	1,491.88	5.31	5.51	37.97	-51.49	-77.34	55.01	44.39	10.62	5.181	
1,600.00	1,595.62	1,597.37	1,590.88	5.69	5.91	43.68	-60.98	-85.03	50.30	38.91	11.39	4.417	
1,700.00	1,693.06	1,696.81	1,689.58	6.10	6.31	53.98	-70.43	-92.70	44.03	31.81	12.22	3.602	
1,800.00	1,790.08	1,796.07	1,788.09	6.53	6.71	69.28	-79.87	-100.35	38.93	25.78	13.15	2.961	
1,892.23	1,879.58	1,887.61	1,878.94	6.94	7.08	85.95	-88.57	-107.40	37.27	23.26	14.01	2.660	
1,900.00	1,887.11	1,895.32	1,886.59	6.98	7.11	87.40	-89.30	-108.00	37.28	23.20	14.08	2.648	
2,000.00	1,984.14	1,994.57	1,985.10	7.44	7.51	105.24	-98.74	-115.65	39.52	24.61	14.91	2.651	
2,100.00	2,081.17	2,093.83	2,083.61	7.91	7.91	119.96	-108.17	-123.30	45.07	29.46	15.61	2.887	
2,200.00	2,178.20	2,193.08	2,182.12	8.38	8.32	130.94	-117.61	-130.95	52.89	36.64	16.26	3.253	
2,300.00	2,275.23	2,292.34	2,280.62	8.87	8.72	138.89	-127.04	-138.60	62.14	45.24	16.91	3.676	
2,400.00	2,372.26	2,391.59	2,379.13	9.36	9.13	144.72	-136.48	-146.25	72.27	54.70	17.57	4.113	
2,500.00	2,469.29	2,490.84	2,477.64	9.85	9.53	149.08	-145.92	-153.90	82.96	64.71	18.25	4.545	
2,600.00	2,566.32	2,590.10	2,576.15	10.36	9.94	152.44	-155.35	-161.55	94.02	75.07	18.95	4.962	
2,700.00	2,663.35	2,689.35	2,674.65	10.86	10.35	155.09	-164.79	-169.20	105.32	85.67	19.65	5.359	
2,800.00	2,760.38	2,788.60	2,773.16	11.37	10.75	157.21	-174.22	-176.85	116.81	96.44	20.37	5.735	
2,900.00	2,857.41	2,887.86	2,871.67	11.88	11.16	158.96	-183.66	-184.50	128.43	107.34	21.09	6.090	
3,000.00	2,954.44	2,987.11	2,970.17	12.39	11.57	160.42	-193.09	-192.15	140.14	118.32	21.82	6.424	
3,100.00	3,051.47	3,086.36	3,068.68	12.91	11.97	161.65	-202.53	-199.80	151.93	129.38	22.55	6.738	
3,200.00	3,148.50	3,185.62	3,167.19	13.42	12.38	162.70	-211.97	-207.45	163.78	140.50	23.28	7.035	
3,300.00	3,245.53	3,284.87	3,265.70	13.94	12.79	163.61	-221.40	-215.10	175.68	151.66	24.02	7.314	
3,400.00	3,342.56	3,384.12	3,364.20	14.46	13.20	164.41	-230.84	-222.75	187.61	162.85	24.76	7.578	
3,500.00	3,439.59	3,483.38	3,462.71	14.99	13.61	165.11	-240.27	-230.40	199.58	174.08	25.50	7.826	
3,600.00	3,536.62	3,582.63	3,561.22	15.51	14.01	165.73	-249.71	-238.05	211.57	185.33	26.24	8.062	
3,700.00	3,633.65	3,681.89	3,659.73	16.03	14.42	166.29	-259.14	-245.70	223.59	196.60	26.99	8.284	
3,800.00	3,730.68	3,781.14	3,758.23	16.56	14.83	166.78	-268.58	-253.35	235.62	207.88	27.74	8.495	
3,900.00	3,827.71	3,880.39	3,856.74	17.09	15.24	167.23	-278.02	-261.00	247.67	219.19	28.48	8.695	
4,000.00	3,924.74	3,979.65	3,955.25	17.61	15.65	167.64	-287.45	-268.65	259.73	230.50	29.23	8.885	
4,100.00	4,021.77	4,078.90	4,053.76	18.14	16.06	168.01	-296.89	-276.30	271.81	241.82	29.98	9.065	
4,200.00	4,118.79	4,178.15	4,152.26	18.67	16.46	168.35	-306.32	-283.95	283.89	253.16	30.73	9.237	
4,300.00	4,215.82	4,277.41	4,250.77	19.20	16.87	168.66	-315.76	-291.60	295.99	264.50	31.48	9.401	
4,400.00	4,312.85	4,376.66	4,349.28	19.73	17.28	168.95	-325.19	-299.25	308.09	275.85	32.24	9.557	
4,500.00	4,409.88	4,475.91	4,447.79	20.26	17.69	169.22	-334.63	-306.90	320.20	287.21	32.99	9.706	
4,600.00	4,506.91	4,575.17	4,546.29	20.79	18.10	169.46	-344.06	-314.55	332.31	298.57	33.74	9.849	
4,700.00	4,603.94	4,674.42	4,644.80	21.32	18.51	169.69	-353.50	-322.20	344.43	309.94	34.50	9.985	
4,800.00	4,700.97	4,773.68	4,743.31	21.86	18.92	169.91	-362.94	-329.85	356.56	321.31	35.25	10.115	
4,900.00	4,798.00	4,872.93	4,841.82	22.39	19.33	170.11	-372.37	-337.50	368.69	332.69	36.00	10.240	

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #663H - OH - Plan #1													Offset Site Error: 0.00 ft
Survey Program: 0-MWD													Offset Well Error: 0.00 ft
Rule Assigned:													
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
5,000.00	4,895.03	4,972.18	4,940.32	22.92	19.74	170.29	-381.81	-345.15	380.82	344.07	36.76	10.360	
5,100.00	4,992.06	5,071.44	5,038.83	23.46	20.15	170.47	-391.24	-352.80	392.96	355.45	37.51	10.475	
5,200.00	5,089.09	5,170.69	5,137.34	23.99	20.55	170.63	-400.68	-360.45	405.10	366.83	38.27	10.585	
5,300.00	5,186.12	5,269.94	5,235.85	24.52	20.96	170.79	-410.11	-368.10	417.25	378.22	39.03	10.691	
5,400.00	5,283.15	5,369.20	5,334.35	25.06	21.37	170.94	-419.55	-375.75	429.40	389.61	39.78	10.794	
5,500.00	5,380.18	5,468.45	5,432.86	25.59	21.78	171.07	-428.99	-383.40	441.55	401.01	40.54	10.892	
5,600.00	5,477.21	5,567.70	5,531.37	26.13	22.19	171.20	-438.42	-391.05	453.70	412.40	41.30	10.986	
5,700.00	5,574.24	5,666.96	5,629.88	26.66	22.60	171.33	-447.86	-398.70	465.86	423.80	42.05	11.078	
5,800.00	5,671.27	5,766.21	5,728.38	27.20	23.01	171.45	-457.29	-406.35	478.01	435.20	42.81	11.166	
5,900.00	5,768.30	5,865.47	5,826.89	27.73	23.42	171.56	-466.73	-414.00	490.17	446.60	43.57	11.251	
6,000.00	5,865.33	5,964.72	5,925.40	28.27	23.83	171.67	-476.16	-421.65	502.33	458.01	44.33	11.333	
6,100.00	5,962.36	6,063.97	6,023.91	28.80	24.24	171.77	-485.60	-429.30	514.49	469.41	45.08	11.412	
6,200.00	6,059.39	6,163.23	6,122.41	29.34	24.65	171.86	-495.04	-436.95	526.66	480.82	45.84	11.489	
6,300.00	6,156.42	6,262.48	6,220.92	29.87	25.06	171.96	-504.47	-444.60	538.82	492.22	46.60	11.563	
6,400.00	6,253.45	6,361.73	6,319.43	30.41	25.47	172.04	-513.91	-452.25	550.99	503.63	47.36	11.634	
6,412.00	6,265.09	6,373.64	6,331.25	30.48	25.52	172.05	-515.04	-453.17	552.45	505.00	47.45	11.643	
6,450.00	6,302.10	6,411.41	6,368.73	30.67	25.67	-174.88	-518.63	-456.08	556.55	508.81	47.74	11.658	
6,500.00	6,351.06	6,461.10	6,418.04	30.90	25.88	-153.87	-523.35	-459.91	560.35	512.23	48.13	11.643	
6,550.00	6,400.04	6,510.49	6,467.07	31.10	26.08	-132.91	-528.05	-463.71	562.39	513.88	48.52	11.592	
6,600.00	6,448.74	6,550.00	6,506.35	31.27	26.24	-116.64	-531.82	-465.58	563.36	514.52	48.84	11.534	
6,650.00	6,496.86	6,582.40	6,538.59	31.41	26.35	-105.59	-534.92	-465.28	563.87	514.78	49.09	11.486	
6,700.00	6,544.10	6,618.64	6,574.59	31.53	26.47	-98.52	-538.39	-462.99	563.99	514.64	49.35	11.429	
6,750.00	6,590.17	6,650.00	6,605.59	31.62	26.57	-93.85	-541.40	-459.36	563.79	514.24	49.55	11.378	
6,773.18	6,611.05	6,672.25	6,627.46	31.66	26.63	-92.49	-543.52	-455.85	563.54	513.82	49.72	11.335	
6,800.00	6,634.80	6,692.09	6,646.85	31.70	26.69	-91.11	-545.40	-452.07	563.21	513.35	49.86	11.296	
6,850.00	6,677.69	6,729.39	6,682.93	31.76	26.78	-89.35	-548.92	-443.34	562.39	512.27	50.13	11.219	
6,900.00	6,718.59	6,767.14	6,718.88	31.79	26.86	-88.38	-552.43	-432.36	561.37	510.95	50.43	11.133	
6,950.00	6,757.25	6,805.40	6,754.57	31.82	26.94	-87.99	-555.93	-419.07	560.20	509.44	50.76	11.036	
7,000.00	6,793.42	6,844.22	6,789.91	31.83	27.01	-88.06	-559.41	-403.40	558.93	507.79	51.14	10.929	
7,050.00	6,826.89	6,883.68	6,824.79	31.82	27.07	-88.48	-562.86	-385.29	557.63	506.05	51.58	10.811	
7,100.00	6,857.45	6,923.84	6,859.07	31.81	27.13	-89.20	-566.27	-364.67	556.36	504.28	52.08	10.682	
7,150.00	6,884.91	6,964.79	6,892.62	31.79	27.18	-90.17	-569.61	-341.44	555.19	502.54	52.65	10.545	
7,200.00	6,909.09	7,006.62	6,925.29	31.76	27.22	-91.35	-572.89	-315.53	554.18	500.90	53.28	10.402	
7,250.00	6,929.86	7,050.00	6,957.30	31.73	27.26	-92.73	-576.12	-286.44	553.38	499.42	53.96	10.255	
7,300.00	6,947.08	7,093.34	6,987.23	31.70	27.29	-94.24	-579.16	-255.26	552.85	498.14	54.71	10.106	
7,350.00	6,960.65	7,138.46	7,016.08	31.68	27.32	-95.91	-582.11	-220.70	552.64	497.15	55.49	9.959	
7,355.78	6,961.98	7,143.77	7,019.31	31.68	27.32	-96.11	-582.44	-216.50	552.64	497.05	55.59	9.942	
7,400.00	6,970.48	7,184.95	7,043.18	31.68	27.35	-97.72	-584.91	-183.04	552.78	496.47	56.31	9.817	
7,450.00	6,976.51	7,232.96	7,068.21	31.71	27.38	-99.64	-587.53	-142.17	553.30	496.16	57.14	9.683	
7,495.26	6,978.67	7,277.88	7,088.78	31.80	27.43	-101.48	-589.72	-102.31	554.11	496.20	57.91	9.569	
7,500.00	6,978.73	7,282.67	7,090.81	31.81	27.43	-101.69	-589.94	-97.98	554.21	496.23	57.99	9.558	
7,600.00	6,980.01	7,391.07	7,127.82	32.47	27.89	-105.42	-594.02	3.69	556.51	496.63	59.88	9.294	
7,700.00	6,981.29	7,509.92	7,148.04	33.86	29.21	-107.41	-596.57	120.61	556.97	494.51	62.46	8.918	
7,755.27	6,982.00	7,574.30	7,150.00	34.81	30.11	-107.58	-597.09	184.93	555.72	491.49	64.23	8.652	
7,800.00	6,982.47	7,619.01	7,150.00	35.63	30.81	-107.57	-597.32	229.64	554.79	489.10	65.69	8.445	
7,837.34	6,982.72	7,656.35	7,150.00	36.37	31.43	-107.56	-597.51	266.98	554.55	487.57	66.98	8.279	
7,876.01	6,982.83	7,695.02	7,150.00	37.13	32.07	-107.54	-597.71	305.65	554.81	486.50	68.31	8.122	
7,900.00	6,982.85	7,719.01	7,150.00	37.63	32.50	-107.53	-597.84	329.64	555.13	485.94	69.19	8.023	
8,000.00	6,982.94	7,819.00	7,150.00	39.78	34.39	-107.47	-598.35	429.63	556.48	483.48	73.01	7.622	
8,100.00	6,983.02	7,918.99	7,150.00	42.06	36.43	-107.42	-598.87	529.61	557.83	480.75	77.09	7.237	
8,200.00	6,983.11	8,018.98	7,150.00	44.43	38.61	-107.37	-599.39	629.60	559.18	477.79	81.39	6.870	
8,300.00	6,983.20	8,118.97	7,150.00	46.89	40.90	-107.31	-599.90	729.59	560.54	474.64	85.89	6.526	

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #663H - OH - Plan #1													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	
8,400.00	6,983.29	8,218.96	7,150.00	49.42	43.29	-107.26	-600.42	829.58	561.89	471.33	90.56	6.205		
8,500.00	6,983.37	8,318.95	7,150.00	52.00	45.75	-107.21	-600.94	929.57	563.24	467.88	95.36	5.906		
8,600.00	6,983.46	8,418.94	7,150.00	54.63	48.29	-107.16	-601.45	1,029.55	564.59	464.31	100.29	5.630		
8,700.00	6,983.55	8,518.93	7,150.00	57.31	50.88	-107.11	-601.97	1,129.54	565.95	460.63	105.31	5.374		
8,800.00	6,983.64	8,618.92	7,150.00	60.02	53.53	-107.06	-602.49	1,229.53	567.30	456.87	110.43	5.137		
8,900.00	6,983.73	8,718.90	7,150.00	62.77	56.21	-107.00	-603.00	1,329.52	568.65	453.02	115.63	4.918		
9,000.00	6,983.81	8,818.89	7,150.00	65.55	58.94	-106.95	-603.52	1,429.51	570.01	449.11	120.90	4.715		
9,100.00	6,983.90	8,918.88	7,150.00	68.35	61.69	-106.90	-604.04	1,529.50	571.36	445.14	126.23	4.527		
9,200.00	6,983.99	9,018.87	7,150.00	71.17	64.48	-106.85	-604.55	1,629.48	572.72	441.11	131.61	4.352		
9,300.00	6,984.08	9,118.86	7,150.00	74.02	67.29	-106.80	-605.07	1,729.47	574.07	437.04	137.03	4.189		
9,400.00	6,984.16	9,218.85	7,150.00	76.88	70.12	-106.75	-605.59	1,829.46	575.43	432.93	142.50	4.038		
9,500.00	6,984.25	9,318.84	7,150.00	79.75	72.97	-106.70	-606.10	1,929.45	576.79	428.78	148.01	3.897		
9,600.00	6,984.34	9,418.83	7,150.00	82.64	75.83	-106.65	-606.62	2,029.44	578.15	424.59	153.55	3.765		
9,700.00	6,984.43	9,518.82	7,150.00	85.55	78.72	-106.60	-607.14	2,129.43	579.50	420.38	159.13	3.642		
9,800.00	6,984.52	9,618.81	7,150.00	88.46	81.61	-106.55	-607.65	2,229.41	580.86	416.13	164.73	3.526		
9,900.00	6,984.60	9,718.80	7,150.00	91.39	84.52	-106.51	-608.17	2,329.40	582.22	411.87	170.35	3.418		
10,000.00	6,984.69	9,818.79	7,150.00	94.32	87.44	-106.46	-608.69	2,429.39	583.58	407.58	176.00	3.316		
10,100.00	6,984.78	9,918.78	7,150.00	97.26	90.37	-106.41	-609.20	2,529.38	584.94	403.27	181.67	3.220		
10,200.00	6,984.87	10,018.77	7,150.00	100.22	93.31	-106.36	-609.72	2,629.37	586.30	398.94	187.36	3.129		
10,300.00	6,984.96	10,118.76	7,150.00	103.17	96.25	-106.31	-610.24	2,729.35	587.66	394.59	193.07	3.044		
10,400.00	6,985.04	10,218.75	7,150.00	106.14	99.21	-106.27	-610.75	2,829.34	589.02	390.23	198.79	2.963		
10,500.00	6,985.13	10,318.74	7,150.00	109.11	102.17	-106.22	-611.27	2,929.33	590.38	385.85	204.53	2.887		
10,600.00	6,985.22	10,418.73	7,150.00	112.09	105.13	-106.17	-611.79	3,029.32	591.74	381.46	210.28	2.814		
10,700.00	6,985.31	10,518.72	7,150.00	115.07	108.11	-106.12	-612.30	3,129.31	593.10	377.05	216.05	2.745		
10,800.00	6,985.39	10,618.71	7,150.00	118.05	111.08	-106.08	-612.82	3,229.30	594.46	372.63	221.83	2.680		
10,900.00	6,985.48	10,718.70	7,150.00	121.04	114.07	-106.03	-613.33	3,329.28	595.83	368.21	227.62	2.618		
11,000.00	6,985.57	10,818.69	7,150.00	124.04	117.05	-105.98	-613.85	3,429.27	597.19	363.77	233.42	2.558		
11,100.00	6,985.66	10,918.67	7,150.00	127.04	120.04	-105.94	-614.37	3,529.26	598.55	359.32	239.23	2.502		
11,200.00	6,985.75	11,018.66	7,150.00	130.04	123.04	-105.89	-614.88	3,629.25	599.92	354.86	245.06	2.448		
11,300.00	6,985.83	11,118.65	7,150.00	133.05	126.04	-105.85	-615.40	3,729.24	601.28	350.39	250.89	2.397		
11,400.00	6,985.92	11,218.64	7,150.00	136.05	129.04	-105.80	-615.92	3,829.22	602.65	345.92	256.73	2.347		
11,500.00	6,986.01	11,318.63	7,150.00	139.07	132.05	-105.76	-616.43	3,929.21	604.01	341.44	262.57	2.300		
11,600.00	6,986.10	11,418.62	7,150.00	142.08	135.05	-105.71	-616.95	4,029.20	605.38	336.95	268.43	2.255		
11,700.00	6,986.18	11,518.61	7,150.00	145.10	138.07	-105.67	-617.47	4,129.19	606.74	332.45	274.29	2.212		
11,800.00	6,986.27	11,618.60	7,150.00	148.12	141.08	-105.62	-617.98	4,229.18	608.11	327.95	280.16	2.171		
11,900.00	6,986.36	11,718.59	7,150.00	151.14	144.10	-105.58	-618.50	4,329.17	609.47	323.44	286.04	2.131		
12,000.00	6,986.45	11,818.58	7,150.00	154.16	147.11	-105.53	-619.02	4,429.15	610.84	318.92	291.92	2.092		
12,100.00	6,986.54	11,918.57	7,150.00	157.19	150.13	-105.49	-619.53	4,529.14	612.21	314.40	297.81	2.056		
12,200.00	6,986.62	12,018.56	7,150.00	160.21	153.16	-105.44	-620.05	4,629.13	613.58	309.87	303.70	2.020		
12,300.00	6,986.71	12,118.55	7,150.00	163.24	156.18	-105.40	-620.57	4,729.12	614.94	305.34	309.60	1.986		
12,400.00	6,986.80	12,218.54	7,150.00	166.28	159.21	-105.36	-621.08	4,829.11	616.31	300.80	315.51	1.953		
12,500.00	6,986.89	12,318.53	7,150.00	169.31	162.23	-105.31	-621.60	4,929.10	617.68	296.26	321.42	1.922		
12,600.00	6,986.98	12,418.52	7,150.00	172.34	165.26	-105.27	-622.12	5,029.08	619.05	291.71	327.34	1.891		
12,700.00	6,987.06	12,518.51	7,150.00	175.38	168.29	-105.23	-622.63	5,129.07	620.42	287.16	333.26	1.862		
12,800.00	6,987.15	12,618.50	7,150.00	178.41	171.32	-105.19	-623.15	5,229.06	621.79	282.60	339.18	1.833		
12,900.00	6,987.24	12,718.49	7,150.00	181.45	174.36	-105.14	-623.67	5,329.05	623.16	278.04	345.11	1.806		
13,000.00	6,987.33	12,818.48	7,150.00	184.49	177.39	-105.10	-624.18	5,429.04	624.53	273.48	351.05	1.779		
13,100.00	6,987.41	12,918.47	7,150.00	187.53	180.43	-105.06	-624.70	5,529.02	625.90	268.91	356.99	1.753		
13,200.00	6,987.50	13,018.46	7,150.00	190.57	183.47	-105.02	-625.22	5,629.01	627.27	264.34	362.93	1.728		
13,300.00	6,987.59	13,118.44	7,150.00	193.62	186.50	-104.97	-625.73	5,729.00	628.64	259.77	368.87	1.704		
13,400.00	6,987.68	13,218.43	7,150.00	196.66	189.54	-104.93	-626.25	5,828.99	630.01	255.19	374.82	1.681		
13,500.00	6,987.77	13,318.42	7,150.00	199.71	192.58	-104.89	-626.77	5,928.98	631.38	250.61	380.78	1.658		

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #663H - OH - Plan #1												Offset Site Error:	0.00 ft
Survey Program: 0-MWD												Offset Well Error:	0.00 ft
Rule Assigned:													
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
13,600.00	6,987.85	13,418.41	7,150.00	202.75	195.62	-104.85	-627.28	6,028.97	632.76	246.02	386.73	1.636	
13,700.00	6,987.94	13,518.40	7,150.00	205.80	198.67	-104.81	-627.80	6,128.95	634.13	241.43	392.70	1.615	
13,800.00	6,988.03	13,618.39	7,150.00	208.85	201.71	-104.77	-628.32	6,228.94	635.50	236.84	398.66	1.594	
13,900.00	6,988.12	13,718.38	7,150.00	211.89	204.75	-104.73	-628.83	6,328.93	636.88	232.25	404.63	1.574	
14,000.00	6,988.20	13,818.37	7,150.00	214.94	207.80	-104.69	-629.35	6,428.92	638.25	227.65	410.60	1.554	
14,100.00	6,988.29	13,918.36	7,150.00	217.99	210.84	-104.65	-629.87	6,528.91	639.62	223.05	416.57	1.535	
14,200.00	6,988.38	14,018.35	7,150.00	221.04	213.89	-104.61	-630.38	6,628.89	641.00	218.45	422.55	1.517	
14,300.00	6,988.47	14,118.34	7,150.00	224.10	216.93	-104.57	-630.90	6,728.88	642.37	213.84	428.53	1.499	Level 3
14,400.00	6,988.56	14,218.33	7,150.00	227.15	219.98	-104.53	-631.42	6,828.87	643.75	209.24	434.51	1.482	Level 3
14,500.00	6,988.64	14,318.32	7,150.00	230.20	223.03	-104.49	-631.93	6,928.86	645.12	204.63	440.49	1.465	Level 3
14,600.00	6,988.73	14,418.31	7,150.00	233.25	226.08	-104.45	-632.45	7,028.85	646.50	200.02	446.48	1.448	Level 3
14,700.00	6,988.82	14,518.30	7,150.00	236.31	229.13	-104.41	-632.97	7,128.84	647.87	195.40	452.47	1.432	Level 3
14,800.00	6,988.91	14,618.29	7,150.00	239.36	232.18	-104.37	-633.48	7,228.82	649.25	190.78	458.47	1.416	Level 3
14,900.00	6,989.00	14,718.28	7,150.00	242.42	235.23	-104.33	-634.00	7,328.81	650.62	186.16	464.46	1.401	Level 3
15,000.00	6,989.08	14,818.27	7,150.00	245.47	238.28	-104.29	-634.52	7,428.80	652.00	181.54	470.46	1.386	Level 3
15,100.00	6,989.17	14,918.26	7,150.00	248.53	241.33	-104.25	-635.03	7,528.79	653.38	176.92	476.46	1.371	Level 3
15,200.00	6,989.26	15,018.25	7,150.00	251.58	244.38	-104.21	-635.55	7,628.78	654.76	172.29	482.46	1.357	Level 3
15,300.00	6,989.35	15,118.24	7,150.00	254.64	247.43	-104.18	-636.06	7,728.77	656.13	167.67	488.47	1.343	Level 3
15,400.00	6,989.43	15,218.23	7,150.00	257.70	250.48	-104.14	-636.58	7,828.75	657.51	163.04	494.47	1.330	Level 3
15,500.00	6,989.52	15,318.21	7,150.00	260.76	253.54	-104.10	-637.10	7,928.74	658.89	158.40	500.48	1.317	Level 3
15,600.00	6,989.61	15,418.20	7,150.00	263.81	256.59	-104.06	-637.61	8,028.73	660.27	153.77	506.50	1.304	Level 3
15,700.00	6,989.70	15,518.19	7,150.00	266.87	259.64	-104.02	-638.13	8,128.72	661.65	149.14	512.51	1.291	Level 3
15,800.00	6,989.79	15,618.18	7,150.00	269.93	262.70	-103.99	-638.65	8,228.71	663.03	144.50	518.53	1.279	Level 3
15,900.00	6,989.87	15,718.17	7,150.00	272.99	265.75	-103.95	-639.16	8,328.69	664.40	139.86	524.54	1.267	Level 3
16,000.00	6,989.96	15,818.16	7,150.00	276.05	268.81	-103.91	-639.68	8,428.68	665.78	135.22	530.56	1.255	Level 3
16,100.00	6,990.05	15,918.15	7,150.00	279.11	271.86	-103.87	-640.20	8,528.67	667.16	130.58	536.59	1.243	Level 2
16,200.00	6,990.14	16,018.14	7,150.00	282.17	274.92	-103.84	-640.71	8,628.66	668.54	125.93	542.61	1.232	Level 2
16,300.00	6,990.22	16,118.13	7,150.00	285.23	277.97	-103.80	-641.23	8,728.65	669.92	121.29	548.64	1.221	Level 2
16,400.00	6,990.31	16,218.12	7,150.00	288.29	281.03	-103.76	-641.75	8,828.64	671.31	116.64	554.66	1.210	Level 2
16,500.00	6,990.40	16,318.11	7,150.00	291.35	284.09	-103.73	-642.26	8,928.62	672.69	111.99	560.69	1.200	Level 2
16,600.00	6,990.49	16,418.10	7,150.00	294.42	287.14	-103.69	-642.78	9,028.61	674.07	107.34	566.73	1.189	Level 2
16,700.00	6,990.58	16,518.09	7,150.00	297.48	290.20	-103.65	-643.30	9,128.60	675.45	102.69	572.76	1.179	Level 2
16,800.00	6,990.66	16,618.08	7,150.00	300.54	293.26	-103.62	-643.81	9,228.59	676.83	98.04	578.79	1.169	Level 2
16,900.00	6,990.75	16,718.07	7,150.00	303.60	296.31	-103.58	-644.33	9,328.58	678.21	93.38	584.83	1.160	Level 2
17,000.00	6,990.84	16,818.06	7,150.00	306.67	299.37	-103.55	-644.85	9,428.56	679.59	88.73	590.87	1.150	Level 2
17,100.00	6,990.93	16,918.05	7,150.00	309.73	302.43	-103.51	-645.36	9,528.55	680.98	84.07	596.91	1.141	Level 2
17,200.00	6,991.02	17,018.04	7,150.00	312.79	305.49	-103.48	-645.88	9,628.54	682.36	79.41	602.95	1.132	Level 2
17,300.00	6,991.10	17,118.03	7,150.00	315.86	308.55	-103.44	-646.40	9,728.53	683.74	74.75	608.99	1.123	Level 2
17,400.00	6,991.19	17,218.02	7,150.00	318.92	311.61	-103.40	-646.91	9,828.52	685.13	70.09	615.04	1.114	Level 2
17,500.00	6,991.28	17,318.01	7,150.00	321.98	314.67	-103.37	-647.43	9,928.51	686.51	65.42	621.09	1.105	Level 2
17,600.00	6,991.37	17,418.00	7,150.00	325.05	317.72	-103.33	-647.95	10,028.49	687.89	60.76	627.13	1.097	Level 2
17,700.00	6,991.45	17,517.99	7,150.00	328.11	320.78	-103.30	-648.46	10,128.48	689.28	56.09	633.18	1.089	Level 2
17,800.00	6,991.54	17,617.97	7,150.00	331.18	323.84	-103.27	-648.98	10,228.47	690.66	51.43	639.23	1.080	Level 2
17,900.00	6,991.63	17,717.96	7,150.00	334.24	326.90	-103.23	-649.50	10,328.46	692.05	46.76	645.29	1.072	Level 2
18,000.00	6,991.72	17,817.95	7,150.00	337.31	329.96	-103.20	-650.01	10,428.45	693.43	42.09	651.34	1.065	Level 2
18,100.00	6,991.81	17,917.94	7,150.00	340.37	333.02	-103.16	-650.53	10,528.44	694.82	37.42	657.40	1.057	Level 2
18,200.00	6,991.89	18,017.93	7,150.00	343.44	336.08	-103.13	-651.05	10,628.42	696.20	32.75	663.45	1.049	Level 2
18,300.00	6,991.98	18,117.92	7,150.00	346.50	339.14	-103.09	-651.56	10,728.41	697.59	28.08	669.51	1.042	Level 2
18,321.44	6,992.00	18,133.59	7,150.00	347.16	339.62	-103.09	-651.64	10,744.08	697.91	27.42	670.49	1.041	Level 2, SF

