

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

RECEIVED

MAY 10 2018

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 3H

9. API Well No. 30-045-35848

10. Field and Pool or Exploratory Area
Nageezi Gallup

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

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

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

13. Describe Proposed or Completed Operation: Clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recomplete 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 recompletion 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.)

NMOC

MAY 11 2018

DISTRICT III

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.

**ADHERE TO PREVIOUS NMOC
CONDITIONS OF APPROVAL**

**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

Title Regulatory Specialist

Signature

Marie E. Florez

Date

05/11/2018

THE SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by

Jack Savage

Title

PE

Date

5/11/18

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

FTO

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)

NMOC *fy*

31

DISTRICT I
1825 N. French Dr., Hobbs, N.M. 88240
Phone: (575) 393-8181 Fax: (575) 393-0720

DISTRICT II
811 S. First St., Artesia, N.M. 88210
Phone: (575) 748-1253 Fax: (575) 748-9720

DISTRICT III
1000 Rio Brason Rd., Aztec, N.M. 87410
Phone: (505) 334-8178 Fax: (505) 334-8170

DISTRICT IV
1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3480 Fax: (505) 476-3482

State of New Mexico
Energy, Minerals & Natural Resources Department

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

Form C-102
Revised August 1, 2011
Submit one copy to appropriate
District Office

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

¹ API Number 30-045-35848	² Pool Code 47540	³ Pool Name NAGEEZI GALLUP
⁴ Property Code 319463	⁵ Property Name HEROS 2308 09L	⁶ Well Number #3H
⁷ OGRID No. 289408	⁸ Operator Name LOGOS OPERATING, LLC	⁹ Elevation 6913

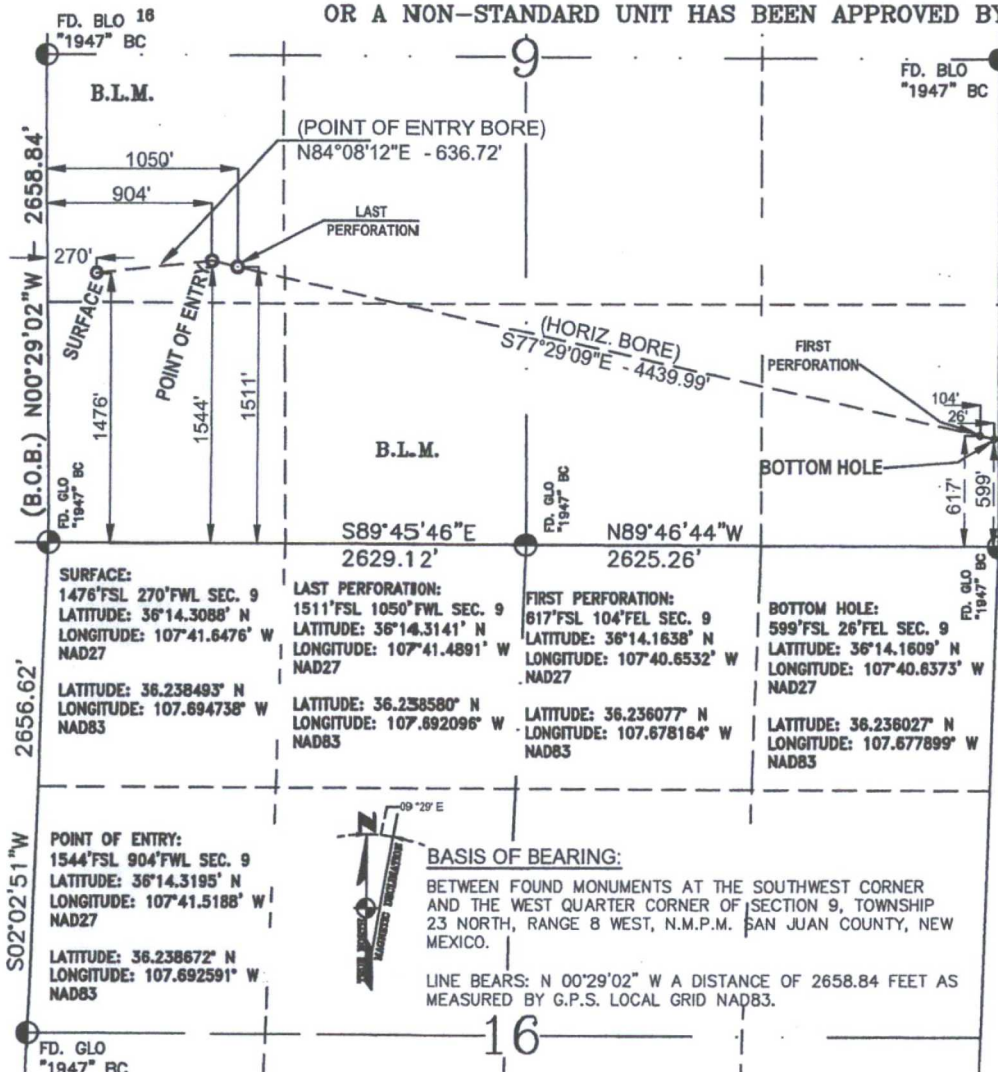
¹⁰ Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
L	9	23-N	8-W		1476	SOUTH	270	WEST	SAN JUAN

¹¹ Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
P	9	23-N	8-W		599	SOUTH	26	EAST	SAN JUAN
¹² Dedicated Acres SEC.9=N/2SW, SESW, S/2SE 200.00 ACRES			¹³ Joint or Infill		¹⁴ Consolidation Code		¹⁵ Order No.		

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



17 OPERATOR CERTIFICATION

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

Signature: Marie E. Florez Date: 5/11/2018
Printed Name: Marie E. Florez
E-mail Address: mflores@logosresourcesllc.com

18 SURVEYOR CERTIFICATION

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

Date of Survey: MAY 9, 2018
Signature and Seal of Professional Surveyor: GLEN W. RUSSELL



Certificate Number: 15703

APD Drilling Plan
LOGOS Operating, LLC

Change of Plans May 10, 2018

HEROS 2308 09L 3H
Lease Serial # NMNM18463

Surface Location: 1476 FSL, 270FWL

Legal Description: Sec 9, T23N, R8W (36.238493° N, 107.694738° W – NAD83)

Bottom Hole Location: 599 FSL, 26 FEL

Legal Description: Sec 9, T23N, R8W (36.236027° N, 107.677899° W – NAD83)

San Juan County, NM

1. The elevation of the unprepared ground is 6,913 feet above sea level.
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 Depth of 5,245' TVD/10,294' MD.
4. Estimated top of important geological markers:

<u>Formation</u>	<u>Depth (TVD)(ft)</u>	<u>Depth (MD)(ft)</u>
Nacimiento	Surface	Surface
Ojo Alamo	861	861
Kirtland	1,066	1,066
Fruitland	1,197	1,197
Pictured Cliffs	1,551	1,552
Lewis	1,661	1,663
Cliff House	3,087	3,100
Menefee	3,112	3,125
Point Lookout	4,012	4,033
Mancos	4,188	4,210
Point of Entry	5,249	5,856

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	1,197	Gas
Pictured Cliffs	1,551	Gas
Cliffhouse	3,087	Gas
Point Lookout	4,012	Gas
Mancos	4,188	Oil/Gas

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

Casing	Size	Depth		Grade	Weight	Connection	PSI		
		MD	TVD				Burst	Collapse	x1000 lbs Tension
Surface	9-5/8"	0-320'	0-320'	J-55	36.00	STC	3520	2020	394
Intermediate	7"	0-5,856'	0-5,249'	J-55	23.00	LTC	4360	3270	313
Production	4-1/2"	5,706'-10,294'	5,249'-5,245'	P-110	11.60	LTC	10690	7560	279

7. Cementing Program:

- a. 12-1/4" hole x 9-5/8" casing at 320' will have cement circulated to surface with 100 sks (100% excess true hole) Class H Cement with 1.0 % CaCl₂, 1/2 #/sk Poly-E-Flake 15.8 ppg, 1.17 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 1500psi.
- a. 8-3/4" hole x 7" casing at 5,856'. Cement will be circulated to surface in a single stage with 533 sks (60% excess true hole) of HALCEM with 1.0 % CaCl₂, 1/4 #/sk Poly-E-Flake, 5 #/sk Kol-Seal (Gilsonite) – 12.3 ppg, 1.95 ft³/sk followed by 272 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.
- a. 6-1/8" hole x 4-1/2" liner at 10,294' MD in a single stage using excess of approximately 30% for TOC at 5706'. Base slurry to consist of 413 sks EXTENDACEM -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

- a. BOPE to be installed prior to Surface Casing drillout.
- b. Pressure control equipment will be used to meet 2,000 (2M) psi specifications.
- c. BOPE working pressure of 3,000 psi.
- d. Function test and visual inspection to be done at each casing size change prior to drill out.
- e. BOP annular to be tested to 50% of working pressure.
- f. All BOP and related equipment will be tested in accordance with the requirements outlined in Onshore Order No. 2 and Notice to Operators dated May 27, 2005.
- g. BOP remote controls to be located on rig floor and readily accessible, master control on ground at accumulator will be able to function all preventors.
- h. Kill line will be 2 in min and have two kill line valves, one being a check valve.
- i. Choke line will be 2 in min and have two choke line valves, choke manifold with have two adjustable chokes, one manual and one remote. All choke lines will be as straight as possible. Any turns will be properly targeted using block and/or running tees. Choke line and manifold to be pressure tested to 1,500 psi.
- j. Float sub and TIW valve will be on the rig floor at all times.
- k. If high pressure co-flex hoses are used, they will be run as straight as possible and anchored to prevent whip.
- l. The main discharge line (panic line) will be at least 100' from the choke manifold and discharged into an appropriately sized discharge facility.

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' – 5,717'	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%
5,717' – 10,155'	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 10 or above 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, LLC 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: TBD
- c. LWD Program: TBD
- d. Coring Program: None.
- e. CBL's and/or Temperature Surveys Will Be Performed as Needed or Required.

- 11. Bottom Hole Pressure expected to be 2,500 +/- psi
- 12. Bottom Hole Temperature expected to be 160 deg F.

Well Control Equipment Schematic for 2M Service

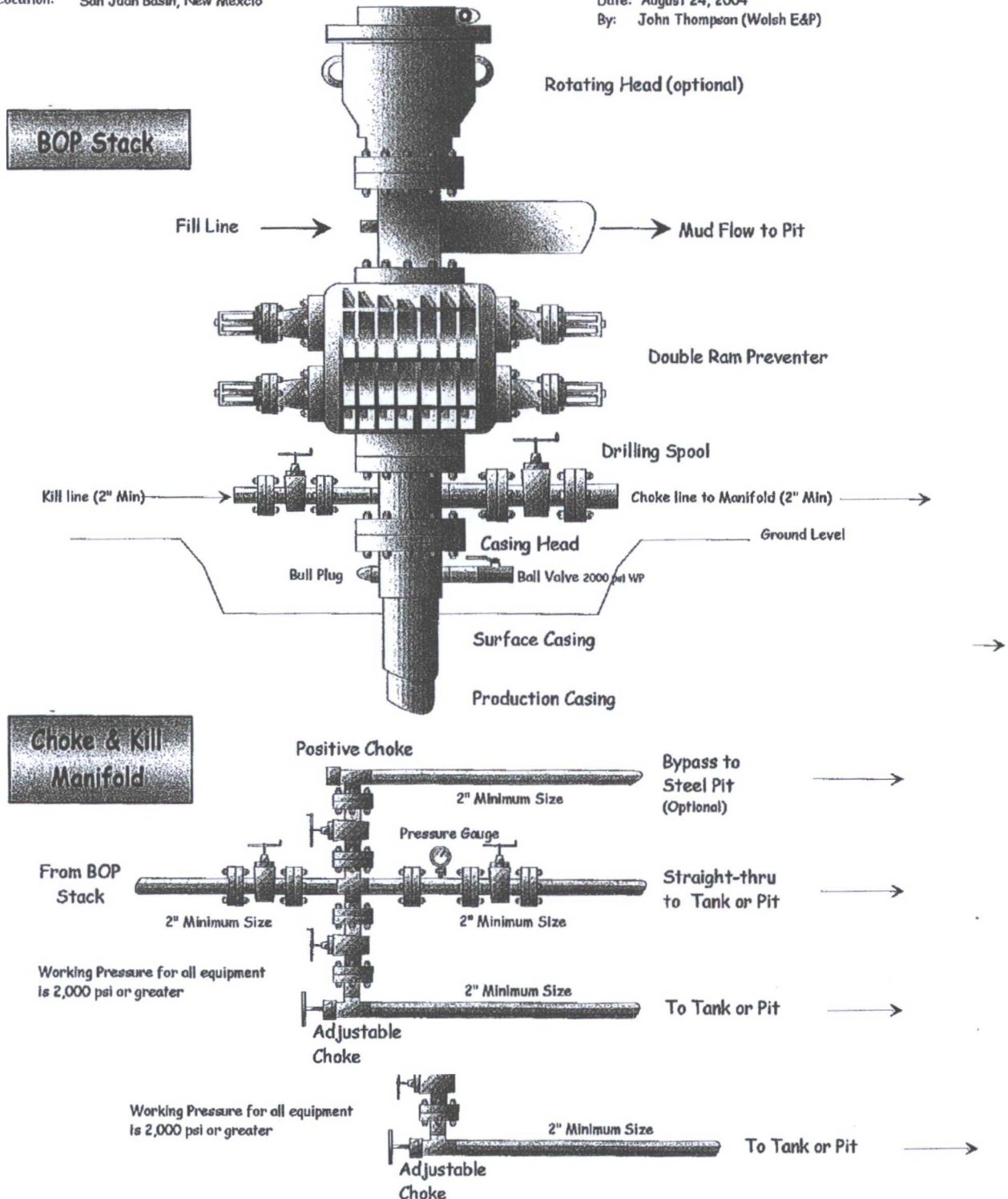
Attachment to Drilling Technical Program

Exhibit #1 Typical BOP setup

Location: San Juan Basin, New Mexico

Date: August 24, 2004

By: John Thompson (Walsh E&P)





Company: Logos Operating LLC
Project: San Juan, NM NAD83
Site: Heros 2308-09L
Well: Heros 2308-09L 3H
Wellbore: OH
Design: Plan #6

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: 8.95°

Magnetic Field
Strength: 49613.0snT
Dip Angle: 62.85°
Date: 11/20/2017
Model: HDGM

WELL DETAILS: Heros 2308-09L 3H

GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
+N/-S +E/-W Northing Easting Latitude Longitude
0.00 0.00 1906137.88 2763962.56 36.2384901 -107.6947383 3H

Plan: Plan #6 (Heros 2308-09L 3H/OH)

Created By: Janie Collins Date: 14:22, May 10 2018

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting
Heros 2308-09L 3H LP	5249.00	66.09	633.09	1906204.88	2764595.56
Heros 2308-09L 3H BHL	5245.00	-896.10	4965.72	1905248.88	2768929.56
Heros 2308-09L 3H First Perf	5245.00	-877.99	4887.75	1905266.88	2768851.56
Heros 2308-09L 3H Last Perf	5249.00	32.89	779.05	1906171.88	2764741.56

