State of New Mexico
Energy, Minerals and Natural Resources Department

New Mexico Oil Conservation Division approval and conditions listed below are made in accordance with OCD Rule 19.15.7.11 and are in addition to the actions approved by BLM on the following 3160-3 APD form.

Operator Signature Date: 8/28/14
Well information;
Operator Logos, Well Name and Number Heros # 001H
API# 30-045-35588, Section 3, Township 23 (N)/S, Range 8 E/(W)

Conditions of Approval:
(See the below checked and handwritten conditions)

- ✓ Notify Aztec OCD 24hrs prior to casing & cement.
- ✓ Hold C-104 for directional survey & "As Drilled" Plat
- ✓ Hold C-104 for (NSL) (NSP), DHC
- o Spacing rule violation. Operator must follow up with change of status notification on other well to be shut in or abandoned
- o Regarding the use of a pit, closed loop system or below grade tank, the operator must comply with the following as applicable:
  - A pit requires a complete C-144 be submitted and approved prior to the construction or use of the pit, pursuant to 19.15.17.8.A
  - A closed loop system requires notification prior to use, pursuant to 19.15.17.9.A
  - A below grade tank requires a registration be filed prior to the construction or use of the below grade tank, pursuant to 19.15.17.8.C
- o Once the well is spud, to prevent ground water contamination through whole or partial conduits from the surface, the operator shall drill without interruption through the fresh water zone or zones and shall immediately set in cement the water protection string
- ✓ Regarding Hydraulic Fracturing, review EPA Underground Injection Control Guidance 84
- ✓ Oil base muds are not to be used until fresh water zones are cased and cemented providing isolation from the oil or diesel. This includes synthetic oils. Oil based mud, drilling fluids and solids must be contained in a steel closed loop system.

Chad Hess
NMOCD Approved by Signature

9-12-2014
Date

Form 3160-3
(March 2012)

FORM APPROVED
OMB No. 1004-0137
Expires October 31, 2014

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

5. Lease Serial No. NM 109398	
6. If Indian, Allotee or Tribe Name	
1a. Type of work: ☑ DRILL ☐ REENTER	7. If Unit or CA Agreement, Name and No.
1b. Type of Well: ☑ Oil Well ☐ Gas Well ☐ Other ☑ Single Zone ☐ Multiple Zone	8. Lease Name and Well No. HEROS 001H
2. Name of Operator Logos Operating, LLC	9. API Well No. 30-045-35588
3a. Address 4001 North Butler Ave, Building 7101 Farmington, NM 87401 / 3b. Phone No. (include area code) 505-330-9333	10. Field and Pool, or Exploratory Basin Mancos
4. Location of Well (Report location clearly and in accordance with any State requirements.*) At surface 1906' FNL & 817' FWL (SW/NW) At proposed prod. zone 350' FNL & 300' FWL (NW/NW)	11. Sec., T. R. M. or Blk. and Survey or Area SHL: Sec 3, T23N R08W, UL E BHL: Sec 4, T23N R08W, UL D
14. Distance in miles and direction from nearest town or post office* 5 miles southeast of Nageezi	12. County or Parish San Juan / 13. State NM
15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any) 817' from western edge of Sec 4 / 16. No. of acres in lease 639.6 acres / 17. Spacing Unit dedicated to this well N2/N2 = 159.6 acres Lots 1-4	
18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft. 1330' from Heros 2H (UL L, Sec 3, T23N R08W) / 19. Proposed Depth 11928' MD, 5308' VD / 20. BLM/BIA Bond No. on file BLM-106245, NMB000917	
21. Elevations (Show whether DF, KDB, RT, GL, etc.) 6892' GL / 22. Approximate date work will start* 12/01/2014 / 23. Estimated duration 45 days	

24. Attachments

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No.1, must be attached to this form:

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

25. Signature Tamra Sessions	Name (Printed/Typed) Tamra Sessions	Date 08/28/2014
Title Operations Technician		
Approved by (Signature) /s/ Stephen Mason	Name (Printed/Typed)	Date 9/5/14
Title AFM	Office FFO	

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

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

(Continued on page 2)

DRILLING OPERATIONS AUTHORIZED ARE SUBJECT TO COMPLIANCE WITH ATTACHED "GENERAL REQUIREMENTS"

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

*(Instructions on page 2)

This action is subject to technical and procedural review pursuant to 43 CFR 3165.3 and appeal pursuant to 43 CFR 3165.4

RCVD SEP 9 '14
OIL CONS. DIV.
DIST. 3

NMOCD

DISTRICT I
1625 N. French Dr., Hobbs, N.M. 88240
Phone: (575) 393-6161 Fax: (575) 393-0720
DISTRICT II
811 S. First St., Artesia, N.M. 88210
Phone: (575) 748-1283 Fax: (575) 748-9720
DISTRICT III
1000 Rio Brazos Rd., Aztec, N.M. 87410
Phone: (505) 334-6178 Fax: (505) 334-6170
DISTRICT IV
1220 S. St. Francis Dr., Santa Fe, N.M. 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico
Energy, Minerals & Natural Resources Department

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, N.M. 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	[2] Pool Code	[3] Pool Name
30-045-35588	97232	Basin Mancos

[4] Property Code	[5] Property Name	[6] Well Number
313147	HEROS	001H

[7] OGRID No.	[8] Operator Name	[9] Elevation
289408	LOGOS OPERATING, LLC	6892

[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
E	3	23 N	8 W		1906	NORTH	817	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
D	4	23 N	8 W	LOT 4	350	NORTH	300	WEST	SAN JUAN

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
159.6 N2/N2 Sect 4			

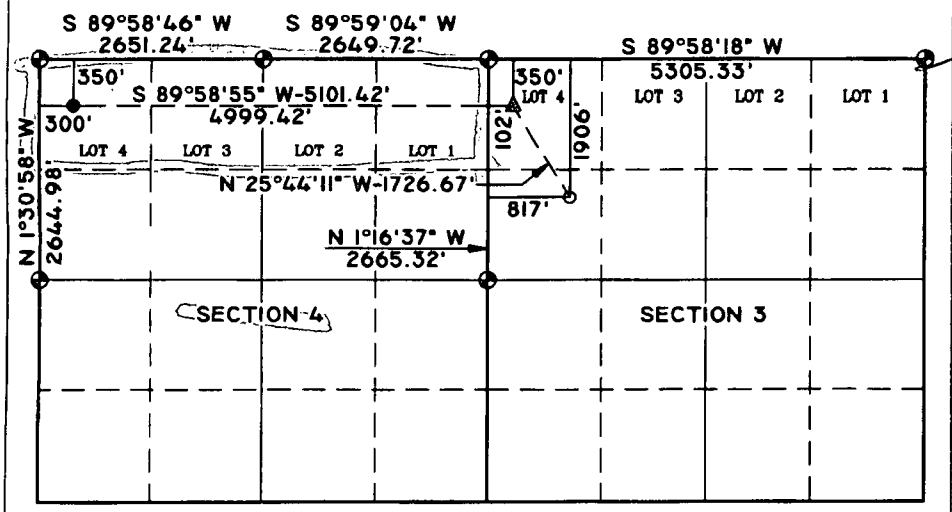
NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION

