

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

RECEIVED

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

SUNDRY NOTICES AND REPORTS ON WELLS
Do not use this form for proposals to drill or to re-enter an abandoned well. Use Form 3160-3 (APD) for such proposals.

5. Lease Serial No. NMNM18463

6. If Indian, Allottee or Tribe Name

SUBMIT IN TRIPLICATE - Other instructions on page 2

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

8. Well Name and No. Heros 2308 09L Com 5H

9. API Well No. 30-045-35877

10. Field and Pool or Exploratory Area
Nageezi Gallup

11. Country or Parish, State
San Juan County, NM

1. Type of Well

☒ Oil Well ☐ Gas Well ☐ Other

2. Name of Operator LOGOS Operating, LLC

3a. Address 2010 Afton Place
Farmington, NM 87401

3b. Phone No. (include area code)
(505) 787-2218

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)
1476 FSL & 300 FWL, NW/SW, L Sec 9 T23N R08W

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

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

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

LOGOS Operating LLC, request a change in plans to the Point of Entry (POE), Bottom-hole Location (BHL) and Total Depth(TD), per the attached C102 Plat, the Drilling and Directional Drill Plan.

NMOCD

JUN 04 2018

BLM'S APPROVAL OR ACCEPTANCE OF THIS ACTION DOES NOT RELIEVE THE LESSEE AND OPERATOR FROM OBTAINING ANY OTHER AUTHORIZATION REQUIRED FOR OPERATIONS ON FEDERAL AND INDIAN LANDS

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

Marie E. Florez

Regulatory Specialist

Title

Signature

Marie E. Florez

Date

05/23/2018

THE SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by

[Signature]

Title

PE

Date

5/24/18

Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Office

FPO

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

(Instructions on page 2)

NMOCD

31

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

15703



Sundry Drilling Plan
LOGOS Operating, LLC

Change of Plans May 10, 2018

Heros 2308 9L Com #5H
API # 30-045-35877
Lease Serial # NMNM 18463

Surface Location: 1476 FSL, 330 FWL

Legal Description: Sec 9, T23N, R8W (36.238493° N, 107.694535° W – NAD83)

Bottom Hole Location: 844 FNL, 257 FEL

Legal Description: Sec 16, T23N, R8W (36.232069° N, 107.678763° W – NAD83)

San Juan County, NM

1. The elevation of the unprepared ground is 6,913 feet above sea level. Estimated KB Elevation = 6938' (25'KB)
2. The geological name of the surface formation is the Nacimiento.
3. A rotary rig will be used to drill the well to a Proposed Total measured Depth of 5,228' TVD/10,408' MD with the first perforation at the PBHL 10,328'MD/5,228'TVD, 812' FNL, 331' FEL. Sec. 16.
4. Estimated top of important geological markers:

<u>Formation</u>	<u>Depth TVD (ft)</u>	<u>MD (ft)</u>
Nacimiento	Surface	Surface
Ojo Alamo	872	872
Kirtland	1,077	1,077
Fruitland	1,208	1,208
Pictured Cliffs	1,562	1,563
Cliff House	3,098	3,114
Menefee	3,123	3,139
Point Lookout	4,023	4,048
Mancos	4,199	4,225

*estimated vertical tops at SHL"

5. Estimated depth at which anticipated water, oil, gas or other mineral bearing formations are expected to be encountered:

<u>Formation</u>	<u>Depth TVD (ft)</u>	<u>Water/Hydrocarbon</u>
Fruitland	1,208	Gas
Pictured Cliffs	1,562	Gas
Cliff House	3,098	Gas
Point Lookout	4,023	Gas
Mancos	4,199	Oil/Gas

6. All proposed casing is new and the program is as follows:

<u>Casing</u>	<u>Size</u>	<u>Depth</u>		<u>Grade</u>	<u>Weight</u>	<u>Connection</u>	<u>PSI x1000lbs</u>		
		<u>MD</u>	<u>TVD</u>				<u>Burst</u>	<u>Collapse</u>	<u>Tension</u>
Surface	9-5/8"	0-320'	0-320'	J-55	36.00	STC	3520	2020	394
Intermediate	7"	0-6,015'	0-5,253'	J-55	23.00	LTC	4360	3270	313
Production	4-1/2 "	5,865'-10,408'	5,253'-	P-110	11.60	LTC	10690	7560	278

7. Cementing Program:

- a. **12-1/4" hole x 9-5/8" casing at 320'** will have cement circulated to surface with **100 sks** (50% excess true hole) Type I-II neat cement with 20% flyash 14.5 ppg, 1.61 ft³/sk. Note: CEMENT MUST BE CIRCULATED TO SURFACE. STANDARD BOW SPRING CENTRALIZERS SHALL BE PLACED ON THE FIRST 3 (BOTTOM 3) JOINTS OF CASING (1 PER JOINT) AND 1 EVERY 3RD JOINT TO SURFACE. 20 BBLS OF WATER FOLLOWED BY 20 BBLS OF MUDFLUSH AHEAD OF CEMENT AS SPACER. Test Surface Casing to 1500 psi.
- b. **8-3/4" hole x 7" casing at 6,015' MD.** Cement will be circulated to surface in a single stage with **538 sks** (60% excess true hole) of HALCEM with 1.0 % CaC₂. 1/4 #/sk Poly-E-Flake, 5 #/sk Kol-Seal (Gilsonite) – 12.3 ppg, 1.95 ft³/sk followed by **294 sks** (60% excess true hole) VARICEM with 0.15% Versaset, 0.30% HALAD-9, 1/4 #/sk Poly-E-Flake, 5 #/sk Kol-Seal — 13.5 ppg, 1.3 ft³/sk. ONE CENTRALIZER PER JOINT FOR THE FIRST 3 JOINTS, THEN EVERY OTHER JOINT TO KOP, THEN ONE EVERY 3RD JOINT TO SURFACE. 20 BBLS OF WATER FOLLOWED BY 30 BBLS OF MUDFLUSH AHEAD OF CEMENT AS SPACER. Test Intermediate Casing to 1500 psi. Cement additives subject to change based on wellbore conditions and cement design criteria.
- c. **6-1/8" hole x 4-1/2" liner at 10,408' MD.** It will be a conventional liner job using 30% excess for TOC at 5,865' MD liner top, Cement slurry consist of **438 sks** EXTENDACEM cement, -13.3 ppg, 1.36 ft³/sk. CENTRALIZERS TO BE USED AT DISCRETION IN LATERAL TO ACHIEVE 70% STAND OFF. CENTRALIZERS TO BE USED TO TIE BACK DEPTH OF 6000' TO ACHIEVE 70% STAND OFF. PACKOFF SEAL ASSEMBLY TO BE USED FOR LINER TOP ISOLATION. Cement additives subject to change based on wellbore conditions and cement design criteria. Liner to be pressure tested during completion operations.

8. Pressure Control Equipment

BOP equipment and accessories will meet or exceed BLM requirements outlined in 43 CFR Part 3160.

A 2000 psig double ram hydraulic BOP will be used (see attached diagram). Since maximum anticipated formation pressure is 1912 psig (0.364 psi/ft @ 5253' TVD), accessories to the BOP will meet BLM requirements for a 2000 psig system. In accordance with Onshore Order #2 (111.A well requirements) the anticipated surface pressure assuming a partially evacuated hole with normal pressure gradient of 0.22 psi/ft will be 1156 psi (5253' TVD x 0.22 psi/ft).

The accumulator system capacity will be sufficient to close all BOPE with a 50% safety factor. Fill line, kill line and line to the choke manifold will be 2".

BOPs will be function tested every 24 hours and will be recorded on an IADC log. Accessories to the BOPE will include upper and lower Kelly cocks with handles with a stabbing valve to fit drill pipe on the floor at all times, string float at bit, 3000 psig choke manifold with 2" adjustable and 2" positive chokes, and pressure gauge.

All BOP equipment will be hydraulically operated with controls accessible both on the rig floor.

The wellhead BOP equipment will be nipped-up on the 9-5/8" x 11" 2,000 psi WP casing head prior to drilling out from under surface casing. All ram preventers and related equipment will be tested to 2,000 psi for 10 minutes. Annular preventers will be tested to 50% of rated working pressure for 10 minutes. Surface casing will be tested to 1500 psi. All preventers and surface casing will be tested before drilling out of surface casing. 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 rams will be activated daily and blind rams shall be activated each trip or at least weekly. The New Mexico Oil & Gas Conservation Commission and the BLM will be notified 24 hours in advance of testing of BOPE.

9. Mud Program:

0' - 320'	Fresh water/Spud Mud. Paper for losses and seepage. 8.4 to 8.8 ppg, 32 to 44 vis, PV <8, YP 2 to 13, FLNC, LGS < 3%
320' - 6,015'	KCL WBM. As needed LCM for losses and seepage. 9.0 to 9.5 ppg, pH 9.0-9.5, 38 to 45 vis, PV 8-14, YP 8-14, FL <20cc/30min, LGS <6%
6,015' - 10,408'	LSND WBM. As needed LCM for losses and seepage. 8.8 to 9.0 ppg, PH 9.0-9.5, 34 to 38 vis, PV 4-8, YP 6-8, FL <8cc/30min, LGS < 4%

**During drilling operations, all necessary products will be sufficiently stored on location for abnormal situations. The characteristics, use, testing of drilling mud and the implementation of related drilling procedures shall be designed to prevent the loss of well control. Sufficient quantities of mud materials shall be maintained or readily accessible for the purpose of assuring well control.

**A pH of 8.0-9.0 in the fresh water base mud system shall be maintained to control the effects corrosion has on metallurgy of equipment used.

Operating and Maintenance

LOGOS Operating will be using all above ground steel pits for fluid and cuttings while drilling. If any tank develops a leak we will have immediate visual discovery, we would then transfer the fluid to another tank then remove any contaminated soil and dispose of it in the cuttings bins for transportation. Any leaks, spills or other undesirable events will be reported in accordance with BLM NTL 3A. Rig crews will monitor the tanks at all times. A trip/surge tank will be used to monitor returns for any "kicks" of formation fluids.

Equipment:

- (1) Grinder/Particle Sizer Package
- (2) HS-2172 Variable Speed/High Volume Centrifuges w/ HCCS Stand & Feed Pumps
- (1) DWU 250 – Dewatering Unit/Command Center
- (1) High-Sided Drive-In Tank

10. Testing, Logging and Coring Program:

- a. Testing Program: No drillstem tests are anticipated
- b. Electric Logging Program: None
- c. LWD Program: TBD
- d. Coring Program: None anticipated.
- e. CBL's and/or Temperature Surveys Will Be Performed as Needed or Required.
- f. MudLogging: On location from 4500'TVD to TD.

11. Bottom Hole Pressure expected to be 2,500 +/- psi

12. Bottom Hole Temperature expected to be 150 deg F.

Well Control Equipment Schematic for 2M Service

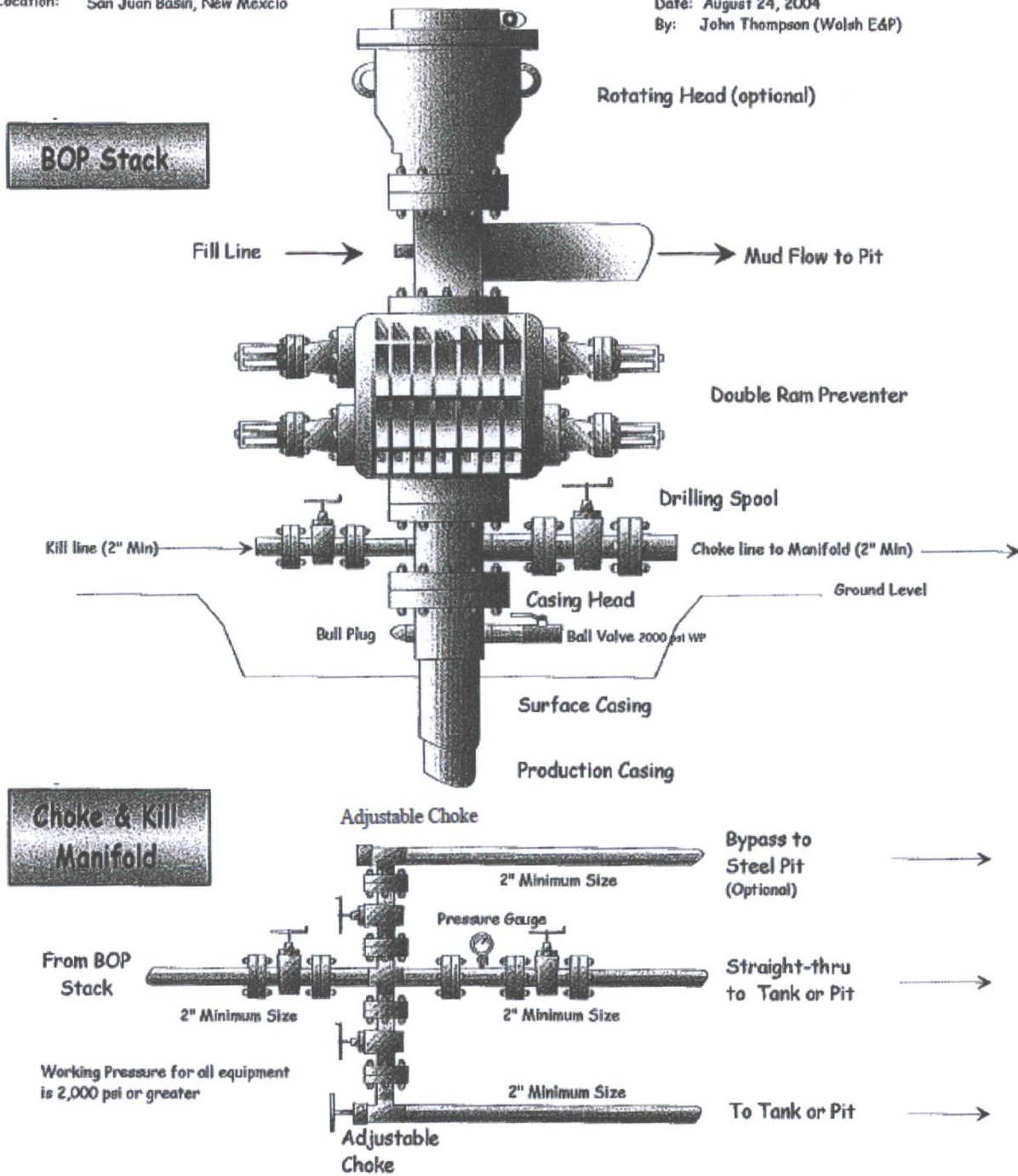
Attachment to Drilling Technical Program

Exhibit #1 Typical BOP setup

Location: San Juan Basin, New Mexico

Date: August 24, 2004

By: John Thompson (Welsh E&P)





Company: Logos Operating LLC
Project: San Juan, NM NAD83
Site: Heros 2308-09L
Well: Heros 2308-09L 5H
Wellbore: OH
Design: Plan #2

PROJECT DETAILS: San Juan, NM NAD83

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



Azimuths to True North
Magnetic North: 8.92°

Magnetic Field
Strength: 49561.4snT
Dip Angle: 62.83°
Date: 5/2/2018
Model: HDGM

WELL DETAILS: Heros 2308-09L 5H

GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
+N/-S +E/-W Northing Easting Latitude Longitude
0.00 0.00 1906138.88 2764022.56 36.2384926 -107.6945348 5H

Plan: Plan #2 (Heros 2308-09L 5H/OH)

Created By: Janie Collins Date: 14:39, May 10 2018

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting
Heros 5H LP	5253.00	-573.93	628.08	1905565.86	2764651.46
Heros 5H BHL	5228.00	-2337.98	4651.40	1903807.57	2768677.31
Heros 5H First Perf	5228.00	-2305.95	4578.26	1903839.49	2768604.12
Heros 5H Last Perf	5253.00	-633.26	765.21	1905506.72	2764788.68