SECTION DETAILS

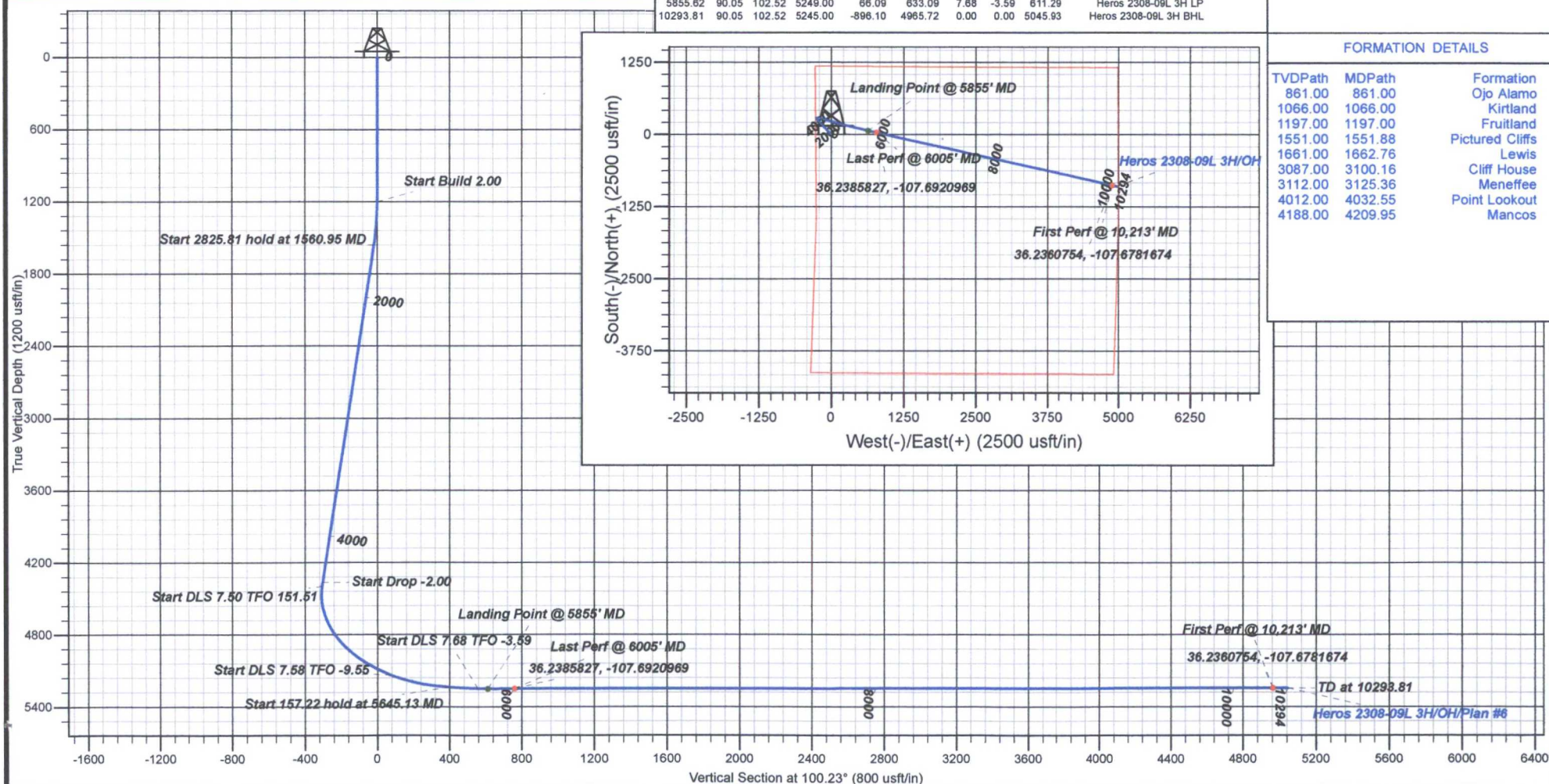
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dieg	TFace	VSec	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1200.00	0.00	0.00	1200.00	0.00	0.00	0.00	0.00	0.00	
1560.95	7.22	317.12	1559.99	16.64	-15.45	2.00	317.12	-18.16	
4386.76	7.22	317.12	4363.41	278.85	-257.08	0.00	0.00	-302.16	
4422.71	6.50	317.12	4399.10	280.00	-260.00	2.00	180.00	-305.59	
5298.32	60.00	107.00	5135.42	196.07	110.31	7.50	151.51	73.74	
5645.13	85.97	102.78	5236.09	112.44	428.21	7.58	-9.55	401.44	
5802.35	85.97	102.78	5247.15	77.75	581.15	0.00	0.00	558.11	
5855.62	90.05	102.52	5249.00	66.09	633.09	7.68	-3.59	611.29	Heros 2308-09L 3H LP
10293.81	90.05	102.52	5245.00	-896.10	4965.72	0.00	0.00	5045.93	Heros 2308-09L 3H BHL

CASING DETAILS

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

FORMATION DETAILS

TVDPath	MDPath	Formation
861.00	861.00	Ojo Alamo
1066.00	1066.00	Kirtland
1197.00	1197.00	Fruitland
1551.00	1551.88	Pictured Cliffs
1661.00	1662.76	Lewis
3087.00	3100.16	Cliff House
3112.00	3125.36	Meneffee
4012.00	4032.55	Point Lookout
4188.00	4209.95	Mancos





Logos Operating LLC

San Juan, NM NAD83

Heros 2308-09L

Heros 2308-09L 3H - Slot 3H

OH

Plan: Plan #6

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 3H - Slot 3H
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 3H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #6		

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
		Grid Convergence:	0.08 °

Well	Heros 2308-09L 3H - Slot 3H		
Well Position	+N/-S	-1.04 usft	Northing:
	+E/-W	30.00 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft
		Ground Level:	6,913.00 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination (°)
	HDGM	11/20/2017	8.95
			Dip Angle (°)
			62.85
			Field Strength (nT)
			49,613

Design	Plan #6		
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 (°)
			100.23

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	
1,560.95	7.22	317.12	1,559.99	16.64	-15.45	2.00	2.00	0.00	317.12	
4,386.76	7.22	317.12	4,363.41	276.85	-257.08	0.00	0.00	0.00	0.00	
4,422.71	6.50	317.12	4,399.10	280.00	-260.00	2.00	-2.00	0.00	180.00	
5,298.32	60.00	107.00	5,135.42	196.07	110.31	7.50	6.11	17.12	151.51	
5,645.13	85.97	102.78	5,236.09	112.44	428.21	7.58	7.49	-1.22	-9.55	
5,802.35	85.97	102.78	5,247.15	77.75	581.15	0.00	0.00	0.00	0.00	
5,855.62	90.05	102.52	5,249.00	66.09	633.09	7.68	7.67	-0.48	-3.59	Heros 2308-09L 3H LI
10,293.81	90.05	102.52	5,245.00	-896.10	4,965.72	0.00	0.00	0.00	0.00	Heros 2308-09L 3H B



Scientific Drilling, Intl
Planning Report



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Heros 2308-09L 3H - Slot 3H
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 3H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #6		

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	
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00	
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00	
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00	
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00	
861.00	0.00	0.00	861.00	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	
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,066.00	0.00	0.00	1,066.00	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	
1,197.00	0.00	0.00	1,197.00	0.00	0.00	0.00	0.00	0.00	0.00	
Fruitland										
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00	
Start Build 2.00										
1,300.00	2.00	317.12	1,299.98	1.28	-1.19	-1.40	2.00	2.00	0.00	
1,400.00	4.00	317.12	1,399.84	5.11	-4.75	-5.58	2.00	2.00	0.00	
1,500.00	6.00	317.12	1,499.45	11.50	-10.68	-12.55	2.00	2.00	0.00	
1,551.88	7.04	317.12	1,551.00	15.82	-14.69	-17.26	2.00	2.00	0.00	
Pictured Cliffs										
1,560.95	7.22	317.12	1,559.99	16.64	-15.45	-18.16	2.00	2.00	0.00	
Start 2825.81 hold at 1560.95 MD										
1,600.00	7.22	317.12	1,598.74	20.24	-18.79	-22.09	0.00	0.00	0.00	
1,662.76	7.22	317.12	1,661.00	26.02	-24.16	-28.39	0.00	0.00	0.00	
Lewis										
1,700.00	7.22	317.12	1,697.94	29.45	-27.34	-32.14	0.00	0.00	0.00	
1,800.00	7.22	317.12	1,797.15	38.65	-35.89	-42.19	0.00	0.00	0.00	
1,900.00	7.22	317.12	1,896.36	47.86	-44.44	-52.24	0.00	0.00	0.00	
2,000.00	7.22	317.12	1,995.57	57.07	-52.99	-62.29	0.00	0.00	0.00	
2,100.00	7.22	317.12	2,094.77	66.28	-61.54	-72.34	0.00	0.00	0.00	
2,200.00	7.22	317.12	2,193.98	75.49	-70.10	-82.39	0.00	0.00	0.00	
2,300.00	7.22	317.12	2,293.19	84.70	-78.65	-92.44	0.00	0.00	0.00	
2,400.00	7.22	317.12	2,392.39	93.90	-87.20	-102.49	0.00	0.00	0.00	
2,500.00	7.22	317.12	2,491.60	103.11	-95.75	-112.54	0.00	0.00	0.00	
2,600.00	7.22	317.12	2,590.81	112.32	-104.30	-122.59	0.00	0.00	0.00	
2,700.00	7.22	317.12	2,690.02	121.53	-112.85	-132.64	0.00	0.00	0.00	
2,800.00	7.22	317.12	2,789.22	130.74	-121.40	-142.69	0.00	0.00	0.00	
2,900.00	7.22	317.12	2,888.43	139.95	-129.95	-152.74	0.00	0.00	0.00	
3,000.00	7.22	317.12	2,987.64	149.15	-138.50	-162.79	0.00	0.00	0.00	
3,100.00	7.22	317.12	3,086.85	158.36	-147.05	-172.84	0.00	0.00	0.00	
3,100.16	7.22	317.12	3,087.00	158.38	-147.06	-172.85	0.00	0.00	0.00	
Cliff House										
3,125.36	7.22	317.12	3,112.00	160.70	-149.22	-175.39	0.00	0.00	0.00	
Meneffee										
3,200.00	7.22	317.12	3,186.05	167.57	-155.60	-182.89	0.00	0.00	0.00	
3,300.00	7.22	317.12	3,285.26	176.78	-164.15	-192.94	0.00	0.00	0.00	



Scientific Drilling, Intl Planning Report



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Heros 2308-09L 3H - Slot 3H
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 3H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #6		

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	7.22	317.12	3,384.47	185.99	-172.70	-202.99	0.00	0.00	0.00	
3,500.00	7.22	317.12	3,483.68	195.20	-181.25	-213.04	0.00	0.00	0.00	
3,600.00	7.22	317.12	3,582.88	204.41	-189.80	-223.09	0.00	0.00	0.00	
3,700.00	7.22	317.12	3,682.09	213.61	-198.36	-233.14	0.00	0.00	0.00	
3,800.00	7.22	317.12	3,781.30	222.82	-206.91	-243.19	0.00	0.00	0.00	
3,900.00	7.22	317.12	3,880.50	232.03	-215.46	-253.24	0.00	0.00	0.00	
4,000.00	7.22	317.12	3,979.71	241.24	-224.01	-263.29	0.00	0.00	0.00	
4,032.55	7.22	317.12	4,012.00	244.24	-226.79	-266.56	0.00	0.00	0.00	
Point Lookout										
4,100.00	7.22	317.12	4,078.92	250.45	-232.56	-273.34	0.00	0.00	0.00	
4,200.00	7.22	317.12	4,178.13	259.66	-241.11	-283.39	0.00	0.00	0.00	
4,209.95	7.22	317.12	4,188.00	260.57	-241.96	-284.39	0.00	0.00	0.00	
Mancos										
4,300.00	7.22	317.12	4,277.33	268.86	-249.66	-293.44	0.00	0.00	0.00	
4,386.76	7.22	317.12	4,363.41	276.85	-257.08	-302.16	0.00	0.00	0.00	
Start Drop -2.00										
4,400.00	6.95	317.12	4,376.54	278.05	-258.19	-303.46	2.00	-2.00	0.00	
4,422.71	6.50	317.12	4,399.10	280.00	-260.00	-305.59	2.00	-2.00	0.00	
Start DLS 7.50 TFO 151.51										
4,500.00	3.10	20.23	4,476.15	285.17	-262.26	-308.73	7.50	-4.40	81.66	
4,600.00	8.18	86.70	4,575.71	288.12	-254.21	-301.33	7.50	5.09	66.47	
4,700.00	15.39	97.46	4,673.55	286.80	-233.92	-281.14	7.50	7.20	10.76	
4,800.00	22.78	101.39	4,767.99	281.25	-201.74	-248.48	7.50	7.39	3.93	
4,900.00	30.22	103.46	4,857.42	271.55	-158.23	-203.94	7.50	7.44	2.07	
5,000.00	37.69	104.78	4,940.32	257.88	-104.12	-148.26	7.50	7.46	1.31	
5,100.00	45.16	105.71	5,015.25	240.46	-40.34	-82.40	7.50	7.47	0.93	
5,200.00	52.64	106.42	5,080.94	219.60	32.01	-7.49	7.50	7.48	0.72	
5,298.32	60.00	107.00	5,135.42	196.07	110.31	73.74	7.50	7.48	0.59	
Start DLS 7.58 TFO -9.55										
5,300.00	60.13	106.98	5,136.26	195.64	111.71	75.19	7.58	7.47	-1.45	
5,400.00	67.60	105.62	5,180.28	170.50	197.82	164.40	7.58	7.48	-1.35	
5,500.00	75.09	104.41	5,212.24	145.99	289.27	258.75	7.58	7.49	-1.22	
5,600.00	82.58	103.27	5,231.59	122.55	384.47	356.59	7.58	7.49	-1.13	
5,645.13	85.97	102.78	5,236.09	112.44	428.21	401.44	7.58	7.50	-1.10	
Start 157.22 hold at 5645.13 MD										
5,700.00	85.97	102.78	5,239.95	100.33	481.59	456.12	0.00	0.00	0.00	
5,800.00	85.97	102.78	5,246.98	78.27	578.87	555.77	0.00	0.00	0.00	
5,802.35	85.97	102.78	5,247.15	77.75	581.15	558.11	0.00	0.00	0.00	
Start DLS 7.68 TFO -3.59										
5,855.62	90.05	102.52	5,249.00	66.09	633.09	611.29	7.68	7.67	-0.48	
Landing Point @ 5855' MD - Heros 2308-09L 3H LP										
5,900.00	90.05	102.52	5,248.96	56.47	676.42	655.63	0.00	0.00	0.00	
6,000.00	90.05	102.52	5,248.87	34.79	774.04	755.55	0.00	0.00	0.00	
6,005.00	90.05	102.52	5,248.87	33.71	778.92	760.55	0.00	0.00	0.00	
36.2385827, -107.6920969 - Last Perf @ 6005' MD										
6,005.30	90.05	102.52	5,248.87	33.64	779.22	760.85	0.00	0.00	0.00	
Heros 2308-09L 3H Last Perf										
6,100.00	90.05	102.52	5,248.78	13.11	871.66	855.47	0.00	0.00	0.00	
6,200.00	90.05	102.52	5,248.69	-8.57	969.28	955.39	0.00	0.00	0.00	
6,300.00	90.05	102.52	5,248.60	-30.25	1,066.90	1,055.31	0.00	0.00	0.00	
6,400.00	90.05	102.52	5,248.51	-51.93	1,164.52	1,155.23	0.00	0.00	0.00	



Scientific Drilling, Intl Planning Report



Database: Grand Junction District
Company: Logos Operating LLC

Project: San Juan, NM NAD83

Site: Heros 2308-09L
Well: Heros 2308-09L 3H
Wellbore: OH
Design: Plan #6

Local Co-ordinate Reference: Well Heros 2308-09L 3H - Slot 3H
TVD Reference: 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