16

BOTTOM HOLE
LAT: 36.2626248° N
LONG: 107.6951737° W
NAD 83
LAT: 36°15.75673' N
LONG: 107°41.67372' W
NAD 27

LANDING POINT
LAT: 36.2626080° N
LONG: 107.6778693° W
NAD 83
LAT: 36°15.75572' N
LONG: 107°40.63549' W
NAD 27

SURFACE
LAT: 36.2583319° N
LONG: 107.6753346° W
NAD 83
LAT: 36°15.49915' N
LONG: 107°40.48341' W
NAD 27



LEGEND:
○ = SURFACE LOCATION
● = BOTTOM HOLE LOCATION
◒ = FOUND 1947 U.S.G.L.O. BRASS CAP
▲ = LANDING POINT

BEARINGS & DISTANCES SHOWN ARE REFERENCED TO THE NEW MEXICO COORDINATE SYSTEM, WEST ZONE, NAD 83, UNLESS OTHERWISE NOTED.

[17] OPERATOR CERTIFICATION

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

Tamra Sessions 8-27-14
Signature Date

Tamra Sessions
Printed Name

tsessions@logosresourcesllc.com
E-mail Address

[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.

02/26/14
Date of Survey

Signature and Seal of Professional Surveyor:

MARSHALL W. LINDEEN
NEW MEXICO
17078
PROFESSIONAL SURVEYOR

17078
Certificate Number
United Field Services, Inc.

RCVD SEP 9'14
OIL CONS. DIV.
DIST. 3

Attachment to Application for Permit to Drill.
Drilling program

LOGOS OPERATING, LLC
4001 N. Butler, Bldg. 7101
Farmington, NM 87401
U.S.A

HEROS #1H
Horizontal Gallup Oil and Gas Well
Surface Location: 1906' FNL – 817' FWL
Section 3, T23N, R8W
Ungraded GL Elev = 6892'
Estimate KB Elev = 6907' (15'KB)
Lat. = 36.258332 deg N
Long. = 107.675335 deg W
NAD83
San Juan County, New Mexico

Proposed Bottom Hole Location: 350' FNL – 300' FWL
Section 4, T23N, R8W
San Juan County, New Mexico

Drilling program written in compliance with onshore Oil and Gas Order No. 1
(III.D.3, effective May 2007) and Onshore Order No. 2 Dated November 18, 1988

1. **ESTIMATED TOPS FOR IMPORTANT GEOLOGICAL FORMATIONS**

Formation Tops	Surface (TVD)
Ojo Alamo	1031
Kirtland	1177
Fruitland	1498
Pictured Cliff's	1705
Chacra	2107
Cliffs House	3183
Menefee	3222
Point Lookout	4092
Mancos	4240
Gallup	5140
Lower Gallup	5328
Landing Point	5342
Total Depth	5308

Drilling Plan

Drill 12 ¼" hole to 320' then set 9 5/8" casing. Drill 8 3/4" hole with fresh water mud from 320' MD to kick off point #1 4325' MD. Trip out of hole and pick up 8 ¾" kick off assembly at 4325' MD and build 7 degrees per 100' to 81.53 degrees, 4.42 degrees azimuth until approximately 5500' MD.

Build angle at 1 deg/100' from 6600' to 6827 to 85 degrees inclination and 270.08 degrees azimuth in the Gallup formation at 5529' MD / 5140' TVD where 7" intermediate casing will be set at 6827' MD / 5338' TVD.
7" casing will be set in a legal position 350' FNL & 102' FWL in Section 3.
The 7" casing will be drilled out with a 6 1/8" drilling assembly building angle at 5 deg/100' to 90.39 degrees inclination and 270.08 degree azimuth to 6935' MD / 5342' TVD. Hold 90.39 degrees, 270.08 degrees azimuth and drill to a total depth at 11928' MD / 5308' TVD. Adjustments may be made to the directional program based on geology. Total depth will be 11928' MD / 5308' TVD - 90.39 degrees, 270.08 degrees Azimuth.
The Bottom hole location will be in a legal location at 11928' MD at 350' FNL & 300' FWL of section 4.
A total of 5101' of horizontal hole will be drilled.

2. **ANTICIPATED DEPTHS OF PROSPECTIVE OIL GAS AND OTHER HYDROCARBONS**

Primary objective is the Gallup formation encountered first at 5140' TVD at 7" casing point

See formation listings in #1 above for additional zones of interest.

3. MINIMUM SPECIFICATIONS FOR PRESSURE CONTROL EQUIPMENT

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

A 2000 psig double ram hydraulic BOP will be used (see attached diagram). Since maximum anticipated formation pressure is 1944 psig (0.364 psi/ft @ 5342' TVD), accessories to the BOP will meet BLM requirements for a 2000 psig system. In accordance with Onshore Order #2 (111.A well requirements) the anticipated surface pressure assuming a partially evacuated hole with normal pressure gradient of 0.22 psi/ft will be 1175 psi (5342' TVD x 0.22 psi/ft).

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

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

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

The wellhead BOP equipment will be nippled-up on the 9-5/8" x 11" 2,000 psi WP casing head prior to drilling out from under surface casing. All ram preventers and related equipment will be tested to 2,000 psi for 10 minutes. Annular preventers will be tested to 50% of rated working pressure for 10 minutes. Surface casing will be tested to 70% of internal yield pressure. All preventers and surface casing will be tested before drilling out of surface casing. BOP equipment will be tested every 14 days, after any repairs are made to the BOP equipment, and after the BOP equipment is subjected to pressure. Annular preventers will be functionally operated at least once per week. Pipe rams will be activated daily and blind rams shall be activated each trip or at least weekly. The New Mexico Oil & Gas Conservation Commission and the BLM will be notified 24 hours in advance of testing of BOPE.

4. PROPOSED BIT AND CASING PROGRAM

A. Bit Program
12-1/4" Surface Hole = Surface to 320'
8-3/4" = 320' to 6827' = 7" Casing point @ 85 degrees
8-3/4" Landing point = 6935' @ 90.39 degrees
6-1/8" Lateral = 6827' MD to 11928' MD = Gallup Pay Zone Horizontal

B. Casing Program – all casing stings are new casing

Casing & Hole Size	Weight	Grade	Coupling	Setting Depth (MD)	Comments
9-5/8" (12-1/4")	36 ppf	J or K-55	LT&C	0' - 320'	New casing. Cement to surface.
7" (8-3/4")	23 ppf	J or K-55	LT&C	0' - 6827' MD	New Casing. Cement in one stage
4-1/2" (6-1/8")	11.6 ppf	P-110	LT&C	5200' - 11928' MD	New Casing - Horizontal Hole Cemented full length with foam cement - TOL at 60 degrees.