SECTION DETAILS

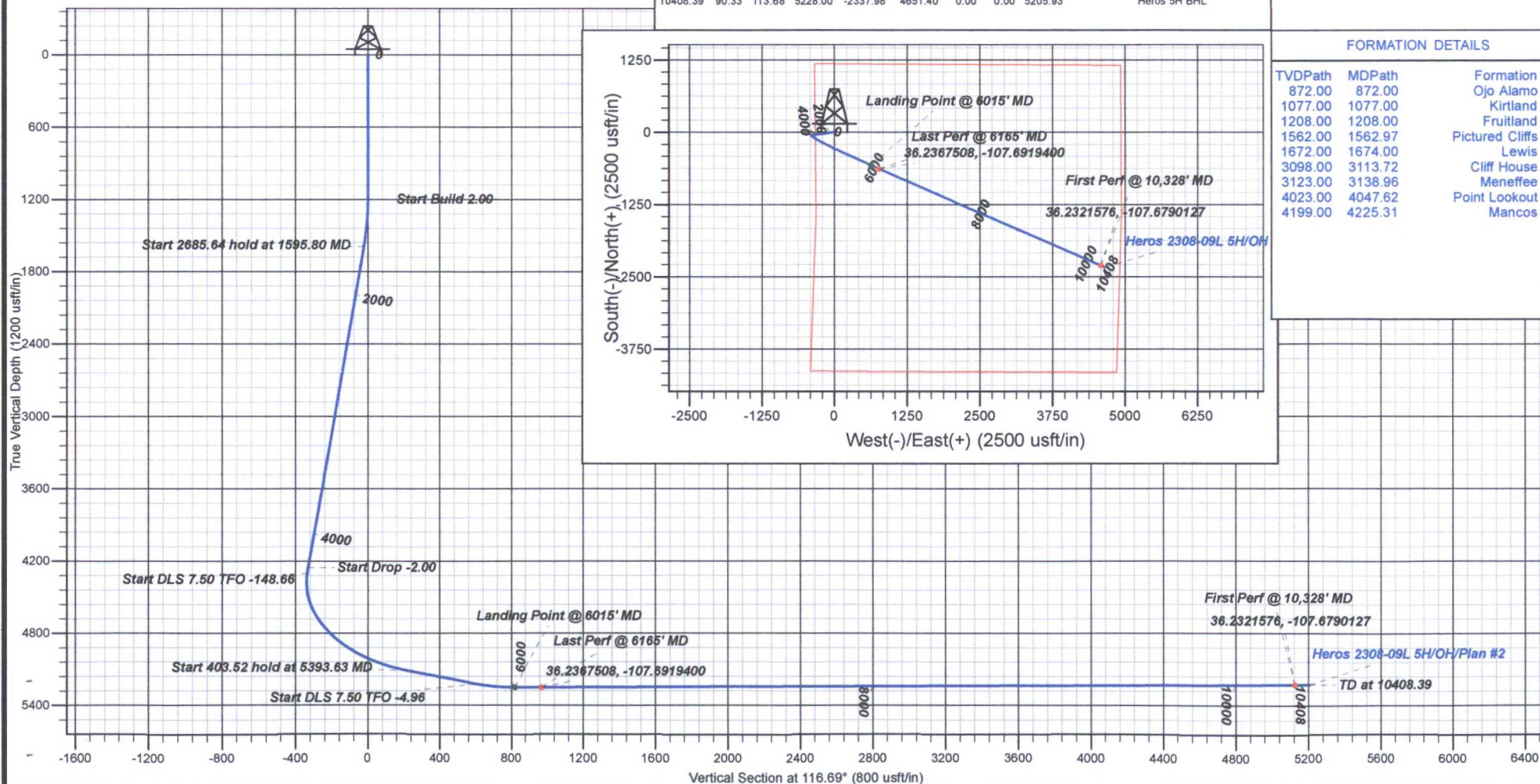
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1200.00	0.00	0.00	1200.00	0.00	0.00	0.00	0.00	0.00	
1595.80	7.92	262.87	1594.54	-3.39	-27.09	2.00	262.87	-22.68	
4281.44	7.92	262.87	4254.59	-49.26	-394.10	0.00	0.00	-330.00	
4327.24	7.00	262.87	4300.00	-50.00	-400.00	2.00	180.00	-334.94	
5393.63	74.03	115.07	5112.36	-320.73	80.52	7.50	-148.66	215.98	
5797.15	74.03	115.07	5223.41	-485.11	431.91	0.00	0.00	603.77	
6015.26	90.33	113.68	5253.00	-573.93	628.08	7.50	-4.96	818.93	Heros 5H LP
10408.39	90.33	113.68	5228.00	-2337.98	4651.40	0.00	0.00	5205.93	Heros 5H BHL

CASING DETAILS

No casing data is available

FORMATION DETAILS

TVDPath	MDPath	Formation
872.00	872.00	Ojo Alamo
1077.00	1077.00	Kirtland
1208.00	1208.00	Fruitland
1562.00	1562.97	Pictured Cliffs
1672.00	1674.00	Lewis
3098.00	3113.72	Cliff House
3123.00	3138.96	Meneffee
4023.00	4047.62	Point Lookout
4199.00	4225.31	Mancos



Vertical Section at 116.69° (800 usft/in)



Logos Operating LLC

San Juan, NM NAD83

Heros 2308-09L

Heros 2308-09L 5H - Slot 5H

OH

Plan: Plan #2

Standard Planning Report

10 May, 2018



www.scientificdrilling.com



Scientific Drilling, Intl
Planning Report



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Heros 2308-09L 5H - Slot 5H
Company:	Logos Operating LLC	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Project:	San Juan, NM NAD83	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site:	Heros 2308-09L	North Reference:	True
Well:	Heros 2308-09L 5H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

Project	San Juan, 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	Heros 2308-09L		
Site Position:		Northing:	1,906,138.89 usft
From:	Map	Easting:	2,763,932.56 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in
		Latitude:	36.2384930
		Longitude:	-107.6948400
		Grid Convergence:	0.08 °

Well	Heros 2308-09L 5H - Slot 5H		
Well Position	+N/-S	-0.13 usft	Northing:
	+E/-W	90.00 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft
		Latitude:	36.2384926
		Longitude:	-107.6945348
		Ground Level:	6,913.00 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination (°)
	HDGM	5/2/2018	8.92
			Dip Angle (°)
			62.83
			Field Strength (nT)
			49,561

Design	Plan #2		
Audit Notes:			
Version:	Phase:	PLAN	Tie On Depth:
			0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction (°)
			116.69

Plan Sections										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Dogleg	Build	Turn	TFO	Target
Depth	(°)	(°)	Depth	(usft)	(usft)	Rate	Rate	Rate	(°)	
(usft)			(usft)			(°/100usft)	(°/100usft)	(°/100usft)		
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,595.80	7.92	262.87	1,594.54	-3.39	-27.09	2.00	2.00	0.00	262.87	
4,281.44	7.92	262.87	4,254.59	-49.26	-394.10	0.00	0.00	0.00	0.00	
4,327.24	7.00	262.87	4,300.00	-50.00	-400.00	2.00	-2.00	0.00	180.00	
5,393.63	74.03	115.07	5,112.36	-320.73	80.52	7.50	6.29	-13.86	-148.66	
5,797.15	74.03	115.07	5,223.41	-485.11	431.91	0.00	0.00	0.00	0.00	
6,015.26	90.33	113.68	5,253.00	-573.93	628.08	7.50	7.47	-0.64	-4.96	Heros 5H LP
10,408.39	90.33	113.68	5,228.00	-2,337.98	4,651.40	0.00	0.00	0.00	0.00	Heros 5H BHL



Scientific Drilling, Intl Planning Report



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Heros 2308-09L 5H - Slot 5H
Company:	Logos Operating LLC	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Project:	San Juan, NM NAD83	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site:	Heros 2308-09L	North Reference:	True
Well:	Heros 2308-09L 5H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.00	0.00	0.00	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	0.00
200.00	0.00	0.00	200.00	0.00	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	0.00
400.00	0.00	0.00	400.00	0.00	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	0.00
600.00	0.00	0.00	600.00	0.00	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	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
872.00	0.00	0.00	872.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ojo Alamo										
900.00	0.00	0.00	900.00	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	0.00
1,077.00	0.00	0.00	1,077.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kirtland										
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 2.00										
1,208.00	0.16	262.87	1,208.00	0.00	-0.01	-0.01	2.00	2.00	0.00	
Fruitland										
1,300.00	2.00	262.87	1,299.98	-0.22	-1.73	-1.45	2.00	2.00	0.00	
1,400.00	4.00	262.87	1,399.84	-0.87	-6.92	-5.80	2.00	2.00	0.00	
1,500.00	6.00	262.87	1,499.45	-1.95	-15.57	-13.04	2.00	2.00	0.00	
1,562.97	7.26	262.87	1,562.00	-2.85	-22.79	-19.08	2.00	2.00	0.00	
Pictured Cliffs										
1,595.80	7.92	262.87	1,594.54	-3.39	-27.09	-22.68	2.00	2.00	0.00	
Start 2685.64 hold at 1595.80 MD										
1,600.00	7.92	262.87	1,598.70	-3.46	-27.66	-23.16	0.00	0.00	0.00	
1,674.00	7.92	262.87	1,672.00	-4.72	-37.77	-31.63	0.00	0.00	0.00	
Lewis										
1,700.00	7.92	262.87	1,697.75	-5.17	-41.33	-34.61	0.00	0.00	0.00	
1,800.00	7.92	262.87	1,796.80	-6.87	-54.99	-46.05	0.00	0.00	0.00	
1,900.00	7.92	262.87	1,895.84	-8.58	-68.66	-57.49	0.00	0.00	0.00	
2,000.00	7.92	262.87	1,994.89	-10.29	-82.32	-68.93	0.00	0.00	0.00	
2,100.00	7.92	262.87	2,093.94	-12.00	-95.99	-80.38	0.00	0.00	0.00	
2,200.00	7.92	262.87	2,192.98	-13.71	-109.66	-91.82	0.00	0.00	0.00	
2,300.00	7.92	262.87	2,292.03	-15.42	-123.32	-103.26	0.00	0.00	0.00	
2,400.00	7.92	262.87	2,391.08	-17.12	-136.99	-114.71	0.00	0.00	0.00	
2,500.00	7.92	262.87	2,490.13	-18.83	-150.65	-126.15	0.00	0.00	0.00	
2,600.00	7.92	262.87	2,589.17	-20.54	-164.32	-137.59	0.00	0.00	0.00	
2,700.00	7.92	262.87	2,688.22	-22.25	-177.99	-149.04	0.00	0.00	0.00	
2,800.00	7.92	262.87	2,787.27	-23.96	-191.65	-160.48	0.00	0.00	0.00	
2,900.00	7.92	262.87	2,886.31	-25.66	-205.32	-171.92	0.00	0.00	0.00	
3,000.00	7.92	262.87	2,985.36	-27.37	-218.98	-183.36	0.00	0.00	0.00	
3,100.00	7.92	262.87	3,084.41	-29.08	-232.65	-194.81	0.00	0.00	0.00	
3,113.72	7.92	262.87	3,098.00	-29.32	-234.52	-196.38	0.00	0.00	0.00	
Cliff House										
3,138.96	7.92	262.87	3,123.00	-29.75	-237.97	-199.27	0.00	0.00	0.00	
Meneffee										
3,200.00	7.92	262.87	3,183.46	-30.79	-246.31	-206.25	0.00	0.00	0.00	
3,300.00	7.92	262.87	3,282.50	-32.50	-259.98	-217.69	0.00	0.00	0.00	



Scientific Drilling, Intl
Planning Report



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Heros 2308-09L 5H - Slot 5H
Company:	Logos Operating LLC	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Project:	San Juan, NM NAD83	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site:	Heros 2308-09L	North Reference:	True
Well:	Heros 2308-09L 5H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
3,400.00	7.92	262.87	3,381.55	-34.21	-273.65	-229.14	0.00	0.00	0.00	
3,500.00	7.92	262.87	3,480.60	-35.91	-287.31	-240.58	0.00	0.00	0.00	
3,600.00	7.92	262.87	3,579.64	-37.62	-300.98	-252.02	0.00	0.00	0.00	
3,700.00	7.92	262.87	3,678.69	-39.33	-314.64	-263.46	0.00	0.00	0.00	
3,800.00	7.92	262.87	3,777.74	-41.04	-328.31	-274.91	0.00	0.00	0.00	
3,900.00	7.92	262.87	3,876.79	-42.75	-341.97	-286.35	0.00	0.00	0.00	
4,000.00	7.92	262.87	3,975.83	-44.46	-355.64	-297.79	0.00	0.00	0.00	
4,047.62	7.92	262.87	4,023.00	-45.27	-362.15	-303.24	0.00	0.00	0.00	
Point Lookout										
4,100.00	7.92	262.87	4,074.88	-46.16	-369.31	-309.24	0.00	0.00	0.00	
4,200.00	7.92	262.87	4,173.93	-47.87	-382.97	-320.68	0.00	0.00	0.00	
4,225.31	7.92	262.87	4,199.00	-48.30	-386.43	-323.58	0.00	0.00	0.00	
Mancos										
4,281.44	7.92	262.87	4,254.59	-49.26	-394.10	-330.00	0.00	0.00	0.00	
Start Drop -2.00										
4,300.00	7.54	262.87	4,272.98	-49.57	-396.58	-332.07	2.00	-2.00	0.00	
4,327.24	7.00	262.87	4,300.00	-50.00	-400.00	-334.94	2.00	-2.00	0.00	
Start DLS 7.50 TFO -148.66										
4,400.00	3.67	212.32	4,372.47	-52.52	-405.65	-338.85	7.50	-4.57	-69.48	
4,500.00	7.86	141.43	4,472.04	-60.58	-403.10	-332.95	7.50	4.18	-70.89	
4,600.00	14.91	127.83	4,570.03	-73.84	-388.65	-314.09	7.50	7.05	-13.61	
4,700.00	22.25	122.96	4,664.76	-92.06	-362.57	-282.60	7.50	7.34	-4.87	
4,800.00	29.67	120.43	4,754.60	-114.93	-325.28	-239.02	7.50	7.42	-2.53	
4,900.00	37.12	118.84	4,838.03	-142.06	-277.44	-184.08	7.50	7.45	-1.59	
5,000.00	44.59	117.72	4,913.61	-172.99	-219.85	-118.74	7.50	7.46	-1.12	
5,100.00	52.06	116.87	4,980.06	-207.19	-153.51	-44.11	7.50	7.47	-0.86	
5,200.00	59.54	116.17	5,036.23	-244.07	-79.54	38.54	7.50	7.48	-0.70	
5,300.00	67.02	115.57	5,081.16	-283.00	0.77	127.79	7.50	7.48	-0.60	
5,393.63	74.03	115.07	5,112.36	-320.73	80.52	215.98	7.50	7.48	-0.54	
Start 403.52 hold at 5393.63 MD										
5,400.00	74.03	115.07	5,114.11	-323.32	86.07	222.10	0.00	0.00	0.00	
5,500.00	74.03	115.07	5,141.63	-364.06	173.15	318.20	0.00	0.00	0.00	
5,600.00	74.03	115.07	5,169.15	-404.80	260.23	414.30	0.00	0.00	0.00	
5,700.00	74.03	115.07	5,196.67	-445.53	347.31	510.40	0.00	0.00	0.00	
5,797.15	74.03	115.07	5,223.41	-485.11	431.91	603.77	0.00	0.00	0.00	
Start DLS 7.50 TFO -4.96										
5,800.00	74.24	115.05	5,224.19	-486.27	434.39	606.51	7.50	7.47	-0.67	
5,900.00	81.71	114.40	5,245.01	-527.14	523.17	704.18	7.50	7.47	-0.65	
6,000.00	89.19	113.77	5,252.94	-567.79	614.12	803.69	7.50	7.47	-0.63	
6,015.26	90.33	113.68	5,253.00	-573.93	628.08	818.93	7.50	7.47	-0.62	
Landing Point @ 6015' MD - Heros 5H LP										
6,100.00	90.33	113.68	5,252.52	-607.96	705.69	903.56	0.00	0.00	0.00	
6,164.67	90.33	113.68	5,252.15	-633.92	764.91	968.13	0.00	0.00	0.00	
Heros 5H Last Perf										
6,165.00	90.33	113.68	5,252.15	-634.06	765.22	968.47	0.00	0.00	0.00	
Last Perf @ 6165' MD - 36.2367508, -107.6919400										
6,200.00	90.33	113.68	5,251.95	-648.11	797.27	1,003.42	0.00	0.00	0.00	
6,300.00	90.33	113.68	5,251.38	-688.27	888.86	1,103.28	0.00	0.00	0.00	
6,400.00	90.33	113.68	5,250.81	-728.42	980.44	1,203.14	0.00	0.00	0.00	
6,500.00	90.33	113.68	5,250.24	-768.58	1,072.02	1,303.00	0.00	0.00	0.00	
6,600.00	90.33	113.68	5,249.67	-808.73	1,163.60	1,402.86	0.00	0.00	0.00	