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)
6,500.00	90.05	102.52	5,248.42	-73.61	1,262.14	1,255.15	0.00	0.00	0.00
6,600.00	90.05	102.52	5,248.33	-95.29	1,359.77	1,355.07	0.00	0.00	0.00
6,700.00	90.05	102.52	5,248.24	-116.97	1,457.39	1,454.99	0.00	0.00	0.00
6,800.00	90.05	102.52	5,248.15	-138.65	1,555.01	1,554.91	0.00	0.00	0.00
6,900.00	90.05	102.52	5,248.06	-160.33	1,652.63	1,654.83	0.00	0.00	0.00
7,000.00	90.05	102.52	5,247.97	-182.01	1,750.25	1,754.75	0.00	0.00	0.00
7,100.00	90.05	102.52	5,247.88	-203.69	1,847.87	1,854.67	0.00	0.00	0.00
7,200.00	90.05	102.52	5,247.79	-225.37	1,945.49	1,954.59	0.00	0.00	0.00
7,300.00	90.05	102.52	5,247.70	-247.05	2,043.12	2,054.51	0.00	0.00	0.00
7,400.00	90.05	102.52	5,247.61	-268.74	2,140.74	2,154.43	0.00	0.00	0.00
7,500.00	90.05	102.52	5,247.52	-290.42	2,238.36	2,254.35	0.00	0.00	0.00
7,600.00	90.05	102.52	5,247.43	-312.10	2,335.98	2,354.27	0.00	0.00	0.00
7,700.00	90.05	102.52	5,247.34	-333.78	2,433.60	2,454.19	0.00	0.00	0.00
7,800.00	90.05	102.52	5,247.25	-355.46	2,531.22	2,554.11	0.00	0.00	0.00
7,900.00	90.05	102.52	5,247.16	-377.14	2,628.84	2,654.03	0.00	0.00	0.00
8,000.00	90.05	102.52	5,247.07	-398.82	2,726.47	2,753.95	0.00	0.00	0.00
8,100.00	90.05	102.52	5,246.98	-420.50	2,824.09	2,853.87	0.00	0.00	0.00
8,200.00	90.05	102.52	5,246.89	-442.18	2,921.71	2,953.79	0.00	0.00	0.00
8,300.00	90.05	102.52	5,246.80	-463.86	3,019.33	3,053.71	0.00	0.00	0.00
8,400.00	90.05	102.52	5,246.71	-485.54	3,116.95	3,153.63	0.00	0.00	0.00
8,500.00	90.05	102.52	5,246.62	-507.22	3,214.57	3,253.55	0.00	0.00	0.00
8,600.00	90.05	102.52	5,246.53	-528.90	3,312.19	3,353.47	0.00	0.00	0.00
8,700.00	90.05	102.52	5,246.44	-550.58	3,409.82	3,453.39	0.00	0.00	0.00
8,800.00	90.05	102.52	5,246.35	-572.26	3,507.44	3,553.31	0.00	0.00	0.00
8,900.00	90.05	102.52	5,246.26	-593.94	3,605.06	3,653.23	0.00	0.00	0.00
9,000.00	90.05	102.52	5,246.17	-615.62	3,702.68	3,753.15	0.00	0.00	0.00
9,100.00	90.05	102.52	5,246.08	-637.30	3,800.30	3,853.07	0.00	0.00	0.00
9,200.00	90.05	102.52	5,245.99	-658.99	3,897.92	3,952.99	0.00	0.00	0.00
9,300.00	90.05	102.52	5,245.90	-680.67	3,995.54	4,052.91	0.00	0.00	0.00
9,400.00	90.05	102.52	5,245.81	-702.35	4,093.17	4,152.83	0.00	0.00	0.00
9,500.00	90.05	102.52	5,245.72	-724.03	4,190.79	4,252.75	0.00	0.00	0.00
9,600.00	90.05	102.52	5,245.63	-745.71	4,288.41	4,352.67	0.00	0.00	0.00
9,700.00	90.05	102.52	5,245.54	-767.39	4,386.03	4,452.59	0.00	0.00	0.00
9,800.00	90.05	102.52	5,245.45	-789.07	4,483.65	4,552.51	0.00	0.00	0.00
9,900.00	90.05	102.52	5,245.36	-810.75	4,581.27	4,652.43	0.00	0.00	0.00
10,000.00	90.05	102.52	5,245.26	-832.43	4,678.89	4,752.35	0.00	0.00	0.00
10,100.00	90.05	102.52	5,245.17	-854.11	4,776.52	4,852.27	0.00	0.00	0.00
10,200.00	90.05	102.52	5,245.08	-875.79	4,874.14	4,952.19	0.00	0.00	0.00
10,213.00	90.05	102.52	5,245.07	-878.61	4,886.83	4,965.18	0.00	0.00	0.00
36.2360754, -107.6781674 - First Perf @ 10,213' MD - Heros 2308-09L 3H First Perf									
10,293.81	90.05	102.52	5,245.00	-896.13	4,965.72	5,045.93	0.00	0.00	0.00
TD at 10293.81 - Heros 2308-09L 3H BHL									



Scientific Drilling, Intl
Planning Report



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Heros 2308-09L 3H - Slot 3H
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 3H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #6		

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Heros 2308-09L 3H BHL - plan misses target center by 0.03usft at 10293.81usft MD (5245.00 TVD, -896.13 N, 4965.72 E) - Point	0.00	0.00	5,245.00	-896.10	4,965.72	1,905,248.89	2,768,929.56	36.2360273	-107.6778999
Heros 2308-09L 3H First - plan misses target center by 1.11usft at 10213.00usft MD (5245.07 TVD, -878.61 N, 4886.83 E) - Point	0.00	0.00	5,245.00	-877.99	4,887.75	1,905,266.89	2,768,851.56	36.2360771	-107.6781643
Heros 2308-09L 3H LP - plan hits target center - Point	0.00	0.00	5,249.00	66.09	633.09	1,906,204.89	2,764,595.56	36.2386717	-107.6925915
Heros 2308-09L 3H Last - plan misses target center by 0.79usft at 6005.30usft MD (5248.87 TVD, 33.64 N, 779.22 E) - Point	0.00	0.00	5,249.00	32.89	779.05	1,906,171.89	2,764,741.56	36.2385804	-107.6920965

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
861.00	861.00	Ojo Alamo		0.00	0.00
1,066.00	1,066.00	Kirtland		0.00	0.00
1,197.00	1,197.00	Fruitland		0.00	0.00
1,551.88	1,551.00	Pictured Cliffs		0.00	0.00
1,662.76	1,661.00	Lewis		0.00	0.00
3,100.16	3,087.00	Cliff House		0.00	0.00
3,125.36	3,112.00	Meneffee		0.00	0.00
4,032.55	4,012.00	Point Lookout		0.00	0.00
4,209.95	4,188.00	Mancos		0.00	0.00

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,200.00	1,200.00	0.00	0.00	Start Build 2.00
1,560.95	1,559.99	16.64	-15.45	Start 2825.81 hold at 1560.95 MD
4,386.76	4,363.41	276.85	-257.08	Start Drop -2.00
4,422.71	4,399.10	280.00	-260.00	Start DLS 7.50 TFO 151.51
5,298.32	5,135.42	196.07	110.31	Start DLS 7.58 TFO -9.55
5,645.13	5,236.09	112.44	428.21	Start 157.22 hold at 5645.13 MD
5,802.35	5,247.15	77.75	581.15	Start DLS 7.68 TFO -3.59
5,855.62	5,249.00	66.09	633.09	Landing Point @ 5855' MD
6,005.00	5,248.87	33.71	778.92	36.2385827, -107.6920969
6,005.00	5,248.87	33.71	778.92	Last Perf @ 6005' MD
10,213.00	5,245.07	-878.61	4,886.83	36.2360754, -107.6781674
10,213.00	5,245.07	-878.61	4,886.83	First Perf @ 10,213' MD
10,293.81	5,245.00	-896.13	4,965.72	TD at 10293.81



Logos Operating LLC

San Juan, NM NAD83

Heros 2308-09L

Heros 2308-09L 3H

OH

Plan #6

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 3H - Slot 3H
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 3H	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 #6	Offset TVD Reference:	Offset Datum

Reference	Plan #6
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria
Interpolation Method:	MD Interval 100.00usft
Depth Range:	Unlimited
Results Limited by:	Maximum center-center distance of 15,000.00 usft
Warning Levels Evaluated at:	2.00 Sigma
Error Model:	ISCWSA
Scan Method:	Closest Approach 3D
Error Surface:	Elliptical Conic
Casing Method:	Not applied

Survey Tool Program		Date	5/10/2018		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.00	10,293.81	Plan #6 (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	743.04	721.12	58.95	54.69	13.837	CC
Heros 2308-09L 1H - OH - OH	800.00	777.67	59.22	54.55	12.690	ES
Heros 2308-09L 1H - OH - OH	5,500.00	6,435.68	192.63	151.63	4.698	SF
Heros 2308-09L 2H - OH - Plan #6	500.00	500.00	30.02	26.88	9.570	CC
Heros 2308-09L 2H - OH - Plan #6	600.00	599.56	30.73	26.87	7.966	ES
Heros 2308-09L 2H - OH - Plan #6	10,200.00	10,350.70	1,018.79	709.41	3.293	SF
Heros 2308-09L 4H - OH - Plan #6	1,200.00	1,200.00	30.02	21.86	3.681	CC
Heros 2308-09L 4H - OH - Plan #6	1,300.00	1,300.42	30.46	21.61	3.440	ES, SF
Heros 2308-09L 5H - OH - Plan #2	1,605.54	1,612.14	55.58	44.52	5.026	CC, ES
Heros 2308-09L 5H - OH - Plan #2	10,293.81	10,062.58	1,421.90	1,119.04	4.695	SF
State NM 16 #21 Unit C - OH - OH	7,535.03	5,222.77	2,126.72	1,897.29	9.269	CC
State NM 16 #21 Unit C - OH - OH	7,600.00	5,222.71	2,127.71	1,896.42	9.199	ES
State NM 16 #21 Unit C - OH - OH	8,000.00	5,222.35	2,176.96	1,935.89	9.031	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								
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Minimum Separation	Separation Factor	Warning		
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(°)	+N/-S (usft)	+E/-W (usft)	(usft)	(usft)	(usft)				
0.00	0.00	0.00	0.00	0.00	0.00	-89.00	1.05	-60.09	64.00						
100.00	100.00	78.04	78.04	0.13	0.14	-89.01	1.04	-60.07	60.07	59.80	0.27	218.770			
200.00	200.00	178.09	178.09	0.49	0.32	-89.07	0.98	-59.96	59.97	59.16	0.81	73.815			
300.00	300.00	278.14	278.14	0.85	0.50	-89.17	0.87	-59.77	59.78	58.43	1.35	44.273			
400.00	400.00	378.19	378.19	1.21	0.68	-89.32	0.71	-59.50	59.51	57.62	1.89	31.517			
471.32	471.32	449.32	449.32	1.47	0.88	-89.38	0.64	-59.35	59.35	57.00	2.35	25.305			
500.00	500.00	477.94	477.94	1.57	0.98	-89.34	0.68	-59.37	59.37	56.83	2.55	23.318			
600.00	600.00	578.11	578.11	1.93	1.32	-89.33	0.70	-59.36	59.36	56.11	3.25	18.266			
700.00	700.00	678.22	678.20	2.29	1.67	-87.72	2.35	-59.00	59.05	55.09	3.96	14.924			
743.04	743.04	721.12	721.04	2.44	1.82	-85.59	4.54	-58.78	58.95	54.69	4.26	13.837	CC		
800.00	800.00	777.67	777.48	2.64	2.02	-82.16	8.08	-58.66	59.22	54.55	4.67	12.690	ES		
900.00	900.00	877.14	876.61	3.00	2.38	-74.44	16.27	-58.40	60.64	55.25	5.39	11.252			
1,000.00	1,000.00	976.21	975.14	3.36	2.74	-65.43	26.59	-58.16	64.01	57.88	6.13	10.442			

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 3H - Slot 3H
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 3H	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 #6	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		Between		Minimum	Separation	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)	Centres (usft)	Ellipses (usft)	Separation (usft)	Factor		
1,100.00	1,100.00	1,074.67	1,072.95	3.72	3.12	-57.03	37.86	-58.38	69.76	62.88	6.88	10.133		
1,200.00	1,200.00	1,172.44	1,169.73	4.08	3.50	-48.41	51.71	-58.26	78.34	70.68	7.65	10.234		
1,300.00	1,299.98	1,268.81	1,264.53	4.43	3.90	2.79	69.02	-58.18	89.54	81.10	8.44	10.608		
1,400.00	1,399.84	1,365.75	1,359.23	4.79	4.32	11.21	89.66	-56.65	100.93	91.73	9.20	10.968		
1,500.00	1,499.45	1,461.33	1,451.84	5.15	4.76	19.68	113.02	-53.41	113.09	103.12	9.97	11.343		
1,600.00	1,598.74	1,555.59	1,542.32	5.51	5.23	27.57	139.16	-49.68	127.60	116.88	10.72	11.902		
1,700.00	1,697.94	1,646.41	1,628.80	5.88	5.71	33.53	166.78	-47.15	146.55	135.08	11.46	12.782		
1,800.00	1,797.15	1,735.42	1,712.11	6.25	6.21	38.11	198.03	-44.87	171.63	159.46	12.17	14.100		
1,900.00	1,896.36	1,826.24	1,795.99	6.62	6.77	41.76	232.72	-42.20	200.80	187.95	12.85	15.631		
2,000.00	1,995.57	1,921.95	1,884.15	7.00	7.37	44.43	269.92	-40.18	231.22	217.69	13.53	17.094		
2,100.00	2,094.77	2,011.32	1,966.26	7.37	7.96	46.05	305.21	-39.57	262.52	248.32	14.20	18.491		
2,200.00	2,193.98	2,095.81	2,042.86	7.75	8.54	47.10	340.83	-39.59	296.67	281.83	14.84	19.996		
2,300.00	2,293.19	2,181.10	2,119.06	8.14	9.15	48.02	379.14	-38.98	333.79	318.31	15.48	21.567		
2,400.00	2,392.39	2,269.07	2,197.01	8.52	9.81	48.70	419.91	-38.77	372.41	356.27	16.14	23.070		
2,500.00	2,491.60	2,367.85	2,284.45	8.90	10.56	49.42	465.83	-37.77	411.34	394.42	16.92	24.310		
2,600.00	2,590.81	2,457.61	2,364.63	9.29	11.24	50.30	506.06	-34.60	448.97	431.35	17.62	25.476		
2,700.00	2,690.02	2,545.46	2,442.55	9.68	11.91	51.19	546.38	-30.08	488.04	469.72	18.32	26.647		
2,800.00	2,789.22	2,658.02	2,543.36	10.06	12.75	52.42	595.83	-22.34	525.58	506.32	19.27	27.281		
2,900.00	2,888.43	2,772.08	2,647.29	10.45	13.57	53.63	642.04	-13.89	559.99	539.77	20.22	27.695		
3,000.00	2,987.64	2,876.28	2,743.71	10.84	14.29	54.44	681.17	-8.52	590.92	569.84	21.08	28.036		
3,100.00	3,086.85	2,967.23	2,827.59	11.23	14.92	54.94	716.15	-4.99	622.58	600.76	21.82	28.531		
3,200.00	3,186.05	3,085.89	2,937.91	11.62	15.72	55.45	759.71	-1.82	652.24	629.44	22.81	28.598		
3,300.00	3,285.26	3,189.17	3,034.80	12.01	16.39	55.79	795.42	-0.26	679.54	655.88	23.65	28.729		
3,400.00	3,384.47	3,266.41	3,106.90	12.40	16.91	55.98	823.14	0.56	708.03	683.74	24.28	29.155		
3,500.00	3,483.68	3,352.73	3,186.89	12.80	17.50	56.17	855.55	1.73	738.28	713.28	24.99	29.539		
3,600.00	3,582.88	3,435.00	3,262.66	13.19	18.08	56.32	887.56	3.04	769.95	744.29	25.66	30.004		
3,700.00	3,682.09	3,504.09	3,325.60	13.58	18.59	56.47	916.00	4.98	804.10	777.91	26.19	30.703		
3,800.00	3,781.30	3,605.22	3,417.46	13.97	19.34	56.72	958.13	8.58	839.02	811.96	27.07	31.000		
3,900.00	3,880.50	3,724.81	3,527.08	14.36	20.20	56.96	1,005.82	11.87	871.93	843.81	28.12	31.002		
4,000.00	3,979.71	3,816.00	3,611.08	14.76	20.84	57.16	1,041.20	14.43	903.85	874.96	28.89	31.286		
4,100.00	4,078.92	3,902.02	3,689.98	15.15	21.46	57.34	1,075.33	17.25	936.74	907.13	29.60	31.642		
4,200.00	4,178.13	3,992.17	3,772.67	15.54	22.11	57.50	1,111.15	19.95	969.66	939.29	30.36	31.935		
4,300.00	4,277.33	4,098.99	3,870.52	15.94	22.88	57.62	1,153.94	22.23	1,002.68	971.39	31.30	32.039		
4,400.00	4,376.54	4,249.81	3,973.79	16.33	24.61	137.29	324.45	108.06	990.60	969.57	21.04	47.093		
4,500.00	4,476.15	4,242.94	3,973.58	16.70	24.59	69.06	331.31	107.69	900.25	878.11	22.14	40.660		
4,600.00	4,575.71	4,243.88	3,973.61	17.02	24.59	-4.74	330.38	107.74	806.87	783.61	23.27	34.679		
4,700.00	4,673.55	4,251.43	3,973.83	17.29	24.61	-26.97	322.84	108.15	711.02	686.70	24.31	29.245		
4,800.00	4,767.99	4,264.56	3,974.17	17.55	24.65	-51.48	309.73	108.84	613.39	588.21	25.18	24.358		
4,900.00	4,857.42	4,282.17	3,974.53	17.80	24.70	-90.00	292.15	109.72	514.82	489.08	25.73	20.007		
5,000.00	4,940.32	4,303.37	3,974.80	18.09	24.76	-129.79	270.97	110.73	416.43	390.72	25.71	16.196		
5,100.00	5,015.25	4,327.27	3,974.92	18.50	24.84	-154.05	247.09	111.79	320.20	295.58	24.61	13.008		
5,200.00	5,080.94	4,353.50	3,974.82	19.11	24.93	-169.07	220.89	112.84	230.52	209.18	21.34	10.800		
5,300.00	5,136.26	4,381.30	3,974.46	19.97	25.04	179.25	193.11	113.86	160.23	143.62	16.62	9.643		
5,374.27	5,170.08	4,402.06	3,974.08	20.83	25.12	171.35	172.36	114.56	139.86	114.29	25.57	5.470		
5,400.00	5,180.28	4,409.12	3,973.93	21.13	25.15	168.70	165.31	114.79	142.46	112.18	30.29	4.704		
5,500.00	5,212.24	4,435.68	3,973.28	22.60	25.27	157.81	138.77	115.61	192.63	151.63	41.00	4.698 SF		
5,600.00	5,231.59	4,460.15	3,972.61	24.36	25.39	144.04	114.31	116.25	275.64	232.12	43.52	6.333		
5,700.00	5,239.95	4,482.90	3,971.93	26.33	25.50	131.43	91.59	116.75	368.92	324.70	44.22	8.343		
5,799.99	5,246.98	4,506.86	3,971.17	28.48	25.62	124.60	67.64	117.19	464.09	419.43	44.66	10.391		
5,900.00	5,248.96	4,532.36	3,970.34	30.76	25.76	107.61	42.16	117.74	560.54	515.47	45.07	12.436		
6,000.00	5,248.87	4,557.27	3,969.48	33.15	25.91	104.79	17.27	118.35	657.31	611.83	45.47	14.454		