Casing strings below the conductor casing will be tested to .22 psi per foot of casing string length or 1500 psi, whichever is greater, but not to exceed 70% of the minimum internal yield.

Minimum casing design factors used:
Collapse - 1.125
Burst - 1.0
Jt. Strength - 1.60

Surface casing shall have a minimum of 1 centralizer per joint on the bottom three (3) joints, starting with the shoe joint for a total of (4) minimum centralizers. Centralizers will be placed 10' above the shoe on the shoe joint, on the 1st, 2nd and 3rd casing collars.

The intermediate casing will be centralized using 1 centralizer the first 6 jts and spaced appropriately through the curve section of the well-bore and then spaced +/- 1 centralizer / 4 jts through the remainder of the cement column, using approximately 40 centralizers.

5. PROPOSED CEMENTING PROGRAM

The proposed cementing program has been designed to protect and/or isolate all usable water zones, potentially productive zones, lost circulation zones, abnormally pressured zones, and any prospectively valuable deposits of minerals. Any isolating medium other than cement shall receive approval prior to use. The casing setting depth shall be calculated to position the casing seat opposite a competent formation which will contain the maximum pressure to which it will be exposed during normal drilling operations. All indications of useable water shall be reported.

- The proposed cementing program is as follows:

  Top plugs shall be used to reduce contamination of cement by displacement fluid. A bottom plug or other acceptable technique, such as a pre-flush fluid, inner string cement method, etc. shall be utilized to help isolate the cement from contamination by the mud fluid being displaced ahead of the cement slurry.

Surface Casing Single Stage Job – (0-320'):
Excess – 100% over gauge hole – 12-1/4" hole and 9-5/8" casing (0.3132ft3/ft)
Top of Cement - Surface
Primary Cement
HALCEM (TM) SYSTEM
0.125 lbm/sk Poly-E-Flake (Lost Circulation Additive)

Fluid Weight	15.80 lbm/gal
Slurry Yield:	1.174 ft^3/sk
Total Mixing Fluid:	5.13 Gal/sk
Top of Fluid:	0 ft
Calculated Fill:	500 ft
Volume:	55.8 bbls
Calculated Sacks:	270 sks

Intermediate Casing – One Stage Job – (0-6827' MD):
Excess – 50% over gauge hole – 8-3/4" hole and 7" casing (0.1503 ft3/ft)
Top of Cement – Surface

Stage 1

Fluid 1: Water Spacer		
Fresh Water	Fluid Density:	8.33 lbm/gal
	Volume :	10 bbl
Fluid 2: Reactive Spacer		
Chemical Wash	Fluid Density:	8.4 lbm/gal
1000 gal/Mgal FRESH WATER	Volume :	40 bbl
Fluid 3: Water Spacer		
Fresh Water	Fluid Density:	8.33 lbm/gal
	Volume :	10 bbl
Fluid 4: Foamed		
ELASTISEAL (TM) SYSTEM	Fluid Weight:	13 lbm/gal
1.50 % CHEM - FOAMER 760, TOTETANK	Volume:	226.1 bbl
6.73 Gal FRESH WATER	Slurry Yield:	1.438 ft3/sack
	Total Mixing Fluid:	6.83 Gal/sack
	Top Of Fluid:	0 ft
	Calculated Fill:	6097 ft
	Calculated sack:	630.08 sack
	Proposed sack:	640 sack
Fluid 5: Tail Slurry		
HALCEM (TM) SYSTEM	Fluid Weight:	13.5 lbm/gal
5.70 Gal FRESH WATER	Volume:	22.5 bbl
	Slurry Yield:	1.291 ft3/sack
	Total Mixing Fluid:	5.7 Gal/sack
	Top Of Fluid:	6097 ft
	Calculated Fill:	600 ft
	Calculated sack:	97.85 sack
	Proposed sack:	100 sack
Fluid 6: Water Based Spacer		
Displacement	Fluid Density:	8.4 lbm/gal
	Volume :	263.6 bbl
Fluid 7: Top Off Annulus		
HALCEM (TM) SYSTEM	Fluid Weight:	15.8 lbm/gal
2 % Calcium Chloride	Volume:	20.9 bbl
5.15 Gal FRESH WATER	Slurry Yield:	1.174 ft3/sack
	Total Mixing Fluid:	5.15 Gal/sack
	Calculated sack:	0 sack
	Proposed sack:	100 sack

Cement volumes are minimums and may be adjusted based on caliper log results.

Production Casing – Single Stage Job (5200' - 11928' MD):
Excess – 50% over gauge hole – 6-1/8" hole and 4-1/2" casing (0.0942 ft3/ft)
Top of Cement – Top of Liner.

Lead Cement - Cap Cement
ELASTISEAL (TM) SYSTEM
0.2 % Versaset (Thixotropic Additive)
0.15 % HALAD-766 (Low Fluid Loss Control)
0.2 % Halad(R)-344 (Low Fluid Loss Control)

Fluid Weight	13 lbm/gal
Slurry Yield:	1.43 ft^3/sk
Total Mixing Fluid:	6.75 Gal/sk
Top of Fluid:	4700 ft
Calculated Fill:	300 ft
Volume:	7.15 bbl
Calculated Sacks:	30 sks

Foamed Lead Cement
ELASTISEAL (TM) SYSTEM
0.2 % Versaset (Thixotropic Additive)
0.15 % HALAD-766 (Low Fluid Loss Control)
2.5 % CHEM - FOAMER 760, TOTETANK (Foamer)
0.2 % Halad(R)-344 (Low Fluid Loss Control)

Fluid Weight	13 lbm/gal
Slurry Yield:	1.43 ft^3/sk
Total Mixing Fluid:	6.75 Gal/sk
Top of Fluid:	5000 ft
Calculated Fill:	4618 ft
Volume:	93 bbl
Calculated Sacks:	270 sks

Tail Cement
ELASTISEAL (TM) SYSTEM
0.2 % Versaset (Thixotropic Additive)
0.15 % HALAD-766 (Low Fluid Loss Control)
0.05 % SA-1015 (Suspension Agent)

Fluid Weight	13.50 lbm/gal
Slurry Yield:	1.28 ft^3/sk
Total Mixing Fluid:	5.64 Gal/sk
Top of Fluid:	9618 ft
Calculated Fill:	1069 ft
Volume:	20.85 bbl
Calculated Sacks:	100 sks