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #665H - OH - Plan #2												Offset Site Error:	0.00 ft
Survey Program: 0-MWD+HDGM												Offset Well Error:	0.00 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance 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	17.52	0.00	N/A	
100.00	100.00	100.00	100.00	0.36	0.36	2.88	17.50	0.88	17.52	16.81	0.72	24.440	
200.00	200.00	200.00	200.00	0.72	0.72	2.88	17.50	0.88	17.52	16.09	1.43	12.220	
300.00	300.00	300.00	300.00	1.08	1.08	2.88	17.50	0.88	17.52	15.37	2.15	8.147	
400.00	400.00	400.00	400.00	1.43	1.43	2.88	17.50	0.88	17.52	14.65	2.87	6.110	
500.00	500.00	500.00	500.00	1.79	1.79	2.88	17.50	0.88	17.52	13.94	3.58	4.888	
600.00	600.00	600.00	600.00	2.15	2.15	2.88	17.50	0.88	17.52	13.22	4.30	4.073	
700.00	700.00	700.00	700.00	2.51	2.51	2.88	17.50	0.88	17.52	12.50	5.02	3.491	
800.00	800.00	800.00	800.00	2.87	2.87	2.88	17.50	0.88	17.52	11.79	5.74	3.055	
900.00	900.00	900.00	900.00	3.23	3.23	2.88	17.50	0.88	17.52	11.07	6.45	2.716	
1,000.00	1,000.00	1,000.00	1,000.00	3.58	3.58	2.88	17.50	0.88	17.52	10.35	7.17	2.444 CC	
1,000.02	1,000.02	1,000.02	1,000.02	3.58	3.58	2.88	17.50	0.88	17.52	10.35	7.17	2.444	
1,100.00	1,099.98	1,100.46	1,100.44	3.93	3.93	154.27	16.03	1.84	17.69	9.84	7.85	2.253 ES, SF	
1,200.00	1,199.84	1,200.68	1,200.52	4.26	4.26	171.72	11.62	4.73	19.42	10.91	8.51	2.281	
1,300.00	1,299.45	1,300.45	1,299.90	4.60	4.60	-167.85	4.33	9.49	25.25	16.06	9.19	2.748	
1,400.00	1,398.70	1,399.53	1,398.24	4.95	4.94	-152.72	-5.78	16.10	36.35	26.47	9.87	3.682	
1,500.00	1,497.47	1,497.72	1,495.22	5.31	5.29	-143.36	-18.60	24.48	52.35	41.79	10.57	4.955	
1,600.00	1,595.62	1,594.81	1,590.55	5.69	5.65	-137.59	-34.00	34.55	72.72	61.45	11.27	6.451	
1,700.00	1,693.06	1,690.62	1,683.95	6.10	6.03	-133.83	-51.84	46.21	97.12	85.12	12.00	8.094	
1,800.00	1,790.08	1,785.22	1,775.42	6.53	6.42	-131.04	-72.00	59.40	124.21	111.46	12.74	9.746	
1,900.00	1,887.11	1,878.68	1,864.97	6.98	6.84	-128.20	-94.40	74.05	152.96	139.46	13.50	11.328	
2,000.00	1,984.14	1,970.84	1,952.36	7.44	7.27	-125.42	-118.87	90.05	183.55	169.27	14.27	12.860	
2,100.00	2,081.17	2,064.33	2,040.30	7.91	7.74	-122.87	-145.43	107.41	215.66	200.57	15.09	14.288	
2,200.00	2,178.20	2,158.62	2,128.97	8.38	8.23	-120.95	-172.29	124.97	248.12	232.17	15.95	15.555	
2,300.00	2,275.23	2,252.92	2,217.63	8.87	8.73	-119.47	-199.16	142.54	280.78	263.95	16.83	16.685	
2,400.00	2,372.26	2,347.21	2,306.29	9.36	9.25	-118.29	-226.03	160.11	313.57	295.85	17.72	17.696	
2,500.00	2,469.29	2,441.51	2,394.96	9.85	9.78	-117.34	-252.89	177.67	346.46	327.83	18.63	18.602	
2,600.00	2,566.32	2,535.80	2,483.62	10.36	10.31	-116.55	-279.76	195.24	379.42	359.88	19.54	19.416	
2,700.00	2,663.35	2,630.10	2,572.28	10.86	10.85	-115.89	-306.63	212.81	412.43	391.96	20.47	20.151	
2,800.00	2,760.38	2,724.40	2,660.95	11.37	11.40	-115.33	-333.49	230.37	445.48	424.08	21.40	20.816	
2,900.00	2,857.41	2,818.69	2,749.61	11.88	11.95	-114.84	-360.36	247.94	478.57	456.23	22.34	21.421	
3,000.00	2,954.44	2,912.99	2,838.28	12.39	12.51	-114.42	-387.23	265.51	511.68	488.39	23.29	21.972	
3,100.00	3,051.47	3,007.28	2,926.94	12.91	13.07	-114.05	-414.09	283.07	544.81	520.57	24.24	22.476	
3,200.00	3,148.50	3,101.58	3,015.60	13.42	13.64	-113.72	-440.96	300.64	577.97	552.77	25.20	22.938	
3,300.00	3,245.53	3,195.87	3,104.27	13.94	14.21	-113.43	-467.83	318.21	611.13	584.97	26.16	23.363	
3,400.00	3,342.56	3,290.17	3,192.93	14.46	14.78	-113.17	-494.69	335.77	644.31	617.19	27.12	23.755	
3,500.00	3,439.59	3,384.47	3,281.59	14.99	15.36	-112.93	-521.56	353.34	677.51	649.41	28.09	24.117	
3,600.00	3,536.62	3,478.76	3,370.26	15.51	15.93	-112.71	-548.43	370.91	710.71	681.64	29.06	24.453	
3,700.00	3,633.65	3,573.06	3,458.92	16.03	16.51	-112.52	-575.29	388.47	743.91	713.88	30.04	24.766	
3,800.00	3,730.68	3,667.35	3,547.59	16.56	17.09	-112.34	-602.16	406.04	777.13	746.12	31.01	25.057	
3,900.00	3,827.71	3,761.65	3,636.25	17.09	17.67	-112.17	-629.03	423.61	810.35	778.36	31.99	25.329	
4,000.00	3,924.74	3,855.94	3,724.91	17.61	18.26	-112.02	-655.89	441.17	843.58	810.61	32.97	25.583	
4,100.00	4,021.77	3,950.24	3,813.58	18.14	18.84	-111.88	-682.76	458.74	876.81	842.86	33.96	25.821	
4,200.00	4,118.79	4,044.54	3,902.24	18.67	19.43	-111.75	-709.63	476.31	910.05	875.11	34.94	26.045	
4,300.00	4,215.82	4,138.83	3,990.91	19.20	20.01	-111.63	-736.49	493.87	943.29	907.36	35.93	26.255	
4,400.00	4,312.85	4,233.13	4,079.57	19.73	20.60	-111.52	-763.36	511.44	976.53	939.62	36.92	26.453	
4,500.00	4,409.88	4,327.42	4,168.23	20.26	21.19	-111.41	-790.23	529.01	1,009.78	971.88	37.90	26.640	
4,600.00	4,506.91	4,421.72	4,256.90	20.79	21.78	-111.32	-817.09	546.57	1,043.03	1,004.14	38.89	26.817	
4,700.00	4,603.94	4,516.01	4,345.56	21.32	22.37	-111.22	-843.96	564.14	1,076.28	1,036.40	39.89	26.984	
4,800.00	4,700.97	4,610.31	4,434.22	21.86	22.96	-111.14	-870.83	581.71	1,109.54	1,068.66	40.88	27.142	
4,900.00	4,798.00	4,704.61	4,522.89	22.39	23.55	-111.05	-897.69	599.27	1,142.80	1,100.92	41.87	27.293	
5,000.00	4,895.03	4,798.90	4,611.55	22.92	24.14	-110.98	-924.56	616.84	1,176.05	1,133.19	42.87	27.435	

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #665H - OH - Plan #2											Offset Site Error:	0.00 ft
Survey Program: 0-MWD+HDGM											Offset Well Error:	0.00 ft
Reference	Offset	Semi Major Axis		Distance		Rule Assigned:		Warning				
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor
8,700.00	6,983.55	6,900.00	6,563.61	57.31	34.75	41.17	-1,500.79	667.40	717.95	647.77	70.18	10.231
8,800.00	6,983.64	6,853.82	6,526.94	60.02	34.69	38.02	-1,491.21	693.78	782.67	713.22	69.45	11.269
8,900.00	6,983.73	6,821.04	6,500.26	62.77	34.64	35.88	-1,484.16	711.47	852.10	782.91	69.19	12.315
9,000.00	6,983.81	6,800.00	6,482.87	65.55	34.62	34.55	-1,479.55	722.36	925.44	856.17	69.27	13.360
9,100.00	6,983.90	6,764.28	6,452.87	68.35	34.56	32.37	-1,471.53	740.02	1,001.86	933.07	68.80	14.562
9,200.00	6,983.99	6,739.62	6,431.84	71.17	34.52	30.92	-1,465.87	751.59	1,081.06	1,012.41	68.65	15.747
9,300.00	6,984.08	6,700.00	6,397.53	74.02	34.46	28.70	-1,456.58	769.08	1,162.80	1,094.73	68.07	17.082
9,400.00	6,984.16	6,700.00	6,397.53	76.88	34.46	28.70	-1,456.58	769.08	1,245.99	1,177.48	68.52	18.186
9,500.00	6,984.25	6,700.00	6,397.53	79.75	34.46	28.70	-1,456.58	769.08	1,331.50	1,262.66	68.84	19.341
9,600.00	6,984.34	6,659.76	6,362.07	82.64	34.38	26.57	-1,446.90	785.46	1,417.61	1,349.34	68.26	20.767
9,700.00	6,984.43	6,643.51	6,347.59	85.55	34.35	25.75	-1,442.92	791.67	1,505.37	1,437.18	68.20	22.074
9,800.00	6,984.52	6,600.00	6,308.39	88.46	34.26	23.64	-1,432.10	807.13	1,594.84	1,527.23	67.61	23.590
9,900.00	6,984.60	6,600.00	6,308.39	91.39	34.26	23.64	-1,432.10	807.13	1,684.16	1,616.32	67.84	24.825
10,000.00	6,984.69	6,600.00	6,308.39	94.32	34.26	23.64	-1,432.10	807.13	1,774.63	1,706.60	68.03	26.087
10,100.00	6,984.78	6,600.00	6,308.39	97.26	34.26	23.64	-1,432.10	807.13	1,866.07	1,797.89	68.18	27.370
10,200.00	6,984.87	6,600.00	6,308.39	100.22	34.26	23.64	-1,432.10	807.13	1,958.34	1,890.04	68.30	28.673
10,300.00	6,984.96	6,567.16	6,278.43	103.17	34.18	22.15	-1,423.77	817.67	2,050.58	1,982.64	67.94	30.182
10,400.00	6,985.04	6,557.14	6,269.23	106.14	34.16	21.71	-1,421.20	820.69	2,143.69	2,075.78	67.91	31.566
10,500.00	6,985.13	6,547.72	6,260.55	109.11	34.14	21.30	-1,418.78	823.44	2,237.26	2,169.38	67.88	32.957
10,600.00	6,985.22	6,538.84	6,252.35	112.09	34.11	20.92	-1,416.48	825.97	2,331.26	2,263.40	67.86	34.353
10,700.00	6,985.31	6,500.00	6,216.27	115.07	34.02	19.33	-1,406.34	836.15	2,426.27	2,358.80	67.48	35.957
10,800.00	6,985.39	6,500.00	6,216.27	118.05	34.02	19.33	-1,406.34	836.15	2,520.72	2,453.15	67.56	37.308
10,900.00	6,985.48	6,500.00	6,216.27	121.04	34.02	19.33	-1,406.34	836.15	2,615.57	2,547.93	67.64	38.668
11,000.00	6,985.57	6,500.00	6,216.27	124.04	34.02	19.33	-1,406.34	836.15	2,710.80	2,643.09	67.71	40.035
11,100.00	6,985.66	6,500.00	6,216.27	127.04	34.02	19.33	-1,406.34	836.15	2,806.36	2,738.59	67.77	41.409
11,200.00	6,985.75	6,500.00	6,216.27	130.04	34.02	19.33	-1,406.34	836.15	2,902.22	2,834.39	67.83	42.789
11,300.00	6,985.83	6,500.00	6,216.27	133.05	34.02	19.33	-1,406.34	836.15	2,998.34	2,930.47	67.88	44.174
11,400.00	6,985.92	6,500.00	6,216.27	136.05	34.02	19.33	-1,406.34	836.15	3,094.72	3,026.80	67.92	45.563
11,500.00	6,986.01	6,500.00	6,216.27	139.07	34.02	19.33	-1,406.34	836.15	3,191.32	3,123.35	67.96	46.957
11,600.00	6,986.10	6,500.00	6,216.27	142.08	34.02	19.33	-1,406.34	836.15	3,288.12	3,220.11	68.00	48.353
11,700.00	6,986.18	6,500.00	6,216.27	145.10	34.02	19.33	-1,406.34	836.15	3,385.10	3,317.06	68.04	49.753
11,800.00	6,986.27	6,500.00	6,216.27	148.12	34.02	19.33	-1,406.34	836.15	3,482.26	3,414.19	68.07	51.155
11,900.00	6,986.36	6,457.63	6,176.55	151.14	33.89	17.71	-1,395.09	845.65	3,578.47	3,510.73	67.74	52.828
12,000.00	6,986.45	6,453.21	6,172.38	154.16	33.88	17.55	-1,393.90	846.55	3,675.69	3,607.95	67.74	54.262
12,100.00	6,986.54	6,448.97	6,168.39	157.19	33.87	17.40	-1,392.77	847.39	3,773.04	3,705.30	67.74	55.697
12,200.00	6,986.62	6,444.90	6,164.55	160.21	33.85	17.25	-1,391.67	848.18	3,870.50	3,802.75	67.75	57.132
12,300.00	6,986.71	6,440.99	6,160.86	163.24	33.84	17.11	-1,390.62	848.92	3,968.07	3,900.32	67.75	58.566
12,400.00	6,986.80	6,400.00	6,122.02	166.28	33.72	15.69	-1,379.52	855.87	4,066.57	3,999.10	67.47	60.276
12,500.00	6,986.89	6,400.00	6,122.02	169.31	33.72	15.69	-1,379.52	855.87	4,164.18	4,096.67	67.51	61.684
12,600.00	6,986.98	6,400.00	6,122.02	172.34	33.72	15.69	-1,379.52	855.87	4,261.90	4,194.35	67.55	63.093
12,700.00	6,987.06	6,400.00	6,122.02	175.38	33.72	15.69	-1,379.52	855.87	4,359.72	4,292.13	67.59	64.503
12,800.00	6,987.15	6,400.00	6,122.02	178.41	33.72	15.69	-1,379.52	855.87	4,457.64	4,390.01	67.63	65.913
12,900.00	6,987.24	6,400.00	6,122.02	181.45	33.72	15.69	-1,379.52	855.87	4,555.65	4,487.98	67.67	67.323
13,000.00	6,987.33	6,400.00	6,122.02	184.49	33.72	15.69	-1,379.52	855.87	4,653.74	4,586.03	67.71	68.734
13,100.00	6,987.41	6,400.00	6,122.02	187.53	33.72	15.69	-1,379.52	855.87	4,751.92	4,684.17	67.75	70.144
13,200.00	6,987.50	6,400.00	6,122.02	190.57	33.72	15.69	-1,379.52	855.87	4,850.16	4,782.38	67.78	71.553
13,300.00	6,987.59	6,400.00	6,122.02	193.62	33.72	15.69	-1,379.52	855.87	4,948.48	4,880.66	67.82	72.962
13,400.00	6,987.68	6,400.00	6,122.02	196.66	33.72	15.69	-1,379.52	855.87	5,046.87	4,979.01	67.86	74.371
13,500.00	6,987.77	6,400.00	6,122.02	199.71	33.72	15.69	-1,379.52	855.87	5,145.31	5,077.41	67.90	75.778
13,600.00	6,987.85	6,400.00	6,122.02	202.75	33.72	15.69	-1,379.52	855.87	5,243.82	5,175.88	67.94	77.185
13,700.00	6,987.94	6,400.00	6,122.02	205.80	33.72	15.69	-1,379.52	855.87	5,342.38	5,274.40	67.98	78.591
13,800.00	6,988.03	6,400.00	6,122.02	208.85	33.72	15.69	-1,379.52	855.87	5,440.99	5,372.98	68.02	79.996

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Rosa Unit 30 - Rosa Unit #665H - OH - Plan #2												Offset Site Error:	0.00 ft
Survey Program: 0-MWD+HDGM												Offset Well Error:	0.00 ft
Reference												Rule Assigned:	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Semi Major Axis Reference (ft)	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)			
13,900.00	6,988.12	6,400.00	6,122.02	211.89	33.72	15.69	-1,379.52	855.87	5,539.66	5,471.60	68.06	81.399	
14,000.00	6,988.20	6,400.00	6,122.02	214.94	33.72	15.69	-1,379.52	855.87	5,638.37	5,570.27	68.10	82.801	
14,100.00	6,988.29	6,400.00	6,122.02	217.99	33.72	15.69	-1,379.52	855.87	5,737.12	5,668.99	68.14	84.202	
14,200.00	6,988.38	6,400.00	6,122.02	221.04	33.72	15.69	-1,379.52	855.87	5,835.92	5,767.75	68.18	85.601	
14,300.00	6,988.47	6,400.00	6,122.02	224.10	33.72	15.69	-1,379.52	855.87	5,934.76	5,866.54	68.22	86.999	
14,400.00	6,988.56	6,400.00	6,122.02	227.15	33.72	15.69	-1,379.52	855.87	6,033.63	5,965.38	68.26	88.394	
14,500.00	6,988.64	6,400.00	6,122.02	230.20	33.72	15.69	-1,379.52	855.87	6,132.55	6,064.25	68.30	89.789	
14,600.00	6,988.73	6,400.00	6,122.02	233.25	33.72	15.69	-1,379.52	855.87	6,231.49	6,163.15	68.34	91.181	
14,700.00	6,988.82	6,400.00	6,122.02	236.31	33.72	15.69	-1,379.52	855.87	6,330.48	6,262.09	68.38	92.571	
14,800.00	6,988.91	6,400.00	6,122.02	239.36	33.72	15.69	-1,379.52	855.87	6,429.49	6,361.06	68.43	93.960	
14,900.00	6,989.00	6,400.00	6,122.02	242.42	33.72	15.69	-1,379.52	855.87	6,528.53	6,460.06	68.47	95.346	
15,000.00	6,989.08	6,400.00	6,122.02	245.47	33.72	15.69	-1,379.52	855.87	6,627.60	6,559.08	68.52	96.731	
15,100.00	6,989.17	6,400.00	6,122.02	248.53	33.72	15.69	-1,379.52	855.87	6,726.70	6,658.14	68.56	98.113	
15,200.00	6,989.26	6,400.00	6,122.02	251.58	33.72	15.69	-1,379.52	855.87	6,825.82	6,757.22	68.61	99.493	
15,300.00	6,989.35	6,400.00	6,122.02	254.64	33.72	15.69	-1,379.52	855.87	6,924.97	6,856.32	68.65	100.870	
15,400.00	6,989.43	6,400.00	6,122.02	257.70	33.72	15.69	-1,379.52	855.87	7,024.15	6,955.45	68.70	102.246	
15,500.00	6,989.52	6,400.00	6,122.02	260.76	33.72	15.69	-1,379.52	855.87	7,123.34	7,054.60	68.75	103.619	
15,600.00	6,989.61	6,400.00	6,122.02	263.81	33.72	15.69	-1,379.52	855.87	7,222.56	7,153.77	68.79	104.989	
15,700.00	6,989.70	6,400.00	6,122.02	266.87	33.72	15.69	-1,379.52	855.87	7,321.80	7,252.96	68.84	106.357	
15,800.00	6,989.79	6,400.00	6,122.02	269.93	33.72	15.69	-1,379.52	855.87	7,421.06	7,352.17	68.89	107.723	
15,900.00	6,989.87	6,400.00	6,122.02	272.99	33.72	15.69	-1,379.52	855.87	7,520.34	7,451.40	68.94	109.086	
16,000.00	6,989.96	6,400.00	6,122.02	276.05	33.72	15.69	-1,379.52	855.87	7,619.64	7,550.65	68.99	110.447	
16,100.00	6,990.05	6,400.00	6,122.02	279.11	33.72	15.69	-1,379.52	855.87	7,718.96	7,649.92	69.04	111.804	
16,200.00	6,990.14	6,400.00	6,122.02	282.17	33.72	15.69	-1,379.52	855.87	7,818.30	7,749.20	69.09	113.160	
16,300.00	6,990.22	6,355.63	6,079.73	285.23	33.55	14.26	-1,367.35	861.60	7,916.58	7,847.71	68.87	114.950	
16,400.00	6,990.31	6,354.45	6,078.61	288.29	33.55	14.22	-1,367.03	861.73	8,015.89	7,946.98	68.92	116.314	
16,500.00	6,990.40	6,353.31	6,077.52	291.35	33.55	14.19	-1,366.71	861.85	8,115.22	8,046.26	68.96	117.676	
16,600.00	6,990.49	6,352.18	6,076.45	294.42	33.54	14.15	-1,366.40	861.97	8,214.56	8,145.55	69.01	119.034	
16,700.00	6,990.58	6,351.09	6,075.40	297.48	33.54	14.12	-1,366.10	862.08	8,313.92	8,244.86	69.06	120.390	
16,800.00	6,990.66	6,350.01	6,074.37	300.54	33.53	14.09	-1,365.80	862.19	8,413.29	8,344.18	69.11	121.742	
16,900.00	6,990.75	6,348.96	6,073.36	303.60	33.53	14.05	-1,365.51	862.30	8,512.68	8,443.52	69.16	123.092	
17,000.00	6,990.84	6,347.93	6,072.38	306.67	33.53	14.02	-1,365.22	862.40	8,612.07	8,542.87	69.21	124.438	
17,100.00	6,990.93	6,346.92	6,071.41	309.73	33.52	13.99	-1,364.94	862.50	8,711.48	8,642.22	69.26	125.781	
17,200.00	6,991.02	6,345.93	6,070.46	312.79	33.52	13.96	-1,364.67	862.60	8,810.91	8,741.59	69.31	127.122	
17,300.00	6,991.10	6,344.96	6,069.54	315.86	33.51	13.93	-1,364.40	862.70	8,910.34	8,840.98	69.36	128.459	
17,400.00	6,991.19	6,300.00	6,026.49	318.92	33.35	12.61	-1,351.90	866.13	9,010.82	8,941.66	69.16	130.286	
17,500.00	6,991.28	6,300.00	6,026.49	321.98	33.35	12.61	-1,351.90	866.13	9,110.23	9,041.01	69.22	131.609	
17,600.00	6,991.37	6,300.00	6,026.49	325.05	33.35	12.61	-1,351.90	866.13	9,209.66	9,140.38	69.28	132.929	
17,700.00	6,991.45	6,300.00	6,026.49	328.11	33.35	12.61	-1,351.90	866.13	9,309.10	9,239.75	69.34	134.246	
17,800.00	6,991.54	6,300.00	6,026.49	331.18	33.35	12.61	-1,351.90	866.13	9,408.55	9,339.14	69.41	135.559	
17,900.00	6,991.63	6,300.00	6,026.49	334.24	33.35	12.61	-1,351.90	866.13	9,508.01	9,438.54	69.47	136.870	
18,000.00	6,991.72	6,300.00	6,026.49	337.31	33.35	12.61	-1,351.90	866.13	9,607.48	9,537.95	69.53	138.177	
18,100.00	6,991.81	6,300.00	6,026.49	340.37	33.35	12.61	-1,351.90	866.13	9,706.96	9,637.37	69.59	139.481	
18,200.00	6,991.89	6,300.00	6,026.49	343.44	33.35	12.61	-1,351.90	866.13	9,806.46	9,736.80	69.66	140.781	
18,300.00	6,991.98	6,300.00	6,026.49	346.50	33.35	12.61	-1,351.90	866.13	9,905.96	9,836.24	69.72	142.079	
18,321.44	6,992.00	6,300.00	6,026.49	347.16	33.35	12.61	-1,351.90	866.13	9,927.29	9,857.55	69.74	142.356	

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Sec 28 T31N R5W Offsets - Rosa Unit #146 - OH - OH													Offset Site Error:	0.00 ft
Survey Program:		152-INCLINOMETER					Rule Assigned:				Offset Well Error:	0.00 ft		
Reference	Offset	Semi Major Axis		Offset Wellbore Centre		Distance				Warning				
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
7,700.00	6,981.29	6,199.00	6,192.17	33.86	188.20	24.01	-1,380.58	9,992.39	9,909.83	9,691.97	217.87	45.486		
7,755.27	6,982.00	6,199.00	6,192.17	34.81	188.20	24.01	-1,380.58	9,992.39	9,854.92	9,637.09	217.83	45.241		
7,800.00	6,982.47	6,199.00	6,192.17	35.63	188.20	17.54	-1,380.58	9,992.39	9,810.46	9,592.65	217.81	45.042		
7,876.01	6,982.83	6,199.00	6,192.17	37.13	188.20	4.01	-1,380.58	9,992.39	9,734.83	9,517.05	217.78	44.701		
7,900.00	6,982.85	6,199.00	6,192.17	37.63	188.20	4.01	-1,380.58	9,992.39	9,710.94	9,493.17	217.77	44.592		
8,000.00	6,982.94	6,199.00	6,192.17	39.78	188.20	4.01	-1,380.58	9,992.39	9,611.39	9,393.65	217.74	44.141		
8,100.00	6,983.02	6,199.00	6,192.17	42.06	188.20	4.01	-1,380.58	9,992.39	9,511.85	9,294.14	217.71	43.690		
8,200.00	6,983.11	6,199.00	6,192.17	44.43	188.20	4.01	-1,380.58	9,992.39	9,412.32	9,194.64	217.68	43.239		
8,300.00	6,983.20	6,199.00	6,192.17	46.89	188.20	4.01	-1,380.58	9,992.39	9,312.80	9,095.15	217.65	42.788		
8,400.00	6,983.29	6,199.00	6,192.17	49.42	188.20	4.01	-1,380.58	9,992.39	9,213.29	8,995.67	217.62	42.337		
8,500.00	6,983.37	6,199.00	6,192.17	52.00	188.20	4.01	-1,380.58	9,992.39	9,113.79	8,896.20	217.59	41.886		
8,600.00	6,983.46	6,199.00	6,192.17	54.63	188.20	4.01	-1,380.58	9,992.39	9,014.30	8,796.74	217.56	41.434		
8,700.00	6,983.55	6,199.00	6,192.17	57.31	188.20	4.01	-1,380.58	9,992.39	8,914.82	8,697.29	217.53	40.983		
8,800.00	6,983.64	6,199.00	6,192.17	60.02	188.20	4.01	-1,380.58	9,992.39	8,815.35	8,597.86	217.50	40.531		
8,900.00	6,983.73	6,199.00	6,192.17	62.77	188.20	4.01	-1,380.58	9,992.39	8,715.90	8,498.43	217.46	40.080		
9,000.00	6,983.81	6,199.00	6,192.17	65.55	188.20	4.01	-1,380.58	9,992.39	8,616.45	8,399.02	217.43	39.628		
9,100.00	6,983.90	6,199.00	6,192.17	68.35	188.20	4.01	-1,380.58	9,992.39	8,517.03	8,299.62	217.40	39.176		
9,200.00	6,983.99	6,199.00	6,192.17	71.17	188.20	4.01	-1,380.58	9,992.39	8,417.61	8,200.24	217.37	38.724		
9,300.00	6,984.08	6,199.00	6,192.17	74.02	188.20	4.01	-1,380.58	9,992.39	8,318.21	8,100.87	217.34	38.273		
9,400.00	6,984.16	6,199.00	6,192.17	76.88	188.20	4.01	-1,380.58	9,992.39	8,218.82	8,001.51	217.31	37.821		
9,500.00	6,984.25	6,199.00	6,192.17	79.75	188.20	4.01	-1,380.58	9,992.39	8,119.45	7,902.17	217.28	37.369		
9,600.00	6,984.34	6,199.00	6,192.17	82.64	188.20	4.01	-1,380.58	9,992.39	8,020.10	7,802.85	217.24	36.917		
9,700.00	6,984.43	6,199.00	6,192.17	85.55	188.20	4.01	-1,380.58	9,992.39	7,920.76	7,703.54	217.21	36.466		
9,800.00	6,984.52	6,199.00	6,192.17	88.46	188.20	4.01	-1,380.58	9,992.39	7,821.43	7,604.25	217.18	36.014		
9,900.00	6,984.60	6,199.00	6,192.17	91.39	188.20	4.01	-1,380.58	9,992.39	7,722.13	7,504.98	217.15	35.562		
10,000.00	6,984.69	6,199.00	6,192.17	94.32	188.20	4.01	-1,380.58	9,992.39	7,622.84	7,405.73	217.11	35.110		
10,100.00	6,984.78	6,199.00	6,192.17	97.26	188.20	4.01	-1,380.58	9,992.39	7,523.57	7,306.49	217.08	34.658		
10,200.00	6,984.87	6,199.00	6,192.17	100.22	188.20	4.01	-1,380.58	9,992.39	7,424.32	7,207.28	217.04	34.207		
10,300.00	6,984.96	6,199.00	6,192.17	103.17	188.20	4.01	-1,380.58	9,992.39	7,325.09	7,108.09	217.01	33.755		
10,400.00	6,985.04	6,199.00	6,192.17	106.14	188.20	4.01	-1,380.58	9,992.39	7,225.89	7,008.92	216.97	33.303		
10,500.00	6,985.13	6,199.00	6,192.17	109.11	188.20	4.01	-1,380.58	9,992.39	7,126.70	6,909.77	216.93	32.852		
10,600.00	6,985.22	6,199.00	6,192.17	112.09	188.20	4.01	-1,380.58	9,992.39	7,027.54	6,810.64	216.90	32.400		
10,700.00	6,985.31	6,199.00	6,192.17	115.07	188.20	4.01	-1,380.58	9,992.39	6,928.40	6,711.55	216.86	31.949		
10,800.00	6,985.39	6,199.00	6,192.17	118.05	188.20	4.01	-1,380.58	9,992.39	6,829.29	6,612.47	216.82	31.498		
10,900.00	6,985.48	6,199.00	6,192.17	121.04	188.20	4.01	-1,380.58	9,992.39	6,730.20	6,513.43	216.78	31.046		
11,000.00	6,985.57	6,199.00	6,192.17	124.04	188.20	4.01	-1,380.58	9,992.39	6,631.15	6,414.41	216.74	30.595		
11,100.00	6,985.66	6,199.00	6,192.17	127.04	188.20	4.01	-1,380.58	9,992.39	6,532.12	6,315.42	216.70	30.144		
11,200.00	6,985.75	6,199.00	6,192.17	130.04	188.20	4.01	-1,380.58	9,992.39	6,433.12	6,216.46	216.65	29.693		
11,300.00	6,985.83	6,199.00	6,192.17	133.05	188.20	4.01	-1,380.58	9,992.39	6,334.15	6,117.54	216.61	29.243		
11,400.00	6,985.92	6,199.00	6,192.17	136.05	188.20	4.01	-1,380.58	9,992.39	6,235.21	6,018.65	216.56	28.792		
11,500.00	6,986.01	6,199.00	6,192.17	139.07	188.20	4.01	-1,380.58	9,992.39	6,136.31	5,919.80	216.51	28.342		
11,600.00	6,986.10	6,199.00	6,192.17	142.08	188.20	4.01	-1,380.58	9,992.39	6,037.44	5,820.98	216.46	27.891		
11,700.00	6,986.18	6,199.00	6,192.17	145.10	188.20	4.01	-1,380.58	9,992.39	5,938.62	5,722.21	216.41	27.441		
11,800.00	6,986.27	6,199.00	6,192.17	148.12	188.20	4.01	-1,380.58	9,992.39	5,839.83	5,623.47	216.36	26.991		
11,900.00	6,986.36	6,199.00	6,192.17	151.14	188.20	4.01	-1,380.58	9,992.39	5,741.09	5,524.78	216.31	26.542		
12,000.00	6,986.45	6,199.00	6,192.17	154.16	188.20	4.01	-1,380.58	9,992.39	5,642.38	5,426.14	216.25	26.092		
12,100.00	6,986.54	6,199.00	6,192.17	157.19	188.20	4.01	-1,380.58	9,992.39	5,543.73	5,327.54	216.19	25.643		
12,200.00	6,986.62	6,199.00	6,192.17	160.21	188.20	4.01	-1,380.58	9,992.39	5,445.12	5,228.99	216.13	25.194		
12,300.00	6,986.71	6,199.00	6,192.17	163.24	188.20	4.01	-1,380.58	9,992.39	5,346.57	5,130.50	216.07	24.745		
12,400.00	6,986.80	6,199.00	6,192.17	166.28	188.20	4.01	-1,380.58	9,992.39	5,248.07	5,032.07	216.00	24.297		
12,500.00	6,986.89	6,199.00	6,192.17	169.31	188.20	4.01	-1,380.58	9,992.39	5,149.63	4,933.70	215.93	23.848		
12,600.00	6,986.98	6,199.00	6,192.17	172.34	188.20	4.01	-1,380.58	9,992.39	5,051.25	4,835.39	215.86	23.400		