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 3H - Slot 3H
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 3H	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 #6	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			
6,100.00	5,248.78	6,578.27	5,268.69	35.64	26.03	102.93	-3.71	118.81	754.20	708.38	45.82	16.460			
6,200.00	5,248.69	6,598.55	5,267.85	38.20	26.16	101.46	-23.96	119.18	851.23	805.07	46.17	18.439			
6,300.00	5,248.60	6,618.98	5,266.92	40.82	26.29	100.21	-44.38	119.47	948.40	901.86	46.54	20.380			
6,400.00	5,248.51	6,640.85	5,265.86	43.49	26.44	99.08	-66.22	119.74	1,045.62	998.66	46.96	22.264			
6,500.00	5,248.42	6,662.51	5,264.73	46.20	26.58	98.12	-87.84	119.98	1,142.89	1,095.49	47.40	24.109			
6,600.00	5,248.33	6,683.08	5,263.60	48.95	26.72	97.32	-108.38	120.19	1,240.21	1,192.37	47.84	25.924			
6,700.00	5,248.24	6,702.45	5,262.50	51.72	26.86	96.66	-127.72	120.33	1,337.59	1,289.32	48.27	27.713			
6,800.00	5,248.15	6,721.42	5,261.39	54.52	27.00	96.08	-146.66	120.43	1,435.03	1,386.34	48.69	29.470			
6,900.00	5,248.06	6,735.00	5,260.58	57.34	27.10	95.70	-160.22	120.48	1,532.54	1,483.55	48.99	31.282			
7,000.00	5,247.97	6,751.96	5,259.53	60.18	27.23	95.27	-177.14	120.46	1,630.14	1,580.75	49.39	33.003			
7,100.00	5,247.88	6,764.60	5,258.72	63.03	27.33	94.96	-189.76	120.38	1,727.86	1,678.18	49.69	34.776			
7,200.00	5,247.79	6,776.67	5,257.93	65.90	27.42	94.68	-201.80	120.24	1,825.69	1,775.72	49.97	36.536			
7,300.00	5,247.70	6,797.00	5,256.54	68.78	27.58	94.25	-222.08	119.87	1,923.66	1,873.16	50.49	38.098			
7,400.00	5,247.61	6,797.00	5,256.54	71.66	27.58	94.25	-222.08	119.87	2,021.64	1,971.20	50.45	40.073			
7,500.00	5,247.52	6,816.29	5,255.22	74.56	27.73	93.87	-241.32	119.42	2,119.71	2,068.75	50.96	41.594			
7,600.00	5,247.43	6,832.02	5,254.19	77.47	27.86	93.59	-257.01	119.03	2,217.82	2,166.44	51.38	43.164			
7,700.00	5,247.34	6,847.50	5,253.22	80.38	27.99	93.35	-272.45	118.62	2,315.96	2,264.16	51.80	44.710			
7,800.00	5,247.25	6,863.26	5,252.27	83.30	28.12	93.11	-288.18	118.18	2,414.13	2,361.89	52.24	46.216			
7,900.00	5,247.16	6,879.99	5,251.34	86.23	28.26	92.89	-304.87	117.70	2,512.32	2,459.61	52.71	47.662			
8,000.00	5,247.07	6,896.58	5,250.49	89.16	28.40	92.70	-321.44	117.21	2,610.53	2,557.34	53.19	49.079			
8,100.00	5,246.98	6,913.05	5,249.72	92.09	28.54	92.53	-337.88	116.71	2,708.75	2,655.08	53.67	50.469			
8,200.00	5,246.89	6,930.81	5,248.94	95.03	28.70	92.36	-355.62	116.15	2,806.99	2,752.79	54.20	51.786			
8,300.00	5,246.80	6,949.59	5,248.00	97.98	28.86	92.18	-374.36	115.57	2,905.23	2,850.46	54.78	53.037			
8,400.00	5,246.71	6,968.36	5,246.91	100.92	29.03	92.00	-393.09	114.98	3,003.47	2,948.12	55.36	54.256			
8,500.00	5,246.62	6,986.20	5,245.76	103.87	29.19	91.82	-410.89	114.43	3,101.72	3,045.80	55.92	55.472			
8,600.00	5,246.53	7,002.07	5,244.75	106.83	29.34	91.68	-426.72	113.92	3,199.97	3,143.55	56.42	56.718			
8,700.00	5,246.44	7,017.81	5,243.81	109.78	29.49	91.55	-442.42	113.41	3,298.24	3,241.32	56.92	57.942			
8,800.00	5,246.35	7,033.43	5,242.93	112.74	29.64	91.43	-458.00	112.88	3,396.53	3,339.10	57.43	59.146			
8,900.00	5,246.26	7,056.37	5,241.74	115.71	29.86	91.27	-480.90	112.11	3,494.82	3,436.63	58.19	60.062			
9,000.00	5,246.17	7,381.02	5,236.47	118.67	33.42	90.55	-805.30	115.58	3,592.13	3,521.98	70.15	51.205			
9,100.00	5,246.08	7,458.77	5,234.64	121.63	34.38	90.41	-882.89	120.21	3,688.29	3,615.08	73.21	50.381			
9,200.00	5,245.99	7,489.78	5,234.00	124.60	34.78	90.36	-913.83	122.31	3,784.22	3,709.78	74.44	50.837			
9,300.00	5,245.90	7,513.26	5,233.59	127.57	35.08	90.33	-937.25	123.88	3,880.17	3,804.80	75.37	51.481			
9,400.00	5,245.81	7,530.00	5,233.34	130.54	35.30	90.32	-953.95	124.98	3,976.17	3,900.14	76.03	52.294			
9,500.00	5,245.72	7,553.74	5,232.99	133.51	35.61	90.29	-977.64	126.49	4,072.21	3,995.23	76.99	52.894			
9,600.00	5,245.63	7,571.93	5,232.68	136.49	35.84	90.27	-995.79	127.60	4,168.33	4,090.61	77.72	53.634			
9,700.00	5,245.54	7,591.00	5,232.33	139.46	36.09	90.25	-1,014.83	128.72	4,264.50	4,186.02	78.49	54.335			
9,800.00	5,245.45	7,616.48	5,231.81	142.44	36.43	90.22	-1,040.26	130.19	4,360.71	4,281.19	79.52	54.836			
9,900.00	5,245.36	7,643.77	5,231.16	145.42	36.79	90.19	-1,067.49	131.76	4,456.92	4,376.29	80.64	55.272			
10,000.00	5,245.26	7,669.16	5,230.49	148.39	37.13	90.15	-1,092.83	133.21	4,553.14	4,471.46	81.68	55.745			
10,100.00	5,245.17	7,835.00	5,226.44	151.37	39.43	89.97	-1,258.16	145.45	4,648.65	4,560.02	88.63	52.450			
10,200.00	5,245.08	7,855.77	5,226.02	154.35	39.73	89.95	-1,278.84	147.30	4,743.99	4,654.48	89.51	52.998			
10,293.81	5,245.00	7,865.59	5,225.79	157.15	39.87	89.95	-1,288.62	148.12	4,833.57	4,743.64	89.93	53.749			

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 3H - Slot 3H
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 3H	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 #6	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	-88.01	1.04	-30.00	30.02						
100.00	100.00	100.00	100.00	0.13	0.13	-88.01	1.04	-30.00	30.02	29.75	0.27	111.647			
200.00	200.00	200.00	200.00	0.49	0.49	-88.01	1.04	-30.00	30.02	29.03	0.99	30.449			
300.00	300.00	300.00	300.00	0.85	0.85	-88.01	1.04	-30.00	30.02	28.31	1.70	17.628			
400.00	400.00	400.00	400.00	1.21	1.21	-88.01	1.04	-30.00	30.02	27.60	2.42	12.405			
500.00	500.00	500.00	500.00	1.57	1.57	-88.01	1.04	-30.00	30.02	26.88	3.14	9.570 CC			
600.00	600.00	599.56	599.54	1.93	1.93	-85.03	2.66	-30.61	30.73	26.87	3.86	7.966 ES			
700.00	700.00	698.88	698.72	2.29	2.28	-76.97	7.50	-32.43	33.31	28.71	4.60	7.247			
800.00	800.00	797.72	797.19	2.64	2.64	-66.36	15.51	-35.44	38.78	33.42	5.37	7.224			
900.00	900.00	895.86	894.80	3.00	3.00	-56.11	26.60	-39.60	48.01	41.84	6.17	7.780			
1,000.00	1,000.00	993.07	990.64	3.36	3.37	-47.83	40.66	-44.89	61.29	54.31	6.98	8.779			
1,100.00	1,100.00	1,089.15	1,085.00	3.72	3.75	-41.68	57.55	-51.23	78.50	70.72	7.78	10.094			
1,200.00	1,200.00	1,184.71	1,178.23	4.08	4.14	-37.21	77.17	-58.61	99.32	90.79	8.53	11.645			
1,300.00	1,299.98	1,282.42	1,273.36	4.43	4.56	8.82	98.05	-66.45	119.72	110.52	9.20	13.012			
1,400.00	1,399.84	1,380.75	1,369.10	4.79	4.99	11.31	119.06	-74.35	137.01	127.13	9.88	13.870			
1,500.00	1,499.45	1,479.57	1,465.31	5.15	5.43	13.53	140.17	-82.28	151.15	140.59	10.57	14.305			
1,600.00	1,598.74	1,578.75	1,561.88	5.51	5.88	15.69	161.36	-90.24	162.42	151.15	11.27	14.416			
1,700.00	1,697.94	1,678.00	1,658.50	5.88	6.33	17.66	182.56	-98.21	173.27	161.29	11.98	14.466			
1,800.00	1,797.15	1,777.24	1,755.13	6.25	6.78	19.40	203.76	-106.18	184.30	171.61	12.69	14.518			
1,900.00	1,896.36	1,876.48	1,851.75	6.62	7.23	20.94	224.96	-114.15	195.48	182.06	13.42	14.570			
2,000.00	1,995.57	1,975.72	1,948.37	7.00	7.69	22.32	246.16	-122.11	206.79	192.64	14.14	14.619			
2,100.00	2,094.77	2,074.97	2,045.00	7.37	8.15	23.55	267.37	-130.08	218.20	203.32	14.88	14.667			
2,200.00	2,193.98	2,174.21	2,141.62	7.75	8.61	24.66	288.57	-138.05	229.70	214.09	15.61	14.711			
2,300.00	2,293.19	2,273.45	2,238.24	8.14	9.08	25.66	309.77	-146.02	241.28	224.92	16.36	14.753			
2,400.00	2,392.39	2,372.70	2,334.87	8.52	9.54	26.57	330.97	-153.98	252.92	235.82	17.10	14.791			
2,500.00	2,491.60	2,471.94	2,431.49	8.90	10.00	27.40	352.17	-161.95	264.63	246.78	17.85	14.827			
2,600.00	2,590.81	2,571.18	2,528.12	9.29	10.47	28.17	373.38	-169.92	276.38	257.78	18.60	14.861			
2,700.00	2,690.02	2,670.42	2,624.74	9.68	10.94	28.86	394.58	-177.89	288.18	268.83	19.35	14.892			
2,800.00	2,789.22	2,769.67	2,721.36	10.06	11.40	29.51	415.78	-185.85	300.01	279.91	20.11	14.921			
2,900.00	2,888.43	2,868.91	2,817.99	10.45	11.87	30.10	436.98	-193.82	311.88	291.02	20.86	14.948			
3,000.00	2,987.64	2,968.15	2,914.61	10.84	12.34	30.65	458.18	-201.79	323.78	302.16	21.62	14.973			
3,100.00	3,086.85	3,067.40	3,011.23	11.23	12.81	31.16	479.38	-209.76	335.71	313.33	22.39	14.997			
3,200.00	3,186.05	3,166.64	3,107.86	11.62	13.28	31.64	500.59	-217.72	347.67	324.52	23.15	15.019			
3,300.00	3,285.26	3,265.88	3,204.48	12.01	13.75	32.09	521.79	-225.69	359.64	335.73	23.91	15.039			
3,400.00	3,384.47	3,365.12	3,301.11	12.40	14.22	32.50	542.99	-233.66	371.64	346.96	24.68	15.058			
3,500.00	3,483.68	3,464.37	3,397.73	12.80	14.69	32.89	564.19	-241.63	383.65	358.20	25.45	15.076			
3,600.00	3,582.88	3,563.61	3,494.35	13.19	15.16	33.26	585.39	-249.59	395.68	369.47	26.22	15.093			
3,700.00	3,682.09	3,662.85	3,590.98	13.58	15.63	33.61	606.60	-257.56	407.73	380.74	26.99	15.109			
3,800.00	3,781.30	3,762.10	3,687.60	13.97	16.10	33.93	627.80	-265.53	419.79	392.03	27.76	15.124			
3,900.00	3,880.50	3,861.34	3,784.22	14.36	16.57	34.24	649.00	-273.50	431.86	403.33	28.53	15.138			
4,000.00	3,979.71	3,960.58	3,880.85	14.76	17.04	34.53	670.20	-281.46	443.94	414.64	29.30	15.152			
4,100.00	4,078.92	4,059.82	3,977.47	15.15	17.51	34.80	691.40	-289.43	456.03	425.96	30.07	15.164			
4,200.00	4,178.13	4,159.07	4,074.10	15.54	17.98	35.06	712.60	-297.40	468.14	437.29	30.85	15.176			
4,300.00	4,277.33	4,258.31	4,170.72	15.94	18.45	35.31	733.81	-305.37	480.25	448.63	31.62	15.187			
4,400.00	4,376.54	4,357.55	4,267.34	16.33	18.92	35.56	755.01	-313.33	492.40	460.00	32.40	15.199			
4,500.00	4,475.15	4,475.90	4,383.05	16.70	19.46	-26.92	776.23	-322.06	505.33	472.04	33.29	15.182			
4,600.00	4,575.71	4,596.42	4,501.87	17.02	19.97	-93.50	797.64	-325.96	519.82	485.77	34.05	15.267			
4,700.00	4,673.55	4,719.91	4,623.26	17.29	20.38	-103.92	814.32	-311.78	535.60	500.90	34.70	15.435			
4,800.00	4,767.99	4,845.43	4,743.14	17.55	20.72	-106.92	827.68	-277.58	552.22	516.96	35.26	15.680			
4,900.00	4,857.42	4,972.23	4,857.39	17.80	20.99	-107.52	837.12	-223.71	569.35	533.54	35.80	15.901			
5,000.00	4,940.32	5,099.52	4,961.98	18.09	21.20	-106.85	842.25	-151.61	586.70	550.24	36.46	16.092			