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Heros 2308-09L 5H - Slot 5H
Company:	Logos Operating LLC	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Project:	San Juan, NM NAD83	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site:	Heros 2308-09L	North Reference:	True
Well:	Heros 2308-09L 5H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
6,700.00	90.33	113.68	5,249.10	-848.89	1,255.18	1,502.72	0.00	0.00	0.00	
6,800.00	90.33	113.68	5,248.53	-889.04	1,346.76	1,602.58	0.00	0.00	0.00	
6,900.00	90.33	113.68	5,247.97	-929.20	1,438.35	1,702.44	0.00	0.00	0.00	
7,000.00	90.33	113.68	5,247.40	-969.35	1,529.93	1,802.30	0.00	0.00	0.00	
7,100.00	90.33	113.68	5,246.83	-1,009.51	1,621.51	1,902.16	0.00	0.00	0.00	
7,200.00	90.33	113.68	5,246.26	-1,049.66	1,713.09	2,002.02	0.00	0.00	0.00	
7,300.00	90.33	113.68	5,245.69	-1,089.82	1,804.67	2,101.88	0.00	0.00	0.00	
7,400.00	90.33	113.68	5,245.12	-1,129.98	1,896.26	2,201.74	0.00	0.00	0.00	
7,500.00	90.33	113.68	5,244.55	-1,170.13	1,987.84	2,301.60	0.00	0.00	0.00	
7,600.00	90.33	113.68	5,243.98	-1,210.29	2,079.42	2,401.46	0.00	0.00	0.00	
7,700.00	90.33	113.68	5,243.41	-1,250.44	2,171.00	2,501.32	0.00	0.00	0.00	
7,800.00	90.33	113.68	5,242.84	-1,290.60	2,262.58	2,601.18	0.00	0.00	0.00	
7,900.00	90.33	113.68	5,242.27	-1,330.75	2,354.16	2,701.04	0.00	0.00	0.00	
8,000.00	90.33	113.68	5,241.71	-1,370.91	2,445.75	2,800.90	0.00	0.00	0.00	
8,100.00	90.33	113.68	5,241.14	-1,411.06	2,537.33	2,900.76	0.00	0.00	0.00	
8,200.00	90.33	113.68	5,240.57	-1,451.22	2,628.91	3,000.62	0.00	0.00	0.00	
8,300.00	90.33	113.68	5,240.00	-1,491.37	2,720.49	3,100.48	0.00	0.00	0.00	
8,400.00	90.33	113.68	5,239.43	-1,531.53	2,812.07	3,200.35	0.00	0.00	0.00	
8,500.00	90.33	113.68	5,238.86	-1,571.68	2,903.66	3,300.21	0.00	0.00	0.00	
8,600.00	90.33	113.68	5,238.29	-1,611.84	2,995.24	3,400.07	0.00	0.00	0.00	
8,700.00	90.33	113.68	5,237.72	-1,651.99	3,086.82	3,499.93	0.00	0.00	0.00	
8,800.00	90.33	113.68	5,237.15	-1,692.15	3,178.40	3,599.79	0.00	0.00	0.00	
8,900.00	90.33	113.68	5,236.58	-1,732.30	3,269.98	3,699.65	0.00	0.00	0.00	
9,000.00	90.33	113.68	5,236.01	-1,772.46	3,361.57	3,799.51	0.00	0.00	0.00	
9,100.00	90.33	113.68	5,235.45	-1,812.61	3,453.15	3,899.37	0.00	0.00	0.00	
9,200.00	90.33	113.68	5,234.88	-1,852.77	3,544.73	3,999.23	0.00	0.00	0.00	
9,300.00	90.33	113.68	5,234.31	-1,892.93	3,636.31	4,099.09	0.00	0.00	0.00	
9,400.00	90.33	113.68	5,233.74	-1,933.08	3,727.89	4,198.95	0.00	0.00	0.00	
9,500.00	90.33	113.68	5,233.17	-1,973.24	3,819.47	4,298.81	0.00	0.00	0.00	
9,600.00	90.33	113.68	5,232.60	-2,013.39	3,911.06	4,398.67	0.00	0.00	0.00	
9,700.00	90.33	113.68	5,232.03	-2,053.55	4,002.64	4,498.53	0.00	0.00	0.00	
9,800.00	90.33	113.68	5,231.46	-2,093.70	4,094.22	4,598.39	0.00	0.00	0.00	
9,900.00	90.33	113.68	5,230.89	-2,133.86	4,185.80	4,698.25	0.00	0.00	0.00	
10,000.00	90.33	113.68	5,230.32	-2,174.01	4,277.38	4,798.11	0.00	0.00	0.00	
10,100.00	90.33	113.68	5,229.76	-2,214.17	4,368.97	4,897.97	0.00	0.00	0.00	
10,200.00	90.33	113.68	5,229.19	-2,254.32	4,460.55	4,997.83	0.00	0.00	0.00	
10,300.00	90.33	113.68	5,228.62	-2,294.48	4,552.13	5,097.69	0.00	0.00	0.00	
10,328.00	90.33	113.68	5,228.46	-2,305.72	4,577.77	5,125.65	0.00	0.00	0.00	
36.2321576, -107.6790127 - First Perf @ 10,328' MD										
10,328.54	90.33	113.68	5,228.45	-2,305.94	4,578.27	5,126.19	0.00	0.00	0.00	
Heros 5H First Perf										
10,400.00	90.33	113.68	5,228.05	-2,334.63	4,643.71	5,197.55	0.00	0.00	0.00	
10,408.39	90.33	113.68	5,228.00	-2,337.98	4,651.40	5,205.93	0.00	0.00	0.00	
TD at 10408.39 - Heros 5H BHL										



Scientific Drilling, Intl
Planning Report



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Heros 2308-09L 5H - Slot 5H
Company:	Logos Operating LLC	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Project:	San Juan, NM NAD83	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site:	Heros 2308-09L	North Reference:	True
Well:	Heros 2308-09L 5H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #2		

Design Targets									
Target Name	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
- Shape									
Heros 5H BHL - plan hits target center - Point	0.00	0.00	5,228.00	-2,337.98	4,651.40	1,903,807.57	2,768,677.31	36.2320690	-107.6787630
Heros 5H First Perf - plan misses target center by 0.45usft at 10328.54usft MD (5228.45 TVD, -2305.94 N, 4578.27 E) - Point	0.00	0.00	5,228.00	-2,305.95	4,578.26	1,903,839.49	2,768,604.12	36.2321570	-107.6790110
Heros 5H LP - plan hits target center - Point	0.00	0.00	5,253.00	-573.93	628.08	1,905,565.86	2,764,651.47	36.2369160	-107.6924050
Heros 5H Last Perf - plan misses target center by 1.12usft at 6164.67usft MD (5252.15 TVD, -633.92 N, 764.91 E) - Point	0.00	0.00	5,253.00	-633.26	765.21	1,905,506.72	2,764,788.68	36.2367530	-107.6919400

Formations						
Measured Depth	Vertical Depth	Name	Lithology	Dip	Dip Direction	
(usft)	(usft)			(°)	(°)	
872.00	872.00	Ojo Alamo		0.00	0.00	
1,077.00	1,077.00	Kirtland		0.00	0.00	
1,208.00	1,208.00	Fruitland		0.00	0.00	
1,562.97	1,562.00	Pictured Cliffs		0.00	0.00	
1,674.00	1,672.00	Lewis		0.00	0.00	
3,113.72	3,098.00	Cliff House		0.00	0.00	
3,138.96	3,123.00	Meneffee		0.00	0.00	
4,047.62	4,023.00	Point Lookout		0.00	0.00	
4,225.31	4,199.00	Mancos		0.00	0.00	

Plan Annotations					
Measured Depth	Vertical Depth	Local Coordinates			
(usft)	(usft)	+N/-S	+E/-W	Comment	
(usft)	(usft)	(usft)	(usft)		
1,200.00	1,200.00	0.00	0.00	Start Build 2.00	
1,595.80	1,594.54	-3.39	-27.09	Start 2685.64 hold at 1595.80 MD	
4,281.44	4,254.59	-49.26	-394.10	Start Drop -2.00	
4,327.24	4,300.00	-50.00	-400.00	Start DLS 7.50 TFO -148.66	
5,393.63	5,112.36	-320.73	80.52	Start 403.52 hold at 5393.63 MD	
5,797.15	5,223.41	-485.11	431.91	Start DLS 7.50 TFO -4.96	
6,015.26	5,253.00	-573.93	628.08	Landing Point @ 6015' MD	
6,165.00	5,252.15	-634.06	765.22	Last Perf @ 6165' MD	
6,165.00	5,252.15	-634.06	765.22	36.2367508, -107.6919400	
10,328.00	5,228.46	-2,305.72	4,577.77	36.2321576, -107.6790127	
10,328.00	5,228.46	-2,305.72	4,577.77	First Perf @ 10,328' MD	
10,408.39	5,228.00	-2,337.98	4,651.40	TD at 10408.39	



Logos Operating LLC

San Juan, NM NAD83

Heros 2308-09L

Heros 2308-09L 5H

OH

Plan #2

Anticollision Report

10 May, 2018



www.scientificdrilling.com



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 5H - Slot 5H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
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:	MD Interval 100.00usft	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 15,000.00 usft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program		Date	5/10/2018		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.00	10,408.39	Plan #2 (OH)	MWD+HDGM	OWSG MWD + HDGM	

Summary						
Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Heros 2308-09L						
Heros 2308-09L 1H - OH - OH	765.27	743.39	118.81	114.39	26.885 CC	
Heros 2308-09L 1H - OH - OH	900.00	877.44	119.40	114.02	22.180 ES	
Heros 2308-09L 1H - OH - OH	5,500.00	6,941.23	174.25	137.45	4.736 SF	
Heros 2308-09L 2H - OH - Plan #6	500.00	500.00	90.00	86.86	28.693 CC	
Heros 2308-09L 2H - OH - Plan #6	600.00	598.86	90.62	86.77	23.521 ES	
Heros 2308-09L 2H - OH - Plan #6	10,300.00	10,350.70	2,457.85	2,151.79	8.031 SF	
Heros 2308-09L 3H - OH - Plan #6	1,612.13	1,605.54	55.58	44.52	5.026 CC, ES	
Heros 2308-09L 3H - OH - Plan #6	10,300.00	10,251.18	1,440.95	1,132.76	4.675 SF	
Heros 2308-09L 4H - OH - Plan #6	1,526.96	1,524.51	24.35	13.94	2.340 CC, ES, SF	
State NM 16 #21 Unit C - OH - OH	7,767.38	5,218.32	1,198.44	962.43	5.078 CC	
State NM 16 #21 Unit C - OH - OH	7,800.00	5,218.13	1,198.88	961.94	5.060 ES	
State NM 16 #21 Unit C - OH - OH	7,900.00	5,217.56	1,205.75	966.31	5.036 SF	

Offset Design Heros 2308-09L - Heros 2308-09L 1H - OH - OH												Offset Site Error:	0.00 usft
Survey Program: 404-MWD												Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum Separation		Separation Factor		Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.00	0.00	0.00	0.00	-89.93	0.14	-120.09	122.09				
100.00	100.00	78.08	78.08	0.13	0.14	-89.94	0.12	-120.07	120.07	119.79	0.27	437.132	
200.00	200.00	178.18	178.18	0.49	0.32	-89.97	0.06	-119.96	119.96	119.15	0.81	147.631	
300.00	300.00	278.27	278.27	0.85	0.50	-90.02	-0.05	-119.77	119.78	118.42	1.35	88.688	
400.00	400.00	378.37	378.37	1.21	0.68	-90.10	-0.20	-119.51	119.51	117.62	1.89	63.281	
471.49	471.49	449.49	449.49	1.47	0.88	-90.13	-0.27	-119.35	119.35	117.00	2.35	50.861	
500.00	500.00	477.89	477.89	1.57	0.98	-90.11	-0.23	-119.37	119.37	116.82	2.55	46.885	
600.00	600.00	578.22	578.22	1.93	1.32	-90.10	-0.21	-119.36	119.36	116.11	3.25	36.722	
700.00	700.00	678.55	678.53	2.29	1.67	-89.30	1.44	-119.00	119.01	115.05	3.96	30.069	
765.27	765.27	743.39	743.27	2.52	1.90	-87.60	4.97	-118.70	118.81	114.39	4.42	26.885 CC	
800.00	800.00	777.75	777.56	2.64	2.02	-86.54	7.17	-118.66	118.88	114.21	4.67	25.482	
900.00	900.00	877.44	876.91	3.00	2.38	-82.60	15.38	-118.40	119.40	114.02	5.38	22.180 ES	
1,000.00	1,000.00	976.33	975.25	3.36	2.74	-77.73	25.69	-118.16	120.95	114.84	6.11	19.788	
1,100.00	1,100.00	1,074.62	1,072.90	3.72	3.12	-72.67	36.94	-118.38	124.11	117.26	6.85	18.115	

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



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 5H - Slot 5H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 1H - OH - OH													Offset Site Error:	0.00 usft
Survey Program: 404-MWD													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
1,200.00	1,200.00	1,172.63	1,169.92	4.08	3.50	-66.74	50.83	-118.26	128.97	121.37	7.61	16.959		
1,300.00	1,299.98	1,269.01	1,264.72	4.43	3.90	37.44	68.15	-118.18	135.68	127.31	8.37	16.212		
1,400.00	1,399.84	1,366.04	1,359.50	4.77	4.32	46.08	88.81	-116.64	142.88	133.75	9.13	15.653		
1,500.00	1,499.45	1,460.36	1,450.91	5.12	4.76	55.70	111.86	-113.45	152.43	142.53	9.90	15.399		
1,600.00	1,598.70	1,550.85	1,537.78	5.47	5.20	65.26	136.90	-109.83	167.23	156.57	10.66	15.686		
1,700.00	1,697.75	1,637.37	1,620.26	5.84	5.66	73.48	162.93	-107.38	188.94	177.55	11.40	16.581		
1,800.00	1,796.80	1,720.94	1,698.64	6.21	6.13	80.09	191.81	-105.29	218.65	206.57	12.08	18.098		
1,900.00	1,895.84	1,805.30	1,776.71	6.58	6.64	85.52	223.64	-102.77	254.02	241.30	12.72	19.967		
2,000.00	1,994.89	1,895.73	1,859.98	6.96	7.21	89.90	258.85	-100.61	292.44	279.08	13.36	21.886		
2,100.00	2,093.94	1,982.27	1,939.66	7.34	7.76	92.96	292.60	-99.63	332.10	318.11	14.00	23.729		
2,200.00	2,192.98	2,061.80	2,012.17	7.73	8.30	95.05	325.27	-99.64	374.47	359.88	14.59	25.659		
2,300.00	2,292.03	2,138.77	2,081.35	8.11	8.84	96.75	359.00	-99.30	419.96	404.79	15.17	27.682		
2,400.00	2,391.08	2,219.75	2,153.37	8.50	9.44	98.23	396.03	-98.81	467.63	451.85	15.78	29.635		
2,500.00	2,490.13	2,300.43	2,224.66	8.89	10.05	99.38	433.80	-98.74	516.57	500.18	16.39	31.511		
2,600.00	2,589.17	2,401.64	2,314.64	9.29	10.81	100.79	480.09	-96.78	564.77	547.56	17.21	32.825		
2,700.00	2,688.22	2,482.00	2,386.30	9.68	11.42	101.93	516.28	-93.46	612.79	594.96	17.83	34.361		
2,800.00	2,787.27	2,569.76	2,464.14	10.08	12.09	103.10	556.52	-88.63	662.00	643.46	18.54	35.703		
2,900.00	2,886.31	2,684.08	2,566.98	10.48	12.94	104.63	605.72	-80.28	709.01	689.50	19.51	36.345		
3,000.00	2,985.36	2,805.90	2,678.51	10.87	13.80	106.03	653.98	-71.93	753.00	732.47	20.53	36.682		
3,100.00	3,084.41	2,893.82	2,759.93	11.27	14.41	106.80	686.89	-67.77	794.54	773.29	21.25	37.393		
3,200.00	3,183.46	2,985.59	2,844.54	11.67	15.05	107.44	722.27	-64.40	837.03	815.02	22.01	38.032		
3,300.00	3,282.50	3,108.19	2,958.79	12.07	15.87	108.15	766.62	-61.38	876.96	853.93	23.03	38.072		
3,400.00	3,381.55	3,201.87	3,046.72	12.48	16.48	108.59	798.91	-60.14	915.17	891.36	23.81	38.435		
3,500.00	3,480.60	3,272.49	3,112.54	12.88	16.95	108.87	824.47	-59.36	954.98	930.58	24.39	39.147		
3,600.00	3,579.64	3,352.35	3,186.54	13.28	17.50	109.15	854.49	-58.27	996.23	971.18	25.06	39.756		
3,700.00	3,678.69	3,424.63	3,253.15	13.68	18.01	109.39	882.52	-57.15	1,038.73	1,013.07	25.65	40.495		
3,800.00	3,777.74	3,486.37	3,309.53	14.09	18.46	109.60	907.63	-55.63	1,083.25	1,057.11	26.13	41.450		
3,900.00	3,876.79	3,577.99	3,392.69	14.49	19.13	109.92	945.94	-52.36	1,129.12	1,102.20	26.92	41.936		
4,000.00	3,975.83	3,702.97	3,506.95	14.89	20.04	110.30	996.43	-48.67	1,173.62	1,145.57	28.05	41.844		
4,100.00	4,074.88	3,790.37	3,587.49	15.30	20.66	110.56	1,030.29	-46.34	1,216.40	1,187.61	28.79	42.248		
4,200.00	4,173.93	3,679.55	3,563.80	15.70	20.70	-169.06	-105.77	60.15	1,198.32	1,173.52	24.80	48.324		
4,300.00	4,272.98	3,674.93	3,564.06	16.11	26.67	-169.39	-101.16	60.11	1,112.45	1,086.69	25.76	43.186		
4,400.00	4,372.47	3,671.83	3,564.23	16.49	26.64	-122.73	-98.07	60.08	1,026.61	999.73	26.88	38.194		
4,500.00	4,472.04	3,674.84	3,564.06	16.80	26.66	-58.54	-101.08	60.11	937.46	909.43	28.03	33.449		
4,600.00	4,570.03	3,683.87	3,563.56	17.06	26.73	-53.89	-110.09	60.19	845.43	816.28	29.15	29.004		
4,700.00	4,664.76	3,698.54	3,562.73	17.31	26.84	-61.50	-124.73	60.31	751.17	720.97	30.20	24.873		
4,800.00	4,754.60	3,718.33	3,561.57	17.54	26.98	-76.72	-144.49	60.42	655.32	624.20	31.12	21.058		
4,900.00	4,838.03	3,743.82	3,560.04	17.79	27.17	-98.71	-169.93	60.48	558.67	526.83	31.83	17.550		
5,000.00	4,913.61	3,775.15	3,558.03	18.13	27.41	-124.09	-201.20	60.26	462.07	429.88	32.19	14.354		
5,100.00	4,980.06	3,806.52	3,555.88	18.64	27.66	-146.38	-232.49	59.65	367.12	335.38	31.73	11.569		
5,200.00	5,036.23	3,837.00	3,553.88	19.42	27.90	-162.42	-262.89	58.90	277.40	247.76	29.64	9.359		
5,300.00	5,081.16	3,869.74	3,551.90	20.51	28.17	-175.08	-295.57	58.00	201.45	176.88	24.57	8.198		
5,400.00	5,114.11	3,904.07	3,550.13	21.91	28.46	-173.44	-329.83	56.98	160.80	137.75	23.06	6.974		
5,423.90	5,120.69	3,912.47	3,549.75	22.30	28.53	-170.63	-338.22	56.72	159.25	133.32	25.93	6.141		
5,500.00	5,141.63	3,941.23	3,548.44	23.57	28.79	-161.09	-366.94	55.83	174.25	137.45	36.79	4.736 SF		
5,600.00	5,169.15	3,979.30	3,546.21	25.41	29.13	-149.22	-404.92	54.64	228.21	182.99	45.22	5.047		
5,700.00	5,196.67	4,014.39	3,544.01	27.40	29.46	-139.65	-439.92	53.52	301.92	253.50	48.42	6.235		
5,800.00	5,224.19	4,050.10	3,542.06	29.52	29.80	-131.30	-475.56	52.31	384.30	334.38	49.93	7.697		
5,900.00	5,245.01	4,089.07	3,540.15	31.77	30.18	-113.48	-514.46	51.11	472.55	421.50	51.05	9.257		
6,000.00	5,252.94	4,132.99	3,538.27	34.15	30.62	-93.85	-558.33	50.06	564.18	511.90	52.28	10.792		
6,100.00	5,252.52	4,183.53	3,536.79	36.60	31.15	-90.62	-608.84	49.62	656.10	602.28	53.82	12.191		