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Sec 28 T31N R5W Offsets - 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	Offset	Semi Major Axis	Highside Toolface (°)	Offset Wellbore Centre	+N/-S (ft)	+E/-W (ft)	Distance	Minimum Separation (ft)	Separation Factor	Warning
				(ft)	(ft)						Between Centres (ft)	Between Ellipses (ft)		
12,700.00	6,987.06	6,199.00	6,192.17	175.38	188.20	4.01	-1,380.58	9,992.39	4,952.94	4,737.15	215.79	22.953		
12,800.00	6,987.15	6,199.00	6,192.17	178.41	188.20	4.01	-1,380.58	9,992.39	4,854.69	4,638.98	215.71	22.506		
12,900.00	6,987.24	6,199.00	6,192.17	181.45	188.20	4.01	-1,380.58	9,992.39	4,756.52	4,540.89	215.63	22.059		
13,000.00	6,987.33	6,199.00	6,192.17	184.49	188.20	4.01	-1,380.58	9,992.39	4,658.42	4,442.88	215.54	21.613		
13,100.00	6,987.41	6,199.00	6,192.17	187.53	188.20	4.01	-1,380.58	9,992.39	4,560.41	4,344.96	215.45	21.167		
13,200.00	6,987.50	6,199.00	6,192.17	190.57	188.20	4.01	-1,380.58	9,992.39	4,462.49	4,247.13	215.36	20.721		
13,300.00	6,987.59	6,199.00	6,192.17	193.62	188.20	4.01	-1,380.58	9,992.39	4,364.66	4,149.40	215.26	20.276		
13,400.00	6,987.68	6,199.00	6,192.17	196.66	188.20	4.01	-1,380.58	9,992.39	4,266.93	4,051.77	215.16	19.832		
13,500.00	6,987.77	6,199.00	6,192.17	199.71	188.20	4.01	-1,380.58	9,992.39	4,169.31	3,954.26	215.05	19.388		
13,600.00	6,987.85	6,199.00	6,192.17	202.75	188.20	4.01	-1,380.58	9,992.39	4,071.80	3,856.86	214.94	18.944		
13,700.00	6,987.94	6,199.00	6,192.17	205.80	188.20	4.01	-1,380.58	9,992.39	3,974.42	3,759.60	214.81	18.502		
13,800.00	6,988.03	6,199.00	6,192.17	208.85	188.20	4.01	-1,380.58	9,992.39	3,877.17	3,662.48	214.69	18.060		
13,900.00	6,988.12	6,199.00	6,192.17	211.89	188.20	4.01	-1,380.58	9,992.39	3,780.06	3,565.51	214.55	17.618		
14,000.00	6,988.20	6,199.00	6,192.17	214.94	188.20	4.01	-1,380.58	9,992.39	3,683.11	3,468.70	214.41	17.178		
14,100.00	6,988.29	6,199.00	6,192.17	217.99	188.20	4.01	-1,380.58	9,992.39	3,586.33	3,372.07	214.26	16.738		
14,200.00	6,988.38	6,199.00	6,192.17	221.04	188.20	4.01	-1,380.58	9,992.39	3,489.73	3,275.63	214.10	16.300		
14,300.00	6,988.47	6,199.00	6,192.17	224.10	188.20	4.01	-1,380.58	9,992.39	3,393.32	3,179.40	213.93	15.862		
14,400.00	6,988.56	6,199.00	6,192.17	227.15	188.20	4.01	-1,380.58	9,992.39	3,297.13	3,083.39	213.74	15.426		
14,500.00	6,988.64	6,199.00	6,192.17	230.20	188.20	4.01	-1,380.58	9,992.39	3,201.17	2,987.63	213.55	14.991		
14,600.00	6,988.73	6,199.00	6,192.17	233.25	188.20	4.01	-1,380.58	9,992.39	3,105.47	2,892.14	213.34	14.557		
14,700.00	6,988.82	6,199.00	6,192.17	236.31	188.20	4.01	-1,380.58	9,992.39	3,010.05	2,796.94	213.11	14.124		
14,800.00	6,988.91	6,199.00	6,192.17	239.36	188.20	4.01	-1,380.58	9,992.39	2,914.93	2,702.07	212.86	13.694		
14,900.00	6,989.00	6,199.00	6,192.17	242.42	188.20	4.01	-1,380.58	9,992.39	2,820.16	2,607.56	212.60	13.265		
15,000.00	6,989.08	6,199.00	6,192.17	245.47	188.20	4.01	-1,380.58	9,992.39	2,725.75	2,513.44	212.31	12.839		
15,100.00	6,989.17	6,199.00	6,192.17	248.53	188.20	4.01	-1,380.58	9,992.39	2,631.76	2,419.77	211.99	12.415		
15,200.00	6,989.26	6,199.00	6,192.17	251.58	188.20	4.01	-1,380.58	9,992.39	2,538.23	2,326.59	211.64	11.993		
15,300.00	6,989.35	6,199.00	6,192.17	254.64	188.20	4.01	-1,380.58	9,992.39	2,445.21	2,233.96	211.25	11.575		
15,400.00	6,989.43	6,199.00	6,192.17	257.70	188.20	4.01	-1,380.58	9,992.39	2,352.76	2,141.94	210.82	11.160		
15,500.00	6,989.52	6,199.00	6,192.17	260.76	188.20	4.01	-1,380.58	9,992.39	2,260.96	2,050.63	210.33	10.750		
15,600.00	6,989.61	6,199.00	6,192.17	263.81	188.20	4.01	-1,380.58	9,992.39	2,169.88	1,960.10	209.77	10.344		
15,700.00	6,989.70	6,199.00	6,192.17	266.87	188.20	4.01	-1,380.58	9,992.39	2,079.62	1,870.47	209.14	9.944		
15,800.00	6,989.79	6,199.00	6,192.17	269.93	188.20	4.01	-1,380.58	9,992.39	1,990.29	1,781.88	208.41	9.550		
15,900.00	6,989.87	6,199.00	6,192.17	272.99	188.20	4.01	-1,380.58	9,992.39	1,902.02	1,694.47	207.55	9.164		
16,000.00	6,989.96	6,199.00	6,192.17	276.05	188.20	4.01	-1,380.58	9,992.39	1,814.97	1,608.42	206.55	8.787		
16,100.00	6,990.05	6,199.00	6,192.17	279.11	188.20	4.01	-1,380.58	9,992.39	1,729.32	1,523.97	205.35	8.421		
16,200.00	6,990.14	6,199.00	6,192.17	282.17	188.20	4.01	-1,380.58	9,992.39	1,645.30	1,441.38	203.91	8.069		
16,300.00	6,990.22	6,199.00	6,192.17	285.23	188.20	4.01	-1,380.58	9,992.39	1,563.15	1,360.98	202.17	7.732		
16,400.00	6,990.31	6,199.00	6,192.17	288.29	188.20	4.01	-1,380.58	9,992.39	1,483.20	1,283.16	200.04	7.414		
16,500.00	6,990.40	6,199.00	6,192.17	291.35	188.20	4.01	-1,380.58	9,992.39	1,405.82	1,208.39	197.43	7.121		
16,600.00	6,990.49	6,199.00	6,192.17	294.42	188.20	4.01	-1,380.58	9,992.39	1,331.45	1,137.26	194.19	6.856		
16,700.00	6,990.58	6,199.00	6,192.17	297.48	188.20	4.01	-1,380.58	9,992.39	1,260.64	1,070.47	190.17	6.629		
16,800.00	6,990.66	6,199.00	6,192.17	300.54	188.20	4.01	-1,380.58	9,992.39	1,194.00	1,008.84	185.17	6.448		
16,900.00	6,990.75	6,199.00	6,192.17	303.60	188.20	4.01	-1,380.58	9,992.39	1,132.29	953.33	178.96	6.327		
17,000.00	6,990.84	6,199.00	6,192.17	306.67	188.20	4.01	-1,380.58	9,992.39	1,076.35	905.04	171.31	6.283		
17,100.00	6,990.93	6,199.00	6,192.17	309.73	188.20	4.01	-1,380.58	9,992.39	1,027.12	865.15	161.96	6.342		
17,200.00	6,991.02	6,199.00	6,192.17	312.79	188.20	4.01	-1,380.58	9,992.39	985.60	834.83	150.77	6.537		
17,300.00	6,991.10	6,199.00	6,192.17	315.86	188.20	4.01	-1,380.58	9,992.39	952.81	815.08	137.73	6.918		
17,400.00	6,991.19	6,199.00	6,192.17	318.92	188.20	4.01	-1,380.58	9,992.39	929.67	806.39	123.29	7.541		
17,500.00	6,991.28	6,199.00	6,192.17	321.98	188.20	4.01	-1,380.58	9,992.39	916.91	807.39	109.52	8.372		
17,567.80	6,991.34	6,199.00	6,192.17	324.06	188.20	4.01	-1,380.58	9,992.39	914.40	808.90	105.50	8.667 CC		
17,600.00	6,991.37	6,199.00	6,192.17	325.05	188.20	4.01	-1,380.58	9,992.39	914.97	807.80	107.17	8.538		
17,700.00	6,991.45	6,199.00	6,192.17	328.11	188.20	4.01	-1,380.58	9,992.39	923.91	802.21	121.70	7.592 ES		

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM _16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Sec 28 T31N R5W Offsets - 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		Offset Wellbore Centre		Distance		Rule Assigned:		Warning			
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	
17,800.00	6,991.54	6,199.00	6,192.17	331.18	188.20	4.01	-1,380.58	9,992.39	943.42	804.32	139.11	6.782	
17,900.00	6,991.63	6,199.00	6,192.17	334.24	188.20	4.01	-1,380.58	9,992.39	972.88	817.58	155.30	6.265	
18,000.00	6,991.72	6,199.00	6,192.17	337.31	188.20	4.01	-1,380.58	9,992.39	1,011.40	841.95	169.45	5.969	
18,100.00	6,991.81	6,199.00	6,192.17	340.37	188.20	4.01	-1,380.58	9,992.39	1,058.00	876.59	181.41	5.832	
18,200.00	6,991.89	6,199.00	6,192.17	343.44	188.20	4.01	-1,380.58	9,992.39	1,111.67	920.36	191.31	5.811 SF	
18,300.00	6,991.98	6,199.00	6,192.17	346.50	188.20	4.01	-1,380.58	9,992.39	1,171.43	972.05	199.38	5.875	
18,321.44	6,992.00	6,199.00	6,192.17	347.16	188.20	4.01	-1,380.58	9,992.39	1,184.95	984.05	200.90	5.898	

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Sec 28 T31N R5W Offsets - Rosa Unit #267 - OH - OH												Offset Site Error:	0.00 ft
Survey Program: 237-INCLINOMETER												Offset Well Error:	0.00 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.00	0.00	119.00	119.00	0.00	3.61	97.09	-1,161.38	9,340.62	9,412.55	9,408.93	3.61	2,604.483	
100.00	100.00	219.00	219.00	0.36	6.65	97.09	-1,161.38	9,340.62	9,412.55	9,405.54	7.01	1,342.877	
200.00	200.00	319.00	319.00	0.72	9.69	97.09	-1,161.38	9,340.62	9,412.55	9,402.14	10.40	904.650	
300.00	300.00	419.00	419.00	1.08	12.72	97.09	-1,161.38	9,340.62	9,412.55	9,398.75	13.80	682.072	
362.44	362.44	481.43	481.43	1.30	14.62	97.08	-1,160.85	9,340.62	9,412.48	9,396.56	15.92	591.250	
400.00	400.00	518.23	518.22	1.43	15.74	97.08	-1,160.86	9,340.62	9,412.48	9,395.31	17.17	548.138	
500.00	500.00	616.19	616.19	1.79	18.71	97.09	-1,161.01	9,340.62	9,412.50	9,392.00	20.51	459.029	
600.00	600.00	714.16	714.15	2.15	21.69	97.09	-1,161.34	9,340.62	9,412.54	9,388.70	23.84	394.841	
700.00	700.00	819.05	819.00	2.51	24.87	97.09	-1,161.38	9,340.62	9,412.55	9,385.16	27.38	343.743	
800.00	800.00	919.05	919.00	2.87	27.91	97.09	-1,161.38	9,340.62	9,412.55	9,381.77	30.78	305.822	
853.07	853.07	972.11	972.05	3.06	29.52	97.08	-1,160.31	9,340.62	9,412.41	9,379.83	32.58	288.906	
900.00	900.00	1,017.19	1,017.14	3.23	30.89	97.08	-1,160.34	9,340.62	9,412.42	9,378.30	34.12	275.887	
1,000.00	1,000.00	1,113.26	1,113.20	3.58	33.81	97.08	-1,160.66	9,340.62	9,412.46	9,375.07	37.39	251.718	
1,100.00	1,099.98	1,219.08	1,218.98	3.93	37.02	-117.91	-1,161.38	9,340.62	9,413.36	9,372.42	40.95	229.884	
1,200.00	1,199.84	1,318.94	1,318.84	4.26	40.05	-117.89	-1,161.38	9,340.62	9,415.82	9,371.50	44.31	212.494	
1,300.00	1,299.45	1,418.56	1,418.45	4.60	43.08	-117.87	-1,161.38	9,340.62	9,419.90	9,372.23	47.67	197.593	
1,400.00	1,398.70	1,516.43	1,516.32	4.95	46.05	-117.83	-1,160.59	9,340.62	9,425.53	9,374.54	50.99	184.844	
1,500.00	1,497.47	1,612.39	1,612.28	5.31	48.97	-117.78	-1,160.83	9,340.62	9,432.93	9,378.67	54.26	173.832	
1,600.00	1,595.62	1,707.86	1,707.74	5.69	51.87	-117.72	-1,161.30	9,340.62	9,442.01	9,384.47	57.54	164.100	
1,700.00	1,693.06	1,812.22	1,812.06	6.10	55.03	-117.65	-1,161.38	9,340.62	9,452.68	9,391.58	61.10	154.705	
1,800.00	1,790.08	1,909.25	1,909.08	6.53	57.98	-117.78	-1,161.38	9,340.62	9,464.20	9,399.74	64.46	146.824	
1,900.00	1,887.11	2,006.09	2,005.92	6.98	60.92	-117.91	-1,160.16	9,340.62	9,475.63	9,407.81	67.82	139.708	
2,000.00	1,984.14	2,100.11	2,099.93	7.44	63.78	-118.03	-1,160.32	9,340.62	9,487.26	9,416.15	71.11	133.410	
2,100.00	2,081.17	2,194.24	2,194.05	7.91	66.64	-118.15	-1,160.75	9,340.62	9,498.98	9,424.56	74.42	127.648	
2,200.00	2,178.20	2,297.42	2,297.20	8.38	69.77	-118.28	-1,161.38	9,340.62	9,510.75	9,432.75	78.00	121.933	
2,300.00	2,275.23	2,394.45	2,394.23	8.87	72.72	-118.41	-1,161.38	9,340.62	9,522.41	9,441.10	81.40	116.980	
2,400.00	2,372.26	2,491.48	2,491.26	9.36	75.66	-118.53	-1,161.38	9,340.62	9,534.31	9,449.50	84.81	112.418	
2,500.00	2,469.29	2,588.50	2,588.29	9.85	78.61	-118.66	-1,161.38	9,340.62	9,546.16	9,457.93	88.22	108.204	
2,600.00	2,566.32	2,685.53	2,685.32	10.36	81.56	-118.78	-1,161.38	9,340.62	9,558.05	9,466.41	91.64	104.301	
2,700.00	2,663.35	2,780.00	2,779.76	10.86	84.42	-118.90	-1,161.38	9,340.62	9,570.00	9,475.01	94.98	100.757	
2,800.00	2,760.38	2,780.00	2,779.76	11.37	84.42	-118.90	-1,161.38	9,340.62	9,582.50	9,487.06	95.45	100.398	
2,900.00	2,857.41	2,780.00	2,779.76	11.88	84.42	-118.90	-1,161.38	9,340.62	9,596.03	9,500.13	95.90	100.061	
3,000.00	2,954.44	2,780.00	2,779.76	12.39	84.42	-118.90	-1,161.38	9,340.62	9,610.59	9,514.24	96.35	99.746	
3,100.00	3,051.47	2,780.00	2,779.76	12.91	84.42	-118.90	-1,161.38	9,340.62	9,626.16	9,529.37	96.79	99.455	
3,200.00	3,148.50	2,780.00	2,779.76	13.42	84.42	-118.90	-1,161.38	9,340.62	9,642.74	9,545.52	97.22	99.186	
3,300.00	3,245.53	2,780.00	2,779.76	13.94	84.42	-118.90	-1,161.38	9,340.62	9,660.33	9,562.69	97.64	98.938	
3,400.00	3,342.56	2,780.00	2,779.76	14.46	84.42	-118.90	-1,161.38	9,340.62	9,678.92	9,580.87	98.05	98.713	
3,500.00	3,439.59	2,780.00	2,779.76	14.99	84.42	-118.90	-1,161.38	9,340.62	9,698.50	9,600.05	98.45	98.510	
3,600.00	3,536.62	2,780.00	2,779.76	15.51	84.42	-118.90	-1,161.38	9,340.62	9,719.08	9,620.23	98.84	98.328	
3,700.00	3,633.65	2,780.00	2,779.76	16.03	84.42	-118.90	-1,161.38	9,340.62	9,740.64	9,641.41	99.22	98.167	
3,800.00	3,730.68	2,780.00	2,779.76	16.56	84.42	-118.90	-1,161.38	9,340.62	9,763.17	9,663.57	99.60	98.027	
3,900.00	3,827.71	2,780.00	2,779.76	17.09	84.42	-118.90	-1,161.38	9,340.62	9,786.68	9,686.72	99.96	97.908	
4,000.00	3,924.74	2,780.00	2,779.76	17.61	84.42	-118.90	-1,161.38	9,340.62	9,811.14	9,710.83	100.31	97.809	
4,100.00	4,021.77	2,780.00	2,779.76	18.14	84.42	-118.90	-1,161.38	9,340.62	9,836.57	9,735.92	100.65	97.729	
4,200.00	4,118.79	2,780.00	2,779.76	18.67	84.42	-118.90	-1,161.38	9,340.62	9,862.94	9,761.96	100.98	97.670	
4,300.00	4,215.82	2,780.00	2,779.76	19.20	84.42	-118.90	-1,161.38	9,340.62	9,890.25	9,788.95	101.30	97.629	
4,400.00	4,312.85	2,780.00	2,779.76	19.73	84.42	-118.90	-1,161.38	9,340.62	9,918.50	9,816.88	101.62	97.608	
4,500.00	4,409.88	2,780.00	2,779.76	20.26	84.42	-118.90	-1,161.38	9,340.62	9,947.67	9,845.75	101.92	97.605	
4,600.00	4,506.91	2,780.00	2,779.76	20.79	84.42	-118.90	-1,161.38	9,340.62	9,977.76	9,875.55	102.21	97.620	
7,900.00	6,982.85	2,780.00	2,779.76	37.63	84.42	-1.88	-1,161.38	9,340.62	9,996.44	9,892.83	103.61	96.481	
8,000.00	6,982.94	2,780.00	2,779.76	39.78	84.42	-1.88	-1,161.38	9,340.62	9,906.41	9,803.00	103.41	95.798	
8,100.00	6,983.02	2,780.00	2,779.76	42.06	84.42	-1.88	-1,161.38	9,340.62	9,816.58	9,713.37	103.21	95.112	

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Sec 28 T31N R5W Offsets - Rosa Unit #267 - OH - OH													Offset Site Error:	0.00 ft
Survey Program:		237-INCLINOMETER					Rule Assigned:			Offset Well Error:		0.00 ft		
Reference	Offset	Semi Major Axis		Offset Wellbore Centre		Distance				Warning				
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
8,200.00	6,983.11	2,780.00	2,779.76	44.43	84.42	-1.88	-1,161.38	9,340.62	9,726.95	9,623.93	103.01	94.426		
8,300.00	6,983.20	2,780.00	2,779.76	46.89	84.42	-1.88	-1,161.38	9,340.62	9,637.52	9,534.70	102.81	93.737		
8,400.00	6,983.29	2,780.00	2,779.76	49.42	84.42	-1.88	-1,161.38	9,340.62	9,548.29	9,445.68	102.62	93.047		
8,500.00	6,983.37	2,780.00	2,779.76	52.00	84.42	-1.88	-1,161.38	9,340.62	9,459.29	9,356.87	102.42	92.356		
8,600.00	6,983.46	2,780.00	2,779.76	54.63	84.42	-1.88	-1,161.38	9,340.62	9,370.51	9,268.28	102.23	91.662		
8,700.00	6,983.55	2,780.00	2,779.76	57.31	84.42	-1.88	-1,161.38	9,340.62	9,281.95	9,179.91	102.04	90.966		
8,800.00	6,983.64	2,780.00	2,779.76	60.02	84.42	-1.88	-1,161.38	9,340.62	9,193.63	9,091.78	101.85	90.269		
8,900.00	6,983.73	2,780.00	2,779.76	62.77	84.42	-1.88	-1,161.38	9,340.62	9,105.55	9,003.89	101.66	89.569		
9,000.00	6,983.81	2,780.00	2,779.76	65.55	84.42	-1.88	-1,161.38	9,340.62	9,017.72	8,916.25	101.47	88.868		
9,100.00	6,983.90	2,780.00	2,779.76	68.35	84.42	-1.88	-1,161.38	9,340.62	8,930.15	8,828.86	101.29	88.164		
9,200.00	6,983.99	2,780.00	2,779.76	71.17	84.42	-1.88	-1,161.38	9,340.62	8,842.84	8,741.73	101.11	87.458		
9,300.00	6,984.08	2,780.00	2,779.76	74.02	84.42	-1.88	-1,161.38	9,340.62	8,755.80	8,654.87	100.93	86.750		
9,400.00	6,984.16	2,780.00	2,779.76	76.88	84.42	-1.88	-1,161.38	9,340.62	8,669.04	8,568.28	100.76	86.039		
9,500.00	6,984.25	2,780.00	2,779.76	79.75	84.42	-1.88	-1,161.38	9,340.62	8,582.57	8,481.98	100.59	85.326		
9,600.00	6,984.34	2,780.00	2,779.76	82.64	84.42	-1.88	-1,161.38	9,340.62	8,496.39	8,395.97	100.42	84.611		
9,700.00	6,984.43	2,780.00	2,779.76	85.55	84.42	-1.88	-1,161.38	9,340.62	8,410.52	8,310.27	100.25	83.893		
9,800.00	6,984.52	2,780.00	2,779.76	88.46	84.42	-1.88	-1,161.38	9,340.62	8,324.97	8,224.88	100.09	83.173		
9,900.00	6,984.60	2,780.00	2,779.76	91.39	84.42	-1.88	-1,161.38	9,340.62	8,239.74	8,139.81	99.94	82.451		
10,000.00	6,984.69	2,780.00	2,779.76	94.32	84.42	-1.88	-1,161.38	9,340.62	8,154.85	8,055.07	99.78	81.726		
10,100.00	6,984.78	2,780.00	2,779.76	97.26	84.42	-1.88	-1,161.38	9,340.62	8,070.30	7,970.67	99.63	80.999		
10,200.00	6,984.87	2,780.00	2,779.76	100.22	84.42	-1.88	-1,161.38	9,340.62	7,986.11	7,886.62	99.49	80.270		
10,300.00	6,984.96	2,780.00	2,779.76	103.17	84.42	-1.88	-1,161.38	9,340.62	7,902.29	7,802.94	99.35	79.538		
10,400.00	6,985.04	2,780.00	2,779.76	106.14	84.42	-1.88	-1,161.38	9,340.62	7,818.85	7,719.64	99.22	78.805		
10,500.00	6,985.13	2,780.00	2,779.76	109.11	84.42	-1.88	-1,161.38	9,340.62	7,735.81	7,636.72	99.09	78.069		
10,600.00	6,985.22	2,780.00	2,779.76	112.09	84.42	-1.88	-1,161.38	9,340.62	7,653.17	7,554.20	98.97	77.332		
10,700.00	6,985.31	2,780.00	2,779.76	115.07	84.42	-1.88	-1,161.38	9,340.62	7,570.94	7,472.10	98.85	76.593		
10,800.00	6,985.39	2,780.00	2,779.76	118.05	84.42	-1.88	-1,161.38	9,340.62	7,489.15	7,390.42	98.73	75.852		
10,900.00	6,985.48	2,780.00	2,779.76	121.04	84.42	-1.88	-1,161.38	9,340.62	7,407.81	7,309.18	98.63	75.110		
11,000.00	6,985.57	2,780.00	2,779.76	124.04	84.42	-1.88	-1,161.38	9,340.62	7,326.93	7,228.40	98.52	74.367		
11,100.00	6,985.66	2,780.00	2,779.76	127.04	84.42	-1.88	-1,161.38	9,340.62	7,246.52	7,148.10	98.43	73.623		
11,200.00	6,985.75	2,780.00	2,779.76	130.04	84.42	-1.88	-1,161.38	9,340.62	7,166.61	7,068.27	98.34	72.879		
11,300.00	6,985.83	2,780.00	2,779.76	133.05	84.42	-1.88	-1,161.38	9,340.62	7,087.21	6,988.96	98.25	72.134		
11,400.00	6,985.92	2,780.00	2,779.76	136.05	84.42	-1.88	-1,161.38	9,340.62	7,008.34	6,910.17	98.17	71.389		
11,500.00	6,986.01	2,780.00	2,779.76	139.07	84.42	-1.88	-1,161.38	9,340.62	6,930.01	6,831.91	98.10	70.645		
11,600.00	6,986.10	2,780.00	2,779.76	142.08	84.42	-1.88	-1,161.38	9,340.62	6,852.24	6,754.22	98.03	69.902		
11,700.00	6,986.18	2,780.00	2,779.76	145.10	84.42	-1.88	-1,161.38	9,340.62	6,775.06	6,677.10	97.96	69.160		
11,800.00	6,986.27	2,780.00	2,779.76	148.12	84.42	-1.88	-1,161.38	9,340.62	6,698.48	6,600.58	97.90	68.420		
11,900.00	6,986.36	2,780.00	2,779.76	151.14	84.42	-1.88	-1,161.38	9,340.62	6,622.53	6,524.68	97.85	67.682		
12,000.00	6,986.45	2,780.00	2,779.76	154.16	84.42	-1.88	-1,161.38	9,340.62	6,547.22	6,449.43	97.80	66.947		
12,100.00	6,986.54	2,780.00	2,779.76	157.19	84.42	-1.88	-1,161.38	9,340.62	6,472.59	6,374.83	97.75	66.215		
12,200.00	6,986.62	2,780.00	2,779.76	160.21	84.42	-1.88	-1,161.38	9,340.62	6,398.64	6,300.93	97.71	65.487		
12,300.00	6,986.71	2,780.00	2,779.76	163.24	84.42	-1.88	-1,161.38	9,340.62	6,325.41	6,227.74	97.67	64.764		
12,400.00	6,986.80	2,780.00	2,779.76	166.28	84.42	-1.88	-1,161.38	9,340.62	6,252.92	6,155.29	97.63	64.046		
12,500.00	6,986.89	2,780.00	2,779.76	169.31	84.42	-1.88	-1,161.38	9,340.62	6,181.20	6,083.61	97.60	63.333		
12,600.00	6,986.98	2,780.00	2,779.76	172.34	84.42	-1.88	-1,161.38	9,340.62	6,110.28	6,012.71	97.57	62.628		
12,700.00	6,987.06	2,780.00	2,779.76	175.38	84.42	-1.88	-1,161.38	9,340.62	6,040.18	5,942.64	97.53	61.929		
12,800.00	6,987.15	2,780.00	2,779.76	178.41	84.42	-1.88	-1,161.38	9,340.62	5,970.93	5,873.42	97.50	61.239		
12,900.00	6,987.24	2,780.00	2,779.76	181.45	84.42	-1.88	-1,161.38	9,340.62	5,902.56	5,805.09	97.47	60.557		
13,000.00	6,987.33	2,780.00	2,779.76	184.49	84.42	-1.88	-1,161.38	9,340.62	5,835.10	5,737.66	97.44	59.885		
13,100.00	6,987.41	2,780.00	2,779.76	187.53	84.42	-1.88	-1,161.38	9,340.62	5,768.59	5,671.19	97.40	59.223		
13,200.00	6,987.50	2,780.00	2,779.76	190.57	84.42	-1.88	-1,161.38	9,340.62	5,703.06	5,605.69	97.37	58.573		
13,300.00	6,987.59	2,780.00	2,779.76	193.62	84.42	-1.88	-1,161.38	9,340.62	5,638.54	5,541.21	97.33	57.935		

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Sec 28 T31N R5W Offsets - Rosa Unit #267 - OH - OH												Offset Site Error:	0.00 ft
Survey Program: 237-INCLINOMETER												Offset Well Error:	0.00 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
13,400.00	6,987.68	2,780.00	2,779.76	196.66	84.42	-1.88	-1,161.38	9,340.62	5,575.06	5,477.78	97.28	57.309	
13,500.00	6,987.77	2,780.00	2,779.76	199.71	84.42	-1.88	-1,161.38	9,340.62	5,512.67	5,415.44	97.23	56.698	
13,600.00	6,987.85	2,780.00	2,779.76	202.75	84.42	-1.88	-1,161.38	9,340.62	5,451.40	5,354.23	97.17	56.102	
13,700.00	6,987.94	2,780.00	2,779.76	205.80	84.42	-1.88	-1,161.38	9,340.62	5,391.29	5,294.19	97.10	55.522	
13,800.00	6,988.03	2,780.00	2,779.76	208.85	84.42	-1.88	-1,161.38	9,340.62	5,332.38	5,235.35	97.03	54.958	
13,900.00	6,988.12	2,780.00	2,779.76	211.89	84.42	-1.88	-1,161.38	9,340.62	5,274.70	5,177.76	96.94	54.413	
14,000.00	6,988.20	2,780.00	2,779.76	214.94	84.42	-1.88	-1,161.38	9,340.62	5,218.30	5,121.47	96.84	53.887	
14,100.00	6,988.29	2,780.00	2,779.76	217.99	84.42	-1.88	-1,161.38	9,340.62	5,163.23	5,066.50	96.73	53.380	
14,200.00	6,988.38	2,780.00	2,779.76	221.04	84.42	-1.88	-1,161.38	9,340.62	5,109.52	5,012.92	96.60	52.895	
14,300.00	6,988.47	2,780.00	2,779.76	224.10	84.42	-1.88	-1,161.38	9,340.62	5,057.21	4,960.76	96.45	52.432	
14,400.00	6,988.56	2,780.00	2,779.76	227.15	84.42	-1.88	-1,161.38	9,340.62	5,006.36	4,910.07	96.29	51.992	
14,500.00	6,988.64	2,780.00	2,779.76	230.20	84.42	-1.88	-1,161.38	9,340.62	4,957.00	4,860.89	96.11	51.577	
14,600.00	6,988.73	2,780.00	2,779.76	233.25	84.42	-1.88	-1,161.38	9,340.62	4,909.18	4,813.28	95.90	51.188	
14,700.00	6,988.82	2,780.00	2,779.76	236.31	84.42	-1.88	-1,161.38	9,340.62	4,862.95	4,767.27	95.68	50.826	
14,800.00	6,988.91	2,780.00	2,779.76	239.36	84.42	-1.88	-1,161.38	9,340.62	4,818.35	4,722.92	95.43	50.492	
14,900.00	6,989.00	2,780.00	2,779.76	242.42	84.42	-1.88	-1,161.38	9,340.62	4,775.43	4,680.28	95.15	50.187	
15,000.00	6,989.08	2,780.00	2,779.76	245.47	84.42	-1.88	-1,161.38	9,340.62	4,734.23	4,639.38	94.85	49.913	
15,100.00	6,989.17	2,780.00	2,779.76	248.53	84.42	-1.88	-1,161.38	9,340.62	4,694.81	4,600.29	94.52	49.670	
15,200.00	6,989.26	2,780.00	2,779.76	251.58	84.42	-1.88	-1,161.38	9,340.62	4,657.19	4,563.03	94.16	49.461	
15,300.00	6,989.35	2,780.00	2,779.76	254.64	84.42	-1.88	-1,161.38	9,340.62	4,621.44	4,527.67	93.77	49.286	
15,400.00	6,989.43	2,780.00	2,779.76	257.70	84.42	-1.88	-1,161.38	9,340.62	4,587.58	4,494.24	93.34	49.147	
15,500.00	6,989.52	2,780.00	2,779.76	260.76	84.42	-1.88	-1,161.38	9,340.62	4,555.67	4,462.78	92.89	49.044	
15,600.00	6,989.61	2,780.00	2,779.76	263.81	84.42	-1.88	-1,161.38	9,340.62	4,525.74	4,433.34	92.40	48.980	
15,700.00	6,989.70	2,780.00	2,779.76	266.87	84.42	-1.88	-1,161.38	9,340.62	4,497.84	4,405.96	91.88	48.955	
15,800.00	6,989.79	2,780.00	2,779.76	269.93	84.42	-1.88	-1,161.38	9,340.62	4,472.00	4,380.68	91.32	48.969	
15,900.00	6,989.87	2,780.00	2,779.76	272.99	84.42	-1.88	-1,161.38	9,340.62	4,448.26	4,357.52	90.74	49.024	
16,000.00	6,989.96	2,780.00	2,779.76	276.05	84.42	-1.88	-1,161.38	9,340.62	4,426.65	4,336.53	90.12	49.119	
16,100.00	6,990.05	2,780.00	2,779.76	279.11	84.42	-1.88	-1,161.38	9,340.62	4,407.21	4,317.73	89.48	49.254	
16,200.00	6,990.14	2,780.00	2,779.76	282.17	84.42	-1.88	-1,161.38	9,340.62	4,389.96	4,301.14	88.81	49.428	
16,300.00	6,990.22	2,780.00	2,779.76	285.23	84.42	-1.88	-1,161.38	9,340.62	4,374.92	4,286.78	88.14	49.637	
16,400.00	6,990.31	2,780.00	2,779.76	288.29	84.42	-1.88	-1,161.38	9,340.62	4,362.13	4,274.67	87.46	49.873	
16,500.00	6,990.40	2,780.00	2,779.76	291.35	84.42	-1.88	-1,161.38	9,340.62	4,351.60	4,264.78	86.82	50.124	
16,600.00	6,990.49	2,780.00	2,779.76	294.42	84.42	-1.88	-1,161.38	9,340.62	4,343.34	4,257.10	86.24	50.363	
16,700.00	6,990.58	2,780.00	2,779.76	297.48	84.42	-1.88	-1,161.38	9,340.62	4,337.38	4,251.56	85.82	50.539	
16,800.00	6,990.66	2,780.00	2,779.76	300.54	84.42	-1.88	-1,161.38	9,340.62	4,333.71	4,248.00	85.72	50.557	
16,900.00	6,990.75	2,780.00	2,779.76	303.60	84.42	-1.88	-1,161.38	9,340.62	4,332.36	4,246.20	86.16	50.282	
16,908.86	6,990.76	2,780.00	2,779.76	303.87	84.42	-1.88	-1,161.38	9,340.62	4,332.35	4,246.11	86.23	50.239 CC	
17,000.00	6,990.84	2,780.00	2,779.76	306.67	84.42	-1.88	-1,161.38	9,340.62	4,333.31	4,246.00	87.31	49.632 ES	
17,100.00	6,990.93	2,780.00	2,779.76	309.73	84.42	-1.88	-1,161.38	9,340.62	4,336.56	4,247.50	89.06	48.694	
17,200.00	6,991.02	2,780.00	2,779.76	312.79	84.42	-1.88	-1,161.38	9,340.62	4,342.12	4,250.95	91.17	47.627	
17,300.00	6,991.10	2,780.00	2,779.76	315.86	84.42	-1.88	-1,161.38	9,340.62	4,349.97	4,256.51	93.46	46.543	
17,400.00	6,991.19	2,780.00	2,779.76	318.92	84.42	-1.88	-1,161.38	9,340.62	4,360.10	4,264.27	95.83	45.499	
17,500.00	6,991.28	2,780.00	2,779.76	321.98	84.42	-1.88	-1,161.38	9,340.62	4,372.49	4,274.27	98.22	44.518	
17,600.00	6,991.37	2,780.00	2,779.76	325.05	84.42	-1.88	-1,161.38	9,340.62	4,387.13	4,286.53	100.60	43.611	
17,700.00	6,991.45	2,780.00	2,779.76	328.11	84.42	-1.88	-1,161.38	9,340.62	4,403.99	4,301.05	102.94	42.780	
17,800.00	6,991.54	2,780.00	2,779.76	331.18	84.42	-1.88	-1,161.38	9,340.62	4,423.05	4,317.80	105.25	42.024	
17,900.00	6,991.63	2,780.00	2,779.76	334.24	84.42	-1.88	-1,161.38	9,340.62	4,444.28	4,336.77	107.51	41.340	
18,000.00	6,991.72	2,780.00	2,779.76	337.31	84.42	-1.88	-1,161.38	9,340.62	4,467.64	4,357.94	109.70	40.724	
18,100.00	6,991.81	2,780.00	2,779.76	340.37	84.42	-1.88	-1,161.38	9,340.62	4,493.11	4,381.27	111.84	40.173	
18,200.00	6,991.89	2,780.00	2,779.76	343.44	84.42	-1.88	-1,161.38	9,340.62	4,520.65	4,406.73	113.92	39.684	
18,300.00	6,991.98	2,780.00	2,779.76	346.50	84.42	-1.88	-1,161.38	9,340.62	4,550.22	4,434.29	115.93	39.251	
18,321.44	6,992.00	2,780.00	2,779.76	347.16	84.42	-1.88	-1,161.38	9,340.62	4,556.82	4,440.47	116.35	39.166 SF	