Detailed Pumping Schedule

Fluid #	Fluid Type	Fluid Name	Surface Density lbm/gal	Estimated Avg Rate bbl/min	Downhole Volume
1	Spacer	Fresh Water Spacer	8.3		10 bbl
2	Spacer	CHEMICAL WASH	8.4		40 bbl
3	Spacer	Fresh Water Spacer	8.3		10 bbl
4	Cement	Cap Cement	13.0		30 sks
5	Cement	Foamed Lead Cement	13.0		270 sks
6	Cement	Tail Cement	13.5		100 sks
7	Spacer	MMCR Spacer	8.3		20 bbl
8	Spacer	Fresh Water Displacement	8.3		

Foam Output Parameter Summary:

Fluid #	Fluid Name	Unfoamed Liquid Volume	Beginning Density lbm/gal	Ending Density lbm/gal	Beginning Rate scf/bbl	Ending Rate scf/bbl
Stage 1						
5	Foamed Lead Cement	50.98bbl	10.0	10.0	303.8	509.4

Foam Design Specifications:

Foam Calculation Method:	Constant Density	Calculated Gas =	20792.1 scf
Backpressure:	14 psig	Additional Gas =	50000 scf
Bottom Hole Circulating Temp:	158 degF	Total Gas =	70792.1 scf
Mud Outlet Temperature:	100 degF		

Production liner clarification: Utilizing foam cement for zonal isolation in the production liner.

Actual volumes will be calculated and determined by conditions onsite. All cement slurries will meet or exceed minimum BLM and New Mexico Oil Conservation Division requirements. Slurries used will be the slurries listed above or equivalent slurries depending on service provider selected. Cement yields may change depending on slurries selected.

All waiting on cement times shall be a minimum of 8 hours or adequate to achieve a minimum of 500 psi compressive strength at the casing shoe prior to drilling out.

6. **PROPOSED DRILLING FLUIDS PROGRAM**
7.

A. Vertical Portion

Hole Size (in)	TVD (ft)	Mud Type	Density (lb/gal)	Viscosity (sec/qt)	Fluid Loss (cc)
12-1/4"	0-320'	Fresh Water	8.4-8.6	60-70	NC
8-3/4"	320'-4325'	Fresh Water LSND	8.5-8.8	40-50	8-10

B. Kick off to Horizontal Lateral:

Hole Size (in)	MD (ft)	Mud Type	Density (lb/gal)	Viscosity (sec/qt)	Fluid Loss (CC)
8-3/4"	4325' (KOP)-6917' MD	Fresh Water LSND	8.5-8.8	40-50	8-10
6-1/8"	6917' - 11928'	Synthetic Oil Based Mud	7.0-9.0	15-25	<1

- There will be sufficient mud on location to control a blowout should one occur. Mud flow and volume will be monitored both visually and with electronic pit volume totalizers. Mud tests shall be performed every 24 hours after mudding up to determine, as applicable: density, viscosity, gel strength, filtration, and pH.

- A closed-loop system will be used to recover drilling fluid and dry cuttings in both phases of the well and on all hole intervals, including fresh water and oil-based operations. Above-ground tanks will be utilized to hold cuttings and fluids for rig operations. A frac tank will be on location to store fresh water. Waste will be disposed of properly at an EPA-approved hazardous waste facility. Fresh water cuttings will be disposed of at Basin Disposal, Inc. and/or Industrial Ecosystems, Inc. The location will be lined in accordance with the Surface Use Plan of Operations.

8. **TESTING, CORING and LOGGING**

- Drill Stem Testing - None anticipated
- Coring - None anticipated.
- Mud Logging - Mud loggers will be on location from intermediate casing point to TD.
- Logging - See Below
- Gamma Ray from surface casing point to TD

Cased Hole:
CBL/CCL/GRNDL will be run as needed for perforating control

9. ABNORMAL PRESSURES & HYDROGEN SULFIDE

The anticipated bottom hole pressure is +/- 2500 psi based on a 9.0 ppg at 5342' TVD of the landing point of the horizontal. No abnormal pressure or temperatures are anticipated.

No hydrogen sulfide gas is anticipated, however, if H_2S is encountered, the guidelines in Onshore Order No. 6 will be followed.

10. ANTICIPATED START DATE AND DURATION OF OPERATIONS

Drilling commenced on December 1, 2014. It is anticipated that completion operations will begin within 30 days after the well has been drilled depending on fracture treatment schedules with various pumping service companies.

It is anticipated that the drilling of this well will take approximately 25 days.

CLOSED-LOOP SYSTEM DESIGN PLAN

The closed-loop system will consist of a series of temporary above-ground storage tanks and/or haul-off bins suitable for holding the cuttings and fluids from drilling operations. The closed- loop system will not entail temporary pits, below-grade storage tanks, below-grade sumps, or drying pads.

Design considerations include:

- The closed-loop system will be signed in accordance with 19.15.17.11 NMAC.
- The closed-loop system storage tanks will be of adequate volume to ensure confinement of all fluids and provide sufficient freeboard to prevent uncontrolled releases.
- Topsoil will be salvaged and stored for use in reclamation activities.
- The closed-loop system storage tanks will be placed in bermed secondary containment sized to contain a minimum of 110 percent of the volume of the largest storage tank.

CLOSED-LOOP SYSTEM OPERATING & MAINTENANCE PLAN

The closed-loop system will be operated and maintained to contain liquids and solids; minimize the amount of drilling fluids and cuttings that require disposal; maximize the amount of drilling fluid recycled and reused in the drilling process; isolate drilling wastes from the environment; prevent contamination of fresh water; and protect public health and the environment.

Operation and maintenance considerations include:

- Fluid levels will be maintained to provide sufficient freeboard to prevent over-topping.
- Visual inspections will be conducted on a daily basis to identify any potential leaks and to ensure that the closed-loop system storage tanks have sufficient freeboard to prevent over-topping.
- Only drilling fluids or cuttings intrinsic to, used by, or generated from, drilling operations will be stored in the closed-loop system storage tanks. Hazardous waste, miscellaneous solid waste, and/or debris will not be stored in the storage tanks.
- The OCD District Office will be notified within 48 hours of discovery of a leak in the closed-loop drilling system. Ifa leak is discovered, all liquid will be removed within 48 hours and the damage repaired.

CLOSED-LOOP SYSTEM CLOSURE PLAN

The closed-loop system will be closed in accordance with 19.15.17.13 NMAC. Closure considerations

include:

- Drilling fluids will be recycled and transferred to other permitted closed-loop systems or returned to the vendor for reuse, as practical.
- Residual fluids will be pulled from the storage tanks, mixed with saw dust or similar absorbent material, and disposed of at Industrial Ecosystem, Inc. waste disposal facilities.
- Remaining cuttings or sludges will be vacuumed from the storage tanks and disposed of at the Envirotech, Inc and/or Industrial Ecosystem, Inc. waste disposal facilities.
- Storage tanks will be removed from the well location during the rig move.
- The well pad will be reclaimed and seeded in accordance with subsections G, Hand I of 19.15.17.13NMAC.