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



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 5H - Slot 5H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 1H - OH - OH													Offset Site Error:	0.00 usft
Survey Program: 404-MWD													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (usft)	Separation Factor	Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference	Offset		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)						
6,200.00	5,251.95	7,239.04	5,236.08	39.12	31.76	90.41	-664.34	50.33	747.15	691.54	55.61	13.435		
6,300.00	5,251.38	7,288.71	5,236.11	41.70	32.32	90.39	-713.99	51.62	837.66	780.42	57.23	14.636		
6,400.00	5,250.81	7,346.40	5,236.51	44.31	33.00	90.41	-771.64	53.86	927.62	868.39	59.23	15.661		
6,500.00	5,250.24	7,400.68	5,236.13	46.97	33.66	90.34	-825.85	56.65	1,017.01	955.86	61.15	16.632		
6,600.00	5,249.67	7,457.08	5,234.68	49.66	34.36	90.16	-882.12	60.10	1,105.96	1,042.77	63.20	17.500		
6,700.00	5,249.10	7,503.61	5,233.75	52.37	34.96	90.06	-928.54	63.23	1,194.63	1,129.74	64.89	18.411		
6,800.00	5,248.53	7,545.52	5,233.12	55.11	35.50	90.01	-970.35	66.97	1,283.39	1,216.98	66.41	19.326		
6,900.00	5,247.97	7,584.65	5,232.45	57.87	36.01	89.96	-1,009.41	68.35	1,372.36	1,304.52	67.84	20.230		
7,000.00	5,247.40	7,628.95	5,231.52	60.64	36.59	89.89	-1,053.62	70.90	1,461.47	1,391.96	69.51	21.025		
7,100.00	5,246.83	7,673.54	5,230.36	63.43	37.19	89.81	-1,098.12	73.46	1,550.59	1,479.38	71.21	21.773		
7,200.00	5,246.26	7,735.58	5,228.43	66.23	38.04	89.69	-1,160.02	77.09	1,639.72	1,566.03	73.69	22.251		
7,300.00	5,245.69	7,823.79	5,226.64	69.04	39.27	89.61	-1,247.91	84.42	1,727.51	1,650.17	77.34	22.338		
7,400.00	5,245.12	7,858.42	5,225.96	71.87	39.76	89.59	-1,282.39	87.52	1,815.15	1,736.45	78.69	23.066		
7,500.00	5,244.55	7,895.00	5,224.97	74.70	40.28	89.55	-1,318.85	90.33	1,903.32	1,823.18	80.15	23.748		
7,600.00	5,243.98	7,945.76	5,223.74	77.54	41.02	89.50	-1,369.45	94.14	1,991.65	1,909.43	82.23	24.221		
7,700.00	5,243.41	8,072.18	5,222.95	80.38	42.88	89.53	-1,495.27	106.35	2,079.12	1,991.46	87.65	23.720		
7,800.00	5,242.84	8,134.16	5,221.67	83.23	43.83	89.49	-1,556.77	113.87	2,165.14	2,074.85	90.29	23.979		
7,900.00	5,242.27	8,168.80	5,220.61	86.09	44.36	89.46	-1,591.15	118.03	2,251.25	2,159.50	91.74	24.538		
8,000.00	5,241.71	8,202.00	5,219.88	88.95	44.86	89.44	-1,624.14	121.72	2,337.78	2,244.65	93.13	25.101		
8,100.00	5,241.14	8,231.50	5,219.50	91.82	45.32	89.44	-1,653.47	124.76	2,424.71	2,330.35	94.36	25.696		
8,200.00	5,240.57	8,263.00	5,219.41	94.69	45.80	89.45	-1,684.83	127.80	2,511.99	2,416.32	95.68	26.255		
8,300.00	5,240.00	8,314.27	5,219.18	97.57	46.59	89.47	-1,735.88	132.59	2,599.42	2,501.54	97.88	26.556		
8,400.00	5,239.43	8,358.92	5,218.40	100.45	47.28	89.45	-1,780.32	136.77	2,686.84	2,587.04	99.80	26.921		
8,500.00	5,238.86	8,570.35	5,216.14	103.33	50.64	89.46	-1,990.11	162.53	2,772.88	2,663.66	109.22	25.389		
8,600.00	5,238.29	8,989.73	5,208.27	106.22	57.80	89.35	-2,399.11	253.08	2,852.95	2,725.51	127.44	22.387		
8,700.00	5,237.72	9,146.61	5,202.51	109.10	60.62	89.24	-2,549.09	298.69	2,928.93	2,794.65	134.28	21.813		
8,800.00	5,237.15	9,669.72	5,199.04	111.99	70.48	89.33	-3,031.97	497.81	2,996.82	2,841.52	155.30	19.297		
8,900.00	5,236.58	9,767.04	5,197.71	114.89	72.39	89.32	-3,118.97	541.40	3,060.77	2,900.92	159.84	19.149		
9,000.00	5,236.01	9,845.01	5,196.62	117.78	73.93	89.32	-3,188.49	576.68	3,124.26	2,960.57	163.69	19.086		
9,100.00	5,235.45	9,926.51	5,195.62	120.68	75.55	89.32	-3,261.01	613.86	3,187.43	3,019.74	167.69	19.008		
9,200.00	5,234.88	10,086.00	5,194.11	123.58	78.76	89.33	-3,402.49	687.46	3,250.54	3,075.93	174.60	18.617		
9,300.00	5,234.31	10,149.00	5,193.77	126.48	80.04	89.34	-3,457.90	717.43	3,312.00	3,134.03	177.97	18.609		
9,400.00	5,233.74	10,182.70	5,193.76	129.38	80.73	89.34	-3,487.71	733.16	3,374.26	3,194.04	180.22	18.723		
9,500.00	5,233.17	10,212.00	5,193.75	132.28	81.33	89.35	-3,513.79	746.50	3,437.55	3,255.31	182.24	18.863		
9,600.00	5,232.60	10,248.42	5,193.41	135.19	82.07	89.35	-3,546.41	762.68	3,501.82	3,317.33	184.49	18.981		
9,700.00	5,232.03	10,276.00	5,192.74	138.09	82.63	89.35	-3,571.27	774.62	3,567.05	3,380.71	186.34	19.142		
9,800.00	5,231.46	10,318.23	5,191.55	141.00	83.49	89.33	-3,609.52	792.47	3,633.12	3,444.38	188.75	19.249		
9,900.00	5,230.89	10,365.19	5,190.38	143.91	84.45	89.32	-3,652.29	811.84	3,699.94	3,508.62	191.32	19.339		
10,000.00	5,230.32	10,443.82	5,187.96	146.82	86.05	89.29	-3,723.96	844.06	3,767.03	3,571.82	195.20	19.298		
10,100.00	5,229.76	10,592.00	5,185.32	149.73	89.11	89.27	-3,857.85	907.49	3,831.97	3,629.97	202.00	18.970		
10,200.00	5,229.19	10,592.00	5,185.32	152.64	89.11	89.27	-3,857.85	907.49	3,898.21	3,695.57	202.64	19.237		
10,300.00	5,228.62	10,592.00	5,185.32	155.56	89.11	89.27	-3,857.85	907.49	3,965.85	3,762.67	203.18	19.519		
10,399.98	5,228.05	10,592.00	5,185.32	158.47	89.11	89.27	-3,857.85	907.49	4,034.83	3,831.19	203.64	19.814		
10,408.39	5,228.00	10,592.00	5,185.32	158.71	89.11	89.27	-3,857.85	907.49	4,040.71	3,837.04	203.67	19.839		

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



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 5H - Slot 5H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 2H - OH - Plan #6													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
0.00	0.00	0.00	0.00	0.00	0.00	-89.92	0.13	-90.00	90.00					
100.00	100.00	100.00	100.00	0.13	0.13	-89.92	0.13	-90.00	90.00	89.73	0.27	334.754		
200.00	200.00	200.00	200.00	0.49	0.49	-89.92	0.13	-90.00	90.00	89.01	0.99	91.297		
300.00	300.00	300.00	300.00	0.85	0.85	-89.92	0.13	-90.00	90.00	88.30	1.70	52.856		
400.00	400.00	400.00	400.00	1.21	1.21	-89.92	0.13	-90.00	90.00	87.58	2.42	37.195		
500.00	500.00	500.00	500.00	1.57	1.57	-89.92	0.13	-90.00	90.00	86.86	3.14	28.693 CC		
600.00	600.00	598.86	598.84	1.93	1.92	-88.91	1.73	-90.60	90.62	86.77	3.85	23.521 ES		
700.00	700.00	697.49	697.34	2.29	2.28	-85.98	6.50	-92.39	92.66	88.08	4.58	20.245		
800.00	800.00	795.65	795.13	2.64	2.64	-81.41	14.40	-95.36	96.57	91.25	5.32	18.167		
900.00	900.00	893.12	891.89	3.00	2.99	-75.71	25.34	-99.47	102.97	96.90	6.07	16.952		
1,000.00	1,000.00	989.69	987.31	3.36	3.36	-69.47	39.21	-104.69	112.51	105.65	6.85	16.417		
1,100.00	1,100.00	1,085.14	1,081.08	3.72	3.73	-63.27	55.87	-110.95	125.66	118.01	7.64	16.442		
1,200.00	1,200.00	1,180.09	1,173.73	4.08	4.13	-57.52	75.27	-118.24	142.61	134.19	8.42	16.940		
1,300.00	1,299.98	1,277.52	1,268.60	4.43	4.54	44.62	96.09	-126.06	160.37	151.24	9.12	17.575		
1,400.00	1,399.84	1,375.02	1,363.52	4.77	4.97	49.41	116.92	-133.89	176.95	167.13	9.82	18.027		
1,500.00	1,499.45	1,472.47	1,458.40	5.12	5.40	54.13	137.74	-141.71	192.63	182.13	10.51	18.334		
1,600.00	1,598.70	1,569.75	1,553.11	5.47	5.84	58.88	158.52	-149.52	207.76	196.56	11.20	18.551		
1,700.00	1,697.75	1,666.91	1,647.71	5.84	6.28	63.54	179.28	-157.32	223.56	211.66	11.90	18.785		
1,800.00	1,796.80	1,764.08	1,742.31	6.21	6.72	67.58	200.04	-165.12	240.64	228.03	12.61	19.084		
1,900.00	1,895.84	1,861.24	1,836.91	6.58	7.16	71.09	220.79	-172.92	258.76	245.43	13.33	19.417		
2,000.00	1,994.89	1,958.41	1,931.52	6.96	7.61	74.13	241.55	-180.72	277.71	263.66	14.05	19.764		
2,100.00	2,093.94	2,055.57	2,026.12	7.34	8.06	76.79	262.31	-188.53	297.33	282.55	14.78	20.112		
2,200.00	2,192.98	2,152.74	2,120.72	7.73	8.51	79.12	283.07	-196.33	317.50	301.98	15.52	20.452		
2,300.00	2,292.03	2,249.91	2,215.32	8.11	8.97	81.17	303.83	-204.13	338.13	321.85	16.27	20.781		
2,400.00	2,391.08	2,347.07	2,309.92	8.50	9.42	82.99	324.58	-211.93	359.12	342.09	17.02	21.095		
2,500.00	2,490.13	2,444.24	2,404.52	8.89	9.87	84.60	345.34	-219.73	380.42	362.64	17.78	21.394		
2,600.00	2,589.17	2,541.40	2,499.12	9.29	10.33	86.05	366.10	-227.53	401.99	383.44	18.54	21.677		
2,700.00	2,688.22	2,638.57	2,593.72	9.68	10.79	87.35	386.86	-235.33	423.78	404.46	19.31	21.944		
2,800.00	2,787.27	2,735.73	2,688.32	10.08	11.24	88.52	407.62	-243.13	445.75	425.67	20.08	22.197		
2,900.00	2,886.31	2,832.90	2,782.92	10.48	11.70	89.59	428.37	-250.93	467.89	447.03	20.85	22.435		
3,000.00	2,985.36	2,930.06	2,877.53	10.87	12.16	90.55	449.13	-258.73	490.17	468.54	21.63	22.660		
3,100.00	3,084.41	3,027.23	2,972.13	11.27	12.62	91.44	469.89	-266.53	512.57	490.16	22.41	22.873		
3,200.00	3,183.46	3,124.39	3,066.73	11.67	13.08	92.25	490.65	-274.33	535.08	511.89	23.19	23.073		
3,300.00	3,282.50	3,221.56	3,161.33	12.07	13.54	92.99	511.41	-282.13	557.68	533.70	23.97	23.263		
3,400.00	3,381.55	3,318.72	3,255.93	12.48	14.00	93.68	532.16	-289.93	580.36	555.60	24.76	23.442		
3,500.00	3,480.60	3,415.89	3,350.53	12.88	14.46	94.31	552.92	-297.74	603.12	577.58	25.54	23.612		
3,600.00	3,579.64	3,513.05	3,445.13	13.28	14.92	94.90	573.68	-305.54	625.94	599.61	26.33	23.772		
3,700.00	3,678.69	3,610.22	3,539.73	13.68	15.38	95.45	594.44	-313.34	648.82	621.70	27.12	23.925		
3,800.00	3,777.74	3,707.39	3,634.33	14.09	15.84	95.96	615.20	-321.14	671.76	643.85	27.91	24.069		
3,900.00	3,876.79	3,804.55	3,728.94	14.49	16.30	96.44	635.95	-328.94	694.74	666.04	28.70	24.207		
4,000.00	3,975.83	3,901.72	3,823.54	14.89	16.76	96.89	656.71	-336.74	717.76	688.27	29.49	24.338		
4,100.00	4,074.88	3,998.88	3,918.14	15.30	17.22	97.31	677.47	-344.54	740.83	710.54	30.28	24.462		
4,200.00	4,173.93	4,096.05	4,012.74	15.70	17.68	97.70	698.23	-352.34	763.93	732.85	31.08	24.581		
4,300.00	4,272.98	4,193.22	4,107.34	16.11	18.14	98.15	718.99	-360.14	787.05	755.18	31.87	24.695		
4,400.00	4,372.47	4,290.18	4,201.75	16.49	18.60	149.96	739.70	-367.93	811.29	778.66	32.63	24.864		
4,500.00	4,472.04	4,393.76	4,302.64	16.80	19.09	-138.21	761.67	-376.18	839.96	806.60	33.36	25.180		
4,600.00	4,570.03	4,522.13	4,428.51	17.06	19.67	-124.62	785.17	-385.01	870.60	836.40	34.20	25.457		
4,700.00	4,664.76	4,634.35	4,539.33	17.31	20.11	-119.57	802.20	-383.69	903.25	868.41	34.84	25.925		
4,800.00	4,754.60	4,751.83	4,654.21	17.54	20.48	-116.47	817.16	-364.94	938.32	902.87	35.45	26.470		
4,900.00	4,838.03	4,875.04	4,770.55	17.79	20.79	-113.94	829.35	-326.69	974.99	938.94	36.05	27.046		
5,000.00	4,913.61	5,004.36	4,884.86	18.13	21.05	-111.54	837.92	-267.15	1,012.43	975.71	36.72	27.574		