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM _16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Sec 29 T31N R5W Offsets - Rosa Unit #200A - OH - OH													Offset Site Error:	0.00 ft
Survey Program:		59-INCLINOMETER					Rule Assigned:			Offset Well Error:		0.00 ft		
Reference	Offset	Semi Major Axis		Offset Wellbore Centre		Distance				Warning				
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
0.00	0.00	126.12	126.12	0.00	3.83	101.27	-1,300.87	6,526.39	6,654.77	6,650.94	3.83	1,737.450		
100.00	100.00	228.01	228.00	0.36	6.92	101.27	-1,301.04	6,526.39	6,654.81	6,647.52	7.28	913.761		
126.53	126.53	254.20	254.19	0.45	7.72	101.27	-1,300.77	6,526.39	6,654.75	6,646.58	8.17	814.199		
200.00	200.00	320.77	320.75	0.72	9.74	101.27	-1,300.96	6,526.39	6,654.80	6,644.34	10.46	636.323		
300.00	300.00	428.02	428.00	1.08	13.00	101.27	-1,301.04	6,526.39	6,654.81	6,640.73	14.07	472.851		
400.00	400.00	528.02	528.00	1.43	16.04	101.27	-1,301.04	6,526.39	6,654.81	6,637.34	17.47	380.948		
451.65	451.65	579.58	579.55	1.62	17.60	101.27	-1,300.51	6,526.39	6,654.70	6,635.48	19.22	346.240		
500.00	500.00	626.82	626.80	1.79	19.04	101.27	-1,300.53	6,526.39	6,654.71	6,633.88	20.83	319.510		
600.00	600.00	724.54	724.51	2.15	22.00	101.27	-1,300.71	6,526.39	6,654.74	6,630.59	24.15	275.516		
700.00	700.00	828.08	828.00	2.51	25.15	101.27	-1,301.04	6,526.39	6,654.81	6,627.15	27.66	240.623		
800.00	800.00	928.08	928.00	2.87	28.18	101.27	-1,301.04	6,526.39	6,654.81	6,623.76	31.05	214.325		
900.00	900.00	1,028.08	1,028.00	3.23	31.22	101.27	-1,301.04	6,526.39	6,654.81	6,620.36	34.44	193.209		
940.37	940.37	1,067.62	1,067.53	3.37	32.42	101.26	-1,299.76	6,526.39	6,654.56	6,618.77	35.79	185.942		
1,000.00	1,000.00	1,123.87	1,123.77	3.58	34.12	101.26	-1,299.86	6,526.39	6,654.58	6,616.87	37.71	176.470		
1,100.00	1,099.98	1,218.22	1,218.11	3.93	36.99	-113.73	-1,300.38	6,526.39	6,655.39	6,614.47	40.91	162.665		
1,200.00	1,199.84	1,328.46	1,327.84	4.26	40.33	-113.73	-1,301.04	6,526.39	6,657.62	6,613.03	44.59	149.307		
1,300.00	1,299.45	1,414.20	1,413.50	4.60	42.93	-113.73	-1,299.54	6,526.39	6,660.86	6,613.33	47.53	140.144		
1,400.00	1,398.70	1,527.82	1,526.70	4.95	46.38	-113.74	-1,301.04	6,526.39	6,666.07	6,614.75	51.32	129.884		
1,500.00	1,497.47	1,620.83	1,619.62	5.31	49.21	-113.75	-1,298.75	6,526.39	6,672.01	6,617.50	54.51	122.407		
1,600.00	1,595.62	1,692.81	1,691.53	5.69	51.39	-113.70	-1,299.84	6,526.39	6,680.10	6,623.03	57.07	117.056		
1,700.00	1,693.06	1,822.47	1,821.06	6.10	55.33	-113.75	-1,301.04	6,526.39	6,689.50	6,628.10	61.40	108.946		
1,800.00	1,790.08	1,917.55	1,916.13	6.53	58.21	-113.94	-1,300.37	6,526.39	6,699.41	6,634.70	64.70	103.538		
1,900.00	1,887.11	2,008.61	2,007.19	6.98	60.98	-114.11	-1,300.75	6,526.39	6,709.58	6,641.68	67.90	98.817		
2,000.00	1,984.14	2,113.60	2,112.14	7.44	64.17	-114.30	-1,301.04	6,526.39	6,719.80	6,648.27	71.53	93.948		
2,100.00	2,081.17	2,210.63	2,209.17	7.91	67.11	-114.49	-1,301.04	6,526.39	6,730.04	6,655.12	74.92	89.827		
2,200.00	2,178.20	2,307.66	2,306.20	8.38	70.06	-114.67	-1,301.04	6,526.39	6,740.36	6,662.03	78.32	86.057		
2,300.00	2,275.23	2,401.56	2,400.08	8.87	72.91	-114.85	-1,299.99	6,526.39	6,750.57	6,668.93	81.64	82.690		
2,400.00	2,372.26	2,495.33	2,493.85	9.36	75.76	-115.02	-1,300.40	6,526.39	6,761.10	6,676.15	84.95	79.587		
2,500.00	2,469.29	2,598.81	2,597.29	9.85	78.90	-115.21	-1,301.04	6,526.39	6,771.73	6,683.16	88.57	76.459		
2,600.00	2,566.32	2,695.84	2,694.32	10.36	81.85	-115.39	-1,301.04	6,526.39	6,782.32	6,690.33	91.99	73.731		
2,700.00	2,663.35	2,792.87	2,791.35	10.86	84.79	-115.57	-1,301.04	6,526.39	6,792.99	6,697.58	95.41	71.197		
2,800.00	2,760.38	2,889.90	2,888.38	11.37	87.74	-115.75	-1,301.04	6,526.39	6,803.72	6,704.88	98.84	68.837		
2,900.00	2,857.41	2,986.93	2,985.41	11.88	90.69	-115.93	-1,301.04	6,526.39	6,814.53	6,712.26	102.27	66.634		
3,000.00	2,954.44	3,083.96	3,082.44	12.39	93.63	-116.11	-1,301.04	6,526.39	6,825.40	6,719.70	105.70	64.575		
3,100.00	3,051.47	3,180.99	3,179.47	12.91	96.58	-116.29	-1,301.04	6,526.39	6,836.34	6,727.21	109.13	62.644		
3,200.00	3,148.50	3,248.00	3,246.42	13.42	98.61	-116.41	-1,301.04	6,526.39	6,847.42	6,735.77	111.65	61.331		
3,300.00	3,245.53	3,248.00	3,246.42	13.94	98.61	-116.41	-1,301.04	6,526.39	6,859.60	6,747.50	112.11	61.187		
3,400.00	3,342.56	3,248.00	3,246.42	14.46	98.61	-116.41	-1,301.04	6,526.39	6,873.23	6,760.68	112.55	61.070		
3,500.00	3,439.59	3,248.00	3,246.42	14.99	98.61	-116.41	-1,301.04	6,526.39	6,888.27	6,775.31	112.96	60.978		
3,600.00	3,536.62	3,248.00	3,246.42	15.51	98.61	-116.41	-1,301.04	6,526.39	6,904.74	6,791.38	113.36	60.911		
3,700.00	3,633.65	3,248.00	3,246.42	16.03	98.61	-116.41	-1,301.04	6,526.39	6,922.60	6,808.87	113.73	60.869		
3,800.00	3,730.68	3,248.00	3,246.42	16.56	98.61	-116.41	-1,301.04	6,526.39	6,941.87	6,827.79	114.08	60.852		
3,900.00	3,827.71	3,248.00	3,246.42	17.09	98.61	-116.41	-1,301.04	6,526.39	6,962.51	6,848.11	114.40	60.859		
4,000.00	3,924.74	3,248.00	3,246.42	17.61	98.61	-116.41	-1,301.04	6,526.39	6,984.53	6,869.82	114.71	60.889		
4,100.00	4,021.77	3,248.00	3,246.42	18.14	98.61	-116.41	-1,301.04	6,526.39	7,007.90	6,892.91	114.99	60.942		
4,200.00	4,118.79	3,248.00	3,246.42	18.67	98.61	-116.41	-1,301.04	6,526.39	7,032.62	6,917.37	115.25	61.019		
4,300.00	4,215.82	3,248.00	3,246.42	19.20	98.61	-116.41	-1,301.04	6,526.39	7,058.67	6,943.18	115.49	61.118		
4,400.00	4,312.85	3,248.00	3,246.42	19.73	98.61	-116.41	-1,301.04	6,526.39	7,086.04	6,970.33	115.71	61.239		
4,500.00	4,409.88	3,248.00	3,246.42	20.26	98.61	-116.41	-1,301.04	6,526.39	7,114.70	6,998.79	115.91	61.381		
4,600.00	4,506.91	3,248.00	3,246.42	20.79	98.61	-116.41	-1,301.04	6,526.39	7,144.65	7,028.56	116.09	61.545		
4,700.00	4,603.94	3,248.00	3,246.42	21.32	98.61	-116.41	-1,301.04	6,526.39	7,175.87	7,059.62	116.25	61.730		
4,800.00	4,700.97	3,248.00	3,246.42	21.86	98.61	-116.41	-1,301.04	6,526.39	7,208.34	7,091.96	116.38	61.936		

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Sec 29 T31N R5W Offsets - Rosa Unit #200A - OH - OH												Offset Site Error:	0.00 ft
Survey Program: 59-INCLINOMETER												Offset Well Error:	0.00 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
4,900.00	4,798.00	3,248.00	3,246.42	22.39	98.61	-116.41	-1,301.04	6,526.39	7,242.05	7,125.54	116.50	62.161	
5,000.00	4,895.03	3,248.00	3,246.42	22.92	98.61	-116.41	-1,301.04	6,526.39	7,276.97	7,160.37	116.61	62.407	
5,100.00	4,992.06	3,248.00	3,246.42	23.46	98.61	-116.41	-1,301.04	6,526.39	7,313.10	7,196.41	116.69	62.671	
5,200.00	5,089.09	3,248.00	3,246.42	23.99	98.61	-116.41	-1,301.04	6,526.39	7,350.41	7,233.65	116.76	62.955	
5,300.00	5,186.12	3,248.00	3,246.42	24.52	98.61	-116.41	-1,301.04	6,526.39	7,388.88	7,272.07	116.81	63.258	
5,400.00	5,283.15	3,248.00	3,246.42	25.06	98.61	-116.41	-1,301.04	6,526.39	7,428.50	7,311.66	116.84	63.579	
5,500.00	5,380.18	3,248.00	3,246.42	25.59	98.61	-116.41	-1,301.04	6,526.39	7,469.25	7,352.39	116.86	63.918	
5,600.00	5,477.21	3,248.00	3,246.42	26.13	98.61	-116.41	-1,301.04	6,526.39	7,511.11	7,394.25	116.86	64.275	
5,700.00	5,574.24	3,248.00	3,246.42	26.66	98.61	-116.41	-1,301.04	6,526.39	7,554.06	7,437.21	116.85	64.649	
5,800.00	5,671.27	3,248.00	3,246.42	27.20	98.61	-116.41	-1,301.04	6,526.39	7,598.08	7,481.26	116.82	65.040	
5,900.00	5,768.30	3,248.00	3,246.42	27.73	98.61	-116.41	-1,301.04	6,526.39	7,643.16	7,526.38	116.78	65.448	
6,000.00	5,865.33	3,248.00	3,246.42	28.27	98.61	-116.41	-1,301.04	6,526.39	7,689.28	7,572.55	116.73	65.872	
6,100.00	5,962.36	3,248.00	3,246.42	28.80	98.61	-116.41	-1,301.04	6,526.39	7,736.41	7,619.75	116.67	66.313	
6,200.00	6,059.39	3,248.00	3,246.42	29.34	98.61	-116.41	-1,301.04	6,526.39	7,784.54	7,667.95	116.59	66.768	
6,300.00	6,156.42	3,248.00	3,246.42	29.87	98.61	-116.41	-1,301.04	6,526.39	7,833.66	7,717.15	116.50	67.239	
6,400.00	6,253.45	3,248.00	3,246.42	30.41	98.61	-116.41	-1,301.04	6,526.39	7,883.73	7,767.33	116.41	67.726	
6,412.00	6,265.09	3,248.00	3,246.42	30.48	98.61	-116.41	-1,301.04	6,526.39	7,889.81	7,773.41	116.39	67.785	
6,450.00	6,302.10	3,248.00	3,246.42	30.67	98.61	-103.90	-1,301.04	6,526.39	7,908.15	7,791.81	116.35	67.970	
6,500.00	6,351.06	3,248.00	3,246.42	30.90	98.61	-83.11	-1,301.04	6,526.39	7,929.47	7,813.21	116.27	68.201	
6,550.00	6,400.04	3,248.00	3,246.42	31.10	98.61	-61.82	-1,301.04	6,526.39	7,947.49	7,831.33	116.16	68.419	
6,600.00	6,448.74	3,248.00	3,246.42	31.27	98.61	-45.04	-1,301.04	6,526.39	7,962.11	7,846.08	116.03	68.622	
6,650.00	6,496.86	3,248.00	3,246.42	31.41	98.61	-33.47	-1,301.04	6,526.39	7,973.27	7,857.40	115.88	68.809	
6,700.00	6,544.10	3,248.00	3,246.42	31.53	98.61	-25.67	-1,301.04	6,526.39	7,980.92	7,865.22	115.70	68.978	
6,750.00	6,590.17	3,248.00	3,246.42	31.62	98.61	-20.25	-1,301.04	6,526.39	7,985.01	7,869.50	115.51	69.128	
6,800.00	6,634.80	3,248.00	3,246.42	31.70	98.61	-16.35	-1,301.04	6,526.39	7,985.53	7,870.23	115.30	69.258	
6,850.00	6,677.69	3,248.00	3,246.42	31.76	98.61	-13.41	-1,301.04	6,526.39	7,982.48	7,867.40	115.08	69.366	
6,900.00	6,718.59	3,248.00	3,246.42	31.79	98.61	-11.13	-1,301.04	6,526.39	7,975.86	7,861.02	114.84	69.452	
6,950.00	6,757.25	3,248.00	3,246.42	31.82	98.61	-9.29	-1,301.04	6,526.39	7,965.72	7,851.12	114.59	69.514	
7,000.00	6,793.42	3,248.00	3,246.42	31.83	98.61	-7.76	-1,301.04	6,526.39	7,952.09	7,837.76	114.34	69.551	
7,050.00	6,826.89	3,248.00	3,246.42	31.82	98.61	-6.45	-1,301.04	6,526.39	7,935.05	7,820.98	114.07	69.562	
7,100.00	6,857.45	3,248.00	3,246.42	31.81	98.61	-5.28	-1,301.04	6,526.39	7,914.69	7,800.88	113.80	69.548	
7,150.00	6,884.91	3,248.00	3,246.42	31.79	98.61	-4.21	-1,301.04	6,526.39	7,891.09	7,777.56	113.53	69.507	
7,200.00	6,909.09	3,248.00	3,246.42	31.76	98.61	-3.19	-1,301.04	6,526.39	7,864.38	7,751.12	113.26	69.439	
7,250.00	6,929.86	3,248.00	3,246.42	31.73	98.61	-2.17	-1,301.04	6,526.39	7,834.69	7,721.70	112.99	69.343	
7,300.00	6,947.08	3,248.00	3,246.42	31.70	98.61	-1.13	-1,301.04	6,526.39	7,802.17	7,689.45	112.72	69.219	
7,350.00	6,960.65	3,248.00	3,246.42	31.68	98.61	0.00	-1,301.04	6,526.39	7,766.99	7,654.54	112.46	69.067	
7,400.00	6,970.48	3,248.00	3,246.42	31.68	98.61	1.28	-1,301.04	6,526.39	7,729.33	7,617.13	112.20	68.888	
7,450.00	6,976.51	3,248.00	3,246.42	31.71	98.61	2.78	-1,301.04	6,526.39	7,689.39	7,577.43	111.96	68.680	
7,495.26	6,978.67	3,248.00	3,246.42	31.80	98.61	4.44	-1,301.04	6,526.39	7,651.44	7,539.69	111.75	68.469	
7,500.00	6,978.73	3,248.00	3,246.42	31.81	98.61	4.44	-1,301.04	6,526.39	7,647.39	7,535.66	111.73	68.444	
7,600.00	6,980.01	3,248.00	3,246.42	32.47	98.61	4.44	-1,301.04	6,526.39	7,561.99	7,450.72	111.27	67.962	
7,700.00	6,981.29	3,248.00	3,246.42	33.86	98.61	4.44	-1,301.04	6,526.39	7,476.95	7,366.15	110.80	67.484	
7,755.27	6,982.00	3,248.00	3,246.42	34.81	98.61	4.44	-1,301.04	6,526.39	7,430.10	7,319.57	110.53	67.221	
7,800.00	6,982.47	3,248.00	3,246.42	35.63	98.61	3.09	-1,301.04	6,526.39	7,392.22	7,281.90	110.32	67.006	
7,876.01	6,982.83	3,248.00	3,246.42	37.13	98.61	0.77	-1,301.04	6,526.39	7,327.73	7,217.76	109.97	66.634	
7,900.00	6,982.85	3,248.00	3,246.42	37.63	98.61	0.77	-1,301.04	6,526.39	7,307.37	7,197.51	109.86	66.516	
8,000.00	6,982.94	3,248.00	3,246.42	39.78	98.61	0.77	-1,301.04	6,526.39	7,222.74	7,113.34	109.40	66.023	
8,100.00	6,983.02	3,248.00	3,246.42	42.06	98.61	0.77	-1,301.04	6,526.39	7,138.51	7,029.58	108.93	65.534	
8,200.00	6,983.11	3,248.00	3,246.42	44.43	98.61	0.77	-1,301.04	6,526.39	7,054.69	6,946.24	108.45	65.048	
8,300.00	6,983.20	3,248.00	3,246.42	46.89	98.61	0.77	-1,301.04	6,526.39	6,971.30	6,863.33	107.97	64.566	
8,400.00	6,983.29	3,248.00	3,246.42	49.42	98.61	0.77	-1,301.04	6,526.39	6,888.35	6,780.86	107.49	64.086	
8,500.00	6,983.37	3,248.00	3,246.42	52.00	98.61	0.77	-1,301.04	6,526.39	6,805.86	6,698.86	106.99	63.610	

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Sec 29 T31N R5W Offsets - Rosa Unit #200A - OH - OH													Offset Site Error:	0.00 ft
Survey Program:		59-INCLINOMETER					Rule Assigned:				Offset Well Error:	0.00 ft		
Reference	Offset	Semi Major Axis		Offset Wellbore Centre		Distance			Warning					
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
8,600.00	6,983.46	3,248.00	3,246.42	54.63	98.61	0.77	-1,301.04	6,526.39	6,723.84	6,617.34	106.50	63.137		
8,700.00	6,983.55	3,248.00	3,246.42	57.31	98.61	0.77	-1,301.04	6,526.39	6,642.32	6,536.32	105.99	62.667		
8,800.00	6,983.64	3,248.00	3,246.42	60.02	98.61	0.77	-1,301.04	6,526.39	6,561.30	6,455.82	105.49	62.201		
8,900.00	6,983.73	3,248.00	3,246.42	62.77	98.61	0.77	-1,301.04	6,526.39	6,480.82	6,375.85	104.97	61.738		
9,000.00	6,983.81	3,248.00	3,246.42	65.55	98.61	0.77	-1,301.04	6,526.39	6,400.89	6,296.43	104.46	61.278		
9,100.00	6,983.90	3,248.00	3,246.42	68.35	98.61	0.77	-1,301.04	6,526.39	6,321.53	6,217.59	103.93	60.823		
9,200.00	6,983.99	3,248.00	3,246.42	71.17	98.61	0.77	-1,301.04	6,526.39	6,242.76	6,139.35	103.41	60.371		
9,300.00	6,984.08	3,248.00	3,246.42	74.02	98.61	0.77	-1,301.04	6,526.39	6,164.61	6,061.73	102.88	59.923		
9,400.00	6,984.16	3,248.00	3,246.42	76.88	98.61	0.77	-1,301.04	6,526.39	6,087.10	5,984.76	102.34	59.479		
9,500.00	6,984.25	3,248.00	3,246.42	79.75	98.61	0.77	-1,301.04	6,526.39	6,010.25	5,908.45	101.80	59.040		
9,600.00	6,984.34	3,248.00	3,246.42	82.64	98.61	0.77	-1,301.04	6,526.39	5,934.09	5,832.83	101.26	58.605		
9,700.00	6,984.43	3,248.00	3,246.42	85.55	98.61	0.77	-1,301.04	6,526.39	5,858.65	5,757.94	100.71	58.175		
9,800.00	6,984.52	3,248.00	3,246.42	88.46	98.61	0.77	-1,301.04	6,526.39	5,783.95	5,683.80	100.15	57.751		
9,900.00	6,984.60	3,248.00	3,246.42	91.39	98.61	0.77	-1,301.04	6,526.39	5,710.03	5,610.43	99.60	57.331		
10,000.00	6,984.69	3,248.00	3,246.42	94.32	98.61	0.77	-1,301.04	6,526.39	5,636.91	5,537.88	99.04	56.918		
10,100.00	6,984.78	3,248.00	3,246.42	97.26	98.61	0.77	-1,301.04	6,526.39	5,564.63	5,466.16	98.47	56.512		
10,200.00	6,984.87	3,248.00	3,246.42	100.22	98.61	0.77	-1,301.04	6,526.39	5,493.22	5,395.32	97.90	56.112		
10,300.00	6,984.96	3,248.00	3,246.42	103.17	98.61	0.77	-1,301.04	6,526.39	5,422.71	5,325.39	97.32	55.720		
10,400.00	6,985.04	3,248.00	3,246.42	106.14	98.61	0.77	-1,301.04	6,526.39	5,353.14	5,256.40	96.74	55.337		
10,500.00	6,985.13	3,248.00	3,246.42	109.11	98.61	0.77	-1,301.04	6,526.39	5,284.55	5,188.40	96.15	54.963		
10,600.00	6,985.22	3,248.00	3,246.42	112.09	98.61	0.77	-1,301.04	6,526.39	5,216.97	5,121.42	95.55	54.599		
10,700.00	6,985.31	3,248.00	3,246.42	115.07	98.61	0.77	-1,301.04	6,526.39	5,150.45	5,055.50	94.95	54.246		
10,800.00	6,985.39	3,248.00	3,246.42	118.05	98.61	0.77	-1,301.04	6,526.39	5,085.02	4,990.69	94.33	53.905		
10,900.00	6,985.48	3,248.00	3,246.42	121.04	98.61	0.77	-1,301.04	6,526.39	5,020.74	4,927.03	93.71	53.578		
11,000.00	6,985.57	3,248.00	3,246.42	124.04	98.61	0.77	-1,301.04	6,526.39	4,957.64	4,864.56	93.07	53.265		
11,100.00	6,985.66	3,248.00	3,246.42	127.04	98.61	0.77	-1,301.04	6,526.39	4,895.76	4,803.34	92.43	52.969		
11,200.00	6,985.75	3,248.00	3,246.42	130.04	98.61	0.77	-1,301.04	6,526.39	4,835.17	4,743.40	91.77	52.690		
11,300.00	6,985.83	3,248.00	3,246.42	133.05	98.61	0.77	-1,301.04	6,526.39	4,775.89	4,684.80	91.09	52.430		
11,400.00	6,985.92	3,248.00	3,246.42	136.05	98.61	0.77	-1,301.04	6,526.39	4,718.00	4,627.60	90.40	52.190		
11,500.00	6,986.01	3,248.00	3,246.42	139.07	98.61	0.77	-1,301.04	6,526.39	4,661.53	4,571.84	89.69	51.974		
11,600.00	6,986.10	3,248.00	3,246.42	142.08	98.61	0.77	-1,301.04	6,526.39	4,606.54	4,517.58	88.96	51.782		
11,700.00	6,986.18	3,248.00	3,246.42	145.10	98.61	0.77	-1,301.04	6,526.39	4,553.08	4,464.87	88.21	51.617		
11,800.00	6,986.27	3,248.00	3,246.42	148.12	98.61	0.77	-1,301.04	6,526.39	4,501.21	4,413.77	87.44	51.481		
11,900.00	6,986.36	3,248.00	3,246.42	151.14	98.61	0.77	-1,301.04	6,526.39	4,450.98	4,364.34	86.64	51.376		
12,000.00	6,986.45	3,248.00	3,246.42	154.16	98.61	0.77	-1,301.04	6,526.39	4,402.45	4,316.64	85.81	51.304		
12,100.00	6,986.54	3,248.00	3,246.42	157.19	98.61	0.77	-1,301.04	6,526.39	4,355.67	4,270.71	84.96	51.269		
12,200.00	6,986.62	3,248.00	3,246.42	160.21	98.61	0.77	-1,301.04	6,526.39	4,310.71	4,226.64	84.07	51.274		
12,300.00	6,986.71	3,248.00	3,246.42	163.24	98.61	0.77	-1,301.04	6,526.39	4,267.62	4,184.46	83.16	51.320		
12,400.00	6,986.80	3,248.00	3,246.42	166.28	98.61	0.77	-1,301.04	6,526.39	4,226.45	4,144.24	82.21	51.411		
12,500.00	6,986.89	3,248.00	3,246.42	169.31	98.61	0.77	-1,301.04	6,526.39	4,187.27	4,106.04	81.23	51.551		
12,600.00	6,986.98	3,248.00	3,246.42	172.34	98.61	0.77	-1,301.04	6,526.39	4,150.13	4,069.92	80.21	51.742		
12,700.00	6,987.06	3,248.00	3,246.42	175.38	98.61	0.77	-1,301.04	6,526.39	4,115.08	4,035.93	79.15	51.989		
12,800.00	6,987.15	3,248.00	3,246.42	178.41	98.61	0.77	-1,301.04	6,526.39	4,082.19	4,004.12	78.06	52.294		
12,900.00	6,987.24	3,248.00	3,246.42	181.45	98.61	0.77	-1,301.04	6,526.39	4,051.49	3,974.56	76.93	52.663		
13,000.00	6,987.33	3,248.00	3,246.42	184.49	98.61	0.77	-1,301.04	6,526.39	4,023.05	3,947.28	75.77	53.097		
13,100.00	6,987.41	3,248.00	3,246.42	187.53	98.61	0.77	-1,301.04	6,526.39	3,996.91	3,922.34	74.57	53.602		
13,200.00	6,987.50	3,248.00	3,246.42	190.57	98.61	0.77	-1,301.04	6,526.39	3,973.11	3,899.78	73.33	54.180		
13,300.00	6,987.59	3,248.00	3,246.42	193.62	98.61	0.77	-1,301.04	6,526.39	3,951.70	3,879.63	72.07	54.834		
13,400.00	6,987.68	3,248.00	3,246.42	196.66	98.61	0.77	-1,301.04	6,526.39	3,932.72	3,861.94	70.78	55.566		
13,500.00	6,987.77	3,248.00	3,246.42	199.71	98.61	0.77	-1,301.04	6,526.39	3,916.20	3,846.73	69.47	56.375		
13,600.00	6,987.85	3,248.00	3,246.42	202.75	98.61	0.77	-1,301.04	6,526.39	3,902.17	3,834.02	68.15	57.255		
13,700.00	6,987.94	3,248.00	3,246.42	205.80	98.61	0.77	-1,301.04	6,526.39	3,890.67	3,823.80	66.86	58.188		