CC - Min centre to center distance or covergent 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 3H - Slot 3H
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 3H	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 #6	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	5,015.25	5,226.46	5,053.34	18.50	21.36	-105.39	842.88	-63.69	604.08	566.63	37.44	16.133		
5,200.00	5,080.94	5,352.32	5,128.68	19.11	21.51	-103.35	839.07	36.88	621.33	582.36	38.97	15.944		
5,300.00	5,136.26	5,471.79	5,184.25	19.97	22.00	-100.96	831.71	142.25	638.61	597.42	41.19	15.504		
5,400.00	5,180.28	5,587.97	5,221.99	21.13	23.50	-97.60	821.85	251.56	654.89	610.78	44.11	14.846		
5,500.00	5,212.24	5,702.30	5,242.58	22.60	25.47	-94.61	809.79	363.26	668.59	620.89	47.70	14.017		
5,600.00	5,231.59	5,804.45	5,250.34	24.36	27.48	-92.42	797.67	464.40	680.09	628.53	51.56	13.191		
5,700.00	5,239.95	5,903.88	5,257.42	26.33	29.61	-91.88	785.81	562.86	690.50	634.86	55.65	12.409		
5,799.99	5,246.98	6,023.04	5,262.04	28.48	32.34	-91.54	770.12	680.84	699.49	638.95	60.54	11.555		
5,900.00	5,248.96	6,122.74	5,262.20	30.76	34.72	-91.07	755.58	779.47	706.79	641.59	65.20	10.840		
6,000.00	5,248.87	6,222.48	5,262.36	33.15	37.19	-91.08	741.04	878.14	714.00	643.95	70.05	10.192		
6,100.00	5,248.78	6,322.22	5,262.52	35.64	39.73	-91.09	726.49	976.81	721.21	646.14	75.07	9.607		
6,200.00	5,248.69	6,421.96	5,262.68	38.20	42.33	-91.10	711.94	1,075.49	728.43	648.20	80.23	9.079		
6,300.00	5,248.60	6,521.70	5,262.85	40.82	44.98	-91.11	697.39	1,174.16	735.64	650.15	85.49	8.605		
6,400.00	5,248.51	6,621.44	5,263.01	43.49	47.67	-91.12	682.84	1,272.83	742.85	652.00	90.85	8.177		
6,500.00	5,248.42	6,721.18	5,263.17	46.20	50.40	-91.13	668.30	1,371.50	750.07	653.78	96.28	7.790		
6,600.00	5,248.33	6,820.92	5,263.33	48.95	53.16	-91.13	653.75	1,470.18	757.28	655.50	101.78	7.440		
6,700.00	5,248.24	6,920.65	5,263.49	51.72	55.94	-91.14	639.20	1,568.85	764.49	657.17	107.33	7.123		
6,800.00	5,248.15	7,020.39	5,263.65	54.52	58.74	-91.15	624.65	1,667.52	771.71	658.78	112.92	6.834		
6,900.00	5,248.06	7,120.13	5,263.81	57.34	61.56	-91.16	610.11	1,766.19	778.92	660.36	118.56	6.570		
7,000.00	5,247.97	7,219.87	5,263.97	60.18	64.40	-91.17	595.56	1,864.87	786.14	661.91	124.23	6.328		
7,100.00	5,247.88	7,319.61	5,264.13	63.03	67.25	-91.17	581.01	1,963.54	793.35	663.42	129.93	6.106		
7,200.00	5,247.79	7,419.35	5,264.29	65.90	70.11	-91.18	566.46	2,062.21	800.56	664.91	135.65	5.902		
7,300.00	5,247.70	7,519.09	5,264.45	68.78	72.99	-91.19	551.91	2,160.88	807.78	666.38	141.40	5.713		
7,400.00	5,247.61	7,618.83	5,264.61	71.66	75.87	-91.19	537.37	2,259.56	814.99	667.83	147.16	5.538		
7,500.00	5,247.52	7,718.57	5,264.77	74.56	78.77	-91.20	522.82	2,358.23	822.20	669.25	152.95	5.376		
7,600.00	5,247.43	7,818.31	5,264.93	77.47	81.67	-91.21	508.27	2,456.90	829.42	670.67	158.75	5.225		
7,700.00	5,247.34	7,918.05	5,265.09	80.38	84.57	-91.22	493.72	2,555.57	836.63	672.07	164.56	5.084		
7,800.00	5,247.25	8,017.79	5,265.25	83.30	87.49	-91.22	479.18	2,654.25	843.84	673.45	170.39	4.952		
7,900.00	5,247.16	8,117.53	5,265.41	86.23	90.41	-91.23	464.63	2,752.92	851.06	674.83	176.23	4.829		
8,000.00	5,247.07	8,217.27	5,265.57	89.16	93.33	-91.23	450.08	2,851.59	858.27	676.19	182.08	4.714		
8,100.00	5,246.98	8,317.01	5,265.73	92.09	96.26	-91.24	435.53	2,950.27	865.48	677.55	187.93	4.605		
8,200.00	5,246.89	8,416.75	5,265.89	95.03	99.20	-91.25	420.99	3,048.94	872.70	678.90	193.80	4.503		
8,300.00	5,246.80	8,516.49	5,266.05	97.98	102.14	-91.25	406.44	3,147.61	879.91	680.24	199.67	4.407		
8,400.00	5,246.71	8,616.22	5,266.21	100.92	105.08	-91.26	391.89	3,246.28	887.13	681.57	205.56	4.316		
8,500.00	5,246.62	8,715.96	5,266.37	103.87	108.02	-91.27	377.34	3,344.96	894.34	682.90	211.44	4.230		
8,600.00	5,246.53	8,815.70	5,266.53	106.83	110.97	-91.27	362.79	3,443.63	901.55	684.22	217.34	4.148		
8,700.00	5,246.44	8,915.44	5,266.69	109.78	113.92	-91.28	348.25	3,542.30	908.77	685.53	223.24	4.071		
8,800.00	5,246.35	9,015.18	5,266.85	112.74	116.88	-91.28	333.70	3,640.97	915.98	686.84	229.14	3.997		
8,900.00	5,246.26	9,114.92	5,267.01	115.71	119.83	-91.29	319.15	3,739.65	923.19	688.15	235.05	3.928		
9,000.00	5,246.17	9,214.66	5,267.17	118.67	122.79	-91.29	304.60	3,838.32	930.41	689.45	240.96	3.861		
9,100.00	5,246.08	9,314.40	5,267.33	121.63	125.75	-91.30	290.06	3,936.99	937.62	690.74	246.88	3.798		
9,200.00	5,245.99	9,414.14	5,267.49	124.60	128.71	-91.30	275.51	4,035.66	944.83	692.04	252.80	3.737		
9,300.00	5,245.90	9,513.88	5,267.65	127.57	131.68	-91.31	260.96	4,134.34	952.05	693.32	258.72	3.680		
9,400.00	5,245.81	9,613.62	5,267.82	130.54	134.64	-91.31	246.41	4,233.01	959.26	694.61	264.65	3.625		
9,500.00	5,245.72	9,713.36	5,267.98	133.51	137.61	-91.32	231.86	4,331.68	966.48	695.89	270.58	3.572		
9,600.00	5,245.63	9,813.10	5,268.14	136.49	140.58	-91.32	217.32	4,430.36	973.69	697.17	276.51	3.521		
9,700.00	5,245.54	9,912.84	5,268.30	139.46	143.55	-91.33	202.77	4,529.03	980.90	698.45	282.45	3.473		
9,800.00	5,245.45	10,012.58	5,268.46	142.44	146.52	-91.33	188.22	4,627.70	988.12	699.73	288.39	3.426		
9,900.00	5,245.36	10,112.32	5,268.62	145.42	149.49	-91.34	173.67	4,726.37	995.33	701.00	294.33	3.382		
10,000.00	5,245.26	10,212.06	5,268.78	148.39	152.46	-91.34	159.13	4,825.05	1,002.54	702.27	300.27	3.339		

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 3H - Slot 3H
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 3H	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 #6	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)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
10,100.00	5,245.17	10,311.80	5,268.94	151.37	155.44	-91.35	144.58	4,923.72	1,009.76	703.54	306.22	3.298	
10,200.00	5,245.08	10,350.70	5,269.00	154.35	156.60	-91.35	138.90	4,962.20	1,018.79	709.41	309.38	3.293 SF	
10,293.81	5,245.00	10,350.70	5,269.00	157.15	156.60	-91.35	138.90	4,962.20	1,035.29	726.69	308.60	3.355	



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 3H - Slot 3H
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 3H	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 #6	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 Tooface (")	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	Offset	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)							
0.00	0.00	0.00	0.00	0.00	0.00	88.17	0.96	30.00	30.02					
100.00	100.00	100.00	100.00	0.13	0.13	88.17	0.96	30.00	30.02	29.75	0.27	111.647		
200.00	200.00	200.00	200.00	0.49	0.49	88.17	0.96	30.00	30.02	29.03	0.99	30.449		
300.00	300.00	300.00	300.00	0.85	0.85	88.17	0.96	30.00	30.02	28.31	1.70	17.628		
400.00	400.00	400.00	400.00	1.21	1.21	88.17	0.96	30.00	30.02	27.60	2.42	12.405		
500.00	500.00	500.00	500.00	1.57	1.57	88.17	0.96	30.00	30.02	26.88	3.14	9.570		
600.00	600.00	600.00	600.00	1.93	1.93	88.17	0.96	30.00	30.02	26.16	3.85	7.789		
700.00	700.00	700.00	700.00	2.29	2.29	88.17	0.96	30.00	30.02	25.45	4.57	6.567		
800.00	800.00	800.00	800.00	2.64	2.64	88.17	0.96	30.00	30.02	24.73	5.29	5.677		
900.00	900.00	900.00	900.00	3.00	3.00	88.17	0.96	30.00	30.02	24.01	6.00	4.999		
1,000.00	1,000.00	1,000.00	1,000.00	3.36	3.36	88.17	0.96	30.00	30.02	23.30	6.72	4.466		
1,100.00	1,100.00	1,100.00	1,100.00	3.72	3.72	88.17	0.96	30.00	30.02	22.58	7.44	4.035		
1,200.00	1,200.00	1,200.00	1,200.00	4.08	4.08	88.17	0.96	30.00	30.02	21.86	8.16	3.681 CC		
1,300.00	1,299.98	1,300.42	1,300.40	4.43	4.42	136.45	-0.62	29.21	30.46	21.61	8.85	3.440 ES, SF		
1,400.00	1,399.84	1,400.34	1,400.18	4.79	4.75	151.08	-5.31	26.87	33.29	23.76	9.54	3.491		
1,500.00	1,499.45	1,499.28	1,498.73	5.15	5.08	168.83	-13.01	23.02	41.67	31.45	10.22	4.076		
1,600.00	1,598.74	1,596.82	1,595.55	5.51	5.41	-176.88	-23.58	17.73	57.13	46.21	10.92	5.231		
1,700.00	1,697.94	1,693.05	1,690.62	5.88	5.75	-166.94	-36.90	11.07	77.01	65.39	11.62	6.629		
1,800.00	1,797.15	1,787.87	1,783.76	6.25	6.10	-159.74	-52.80	3.12	100.33	88.02	12.31	8.152		
1,900.00	1,896.36	1,881.13	1,874.73	6.62	6.45	-154.29	-71.13	-6.04	126.89	113.90	12.99	9.771		
2,000.00	1,995.57	1,973.73	1,964.39	7.00	6.82	-150.00	-91.82	-16.39	156.47	142.81	13.66	11.456		
2,100.00	2,094.77	2,068.44	2,055.90	7.37	7.22	-146.85	-113.67	-27.31	187.26	172.91	14.35	13.052		
2,200.00	2,193.98	2,163.16	2,147.41	7.75	7.62	-144.58	-135.52	-38.24	218.42	203.38	15.04	14.522		
2,300.00	2,293.19	2,257.87	2,238.92	8.14	8.04	-142.88	-157.36	-49.16	249.81	234.07	15.74	15.870		
2,400.00	2,392.39	2,352.59	2,330.43	8.52	8.46	-141.56	-179.21	-60.08	281.36	264.92	16.45	17.109		
2,500.00	2,491.60	2,447.30	2,421.94	8.90	8.89	-140.50	-201.06	-71.00	313.02	295.87	17.16	18.246		
2,600.00	2,590.81	2,542.01	2,513.45	9.29	9.32	-139.64	-222.90	-81.93	344.76	326.89	17.87	19.293		
2,700.00	2,690.02	2,636.73	2,604.96	9.68	9.76	-138.92	-244.75	-92.85	376.55	357.97	18.59	20.259		
2,800.00	2,789.22	2,731.44	2,696.47	10.06	10.21	-138.31	-266.59	-103.77	408.40	389.09	19.31	21.151		
2,900.00	2,888.43	2,826.16	2,787.98	10.45	10.66	-137.80	-288.44	-114.70	440.27	420.24	20.03	21.977		
3,000.00	2,987.64	2,920.87	2,879.49	10.84	11.11	-137.35	-310.29	-125.62	472.17	451.41	20.76	22.744		
3,100.00	3,086.85	3,015.58	2,971.00	11.23	11.57	-136.96	-332.13	-136.54	504.10	482.61	21.49	23.457		
3,200.00	3,186.05	3,110.30	3,062.51	11.62	12.02	-136.61	-353.98	-147.47	536.04	513.82	22.22	24.121		
3,300.00	3,285.26	3,205.01	3,154.03	12.01	12.49	-136.31	-375.83	-158.39	568.00	545.05	22.96	24.742		
3,400.00	3,384.47	3,299.73	3,245.54	12.40	12.95	-136.03	-397.67	-169.31	599.98	576.28	23.69	25.323		
3,500.00	3,483.68	3,394.44	3,337.05	12.80	13.41	-135.79	-419.52	-180.24	631.96	607.53	24.43	25.867		
3,600.00	3,582.88	3,489.15	3,428.56	13.19	13.88	-135.56	-441.36	-191.16	663.96	638.78	25.17	26.378		
3,700.00	3,682.09	3,583.87	3,520.07	13.58	14.35	-135.36	-463.21	-202.08	695.96	670.05	25.91	26.859		
3,800.00	3,781.30	3,678.58	3,611.58	13.97	14.82	-135.18	-485.06	-213.00	727.97	701.31	26.65	27.311		
3,900.00	3,880.50	3,773.30	3,703.09	14.36	15.29	-135.01	-506.90	-223.93	759.98	732.58	27.40	27.739		
4,000.00	3,979.71	3,868.01	3,794.60	14.76	15.76	-134.85	-528.75	-234.85	792.00	763.86	28.14	28.143		
4,100.00	4,078.92	3,962.72	3,886.11	15.15	16.23	-134.71	-550.60	-245.77	824.03	795.14	28.89	28.525		
4,200.00	4,178.13	4,057.44	3,977.62	15.54	16.71	-134.58	-572.44	-256.70	856.06	826.42	29.63	28.887		
4,300.00	4,277.33	4,152.15	4,069.13	15.94	17.18	-134.46	-594.29	-267.62	888.09	857.71	30.38	29.230		
4,400.00	4,376.54	4,246.87	4,160.65	16.33	17.66	-134.40	-616.14	-278.54	920.11	888.98	31.13	29.556		
4,500.00	4,476.15	4,341.93	4,252.49	16.70	18.14	161.19	-638.06	-289.51	950.33	918.47	31.86	29.831		
4,600.00	4,575.71	4,432.46	4,340.21	17.02	18.58	93.89	-658.47	-298.46	976.45	943.98	32.47	30.072		
4,700.00	4,675.55	4,500.00	4,405.48	17.29	18.91	82.39	-675.75	-299.68	1,001.35	968.54	32.80	30.526		
4,800.00	4,767.99	4,563.25	4,465.91	17.55	19.20	77.87	-693.97	-295.86	1,025.27	992.21	33.06	31.014		
4,900.00	4,857.42	4,629.32	4,527.86	17.80	19.49	75.47	-714.98	-286.78	1,048.04	1,014.68	33.36	31.417		
5,000.00	4,940.32	4,700.00	4,592.30	18.09	19.78	74.14	-739.52	-271.37	1,069.52	1,035.73	33.79	31.650		