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Anticollision Report



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Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 2H - OH - Plan #6													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
5,100.00	4,980.06	5,140.02	4,992.66	18.64	21.26	-109.08	842.03	-185.19	1,049.77	1,012.16	37.61	27.912		
5,200.00	5,036.23	5,281.88	5,088.52	19.42	21.42	-106.50	840.83	-80.89	1,086.16	1,047.16	39.00	27.853		
5,300.00	5,081.16	5,424.44	5,164.19	20.51	21.69	-103.77	834.07	39.49	1,120.82	1,079.67	41.15	27.238		
5,400.00	5,114.11	5,559.93	5,214.40	21.91	23.08	-101.11	823.54	164.70	1,153.92	1,109.80	44.13	26.150		
5,500.00	5,141.63	5,695.95	5,241.88	23.57	25.36	-100.28	809.60	297.00	1,184.42	1,136.43	48.00	24.677		
5,600.00	5,169.15	5,799.16	5,249.97	25.41	27.37	-99.07	797.38	399.15	1,212.87	1,161.07	51.81	23.411		
5,700.00	5,196.67	5,892.21	5,256.59	27.40	29.36	-98.00	786.29	491.31	1,241.66	1,185.95	55.71	22.289		
5,800.00	5,224.19	6,021.66	5,262.04	29.52	32.30	-96.35	769.41	619.46	1,269.81	1,209.02	60.79	20.887		
5,900.00	5,245.01	6,115.48	5,262.19	31.77	34.54	-93.15	755.73	712.29	1,296.85	1,231.65	65.19	19.893		
6,000.00	5,252.94	6,211.39	5,262.35	34.15	36.91	-90.65	741.74	807.17	1,323.71	1,253.90	69.82	18.960		
6,100.00	5,252.52	6,307.85	5,262.50	36.60	39.36	-90.35	727.67	902.60	1,350.10	1,275.51	74.59	18.101		
6,200.00	5,251.95	6,404.31	5,262.66	39.12	41.86	-90.37	713.60	998.02	1,376.47	1,296.99	79.48	17.318		
6,300.00	5,251.38	6,500.76	5,262.81	41.70	44.42	-90.39	699.53	1,093.45	1,402.84	1,318.36	84.49	16.604		
6,400.00	5,250.81	6,597.22	5,262.97	44.31	47.02	-90.42	685.46	1,188.88	1,429.22	1,339.64	89.58	15.955		
6,500.00	5,250.24	6,693.68	5,263.12	46.97	49.64	-90.44	671.39	1,284.30	1,455.59	1,360.84	94.75	15.363		
6,600.00	5,249.67	6,790.14	5,263.28	49.66	52.30	-90.46	657.32	1,379.73	1,481.96	1,381.99	99.98	14.823		
6,700.00	5,249.10	6,886.60	5,263.43	52.37	54.98	-90.48	643.25	1,475.16	1,508.34	1,403.08	105.26	14.330		
6,800.00	5,248.53	6,983.06	5,263.59	55.11	57.69	-90.49	629.18	1,570.58	1,534.71	1,424.12	110.58	13.878		
6,900.00	5,247.97	7,079.51	5,263.74	57.87	60.41	-90.51	615.11	1,666.01	1,561.08	1,445.13	115.95	13.463		
7,000.00	5,247.40	7,175.97	5,263.90	60.64	63.15	-90.53	601.04	1,761.44	1,587.46	1,466.11	121.35	13.082		
7,100.00	5,246.83	7,272.43	5,264.05	63.43	65.90	-90.54	586.97	1,856.86	1,613.83	1,487.05	126.78	12.730		
7,200.00	5,246.26	7,368.89	5,264.21	66.23	68.66	-90.56	572.90	1,952.29	1,640.20	1,507.97	132.23	12.404		
7,300.00	5,245.69	7,465.35	5,264.36	69.04	71.44	-90.58	558.84	2,047.72	1,666.58	1,528.87	137.71	12.102		
7,400.00	5,245.12	7,561.81	5,264.52	71.87	74.22	-90.59	544.77	2,143.14	1,692.95	1,549.74	143.21	11.822		
7,500.00	5,244.55	7,658.26	5,264.67	74.70	77.02	-90.61	530.70	2,238.57	1,719.33	1,570.60	148.72	11.561		
7,600.00	5,243.98	7,754.72	5,264.83	77.54	79.82	-90.62	516.63	2,334.00	1,745.70	1,591.45	154.26	11.317		
7,700.00	5,243.41	7,851.18	5,264.98	80.38	82.62	-90.63	502.56	2,429.42	1,772.08	1,612.27	159.80	11.089		
7,800.00	5,242.84	7,947.64	5,265.14	83.23	85.44	-90.65	488.49	2,524.85	1,798.45	1,633.09	165.36	10.876		
7,900.00	5,242.27	8,044.10	5,265.29	86.09	88.26	-90.66	474.42	2,620.28	1,824.82	1,653.89	170.93	10.676		
8,000.00	5,241.71	8,140.56	5,265.45	88.95	91.08	-90.67	460.35	2,715.70	1,851.20	1,674.69	176.51	10.488		
8,100.00	5,241.14	8,237.01	5,265.60	91.82	93.91	-90.68	446.28	2,811.13	1,877.57	1,695.47	182.10	10.311		
8,200.00	5,240.57	8,333.47	5,265.76	94.69	96.75	-90.70	432.21	2,906.56	1,903.95	1,716.25	187.70	10.144		
8,300.00	5,240.00	8,429.93	5,265.91	97.57	99.59	-90.71	418.14	3,001.98	1,930.32	1,737.02	193.31	9.986		
8,400.00	5,239.43	8,526.39	5,266.07	100.45	102.43	-90.72	404.07	3,097.41	1,956.70	1,757.78	198.92	9.836		
8,500.00	5,238.86	8,622.85	5,266.22	103.33	105.27	-90.73	390.00	3,192.84	1,983.07	1,778.53	204.54	9.695		
8,600.00	5,238.29	8,719.31	5,266.38	106.22	108.12	-90.74	375.93	3,288.26	2,009.45	1,799.28	210.17	9.561		
8,700.00	5,237.72	8,815.77	5,266.53	109.10	110.97	-90.75	361.86	3,383.69	2,035.83	1,820.02	215.80	9.434		
8,800.00	5,237.15	8,912.22	5,266.69	111.99	113.83	-90.76	347.79	3,479.12	2,062.20	1,840.76	221.44	9.313		
8,900.00	5,236.58	9,008.68	5,266.84	114.89	116.68	-90.77	333.73	3,574.54	2,088.58	1,861.49	227.08	9.197		
9,000.00	5,236.01	9,105.14	5,267.00	117.78	119.54	-90.78	319.66	3,669.97	2,114.95	1,882.22	232.73	9.088		
9,100.00	5,235.45	9,201.60	5,267.15	120.68	122.40	-90.79	305.59	3,765.40	2,141.33	1,902.94	238.38	8.983		
9,200.00	5,234.88	9,298.06	5,267.31	123.58	125.26	-90.80	291.52	3,860.82	2,167.70	1,923.66	244.04	8.883		
9,300.00	5,234.31	9,394.52	5,267.46	126.48	128.13	-90.81	277.45	3,956.25	2,194.08	1,944.38	249.70	8.787		
9,400.00	5,233.74	9,490.97	5,267.62	129.38	130.99	-90.82	263.38	4,051.68	2,220.45	1,965.09	255.36	8.695		
9,500.00	5,233.17	9,587.43	5,267.77	132.28	133.86	-90.83	249.31	4,147.10	2,246.83	1,985.80	261.03	8.608		
9,600.00	5,232.60	9,683.89	5,267.93	135.19	136.73	-90.83	235.24	4,242.53	2,273.21	2,006.51	266.69	8.524		
9,700.00	5,232.03	9,780.35	5,268.08	138.09	139.60	-90.84	221.17	4,337.96	2,299.58	2,027.22	272.37	8.443		
9,800.00	5,231.46	9,876.81	5,268.24	141.00	142.47	-90.85	207.10	4,433.38	2,325.96	2,047.92	278.04	8.366		
9,900.00	5,230.89	9,973.27	5,268.39	143.91	145.35	-90.86	193.03	4,528.81	2,352.33	2,068.62	283.72	8.291		
10,000.00	5,230.32	10,069.72	5,268.55	146.82	148.22	-90.87	178.96	4,624.24	2,378.71	2,089.31	289.39	8.220		

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Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 2H - OH - Plan #6													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (")	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
10,100.00	5,229.76	10,166.18	5,268.70	149.73	151.10	-90.87	164.89	4,719.66	2,405.08	2,110.01	295.07	8.151		
10,200.00	5,229.19	10,262.64	5,268.86	152.64	153.97	-90.88	150.82	4,815.09	2,431.46	2,130.70	300.76	8.084		
10,300.00	5,228.62	10,350.70	5,269.00	155.56	156.60	-90.89	137.98	4,902.20	2,457.85	2,151.79	306.06	8.031 SF		
10,399.98	5,228.05	10,350.70	5,269.00	158.47	156.60	-90.89	137.98	4,902.20	2,486.42	2,179.33	307.09	8.097		
10,408.39	5,228.00	10,350.70	5,269.00	158.71	156.60	-90.89	137.98	4,902.20	2,488.96	2,181.80	307.16	8.103		

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Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 5H - Slot 5H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 3H - OH - Plan #6													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)						
0.00	0.00	0.00	0.00	0.00	0.00	-90.87	-0.91	-60.00	60.01					
100.00	100.00	100.00	100.00	0.13	0.13	-90.87	-0.91	-60.00	60.01	59.74	0.27	223.200		
200.00	200.00	200.00	200.00	0.49	0.49	-90.87	-0.91	-60.00	60.01	59.02	0.99	60.873		
300.00	300.00	300.00	300.00	0.85	0.85	-90.87	-0.91	-60.00	60.01	58.31	1.70	35.242		
400.00	400.00	400.00	400.00	1.21	1.21	-90.87	-0.91	-60.00	60.01	57.59	2.42	24.800		
500.00	500.00	500.00	500.00	1.57	1.57	-90.87	-0.91	-60.00	60.01	56.87	3.14	19.131		
600.00	600.00	600.00	600.00	1.93	1.93	-90.87	-0.91	-60.00	60.01	56.15	3.85	15.572		
700.00	700.00	700.00	700.00	2.29	2.29	-90.87	-0.91	-60.00	60.01	55.44	4.57	13.129		
800.00	800.00	800.00	800.00	2.64	2.64	-90.87	-0.91	-60.00	60.01	54.72	5.29	11.349		
900.00	900.00	900.00	900.00	3.00	3.00	-90.87	-0.91	-60.00	60.01	54.00	6.00	9.994		
1,000.00	1,000.00	1,000.00	1,000.00	3.36	3.36	-90.87	-0.91	-60.00	60.01	53.29	6.72	8.928		
1,100.00	1,100.00	1,100.00	1,100.00	3.72	3.72	-90.87	-0.91	-60.00	60.01	52.57	7.44	8.067		
1,200.00	1,200.00	1,200.00	1,200.00	4.08	4.08	-90.87	-0.91	-60.00	60.01	51.85	8.16	7.358		
1,300.00	1,299.98	1,298.59	1,298.57	4.43	4.43	7.65	0.33	-61.16	59.44	50.59	8.86	6.711		
1,400.00	1,399.84	1,397.04	1,396.89	4.77	4.78	11.98	4.05	-64.61	57.97	48.41	9.56	6.067		
1,500.00	1,499.45	1,495.20	1,494.68	5.12	5.13	19.58	10.22	-70.34	56.31	46.05	10.26	5.487		
1,600.00	1,598.70	1,593.50	1,592.28	5.47	5.49	30.58	18.72	-78.24	55.60	44.63	10.97	5.067		
1,612.13	1,610.72	1,605.54	1,604.24	5.52	5.53	32.07	19.83	-79.27	55.58	44.52	11.06	5.026 CC, ES		
1,700.00	1,697.75	1,692.77	1,690.77	5.84	5.85	42.77	27.87	-86.73	56.57	44.89	11.68	4.843		
1,800.00	1,796.80	1,792.04	1,789.26	6.21	6.22	54.06	37.01	-95.21	60.00	47.60	12.40	4.837		
1,900.00	1,895.84	1,891.32	1,887.74	6.58	6.59	63.82	46.15	-103.70	65.49	52.36	13.13	4.986		
2,000.00	1,994.89	1,990.59	1,986.23	6.96	6.96	71.89	55.29	-112.19	72.58	58.70	13.87	5.231		
2,100.00	2,093.94	2,089.86	2,084.72	7.34	7.34	78.44	64.43	-120.68	80.85	66.22	14.62	5.529		
2,200.00	2,192.98	2,189.14	2,183.20	7.73	7.71	83.72	73.57	-129.17	89.97	74.59	15.37	5.852		
2,300.00	2,292.03	2,288.41	2,281.69	8.11	8.09	88.00	82.71	-137.66	99.71	83.58	16.13	6.181		
2,400.00	2,391.08	2,387.68	2,380.17	8.50	8.47	91.51	91.86	-146.14	109.91	93.01	16.89	6.507		
2,500.00	2,490.13	2,486.95	2,478.66	8.89	8.85	94.42	101.00	-154.63	120.44	102.79	17.65	6.822		
2,600.00	2,589.17	2,586.23	2,577.15	9.29	9.24	96.86	110.14	-163.12	131.24	112.82	18.42	7.125		
2,700.00	2,688.22	2,685.50	2,675.63	9.68	9.62	98.92	119.28	-171.61	142.23	123.04	19.19	7.413		
2,800.00	2,787.27	2,784.77	2,774.12	10.08	10.01	100.69	128.42	-180.10	153.38	133.43	19.95	7.687		
2,900.00	2,886.31	2,884.05	2,872.61	10.48	10.39	102.21	137.56	-188.59	164.65	143.93	20.72	7.945		
3,000.00	2,985.36	2,983.32	2,971.09	10.87	10.78	103.54	146.71	-197.08	176.03	154.54	21.49	8.189		
3,100.00	3,084.41	3,082.59	3,069.58	11.27	11.16	104.71	155.85	-205.56	187.49	165.22	22.27	8.420		
3,200.00	3,183.46	3,181.87	3,168.06	11.67	11.55	105.74	164.99	-214.05	199.01	175.97	23.04	8.638		
3,300.00	3,282.50	3,281.14	3,266.55	12.07	11.94	106.66	174.13	-222.54	210.60	186.78	23.81	8.843		
3,400.00	3,381.55	3,380.41	3,365.04	12.48	12.33	107.49	183.27	-231.03	222.23	197.64	24.59	9.038		
3,500.00	3,480.60	3,479.69	3,463.52	12.88	12.72	108.23	192.41	-239.52	233.90	208.53	25.36	9.221		
3,600.00	3,579.64	3,578.96	3,562.01	13.28	13.10	108.90	201.55	-248.01	245.61	219.46	26.14	9.395		
3,700.00	3,678.69	3,678.23	3,660.50	13.68	13.49	109.51	210.70	-256.50	257.34	230.42	26.92	9.560		
3,800.00	3,777.74	3,777.51	3,758.98	14.09	13.88	110.07	219.84	-264.98	269.11	241.41	27.70	9.716		
3,900.00	3,876.79	3,876.78	3,857.47	14.49	14.27	110.58	228.98	-273.47	280.89	252.42	28.47	9.865		
4,000.00	3,975.83	3,976.05	3,955.95	14.89	14.66	111.05	238.12	-281.96	292.70	263.45	29.25	10.006		
4,100.00	4,074.88	4,075.33	4,054.44	15.30	15.05	111.48	247.26	-290.45	304.52	274.49	30.03	10.140		
4,200.00	4,173.93	4,174.60	4,152.93	15.70	15.44	111.88	256.40	-298.94	316.36	285.55	30.81	10.268		
4,300.00	4,272.98	4,273.88	4,251.42	16.11	15.84	112.28	265.55	-307.43	328.20	296.60	31.59	10.389		
4,400.00	4,372.47	4,373.08	4,349.84	16.49	16.23	112.61	274.68	-315.91	340.04	307.69	32.35	10.512		
4,500.00	4,472.04	4,475.83	4,452.02	16.80	16.62	-127.59	282.91	-322.35	353.42	320.36	33.08	10.690		
4,600.00	4,570.03	4,579.54	4,555.42	17.06	16.96	-115.26	286.95	-316.86	368.15	334.46	33.69	10.929		
4,700.00	4,664.76	4,685.28	4,659.32	17.31	17.25	-111.37	286.35	-297.67	383.97	349.73	34.25	11.212		
4,800.00	4,754.60	4,793.08	4,761.60	17.54	17.53	-109.53	280.86	-264.34	400.51	365.74	34.77	11.519		
4,900.00	4,838.03	4,902.96	4,859.98	17.79	17.81	-108.35	270.29	-216.77	417.37	382.06	35.31	11.819		