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Sec 29 T31N R5W Offsets - Rosa Unit #200A - OH - OH													Offset Site Error:	0.00 ft
Survey Program:		59-INCLINOMETER					Rule Assigned:			Offset Well Error:		0.00 ft		
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
13,800.00	6,988.03	3,248.00	3,246.42	208.85	98.61	0.77	-1,301.04	6,526.39	3,881.70	3,816.06	65.64	59.134		
13,900.00	6,988.12	3,248.00	3,246.42	211.89	98.61	0.77	-1,301.04	6,526.39	3,875.30	3,810.71	64.60	59.992		
14,000.00	6,988.20	3,248.00	3,246.42	214.94	98.61	0.77	-1,301.04	6,526.39	3,871.47	3,807.50	63.97	60.519		
14,098.31	6,988.29	3,248.00	3,246.42	217.94	98.61	0.77	-1,301.04	6,526.39	3,870.23	3,806.00	64.22	60.263 CC		
14,100.00	6,988.29	3,248.00	3,246.42	217.99	98.61	0.77	-1,301.04	6,526.39	3,870.23	3,805.99	64.24	60.249		
14,200.00	6,988.38	3,248.00	3,246.42	221.04	98.61	0.77	-1,301.04	6,526.39	3,871.56	3,805.82	65.75	58.887 ES		
14,300.00	6,988.47	3,248.00	3,246.42	224.10	98.61	0.77	-1,301.04	6,526.39	3,875.48	3,807.32	68.16	56.858		
14,400.00	6,988.56	3,248.00	3,246.42	227.15	98.61	0.77	-1,301.04	6,526.39	3,881.97	3,810.97	71.00	54.677		
14,500.00	6,988.64	3,248.00	3,246.42	230.20	98.61	0.77	-1,301.04	6,526.39	3,891.02	3,817.01	74.00	52.580		
14,600.00	6,988.73	3,248.00	3,246.42	233.25	98.61	0.77	-1,301.04	6,526.39	3,902.61	3,825.55	77.06	50.643		
14,700.00	6,988.82	3,248.00	3,246.42	236.31	98.61	0.77	-1,301.04	6,526.39	3,916.72	3,836.60	80.12	48.885		
14,800.00	6,988.91	3,248.00	3,246.42	239.36	98.61	0.77	-1,301.04	6,526.39	3,933.32	3,850.17	83.15	47.303		
14,900.00	6,989.00	3,248.00	3,246.42	242.42	98.61	0.77	-1,301.04	6,526.39	3,952.39	3,866.25	86.14	45.885		
15,000.00	6,989.08	3,248.00	3,246.42	245.47	98.61	0.77	-1,301.04	6,526.39	3,973.88	3,884.81	89.06	44.618		
15,100.00	6,989.17	3,248.00	3,246.42	248.53	98.61	0.77	-1,301.04	6,526.39	3,997.75	3,905.83	91.92	43.490		
15,200.00	6,989.26	3,248.00	3,246.42	251.58	98.61	0.77	-1,301.04	6,526.39	4,023.97	3,929.26	94.71	42.487		
15,300.00	6,989.35	3,248.00	3,246.42	254.64	98.61	0.77	-1,301.04	6,526.39	4,052.49	3,955.07	97.42	41.598		
15,400.00	6,989.43	3,248.00	3,246.42	257.70	98.61	0.77	-1,301.04	6,526.39	4,083.26	3,983.21	100.05	40.812		
15,500.00	6,989.52	3,248.00	3,246.42	260.76	98.61	0.77	-1,301.04	6,526.39	4,116.23	4,013.64	102.60	40.121		
15,600.00	6,989.61	3,248.00	3,246.42	263.81	98.61	0.77	-1,301.04	6,526.39	4,151.35	4,046.29	105.06	39.515		
15,700.00	6,989.70	3,248.00	3,246.42	266.87	98.61	0.77	-1,301.04	6,526.39	4,188.56	4,081.13	107.43	38.988		
15,800.00	6,989.79	3,248.00	3,246.42	269.93	98.61	0.77	-1,301.04	6,526.39	4,227.81	4,118.09	109.72	38.532		
15,900.00	6,989.87	3,248.00	3,246.42	272.99	98.61	0.77	-1,301.04	6,526.39	4,269.04	4,157.12	111.93	38.142		
16,000.00	6,989.96	3,248.00	3,246.42	276.05	98.61	0.77	-1,301.04	6,526.39	4,312.20	4,198.16	114.04	37.812		
16,100.00	6,990.05	3,248.00	3,246.42	279.11	98.61	0.77	-1,301.04	6,526.39	4,357.23	4,241.15	116.08	37.537		
16,200.00	6,990.14	3,248.00	3,246.42	282.17	98.61	0.77	-1,301.04	6,526.39	4,404.06	4,286.03	118.03	37.314		
16,300.00	6,990.22	3,248.00	3,246.42	285.23	98.61	0.77	-1,301.04	6,526.39	4,452.65	4,332.76	119.89	37.138		
16,400.00	6,990.31	3,248.00	3,246.42	288.29	98.61	0.77	-1,301.04	6,526.39	4,502.94	4,381.25	121.68	37.006		
16,500.00	6,990.40	3,248.00	3,246.42	291.35	98.61	0.77	-1,301.04	6,526.39	4,554.86	4,431.47	123.39	36.914		
16,600.00	6,990.49	3,248.00	3,246.42	294.42	98.61	0.77	-1,301.04	6,526.39	4,608.37	4,483.35	125.03	36.859		
16,700.00	6,990.58	3,248.00	3,246.42	297.48	98.61	0.77	-1,301.04	6,526.39	4,663.42	4,536.83	126.59	36.840 SF		
16,800.00	6,990.66	3,248.00	3,246.42	300.54	98.61	0.77	-1,301.04	6,526.39	4,719.93	4,591.86	128.07	36.853		
16,900.00	6,990.75	3,248.00	3,246.42	303.60	98.61	0.77	-1,301.04	6,526.39	4,777.88	4,648.38	129.49	36.896		
17,000.00	6,990.84	3,248.00	3,246.42	306.67	98.61	0.77	-1,301.04	6,526.39	4,837.20	4,706.35	130.85	36.968		
17,100.00	6,990.93	3,248.00	3,246.42	309.73	98.61	0.77	-1,301.04	6,526.39	4,897.84	4,765.70	132.14	37.066		
17,200.00	6,991.02	3,248.00	3,246.42	312.79	98.61	0.77	-1,301.04	6,526.39	4,959.75	4,826.39	133.37	37.189		
17,300.00	6,991.10	3,248.00	3,246.42	315.86	98.61	0.77	-1,301.04	6,526.39	5,022.90	4,888.36	134.54	37.335		
17,400.00	6,991.19	3,248.00	3,246.42	318.92	98.61	0.77	-1,301.04	6,526.39	5,087.22	4,951.57	135.65	37.503		
17,500.00	6,991.28	3,248.00	3,246.42	321.98	98.61	0.77	-1,301.04	6,526.39	5,152.68	5,015.97	136.71	37.691		
17,600.00	6,991.37	3,248.00	3,246.42	325.05	98.61	0.77	-1,301.04	6,526.39	5,219.24	5,081.52	137.72	37.898		
17,700.00	6,991.45	3,248.00	3,246.42	328.11	98.61	0.77	-1,301.04	6,526.39	5,286.85	5,148.18	138.68	38.123		
17,800.00	6,991.54	3,248.00	3,246.42	331.18	98.61	0.77	-1,301.04	6,526.39	5,355.48	5,215.89	139.59	38.366		
17,900.00	6,991.63	3,248.00	3,246.42	334.24	98.61	0.77	-1,301.04	6,526.39	5,425.08	5,284.62	140.46	38.624		
18,000.00	6,991.72	3,248.00	3,246.42	337.31	98.61	0.77	-1,301.04	6,526.39	5,495.62	5,354.34	141.28	38.898		
18,100.00	6,991.81	3,248.00	3,246.42	340.37	98.61	0.77	-1,301.04	6,526.39	5,567.06	5,424.99	142.07	39.186		
18,200.00	6,991.89	3,248.00	3,246.42	343.44	98.61	0.77	-1,301.04	6,526.39	5,639.37	5,496.56	142.82	39.487		
18,300.00	6,991.98	3,248.00	3,246.42	346.50	98.61	0.77	-1,301.04	6,526.39	5,712.52	5,568.99	143.53	39.801		
18,321.44	6,992.00	3,248.00	3,246.42	347.16	98.61	0.77	-1,301.04	6,526.39	5,728.30	5,584.63	143.67	39.870		

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Sec 29 T31N R5W Offsets - Rosa Unit #23 - OH - OH													Offset Site Error:	0.00 ft
Survey Program:		5935-UNKNOWN					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	
14,000.00	6,988.20	5,935.00	5,935.00	214.94	237.40	14.47	-1,475.18	3,700.96	2,945.14	2,677.46	267.68	11.002		
14,100.00	6,988.29	5,935.00	5,935.00	217.99	237.40	14.47	-1,475.18	3,700.96	3,037.76	2,769.29	268.47	11.315		
14,200.00	6,988.38	5,935.00	5,935.00	221.04	237.40	14.47	-1,475.18	3,700.96	3,130.83	2,861.65	269.18	11.631		
14,300.00	6,988.47	5,935.00	5,935.00	224.10	237.40	14.47	-1,475.18	3,700.96	3,224.32	2,954.50	269.83	11.950		
14,400.00	6,988.56	5,935.00	5,935.00	227.15	237.40	14.47	-1,475.18	3,700.96	3,318.19	3,047.78	270.41	12.271		
14,500.00	6,988.64	5,935.00	5,935.00	230.20	237.40	14.47	-1,475.18	3,700.96	3,412.41	3,141.47	270.95	12.594		
14,600.00	6,988.73	5,935.00	5,935.00	233.25	237.40	14.47	-1,475.18	3,700.96	3,506.95	3,235.52	271.43	12.920		
14,700.00	6,988.82	5,935.00	5,935.00	236.31	237.40	14.47	-1,475.18	3,700.96	3,601.78	3,329.90	271.88	13.248		
14,800.00	6,988.91	5,935.00	5,935.00	239.36	237.40	14.47	-1,475.18	3,700.96	3,696.89	3,424.60	272.29	13.577		
14,900.00	6,989.00	5,935.00	5,935.00	242.42	237.40	14.47	-1,475.18	3,700.96	3,792.25	3,519.58	272.67	13.908		
15,000.00	6,989.08	5,935.00	5,935.00	245.47	237.40	14.47	-1,475.18	3,700.96	3,887.84	3,614.82	273.01	14.240		
15,100.00	6,989.17	5,935.00	5,935.00	248.53	237.40	14.47	-1,475.18	3,700.96	3,983.64	3,710.31	273.33	14.574		
15,200.00	6,989.26	5,935.00	5,935.00	251.58	237.40	14.47	-1,475.18	3,700.96	4,079.65	3,806.02	273.63	14.909		
15,300.00	6,989.35	5,935.00	5,935.00	254.64	237.40	14.47	-1,475.18	3,700.96	4,175.85	3,901.94	273.91	15.245		
15,400.00	6,989.43	5,935.00	5,935.00	257.70	237.40	14.47	-1,475.18	3,700.96	4,272.22	3,998.05	274.17	15.583		
15,500.00	6,989.52	5,935.00	5,935.00	260.76	237.40	14.47	-1,475.18	3,700.96	4,368.75	4,094.35	274.41	15.921		
15,600.00	6,989.61	5,935.00	5,935.00	263.81	237.40	14.47	-1,475.18	3,700.96	4,465.44	4,190.81	274.63	16.260		
15,700.00	6,989.70	5,935.00	5,935.00	266.87	237.40	14.47	-1,475.18	3,700.96	4,562.27	4,287.42	274.84	16.599		
15,800.00	6,989.79	5,935.00	5,935.00	269.93	237.40	14.47	-1,475.18	3,700.96	4,659.23	4,384.19	275.04	16.940		
15,900.00	6,989.87	5,935.00	5,935.00	272.99	237.40	14.47	-1,475.18	3,700.96	4,756.32	4,481.09	275.23	17.281		
16,000.00	6,989.96	5,935.00	5,935.00	276.05	237.40	14.47	-1,475.18	3,700.96	4,853.53	4,578.12	275.41	17.623		
16,100.00	6,990.05	5,935.00	5,935.00	279.11	237.40	14.47	-1,475.18	3,700.96	4,950.85	4,675.27	275.58	17.965		
16,200.00	6,990.14	5,935.00	5,935.00	282.17	237.40	14.47	-1,475.18	3,700.96	5,048.27	4,772.53	275.73	18.308		
16,300.00	6,990.22	5,935.00	5,935.00	285.23	237.40	14.47	-1,475.18	3,700.96	5,145.79	4,869.91	275.89	18.652		
16,400.00	6,990.31	5,935.00	5,935.00	288.29	237.40	14.47	-1,475.18	3,700.96	5,243.41	4,967.38	276.03	18.996		
16,500.00	6,990.40	5,935.00	5,935.00	291.35	237.40	14.47	-1,475.18	3,700.96	5,341.11	5,064.94	276.17	19.340		
16,600.00	6,990.49	5,935.00	5,935.00	294.42	237.40	14.47	-1,475.18	3,700.96	5,438.90	5,162.60	276.30	19.685		
16,700.00	6,990.58	5,935.00	5,935.00	297.48	237.40	14.47	-1,475.18	3,700.96	5,536.76	5,260.34	276.43	20.030		
16,800.00	6,990.66	5,935.00	5,935.00	300.54	237.40	14.47	-1,475.18	3,700.96	5,634.70	5,358.16	276.55	20.375		
16,900.00	6,990.75	5,935.00	5,935.00	303.60	237.40	14.47	-1,475.18	3,700.96	5,732.72	5,456.05	276.67	20.721		
17,000.00	6,990.84	5,935.00	5,935.00	306.67	237.40	14.47	-1,475.18	3,700.96	5,830.80	5,554.02	276.78	21.067		
17,100.00	6,990.93	5,935.00	5,935.00	309.73	237.40	14.47	-1,475.18	3,700.96	5,928.94	5,652.05	276.89	21.413		
17,200.00	6,991.02	5,935.00	5,935.00	312.79	237.40	14.47	-1,475.18	3,700.96	6,027.14	5,750.15	276.99	21.759		
17,300.00	6,991.10	5,935.00	5,935.00	315.86	237.40	14.47	-1,475.18	3,700.96	6,125.41	5,848.31	277.10	22.106		
17,400.00	6,991.19	5,935.00	5,935.00	318.92	237.40	14.47	-1,475.18	3,700.96	6,223.73	5,946.53	277.20	22.452		
17,500.00	6,991.28	5,935.00	5,935.00	321.98	237.40	14.47	-1,475.18	3,700.96	6,322.10	6,044.80	277.29	22.799		
17,600.00	6,991.37	5,935.00	5,935.00	325.05	237.40	14.47	-1,475.18	3,700.96	6,420.52	6,143.13	277.39	23.146		
17,700.00	6,991.45	5,935.00	5,935.00	328.11	237.40	14.47	-1,475.18	3,700.96	6,518.99	6,241.51	277.48	23.493		
17,800.00	6,991.54	5,935.00	5,935.00	331.18	237.40	14.47	-1,475.18	3,700.96	6,617.50	6,339.93	277.57	23.841		
17,900.00	6,991.63	5,935.00	5,935.00	334.24	237.40	14.47	-1,475.18	3,700.96	6,716.06	6,438.40	277.66	24.188		
18,000.00	6,991.72	5,935.00	5,935.00	337.31	237.40	14.47	-1,475.18	3,700.96	6,814.66	6,536.91	277.75	24.535		
18,100.00	6,991.81	5,935.00	5,935.00	340.37	237.40	14.47	-1,475.18	3,700.96	6,913.30	6,635.47	277.84	24.883		
18,200.00	6,991.89	5,935.00	5,935.00	343.44	237.40	14.47	-1,475.18	3,700.96	7,011.98	6,734.06	277.92	25.230		
18,300.00	6,991.98	5,935.00	5,935.00	346.50	237.40	14.47	-1,475.18	3,700.96	7,110.70	6,832.70	278.00	25.578		
18,321.44	6,992.00	5,935.00	5,935.00	347.16	237.40	14.47	-1,475.18	3,700.96	7,131.87	6,853.84	278.02	25.652		

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Sec 30 T31N R5W Offsets - 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		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)	
8,700.00	6,983.55	6,109.00	6,105.80	57.31	185.48	-38.30	-418.53	-182.39	1,738.70	1,546.35	192.35	9.039
8,800.00	6,983.64	6,109.00	6,105.80	60.02	185.48	-38.30	-418.53	-182.39	1,816.00	1,620.89	195.11	9.308
8,900.00	6,983.73	6,109.00	6,105.80	62.77	185.48	-38.30	-418.53	-182.39	1,895.42	1,697.86	197.56	9.594
9,000.00	6,983.81	6,109.00	6,105.80	65.55	185.48	-38.30	-418.53	-182.39	1,976.71	1,776.99	199.73	9.897
9,100.00	6,983.90	6,109.00	6,105.80	68.35	185.48	-38.30	-418.53	-182.39	2,059.65	1,858.00	201.66	10.214
9,200.00	6,983.99	6,109.00	6,105.80	71.17	185.48	-38.30	-418.53	-182.39	2,144.05	1,940.68	203.37	10.543
9,300.00	6,984.08	6,109.00	6,105.80	74.02	185.48	-38.30	-418.53	-182.39	2,229.74	2,024.84	204.89	10.882
9,400.00	6,984.16	6,109.00	6,105.80	76.88	185.48	-38.30	-418.53	-182.39	2,316.57	2,110.31	206.25	11.232
9,500.00	6,984.25	6,109.00	6,105.80	79.75	185.48	-38.30	-418.53	-182.39	2,404.43	2,196.95	207.47	11.589
9,600.00	6,984.34	6,109.00	6,105.80	82.64	185.48	-38.30	-418.53	-182.39	2,493.20	2,284.63	208.57	11.954
9,700.00	6,984.43	6,109.00	6,105.80	85.55	185.48	-38.30	-418.53	-182.39	2,582.79	2,373.24	209.55	12.325
9,800.00	6,984.52	6,109.00	6,105.80	88.46	185.48	-38.30	-418.53	-182.39	2,673.12	2,462.68	210.44	12.703
9,900.00	6,984.60	6,109.00	6,105.80	91.39	185.48	-38.30	-418.53	-182.39	2,764.12	2,552.88	211.24	13.085
10,000.00	6,984.69	6,109.00	6,105.80	94.32	185.48	-38.30	-418.53	-182.39	2,855.72	2,643.75	211.97	13.472
10,100.00	6,984.78	6,109.00	6,105.80	97.26	185.48	-38.30	-418.53	-182.39	2,947.86	2,735.23	212.63	13.864
10,200.00	6,984.87	6,109.00	6,105.80	100.22	185.48	-38.30	-418.53	-182.39	3,040.51	2,827.27	213.23	14.259
10,300.00	6,984.96	6,109.00	6,105.80	103.17	185.48	-38.30	-418.53	-182.39	3,133.60	2,919.81	213.78	14.658
10,400.00	6,985.04	6,109.00	6,105.80	106.14	185.48	-38.30	-418.53	-182.39	3,227.11	3,012.82	214.29	15.060
10,500.00	6,985.13	6,109.00	6,105.80	109.11	185.48	-38.30	-418.53	-182.39	3,320.99	3,106.24	214.75	15.464
10,600.00	6,985.22	6,109.00	6,105.80	112.09	185.48	-38.30	-418.53	-182.39	3,415.23	3,200.04	215.18	15.871
10,700.00	6,985.31	6,109.00	6,105.80	115.07	185.48	-38.30	-418.53	-182.39	3,509.78	3,294.20	215.58	16.281
10,800.00	6,985.39	6,109.00	6,105.80	118.05	185.48	-38.30	-418.53	-182.39	3,604.62	3,388.68	215.94	16.693
10,900.00	6,985.48	6,109.00	6,105.80	121.04	185.48	-38.30	-418.53	-182.39	3,699.74	3,483.46	216.28	17.106
11,000.00	6,985.57	6,109.00	6,105.80	124.04	185.48	-38.30	-418.53	-182.39	3,795.11	3,578.52	216.59	17.522
11,100.00	6,985.66	6,109.00	6,105.80	127.04	185.48	-38.30	-418.53	-182.39	3,890.71	3,673.82	216.89	17.939
11,200.00	6,985.75	6,109.00	6,105.80	130.04	185.48	-38.30	-418.53	-182.39	3,986.53	3,769.37	217.16	18.357
11,300.00	6,985.83	6,109.00	6,105.80	133.05	185.48	-38.30	-418.53	-182.39	4,082.54	3,865.13	217.42	18.777
11,400.00	6,985.92	6,109.00	6,105.80	136.05	185.48	-38.30	-418.53	-182.39	4,178.75	3,961.09	217.66	19.199
11,500.00	6,986.01	6,109.00	6,105.80	139.07	185.48	-38.30	-418.53	-182.39	4,275.13	4,057.24	217.88	19.621
11,600.00	6,986.10	6,109.00	6,105.80	142.08	185.48	-38.30	-418.53	-182.39	4,371.67	4,153.57	218.10	20.045
11,700.00	6,986.18	6,109.00	6,105.80	145.10	185.48	-38.30	-418.53	-182.39	4,468.36	4,250.07	218.30	20.469
11,800.00	6,986.27	6,109.00	6,105.80	148.12	185.48	-38.30	-418.53	-182.39	4,565.20	4,346.71	218.49	20.895
11,900.00	6,986.36	6,109.00	6,105.80	151.14	185.48	-38.30	-418.53	-182.39	4,662.17	4,443.50	218.67	21.321
12,000.00	6,986.45	6,109.00	6,105.80	154.16	185.48	-38.30	-418.53	-182.39	4,759.26	4,540.43	218.84	21.748
12,100.00	6,986.54	6,109.00	6,105.80	157.19	185.48	-38.30	-418.53	-182.39	4,856.48	4,637.48	219.00	22.176
12,200.00	6,986.62	6,109.00	6,105.80	160.21	185.48	-38.30	-418.53	-182.39	4,953.80	4,734.64	219.15	22.604
12,300.00	6,986.71	6,109.00	6,105.80	163.24	185.48	-38.30	-418.53	-182.39	5,051.23	4,831.92	219.30	23.033
12,400.00	6,986.80	6,109.00	6,105.80	166.28	185.48	-38.30	-418.53	-182.39	5,148.75	4,929.31	219.44	23.463
12,500.00	6,986.89	6,109.00	6,105.80	169.31	185.48	-38.30	-418.53	-182.39	5,246.37	5,026.79	219.58	23.893
12,600.00	6,986.98	6,109.00	6,105.80	172.34	185.48	-38.30	-418.53	-182.39	5,344.08	5,124.37	219.71	24.323
12,700.00	6,987.06	6,109.00	6,105.80	175.38	185.48	-38.30	-418.53	-182.39	5,441.87	5,222.04	219.84	24.754
12,800.00	6,987.15	6,109.00	6,105.80	178.41	185.48	-38.30	-418.53	-182.39	5,539.74	5,319.79	219.96	25.186
12,900.00	6,987.24	6,109.00	6,105.80	181.45	185.48	-38.30	-418.53	-182.39	5,637.69	5,417.62	220.07	25.617
13,000.00	6,987.33	6,109.00	6,105.80	184.49	185.48	-38.30	-418.53	-182.39	5,735.70	5,515.52	220.19	26.049
13,100.00	6,987.41	6,109.00	6,105.80	187.53	185.48	-38.30	-418.53	-182.39	5,833.79	5,613.49	220.30	26.482
13,200.00	6,987.50	6,109.00	6,105.80	190.57	185.48	-38.30	-418.53	-182.39	5,931.94	5,711.53	220.40	26.914
13,300.00	6,987.59	6,109.00	6,105.80	193.62	185.48	-38.30	-418.53	-182.39	6,030.14	5,809.64	220.50	27.347
13,400.00	6,987.68	6,109.00	6,105.80	196.66	185.48	-38.30	-418.53	-182.39	6,128.41	5,907.80	220.60	27.780
13,500.00	6,987.77	6,109.00	6,105.80	199.71	185.48	-38.30	-418.53	-182.39	6,226.73	6,006.03	220.70	28.213
13,600.00	6,987.85	6,109.00	6,105.80	202.75	185.48	-38.30	-418.53	-182.39	6,325.10	6,104.31	220.80	28.647
13,700.00	6,987.94	6,109.00	6,105.80	205.80	185.48	-38.30	-418.53	-182.39	6,423.53	6,202.64	220.89	29.080
13,800.00	6,988.03	6,109.00	6,105.80	208.85	185.48	-38.30	-418.53	-182.39	6,522.00	6,301.02	220.98	29.514

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Sec 30 T31N R5W Offsets - 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		Distance		Rule Assigned:		Warning				
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor
13,900.00	6,988.12	6,109.00	6,105.80	211.89	185.48	-38.30	-418.53	-182.39	6,620.52	6,399.45	221.07	29.947
14,000.00	6,988.20	6,109.00	6,105.80	214.94	185.48	-38.30	-418.53	-182.39	6,719.08	6,497.92	221.16	30.381
14,100.00	6,988.29	6,109.00	6,105.80	217.99	185.48	-38.30	-418.53	-182.39	6,817.68	6,596.44	221.24	30.815
14,200.00	6,988.38	6,109.00	6,105.80	221.04	185.48	-38.30	-418.53	-182.39	6,916.33	6,695.00	221.33	31.249
14,300.00	6,988.47	6,109.00	6,105.80	224.10	185.48	-38.30	-418.53	-182.39	7,015.01	6,793.60	221.41	31.683
14,400.00	6,988.56	6,109.00	6,105.80	227.15	185.48	-38.30	-418.53	-182.39	7,113.73	6,892.23	221.49	32.117
14,500.00	6,988.64	6,109.00	6,105.80	230.20	185.48	-38.30	-418.53	-182.39	7,212.48	6,990.91	221.57	32.551
14,600.00	6,988.73	6,109.00	6,105.80	233.25	185.48	-38.30	-418.53	-182.39	7,311.27	7,089.62	221.65	32.985
14,700.00	6,988.82	6,109.00	6,105.80	236.31	185.48	-38.30	-418.53	-182.39	7,410.09	7,188.36	221.73	33.419
14,800.00	6,988.91	6,109.00	6,105.80	239.36	185.48	-38.30	-418.53	-182.39	7,508.94	7,287.13	221.81	33.853
14,900.00	6,989.00	6,109.00	6,105.80	242.42	185.48	-38.30	-418.53	-182.39	7,607.82	7,385.94	221.89	34.287
15,000.00	6,989.08	6,109.00	6,105.80	245.47	185.48	-38.30	-418.53	-182.39	7,706.73	7,484.77	221.97	34.720
15,100.00	6,989.17	6,109.00	6,105.80	248.53	185.48	-38.30	-418.53	-182.39	7,805.67	7,583.63	222.04	35.154
15,200.00	6,989.26	6,109.00	6,105.80	251.58	185.48	-38.30	-418.53	-182.39	7,904.64	7,682.52	222.12	35.588
15,300.00	6,989.35	6,109.00	6,105.80	254.64	185.48	-38.30	-418.53	-182.39	8,003.63	7,781.44	222.19	36.021
15,400.00	6,989.43	6,109.00	6,105.80	257.70	185.48	-38.30	-418.53	-182.39	8,102.64	7,880.38	222.27	36.455
15,500.00	6,989.52	6,109.00	6,105.80	260.76	185.48	-38.30	-418.53	-182.39	8,201.68	7,979.34	222.34	36.888
15,600.00	6,989.61	6,109.00	6,105.80	263.81	185.48	-38.30	-418.53	-182.39	8,300.75	8,078.33	222.41	37.321
15,700.00	6,989.70	6,109.00	6,105.80	266.87	185.48	-38.30	-418.53	-182.39	8,399.83	8,177.34	222.49	37.754
15,800.00	6,989.79	6,109.00	6,105.80	269.93	185.48	-38.30	-418.53	-182.39	8,498.94	8,276.38	222.56	38.187
15,900.00	6,989.87	6,109.00	6,105.80	272.99	185.48	-38.30	-418.53	-182.39	8,598.06	8,375.43	222.63	38.620
16,000.00	6,989.96	6,109.00	6,105.80	276.05	185.48	-38.30	-418.53	-182.39	8,697.21	8,474.51	222.70	39.053
16,100.00	6,990.05	6,109.00	6,105.80	279.11	185.48	-38.30	-418.53	-182.39	8,796.38	8,573.60	222.78	39.485
16,200.00	6,990.14	6,109.00	6,105.80	282.17	185.48	-38.30	-418.53	-182.39	8,895.56	8,672.71	222.85	39.917
16,300.00	6,990.22	6,109.00	6,105.80	285.23	185.48	-38.30	-418.53	-182.39	8,994.77	8,771.84	222.92	40.349
16,400.00	6,990.31	6,109.00	6,105.80	288.29	185.48	-38.30	-418.53	-182.39	9,093.99	8,870.99	222.99	40.781
16,500.00	6,990.40	6,109.00	6,105.80	291.35	185.48	-38.30	-418.53	-182.39	9,193.22	8,970.16	223.07	41.213
16,600.00	6,990.49	6,109.00	6,105.80	294.42	185.48	-38.30	-418.53	-182.39	9,292.48	9,069.34	223.14	41.645
16,700.00	6,990.58	6,109.00	6,105.80	297.48	185.48	-38.30	-418.53	-182.39	9,391.75	9,168.54	223.21	42.076
16,800.00	6,990.66	6,109.00	6,105.80	300.54	185.48	-38.30	-418.53	-182.39	9,491.03	9,267.75	223.28	42.507
16,900.00	6,990.75	6,109.00	6,105.80	303.60	185.48	-38.30	-418.53	-182.39	9,590.33	9,366.98	223.35	42.938
17,000.00	6,990.84	6,109.00	6,105.80	306.67	185.48	-38.30	-418.53	-182.39	9,689.64	9,466.22	223.43	43.369
17,100.00	6,990.93	6,109.00	6,105.80	309.73	185.48	-38.30	-418.53	-182.39	9,788.97	9,565.48	223.50	43.799
17,200.00	6,991.02	6,109.00	6,105.80	312.79	185.48	-38.30	-418.53	-182.39	9,888.31	9,664.74	223.57	44.229
17,300.00	6,991.10	6,109.00	6,105.80	315.86	185.48	-38.30	-418.53	-182.39	9,987.67	9,764.03	223.64	44.659