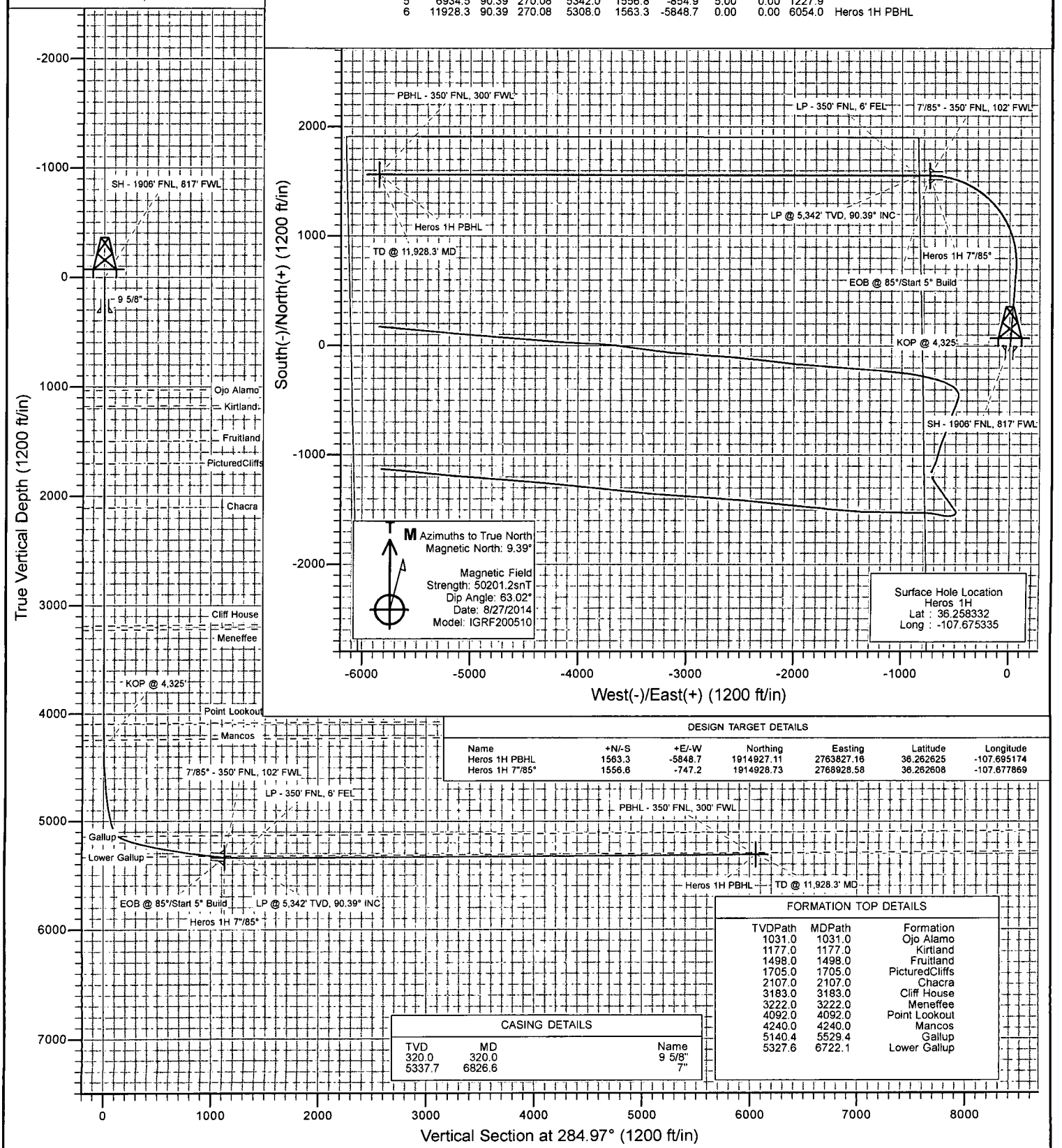
Project: San Juan County, NM
Site: S3-T23N-R8W (Heros Pad)
Well: Heros 1H
Wellbore: HZ
Design: Plan #1

CATHEDRAL

Plan #1
Heros 1H
145XXX; SC
KB=15' @ 6907.0ft
Ground Elevation @ 6892.0
North American Datum 1983
Well Heros 1H, True North

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	4325.0	0.00	0.00	4325.0	0.0	0.0	0.00	0.00	0.0	
3	5490.5	81.60	4.42	5134.6	696.7	53.8	7.00	4.42	127.9	
4	6826.6	85.00	270.08	5337.7	1556.6	-747.2	7.00	-95.59	1123.9	Heros 1H 7"/85°
5	6934.5	90.39	270.08	5342.0	1556.8	-854.9	5.00	0.00	1227.9	
6	11928.3	90.39	270.08	5308.0	1563.3	-5848.7	0.00	0.00	6054.0	Heros 1H PBHL



DESIGN TARGET DETAILS

Name	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Heros 1H PBHL	1563.3	-5848.7	1914927.11	2763827.16	36.262625	-107.695174
Heros 1H 7"/85°	1556.6	-747.2	1914928.73	2768928.58	36.262608	-107.677869

CASING DETAILS

TVD	MD	Name
320.0	320.0	9 5/8"
5337.7	6826.6	7"

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
1031.0	1031.0	Ojo Alamo
1177.0	1177.0	Kirtland
1498.0	1498.0	Fruitland
1705.0	1705.0	PicturedCliffs
2107.0	2107.0	Chacra
3183.0	3183.0	Cliff House
3222.0	3222.0	Meneffee
4092.0	4092.0	Point Lookout
4240.0	4240.0	Mancos
5140.4	5529.4	Gallup
5327.6	6722.1	Lower Gallup

Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	**Local Co-ordinate Reference:**	Well Heros 1H
Company:	LOGOS Operating,LLC	**TVD Reference:**	KB=15' @ 6907.0ft
Project:	San Juan County, NM	**MD Reference:**	KB=15' @ 6907.0ft
Site:	S3-T23N-R8W (Heros Pad)	**North Reference:**	True
Well:	Heros 1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	HZ		
Design:	Plan #1		

Project San Juan County, NM

Map System:	US State Plane 1983	**System Datum:**	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Western Zone		

Site S3-T23N-R8W (Heros Pad)

Site Position:		**Northing:**	1,913,321.16 ft	**Latitude:**	36.258189
From:	Lat/Long	**Easting:**	2,769,675.73 ft	**Longitude:**	-107.675344
Position Uncertainty:	0.0 ft	**Slot Radius:**	13.200 in	**Grid Convergence:**	0.09 °

Well Heros 1H

Well Position	**+N/-S**	0.0 ft	**Northing:**	1,913,373.33 ft	**Latitude:**	36.258332
	+E/-W	0.0 ft	**Easting:**	2,769,678.36 ft	**Longitude:**	-107.675335
Position Uncertainty		0.0 ft	**Wellhead Elevation:**	0.0 ft	**Ground Level:**	6,892.0 ft