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



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 5H - Slot 5H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 3H - OH - Plan #6													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
5,000.00	4,913.61	5,014.87	4,952.00	18.13	18.15	-107.38	254.61	-155.22	434.15	398.17	35.98	12.066		
5,100.00	4,980.06	5,128.69	5,035.09	18.64	18.66	-106.44	233.90	-80.41	450.48	413.54	36.93	12.197		
5,200.00	5,036.23	5,244.22	5,106.74	19.42	19.46	-105.46	208.45	6.43	465.98	427.62	38.36	12.147		
5,300.00	5,081.16	5,352.11	5,160.66	20.51	20.54	-104.39	181.57	95.82	480.82	440.43	40.39	11.905		
5,400.00	5,114.11	5,452.43	5,198.58	21.91	21.87	-103.27	156.63	185.20	497.31	454.33	42.98	11.571		
5,500.00	5,141.63	5,552.35	5,223.97	23.57	23.49	-102.62	132.65	278.75	514.44	468.22	46.22	11.131		
5,600.00	5,169.15	5,649.28	5,236.38	25.41	25.30	-100.66	110.60	372.25	531.70	481.71	49.99	10.635		
5,700.00	5,196.67	5,744.92	5,243.11	27.40	27.29	-98.26	89.51	465.29	549.86	495.75	54.10	10.164		
5,800.00	5,224.19	5,840.03	5,248.85	29.52	29.38	-95.88	68.57	557.87	568.95	510.60	58.35	9.750		
5,900.00	5,245.01	5,935.31	5,248.93	31.77	31.60	-92.12	47.90	650.89	589.07	526.28	62.79	9.381		
6,000.00	5,252.94	6,032.90	5,248.84	34.15	33.97	-89.77	26.74	746.15	609.03	541.58	67.46	9.028		
6,100.00	5,252.52	6,131.01	5,248.75	36.60	36.43	-89.59	5.47	841.93	628.39	556.09	72.30	8.692		
6,200.00	5,251.95	6,229.12	5,248.66	39.12	38.96	-89.64	-15.80	937.70	647.73	570.45	77.28	8.382		
6,300.00	5,251.38	6,327.23	5,248.58	41.70	41.54	-89.69	-37.07	1,033.48	667.07	584.70	82.37	8.099		
6,400.00	5,250.81	6,425.34	5,248.49	44.31	44.17	-89.74	-58.34	1,129.25	686.41	598.86	87.55	7.840		
6,500.00	5,250.24	6,523.45	5,248.40	46.97	46.84	-89.78	-79.61	1,225.03	705.76	612.95	92.81	7.604		
6,600.00	5,249.67	6,621.56	5,248.31	49.66	49.54	-89.83	-100.88	1,320.81	725.10	626.97	98.13	7.389		
6,700.00	5,249.10	6,719.67	5,248.22	52.37	52.27	-89.87	-122.15	1,416.58	744.44	640.93	103.51	7.192		
6,800.00	5,248.53	6,817.78	5,248.13	55.11	55.02	-89.91	-143.42	1,512.36	763.79	654.85	108.94	7.011		
6,900.00	5,247.97	6,915.89	5,248.04	57.87	57.79	-89.94	-164.69	1,608.14	783.13	668.73	114.40	6.845		
7,000.00	5,247.40	7,014.00	5,247.96	60.64	60.58	-89.98	-185.96	1,703.91	802.48	682.58	119.90	6.693		
7,100.00	5,246.83	7,112.11	5,247.87	63.43	63.38	-90.01	-207.24	1,799.69	821.82	696.39	125.43	6.552		
7,200.00	5,246.26	7,210.22	5,247.78	66.23	66.19	-90.04	-228.51	1,895.46	841.17	710.18	130.98	6.422		
7,300.00	5,245.69	7,308.33	5,247.69	69.04	69.02	-90.07	-249.78	1,991.24	860.51	723.95	136.56	6.301		
7,400.00	5,245.12	7,406.44	5,247.60	71.87	71.85	-90.10	-271.05	2,087.02	879.86	737.70	142.16	6.189		
7,500.00	5,244.55	7,504.55	5,247.51	74.70	74.69	-90.13	-292.32	2,182.79	899.20	751.43	147.77	6.085		
7,600.00	5,243.98	7,602.66	5,247.43	77.54	77.55	-90.15	-313.59	2,278.57	918.55	765.15	153.40	5.988		
7,700.00	5,243.41	7,700.77	5,247.34	80.38	80.40	-90.18	-334.86	2,374.35	937.90	778.85	159.05	5.897		
7,800.00	5,242.84	7,798.88	5,247.25	83.23	83.27	-90.20	-356.13	2,470.12	957.24	792.53	164.71	5.812		
7,900.00	5,242.27	7,896.98	5,247.16	86.09	86.14	-90.23	-377.40	2,565.90	976.59	806.21	170.38	5.732		
8,000.00	5,241.71	7,995.09	5,247.07	88.95	89.01	-90.25	-398.67	2,661.68	995.94	819.88	176.06	5.657		
8,100.00	5,241.14	8,093.20	5,246.98	91.82	91.89	-90.27	-419.95	2,757.45	1,015.28	833.54	181.75	5.586		
8,200.00	5,240.57	8,191.31	5,246.90	94.69	94.78	-90.29	-441.22	2,853.23	1,034.63	847.19	187.44	5.520		
8,300.00	5,240.00	8,289.42	5,246.81	97.57	97.67	-90.31	-462.49	2,949.00	1,053.98	860.83	193.15	5.457		
8,400.00	5,239.43	8,387.53	5,246.72	100.45	100.56	-90.33	-483.76	3,044.78	1,073.32	874.46	198.86	5.397		
8,500.00	5,238.86	8,485.64	5,246.63	103.33	103.45	-90.35	-505.03	3,140.56	1,092.67	888.09	204.58	5.341		
8,600.00	5,238.29	8,583.75	5,246.54	106.22	106.35	-90.37	-526.30	3,236.33	1,112.02	901.71	210.31	5.288		
8,700.00	5,237.72	8,681.86	5,246.45	109.10	109.25	-90.39	-547.57	3,332.11	1,131.37	915.33	216.04	5.237		
8,800.00	5,237.15	8,779.97	5,246.36	111.99	112.15	-90.40	-568.84	3,427.89	1,150.71	928.94	221.77	5.189		
8,900.00	5,236.58	8,878.08	5,246.28	114.89	115.06	-90.42	-590.11	3,523.66	1,170.06	942.55	227.51	5.143		
9,000.00	5,236.01	8,976.19	5,246.19	117.78	117.96	-90.44	-611.38	3,619.44	1,189.41	956.15	233.26	5.099		
9,100.00	5,235.45	9,074.30	5,246.10	120.68	120.87	-90.45	-632.66	3,715.21	1,208.76	969.75	239.01	5.057		
9,200.00	5,234.88	9,172.41	5,246.01	123.58	123.78	-90.47	-653.93	3,810.99	1,228.11	983.35	244.76	5.018		
9,300.00	5,234.31	9,270.52	5,245.92	126.48	126.70	-90.48	-675.20	3,906.77	1,247.45	996.94	250.51	4.980		
9,400.00	5,233.74	9,368.63	5,245.83	129.38	129.61	-90.49	-696.47	4,002.54	1,266.80	1,010.53	256.27	4.943		
9,500.00	5,233.17	9,466.74	5,245.75	132.28	132.53	-90.51	-717.74	4,098.32	1,286.15	1,024.12	262.04	4.908		
9,600.00	5,232.60	9,564.85	5,245.66	135.19	135.44	-90.52	-739.01	4,194.10	1,305.50	1,037.70	267.80	4.875		
9,700.00	5,232.03	9,662.96	5,245.57	138.09	138.36	-90.53	-760.28	4,289.87	1,324.85	1,051.28	273.57	4.843		
9,800.00	5,231.46	9,761.07	5,245.48	141.00	141.28	-90.54	-781.55	4,385.65	1,344.20	1,064.86	279.34	4.812		
9,900.00	5,230.89	9,859.18	5,245.39	143.91	144.20	-90.56	-802.82	4,481.42	1,363.54	1,078.43	285.11	4.783		

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



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 5H - Slot 5H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 3H - OH - Plan #6												Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM												Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance						
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,000.00	5,230.32	9,957.29	5,245.30	146.82	147.12	-90.57	-824.09	4,577.20	1,382.89	1,092.01	290.88	4.754	
10,100.00	5,229.76	10,055.40	5,245.21	149.73	150.05	-90.58	-845.37	4,672.98	1,402.24	1,105.58	296.66	4.727	
10,200.00	5,229.19	10,153.51	5,245.13	152.64	152.97	-90.59	-866.64	4,768.75	1,421.59	1,119.15	302.44	4.700	
10,300.00	5,228.62	10,251.18	5,245.04	155.56	155.88	-90.60	-887.80	4,864.10	1,440.95	1,132.76	308.20	4.675 SF	
10,399.98	5,228.05	10,293.81	5,245.00	158.47	157.15	-90.61	-897.03	4,905.72	1,461.38	1,150.49	310.89	4.701	
10,408.39	5,228.00	10,293.81	5,245.00	158.71	157.15	-90.61	-897.03	4,905.72	1,463.32	1,152.44	310.88	4.707	



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 5H - Slot 5H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 4H - OH - Plan #6													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (usft)	Separation Factor	Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)						
0.00	0.00	0.00	0.00	0.00	0.00	-89.92	0.04	-30.00	30.00					
100.00	100.00	100.00	100.00	0.13	0.13	-89.92	0.04	-30.00	30.00	29.73	0.27	111.585		
200.00	200.00	200.00	200.00	0.49	0.49	-89.92	0.04	-30.00	30.00	29.01	0.99	30.432		
300.00	300.00	300.00	300.00	0.85	0.85	-89.92	0.04	-30.00	30.00	28.30	1.70	17.619		
400.00	400.00	400.00	400.00	1.21	1.21	-89.92	0.04	-30.00	30.00	27.58	2.42	12.398		
500.00	500.00	500.00	500.00	1.57	1.57	-89.92	0.04	-30.00	30.00	26.86	3.14	9.564		
600.00	600.00	600.00	600.00	1.93	1.93	-89.92	0.04	-30.00	30.00	26.15	3.85	7.785		
700.00	700.00	700.00	700.00	2.29	2.29	-89.92	0.04	-30.00	30.00	25.43	4.57	6.564		
800.00	800.00	800.00	800.00	2.64	2.64	-89.92	0.04	-30.00	30.00	24.71	5.29	5.674		
900.00	900.00	900.00	900.00	3.00	3.00	-89.92	0.04	-30.00	30.00	24.00	6.00	4.996		
1,000.00	1,000.00	1,000.00	1,000.00	3.36	3.36	-89.92	0.04	-30.00	30.00	23.28	6.72	4.463		
1,100.00	1,100.00	1,100.00	1,100.00	3.72	3.72	-89.92	0.04	-30.00	30.00	22.56	7.44	4.033		
1,200.00	1,200.00	1,200.00	1,200.00	4.08	4.08	-89.92	0.04	-30.00	30.00	21.84	8.16	3.679		
1,300.00	1,299.98	1,299.51	1,299.49	4.43	4.42	4.59	-1.50	-30.77	29.07	20.23	8.84	3.287		
1,400.00	1,399.84	1,398.86	1,398.70	4.77	4.75	-4.25	-6.13	-33.09	26.71	17.19	9.52	2.806		
1,500.00	1,499.45	1,497.89	1,497.35	5.12	5.08	-21.83	-13.80	-36.92	24.51	14.30	10.21	2.400		
1,526.96	1,526.25	1,524.51	1,523.81	5.21	5.17	-28.22	-16.38	-38.21	24.35	13.94	10.40	2.340 CC, ES, SF		
1,600.00	1,598.70	1,596.44	1,595.18	5.47	5.41	-47.55	-24.45	-42.25	25.81	14.89	10.92	2.363		
1,700.00	1,697.75	1,694.47	1,692.02	5.84	5.76	-68.60	-38.03	-49.04	34.24	22.61	11.63	2.945		
1,800.00	1,796.80	1,791.87	1,787.67	6.21	6.11	-78.77	-54.45	-57.25	48.49	36.17	12.32	3.935		
1,900.00	1,895.84	1,888.41	1,881.80	6.58	6.48	-82.86	-73.58	-66.81	66.52	53.50	13.02	5.108		
2,000.00	1,994.89	1,984.87	1,975.15	6.96	6.87	-84.22	-95.31	-77.68	87.40	73.68	13.72	6.369		
2,100.00	2,093.94	2,082.53	2,069.51	7.34	7.28	-84.91	-117.84	-88.94	108.85	94.40	14.44	7.535		
2,200.00	2,192.98	2,180.20	2,163.88	7.73	7.70	-85.37	-140.36	-100.20	130.30	115.12	15.18	8.585		
2,300.00	2,292.03	2,277.87	2,258.24	8.11	8.12	-85.70	-162.89	-111.47	151.76	135.84	15.92	9.533		
2,400.00	2,391.08	2,375.53	2,352.80	8.50	8.56	-85.95	-185.42	-122.73	173.22	156.55	16.67	10.392		
2,500.00	2,490.13	2,473.20	2,446.97	8.89	9.01	-86.14	-207.94	-133.99	194.69	177.26	17.43	11.172		
2,600.00	2,589.17	2,570.87	2,541.33	9.29	9.46	-86.29	-230.47	-145.26	216.16	197.97	18.19	11.883		
2,700.00	2,688.22	2,668.54	2,635.70	9.68	9.91	-86.42	-253.00	-156.52	237.62	218.67	18.96	12.533		
2,800.00	2,787.27	2,766.20	2,730.06	10.08	10.37	-86.53	-275.53	-167.79	259.09	239.36	19.73	13.130		
2,900.00	2,886.31	2,863.87	2,824.42	10.48	10.84	-86.62	-298.05	-179.05	280.56	260.05	20.51	13.678		
3,000.00	2,985.36	2,961.54	2,918.79	10.87	11.31	-86.69	-320.58	-190.31	302.04	280.74	21.29	14.184		
3,100.00	3,084.41	3,059.20	3,013.15	11.27	11.78	-86.76	-343.11	-201.58	323.51	301.43	22.08	14.652		
3,200.00	3,183.46	3,156.87	3,107.51	11.67	12.25	-86.82	-365.64	-212.84	344.98	322.11	22.87	15.085		
3,300.00	3,282.50	3,254.54	3,201.88	12.07	12.73	-86.87	-388.16	-224.10	366.45	342.79	23.66	15.488		
3,400.00	3,381.55	3,352.21	3,296.24	12.48	13.21	-86.92	-410.69	-235.37	387.92	363.47	24.45	15.864		
3,500.00	3,480.60	3,449.87	3,390.80	12.88	13.69	-86.96	-433.22	-246.63	409.39	384.14	25.25	16.214		
3,600.00	3,579.64	3,547.54	3,484.97	13.28	14.17	-86.99	-455.75	-257.89	430.87	404.82	26.05	16.541		
3,700.00	3,678.69	3,645.21	3,579.33	13.68	14.65	-87.03	-478.27	-269.16	452.34	425.49	26.85	16.848		
3,800.00	3,777.74	3,742.87	3,673.70	14.09	15.14	-87.06	-500.80	-280.42	473.81	446.16	27.65	17.136		
3,900.00	3,876.79	3,840.54	3,768.06	14.49	15.62	-87.09	-523.33	-291.69	495.29	466.83	28.45	17.407		
4,000.00	3,975.83	3,938.21	3,862.42	14.89	16.11	-87.11	-545.85	-302.95	516.76	487.50	29.26	17.663		
4,100.00	4,074.88	4,035.88	3,956.79	15.30	16.60	-87.14	-568.38	-314.21	538.23	508.17	30.06	17.903		
4,200.00	4,173.93	4,133.54	4,051.15	15.70	17.09	-87.16	-590.91	-325.48	559.71	528.83	30.87	18.131		
4,300.00	4,272.98	4,231.21	4,145.51	16.11	17.58	-87.25	-613.44	-336.74	581.18	549.50	31.68	18.347		
4,400.00	4,372.47	4,329.06	4,240.06	16.49	18.07	-37.51	-636.01	-348.03	601.09	568.65	32.44	18.528		
4,500.00	4,472.04	4,423.46	4,331.49	16.80	18.54	33.46	-657.26	-357.88	614.67	581.62	33.05	18.597		
4,600.00	4,570.03	4,500.00	4,405.48	17.06	18.91	47.38	-676.66	-359.68	625.55	592.18	33.37	18.745		
4,700.00	4,664.76	4,567.07	4,469.52	17.31	19.21	52.67	-696.05	-355.48	634.80	601.31	33.49	18.955		
4,800.00	4,754.60	4,639.98	4,537.71	17.54	19.53	55.96	-719.46	-344.83	642.56	608.89	33.67	19.082		
4,900.00	4,838.03	4,713.94	4,604.75	17.79	19.84	58.57	-745.50	-327.65	648.91	614.97	33.94	19.121		