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Sec 30 T31N R5W Offsets - 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	Offset	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.00	0.00	38.00	38.00	0.00	1.15	153.50	-1,335.14	665.69	1,491.89	1,490.73	1.15	1,292.590	
100.00	100.00	138.00	138.00	0.36	4.19	153.50	-1,335.14	665.69	1,491.89	1,487.34	4.55	327.926	
200.00	200.00	238.00	238.00	0.72	7.23	153.50	-1,335.14	665.69	1,491.89	1,483.94	7.94	187.783	
300.00	300.00	338.01	338.00	1.08	10.27	153.50	-1,335.14	665.69	1,491.89	1,480.55	11.34	131.555	
400.00	400.00	438.01	438.00	1.43	13.30	153.50	-1,335.14	665.69	1,491.89	1,477.15	14.74	101.244	
500.00	500.00	538.01	538.00	1.79	16.34	153.50	-1,335.14	665.69	1,491.89	1,473.76	18.13	82.285	
541.36	541.36	578.75	578.72	1.94	17.58	153.48	-1,333.94	665.69	1,490.82	1,471.31	19.52	76.389	
600.00	600.00	635.00	634.98	2.15	19.28	153.48	-1,334.02	665.69	1,490.89	1,469.46	21.43	69.556	
700.00	700.00	730.95	730.91	2.51	22.20	153.49	-1,334.38	665.69	1,491.23	1,466.53	24.71	60.358	
800.00	800.00	838.21	838.00	2.87	25.45	153.50	-1,335.14	665.69	1,491.89	1,463.57	28.32	52.675	
900.00	900.00	938.21	938.00	3.23	28.49	153.50	-1,335.14	665.69	1,491.89	1,460.17	31.72	47.037	
1,000.00	1,000.00	1,038.21	1,038.00	3.58	31.53	153.50	-1,335.14	665.69	1,491.89	1,456.78	35.11	42.489	
1,100.00	1,099.98	1,132.46	1,132.20	3.93	34.39	-61.60	-1,333.20	665.69	1,489.34	1,451.02	38.32	38.869	
1,200.00	1,199.84	1,223.48	1,223.20	4.26	37.15	-61.78	-1,333.90	665.69	1,487.54	1,446.13	41.41	35.922	
1,300.00	1,299.45	1,337.83	1,337.45	4.60	40.63	-62.16	-1,335.14	665.69	1,484.46	1,439.24	45.22	32.825	
1,400.00	1,398.70	1,437.08	1,436.70	4.95	43.64	-62.68	-1,335.14	665.69	1,478.79	1,430.20	48.59	30.437	
1,500.00	1,497.47	1,535.84	1,535.47	5.31	46.64	-63.34	-1,335.14	665.69	1,471.62	1,419.67	51.95	28.330	
1,600.00	1,595.62	1,630.84	1,630.45	5.69	49.52	-64.15	-1,334.13	665.69	1,462.18	1,406.97	55.21	26.485	
1,700.00	1,693.06	1,724.21	1,723.82	6.10	52.36	-65.07	-1,334.52	665.69	1,452.69	1,394.25	58.44	24.857	
1,800.00	1,790.08	1,828.54	1,828.08	6.53	55.53	-65.97	-1,335.14	665.69	1,442.94	1,380.91	62.03	23.262	
1,900.00	1,887.11	1,925.57	1,925.11	6.98	58.48	-66.83	-1,335.14	665.69	1,433.01	1,367.60	65.41	21.908	
2,000.00	1,984.14	2,022.60	2,022.14	7.44	61.42	-67.70	-1,335.14	665.69	1,423.42	1,354.61	68.80	20.688	
2,100.00	2,081.17	2,117.19	2,116.73	7.91	64.29	-68.58	-1,334.11	665.69	1,413.32	1,341.18	72.13	19.593	
2,200.00	2,178.20	2,210.46	2,209.99	8.38	67.13	-69.44	-1,334.46	665.69	1,404.74	1,329.30	75.43	18.622	
2,300.00	2,275.23	2,313.76	2,313.23	8.87	70.26	-70.38	-1,335.14	665.69	1,396.76	1,317.71	79.05	17.670	
2,400.00	2,372.26	2,410.79	2,410.26	9.36	73.21	-71.30	-1,335.14	665.69	1,388.60	1,306.12	82.48	16.835	
2,500.00	2,469.29	2,507.82	2,507.29	9.85	76.16	-72.22	-1,335.14	665.69	1,380.82	1,294.90	85.92	16.071	
2,600.00	2,566.32	2,603.34	2,602.80	10.36	79.06	-73.17	-1,334.05	665.69	1,372.57	1,283.25	89.32	15.367	
2,700.00	2,663.35	2,697.00	2,696.46	10.86	81.90	-74.08	-1,334.33	665.69	1,365.80	1,273.13	92.67	14.738	
2,800.00	2,760.38	2,790.80	2,790.24	11.37	84.75	-74.98	-1,334.91	665.69	1,359.65	1,263.63	96.03	14.159	
2,900.00	2,857.41	2,896.04	2,895.41	11.88	87.95	-76.02	-1,335.14	665.69	1,353.59	1,253.85	99.74	13.572	
3,000.00	2,954.44	2,993.07	2,992.44	12.39	90.89	-76.99	-1,335.14	665.69	1,347.78	1,244.58	103.20	13.060	
3,100.00	3,051.47	3,090.05	3,089.41	12.91	93.84	-78.01	-1,333.66	665.69	1,341.29	1,234.62	106.67	12.574	
3,200.00	3,148.50	3,183.47	3,182.82	13.42	96.68	-78.95	-1,333.84	665.69	1,336.46	1,226.43	110.03	12.146	
3,300.00	3,245.53	3,277.04	3,276.38	13.94	99.52	-79.89	-1,334.37	665.69	1,332.31	1,218.91	113.40	11.749	
3,400.00	3,342.56	3,381.34	3,380.56	14.46	102.69	-80.94	-1,335.14	665.69	1,328.70	1,211.60	117.09	11.347	
3,500.00	3,439.59	3,478.37	3,477.59	14.99	105.63	-81.94	-1,335.14	665.69	1,324.99	1,204.42	120.57	10.989	
3,600.00	3,536.62	3,574.55	3,573.75	15.51	108.55	-82.98	-1,333.83	665.69	1,320.84	1,196.81	124.02	10.650	
3,700.00	3,633.65	3,666.42	3,665.61	16.03	111.34	-83.93	-1,334.20	665.69	1,318.27	1,190.92	127.35	10.352	
3,800.00	3,730.68	3,769.65	3,768.68	16.56	114.48	-84.98	-1,335.14	665.69	1,316.47	1,185.45	131.01	10.048	
3,900.00	3,827.71	3,866.68	3,865.71	17.09	117.42	-86.00	-1,335.14	665.69	1,314.51	1,180.01	134.49	9.774	
4,000.00	3,924.74	3,963.71	3,962.74	17.61	120.37	-87.02	-1,335.14	665.69	1,312.99	1,175.02	137.97	9.516	
4,100.00	4,021.77	4,060.74	4,059.77	18.14	123.32	-88.04	-1,335.14	665.69	1,311.92	1,170.46	141.45	9.274	
4,200.00	4,118.79	4,157.77	4,156.79	18.67	126.26	-89.07	-1,335.14	665.69	1,311.29	1,166.36	144.93	9.048	
4,290.74	4,206.84	4,245.82	4,244.84	19.15	128.94	-90.00	-1,335.14	665.69	1,311.10	1,163.02	148.09	8.854	
4,300.00	4,215.82	4,254.80	4,253.82	19.20	129.21	-90.09	-1,335.14	665.69	1,311.11	1,162.70	148.41	8.834	
4,400.00	4,312.85	4,351.83	4,350.85	19.73	132.16	-91.12	-1,335.14	665.69	1,311.37	1,159.48	151.89	8.634	
4,500.00	4,409.88	4,448.86	4,447.88	20.26	135.10	-92.15	-1,335.14	665.69	1,312.08	1,156.72	155.36	8.445	
4,600.00	4,506.91	4,545.89	4,544.91	20.79	138.05	-93.17	-1,335.14	665.69	1,313.24	1,154.41	158.83	8.268	
4,700.00	4,603.94	4,642.91	4,641.94	21.32	141.00	-94.19	-1,335.14	665.69	1,314.84	1,152.54	162.30	8.101	
4,800.00	4,700.97	4,739.94	4,738.97	21.86	143.94	-95.21	-1,335.14	665.69	1,316.88	1,151.11	165.77	7.944	
4,900.00	4,798.00	4,836.97	4,836.00	22.39	146.89	-96.23	-1,335.14	665.69	1,319.36	1,150.13	169.23	7.796	

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Sec 30 T31N R5W Offsets - Rosa Unit #162C - OH - OH												Offset Site Error: 0.00 ft		
Survey Program: 290-INCLINOMETER				Offset					Rule Assigned:				Offset Well Error: 0.00 ft	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
5,000.00	4,895.03	4,934.00	4,933.03	22.92	149.84	-97.24	-1,335.14	665.69	1,322.28	1,149.59	172.69	7.657		
5,100.00	4,992.06	5,031.03	5,030.06	23.46	152.78	-98.24	-1,335.14	665.69	1,325.64	1,149.49	176.15	7.526		
5,200.00	5,089.09	5,128.06	5,127.09	23.99	155.73	-99.25	-1,335.14	665.69	1,329.43	1,149.82	179.60	7.402		
5,300.00	5,186.12	5,225.09	5,224.12	24.52	158.68	-100.24	-1,335.14	665.69	1,333.65	1,150.59	183.05	7.286		
5,400.00	5,283.15	5,322.12	5,321.15	25.06	161.62	-101.23	-1,335.14	665.69	1,338.29	1,151.79	186.50	7.176		
5,500.00	5,380.18	5,419.15	5,418.18	25.59	164.57	-102.22	-1,335.14	665.69	1,343.35	1,153.40	189.94	7.072		
5,600.00	5,477.21	5,516.18	5,515.21	26.13	167.52	-103.19	-1,335.14	665.69	1,348.82	1,155.44	193.38	6.975		
5,700.00	5,574.24	5,613.21	5,612.24	26.66	170.46	-104.16	-1,335.14	665.69	1,354.71	1,157.89	196.81	6.883		
5,800.00	5,671.27	5,710.24	5,709.27	27.20	173.41	-105.12	-1,335.14	665.69	1,361.00	1,160.75	200.24	6.797		
5,900.00	5,768.30	5,807.27	5,806.30	27.73	176.36	-106.07	-1,335.14	665.69	1,367.68	1,164.02	203.67	6.715		
6,000.00	5,865.33	5,904.30	5,903.33	28.27	179.30	-107.02	-1,335.14	665.69	1,374.77	1,167.68	207.09	6.639		
6,100.00	5,962.36	6,001.33	6,000.36	28.80	182.25	-107.95	-1,335.14	665.69	1,382.24	1,171.73	210.51	6.566		
6,200.00	6,059.39	6,098.36	6,097.39	29.34	185.20	-108.87	-1,335.14	665.69	1,390.09	1,176.17	213.92	6.498		
6,300.00	6,156.42	6,195.39	6,194.42	29.87	188.14	-109.79	-1,335.14	665.69	1,398.31	1,180.99	217.33	6.434		
6,400.00	6,253.45	6,292.42	6,291.45	30.41	191.09	-110.69	-1,335.14	665.69	1,406.90	1,186.17	220.73	6.374		
6,412.00	6,265.09	6,304.06	6,303.09	30.48	191.44	-110.80	-1,335.14	665.69	1,407.96	1,186.82	221.14	6.367		
6,450.00	6,302.10	6,341.07	6,340.10	30.67	192.57	-98.37	-1,335.14	665.69	1,410.24	1,187.81	222.43	6.340		
6,500.00	6,351.06	6,390.03	6,389.06	30.90	194.05	-77.66	-1,335.14	665.69	1,409.96	1,185.84	224.12	6.291		
6,550.00	6,400.04	6,439.01	6,438.04	31.10	195.54	-56.40	-1,335.14	665.69	1,405.95	1,180.15	225.80	6.227		
6,600.00	6,448.74	6,487.71	6,486.74	31.27	197.02	-39.59	-1,335.14	665.69	1,398.20	1,170.75	227.45	6.147		
6,650.00	6,496.86	6,535.83	6,534.86	31.41	198.48	-27.94	-1,335.14	665.69	1,386.74	1,157.68	229.06	6.054		
6,700.00	6,544.10	6,583.07	6,582.10	31.53	199.91	-19.97	-1,335.14	665.69	1,371.64	1,141.01	230.63	5.947		
6,750.00	6,590.17	6,629.15	6,628.17	31.62	201.31	-14.32	-1,335.14	665.69	1,352.97	1,120.82	232.15	5.828		
6,800.00	6,634.80	6,673.77	6,672.80	31.70	202.67	-10.07	-1,335.14	665.69	1,330.84	1,097.23	233.61	5.697		
6,850.00	6,677.69	6,716.66	6,715.69	31.76	203.97	-6.68	-1,335.14	665.69	1,305.37	1,070.36	235.01	5.555		
6,900.00	6,718.59	6,757.56	6,756.59	31.79	205.21	-3.78	-1,335.14	665.69	1,276.71	1,040.38	236.33	5.402		
6,950.00	6,757.25	6,796.22	6,795.25	31.82	206.39	-1.13	-1,335.14	665.69	1,245.04	1,007.47	237.57	5.241		
7,000.00	6,793.42	6,832.40	6,831.42	31.83	207.49	1.46	-1,335.14	665.69	1,210.54	971.82	238.73	5.071		
7,050.00	6,826.89	6,865.86	6,864.89	31.82	208.50	4.18	-1,335.14	665.69	1,173.43	933.65	239.79	4.894		
7,100.00	6,857.45	6,896.42	6,895.45	31.81	209.43	7.24	-1,335.14	665.69	1,133.95	893.20	240.75	4.710		
7,150.00	6,884.91	6,923.88	6,922.91	31.79	210.26	10.88	-1,335.14	665.69	1,092.33	850.73	241.60	4.521		
7,200.00	6,909.09	6,948.06	6,947.09	31.76	211.00	15.46	-1,335.14	665.69	1,048.86	806.51	242.35	4.328		
7,250.00	6,929.86	6,968.83	6,967.86	31.73	211.63	21.48	-1,335.14	665.69	1,003.81	760.83	242.98	4.131		
7,300.00	6,947.08	6,986.05	6,985.08	31.70	212.15	29.67	-1,335.14	665.69	957.49	714.00	243.49	3.932		
7,350.00	6,960.65	6,999.62	6,998.65	31.68	212.56	40.89	-1,335.14	665.69	910.22	666.33	243.89	3.732		
7,400.00	6,970.48	7,009.45	7,008.48	31.68	212.86	55.60	-1,335.14	665.69	862.33	618.15	244.18	3.532		
7,450.00	6,976.51	7,015.49	7,014.51	31.71	213.05	72.65	-1,335.14	665.69	814.16	569.82	244.34	3.332		
7,495.26	6,978.67	7,017.64	7,016.67	31.80	213.11	87.52	-1,335.14	665.69	770.63	526.23	244.39	3.153		
7,500.00	6,978.73	7,017.70	7,016.73	31.81	213.11	87.53	-1,335.14	665.69	766.09	521.69	244.39	3.135		
7,600.00	6,980.01	7,018.98	7,018.01	32.47	213.15	87.87	-1,335.14	665.69	670.85	426.40	244.44	2.744		
7,700.00	6,981.29	7,020.26	7,019.29	33.86	213.19	88.20	-1,335.14	665.69	577.22	332.62	244.60	2.360		
7,755.27	6,982.00	7,020.97	7,020.00	34.81	213.21	88.39	-1,335.14	665.69	526.47	281.70	244.77	2.151		
7,800.00	6,982.47	7,021.45	7,020.47	35.63	213.23	89.01	-1,335.14	665.69	485.98	241.00	244.98	1.984		
7,876.01	6,982.83	7,021.80	7,020.83	37.13	213.24	89.91	-1,335.14	665.69	418.38	172.84	245.54	1.704		
7,900.00	6,982.85	7,021.82	7,020.85	37.63	213.24	89.91	-1,335.14	665.69	397.51	151.72	245.79	1.617		
8,000.00	6,982.94	7,021.91	7,020.94	39.78	213.24	89.94	-1,335.14	665.69	315.37	67.78	247.58	1.274	Level 3	
8,100.00	6,983.02	7,022.00	7,021.02	42.06	213.24	89.96	-1,335.14	665.69	246.77	-4.55	251.32	0.982	Level 1	
8,200.00	6,983.11	7,022.08	7,021.11	44.43	213.25	89.99	-1,335.14	665.69	205.76	-51.09	256.84	0.801	Level 1	
8,242.80	6,983.15	7,022.12	7,021.15	45.49	213.25	90.00	-1,335.14	665.69	201.26	-57.43	258.68	0.778	Level 1, CC, ES, SF	
8,300.00	6,983.20	7,022.17	7,021.20	46.89	213.25	90.01	-1,335.14	665.69	209.23	-50.32	259.54	0.806	Level 1	
8,400.00	6,983.29	7,022.26	7,021.29	49.42	213.25	90.04	-1,335.14	665.69	255.37	-2.25	257.62	0.991	Level 1	
8,500.00	6,983.37	7,022.35	7,021.37	52.00	213.25	90.06	-1,335.14	665.69	326.58	71.77	254.81	1.282	Level 3	

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Sec 30 T31N R5W Offsets - Rosa Unit #162C - OH - OH													Offset Site Error:	0.00 ft	
Survey Program: 290-INCLINOMETER				Offset		Semi Major Axis		Offset Wellbore Centre		Rule Assigned:				Offset Well Error:	0.00 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning		
13,800.00	6,988.03	7,027.00	7,026.03	208.85	213.40	91.39	-1,335.14	665.69	5,560.84	5,313.14	247.71	22.449			
13,900.00	6,988.12	7,027.09	7,026.12	211.89	213.40	91.41	-1,335.14	665.69	5,660.78	5,413.03	247.75	22.849			
14,000.00	6,988.20	7,027.18	7,026.20	214.94	213.40	91.44	-1,335.14	665.69	5,760.72	5,512.93	247.79	23.248			
14,100.00	6,988.29	7,027.26	7,026.29	217.99	213.40	91.46	-1,335.14	665.69	5,860.66	5,612.82	247.83	23.648			
14,200.00	6,988.38	7,027.35	7,026.38	221.04	213.41	91.49	-1,335.14	665.69	5,960.60	5,712.72	247.88	24.047			
14,300.00	6,988.47	7,027.44	7,026.47	224.10	213.41	91.51	-1,335.14	665.69	6,060.54	5,812.62	247.92	24.445			
14,400.00	6,988.56	7,027.53	7,026.56	227.15	213.41	91.54	-1,335.14	665.69	6,160.49	5,912.52	247.97	24.844			
14,500.00	6,988.64	7,027.62	7,026.64	230.20	213.41	91.56	-1,335.14	665.69	6,260.43	6,012.42	248.01	25.242			
14,600.00	6,988.73	7,027.70	7,026.73	233.25	213.42	91.59	-1,335.14	665.69	6,360.38	6,112.32	248.06	25.640			
14,700.00	6,988.82	7,027.79	7,026.82	236.31	213.42	91.61	-1,335.14	665.69	6,460.33	6,212.23	248.11	26.038			
14,800.00	6,988.91	7,027.88	7,026.91	239.36	213.42	91.64	-1,335.14	665.69	6,560.29	6,312.13	248.16	26.436			
14,900.00	6,989.00	7,027.97	7,027.00	242.42	213.43	91.66	-1,335.14	665.69	6,660.24	6,412.03	248.21	26.834			
15,000.00	6,989.08	7,028.06	7,027.08	245.47	213.43	91.69	-1,335.14	665.69	6,760.20	6,511.94	248.26	27.231			
15,100.00	6,989.17	7,028.14	7,027.17	248.53	213.43	91.71	-1,335.14	665.69	6,860.15	6,611.84	248.31	27.628			
15,200.00	6,989.26	7,028.23	7,027.26	251.58	213.43	91.74	-1,335.14	665.69	6,960.11	6,711.75	248.36	28.024			
15,300.00	6,989.35	7,028.32	7,027.35	254.64	213.44	91.76	-1,335.14	665.69	7,060.07	6,811.66	248.41	28.421			
15,400.00	6,989.43	7,028.41	7,027.43	257.70	213.44	91.79	-1,335.14	665.69	7,160.03	6,911.56	248.46	28.817			
15,500.00	6,989.52	7,028.49	7,027.52	260.76	213.44	91.81	-1,335.14	665.69	7,259.99	7,011.47	248.52	29.213			
15,600.00	6,989.61	7,028.58	7,027.61	263.81	213.44	91.84	-1,335.14	665.69	7,359.95	7,111.38	248.57	29.609			
15,700.00	6,989.70	7,028.67	7,027.70	266.87	213.45	91.86	-1,335.14	665.69	7,459.91	7,211.29	248.63	30.004			
15,800.00	6,989.79	7,028.76	7,027.79	269.93	213.45	91.89	-1,335.14	665.69	7,559.88	7,311.19	248.68	30.400			
15,900.00	6,989.87	7,028.85	7,027.87	272.99	213.45	91.91	-1,335.14	665.69	7,659.84	7,411.10	248.74	30.795			
16,000.00	6,989.96	7,028.93	7,027.96	276.05	213.45	91.94	-1,335.14	665.69	7,759.81	7,511.01	248.80	31.189			
16,100.00	6,990.05	7,029.02	7,028.05	279.11	213.46	91.96	-1,335.14	665.69	7,859.78	7,610.92	248.86	31.584			
16,200.00	6,990.14	7,029.11	7,028.14	282.17	213.46	91.99	-1,335.14	665.69	7,959.74	7,710.83	248.91	31.978			
16,300.00	6,990.22	7,029.20	7,028.22	285.23	213.46	92.01	-1,335.14	665.69	8,059.71	7,810.74	248.97	32.372			
16,400.00	6,990.31	7,029.28	7,028.31	288.29	213.47	92.04	-1,335.14	665.69	8,159.68	7,910.65	249.03	32.765			
16,500.00	6,990.40	7,029.37	7,028.40	291.35	213.47	92.06	-1,335.14	665.69	8,259.65	8,010.56	249.09	33.159			
16,600.00	6,990.49	7,029.46	7,028.49	294.42	213.47	92.09	-1,335.14	665.69	8,359.62	8,110.47	249.15	33.552			
16,700.00	6,990.58	7,029.55	7,028.58	297.48	213.47	92.11	-1,335.14	665.69	8,459.59	8,210.38	249.22	33.945			
16,800.00	6,990.66	7,029.64	7,028.66	300.54	213.48	92.14	-1,335.14	665.69	8,559.56	8,310.29	249.28	34.337			
16,900.00	6,990.75	7,029.72	7,028.75	303.60	213.48	92.16	-1,335.14	665.69	8,659.54	8,410.19	249.34	34.730			
17,000.00	6,990.84	7,029.81	7,028.84	306.67	213.48	92.19	-1,335.14	665.69	8,759.51	8,510.10	249.41	35.122			
17,100.00	6,990.93	7,029.90	7,028.93	309.73	213.48	92.21	-1,335.14	665.69	8,859.48	8,610.01	249.47	35.513			
17,200.00	6,991.02	7,029.99	7,029.02	312.79	213.49	92.24	-1,335.14	665.69	8,959.46	8,709.92	249.53	35.905			
17,300.00	6,991.10	7,030.08	7,029.10	315.86	213.49	92.26	-1,335.14	665.69	9,059.43	8,809.83	249.60	36.296			
17,400.00	6,991.19	7,030.16	7,029.19	318.92	213.49	92.29	-1,335.14	665.69	9,159.41	8,909.74	249.67	36.687			
17,500.00	6,991.28	7,030.25	7,029.28	321.98	213.49	92.31	-1,335.14	665.69	9,259.39	9,009.65	249.73	37.077			
17,600.00	6,991.37	7,030.34	7,029.37	325.05	213.50	92.34	-1,335.14	665.69	9,359.36	9,109.56	249.80	37.467			
17,700.00	6,991.45	7,030.43	7,029.45	328.11	213.50	92.36	-1,335.14	665.69	9,459.34	9,209.47	249.87	37.857			
17,800.00	6,991.54	7,030.51	7,029.54	331.18	213.50	92.39	-1,335.14	665.69	9,559.32	9,309.38	249.94	38.247			
17,900.00	6,991.63	7,030.60	7,029.63	334.24	213.51	92.41	-1,335.14	665.69	9,659.29	9,409.29	250.01	38.636			
18,000.00	6,991.72	7,030.69	7,029.72	337.31	213.51	92.44	-1,335.14	665.69	9,759.27	9,509.20	250.08	39.025			
18,100.00	6,991.81	7,030.78	7,029.81	340.37	213.51	92.46	-1,335.14	665.69	9,859.25	9,609.11	250.15	39.414			
18,200.00	6,991.89	7,030.87	7,029.89	343.44	213.51	92.49	-1,335.14	665.69	9,959.23	9,709.01	250.22	39.802			

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM_16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Sec 30 T31N R5W Offsets - Rosa Unit #233 - OH - OH												Offset Site Error:	0.00 ft
Survey Program: 225-INCLINOMETER												Offset Well Error:	0.00 ft
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference	Offset	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
4,900.00	4,798.00	2,540.00	2,539.73	22.39	77.14	-66.99	-549.08	18.48	2,326.44	2,300.80	25.64	90.728	
5,000.00	4,895.03	2,540.00	2,539.73	22.92	77.14	-66.99	-549.08	18.48	2,425.29	2,399.63	25.66	94.500	
5,100.00	4,992.06	2,540.00	2,539.73	23.46	77.14	-66.99	-549.08	18.48	2,524.24	2,498.52	25.71	98.175	
5,200.00	5,089.09	2,540.00	2,539.73	23.99	77.14	-66.99	-549.08	18.48	2,623.26	2,597.48	25.78	101.756	
5,300.00	5,186.12	2,540.00	2,539.73	24.52	77.14	-66.99	-549.08	18.48	2,722.36	2,696.49	25.87	105.246	
5,400.00	5,283.15	2,540.00	2,539.73	25.06	77.14	-66.99	-549.08	18.48	2,821.52	2,795.55	25.97	108.650	
5,500.00	5,380.18	2,540.00	2,539.73	25.59	77.14	-66.99	-549.08	18.48	2,920.73	2,894.65	26.09	111.969	
5,600.00	5,477.21	2,540.00	2,539.73	26.13	77.14	-66.99	-549.08	18.48	3,020.00	2,993.79	26.21	115.208	
5,700.00	5,574.24	2,540.00	2,539.73	26.66	77.14	-66.99	-549.08	18.48	3,119.32	3,092.96	26.35	118.368	
5,800.00	5,671.27	2,540.00	2,539.73	27.20	77.14	-66.99	-549.08	18.48	3,218.67	3,192.17	26.50	121.452	
5,900.00	5,768.30	2,540.00	2,539.73	27.73	77.14	-66.99	-549.08	18.48	3,318.07	3,291.41	26.66	124.463	
6,000.00	5,865.33	2,540.00	2,539.73	28.27	77.14	-66.99	-549.08	18.48	3,417.50	3,390.68	26.82	127.403	
6,100.00	5,962.36	2,540.00	2,539.73	28.80	77.14	-66.99	-549.08	18.48	3,516.96	3,489.97	27.00	130.274	
6,200.00	6,059.39	2,540.00	2,539.73	29.34	77.14	-66.99	-549.08	18.48	3,616.46	3,589.28	27.18	133.078	
6,300.00	6,156.42	2,540.00	2,539.73	29.87	77.14	-66.99	-549.08	18.48	3,715.98	3,688.62	27.36	135.816	
6,400.00	6,253.45	2,540.00	2,539.73	30.41	77.14	-66.99	-549.08	18.48	3,815.52	3,787.97	27.55	138.490	
6,412.00	6,265.09	2,540.00	2,539.73	30.48	77.14	-66.99	-549.08	18.48	3,827.47	3,799.90	27.57	138.807	
6,450.00	6,302.10	2,540.00	2,539.73	30.67	77.14	-76.34	-549.08	18.48	3,865.23	3,837.60	27.63	139.903	
6,500.00	6,351.06	2,540.00	2,539.73	30.90	77.14	-68.49	-549.08	18.48	3,914.53	3,886.89	27.64	141.619	
6,550.00	6,400.04	2,540.00	2,539.73	31.10	77.14	-53.33	-549.08	18.48	3,963.13	3,935.54	27.59	143.634	
6,600.00	6,448.74	2,540.00	2,539.73	31.27	77.14	-40.00	-549.08	18.48	4,010.78	3,983.30	27.48	145.931	
6,650.00	6,496.86	2,540.00	2,539.73	31.41	77.14	-30.62	-549.08	18.48	4,057.21	4,029.89	27.32	148.495	
6,700.00	6,544.10	2,540.00	2,539.73	31.53	77.14	-24.33	-549.08	18.48	4,102.18	4,075.07	27.11	151.310	
6,750.00	6,590.17	2,540.00	2,539.73	31.62	77.14	-20.02	-549.08	18.48	4,145.47	4,118.62	26.86	154.357	
6,800.00	6,634.80	2,540.00	2,539.73	31.70	77.14	-16.98	-549.08	18.48	4,186.87	4,160.31	26.56	157.615	
6,850.00	6,677.69	2,540.00	2,539.73	31.76	77.14	-14.76	-549.08	18.48	4,226.18	4,199.94	26.24	161.054	
6,900.00	6,718.59	2,540.00	2,539.73	31.79	77.14	-13.09	-549.08	18.48	4,263.22	4,237.33	25.89	164.641	
6,950.00	6,757.25	2,540.00	2,539.73	31.82	77.14	-11.81	-549.08	18.48	4,297.83	4,272.29	25.53	168.334	
7,000.00	6,793.42	2,540.00	2,539.73	31.83	77.14	-10.81	-549.08	18.48	4,329.84	4,304.68	25.16	172.080	
7,050.00	6,826.89	2,540.00	2,539.73	31.82	77.14	-10.01	-549.08	18.48	4,359.13	4,334.33	24.79	175.816	
7,100.00	6,857.45	2,540.00	2,539.73	31.81	77.14	-9.38	-549.08	18.48	4,385.56	4,361.12	24.44	179.465	
7,150.00	6,884.91	2,540.00	2,539.73	31.79	77.14	-8.87	-549.08	18.48	4,409.03	4,384.93	24.10	182.942	
7,200.00	6,909.09	2,540.00	2,539.73	31.76	77.14	-8.46	-549.08	18.48	4,429.45	4,405.65	23.80	186.149	
7,250.00	6,929.86	2,540.00	2,539.73	31.73	77.14	-8.14	-549.08	18.48	4,446.72	4,423.19	23.53	188.982	
7,300.00	6,947.08	2,540.00	2,539.73	31.70	77.14	-7.89	-549.08	18.48	4,460.78	4,437.46	23.31	191.334	
7,350.00	6,960.65	2,540.00	2,539.73	31.68	77.14	-7.70	-549.08	18.48	4,471.57	4,448.42	23.16	193.102	
7,400.00	6,970.48	2,540.00	2,539.73	31.68	77.14	-7.56	-549.08	18.48	4,479.06	4,455.99	23.06	194.197	
7,450.00	6,976.51	2,540.00	2,539.73	31.71	77.14	-7.48	-549.08	18.48	4,483.20	4,460.16	23.04	194.549	
7,495.26	6,978.67	2,540.00	2,539.73	31.80	77.14	-7.45	-549.08	18.48	4,484.06	4,460.97	23.09	194.191	
7,500.00	6,978.73	2,540.00	2,539.73	31.81	77.14	-7.45	-549.08	18.48	4,484.01	4,460.91	23.10	194.115	
7,546.67	6,979.33	2,540.00	2,539.73	32.03	77.14	-7.45	-549.08	18.48	4,483.76	4,460.53	23.23	193.006	
7,600.00	6,980.01	2,540.00	2,539.73	32.47	77.14	-7.45	-549.08	18.48	4,484.08	4,460.62	23.46	191.133	
7,700.00	6,981.29	2,540.00	2,539.73	33.86	77.14	-7.45	-549.08	18.48	4,486.38	4,462.22	24.16	185.680	
7,755.27	6,982.00	2,540.00	2,539.73	34.81	77.14	-7.45	-549.08	18.48	4,488.61	4,463.92	24.69	181.807	
7,800.00	6,982.47	2,540.00	2,539.73	35.63	77.14	-7.41	-549.08	18.48	4,490.86	4,465.67	25.19	178.293	
7,876.01	6,982.83	2,540.00	2,539.73	37.13	77.14	-7.33	-549.08	18.48	4,495.44	4,469.26	26.19	171.673	
7,900.00	6,982.85	2,540.00	2,539.73	37.63	77.14	-7.33	-549.08	18.48	4,497.11	4,470.57	26.54	169.474	
8,000.00	6,982.94	2,540.00	2,539.73	39.78	77.14	-7.33	-549.08	18.48	4,505.41	4,477.28	28.13	160.186	
8,100.00	6,983.02	2,540.00	2,539.73	42.06	77.14	-7.33	-549.08	18.48	4,515.91	4,486.01	29.90	151.050	
8,200.00	6,983.11	2,540.00	2,539.73	44.43	77.14	-7.33	-549.08	18.48	4,528.59	4,496.79	31.81	142.385	
8,300.00	6,983.20	2,540.00	2,539.73	46.89	77.14	-7.33	-549.08	18.48	4,543.44	4,509.62	33.82	134.359	
8,400.00	6,983.29	2,540.00	2,539.73	49.42	77.14	-7.33	-549.08	18.48	4,560.44	4,524.54	35.90	127.034	

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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM _16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design: Sec 30 T31N R5W Offsets - Rosa Unit #233 - OH - OH													Offset Site Error:	0.00 ft
Survey Program:		225-INCLINOMETER						Rule Assigned:		Offset Well Error:		0.00 ft		
Reference	Offset	Semi Major Axis		Offset Wellbore Centre		Distance		Warning						
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning	
13,700.00	6,987.94	2,540.00	2,539.73	205.80	77.14	-7.33	-549.08	18.48	7,590.64	7,482.43	108.20	70.152		
13,800.00	6,988.03	2,540.00	2,539.73	208.85	77.14	-7.33	-549.08	18.48	7,671.54	7,562.79	108.75	70.542		
13,900.00	6,988.12	2,540.00	2,539.73	211.89	77.14	-7.33	-549.08	18.48	7,752.88	7,643.60	109.29	70.942		
14,000.00	6,988.20	2,540.00	2,539.73	214.94	77.14	-7.33	-549.08	18.48	7,834.66	7,724.86	109.80	71.352		
14,100.00	6,988.29	2,540.00	2,539.73	217.99	77.14	-7.33	-549.08	18.48	7,916.86	7,806.55	110.31	71.772		
14,200.00	6,988.38	2,540.00	2,539.73	221.04	77.14	-7.33	-549.08	18.48	7,999.46	7,888.67	110.79	72.202		
14,300.00	6,988.47	2,540.00	2,539.73	224.10	77.14	-7.33	-549.08	18.48	8,082.46	7,971.19	111.27	72.640		
14,400.00	6,988.56	2,540.00	2,539.73	227.15	77.14	-7.33	-549.08	18.48	8,165.83	8,054.10	111.73	73.087		
14,500.00	6,988.64	2,540.00	2,539.73	230.20	77.14	-7.33	-549.08	18.48	8,249.58	8,137.40	112.18	73.542		
14,600.00	6,988.73	2,540.00	2,539.73	233.25	77.14	-7.33	-549.08	18.48	8,333.68	8,221.07	112.61	74.004		
14,700.00	6,988.82	2,540.00	2,539.73	236.31	77.14	-7.33	-549.08	18.48	8,418.13	8,305.10	113.03	74.474		
14,800.00	6,988.91	2,540.00	2,539.73	239.36	77.14	-7.33	-549.08	18.48	8,502.92	8,389.48	113.45	74.952		
14,900.00	6,989.00	2,540.00	2,539.73	242.42	77.14	-7.33	-549.08	18.48	8,588.04	8,474.19	113.85	75.436		
15,000.00	6,989.08	2,540.00	2,539.73	245.47	77.14	-7.33	-549.08	18.48	8,673.47	8,559.24	114.24	75.926		
15,100.00	6,989.17	2,540.00	2,539.73	248.53	77.14	-7.33	-549.08	18.48	8,759.21	8,644.60	114.62	76.423		
15,200.00	6,989.26	2,540.00	2,539.73	251.58	77.14	-7.33	-549.08	18.48	8,845.26	8,730.27	114.98	76.926		
15,300.00	6,989.35	2,540.00	2,539.73	254.64	77.14	-7.33	-549.08	18.48	8,931.59	8,816.24	115.34	77.434		
15,400.00	6,989.43	2,540.00	2,539.73	257.70	77.14	-7.33	-549.08	18.48	9,018.20	8,902.51	115.70	77.948		
15,500.00	6,989.52	2,540.00	2,539.73	260.76	77.14	-7.33	-549.08	18.48	9,105.09	8,989.06	116.04	78.467		
15,600.00	6,989.61	2,540.00	2,539.73	263.81	77.14	-7.33	-549.08	18.48	9,192.25	9,075.88	116.37	78.991		
15,700.00	6,989.70	2,540.00	2,539.73	266.87	77.14	-7.33	-549.08	18.48	9,279.66	9,162.97	116.70	79.520		
15,800.00	6,989.79	2,540.00	2,539.73	269.93	77.14	-7.33	-549.08	18.48	9,367.33	9,250.32	117.01	80.054		
15,900.00	6,989.87	2,540.00	2,539.73	272.99	77.14	-7.33	-549.08	18.48	9,455.24	9,337.92	117.32	80.592		
16,000.00	6,989.96	2,540.00	2,539.73	276.05	77.14	-7.33	-549.08	18.48	9,543.39	9,425.77	117.62	81.134		
16,100.00	6,990.05	2,540.00	2,539.73	279.11	77.14	-7.33	-549.08	18.48	9,631.77	9,513.85	117.92	81.681		
16,200.00	6,990.14	2,540.00	2,539.73	282.17	77.14	-7.33	-549.08	18.48	9,720.38	9,602.17	118.21	82.231		
16,300.00	6,990.22	2,540.00	2,539.73	285.23	77.14	-7.33	-549.08	18.48	9,809.20	9,690.71	118.49	82.785		
16,400.00	6,990.31	2,540.00	2,539.73	288.29	77.14	-7.33	-549.08	18.48	9,898.24	9,779.48	118.77	83.343		
16,500.00	6,990.40	2,540.00	2,539.73	291.35	77.14	-7.33	-549.08	18.48	9,987.49	9,868.45	119.03	83.904		