CC - Min centre to center distance or covergent 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 3H - Slot 3H
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 3H	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 #6	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		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)						
5,100.00	5,015.25	4,764.18	4,648.72	18.50	20.04	73.28	-763.46	-252.39	1,089.57	1,055.26	34.31	31.759		
5,200.00	5,080.94	4,833.64	4,707.06	19.11	20.31	72.94	-790.97	-226.66	1,108.12	1,073.00	35.13	31.546		
5,300.00	5,136.26	4,904.99	4,763.54	19.97	20.58	72.98	-820.71	-194.84	1,125.10	1,088.81	36.29	30.999		
5,400.00	5,180.28	4,978.36	4,817.47	21.13	20.85	73.98	-852.59	-156.70	1,141.94	1,104.06	37.89	30.142		
5,500.00	5,212.24	5,053.96	4,868.11	22.80	21.15	74.81	-886.51	-112.04	1,159.98	1,120.05	39.92	29.056		
5,600.00	5,231.59	5,132.42	4,914.86	24.36	21.49	75.51	-922.51	-60.38	1,179.14	1,136.72	42.42	27.799		
5,700.00	5,239.95	5,215.52	4,957.39	26.33	21.95	76.92	-961.12	-0.37	1,199.50	1,154.21	45.30	26.481		
5,799.99	5,246.98	5,304.84	4,996.02	28.48	22.62	78.75	-1,002.68	68.58	1,221.41	1,172.82	48.58	25.141		
5,900.00	5,248.96	5,391.66	5,032.76	30.76	23.51	79.70	-1,043.08	136.08	1,244.07	1,191.98	52.09	23.882		
6,000.00	5,248.87	5,477.60	5,069.14	33.15	24.60	81.57	-1,083.07	202.90	1,268.11	1,212.32	55.79	22.729		
6,100.00	5,248.78	5,563.55	5,105.51	35.64	25.87	83.39	-1,123.05	269.71	1,293.73	1,234.09	59.64	21.692		
6,200.00	5,248.69	5,649.49	5,141.88	38.20	27.27	85.16	-1,163.04	336.53	1,320.83	1,257.23	63.60	20.769		
6,300.00	5,248.60	5,728.93	5,175.37	40.82	28.65	86.73	-1,200.05	398.33	1,349.37	1,281.89	67.48	19.997		
6,400.00	5,248.51	5,790.94	5,198.25	43.49	29.82	87.78	-1,230.24	447.40	1,380.30	1,309.27	71.03	19.433		
6,500.00	5,248.42	5,850.00	5,215.69	46.20	31.00	88.57	-1,260.54	494.98	1,413.65	1,339.12	74.53	18.967		
6,600.00	5,248.33	5,922.95	5,231.25	48.95	32.56	89.26	-1,299.75	554.46	1,448.97	1,370.50	78.48	18.464		
6,700.00	5,248.24	5,991.20	5,239.69	51.72	34.07	89.62	-1,337.93	610.38	1,486.02	1,403.69	82.33	18.049		
6,800.00	5,248.15	6,059.57	5,242.14	54.52	35.63	89.73	-1,377.32	666.18	1,524.59	1,438.38	86.21	17.684		
6,900.00	5,248.06	6,148.03	5,240.37	57.34	37.69	89.67	-1,429.03	737.93	1,564.08	1,473.27	90.81	17.224		
7,000.00	5,247.97	6,239.88	5,238.48	60.18	39.87	89.61	-1,482.73	812.42	1,603.58	1,508.00	95.58	16.777		
7,100.00	5,247.88	6,331.73	5,236.58	63.03	42.09	89.55	-1,536.43	886.92	1,643.09	1,542.68	100.41	16.364		
7,200.00	5,247.79	6,423.58	5,234.68	65.90	44.35	89.49	-1,590.12	961.41	1,682.60	1,577.31	105.28	15.981		
7,300.00	5,247.70	6,515.43	5,232.79	68.78	46.63	89.44	-1,643.82	1,035.91	1,722.11	1,611.90	110.20	15.627		
7,400.00	5,247.61	6,607.29	5,230.89	71.66	48.94	89.39	-1,697.52	1,110.41	1,761.62	1,646.46	115.15	15.298		
7,500.00	5,247.52	6,699.14	5,229.00	74.56	51.28	89.34	-1,751.22	1,184.90	1,801.13	1,680.99	120.14	14.992		
7,600.00	5,247.43	6,790.99	5,227.10	77.47	53.63	89.29	-1,804.92	1,259.40	1,840.64	1,715.49	125.15	14.707		
7,700.00	5,247.34	6,882.84	5,225.20	80.38	56.00	89.24	-1,858.62	1,333.89	1,880.16	1,749.97	130.19	14.442		
7,800.00	5,247.25	6,974.69	5,223.31	83.30	58.39	89.20	-1,912.32	1,408.39	1,919.67	1,784.43	135.24	14.194		
7,900.00	5,247.16	7,066.55	5,221.41	86.23	60.79	89.16	-1,966.01	1,482.89	1,959.19	1,818.87	140.32	13.962		
8,000.00	5,247.07	7,158.40	5,219.51	89.16	63.20	89.12	-2,019.71	1,557.38	1,998.70	1,853.29	145.41	13.745		
8,100.00	5,246.98	7,250.25	5,217.62	92.09	65.62	89.08	-2,073.41	1,631.88	2,038.22	1,887.70	150.52	13.541		
8,200.00	5,246.89	7,342.10	5,215.72	95.03	68.04	89.04	-2,127.11	1,706.37	2,077.74	1,922.10	155.64	13.350		
8,300.00	5,246.80	7,433.95	5,213.83	97.98	70.48	89.01	-2,180.81	1,780.87	2,117.26	1,956.49	160.77	13.170		
8,400.00	5,246.71	7,525.81	5,211.93	100.92	72.93	88.97	-2,234.51	1,855.37	2,156.78	1,990.87	165.91	12.999		
8,500.00	5,246.62	7,617.66	5,210.03	103.87	75.38	88.94	-2,288.21	1,929.86	2,196.30	2,025.23	171.07	12.839		
8,600.00	5,246.53	7,709.51	5,208.14	106.83	77.83	88.91	-2,341.91	2,004.36	2,235.82	2,059.59	176.23	12.687		
8,700.00	5,246.44	7,801.36	5,206.24	109.78	80.30	88.88	-2,395.60	2,078.85	2,275.34	2,093.94	181.40	12.543		
8,800.00	5,246.35	7,893.21	5,204.34	112.74	82.76	88.85	-2,449.30	2,153.35	2,314.86	2,128.29	186.58	12.407		
8,900.00	5,246.26	7,985.07	5,202.45	115.71	85.24	88.82	-2,503.00	2,227.84	2,354.39	2,162.63	191.76	12.278		
9,000.00	5,246.17	8,077.22	5,200.55	118.67	87.72	88.79	-2,556.87	2,302.59	2,393.90	2,196.94	196.96	12.154		
9,100.00	5,246.08	8,169.37	5,198.65	121.63	90.16	88.70	-2,610.74	2,382.08	2,428.58	2,212.07	202.15	12.037		
9,200.00	5,245.99	8,261.52	5,196.75	124.60	92.55	88.70	-2,664.61	2,461.57	2,466.91	2,217.78	207.35	11.920		
9,300.00	5,245.90	8,353.67	5,194.85	127.57	94.94	88.71	-2,718.48	2,541.06	2,463.33	2,228.43	212.55	11.803		
9,400.00	5,245.81	8,445.82	5,192.95	130.54	97.33	88.71	-2,772.35	2,620.55	2,479.76	2,239.07	217.75	11.686		
9,500.00	5,245.72	8,537.97	5,191.05	133.51	99.72	88.72	-2,826.22	2,700.04	2,496.19	2,249.70	222.95	11.569		
9,600.00	5,245.63	8,630.12	5,189.15	136.49	102.11	88.72	-2,880.09	2,780.53	2,512.62	2,260.34	228.15	11.452		
9,700.00	5,245.54	8,722.27	5,187.25	139.46	104.50	88.73	-2,933.96	2,861.02	2,529.04	2,270.97	233.35	11.335		
9,800.00	5,245.45	8,814.42	5,185.35	142.44	106.89	88.73	-2,987.83	2,941.51	2,545.47	2,281.59	238.55	11.218		
9,900.00	5,245.36	8,906.57	5,183.45	145.42	109.28	88.73	-3,041.70	3,022.00	2,561.90	2,292.21	243.75	11.101		
10,000.00	5,245.26	9,000.00	5,181.55	148.39	111.67	88.74	-3,095.57	3,102.49	2,578.33	2,302.83	248.95	10.984		

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 3H - Slot 3H
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 3H	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 #6	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	
10,100.00	5,245.17	9,741.51	5,189.43	151.37	134.43	88.74	-3,259.71	3,805.56	2,594.76	2,313.45	281.31	9.224	
10,200.00	5,245.08	9,840.15	5,189.17	154.35	137.25	88.75	-3,296.62	3,897.03	2,611.18	2,324.06	287.12	9.094	
10,293.81	5,245.00	9,932.68	5,188.92	157.15	139.91	88.75	-3,331.25	3,982.84	2,626.62	2,334.04	292.58	8.978	



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 3H - Slot 3H
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 3H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 5H - OH - Plan #2													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)		Between Centres (usft)	Between Ellipses (usft)				Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	
0.00	0.00	0.00	0.00	0.00	0.00	89.13	0.91	60.00	60.01					
100.00	100.00	100.00	100.00	0.13	0.13	89.13	0.91	60.00	60.01	59.74	0.27	223.200		
200.00	200.00	200.00	200.00	0.49	0.49	89.13	0.91	60.00	60.01	59.02	0.99	60.873		
300.00	300.00	300.00	300.00	0.85	0.85	89.13	0.91	60.00	60.01	58.31	1.70	35.242		
400.00	400.00	400.00	400.00	1.21	1.21	89.13	0.91	60.00	60.01	57.59	2.42	24.800		
500.00	500.00	500.00	500.00	1.57	1.57	89.13	0.91	60.00	60.01	56.87	3.14	19.131		
600.00	600.00	600.00	600.00	1.93	1.93	89.13	0.91	60.00	60.01	56.15	3.85	15.572		
700.00	700.00	700.00	700.00	2.29	2.29	89.13	0.91	60.00	60.01	55.44	4.57	13.129		
800.00	800.00	800.00	800.00	2.64	2.64	89.13	0.91	60.00	60.01	54.72	5.29	11.349		
900.00	900.00	900.00	900.00	3.00	3.00	89.13	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	89.13	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	89.13	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	89.13	0.91	60.00	60.01	51.85	8.16	7.358		
1,300.00	1,299.98	1,302.10	1,302.08	4.43	4.43	133.48	0.69	58.20	59.42	50.55	8.87	6.697		
1,400.00	1,399.84	1,404.04	1,403.87	4.79	4.78	138.06	0.01	52.79	57.91	48.32	9.59	6.039		
1,500.00	1,499.45	1,505.66	1,505.08	5.15	5.14	146.09	-1.11	43.84	56.24	45.93	10.31	5.456		
1,600.00	1,598.74	1,606.63	1,605.27	5.51	5.50	157.55	-2.66	31.43	55.58	44.56	11.02	5.044		
1,605.54	1,604.24	1,612.14	1,610.72	5.53	5.52	158.23	-2.75	30.68	55.58	44.52	11.06	5.026 CC, ES		
1,700.00	1,697.94	1,705.91	1,703.60	5.88	5.86	169.71	-4.35	17.87	56.73	45.01	11.72	4.840		
1,800.00	1,797.15	1,805.18	1,801.93	6.25	6.23	-179.08	-6.05	4.30	60.30	47.87	12.44	4.848		
1,900.00	1,896.36	1,904.45	1,900.25	6.62	6.60	-169.44	-7.74	-9.27	65.91	52.74	13.17	5.004		
2,000.00	1,995.57	2,003.72	1,998.58	7.00	6.97	-161.47	-9.44	-22.83	73.09	59.18	13.92	5.252		
2,100.00	2,094.77	2,103.00	2,096.91	7.37	7.35	-155.02	-11.14	-36.40	81.42	66.76	14.67	5.551		
2,200.00	2,193.98	2,202.27	2,195.23	7.75	7.73	-149.81	-12.83	-49.97	90.59	75.17	15.42	5.873		
2,300.00	2,293.19	2,301.54	2,293.56	8.14	8.12	-145.59	-14.53	-63.53	100.37	84.18	16.18	6.202		
2,400.00	2,392.39	2,400.82	2,391.89	8.52	8.51	-142.12	-16.22	-77.10	110.59	93.65	16.95	6.526		
2,500.00	2,491.60	2,500.09	2,490.22	8.90	8.90	-139.25	-17.92	-90.66	121.15	103.44	17.71	6.841		
2,600.00	2,590.81	2,599.36	2,588.54	9.29	9.29	-136.84	-19.62	-104.23	131.96	113.48	18.48	7.142		
2,700.00	2,690.02	2,698.64	2,686.87	9.68	9.68	-134.80	-21.31	-117.80	142.96	123.72	19.24	7.429		
2,800.00	2,789.22	2,797.91	2,785.20	10.06	10.07	-133.05	-23.01	-131.36	154.12	134.11	20.01	7.702		
2,900.00	2,888.43	2,897.18	2,883.52	10.45	10.47	-131.54	-24.70	-144.93	165.40	144.62	20.78	7.959		
3,000.00	2,987.64	2,996.46	2,981.85	10.84	10.86	-130.22	-26.40	-158.50	176.78	155.23	21.55	8.203		
3,100.00	3,086.85	3,095.73	3,080.18	11.23	11.26	-129.06	-28.09	-172.06	188.25	165.92	22.32	8.432		
3,200.00	3,186.05	3,195.00	3,178.51	11.62	11.65	-128.03	-29.79	-185.63	199.78	176.68	23.10	8.649		
3,300.00	3,285.26	3,294.28	3,276.83	12.01	12.05	-127.12	-31.49	-199.20	211.36	187.49	23.87	8.854		
3,400.00	3,384.47	3,393.55	3,375.16	12.40	12.45	-126.30	-33.18	-212.76	223.00	198.35	24.65	9.048		
3,500.00	3,483.68	3,492.82	3,473.49	12.80	12.85	-125.56	-34.88	-226.33	234.67	209.25	25.42	9.232		
3,600.00	3,582.88	3,592.10	3,571.82	13.19	13.25	-124.90	-36.57	-239.90	246.38	220.18	26.20	9.405		
3,700.00	3,682.09	3,691.37	3,670.14	13.58	13.65	-124.29	-38.27	-253.46	258.12	231.14	26.97	9.569		
3,800.00	3,781.30	3,790.64	3,768.47	13.97	14.05	-123.74	-39.97	-267.03	269.88	242.13	27.75	9.725		
3,900.00	3,880.50	3,889.92	3,868.80	14.36	14.45	-123.23	-41.66	-280.60	281.67	253.14	28.53	9.874		
4,000.00	3,979.71	3,989.19	3,965.12	14.76	14.85	-122.76	-43.36	-294.16	293.48	264.17	29.31	10.014		
4,100.00	4,078.92	4,088.46	4,063.45	15.15	15.25	-122.33	-45.05	-307.73	305.30	275.22	30.08	10.148		
4,200.00	4,178.13	4,187.74	4,161.78	15.54	15.65	-121.93	-46.75	-321.29	317.14	286.28	30.86	10.276		
4,300.00	4,277.33	4,287.26	4,260.36	15.94	16.06	-121.56	-48.45	-334.89	329.00	297.35	31.65	10.397		
4,400.00	4,376.54	4,384.34	4,356.85	16.33	16.43	-121.81	-50.83	-344.97	340.70	308.32	32.39	10.520		
4,500.00	4,476.15	4,476.11	4,448.33	16.70	16.73	173.28	-57.27	-344.79	353.34	320.35	32.99	10.711		
4,600.00	4,575.71	4,566.80	4,537.78	17.02	16.98	105.07	-67.96	-334.75	367.04	333.57	33.47	10.968		
4,700.00	4,675.55	4,656.62	4,624.17	17.29	17.20	92.80	-82.65	-315.29	381.51	347.65	33.86	11.267		
4,800.00	4,767.99	4,745.72	4,706.54	17.55	17.41	87.59	-101.05	-286.87	396.45	362.24	34.22	11.587		
4,900.00	4,857.42	4,834.30	4,784.02	17.80	17.62	84.48	-122.86	-250.02	411.56	376.97	34.59	11.898		