Wellbore HZ

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	8/27/2014	9.39	63.02	50,201

Design Plan #1

Audit Notes:

Version:		**Phase:**	PLAN	**Tie On Depth:**	0.0

Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.0	0.0	0.0	284.97

Plan Sections

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
4,325.0	0.00	0.00	4,325.0	0.0	0.0	0.00	0.00	0.00	0.00	
5,490.5	81.60	4.42	5,134.6	696.7	53.8	7.00	7.00	0.00	4.42	
6,826.6	85.00	270.08	5,337.7	1,556.6	-747.2	7.00	0.25	-7.06	-95.59	Heros 1H 7"/85°
6,934.5	90.39	270.08	5,342.0	1,556.8	-854.9	5.00	5.00	0.00	0.00	
11,928.3	90.39	270.08	5,308.0	1,563.3	-5,848.7	0.00	0.00	0.00	0.00	Heros 1H PBHL

Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	**Local Co-ordinate Reference:**	Well Heros 1H
Company:	LOGOS Operating LLC	**TVD Reference:**	KB=15' @ 6907.0ft
Project:	San Juan County, NM	**MD Reference:**	KB=15' @ 6907.0ft
Site:	S3-T23N-R8W (Heros Pad)	**North Reference:**	True
Well:	Heros 1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	HZ		
Design:	Plan #1		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Comments / Formations
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	
0.5	0.00	0.00	0.5	0.0	0.0	0.0	0.00	0.00	SH - 1906' FNL, 817' FWL
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	
320.0	0.00	0.00	320.0	0.0	0.0	0.0	0.00	0.00	9 5/8"
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	
1,031.0	0.00	0.00	1,031.0	0.0	0.0	0.0	0.00	0.00	Ojo Alamo
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	
1,177.0	0.00	0.00	1,177.0	0.0	0.0	0.0	0.00	0.00	Kirtland
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	
1,498.0	0.00	0.00	1,498.0	0.0	0.0	0.0	0.00	0.00	Fruitland
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	0.00	
1,705.0	0.00	0.00	1,705.0	0.0	0.0	0.0	0.00	0.00	PicturedCliffs
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.0	0.00	0.00	
1,900.0	0.00	0.00	1,900.0	0.0	0.0	0.0	0.00	0.00	
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.0	0.00	0.00	
2,100.0	0.00	0.00	2,100.0	0.0	0.0	0.0	0.00	0.00	
2,107.0	0.00	0.00	2,107.0	0.0	0.0	0.0	0.00	0.00	Chacra
2,200.0	0.00	0.00	2,200.0	0.0	0.0	0.0	0.00	0.00	
2,300.0	0.00	0.00	2,300.0	0.0	0.0	0.0	0.00	0.00	
2,400.0	0.00	0.00	2,400.0	0.0	0.0	0.0	0.00	0.00	
2,500.0	0.00	0.00	2,500.0	0.0	0.0	0.0	0.00	0.00	
2,600.0	0.00	0.00	2,600.0	0.0	0.0	0.0	0.00	0.00	
2,700.0	0.00	0.00	2,700.0	0.0	0.0	0.0	0.00	0.00	
2,800.0	0.00	0.00	2,800.0	0.0	0.0	0.0	0.00	0.00	
2,900.0	0.00	0.00	2,900.0	0.0	0.0	0.0	0.00	0.00	
3,000.0	0.00	0.00	3,000.0	0.0	0.0	0.0	0.00	0.00	
3,100.0	0.00	0.00	3,100.0	0.0	0.0	0.0	0.00	0.00	
3,183.0	0.00	0.00	3,183.0	0.0	0.0	0.0	0.00	0.00	Cliff House
3,200.0	0.00	0.00	3,200.0	0.0	0.0	0.0	0.00	0.00	
3,222.0	0.00	0.00	3,222.0	0.0	0.0	0.0	0.00	0.00	Meneffee
3,300.0	0.00	0.00	3,300.0	0.0	0.0	0.0	0.00	0.00	
3,400.0	0.00	0.00	3,400.0	0.0	0.0	0.0	0.00	0.00	
3,500.0	0.00	0.00	3,500.0	0.0	0.0	0.0	0.00	0.00	
3,600.0	0.00	0.00	3,600.0	0.0	0.0	0.0	0.00	0.00	
3,700.0	0.00	0.00	3,700.0	0.0	0.0	0.0	0.00	0.00	
3,800.0	0.00	0.00	3,800.0	0.0	0.0	0.0	0.00	0.00	
3,900.0	0.00	0.00	3,900.0	0.0	0.0	0.0	0.00	0.00	
4,000.0	0.00	0.00	4,000.0	0.0	0.0	0.0	0.00	0.00	
4,092.0	0.00	0.00	4,092.0	0.0	0.0	0.0	0.00	0.00	Point Lookout
4,100.0	0.00	0.00	4,100.0	0.0	0.0	0.0	0.00	0.00	

Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	**Local Co-ordinate Reference:**	Well Heros 1H
Company:	LOGOS Operating LLC	**TVD Reference:**	KB=15' @ 6907.0ft
Project:	San Juan County, NM	**MD Reference:**	KB=15' @ 6907.0ft
Site:	S3-T23N-R8W (Heros Pad)	**North Reference:**	True
Well:	Heros 1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	HZ		
Design:	Plan #1		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Comments / Formations
4,200.0	0.00	0.00	4,200.0	0.0	0.0	0.0	0.00	0.00	
4,240.0	0.00	0.00	4,240.0	0.0	0.0	0.0	0.00	0.00	Mancos
4,300.0	0.00	0.00	4,300.0	0.0	0.0	0.0	0.00	0.00	
4,325.0	0.00	0.00	4,325.0	0.0	0.0	0.0	0.00	0.00	KOP @ 4,325'
4,350.0	1.75	4.42	4,350.0	0.4	0.0	0.1	7.00	7.00	
4,400.0	5.25	4.42	4,399.9	3.4	0.3	0.6	7.00	7.00	
4,450.0	8.75	4.42	4,449.5	9.5	0.7	1.7	7.00	7.00	
4,500.0	12.25	4.42	4,498.7	18.6	1.4	3.4	7.00	7.00	
4,550.0	15.75	4.42	4,547.2	30.6	2.4	5.6	7.00	7.00	
4,600.0	19.25	4.42	4,594.9	45.6	3.5	8.4	7.00	7.00	
4,650.0	22.75	4.42	4,641.5	63.5	4.9	11.7	7.00	7.00	
4,700.0	26.25	4.42	4,687.0	84.2	6.5	15.5	7.00	7.00	
4,750.0	29.75	4.42	4,731.2	107.6	8.3	19.8	7.00	7.00	
4,800.0	33.26	4.42	4,773.8	133.6	10.3	24.5	7.00	7.00	
4,850.0	36.76	4.42	4,814.7	162.2	12.5	29.8	7.00	7.00	
4,900.0	40.26	4.42	4,853.8	193.3	14.9	35.5	7.00	7.00	
4,950.0	43.76	4.42	4,891.0	226.6	17.5	41.6	7.00	7.00	
5,000.0	47.26	4.42	4,926.0	262.2	20.2	48.1	7.00	7.00	
5,050.0	50.76	4.42	4,958.8	299.8	23.1	55.1	7.00	7.00	
5,100.0	54.26	4.42	4,989.2	339.3	26.2	62.3	7.00	7.00	
5,150.0	57.76	4.42	5,017.2	380.7	29.4	69.9	7.00	7.00	
5,200.0	61.26	4.42	5,042.6	423.6	32.7	77.8	7.00	7.00	
5,250.0	64.76	4.42	5,065.3	468.0	36.1	85.9	7.00	7.00	
5,300.0	68.26	4.42	5,085.2	513.7	39.7	94.3	7.00	7.00	
5,350.0	71.76	4.42	5,102.3	560.6	43.3	102.9	7.00	7.00	
5,400.0	75.26	4.42	5,116.5	608.4	47.0	111.7	7.00	7.00	
5,450.0	78.76	4.42	5,127.7	656.9	50.7	120.6	7.00	7.00	
5,490.5	81.60	4.42	5,134.6	696.7	53.8	127.9	7.00	7.00	
5,500.0	81.53	3.75	5,136.0	706.1	54.5	129.7	7.00	-0.68	
5,529.4	81.34	1.67	5,140.4	735.2	55.8	135.9	7.00	-0.65	Gallup
5,550.0	81.21	0.22	5,143.5	755.5	56.2	140.8	7.00	-0.62	
5,600.0	80.93	356.69	5,151.3	804.9	54.8	154.9	7.00	-0.57	
5,650.0	80.68	353.15	5,159.2	854.0	50.5	171.8	7.00	-0.50	
5,700.0	80.46	349.61	5,167.4	902.8	43.1	191.5	7.00	-0.43	
5,750.0	80.28	346.06	5,175.8	951.0	32.7	214.0	7.00	-0.36	
5,800.0	80.13	342.51	5,184.3	998.4	19.4	239.1	7.00	-0.29	
5,850.0	80.02	338.96	5,192.9	1,044.9	3.1	266.8	7.00	-0.22	
5,900.0	79.95	335.41	5,201.6	1,090.2	-16.0	297.0	7.00	-0.14	
5,950.0	79.92	331.85	5,210.4	1,134.3	-37.8	329.5	7.00	-0.06	
6,000.0	79.93	328.30	5,219.1	1,177.0	-62.4	364.2	7.00	0.01	
6,050.0	79.97	324.74	5,227.9	1,218.1	-89.5	401.1	7.00	0.09	
6,100.0	80.05	321.19	5,236.5	1,257.4	-119.2	439.8	7.00	0.16	
6,150.0	80.17	317.64	5,245.1	1,294.8	-151.2	480.5	7.00	0.24	
6,200.0	80.33	314.09	5,253.6	1,330.1	-185.6	522.7	7.00	0.31	
6,250.0	80.52	310.54	5,261.9	1,363.3	-222.0	566.5	7.00	0.38	
6,300.0	80.75	307.00	5,270.1	1,394.2	-260.5	611.6	7.00	0.46	
6,350.0	81.01	303.47	5,278.0	1,422.7	-300.8	657.9	7.00	0.52	
6,400.0	81.30	299.94	5,285.7	1,448.6	-342.8	705.3	7.00	0.59	
6,450.0	81.63	296.42	5,293.1	1,472.0	-386.4	753.4	7.00	0.66	
6,500.0	81.99	292.90	5,300.2	1,492.6	-431.3	802.2	7.00	0.72	
6,550.0	82.38	289.39	5,307.0	1,510.5	-477.5	851.4	7.00	0.78	
6,600.0	82.80	285.88	5,313.5	1,525.5	-524.8	900.9	7.00	0.84	