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM _16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Reference Depths are relative to GL 6394' @ 6394.00ft

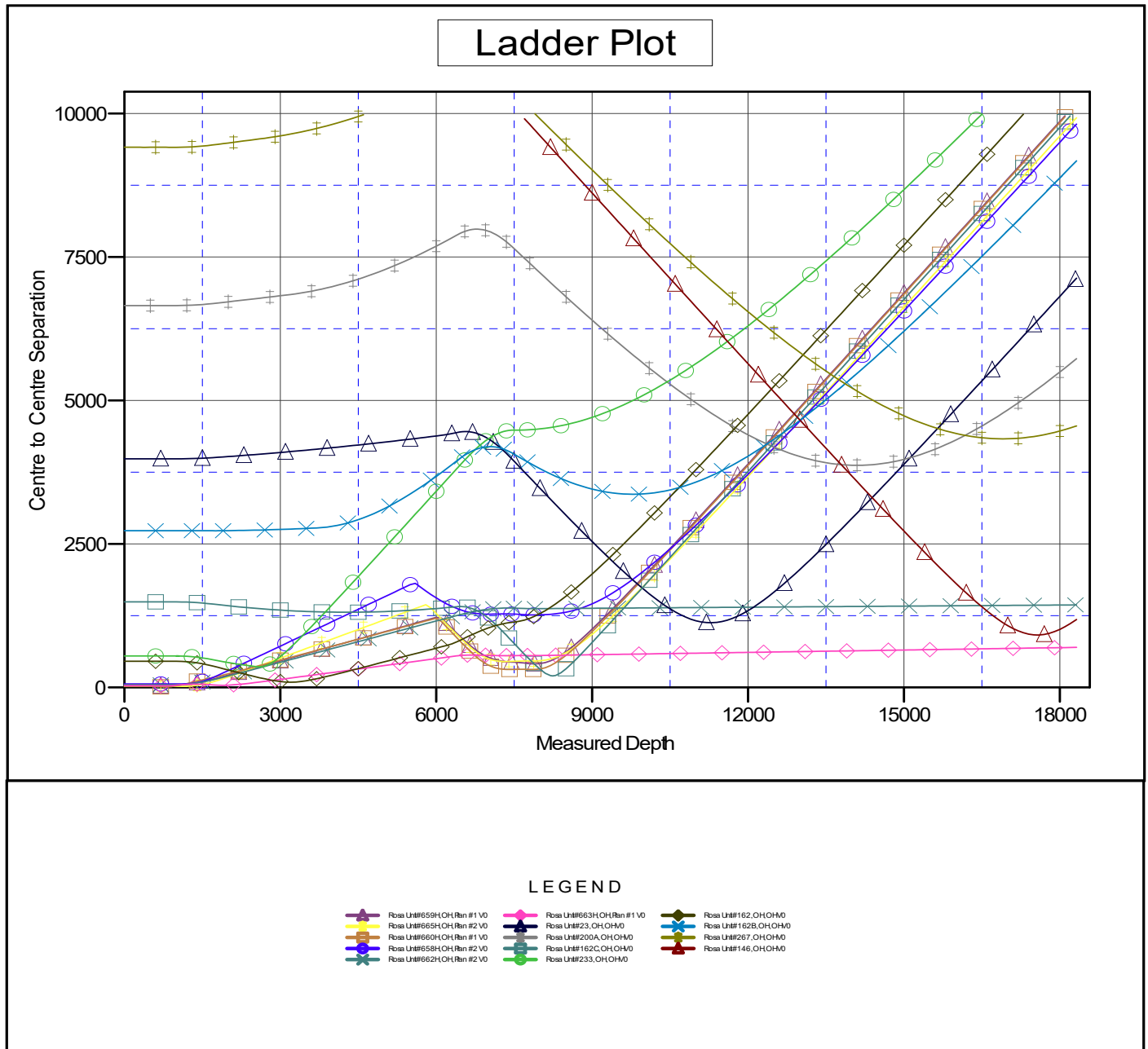
Offset Depths are relative to Offset Datum

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°



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



Lonestar Consulting

Anticollision Report



Company:	Logos Opersting LLC	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Project:	Rio Arriba, NM NAD83	TVD Reference:	GL 6394' @ 6394.00ft
Reference Site:	Rosa Unit 30	MD Reference:	GL 6394' @ 6394.00ft
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:	EDM _16.0
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Reference Depths are relative to GL 6394' @ 6394.00ft

Offset Depths are relative to Offset Datum

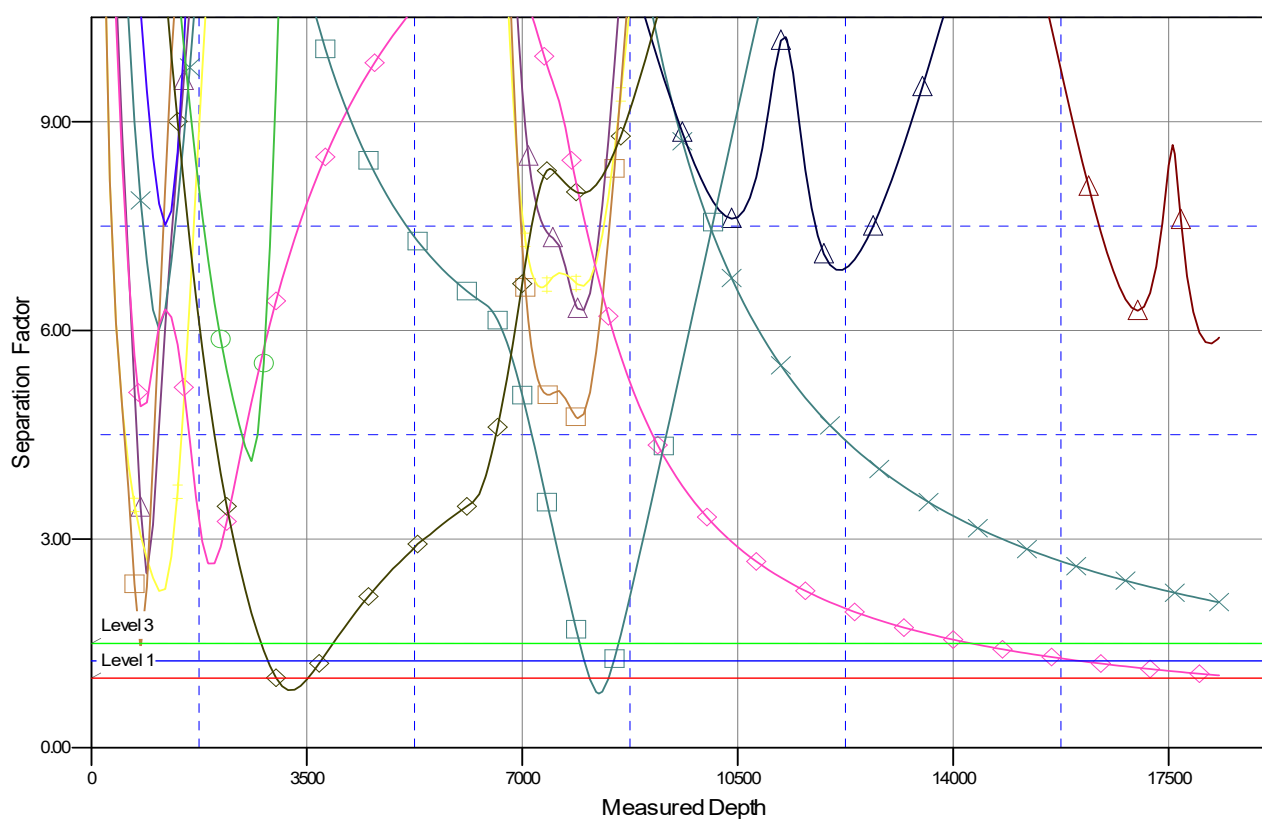
Central Meridian is -107.8333334

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#659H.OH.Ren #1 VO	Rosa Unit#663H.OH.Ren #1 VO	Rosa Unit#162.OH.OHMO
Rosa Unit#659H.OH.Ren #2 VO	Rosa Unit#23.OH.OHMO	Rosa Unit#162B.OH.OHMO
Rosa Unit#660H.OH.Ren #1 VO	Rosa Unit#200A.OH.OHMO	Rosa Unit#267.OH.OHMO
Rosa Unit#660H.OH.Ren #2 VO	Rosa Unit#162C.OH.OHMO	Rosa Unit#146.OH.OHMO
Rosa Unit#662H.OH.Ren #1 VO	Rosa Unit#235.OH.OHMO	

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



Company: Logos Operating LLC
 Project: Rio Arriba, NM NAD83
 Site: Rosa Unit 30
 Well: Rosa Unit #664H
 Wellbore: OH
 Design: Plan #2

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' @ 6394.00ft
 +N/-S +E/-W Northing Easting Latitude Longitude
 0.00 0.00 2136125.13 2848533.64 36.8695578 -107.4044821 B5 (664H)

Plan: Plan #2 (Rosa Unit #664H/OH)

Created By: Janie Collins Date: 9:23, July 05 2021



Azimuths to True North
 Magnetic North: 10

Magnetic Field
 Strength: 51652
 Dip Angle: 63
 Date: 12/31/2008
 Model: IGRF2008

DESIGN TARGET DETAILS

Time	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
664H POE	6982.00	-1126.80	182.19	2134999.16	2848720.90	36.8664628	-107.4038592
664H BHL	6992.00	-1331.43	10746.33	2134841.98	2859285.83	36.8658950	-107.3677458

SECTION DETAILS

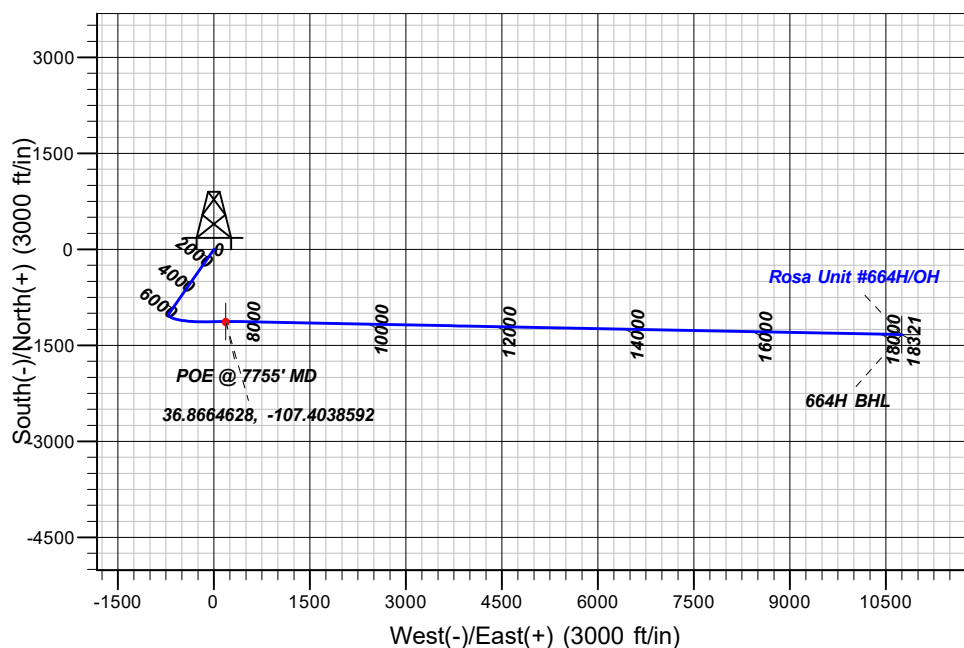
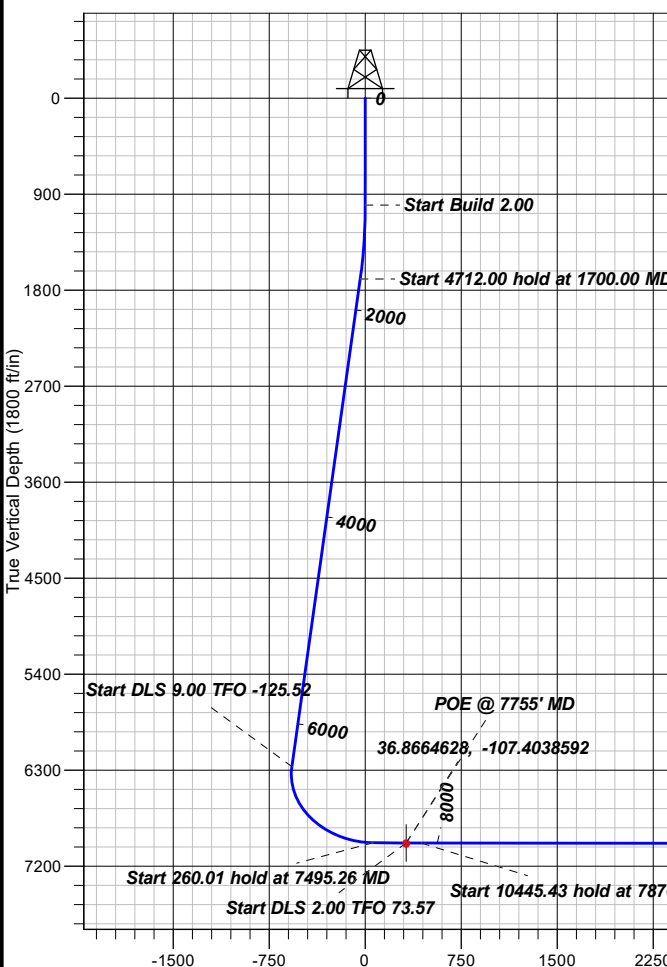
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1000.00	0.00	0.00	1000.00	0.00	0.00	0.00	0.00	0.00
1700.00	14.00	215.00	1693.06	-69.71	-48.81	2.00	215.00	-39.87
6412.00	14.00	215.00	6265.09	-1003.49	-702.65	0.00	0.00	-573.93
7495.26	89.27	88.81	6978.67	-1132.22	-77.74	9.00	-125.52	62.06
7755.27	89.27	88.81	6982.00	-1126.80	182.19	0.00	0.00	319.36
7876.01	89.95	91.12	6982.83	-1126.73	302.91	2.00	73.57	439.15
18321.43	89.95	91.12	6992.00	-1331.43	10746.33	0.00	0.00	10828.50

CASING DETAILS

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

FORMATION DETAILS

TVDPath	MDPath	Formation
2491.00	2522.37	Ojo Alamo
2619.00	2654.29	Kirtland
3080.00	3129.40	Fruitland
3409.00	3468.48	Pictured Cliffs
3503.00	3565.35	Lewis
4590.00	4685.63	Chacra
5417.00	5537.95	Cliff House
5465.00	5587.42	Menefee
5667.00	5795.60	Point Lookout
6153.00	6296.48	Mancos



Vertical Section at 97.06° (1500 ft/in)



Logos Opersting LLC

Rio Arriba, NM NAD83

Rosa Unit 30

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

OH

Plan: Plan #2

Standard Planning Report

05 July, 2021





Lonestar Consulting

Planning Report



Database:	EDM _16.0	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Company:	Logos Opersting LLC	TVD Reference:	GL 6394' @ 6394.00ft
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6394' @ 6394.00ft
Site:	Rosa Unit 30	North Reference:	True
Well:	Rosa Unit #664H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

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
	+E/-W	0.00 ft	Easting:	2,848,533.65 usft
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)
	IGRF2000	12/31/2004	10.80	63.86	51,651.99425517

Design	Plan #2			
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	97.06

Plan Survey Tool Program	Date	7/5/2021		
Depth From (ft)	Depth To (ft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	18,321.44 Plan #2 (OH)	MWD	
			MWD - Standard	

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	
6,412.00	14.00	215.00	6,265.09	-1,003.49	-702.65	0.00	0.00	0.00	0.00	
7,495.26	89.27	88.81	6,978.67	-1,132.22	-77.74	9.00	6.95	-11.65	-125.52	
7,755.27	89.27	88.81	6,982.00	-1,126.80	182.19	0.00	0.00	0.00	0.00	664H POE
7,876.01	89.95	91.12	6,982.83	-1,126.73	302.91	2.00	0.57	1.92	73.57	
18,321.44	89.95	91.12	6,992.00	-1,331.43	10,746.33	0.00	0.00	0.00	0.00	664H BHL



Lonestar Consulting

Planning Report



Database:	EDM _16.0	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Company:	Logos Operating LLC	TVD Reference:	GL 6394' @ 6394.00ft
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6394' @ 6394.00ft
Site:	Rosa Unit 30	North Reference:	True
Well:	Rosa Unit #664H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

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	-0.82	2.00	2.00	0.00
1,200.00	4.00	215.00	1,199.84	-5.72	-4.00	-3.27	2.00	2.00	0.00
1,300.00	6.00	215.00	1,299.45	-12.86	-9.00	-7.35	2.00	2.00	0.00
1,400.00	8.00	215.00	1,398.70	-22.84	-15.99	-13.06	2.00	2.00	0.00
1,500.00	10.00	215.00	1,497.47	-35.65	-24.96	-20.39	2.00	2.00	0.00
1,600.00	12.00	215.00	1,595.62	-51.28	-35.91	-29.33	2.00	2.00	0.00
1,700.00	14.00	215.00	1,693.06	-69.71	-48.81	-39.87	2.00	2.00	0.00
1,800.00	14.00	215.00	1,790.08	-89.52	-62.69	-51.20	0.00	0.00	0.00
1,900.00	14.00	215.00	1,887.11	-109.34	-76.56	-62.54	0.00	0.00	0.00
2,000.00	14.00	215.00	1,984.14	-129.16	-90.44	-73.87	0.00	0.00	0.00
2,100.00	14.00	215.00	2,081.17	-148.98	-104.31	-85.20	0.00	0.00	0.00
2,200.00	14.00	215.00	2,178.20	-168.79	-118.19	-96.54	0.00	0.00	0.00
2,300.00	14.00	215.00	2,275.23	-188.61	-132.07	-107.87	0.00	0.00	0.00
2,400.00	14.00	215.00	2,372.26	-208.43	-145.94	-119.21	0.00	0.00	0.00
2,500.00	14.00	215.00	2,469.29	-228.24	-159.82	-130.54	0.00	0.00	0.00
2,600.00	14.00	215.00	2,566.32	-248.06	-173.69	-141.88	0.00	0.00	0.00
2,700.00	14.00	215.00	2,663.35	-267.88	-187.57	-153.21	0.00	0.00	0.00
2,800.00	14.00	215.00	2,760.38	-287.69	-201.45	-164.54	0.00	0.00	0.00
2,900.00	14.00	215.00	2,857.41	-307.51	-215.32	-175.88	0.00	0.00	0.00
3,000.00	14.00	215.00	2,954.44	-327.33	-229.20	-187.21	0.00	0.00	0.00
3,100.00	14.00	215.00	3,051.47	-347.15	-243.07	-198.55	0.00	0.00	0.00
3,200.00	14.00	215.00	3,148.50	-366.96	-256.95	-209.88	0.00	0.00	0.00
3,300.00	14.00	215.00	3,245.53	-386.78	-270.83	-221.21	0.00	0.00	0.00
3,400.00	14.00	215.00	3,342.56	-406.60	-284.70	-232.55	0.00	0.00	0.00
3,500.00	14.00	215.00	3,439.59	-426.41	-298.58	-243.88	0.00	0.00	0.00
3,600.00	14.00	215.00	3,536.62	-446.23	-312.45	-255.22	0.00	0.00	0.00
3,700.00	14.00	215.00	3,633.65	-466.05	-326.33	-266.55	0.00	0.00	0.00
3,800.00	14.00	215.00	3,730.68	-485.87	-340.21	-277.89	0.00	0.00	0.00
3,900.00	14.00	215.00	3,827.71	-505.68	-354.08	-289.22	0.00	0.00	0.00
4,000.00	14.00	215.00	3,924.74	-525.50	-367.96	-300.55	0.00	0.00	0.00
4,100.00	14.00	215.00	4,021.77	-545.32	-381.84	-311.89	0.00	0.00	0.00
4,200.00	14.00	215.00	4,118.79	-565.13	-395.71	-323.22	0.00	0.00	0.00
4,300.00	14.00	215.00	4,215.82	-584.95	-409.59	-334.56	0.00	0.00	0.00
4,400.00	14.00	215.00	4,312.85	-604.77	-423.46	-345.89	0.00	0.00	0.00
4,500.00	14.00	215.00	4,409.88	-624.59	-437.34	-357.22	0.00	0.00	0.00
4,600.00	14.00	215.00	4,506.91	-644.40	-451.22	-368.56	0.00	0.00	0.00
4,700.00	14.00	215.00	4,603.94	-664.22	-465.09	-379.89	0.00	0.00	0.00
4,800.00	14.00	215.00	4,700.97	-684.04	-478.97	-391.23	0.00	0.00	0.00
4,900.00	14.00	215.00	4,798.00	-703.85	-492.84	-402.56	0.00	0.00	0.00
5,000.00	14.00	215.00	4,895.03	-723.67	-506.72	-413.90	0.00	0.00	0.00
5,100.00	14.00	215.00	4,992.06	-743.49	-520.60	-425.23	0.00	0.00	0.00
5,200.00	14.00	215.00	5,089.09	-763.30	-534.47	-436.56	0.00	0.00	0.00
5,300.00	14.00	215.00	5,186.12	-783.12	-548.35	-447.90	0.00	0.00	0.00



Lonestar Consulting

Planning Report



Database:	EDM _16.0	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Company:	Logos Operating LLC	TVD Reference:	GL 6394' @ 6394.00ft
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6394' @ 6394.00ft
Site:	Rosa Unit 30	North Reference:	True
Well:	Rosa Unit #664H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

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)
5,400.00	14.00	215.00	5,283.15	-802.94	-562.22	-459.23	0.00	0.00	0.00
5,500.00	14.00	215.00	5,380.18	-822.76	-576.10	-470.57	0.00	0.00	0.00
5,600.00	14.00	215.00	5,477.21	-842.57	-589.98	-481.90	0.00	0.00	0.00
5,700.00	14.00	215.00	5,574.24	-862.39	-603.85	-493.23	0.00	0.00	0.00
5,800.00	14.00	215.00	5,671.27	-882.21	-617.73	-504.57	0.00	0.00	0.00
5,900.00	14.00	215.00	5,768.30	-902.02	-631.60	-515.90	0.00	0.00	0.00
6,000.00	14.00	215.00	5,865.33	-921.84	-645.48	-527.24	0.00	0.00	0.00
6,100.00	14.00	215.00	5,962.36	-941.66	-659.36	-538.57	0.00	0.00	0.00
6,200.00	14.00	215.00	6,059.39	-961.48	-673.23	-549.90	0.00	0.00	0.00
6,300.00	14.00	215.00	6,156.42	-981.29	-687.11	-561.24	0.00	0.00	0.00
6,400.00	14.00	215.00	6,253.45	-1,001.11	-700.98	-572.57	0.00	0.00	0.00
6,412.00	14.00	215.00	6,265.09	-1,003.49	-702.65	-573.93	0.00	0.00	0.00
6,500.00	11.36	180.30	6,351.06	-1,020.90	-708.81	-577.91	9.00	-3.00	-39.44
6,600.00	14.26	140.88	6,448.74	-1,040.34	-701.08	-567.84	9.00	2.90	-39.42
6,700.00	20.91	120.37	6,544.10	-1,058.96	-677.86	-542.51	9.00	6.66	-20.51
6,800.00	28.83	110.06	6,634.80	-1,076.29	-639.73	-502.54	9.00	7.92	-10.31
6,900.00	37.21	104.00	6,718.59	-1,091.90	-587.64	-448.92	9.00	8.38	-6.06
7,000.00	45.80	99.92	6,793.42	-1,105.42	-522.85	-382.97	9.00	8.59	-4.07
7,100.00	54.50	96.90	6,857.45	-1,116.51	-446.98	-306.31	9.00	8.70	-3.03
7,200.00	63.26	94.47	6,909.09	-1,124.89	-361.88	-220.82	9.00	8.76	-2.43
7,300.00	72.05	92.39	6,947.08	-1,130.36	-269.65	-128.62	9.00	8.79	-2.08
7,400.00	80.86	90.51	6,970.48	-1,132.79	-172.56	-31.97	9.00	8.81	-1.88
7,495.26	89.27	88.81	6,978.67	-1,132.22	-77.74	62.06	9.00	8.82	-1.79
7,500.00	89.27	88.81	6,978.73	-1,132.12	-73.00	66.75	0.00	0.00	0.00
7,600.00	89.27	88.81	6,980.01	-1,130.04	26.97	165.71	0.00	0.00	0.00
7,700.00	89.27	88.81	6,981.29	-1,127.95	126.94	264.66	0.00	0.00	0.00
7,755.27	89.27	88.81	6,982.00	-1,126.80	182.19	319.36	0.00	0.00	0.00
7,800.00	89.52	89.66	6,982.47	-1,126.21	226.91	363.66	2.00	0.57	1.92
7,876.01	89.95	91.12	6,982.83	-1,126.73	302.91	439.15	2.00	0.57	1.92
7,900.00	89.95	91.12	6,982.85	-1,127.20	326.90	463.02	0.00	0.00	0.00
8,000.00	89.95	91.12	6,982.94	-1,129.16	426.88	562.48	0.00	0.00	0.00
8,100.00	89.95	91.12	6,983.02	-1,131.12	526.86	661.94	0.00	0.00	0.00
8,200.00	89.95	91.12	6,983.11	-1,133.08	626.84	761.41	0.00	0.00	0.00
8,300.00	89.95	91.12	6,983.20	-1,135.04	726.83	860.87	0.00	0.00	0.00
8,400.00	89.95	91.12	6,983.29	-1,137.00	826.81	960.33	0.00	0.00	0.00
8,500.00	89.95	91.12	6,983.37	-1,138.96	926.79	1,059.80	0.00	0.00	0.00
8,600.00	89.95	91.12	6,983.46	-1,140.92	1,026.77	1,159.26	0.00	0.00	0.00
8,700.00	89.95	91.12	6,983.55	-1,142.88	1,126.75	1,258.72	0.00	0.00	0.00
8,800.00	89.95	91.12	6,983.64	-1,144.84	1,226.73	1,358.19	0.00	0.00	0.00
8,900.00	89.95	91.12	6,983.73	-1,146.80	1,326.71	1,457.65	0.00	0.00	0.00
9,000.00	89.95	91.12	6,983.81	-1,148.76	1,426.69	1,557.11	0.00	0.00	0.00
9,100.00	89.95	91.12	6,983.90	-1,150.72	1,526.67	1,656.57	0.00	0.00	0.00
9,200.00	89.95	91.12	6,983.99	-1,152.68	1,626.65	1,756.04	0.00	0.00	0.00
9,300.00	89.95	91.12	6,984.08	-1,154.64	1,726.63	1,855.50	0.00	0.00	0.00
9,400.00	89.95	91.12	6,984.16	-1,156.60	1,826.61	1,954.96	0.00	0.00	0.00
9,500.00	89.95	91.12	6,984.25	-1,158.56	1,926.59	2,054.43	0.00	0.00	0.00
9,600.00	89.95	91.12	6,984.34	-1,160.52	2,026.58	2,153.89	0.00	0.00	0.00
9,700.00	89.95	91.12	6,984.43	-1,162.47	2,126.56	2,253.35	0.00	0.00	0.00
9,800.00	89.95	91.12	6,984.52	-1,164.43	2,226.54	2,352.82	0.00	0.00	0.00
9,900.00	89.95	91.12	6,984.60	-1,166.39	2,326.52	2,452.28	0.00	0.00	0.00
10,000.00	89.95	91.12	6,984.69	-1,168.35	2,426.50	2,551.74	0.00	0.00	0.00
10,100.00	89.95	91.12	6,984.78	-1,170.31	2,526.48	2,651.21	0.00	0.00	0.00
10,200.00	89.95	91.12	6,984.87	-1,172.27	2,626.46	2,750.67	0.00	0.00	0.00
10,300.00	89.95	91.12	6,984.96	-1,174.23	2,726.44	2,850.13	0.00	0.00	0.00



Lonestar Consulting

Planning Report



Database:	EDM _16.0	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Company:	Logos Operating LLC	TVD Reference:	GL 6394' @ 6394.00ft
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6394' @ 6394.00ft
Site:	Rosa Unit 30	North Reference:	True
Well:	Rosa Unit #664H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