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 3H - Slot 3H
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 3H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 5H - OH - Plan #2													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	Offset		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)						
5,000.00	4,940.32	4,922.54	4,855.80	18.09	17.86	82.35	-147.81	-205.27	426.56	391.49	35.07	12.164		
5,100.00	5,015.25	5,010.61	4,921.12	18.50	18.17	80.83	-175.56	-153.20	441.22	405.46	35.75	12.340		
5,200.00	5,080.94	5,100.00	4,980.06	19.11	18.64	79.76	-206.28	-93.50	455.30	418.50	36.80	12.371		
5,300.00	5,136.26	5,186.99	5,029.54	19.97	19.31	79.04	-238.23	-29.55	468.60	430.33	38.27	12.244		
5,400.00	5,180.28	5,275.45	5,071.22	21.13	20.22	79.30	-272.38	40.54	482.46	442.15	40.31	11.968		
5,500.00	5,212.24	5,364.05	5,103.67	22.60	21.38	79.38	-307.80	114.93	498.11	455.18	42.93	11.604		
5,600.00	5,231.59	5,458.67	5,130.26	24.36	22.88	79.69	-346.31	197.16	514.96	468.70	46.26	11.131		
5,700.00	5,239.95	5,554.59	5,156.66	26.33	24.57	81.56	-385.38	280.69	532.18	482.03	50.15	10.612		
5,799.99	5,246.98	5,650.22	5,182.97	28.48	26.41	83.96	-424.34	363.96	550.36	496.05	54.31	10.134		
5,900.00	5,248.96	5,744.60	5,208.95	30.76	28.34	85.88	-462.79	446.15	569.43	510.80	58.64	9.711		
6,000.00	5,248.87	5,840.43	5,234.14	33.15	30.41	88.53	-501.86	529.93	589.75	526.64	63.11	9.345		
6,100.00	5,248.78	5,943.01	5,250.01	35.64	32.78	90.11	-543.78	622.12	610.25	542.31	67.94	8.982		
6,200.00	5,248.69	6,046.15	5,252.82	38.20	35.28	90.37	-585.42	716.38	629.87	556.91	72.96	8.633		
6,300.00	5,248.60	6,144.26	5,252.27	40.82	37.72	90.32	-624.81	806.23	649.21	571.25	77.96	8.328		
6,400.00	5,248.51	6,242.37	5,251.71	43.49	40.21	90.27	-664.21	896.08	668.55	585.49	83.06	8.049		
6,500.00	5,248.42	6,340.48	5,251.15	46.20	42.76	90.22	-703.61	985.93	687.89	599.64	88.25	7.795		
6,600.00	5,248.33	6,438.59	5,250.59	48.95	45.34	90.18	-743.00	1,075.78	707.24	613.71	93.52	7.562		
6,700.00	5,248.24	6,536.70	5,250.03	51.72	47.96	90.13	-782.40	1,165.63	726.58	627.73	98.85	7.350		
6,800.00	5,248.15	6,634.81	5,249.47	54.52	50.60	90.09	-821.80	1,255.49	745.92	641.69	104.24	7.156		
6,900.00	5,248.06	6,732.92	5,248.92	57.34	53.28	90.06	-861.19	1,345.34	765.27	655.60	109.67	6.978		
7,000.00	5,247.97	6,831.03	5,248.36	60.18	55.97	90.02	-900.59	1,435.19	784.61	669.47	115.14	6.815		
7,100.00	5,247.88	6,929.14	5,247.80	63.03	58.68	89.98	-939.98	1,525.04	803.96	683.32	120.64	6.664		
7,200.00	5,247.79	7,027.25	5,247.24	65.90	61.40	89.95	-979.38	1,614.89	823.30	697.13	126.17	6.525		
7,300.00	5,247.70	7,125.36	5,246.68	68.78	64.14	89.92	-1,018.78	1,704.74	842.65	710.92	131.73	6.397		
7,400.00	5,247.61	7,223.47	5,246.12	71.66	66.89	89.89	-1,058.17	1,794.59	861.99	724.68	137.31	6.278		
7,500.00	5,247.52	7,321.58	5,245.57	74.56	69.65	89.86	-1,097.57	1,884.44	881.34	738.43	142.91	6.167		
7,600.00	5,247.43	7,419.69	5,245.01	77.47	72.42	89.83	-1,136.96	1,974.29	900.68	752.16	148.53	6.064		
7,700.00	5,247.34	7,517.80	5,244.45	80.38	75.20	89.81	-1,176.36	2,064.14	920.03	765.87	154.16	5.968		
7,800.00	5,247.25	7,615.91	5,243.89	83.30	77.99	89.78	-1,215.76	2,154.00	939.38	779.57	159.81	5.878		
7,900.00	5,247.16	7,714.02	5,243.33	86.23	80.78	89.76	-1,255.15	2,243.85	958.72	793.25	165.47	5.794		
8,000.00	5,247.07	7,812.13	5,242.77	89.16	83.58	89.73	-1,294.55	2,333.70	978.07	806.93	171.14	5.715		
8,100.00	5,246.98	7,910.24	5,242.22	92.09	86.38	89.71	-1,333.94	2,423.55	997.42	820.60	176.82	5.641		
8,200.00	5,246.89	8,008.35	5,241.66	95.03	89.19	89.69	-1,373.34	2,513.40	1,016.76	834.25	182.51	5.571		
8,300.00	5,246.80	8,106.46	5,241.10	97.98	92.01	89.67	-1,412.74	2,603.25	1,036.11	847.90	188.21	5.505		
8,400.00	5,246.71	8,204.57	5,240.54	100.92	94.82	89.65	-1,452.13	2,693.10	1,055.46	861.54	193.92	5.443		
8,500.00	5,246.62	8,302.68	5,239.98	103.87	97.65	89.63	-1,491.53	2,782.95	1,074.80	875.17	199.63	5.384		
8,600.00	5,246.53	8,400.79	5,239.42	106.83	100.47	89.61	-1,530.93	2,872.80	1,094.15	888.80	205.35	5.328		
8,700.00	5,246.44	8,498.90	5,238.87	109.78	103.30	89.59	-1,570.32	2,962.65	1,113.50	902.42	211.08	5.275		
8,800.00	5,246.35	8,597.01	5,238.31	112.74	106.13	89.58	-1,609.72	3,052.50	1,132.85	916.04	216.81	5.225		
8,900.00	5,246.26	8,695.12	5,237.75	115.71	108.96	89.56	-1,649.11	3,142.36	1,152.19	929.65	222.54	5.177		
9,000.00	5,246.17	8,793.23	5,237.19	118.67	111.80	89.54	-1,688.51	3,232.21	1,171.54	943.26	228.28	5.132		
9,100.00	5,246.08	8,891.34	5,236.63	121.63	114.64	89.53	-1,727.91	3,322.06	1,190.89	956.86	234.03	5.089		
9,200.00	5,245.99	8,989.45	5,236.07	124.60	117.48	89.51	-1,767.30	3,411.91	1,210.24	970.46	239.78	5.047		
9,300.00	5,245.90	9,087.56	5,235.52	127.57	120.32	89.50	-1,806.70	3,501.76	1,229.59	984.05	245.53	5.008		
9,400.00	5,245.81	9,185.67	5,234.96	130.54	123.16	89.48	-1,846.09	3,591.61	1,248.93	997.65	251.29	4.970		
9,500.00	5,245.72	9,283.78	5,234.40	133.51	126.01	89.47	-1,885.49	3,681.46	1,268.28	1,011.23	257.05	4.934		
9,600.00	5,245.63	9,381.89	5,233.84	136.49	128.85	89.46	-1,924.89	3,771.31	1,287.63	1,024.82	262.81	4.899		
9,700.00	5,245.54	9,480.00	5,233.28	139.46	131.70	89.44	-1,964.28	3,861.16	1,306.98	1,038.40	268.57	4.866		
9,800.00	5,245.45	9,578.11	5,232.72	142.44	134.55	89.43	-2,003.68	3,951.01	1,326.33	1,051.98	274.34	4.835		
9,900.00	5,245.36	9,676.22	5,232.17	145.42	137.40	89.42	-2,043.07	4,040.87	1,345.67	1,065.56	280.11	4.804		

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 3H - Slot 3H
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 3H	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 #6	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 5H - OH - Plan #2													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)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
10,000.00	5,245.26	9,774.33	5,231.61	148.39	140.26	89.41	-2,082.47	4,130.72	1,365.02	1,079.14	285.88	4.775		
10,100.00	5,245.17	9,872.44	5,231.05	151.37	143.11	89.39	-2,121.87	4,220.57	1,384.37	1,092.71	291.66	4.747		
10,200.00	5,245.08	9,970.55	5,230.49	154.35	145.96	89.38	-2,161.26	4,310.42	1,403.72	1,106.28	297.44	4.719		
10,293.81	5,245.00	10,062.58	5,229.97	157.15	148.64	89.37	-2,198.22	4,394.70	1,421.90	1,119.04	302.86	4.695 SF		



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 3H - Slot 3H
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 3H	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 #6	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	142.66	-2,374.15	1,811.47	2,986.41					
100.00	100.00	75.00	75.00	0.13	1.14	142.66	-2,374.15	1,811.47	2,986.30	2,985.03	1.27	2,345.097		
200.00	200.00	175.00	175.00	0.49	2.66	142.66	-2,374.15	1,811.47	2,986.30	2,983.15	3.15	947.945		
300.00	300.00	275.00	275.00	0.85	4.18	142.66	-2,374.15	1,811.47	2,986.30	2,981.28	5.03	594.034		
400.00	400.00	375.00	375.00	1.21	6.64	142.66	-2,374.15	1,811.47	2,986.30	2,978.46	7.85	380.641		
500.00	500.00	475.00	475.00	1.57	9.67	142.66	-2,374.15	1,811.47	2,986.30	2,975.06	11.24	265.667		
600.00	600.00	575.00	575.00	1.93	12.71	142.66	-2,374.15	1,811.47	2,986.30	2,971.67	14.64	204.037		
700.00	700.00	675.00	675.00	2.29	15.75	142.66	-2,374.15	1,811.47	2,986.30	2,968.27	18.03	165.617		
800.00	800.00	775.00	775.00	2.64	18.78	142.66	-2,374.15	1,811.47	2,986.30	2,964.88	21.43	139.373		
900.00	900.00	875.00	875.00	3.00	21.82	142.66	-2,374.15	1,811.47	2,986.30	2,961.48	24.82	120.309		
1,000.00	1,000.00	975.00	975.00	3.36	24.86	142.66	-2,374.15	1,811.47	2,986.30	2,958.09	28.22	105.832		
1,100.00	1,100.00	1,075.00	1,075.00	3.72	27.89	142.66	-2,374.15	1,811.47	2,986.30	2,954.69	31.61	94.466		
1,200.00	1,200.00	1,175.00	1,175.00	4.08	30.93	142.66	-2,374.15	1,811.47	2,986.30	2,951.30	35.01	85.304		
1,300.00	1,299.98	1,274.98	1,274.98	4.43	33.97	-174.46	-2,374.15	1,811.47	2,988.04	2,949.64	38.40	77.813		
1,400.00	1,399.84	1,374.84	1,374.84	4.79	37.00	-174.46	-2,374.15	1,811.47	2,993.25	2,951.46	41.79	71.628		
1,500.00	1,499.45	1,474.47	1,474.45	5.15	40.02	-174.46	-2,374.15	1,811.47	3,001.93	2,956.75	45.17	66.458		
1,600.00	1,598.74	1,573.75	1,573.74	5.51	43.04	-174.47	-2,374.15	1,811.47	3,013.79	2,965.25	48.54	62.085		
1,700.00	1,697.94	1,672.96	1,672.94	5.88	46.05	-174.49	-2,374.15	1,811.47	3,026.30	2,974.39	51.91	58.299		
1,800.00	1,797.15	1,772.16	1,772.15	6.25	49.07	-174.52	-2,374.15	1,811.47	3,038.81	2,983.53	55.28	54.972		
1,900.00	1,896.36	1,871.37	1,871.36	6.62	52.08	-174.54	-2,374.15	1,811.47	3,051.32	2,992.67	58.65	52.027		
2,000.00	1,995.57	1,970.58	1,970.57	7.00	55.09	-174.56	-2,374.15	1,811.47	3,063.83	3,001.81	62.02	49.401		
2,100.00	2,094.77	2,069.79	2,069.77	7.37	58.10	-174.58	-2,374.15	1,811.47	3,076.34	3,010.95	65.39	47.045		
2,200.00	2,193.98	2,168.99	2,168.98	7.75	61.12	-174.61	-2,374.15	1,811.47	3,088.85	3,020.09	68.76	44.919		
2,300.00	2,293.19	2,268.20	2,268.19	8.14	64.13	-174.63	-2,374.15	1,811.47	3,101.36	3,029.23	72.14	42.992		
2,400.00	2,392.39	2,367.41	2,367.39	8.52	67.14	-174.65	-2,374.15	1,811.47	3,113.88	3,038.37	75.51	41.237		
2,500.00	2,491.60	2,466.62	2,466.60	8.90	70.15	-174.67	-2,374.15	1,811.47	3,126.39	3,047.50	78.89	39.632		
2,600.00	2,590.81	2,565.82	2,565.81	9.29	73.17	-174.69	-2,374.15	1,811.47	3,138.90	3,056.64	82.26	38.158		
2,700.00	2,690.02	2,665.09	2,665.02	9.68	76.18	-174.71	-2,374.15	1,811.47	3,151.42	3,065.78	85.64	36.799		
2,800.00	2,789.22	2,764.30	2,764.22	10.06	79.19	-174.73	-2,374.15	1,811.47	3,163.93	3,074.92	89.01	35.544		
2,900.00	2,888.43	2,863.51	2,863.43	10.45	82.21	-174.76	-2,374.15	1,811.47	3,176.44	3,084.05	92.39	34.381		
3,000.00	2,987.64	2,962.71	2,962.64	10.84	85.22	-174.78	-2,374.15	1,811.47	3,188.96	3,093.19	95.77	33.300		
3,100.00	3,086.85	3,061.92	3,061.85	11.23	88.23	-174.80	-2,374.15	1,811.47	3,201.47	3,102.33	99.14	32.292		
3,200.00	3,186.05	3,161.13	3,161.05	11.62	91.25	-174.82	-2,374.15	1,811.47	3,213.99	3,111.47	102.52	31.350		
3,300.00	3,285.26	3,260.34	3,260.26	12.01	94.26	-174.84	-2,374.15	1,811.47	3,226.50	3,120.61	105.90	30.469		
3,400.00	3,384.47	3,359.54	3,359.47	12.40	97.27	-174.86	-2,374.15	1,811.47	3,239.02	3,129.75	109.27	29.642		
3,500.00	3,483.68	3,458.75	3,458.68	12.80	100.28	-174.88	-2,374.15	1,811.47	3,251.54	3,138.89	112.65	28.864		
3,600.00	3,582.88	3,557.96	3,557.88	13.19	103.30	-174.90	-2,374.15	1,811.47	3,264.05	3,148.03	116.03	28.132		
3,700.00	3,682.09	3,657.17	3,657.09	13.58	106.31	-174.92	-2,374.15	1,811.47	3,276.57	3,157.17	119.40	27.441		
3,800.00	3,781.30	3,756.37	3,756.30	13.97	109.32	-174.94	-2,374.15	1,811.47	3,289.09	3,166.31	122.78	26.788		
3,900.00	3,880.50	3,855.58	3,855.50	14.36	112.33	-174.96	-2,374.15	1,811.47	3,301.61	3,175.45	126.16	26.170		
4,000.00	3,979.71	3,954.79	3,954.71	14.76	115.35	-174.97	-2,374.15	1,811.47	3,314.13	3,184.59	129.54	25.584		
4,100.00	4,078.92	4,053.99	4,053.92	15.15	118.36	-174.99	-2,374.15	1,811.47	3,326.65	3,193.73	132.92	25.028		
4,200.00	4,178.13	4,153.20	4,153.13	15.54	121.37	-175.01	-2,374.15	1,811.47	3,339.16	3,202.87	136.29	24.500		
4,300.00	4,277.33	4,252.41	4,252.33	15.94	124.39	-175.03	-2,374.15	1,811.47	3,351.68	3,212.01	139.67	23.997		
4,400.00	4,376.54	4,351.62	4,351.54	16.33	127.40	-175.05	-2,374.15	1,811.47	3,364.17	3,221.12	143.05	23.517		
4,500.00	4,476.15	4,451.00	4,482.71	16.70	131.39	121.81	-2,374.15	1,811.47	3,372.43	3,225.03	147.41	22.879		
4,600.00	4,575.71	4,551.00	4,550.71	17.02	133.45	55.77	-2,374.15	1,811.47	3,389.67	3,219.88	149.79	22.496		
4,700.00	4,673.55	4,648.84	4,648.55	17.29	136.42	46.04	-2,374.15	1,811.47	3,396.23	3,203.16	153.07	21.926		
4,800.00	4,767.99	4,743.28	4,742.99	17.55	139.29	43.76	-2,374.15	1,811.47	3,393.29	3,176.06	156.23	21.329		
4,900.00	4,857.42	4,832.71	4,832.42	17.80	142.01	44.03	-2,374.15	1,811.47	3,398.40	3,139.17	159.23	20.715		
5,000.00	4,940.32	4,915.60	4,915.32	18.09	144.53	45.84	-2,374.15	1,811.47	3,255.31	3,093.28	162.04	20.090		