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



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 5H - Slot 5H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 4H - OH - Plan #6													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (usft)	Separation Factor	Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)						
5,000.00	4,913.61	4,789.23	4,670.12	18.13	20.14	60.95	-774.12	-303.73	653.97	619.59	34.38	19.021		
5,100.00	4,980.06	4,866.14	4,733.25	18.64	20.43	63.31	-805.26	-272.83	657.90	622.78	35.12	18.733		
5,200.00	5,036.23	4,945.01	4,793.51	19.42	20.73	65.73	-838.86	-234.71	660.88	624.62	36.26	18.224		
5,300.00	5,081.16	5,026.20	4,850.13	20.51	21.04	68.26	-874.86	-189.05	663.10	625.20	37.91	17.492		
5,400.00	5,114.11	5,110.19	4,902.24	21.91	21.39	70.92	-913.16	-135.54	664.77	624.67	40.10	16.580		
5,500.00	5,141.63	5,200.00	4,950.01	23.57	21.85	73.27	-954.81	-71.97	667.67	624.93	42.74	15.621		
5,600.00	5,169.15	5,295.16	4,991.92	25.41	22.54	74.88	-999.09	1.05	672.14	626.38	45.77	14.686		
5,700.00	5,196.67	5,393.46	5,033.52	27.40	23.53	76.36	-1,044.83	77.47	677.19	628.03	49.16	13.774		
5,800.00	5,224.19	5,491.76	5,075.13	29.52	24.80	77.81	-1,090.56	153.90	682.69	629.84	52.85	12.918		
5,900.00	5,245.01	5,588.60	5,116.11	31.77	26.27	79.50	-1,135.62	229.19	687.96	631.10	56.85	12.100		
6,000.00	5,252.94	5,681.57	5,155.46	34.15	27.82	81.95	-1,178.88	301.47	693.31	632.19	61.12	11.344		
6,100.00	5,252.52	5,759.50	5,187.22	36.60	29.22	84.60	-1,215.63	362.38	701.00	635.77	65.23	10.747		
6,200.00	5,251.95	5,834.83	5,211.62	39.12	30.70	86.68	-1,253.54	422.70	713.08	643.77	69.31	10.288		
6,300.00	5,251.38	5,914.24	5,229.75	41.70	32.37	88.22	-1,295.89	487.33	728.62	655.11	73.51	9.912		
6,400.00	5,250.81	6,000.00	5,240.34	44.31	34.27	89.12	-1,343.86	557.58	746.78	668.84	77.94	9.581		
6,500.00	5,250.24	6,080.80	5,241.76	46.97	36.12	89.28	-1,390.64	623.40	767.00	684.69	82.31	9.318		
6,600.00	5,249.67	6,178.57	5,239.74	49.66	38.41	89.19	-1,447.80	702.69	788.00	700.75	87.24	9.032		
6,700.00	5,249.10	6,276.33	5,237.72	52.37	40.74	89.11	-1,504.95	781.98	808.99	716.75	92.25	8.770		
6,800.00	5,248.53	6,374.10	5,235.71	55.11	43.13	89.02	-1,562.11	861.27	829.99	732.67	97.32	8.529		
6,900.00	5,247.97	6,471.86	5,233.69	57.87	45.54	88.95	-1,619.26	940.56	850.99	748.55	102.44	8.307		
7,000.00	5,247.40	6,569.62	5,231.67	60.64	47.99	88.87	-1,676.42	1,019.85	871.99	764.38	107.60	8.104		
7,100.00	5,246.83	6,667.39	5,229.65	63.43	50.47	88.80	-1,733.57	1,099.15	892.99	780.18	112.81	7.916		
7,200.00	5,246.26	6,765.15	5,227.63	66.23	52.97	88.74	-1,790.73	1,178.44	913.99	795.94	118.05	7.742		
7,300.00	5,245.69	6,862.92	5,225.61	69.04	55.49	88.67	-1,847.89	1,257.73	935.00	811.67	123.32	7.582		
7,400.00	5,245.12	6,960.68	5,223.60	71.87	58.02	88.61	-1,905.04	1,337.02	956.00	827.38	128.62	7.433		
7,500.00	5,244.55	7,058.44	5,221.58	74.70	60.57	88.55	-1,962.20	1,416.31	977.01	843.06	133.94	7.294		
7,600.00	5,243.98	7,156.21	5,219.56	77.54	63.14	88.50	-2,019.35	1,495.60	998.01	858.73	139.28	7.165		
7,700.00	5,243.41	7,253.97	5,217.54	80.38	65.71	88.44	-2,076.51	1,574.89	1,019.02	874.38	144.64	7.045		
7,800.00	5,242.84	7,351.74	5,215.52	83.23	68.30	88.39	-2,133.66	1,654.18	1,040.03	890.02	150.01	6.933		
7,900.00	5,242.27	7,449.50	5,213.50	86.09	70.89	88.34	-2,190.82	1,733.47	1,061.04	905.64	155.40	6.828		
8,000.00	5,241.71	7,547.27	5,211.49	88.95	73.50	88.29	-2,247.97	1,812.76	1,082.05	921.25	160.80	6.729		
8,100.00	5,241.14	7,645.03	5,209.47	91.82	76.11	88.25	-2,305.13	1,892.05	1,103.06	936.84	166.21	6.636		
8,200.00	5,240.57	7,742.79	5,207.45	94.69	78.73	88.20	-2,362.28	1,971.35	1,124.07	952.43	171.63	6.549		
8,300.00	5,240.00	7,840.56	5,205.43	97.57	81.35	88.16	-2,419.44	2,050.64	1,145.08	968.01	177.06	6.467		
8,400.00	5,239.43	7,938.32	5,203.41	100.45	83.98	88.12	-2,476.59	2,129.93	1,166.09	983.59	182.50	6.389		
8,500.00	5,238.86	8,036.24	5,201.39	103.33	86.62	88.08	-2,533.83	2,209.34	1,187.10	999.14	187.96	6.316		
8,600.00	5,238.29	8,155.83	5,199.96	106.22	89.85	88.03	-2,603.36	2,306.62	1,207.83	1,013.54	194.29	6.217		
8,700.00	5,237.72	8,327.18	5,196.02	109.10	94.54	87.99	-2,696.74	2,450.22	1,224.13	1,021.78	202.35	6.050		
8,800.00	5,237.15	8,501.33	5,193.82	111.99	99.37	87.96	-2,782.71	2,601.62	1,234.45	1,024.53	209.92	5.880		
8,900.00	5,236.58	8,677.04	5,192.41	114.89	104.29	87.95	-2,860.00	2,759.39	1,238.69	1,021.79	216.90	5.711		
9,000.00	5,236.01	8,828.38	5,191.82	117.78	108.54	87.96	-2,918.91	2,898.78	1,237.12	1,014.03	223.09	5.545		
9,100.00	5,235.45	8,928.34	5,191.56	120.68	111.34	87.97	-2,956.31	2,991.47	1,234.14	1,005.27	228.88	5.392		
9,200.00	5,234.88	9,028.29	5,191.30	123.58	114.16	87.98	-2,993.72	3,084.16	1,231.17	996.50	234.67	5.246		
9,300.00	5,234.31	9,128.25	5,191.03	126.48	116.99	87.99	-3,031.13	3,176.86	1,228.20	987.74	240.46	5.108		
9,400.00	5,233.74	9,228.20	5,190.77	129.38	119.82	88.00	-3,068.53	3,269.55	1,225.23	978.96	246.26	4.975		
9,500.00	5,233.17	9,328.16	5,190.51	132.28	122.65	88.01	-3,105.94	3,362.24	1,222.25	970.19	252.07	4.849		
9,600.00	5,232.60	9,428.11	5,190.25	135.19	125.49	88.02	-3,143.35	3,454.93	1,219.28	961.41	257.87	4.728		
9,700.00	5,232.03	9,528.07	5,189.99	138.09	128.34	88.03	-3,180.75	3,547.82	1,216.31	952.62	263.68	4.613		
9,800.00	5,231.46	9,628.03	5,189.72	141.00	131.19	88.04	-3,218.16	3,640.32	1,213.33	943.83	269.50	4.502		
9,900.00	5,230.89	9,727.98	5,189.46	143.91	134.05	88.05	-3,255.57	3,733.01	1,210.36	935.04	275.32	4.396		

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Scientific Drilling, Intl
Anticollision Report



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Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 4H - OH - Plan #6													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error: 0.00 usft
Reference	Offset	Semi Major Axis		Distance									Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (")	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
10,000.00	5,230.32	9,827.94	5,189.20	146.82	136.90	88.06	-3,292.97	3,825.70	1,207.39	926.25	281.14	4.295	
10,100.00	5,229.76	9,927.89	5,188.94	149.73	139.77	88.07	-3,330.38	3,918.39	1,204.41	917.46	286.96	4.197	
10,200.00	5,229.19	10,027.85	5,188.67	152.64	142.64	88.08	-3,367.79	4,011.08	1,201.44	908.66	292.78	4.103	
10,300.00	5,228.62	10,127.80	5,188.41	155.56	145.51	88.09	-3,405.19	4,103.77	1,198.47	899.86	298.61	4.013	
10,399.98	5,228.05	10,227.74	5,188.15	158.47	148.38	88.10	-3,442.59	4,196.45	1,195.50	891.06	304.44	3.927	
10,408.39	5,228.00	10,236.14	5,188.13	158.71	148.62	88.10	-3,445.74	4,204.24	1,195.27	890.34	304.93	3.920	



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 5H - Slot 5H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - State NM 16 #21 Unit C - OH - OH													Offset Site Error: 0.00 usft	
Survey Program: 313-INCLINOMETER													Offset Well Error: 0.00 usft	
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
0.00	0.00	0.00	0.00	0.00	0.00	143.59	-2,375.07	1,751.47	2,951.14					
100.00	100.00	75.00	75.00	0.13	1.14	143.59	-2,375.07	1,751.47	2,951.03	2,949.76	1.27	2,317.395		
200.00	200.00	175.00	175.00	0.49	2.66	143.59	-2,375.07	1,751.47	2,951.03	2,947.88	3.15	936.747		
300.00	300.00	275.00	275.00	0.85	4.18	143.59	-2,375.07	1,751.47	2,951.03	2,946.00	5.03	587.017		
400.00	400.00	375.00	375.00	1.21	6.64	143.59	-2,375.07	1,751.47	2,951.03	2,943.18	7.85	376.145		
500.00	500.00	475.00	475.00	1.57	9.67	143.59	-2,375.07	1,751.47	2,951.03	2,939.79	11.24	262.529		
600.00	600.00	575.00	575.00	1.93	12.71	143.59	-2,375.07	1,751.47	2,951.03	2,936.39	14.64	201.627		
700.00	700.00	675.00	675.00	2.29	15.75	143.59	-2,375.07	1,751.47	2,951.03	2,933.00	18.03	163.661		
800.00	800.00	775.00	775.00	2.64	18.78	143.59	-2,375.07	1,751.47	2,951.03	2,929.60	21.43	137.727		
900.00	900.00	875.00	875.00	3.00	21.82	143.59	-2,375.07	1,751.47	2,951.03	2,926.21	24.82	118.888		
1,000.00	1,000.00	975.00	975.00	3.36	24.86	143.59	-2,375.07	1,751.47	2,951.03	2,922.81	28.22	104.582		
1,100.00	1,100.00	1,075.00	1,075.00	3.72	27.89	143.59	-2,375.07	1,751.47	2,951.03	2,919.42	31.61	93.350		
1,200.00	1,200.00	1,175.00	1,175.00	4.08	30.93	143.59	-2,375.07	1,751.47	2,951.03	2,916.02	35.01	84.296		
1,300.00	1,299.98	1,274.98	1,274.98	4.43	33.97	-119.30	-2,375.07	1,751.47	2,951.88	2,913.49	38.39	76.886		
1,400.00	1,399.84	1,374.84	1,374.84	4.77	37.00	-119.34	-2,375.07	1,751.47	2,954.45	2,912.68	41.77	70.735		
1,500.00	1,499.45	1,474.47	1,474.45	5.12	40.02	-119.41	-2,375.07	1,751.47	2,958.74	2,913.60	45.14	65.545		
1,600.00	1,598.70	1,573.72	1,573.70	5.47	43.04	-119.52	-2,375.07	1,751.47	2,964.76	2,916.26	48.51	61.119		
1,700.00	1,697.75	1,672.76	1,672.75	5.84	46.05	-119.75	-2,375.07	1,751.47	2,971.62	2,919.75	51.88	57.284		
1,800.00	1,796.80	1,771.81	1,771.80	6.21	49.05	-119.97	-2,375.07	1,751.47	2,978.53	2,923.28	55.25	53.913		
1,900.00	1,895.84	1,870.86	1,870.84	6.58	52.06	-120.20	-2,375.07	1,751.47	2,985.48	2,926.86	58.62	50.926		
2,000.00	1,994.89	1,969.90	1,969.89	6.96	55.07	-120.43	-2,375.07	1,751.47	2,992.48	2,930.48	62.00	48.263		
2,100.00	2,093.94	2,068.95	2,068.94	7.34	58.08	-120.65	-2,375.07	1,751.47	2,999.53	2,934.14	65.39	45.874		
2,200.00	2,192.98	2,168.00	2,167.98	7.73	61.09	-120.88	-2,375.07	1,751.47	3,006.63	2,937.85	68.77	43.719		
2,300.00	2,292.03	2,267.05	2,267.03	8.11	64.09	-121.10	-2,375.07	1,751.47	3,013.77	2,941.61	72.16	41.766		
2,400.00	2,391.08	2,366.09	2,366.08	8.50	67.10	-121.32	-2,375.07	1,751.47	3,020.95	2,945.40	75.55	39.987		
2,500.00	2,490.13	2,465.14	2,465.13	8.89	70.11	-121.54	-2,375.07	1,751.47	3,028.18	2,949.25	78.94	38.361		
2,600.00	2,589.17	2,564.19	2,564.17	9.29	73.12	-121.76	-2,375.07	1,751.47	3,035.46	2,953.13	82.33	36.869		
2,700.00	2,688.22	2,663.30	2,663.22	9.68	76.13	-121.98	-2,375.07	1,751.47	3,042.78	2,957.06	85.73	35.494		
2,800.00	2,787.27	2,762.34	2,762.27	10.08	79.13	-122.20	-2,375.07	1,751.47	3,050.15	2,961.03	89.12	34.225		
2,900.00	2,886.31	2,861.39	2,861.31	10.48	82.14	-122.42	-2,375.07	1,751.47	3,057.56	2,965.05	92.52	33.049		
3,000.00	2,985.36	2,960.44	2,960.36	10.87	85.15	-122.63	-2,375.07	1,751.47	3,065.02	2,969.11	95.91	31.957		
3,100.00	3,084.41	3,059.48	3,059.41	11.27	88.16	-122.85	-2,375.07	1,751.47	3,072.52	2,973.21	99.31	30.939		
3,200.00	3,183.46	3,158.53	3,158.46	11.67	91.17	-123.06	-2,375.07	1,751.47	3,080.06	2,977.35	102.70	29.990		
3,300.00	3,282.50	3,257.58	3,257.50	12.07	94.17	-123.27	-2,375.07	1,751.47	3,087.64	2,981.54	106.10	29.101		
3,400.00	3,381.55	3,356.63	3,356.55	12.48	97.18	-123.49	-2,375.07	1,751.47	3,095.27	2,985.77	109.50	28.268		
3,500.00	3,480.60	3,455.67	3,455.60	12.88	100.19	-123.70	-2,375.07	1,751.47	3,102.94	2,990.05	112.90	27.485		
3,600.00	3,579.64	3,554.72	3,554.64	13.28	103.20	-123.91	-2,375.07	1,751.47	3,110.65	2,994.36	116.29	26.748		
3,700.00	3,678.69	3,653.77	3,653.69	13.68	106.21	-124.11	-2,375.07	1,751.47	3,118.41	2,998.72	119.69	26.053		
3,800.00	3,777.74	3,752.81	3,752.74	14.09	109.21	-124.32	-2,375.07	1,751.47	3,126.20	3,003.11	123.09	25.397		
3,900.00	3,876.79	3,851.86	3,851.79	14.49	112.22	-124.53	-2,375.07	1,751.47	3,134.04	3,007.55	126.49	24.777		
4,000.00	3,975.83	3,950.91	3,950.83	14.89	115.23	-124.73	-2,375.07	1,751.47	3,141.92	3,012.03	129.89	24.189		
4,100.00	4,074.88	4,049.96	4,049.88	15.30	118.24	-124.94	-2,375.07	1,751.47	3,149.84	3,016.55	133.29	23.632		
4,200.00	4,173.93	4,149.00	4,148.93	15.70	121.25	-125.14	-2,375.07	1,751.47	3,157.79	3,021.11	136.69	23.103		
4,300.00	4,272.98	4,248.06	4,247.98	16.11	124.25	-125.37	-2,375.07	1,751.47	3,165.76	3,025.67	140.08	22.599		
4,400.00	4,372.47	4,347.55	4,347.47	16.49	127.27	-75.23	-2,375.07	1,751.47	3,169.76	3,026.28	143.48	22.092		
4,500.00	4,472.04	4,448.00	4,482.71	16.80	131.39	-4.43	-2,375.07	1,751.47	3,162.32	3,014.40	147.92	21.379		
4,600.00	4,570.03	4,545.32	4,545.03	17.06	133.28	9.56	-2,375.07	1,751.47	3,142.57	2,992.48	150.09	20.937		
4,700.00	4,664.76	4,640.04	4,639.76	17.31	136.16	15.34	-2,375.07	1,751.47	3,111.47	2,958.24	153.23	20.306		
4,800.00	4,754.60	4,729.89	4,729.60	17.54	138.89	19.38	-2,375.07	1,751.47	3,069.38	2,913.19	156.19	19.651		
4,900.00	4,838.03	4,813.32	4,813.03	17.79	141.42	23.24	-2,375.07	1,751.47	3,017.08	2,858.14	158.94	18.983		
5,000.00	4,913.61	4,888.90	4,888.61	18.13	143.71	27.63	-2,375.07	1,751.47	2,955.54	2,794.11	161.43	18.309		