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)
10,400.00	89.95	91.12	6,985.04	-1,176.19	2,826.42	2,949.59	0.00	0.00	0.00
10,500.00	89.95	91.12	6,985.13	-1,178.15	2,926.40	3,049.06	0.00	0.00	0.00
10,600.00	89.95	91.12	6,985.22	-1,180.11	3,026.38	3,148.52	0.00	0.00	0.00
10,700.00	89.95	91.12	6,985.31	-1,182.07	3,126.36	3,247.98	0.00	0.00	0.00
10,800.00	89.95	91.12	6,985.39	-1,184.03	3,226.34	3,347.45	0.00	0.00	0.00
10,900.00	89.95	91.12	6,985.48	-1,185.99	3,326.33	3,446.91	0.00	0.00	0.00
11,000.00	89.95	91.12	6,985.57	-1,187.95	3,426.31	3,546.37	0.00	0.00	0.00
11,100.00	89.95	91.12	6,985.66	-1,189.91	3,526.29	3,645.84	0.00	0.00	0.00
11,200.00	89.95	91.12	6,985.75	-1,191.87	3,626.27	3,745.30	0.00	0.00	0.00
11,300.00	89.95	91.12	6,985.83	-1,193.83	3,726.25	3,844.76	0.00	0.00	0.00
11,400.00	89.95	91.12	6,985.92	-1,195.79	3,826.23	3,944.23	0.00	0.00	0.00
11,500.00	89.95	91.12	6,986.01	-1,197.75	3,926.21	4,043.69	0.00	0.00	0.00
11,600.00	89.95	91.12	6,986.10	-1,199.71	4,026.19	4,143.15	0.00	0.00	0.00
11,700.00	89.95	91.12	6,986.18	-1,201.67	4,126.17	4,242.61	0.00	0.00	0.00
11,800.00	89.95	91.12	6,986.27	-1,203.63	4,226.15	4,342.08	0.00	0.00	0.00
11,900.00	89.95	91.12	6,986.36	-1,205.59	4,326.13	4,441.54	0.00	0.00	0.00
12,000.00	89.95	91.12	6,986.45	-1,207.55	4,426.11	4,541.00	0.00	0.00	0.00
12,100.00	89.95	91.12	6,986.54	-1,209.51	4,526.09	4,640.47	0.00	0.00	0.00
12,200.00	89.95	91.12	6,986.62	-1,211.47	4,626.08	4,739.93	0.00	0.00	0.00
12,300.00	89.95	91.12	6,986.71	-1,213.43	4,726.06	4,839.39	0.00	0.00	0.00
12,400.00	89.95	91.12	6,986.80	-1,215.39	4,826.04	4,938.86	0.00	0.00	0.00
12,500.00	89.95	91.12	6,986.89	-1,217.35	4,926.02	5,038.32	0.00	0.00	0.00
12,600.00	89.95	91.12	6,986.98	-1,219.31	5,026.00	5,137.78	0.00	0.00	0.00
12,700.00	89.95	91.12	6,987.06	-1,221.27	5,125.98	5,237.25	0.00	0.00	0.00
12,800.00	89.95	91.12	6,987.15	-1,223.23	5,225.96	5,336.71	0.00	0.00	0.00
12,900.00	89.95	91.12	6,987.24	-1,225.19	5,325.94	5,436.17	0.00	0.00	0.00
13,000.00	89.95	91.12	6,987.33	-1,227.14	5,425.92	5,535.63	0.00	0.00	0.00
13,100.00	89.95	91.12	6,987.41	-1,229.10	5,525.90	5,635.10	0.00	0.00	0.00
13,200.00	89.95	91.12	6,987.50	-1,231.06	5,625.88	5,734.56	0.00	0.00	0.00
13,300.00	89.95	91.12	6,987.59	-1,233.02	5,725.86	5,834.02	0.00	0.00	0.00
13,400.00	89.95	91.12	6,987.68	-1,234.98	5,825.84	5,933.49	0.00	0.00	0.00
13,500.00	89.95	91.12	6,987.77	-1,236.94	5,925.82	6,032.95	0.00	0.00	0.00
13,600.00	89.95	91.12	6,987.85	-1,238.90	6,025.81	6,132.41	0.00	0.00	0.00
13,700.00	89.95	91.12	6,987.94	-1,240.86	6,125.79	6,231.88	0.00	0.00	0.00
13,800.00	89.95	91.12	6,988.03	-1,242.82	6,225.77	6,331.34	0.00	0.00	0.00
13,900.00	89.95	91.12	6,988.12	-1,244.78	6,325.75	6,430.80	0.00	0.00	0.00
14,000.00	89.95	91.12	6,988.20	-1,246.74	6,425.73	6,530.27	0.00	0.00	0.00
14,100.00	89.95	91.12	6,988.29	-1,248.70	6,525.71	6,629.73	0.00	0.00	0.00
14,200.00	89.95	91.12	6,988.38	-1,250.66	6,625.69	6,729.19	0.00	0.00	0.00
14,300.00	89.95	91.12	6,988.47	-1,252.62	6,725.67	6,828.65	0.00	0.00	0.00
14,400.00	89.95	91.12	6,988.56	-1,254.58	6,825.65	6,928.12	0.00	0.00	0.00
14,500.00	89.95	91.12	6,988.64	-1,256.54	6,925.63	7,027.58	0.00	0.00	0.00
14,600.00	89.95	91.12	6,988.73	-1,258.50	7,025.61	7,127.04	0.00	0.00	0.00
14,700.00	89.95	91.12	6,988.82	-1,260.46	7,125.59	7,226.51	0.00	0.00	0.00
14,800.00	89.95	91.12	6,988.91	-1,262.42	7,225.57	7,325.97	0.00	0.00	0.00
14,900.00	89.95	91.12	6,989.00	-1,264.38	7,325.56	7,425.43	0.00	0.00	0.00
15,000.00	89.95	91.12	6,989.08	-1,266.34	7,425.54	7,524.90	0.00	0.00	0.00
15,100.00	89.95	91.12	6,989.17	-1,268.30	7,525.52	7,624.36	0.00	0.00	0.00
15,200.00	89.95	91.12	6,989.26	-1,270.26	7,625.50	7,723.82	0.00	0.00	0.00
15,300.00	89.95	91.12	6,989.35	-1,272.22	7,725.48	7,823.29	0.00	0.00	0.00
15,400.00	89.95	91.12	6,989.43	-1,274.18	7,825.46	7,922.75	0.00	0.00	0.00
15,500.00	89.95	91.12	6,989.52	-1,276.14	7,925.44	8,022.21	0.00	0.00	0.00
15,600.00	89.95	91.12	6,989.61	-1,278.10	8,025.42	8,121.67	0.00	0.00	0.00
15,700.00	89.95	91.12	6,989.70	-1,280.06	8,125.40	8,221.14	0.00	0.00	0.00



Lonestar Consulting Planning Report



Database:	EDM _16.0	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Company:	Logos Operating LLC	TVD Reference:	GL 6394' @ 6394.00ft
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6394' @ 6394.00ft
Site:	Rosa Unit 30	North Reference:	True
Well:	Rosa Unit #664H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

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)	
15,800.00	89.95	91.12	6,989.79	-1,282.02	8,225.38	8,320.60	0.00	0.00	0.00	
15,900.00	89.95	91.12	6,989.87	-1,283.98	8,325.36	8,420.06	0.00	0.00	0.00	
16,000.00	89.95	91.12	6,989.96	-1,285.94	8,425.34	8,519.53	0.00	0.00	0.00	
16,100.00	89.95	91.12	6,990.05	-1,287.90	8,525.32	8,618.99	0.00	0.00	0.00	
16,200.00	89.95	91.12	6,990.14	-1,289.85	8,625.31	8,718.45	0.00	0.00	0.00	
16,300.00	89.95	91.12	6,990.22	-1,291.81	8,725.29	8,817.92	0.00	0.00	0.00	
16,400.00	89.95	91.12	6,990.31	-1,293.77	8,825.27	8,917.38	0.00	0.00	0.00	
16,500.00	89.95	91.12	6,990.40	-1,295.73	8,925.25	9,016.84	0.00	0.00	0.00	
16,600.00	89.95	91.12	6,990.49	-1,297.69	9,025.23	9,116.31	0.00	0.00	0.00	
16,700.00	89.95	91.12	6,990.58	-1,299.65	9,125.21	9,215.77	0.00	0.00	0.00	
16,800.00	89.95	91.12	6,990.66	-1,301.61	9,225.19	9,315.23	0.00	0.00	0.00	
16,900.00	89.95	91.12	6,990.75	-1,303.57	9,325.17	9,414.69	0.00	0.00	0.00	
17,000.00	89.95	91.12	6,990.84	-1,305.53	9,425.15	9,514.16	0.00	0.00	0.00	
17,100.00	89.95	91.12	6,990.93	-1,307.49	9,525.13	9,613.62	0.00	0.00	0.00	
17,200.00	89.95	91.12	6,991.02	-1,309.45	9,625.11	9,713.08	0.00	0.00	0.00	
17,300.00	89.95	91.12	6,991.10	-1,311.41	9,725.09	9,812.55	0.00	0.00	0.00	
17,400.00	89.95	91.12	6,991.19	-1,313.37	9,825.07	9,912.01	0.00	0.00	0.00	
17,500.00	89.95	91.12	6,991.28	-1,315.33	9,925.06	10,011.47	0.00	0.00	0.00	
17,600.00	89.95	91.12	6,991.37	-1,317.29	10,025.04	10,110.94	0.00	0.00	0.00	
17,700.00	89.95	91.12	6,991.45	-1,319.25	10,125.02	10,210.40	0.00	0.00	0.00	
17,800.00	89.95	91.12	6,991.54	-1,321.21	10,225.00	10,309.86	0.00	0.00	0.00	
17,900.00	89.95	91.12	6,991.63	-1,323.17	10,324.98	10,409.33	0.00	0.00	0.00	
18,000.00	89.95	91.12	6,991.72	-1,325.13	10,424.96	10,508.79	0.00	0.00	0.00	
18,100.00	89.95	91.12	6,991.81	-1,327.09	10,524.94	10,608.25	0.00	0.00	0.00	
18,200.00	89.95	91.12	6,991.89	-1,329.05	10,624.92	10,707.71	0.00	0.00	0.00	
18,300.00	89.95	91.12	6,991.98	-1,331.01	10,724.90	10,807.18	0.00	0.00	0.00	
18,321.44	89.95	91.12	6,992.00	-1,331.43	10,746.33	10,828.50	0.00	0.00	0.00	

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
664H POE - hit/miss target - Shape	0.00	0.00	6,982.00	-1,126.80	182.19	2,134,999.16	2,848,720.90	36.8664627	-107.4038593
664H BHL - plan hits target center - Point	0.00	0.00	6,992.00	-1,331.43	10,746.33	2,134,841.98	2,859,285.83	36.8658950	-107.3677458



Lonestar Consulting Planning Report



Database:	EDM _16.0	Local Co-ordinate Reference:	Well Rosa Unit #664H - Slot B5 (664H)
Company:	Logos Operating LLC	TVD Reference:	GL 6394' @ 6394.00ft
Project:	Rio Arriba, NM NAD83	MD Reference:	GL 6394' @ 6394.00ft
Site:	Rosa Unit 30	North Reference:	True
Well:	Rosa Unit #664H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

Formations					
Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,522.37	2,491.00	Ojo Alamo		0.00	0.00
2,654.29	2,619.00	Kirtland		0.00	0.00
3,129.40	3,080.00	Fruitland		0.00	0.00
3,468.48	3,409.00	Pictured Cliffs		0.00	0.00
3,565.35	3,503.00	Lewis		0.00	0.00
4,685.63	4,590.00	Chacra		0.00	0.00
5,537.95	5,417.00	Cliff House		0.00	0.00
5,587.42	5,465.00	Menefee		0.00	0.00
5,795.60	5,667.00	Point Lookout		0.00	0.00
6,296.48	6,153.00	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 4712.00 hold at 1700.00 MD	
6,412.00	6,265.09	-1,003.49	-702.65	Start DLS 9.00 TFO -125.52	
7,495.26	6,978.67	-1,132.22	-77.74	Start 260.01 hold at 7495.26 MD	
7,755.27	6,982.00	-1,126.80	182.19	POE @ 7755' MD	
7,755.27	6,982.00	-1,126.80	182.19	36.8664628, -107.4038592	
7,755.27	6,982.00	-1,126.80	182.19	Start DLS 2.00 TFO 73.57	
7,876.01	6,982.83	-1,126.73	302.92	Start 10445.43 hold at 7876.01 MD	
18,321.43	6,992.00	-1,331.43	10,746.33	TD at 18321.43	

Logos Operating, LLC. Rosa Unit #662H and 664H**DOI-BLM-NM-F010-2022-0001-DNA****Conditions of Approval (COA)****– Design Features –**

Logos Operating, LLC would adhere to the following Conditions of Approval (COAs) and follow the general design features and best management practices (BMPs).

Control of Waste

- *Drilling of the horizontal lateral will be accomplished with water-based mud and/or oil-based mud. All cuttings will be placed in roll-off bins and hauled to Section 25 cuttings disposal. No blow pit will be used.*
- *If oil-based mud drilling is used, a closed-loop system will be used to minimize potential impacts to surface and groundwater quality. A 30-mil reinforced liner will be placed under the drill rig mats and all drilling machinery. This area will be enclosed by a containment berm and ditches, which will drain to sump areas for spill prevention and control. The containment berm will be ramped to allow access to the solids control area.*
- *Storage tanks will be sized to ensure confinement of all fluids and will provide sufficient freeboard to prevent uncontrolled releases.*
- *Drilling fluids will be stored on-site in aboveground storage tanks. Upon termination of drilling operations, the drilling fluids will be recycled and transferred to other permitted closed-loop systems or returned to the vendor for reuse, as practical. All residual fluids will be hauled to a commercial disposal facility.*
- *Green completion technology will be used.*
- *Any spills of non-freshwater fluids will be immediately cleaned up and removed to an approved disposal site.*
- *Portable toilets will be provided and maintained during construction, as needed.*
- *Garbage, trash, and other waste materials will be collected in a portable, self-contained, and fully enclosed trash container during drilling and completion operations. The accumulated trash will be removed, as needed, and will be disposed of at an authorized sanitary landfill. No trash will be buried or burned on location.*
- *Immediately after removal of the drilling and completion rigs, all debris and other waste materials not contained in the trash container will be cleaned up and removed from the well location.*
- *No chemicals subject to reporting under the Superfund Amendments and Reauthorization Act Title III in an amount equal to or greater than 10,000 pounds will be used, produced, stored, transported, or disposed annually in association with the drilling, testing, or completing of these wells.*

- *No extremely hazardous substances (as defined in 40 CFR 355) in threshold planning quantities will be used, produced, stored, transported, or disposed in association with the drilling, testing, or completing of these wells.*
- *Berms will be constructed around all storage facilities sufficient in size to contain the storage capacity of tanks. Berm walls will be compacted with appropriate equipment to assure containment.*

Protection of Paleontological Resources

- *If a paleontological site is discovered, the BLM would be notified and the site would be avoided by personnel, personal vehicles, and company equipment. Workers would be informed that it is illegal to collect, damage, or disturb some such resources, and that such activities are punishable by criminal and/or administrative penalties.*
- *Any paleontological resource discovery by the Holder, or any person working on their behalf on public or Federal land, shall be immediately reported to the Authorized Officer. The Holder shall suspend all operations in the immediate area of such discovery until given written authorization to proceed is issued by the Authorized Officer. An evaluation of the discovery will be made by the Authorized Officer to determine appropriate actions to prevent the loss of significant scientific values. The Holder will be responsible for the cost of the evaluation. The results of further investigation will dictate site specific stipulations for avoidance or salvage of any potentially significant paleontological resources. Any decision as to proper mitigation measures will be made by the Authorized Officer, after consultation with the Holder.*

Protection of Cultural Resources

- *All BLM/FFO cultural resources stipulations will be followed as indicated in the Cultural Resource Records of Review. These stipulations may include, but are not limited to, temporary or permanent fencing or other physical barriers, monitoring of earth disturbing construction, reduction and/or specific construction avoidance zones, and employee education. All employees, contractors, and sub-contractors of the project will be informed by the project proponent that cultural sites are to be avoided by all personnel, personal vehicles, and company equipment. All employees, contractors, and sub-contractors of the project will also be informed that it is illegal to collect, damage, or disturb cultural resources and that such activities are punishable by criminal and/or administrative penalties under the provisions of the Archaeological Resources Protection Act. In the event of a discovery during construction, the project proponent will immediately stop all construction activities in the immediate vicinity of the discovery and then immediately notify the archaeological monitor, if present, or the BLM. The BLM will then evaluate or cause the site to be evaluated. Should a discovery be evaluated as significant (e.g., National Register, Native American Graves Protection and Repatriation Act, Archaeological Resources Protection Act), it will be protected in place until mitigating measures can be developed and implemented according to guidelines set by the BLM.*

Protection of Flora and Fauna, including Special Status Species (SSS) and Livestock

- *Horizontal drilling of multiple wells from one well pad will minimize the amount of surface disturbance, fugitive dust, and emissions.*

- *Temporary surface water lines will be implemented to minimize truck traffic from hauling of water. The surface waterlines would consist of a maximum of two 10-inch to 12-inch diameter heavy duty lay flat lines and/or poly surface pipelines permitted for temporary use.*

- *Surface water lines will be temporarily placed in or adjacent to existing roads, existing pipeline corridors and along the proposed pipeline corridor. 24-inch culverts will be installed and utilized to cross any roads.*

- *In areas where the surface lines traverse a side slope or steep slope, t-posts will be used to secure them. The 12-inch lay flat lines will have a joint every 660 feet and a 6-foot by 10-foot containment will be placed under each connection.*

- *All surface lines in service will be inspected daily.*

- *The drilling rig will use natural gas-powered engines and is self-moving between well bores (i.e., does not require multiple trucks or other vehicles to move between well bores drilled on the same pad). Use of natural gas-powered engines will result in less air and noise emissions.*

- *Once drilling is complete, LOGOS would reuse produced water in its own operations or dispose of the produced water from wells.*

- *Produced water would be piped through the existing water gathering system in the Rosa Mesa area where possible and would be hauled by truck if necessary.*

- *Vegetation removed during construction, including trees that measure less than 3 inches in diameter*

(at ground level) and slash/brush, will be chipped or mulched and incorporated into the topsoil as additional organic matter. All trees 3 inches in diameter or greater (at ground level) will be cut to ground level and delimbed. Tree trunks (left whole) and cut limbs will be stacked on existing well pad. The subsurface portion of trees (tree stumps) will be hauled to an approved disposal facility.

- *The construction and drilling activities will not be allowed during the Rosa Mesa Wildlife Area SDA seasonal restriction, between December 1 and March 31, to protect the integrity of the habitat for wintering deer and elk. This stipulation does not apply to operation and maintenance of production facilities.*

- *A migratory bird nest survey will be conducted for any ground-disturbing activities occurring between May 15 and July 31. The survey must be conducted by a BLM biologist using a survey protocol developed and provided by the BLM/FFO. If active nests are located within the proposed permitted area, project activities will not be permitted without written approval by a BLM/FFO biologist.*

- *Should any active raptor nests be observed within one-third mile of the proposed project area or should any SSS (listed by the USFWS or BLM) be observed within the proposed project area prior to or during project implementation, construction would cease and the BLM-FFO would be immediately contacted. The BLM-FFO would then ensure evaluation of the resource. Should a discovery be evaluated as significant (protected under the ESA, etc.), it would be protected in place until mitigation could be developed and implemented according to guidelines set by the BLM.*

- Any open water containing fluids (i.e. produced water) that could harm birds and other wildlife will be netted in accordance to BLM/FFO migratory bird policy.
- Wildlife hazards associated with the proposed project would be fenced, covered, and/or contained in storage tanks, as necessary.
- Grazing permittees will be notified when construction is scheduled to begin. All hazards to livestock will be fenced or contained.
- All existing improvements (such as fences, gates, and bar ditches) will be repaired to previous or better than pre-construction conditions. Cut fences will be tied to H-braces prior to cutting and openings will be protected as necessary during construction to prevent the escape of livestock. A temporary closure will be installed the same day the fence is cut. Following reclamation, the fence will be reconstructed to BLM specifications.
- Backfilling operations will be performed within a reasonable amount of time to ensure that the trenches are not left open for more than 24 hours. If a trench is left open overnight, it will be temporarily fenced or a night watchman will be utilized. The excavated soils will be returned to the trenches, atop the pipe, and compacted to prevent subsidence. The trenches will be compacted after approximately 2 feet of fill is placed over the pipe and after the ground surface has been leveled.
- Escape ramps/crossovers will be constructed every 1,320 feet. The ends of the open trench will be sloped each night with a 4:1 slope.
- Established livestock and wildlife trails will be left in place as crossovers. In areas where active grazing is taking place, escape ramps/crossovers will be placed every 500 feet. Crossovers will be a minimum of 10 feet wide and not fenced.
- The end of the pipe will be plugged to prevent animals from crawling in.
- Before the trench is closed, it will be inspected for animals. Any trapped wildlife or livestock will be promptly removed and released at least 150 yards from the trench.
- Production equipment will be placed on location in such a manner to minimize long-term disturbance and maximize interim reclamation. As practical, access will be provided by a teardrop-shaped road through the production area so that the center may be revegetated.

Protection of Topsoil

- The upper 6 inches of topsoil (if available) will be stripped following vegetation and site clearing. Topsoil will not be mixed with the underlying subsoil horizons and will be stockpiled as a berm along the perimeter of the well pad within the construction zone, separate from subsoil or other excavated material.
- Topsoil and sub-surface soils will be replaced in the proper order, prior to final seedbed preparation. Spreading shall not be done when the ground or topsoil is wet. Vehicle/equipment traffic will not be allowed to cross topsoil stockpiles. If topsoil is stored for a length of time such that nutrients are depleted from the topsoil, amendments will be added to the topsoil as advised by the Logos environmental scientist or appropriate agent/contractor.

Protection of the Public

- *The hauling of equipment and materials on public roads would comply with Department of Transportation regulations. No toxic substances would be stored or used within the proposed project area. Logos would have inspectors present during construction. Any accidents involving persons or property would immediately be reported to the BLM-FFO. Logos would notify the public of potential hazards by posting signage, as necessary.*

Prevention and Control of Weeds

- *Prior to construction equipment entering the proposed project area, construction equipment would be inspected for noxious weeds and cleaned.*
- *It will be the operator's responsibility to monitor, control, and eradicate all noxious weed species within the permitted area throughout the life of the proposed project. The operator will contact the BLM/FFO regarding acceptable weed-control methods. If the operator does not hold a current Pesticide Use Proposal, a Pesticide Use Proposal will be submitted prior to pesticide application. Only pesticides authorized for use on BLM lands will be used. The use of pesticides will comply with federal and state laws. Pesticides will be used only in accordance with their registered use and limitations. The operator will contact the BLM/FFO prior to using these chemicals.*

Protection of Air Resources

- *The BLM's regulatory jurisdiction over field production operations has resulted in the development of BMPs designed to reduce impacts to air quality by reducing all emissions from field production and operations. Typical measures could include flaring hydrocarbons and gases at high temperatures in order to reduce emissions of incomplete combustion, requiring that vapor recovery systems be maintained and functional in areas where petroleum liquids are stored, ensuring that compressor engines 300 horsepower or less have nitrogen oxide (NOx) emissions limited to 2 grams per horsepower hour, revegetating areas not required for production facilities to reduce the amount of dust, and watering dirt roads during periods of high use in order to reduce fugitive dust emissions.*
- *BMPs for dust abatement and erosion control will be utilized to reduce fugitive dust for the life of the project, as necessary. Water application, using a rear-spraying truck or other suitable means, will be the primary method of dust suppression along the road. Magnesium chloride, organic-based compounds, or polymer compounds could also be applied to roads or other surfaces to reduce fugitive dust. Neither petroleum-based products nor produced water would be used.*

Noise

- *Engines would be equipped with mufflers and barriers or other sound-proofing measures would be implemented, if needed, to meet the requirements of BLM Notice to Lessees and Operators on Onshore Oil and Gas Leases within the jurisdiction of the FFO NTL 04-2 FFO.*

Additional Design Features and BMPs

- *Diversions and other water control features will be installed as needed during construction and interim reclamation.*
- *The access road will be designed and constructed as a Resource Road in accordance with the BLM Gold Book Standards (BLM and USFS 2007), BLM 9113-1 (Roads Design Handbook), and BLM 9113-2 (Roads National Inventory and Condition Assessment Guidance and Instructions Handbook). Construction will include ditching, draining, installing culverts, crowning and capping or sloping and dipping the roadbed, as necessary, to provide a well-constructed and safe road.*
- *Production facilities would be painted **Juniper Green** to blend with the natural color of the landscape and would be located to reasonably minimize visual impact, to the extent practical. Equipment subject to safety considerations would not be painted.*
- *Vehicles would be restricted to proposed disturbance areas and existing areas of surface disturbance, such as existing roads and well pads.*
- *No construction or routine maintenance activities would be performed during periods when the soil is too wet to adequately support construction equipment. If equipment would create ruts deeper than six inches, the soil would be deemed too wet for construction or maintenance.*
- *Worker safety incidents would be reported to the BLM-FFO as required under Notice to Lessees (NTL) -3A (USGS 1979). Logos would adhere to company safety policies, Occupational Safety and Health Administration regulations, and Department of Transportation regulations.*



United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Farmington District Office
6251 College Blvd, Suite A
Farmington, New Mexico 87402



In Reply Refer To:
3162.3-1(NMF0110)

* LOGOS OPERATING LLC
#664H ROSA UNIT
Lease: NMSF078764
SH: NE $\frac{1}{4}$ SW $\frac{1}{4}$ Section 30, T.31 N., R.5W.
Rio Arriba County, New Mexico
BH: SE $\frac{1}{4}$ SW $\frac{1}{4}$ Section 28, T.31 N., R5 W.
Rio Arriba County, New Mexico
***Above Data Required on Well Sign**

GENERAL REQUIREMENTS FOR OIL AND GAS OPERATIONS ON FEDERAL AND INDIAN LEASES

The following special requirements apply and are effective when **checked**:

- A. ☒ Note all surface/drilling conditions of approval attached.
- B. ☒ The required wait on cement (WOC) time will be a minimum of 500 psi compressive strength at 60 degrees. Blowout preventor (BOP) nipple-up operations may then be initiated
- C. ☐ Test the surface casing to a minimum of _____ psi for 30 minutes.
- D. ☐ Test all casing strings below the surface casing to .22 psi/ft. of casing string length or 1500 psi, whichever is greater, but not to exceed 70% of the minimum internal yield burst) for a minimum of 30 minutes.
- E. ☐ Communitization Agreement covering the acreage dedicated to this well must be filed for approval with the Bureau of Land Management, Farmington District Office, Branch of Reservoir Management, 6251 College Blvd. Suite A, Farmington, New Mexico 87402. The effective date of the agreement must be **prior** to any sales.
- F. ☒ The use of co-flex hose is authorized contingent upon the following:
 1. From the BOP to the choke manifold: the co-flex hose must be hobbled on both ends and saddle to prevent whip.
 2. From the choke manifold to the discharge tank: the co-flex hoses must be as straight as practical, hobbled on both ends and anchored to prevent whip.
 3. The co-flex hose pressure rating must be at least commensurate with approved BOPE.

INTERIOR REGION 7 • UPPER COLORADO BASIN

COLORADO, NEW MEXICO, UTAH, WYOMING

I. GENERAL

- A. Full compliance with all applicable laws, regulations, and Onshore Orders, with the approved Permit to drill, and with the approved Surface Use and Operations Plan is required. Lessees and/or operators are fully accountable for the actions of their contractors and subcontractors. Failure to comply with these requirements and the filing of required reports will result in strict enforcement pursuant to 43 CFR 3163.1 or 3163.2.
- B. Each well shall have a well sign in legible condition from spud date to final abandonment. The sign should show the operator's name, lease serial number, or unit name, well number, location of the well, and whether lease is Tribal or Allotted, (See 43 CFR 3162.6(b)).
- C. A complete copy of the approved Application for Permit to Drill, along with any conditions of approval, shall be available to authorized personnel at the drill site whenever active drilling operations are under way.
- D. For Wildcat wells only, a drilling operations progress report is to be submitted, to the BLM-Field Office, weekly from the spud date until the well is completed and the Well Completion Report (Form 3160-4) is filed. The report should be on 8-1/2 x 11 inch paper, and each page should identify the well by; operator's name, well number, location and lease number.
- E. As soon as practical, notice is required of all blowouts, fires and accidents involving life-threatening injuries or loss of life. (See NTL-3A).
- F. Prior approval by the BLM-Authorized Office (Drilling and Production Section) is required for variance from the approved drilling program and before commencing plugging operations, plug back work casing repair work, corrective cementing operations, or suspending drilling operations indefinitely. Emergency approval may be obtained orally, but such approval is contingent upon filing of a notice of intent (on a Sundry Notice, Form 3160-5) within three business days (original and three copies of Federal leases and an original and four copies on Indian leases). **Any changes to the approved plan or any questions regarding drilling operations should be directed to BLM during regular business hours at 505-564-7600. Emergency program changes after hours should be directed to at Virgil Lucero at 505-793-1836.**
- G. **The Inspection and Enforcement Section (I&E), phone number (505-564-7750) is to be notified at least 24 hours in advance of BOP test, spudding, cementing, or plugging operations so that a BLM representative may witness the operations.**
- H. Unless drilling operations are commenced within two years, approval of the Application for Permit to Drill will expire. A written request for a two years extension may be granted if submitted prior to expiration.
- I. From the time drilling operations are initiated and until drilling operations are completed, a member of the drilling crew or the tool pusher shall maintain rig surveillance at all time, unless the well is secured with blowout preventers or cement plugs.
- J. If for any reason, drilling operations are suspended for more than 90 days, a written notice must be provided to this office outlining your plans for this well.

II. REPORTING REQUIREMENTS

- A. For reporting purposes, all well Sundry notices, well completion and other well actions shall be referenced by the appropriate lease, communitization agreement and/or unit agreement numbers.
- B. The following reports shall be filed with the BLM-Authorized Officer within 30 days after the work is completed.
1. Original and three copies on Federal and an Original and five copies on Indian leases of Sundry Notice (Form 3150-5), giving complete information concerning.
 - a. Setting of each string of casing. Show size and depth of hole, grade and weight of casing, depth set, depth of any and all cementing tools that are used, amount (in cubic feet) and types of cement used, whether cement circulated to surface and all cement tops in the casing annulus, casing test method and results, and the date work was done. Show spud date on first report submitted.
 - b. Intervals tested, perforated (include; size, number and location of perforations), acidized, or fractured; and results obtained. Provide date work was done on well completion report and completion sundry notice.
 - c. Subsequent Report of Abandonment, show the manner in which the well was plugged, including depths where casing was cut and pulled, intervals (by depths) where cement plugs were replaced, and dates of the operations.
 2. Well Completion Report (Form 3160-4) will be submitted with 30 days after well has been completed.
 - a. Initial Bottom Hole Pressure (BHP) for the producing formations. Show the BHP on the completion report. The pressure may be: 1) measured with a bottom hole bomb, or; 2) calculated based on shut in surface pressures (minimum seven day buildup) and fluid level shot.
 3. Submit a cement evaluation log, if cement is not circulated to surface.

III. DRILLER'S LOG

The following shall be entered in the daily driller's log: 1) Blowout preventer pressures tests, including test pressures and results. 2) Blowout preventer tests for proper functioning, 3) Blowout prevention drills conducted, 4) Casing run, including size, grade, weight, and depth set, 5) How pipe was cemented, including amount of cement, type, whether cement circulated to surface, location of cementing tools, etc., 6) Waiting on cement time for each casing string, 7) Casing pressure tests after cementing, including test pressure and results and 8) Estimated amounts of oil and gas recovered and/or produced during drill stem test.

IV. GAS FLARING

Gas produced from this well may not be vented or flared beyond an initial, authorized test period of *** Days** or 50 MMCF following its (completion)(recompletion), whichever first occurs, without the prior, written approval of the authorized officer. Should gas be vented or flared without approval beyond the test period authorized above, you may be directed to shut-in the well until the gas can be captured or approval to continue venting or flaring as uneconomic is granted. You shall be required to compensate the lessor for the portion of the gas vented or flared without approval which is determined to have been avoidably lost.

***30 days**, unless a longer test period is specifically approved by the authorized officer. The 30-day period will commence upon the first gas to surface.

V. SAFETY

- A. All rig heating stoves are to be of the explosion-proof type.
- B. Rig safety lines are to be installed.
- C. Hard hats and other Personal Protective Equipment (PPE) must be utilized.

VI. CHANGE OF PLANS OR ABANDONMENT

- A. Any changes of plans required in order to mitigate unanticipated conditions encountered during drilling operations, will require approval as set forth in Section 1.F.
- B. If the well is dry, it is to be plugged in accordance with 43 CFR 3162.3-4, approval of the proposed plugging program is required as set forth in Section 1.F. The report should show the total depth reached, the reason for plugging, and the proposed intervals, by depths, where cement plugs are to be placed, type of plugging mud, etc. A Subsequent Report of Abandonment is required as set forth in Section II.B.1c.
- C. Unless a well has been properly cased and cemented, or properly plugged, the drilling rig must not be moved from the drill site without prior approval from the BLM-Authorized Officer.

VII. PHONE NUMBERS

- A. For BOPE tests, cementing, and plugging operations the phone number is 505-564-7750 and must be called 24 hours in advance in order that a BLM representative may witness the operations.
- B. Emergency program changes after hours contact:

Virgil Lucero (505) 793-1836
Joe Killins (505) 564-7736

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 92404

CONDITIONS

Operator: LOGOS OPERATING, LLC 2010 Afton Place Farmington, NM 87401	OGRID: 289408
	Action Number: 92404
	Action Type: [C-101] BLM - Federal/Indian Land Lease (Form 3160-3)

CONDITIONS

Created By	Condition	Condition Date
kpickford	Notify OCD 24 hours prior to casing & cement	3/23/2022
kpickford	Will require a File As Drilled C-102 and a Directional Survey with the C-104	3/23/2022
kpickford	Once the well is spud, to prevent ground water contamination through whole or partial conduits from the surface, the operator shall drill without interruption through the fresh water zone or zones and shall immediately set in cement the water protection string	3/23/2022
kpickford	Cement is required to circulate on both surface and intermediate1 strings of casing	3/23/2022
kpickford	Oil base muds are not to be used until fresh water zones are cased and cemented providing isolation from the oil or diesel. This includes synthetic oils. Oil based mud, drilling fluids and solids must be contained in a steel closed loop system	3/23/2022