CC - Min centre to center distance or covergent 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 3H - Slot 3H
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 3H	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 #6	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	5,015.25	4,990.53	4,990.25	18.50	146.80	48.94	-2,374.15	1,811.47	3,203.97	3,039.33	164.64	19.461		
5,200.00	5,080.94	5,056.22	5,055.94	19.11	148.80	53.28	-2,374.15	1,811.47	3,145.47	2,978.45	167.03	18.832		
5,300.00	5,136.26	5,111.55	5,111.26	19.97	150.48	58.90	-2,374.15	1,811.47	3,081.08	2,911.86	169.21	18.208		
5,400.00	5,180.28	5,155.57	5,155.28	21.13	151.81	67.06	-2,374.15	1,811.47	3,013.15	2,841.94	171.22	17.599		
5,500.00	5,212.24	5,187.53	5,187.24	22.60	152.78	75.31	-2,374.15	1,811.47	2,944.18	2,771.09	173.09	17.010		
5,600.00	5,231.59	5,206.88	5,206.59	24.36	153.37	83.13	-2,374.15	1,811.47	2,875.74	2,700.89	174.84	16.447		
5,700.00	5,239.95	5,215.24	5,214.95	26.33	153.62	86.50	-2,374.15	1,811.47	2,809.21	2,632.66	176.54	15.912		
5,799.99	5,246.98	5,222.27	5,221.98	28.48	153.84	86.69	-2,374.15	1,811.47	2,744.76	2,566.31	178.45	15.381		
5,900.00	5,248.96	5,224.25	5,223.96	30.76	153.90	90.04	-2,374.15	1,811.47	2,682.59	2,502.15	180.44	14.867		
6,000.00	5,248.87	5,224.16	5,223.87	33.15	153.90	90.04	-2,374.15	1,811.47	2,622.84	2,440.25	182.58	14.365		
6,100.00	5,248.78	5,224.07	5,223.78	35.64	153.89	90.03	-2,374.15	1,811.47	2,565.59	2,380.65	184.94	13.873		
6,200.00	5,248.69	5,223.98	5,223.69	38.20	153.89	90.03	-2,374.15	1,811.47	2,511.03	2,323.55	187.48	13.394		
6,300.00	5,248.60	5,223.89	5,223.60	40.82	153.89	90.03	-2,374.15	1,811.47	2,459.32	2,269.13	190.19	12.931		
6,400.00	5,248.51	5,223.80	5,223.51	43.49	153.88	90.03	-2,374.15	1,811.47	2,410.65	2,217.59	193.06	12.487		
6,500.00	5,248.42	5,223.71	5,223.42	46.20	153.88	90.03	-2,374.15	1,811.47	2,365.21	2,169.15	196.06	12.064		
6,600.00	5,248.33	5,223.62	5,223.33	48.95	153.88	90.02	-2,374.15	1,811.47	2,323.19	2,124.02	199.18	11.664		
6,700.00	5,248.24	5,223.53	5,223.24	51.72	153.88	90.02	-2,374.15	1,811.47	2,284.78	2,082.39	202.39	11.289		
6,800.00	5,248.15	5,223.44	5,223.15	54.52	153.87	90.02	-2,374.15	1,811.47	2,250.16	2,044.49	205.67	10.941		
6,900.00	5,248.06	5,223.35	5,223.06	57.34	153.87	90.02	-2,374.15	1,811.47	2,219.51	2,010.51	209.00	10.620		
7,000.00	5,247.97	5,223.26	5,222.97	60.18	153.87	90.01	-2,374.15	1,811.47	2,192.99	1,980.65	212.34	10.328		
7,100.00	5,247.88	5,223.17	5,222.88	63.03	153.87	90.01	-2,374.15	1,811.47	2,170.76	1,955.07	215.68	10.065		
7,200.00	5,247.79	5,223.08	5,222.79	65.90	153.86	90.01	-2,374.15	1,811.47	2,152.95	1,933.96	218.99	9.831		
7,300.00	5,247.70	5,222.98	5,222.70	68.78	153.86	90.01	-2,374.15	1,811.47	2,139.67	1,917.44	222.23	9.628		
7,400.00	5,247.61	5,222.89	5,222.61	71.66	153.86	90.00	-2,374.15	1,811.47	2,131.00	1,905.63	225.38	9.455		
7,500.00	5,247.52	5,222.80	5,222.52	74.56	153.85	90.00	-2,374.15	1,811.47	2,127.01	1,898.61	228.40	9.312		
7,535.03	5,247.49	5,222.77	5,222.49	75.58	153.85	90.00	-2,374.15	1,811.47	2,126.72	1,897.29	229.43	9.269 CC		
7,600.00	5,247.43	5,222.71	5,222.43	77.47	153.85	90.00	-2,374.15	1,811.47	2,127.71	1,896.42	231.29	9.199 ES		
7,700.00	5,247.34	5,222.62	5,222.34	80.38	153.85	90.00	-2,374.15	1,811.47	2,133.11	1,899.09	234.02	9.115		
7,800.00	5,247.25	5,222.53	5,222.25	83.30	153.85	89.99	-2,374.15	1,811.47	2,143.16	1,906.60	236.56	9.060		
7,900.00	5,247.16	5,222.44	5,222.16	86.23	153.84	89.99	-2,374.15	1,811.47	2,157.81	1,918.90	238.91	9.032		
8,000.00	5,247.07	5,222.35	5,222.07	89.16	153.84	89.99	-2,374.15	1,811.47	2,176.96	1,935.89	241.06	9.031 SF		
8,100.00	5,246.98	5,222.26	5,221.98	92.09	153.84	89.99	-2,374.15	1,811.47	2,200.48	1,957.48	243.01	9.055		
8,200.00	5,246.89	5,222.17	5,221.89	95.03	153.84	89.98	-2,374.15	1,811.47	2,228.26	1,983.51	244.75	9.104		
8,300.00	5,246.80	5,222.08	5,221.80	97.98	153.83	89.98	-2,374.15	1,811.47	2,260.11	2,013.83	246.29	9.177		
8,400.00	5,246.71	5,221.99	5,221.71	100.92	153.83	89.98	-2,374.15	1,811.47	2,295.89	2,048.26	247.63	9.271		
8,500.00	5,246.62	5,221.90	5,221.62	103.87	153.83	89.98	-2,374.15	1,811.47	2,335.40	2,086.61	248.79	9.387		
8,600.00	5,246.53	5,221.81	5,221.53	106.83	153.82	89.97	-2,374.15	1,811.47	2,378.46	2,128.70	249.77	9.523		
8,700.00	5,246.44	5,221.72	5,221.44	109.78	153.82	89.97	-2,374.15	1,811.47	2,424.89	2,174.30	250.59	9.677		
8,800.00	5,246.35	5,221.63	5,221.35	112.74	153.82	89.97	-2,374.15	1,811.47	2,474.49	2,223.23	251.25	9.849		
8,900.00	5,246.26	5,221.54	5,221.26	115.71	153.82	89.97	-2,374.15	1,811.47	2,527.07	2,275.29	251.78	10.037		
9,000.00	5,246.17	5,221.45	5,221.17	118.67	153.81	89.96	-2,374.15	1,811.47	2,582.45	2,330.27	252.19	10.240		
9,100.00	5,246.08	5,221.36	5,221.08	121.63	153.81	89.96	-2,374.15	1,811.47	2,640.47	2,387.98	252.48	10.458		
9,200.00	5,245.99	5,221.27	5,220.99	124.60	153.81	89.96	-2,374.15	1,811.47	2,700.94	2,448.26	252.68	10.689		
9,300.00	5,245.90	5,221.18	5,220.90	127.57	153.81	89.96	-2,374.15	1,811.47	2,763.70	2,510.92	252.79	10.933		
9,400.00	5,245.81	5,221.09	5,220.81	130.54	153.80	89.95	-2,374.15	1,811.47	2,828.61	2,575.79	252.82	11.188		
9,500.00	5,245.72	5,221.00	5,220.72	133.51	153.80	89.95	-2,374.15	1,811.47	2,895.52	2,642.74	252.78	11.455		
9,600.00	5,245.63	5,220.91	5,220.63	136.49	153.80	89.95	-2,374.15	1,811.47	2,964.29	2,711.60	252.69	11.731		
9,700.00	5,245.54	5,220.82	5,220.54	139.46	153.79	89.95	-2,374.15	1,811.47	3,034.80	2,782.26	252.54	12.017		
9,800.00	5,245.45	5,220.73	5,220.45	142.44	153.79	89.95	-2,374.15	1,811.47	3,106.93	2,854.57	252.36	12.312		
9,900.00	5,245.36	5,220.64	5,220.36	145.42	153.79	89.94	-2,374.15	1,811.47	3,180.57	2,928.43	252.14	12.614		

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 3H - Slot 3H
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 3H	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 #6	Offset TVD Reference:	Offset Datum

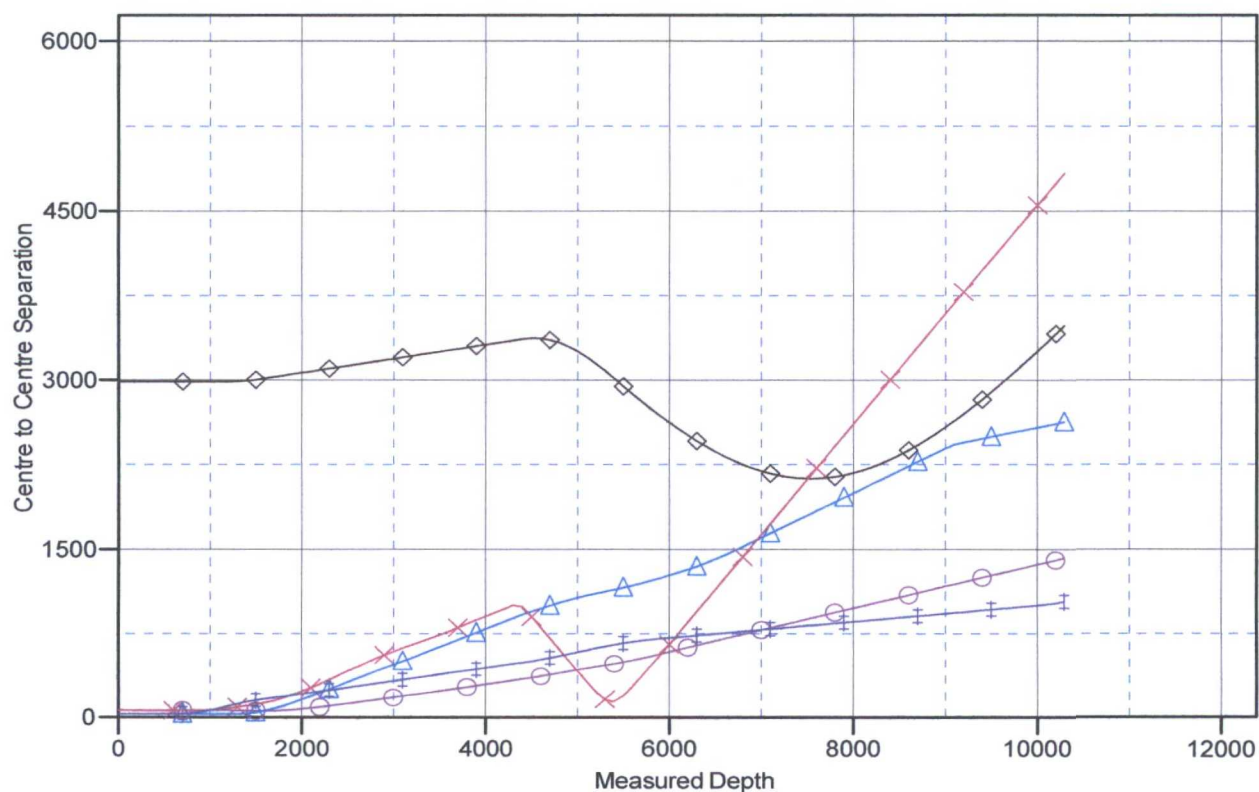
Offset Design											Heros 2308-09L- State NM 16 #21 Unit C - OH - OH		Offset Site Error: 0.00 usft	
Survey Program: 313-INCLINOMETER													Offset Well Error: 0.00 usft	
Reference		Offset		Semi Major Axis			Distance							
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical 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	5,245.26	5,220.55	5,220.26	148.39	153.79	89.94	-2,374.15	1,811.47	3,255.61	3,003.72	251.89	12.925		
10,100.00	5,245.17	5,220.46	5,220.17	151.37	153.78	89.94	-2,374.15	1,811.47	3,331.96	3,080.36	251.61	13.243		
10,200.00	5,245.08	5,220.37	5,220.08	154.35	153.78	89.94	-2,374.15	1,811.47	3,409.54	3,158.23	251.31	13.567		
10,293.81	5,245.00	5,220.29	5,220.00	157.15	153.78	89.93	-2,374.15	1,811.47	3,483.38	3,232.36	251.02	13.877		

Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 3H - Slot 3H
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 3H	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 #6	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 -107.833334

Coordinates are relative to: Heros 2308-09L 3H - Slot 3H
Coordinate System is US State Plane 1983, New Mexico Western Zone
Grid Convergence at Surface is: 0.08°

Ladder Plot



LEGEND

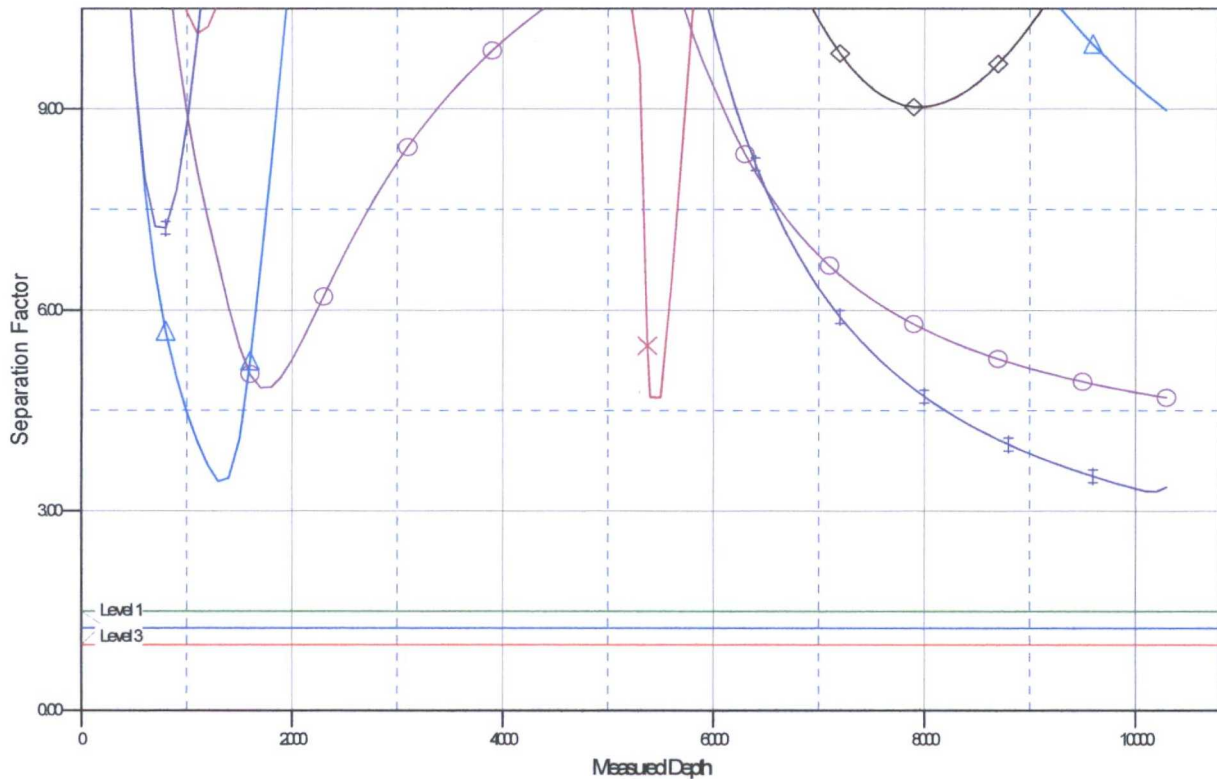
- Heros 2308-09L 5H, OH, Plan #2 V0
- State NM 16 #21 Unit C, OH, OH V0
- Heros 2308-09L 2H, OH, Plan #6 V0
- Heros 2308-09L 4H, OH, Plan #6 V0
- Heros 2308-09L 1H, OH, OH V0

Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 3H - Slot 3H
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 3H	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 #6	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 3H - Slot 3H
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 5H, OH, Plan #2 V0
- ◆ State NM 16 #21 Unit C, OH, OH V0
- ◆ Heros 2308-09L 2H, OH, Plan #6 V0
- △ Heros 2308-09L 4H, OH, Plan #6 V0
- ✕ Heros 2308-09L 1H, OH, OH V0