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



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 5H - Slot 5H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - State NM 16 #21 Unit C - OH - OH													Offset Site Error: 0.00 usft	
Survey Program: 313-INCLINOMETER													Offset Well Error: 0.00 usft	
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
5,100.00	4,980.06	4,955.35	4,955.06	18.64	145.73	33.08	-2,375.07	1,751.47	2,885.93	2,722.30	163.64	17.636		
5,200.00	5,036.23	5,011.52	5,011.23	19.42	147.44	40.16	-2,375.07	1,751.47	2,809.58	2,644.03	165.55	16.971		
5,300.00	5,081.16	5,056.45	5,056.16	20.51	148.80	49.42	-2,375.07	1,751.47	2,727.94	2,560.76	167.17	16.318		
5,400.00	5,114.11	5,089.40	5,089.11	21.91	149.80	60.42	-2,375.07	1,751.47	2,642.58	2,474.07	168.51	15.682		
5,500.00	5,141.63	5,116.92	5,116.63	23.57	150.64	61.42	-2,375.07	1,751.47	2,556.41	2,386.64	169.78	15.057		
5,600.00	5,169.15	5,144.44	5,144.15	25.41	151.47	62.45	-2,375.07	1,751.47	2,470.98	2,299.80	171.18	14.435		
5,700.00	5,196.67	5,171.96	5,171.67	27.40	152.31	63.49	-2,375.07	1,751.47	2,386.37	2,213.64	172.73	13.816		
5,800.00	5,224.19	5,199.47	5,199.19	29.52	153.15	64.86	-2,375.07	1,751.47	2,302.66	2,128.22	174.44	13.201		
5,900.00	5,245.01	5,220.29	5,220.01	31.77	153.78	77.00	-2,375.07	1,751.47	2,218.90	2,042.76	176.14	12.597		
6,000.00	5,252.94	5,228.22	5,227.94	34.15	154.02	88.80	-2,375.07	1,751.47	2,135.37	1,957.68	177.69	12.018		
6,100.00	5,252.52	5,227.80	5,227.52	36.60	154.01	90.45	-2,375.07	1,751.47	2,053.37	1,874.15	179.22	11.457		
6,200.00	5,251.95	5,227.24	5,226.95	39.12	153.99	90.43	-2,375.07	1,751.47	1,973.03	1,792.03	181.00	10.901		
6,300.00	5,251.38	5,226.67	5,226.38	41.70	153.97	90.40	-2,375.07	1,751.47	1,894.57	1,711.53	183.04	10.351		
6,400.00	5,250.81	5,226.10	5,225.81	44.31	153.95	90.37	-2,375.07	1,751.47	1,818.22	1,632.86	185.36	9.809		
6,500.00	5,250.24	5,225.53	5,225.24	46.97	153.94	90.34	-2,375.07	1,751.47	1,744.26	1,556.31	187.95	9.280		
6,600.00	5,249.67	5,224.96	5,224.67	49.66	153.92	90.32	-2,375.07	1,751.47	1,673.02	1,482.18	190.83	8.767		
6,700.00	5,249.10	5,224.39	5,224.10	52.37	153.90	90.29	-2,375.07	1,751.47	1,604.84	1,410.84	194.00	8.272		
6,800.00	5,248.53	5,223.82	5,223.53	55.11	153.89	90.26	-2,375.07	1,751.47	1,540.14	1,342.70	197.45	7.800		
6,900.00	5,247.97	5,223.25	5,222.97	57.87	153.87	90.24	-2,375.07	1,751.47	1,479.38	1,278.22	201.16	7.354		
7,000.00	5,247.40	5,222.68	5,222.40	60.64	153.85	90.21	-2,375.07	1,751.47	1,423.06	1,217.94	205.12	6.938		
7,100.00	5,246.83	5,222.11	5,221.83	63.43	153.83	90.18	-2,375.07	1,751.47	1,371.73	1,162.45	209.28	6.555		
7,200.00	5,246.26	5,221.54	5,221.26	66.23	153.82	90.15	-2,375.07	1,751.47	1,325.96	1,112.38	213.58	6.208		
7,300.00	5,245.69	5,220.98	5,220.69	69.04	153.80	90.13	-2,375.07	1,751.47	1,286.35	1,068.40	217.94	5.902		
7,400.00	5,245.12	5,220.41	5,220.12	71.87	153.78	90.10	-2,375.07	1,751.47	1,253.48	1,031.21	222.27	5.639		
7,500.00	5,244.55	5,219.84	5,219.55	74.70	153.76	90.07	-2,375.07	1,751.47	1,227.90	1,001.45	226.45	5.422		
7,600.00	5,243.98	5,219.27	5,218.98	77.54	153.75	90.05	-2,375.07	1,751.47	1,210.07	979.70	230.37	5.253		
7,700.00	5,243.41	5,218.70	5,218.41	80.38	153.73	90.02	-2,375.07	1,751.47	1,200.33	966.43	233.90	5.132		
7,767.38	5,243.03	5,218.32	5,218.03	82.30	153.72	90.00	-2,375.07	1,751.47	1,198.44	962.43	236.01	5.078 CC		
7,800.00	5,242.84	5,218.13	5,217.84	83.23	153.71	89.99	-2,375.07	1,751.47	1,198.88	961.94	236.94	5.060 ES		
7,900.00	5,242.27	5,217.56	5,217.27	86.09	153.70	89.96	-2,375.07	1,751.47	1,205.75	966.31	239.44	5.036 SF		
8,000.00	5,241.71	5,216.99	5,216.71	88.95	153.68	89.94	-2,375.07	1,751.47	1,220.80	979.46	241.34	5.058		
8,100.00	5,241.14	5,216.42	5,216.14	91.82	153.66	89.91	-2,375.07	1,751.47	1,243.74	1,001.08	242.66	5.125		
8,200.00	5,240.57	5,215.85	5,215.57	94.69	153.64	89.88	-2,375.07	1,751.47	1,274.13	1,030.70	243.42	5.234		
8,300.00	5,240.00	5,215.28	5,215.00	97.57	153.63	89.86	-2,375.07	1,751.47	1,311.46	1,067.76	243.70	5.382		
8,400.00	5,239.43	5,214.72	5,214.43	100.45	153.61	89.83	-2,375.07	1,751.47	1,355.15	1,111.61	243.55	5.564		
8,500.00	5,238.86	5,214.15	5,213.86	103.33	153.59	89.80	-2,375.07	1,751.47	1,404.62	1,161.57	243.06	5.779		
8,600.00	5,238.29	5,213.58	5,213.29	106.22	153.57	89.77	-2,375.07	1,751.47	1,459.27	1,216.98	242.29	6.023		
8,700.00	5,237.72	5,213.01	5,212.72	109.10	153.56	89.75	-2,375.07	1,751.47	1,518.55	1,277.22	241.33	6.292		
8,800.00	5,237.15	5,212.44	5,212.15	111.99	153.54	89.72	-2,375.07	1,751.47	1,581.93	1,341.70	240.23	6.585		
8,900.00	5,236.58	5,211.87	5,211.58	114.89	153.52	89.69	-2,375.07	1,751.47	1,648.95	1,409.92	239.03	6.898		
9,000.00	5,236.01	5,211.30	5,211.01	117.78	153.51	89.66	-2,375.07	1,751.47	1,719.17	1,481.39	237.78	7.230		
9,100.00	5,235.45	5,210.73	5,210.45	120.68	153.49	89.64	-2,375.07	1,751.47	1,792.22	1,555.72	236.50	7.578		
9,200.00	5,234.88	5,210.16	5,209.88	123.58	153.47	89.61	-2,375.07	1,751.47	1,867.77	1,632.55	235.22	7.941		
9,300.00	5,234.31	5,209.59	5,209.31	126.48	153.45	89.58	-2,375.07	1,751.47	1,945.53	1,711.58	233.95	8.316		
9,400.00	5,233.74	5,209.03	5,208.74	129.38	153.44	89.56	-2,375.07	1,751.47	2,025.24	1,792.53	232.71	8.703		
9,500.00	5,233.17	5,208.46	5,208.17	132.28	153.42	89.53	-2,375.07	1,751.47	2,106.68	1,875.17	231.51	9.100		
9,600.00	5,232.60	5,207.89	5,207.60	135.19	153.40	89.50	-2,375.07	1,751.47	2,189.66	1,959.32	230.34	9.506		
9,700.00	5,232.03	5,207.32	5,207.03	138.09	153.38	89.47	-2,375.07	1,751.47	2,274.01	2,044.79	229.22	9.921		
9,800.00	5,231.46	5,206.75	5,206.46	141.00	153.37	89.45	-2,375.07	1,751.47	2,359.59	2,131.44	228.15	10.342		
9,900.00	5,230.89	5,206.18	5,205.89	143.91	153.35	89.42	-2,375.07	1,751.47	2,446.25	2,219.14	227.12	10.771		

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



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 5H - Slot 5H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - State NM 16 #21 Unit C - OH - OH													Offset Site Error:	0.00 usft
Survey Program: 313-INCLINOMETER													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance							Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
10,000.00	5,230.32	5,205.61	5,205.32	146.82	153.33	89.39	-2,375.07	1,751.47	2,533.90	2,307.77	226.13	11.205		
10,100.00	5,229.76	5,205.04	5,204.76	149.73	153.32	89.37	-2,375.07	1,751.47	2,622.44	2,397.25	225.19	11.645		
10,200.00	5,229.19	5,204.47	5,204.19	152.64	153.30	89.34	-2,375.07	1,751.47	2,711.77	2,487.47	224.29	12.090		
10,300.00	5,228.62	5,203.90	5,203.62	155.56	153.28	89.31	-2,375.07	1,751.47	2,801.82	2,578.38	223.44	12.540		
10,399.98	5,228.05	5,203.33	5,203.05	158.47	153.26	89.28	-2,375.07	1,751.47	2,892.51	2,669.88	222.62	12.993		
10,408.39	5,228.00	5,203.29	5,203.00	158.71	153.26	89.28	-2,375.07	1,751.47	2,900.17	2,677.61	222.56	13.031		



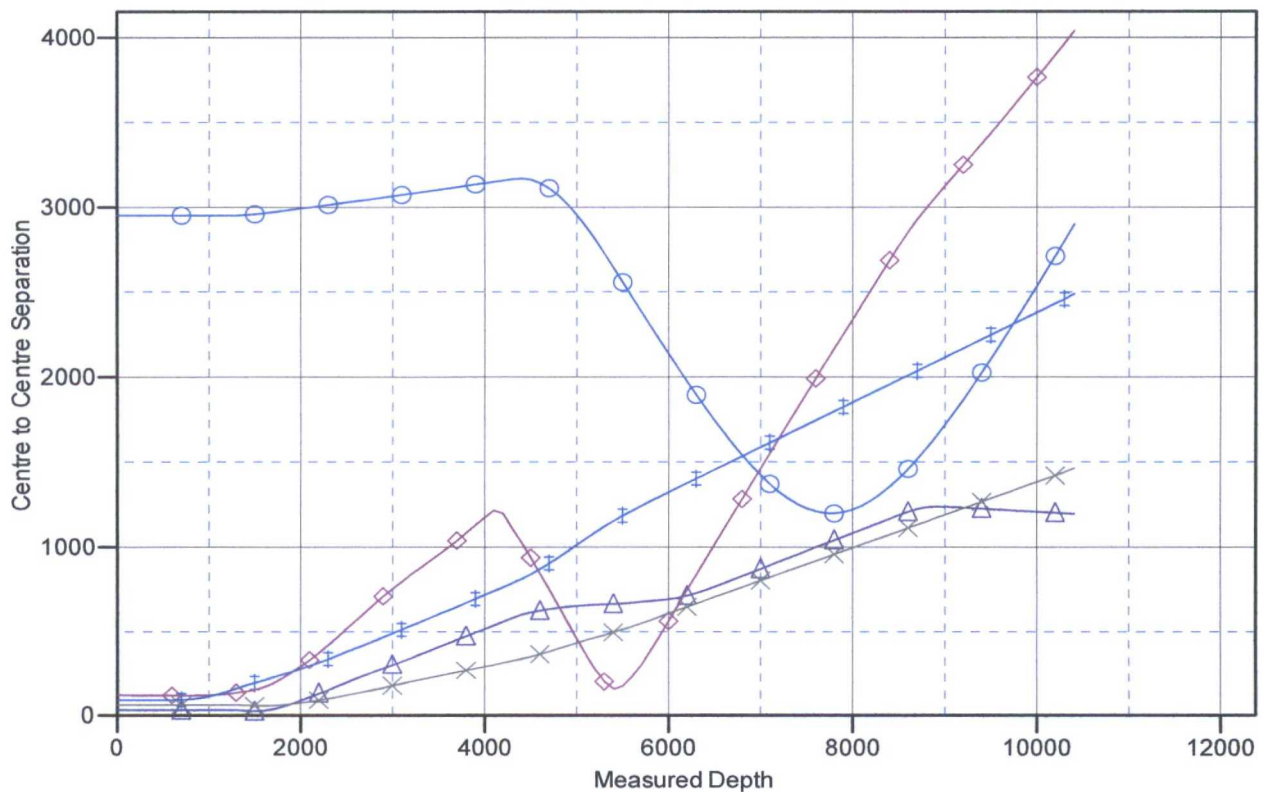
Company: Logos Operating LLC
Project: San Juan, NM NAD83
Reference Site: Heros 2308-09L
Site Error: 0.00 usft
Reference Well: Heros 2308-09L 5H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan #2

Local Co-ordinate Reference:
TVD Reference: Well Heros 2308-09L 5H - Slot 5H
GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
MD Reference: GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
North Reference: True
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: Grand Junction District
Offset TVD Reference: Offset Datum

Reference Depths are relative to GL 6913' & RKB 25' @ 6938.00usft (A)
Offset Depths are relative to Offset Datum
Central Meridian is -107.8333334

Coordinates are relative to: Heros 2308-09L 5H - Slot 5H
Coordinate System is US State Plane 1983, New Mexico Western Zone
Grid Convergence at Surface is: 0.08"

Ladder Plot



LEGEND

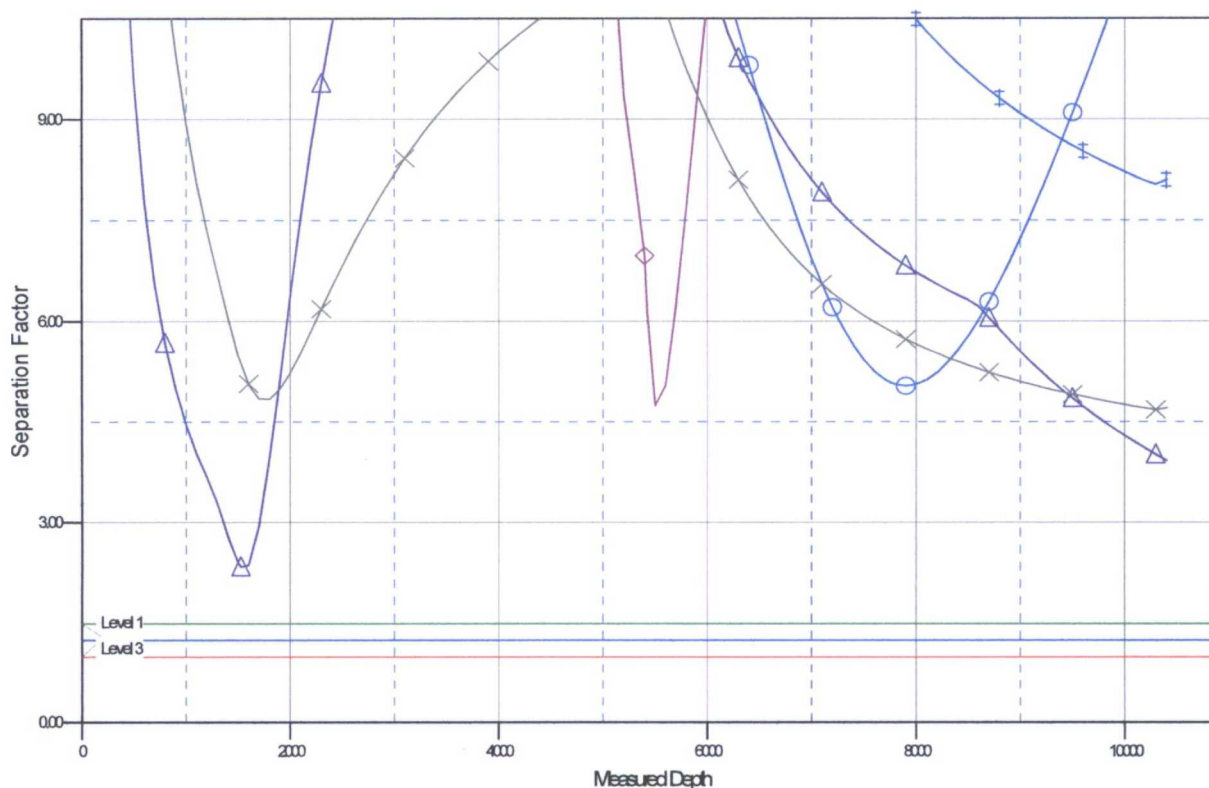
△ Heros 2308-09L 4H, OH, Plan #6 V0 ♦ Heros 2308-09L 1H, OH, OH V0 ■ Heros 2308-09L 2H, OH, Plan #6 V0
○ State NM 16 #21 Unit C, OH, OH V0 × Heros 2308-09L 3H, OH, Plan #6 V0

Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 5H - Slot 5H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 5H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #2	Offset TVD Reference:	Offset Datum

Reference Depths are relative to GL 6913' & RKB 25' @ 6938.00usft (A)
Offset Depths are relative to Offset Datum
Central Meridian is -107.8333334

Coordinates are relative to: Heros 2308-09L 5H - Slot 5H
Coordinate System is US State Plane 1983, New Mexico Western Zone
Grid Convergence at Surface is: 0.08"

Separation Factor Plot



LEGEND

- ▲ Heros 2308-09L 4H, OH, Plan #6 V0
- ◆ Heros 2308-09L 1H, OH, OH V0
- ◆ Heros 2308-09L 2H, OH, Plan #6 V0
- State NM 16 #21 Unit C, OH, OH V0
- ✕ Heros 2308-09L 3H, OH, Plan #6 V0