Database:	USA EDM 5000 Multi Users DB	**Local Co-ordinate Reference:**	Well Heros 1H
Company:	LOGOS Operating LLC	**TVD Reference:**	KB=15' @ 6907.0ft
Project:	San Juan County, NM	**MD Reference:**	KB=15' @ 6907.0ft
Site:	S3-T23N-R8W (Heros Pad)	**North Reference:**	True
Well:	Heros 1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	HZ		
Design:	Plan #1		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Comments / Formations
6,650.0	83.24	282.38	5,319.5	1,537.6	-572.9	950.5	7.00	0.89	
6,700.0	83.71	278.89	5,325.2	1,546.8	-621.7	1,000.1	7.00	0.94	
6,722.1	83.93	277.35	5,327.6	1,549.9	-643.5	1,021.9	7.00	0.97	Lower Gallup
6,750.0	84.20	275.41	5,330.5	1,553.0	-671.1	1,049.3	7.00	0.99	
6,800.0	84.72	271.93	5,335.3	1,556.2	-720.7	1,098.1	7.00	1.03	
6,826.6	85.00	270.08	5,337.7	1,556.6	-747.2	1,123.8	7.00	1.06	7'/85° - 350' FNL, 102' FWL - EOB @ 85°/Start
6,900.0	88.67	270.08	5,341.8	1,556.7	-820.5	1,194.6	5.00	5.00	
6,934.5	90.39	270.08	5,342.0	1,556.8	-855.0	1,228.0	4.99	4.99	LP - 350' FNL, 6' FEL - LP @ 5,342' TVD, 90.39
7,000.0	90.39	270.08	5,341.6	1,556.8	-920.5	1,291.3	0.00	0.00	
7,100.0	90.39	270.08	5,340.9	1,557.0	-1,020.5	1,387.9	0.00	0.00	
7,200.0	90.39	270.08	5,340.2	1,557.1	-1,120.5	1,484.6	0.00	0.00	
7,300.0	90.39	270.08	5,339.5	1,557.2	-1,220.5	1,581.2	0.00	0.00	
7,400.0	90.39	270.08	5,338.9	1,557.4	-1,320.5	1,677.8	0.00	0.00	
7,500.0	90.39	270.08	5,338.2	1,557.5	-1,420.5	1,774.5	0.00	0.00	
7,600.0	90.39	270.08	5,337.5	1,557.6	-1,520.5	1,871.1	0.00	0.00	
7,700.0	90.39	270.08	5,336.8	1,557.8	-1,620.5	1,967.8	0.00	0.00	
7,800.0	90.39	270.08	5,336.1	1,557.9	-1,720.4	2,064.4	0.00	0.00	
7,900.0	90.39	270.08	5,335.5	1,558.0	-1,820.4	2,161.0	0.00	0.00	
8,000.0	90.39	270.08	5,334.8	1,558.2	-1,920.4	2,257.7	0.00	0.00	
8,100.0	90.39	270.08	5,334.1	1,558.3	-2,020.4	2,354.3	0.00	0.00	
8,200.0	90.39	270.08	5,333.4	1,558.4	-2,120.4	2,451.0	0.00	0.00	
8,300.0	90.39	270.08	5,332.7	1,558.6	-2,220.4	2,547.6	0.00	0.00	
8,400.0	90.39	270.08	5,332.0	1,558.7	-2,320.4	2,644.2	0.00	0.00	
8,500.0	90.39	270.08	5,331.4	1,558.8	-2,420.4	2,740.9	0.00	0.00	
8,600.0	90.39	270.08	5,330.7	1,558.9	-2,520.4	2,837.5	0.00	0.00	
8,700.0	90.39	270.08	5,330.0	1,559.1	-2,620.4	2,934.2	0.00	0.00	
8,800.0	90.39	270.08	5,329.3	1,559.2	-2,720.4	3,030.8	0.00	0.00	
8,900.0	90.39	270.08	5,328.6	1,559.3	-2,820.4	3,127.4	0.00	0.00	
9,000.0	90.39	270.08	5,328.0	1,559.5	-2,920.4	3,224.1	0.00	0.00	
9,100.0	90.39	270.08	5,327.3	1,559.6	-3,020.4	3,320.7	0.00	0.00	
9,200.0	90.39	270.08	5,326.6	1,559.7	-3,120.4	3,417.4	0.00	0.00	
9,300.0	90.39	270.08	5,325.9	1,559.9	-3,220.4	3,514.0	0.00	0.00	
9,400.0	90.39	270.08	5,325.2	1,560.0	-3,320.4	3,610.6	0.00	0.00	
9,500.0	90.39	270.08	5,324.5	1,560.1	-3,420.4	3,707.3	0.00	0.00	
9,600.0	90.39	270.08	5,323.9	1,560.3	-3,520.4	3,803.9	0.00	0.00	
9,700.0	90.39	270.08	5,323.2	1,560.4	-3,620.4	3,900.6	0.00	0.00	
9,800.0	90.39	270.08	5,322.5	1,560.5	-3,720.4	3,997.2	0.00	0.00	
9,900.0	90.39	270.08	5,321.8	1,560.7	-3,820.4	4,093.8	0.00	0.00	
10,000.0	90.39	270.08	5,321.1	1,560.8	-3,920.4	4,190.5	0.00	0.00	
10,100.0	90.39	270.08	5,320.5	1,560.9	-4,020.4	4,287.1	0.00	0.00	
10,200.0	90.39	270.08	5,319.8	1,561.1	-4,120.4	4,383.8	0.00	0.00	
10,300.0	90.39	270.08	5,319.1	1,561.2	-4,220.4	4,480.4	0.00	0.00	
10,400.0	90.39	270.08	5,318.4	1,561.3	-4,320.4	4,577.0	0.00	0.00	
10,500.0	90.39	270.08	5,317.7	1,561.4	-4,420.4	4,673.7	0.00	0.00	
10,600.0	90.39	270.08	5,317.1	1,561.6	-4,520.4	4,770.3	0.00	0.00	
10,700.0	90.39	270.08	5,316.4	1,561.7	-4,620.4	4,867.0	0.00	0.00	
10,800.0	90.39	270.08	5,315.7	1,561.8	-4,720.4	4,963.6	0.00	0.00	
10,900.0	90.39	270.08	5,315.0	1,562.0	-4,820.4	5,060.2	0.00	0.00	
11,000.0	90.39	270.08	5,314.3	1,562.1	-4,920.4	5,156.9	0.00	0.00	
11,100.0	90.39	270.08	5,313.6	1,562.2	-5,020.4	5,253.5	0.00	0.00	
11,200.0	90.39	270.08	5,313.0	1,562.4	-5,120.4	5,350.2	0.00	0.00	
11,300.0	90.39	270.08	5,312.3	1,562.5	-5,220.4	5,446.8	0.00	0.00	

Database:	USA EDM 5000 Multi Users DB	**Local Co-ordinate Reference:**	Well Heros 1H
Company:	LOGOS Operating LLC	**TVD Reference:**	KB=15' @ 6907.0ft
Project:	San Juan County, NM	**MD Reference:**	KB=15' @ 6907.0ft
Site:	S3-T23N-R8W (Heros Pad)	**North Reference:**	True
Well:	Heros 1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	HZ		
Design:	Plan #1		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Comments / Formations
11,400.0	90.39	270.08	5,311.6	1,562.6	-5,320.4	5,543.4	0.00	0.00	
11,500.0	90.39	270.08	5,310.9	1,562.8	-5,420.4	5,640.1	0.00	0.00	
11,600.0	90.39	270.08	5,310.2	1,562.9	-5,520.4	5,736.7	0.00	0.00	
11,700.0	90.39	270.08	5,309.6	1,563.0	-5,620.4	5,833.4	0.00	0.00	
11,800.0	90.39	270.08	5,308.9	1,563.2	-5,720.4	5,930.0	0.00	0.00	
11,900.0	90.39	270.08	5,308.2	1,563.3	-5,820.3	6,026.6	0.00	0.00	
11,928.3	90.39	270.08	5,308.0	1,563.3	-5,848.6	6,054.0	0.00	0.00	PBHL - 350' FNL, 300' FWL - TD @ 11,928.3' M

Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Heros 1H PBHL - plan hits target center - Point	0.00	0.00	5,308.0	1,563.3	-5,848.7	1,914,927.11	2,763,827.16	36.262625	-107.695174
Heros 1H 7"/85° - plan hits target center - Point	0.00	0.00	5,337.7	1,556.6	-747.2	1,914,928.73	2,768,928.58	36.262608	-107.677869

Casing Points

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (in)	Hole Diameter (in)
320.0	320.0	9 5/8"	0.000	0.000
6,826.6	5,337.7	7"	0.000	0.000

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,031.0	1,031.0	Ojo Alamo		-0.39	270.08
1,177.0	1,177.0	Kirtland		-0.39	270.08
1,498.0	1,498.0	Fruitland		-0.39	270.08
1,705.0	1,705.0	PicturedCliffs		-0.39	270.08
2,107.0	2,107.0	Chacra		-0.39	270.08
3,183.0	3,183.0	Cliff House		-0.39	270.08
3,222.0	3,222.0	Meneffee		-0.39	270.08
4,092.0	4,092.0	Point Lookout		-0.39	270.08
4,240.0	4,240.0	Mancos		-0.39	270.08
5,529.4	5,140.0	Gallup		-0.39	270.08
6,722.1	5,332.0	Lower Gallup		-0.39	270.08

Database:	USA EDM 5000 Multi Users DB	**Local Co-ordinate Reference:**	Well Heros 1H
Company:	LOGOS Operating LLC	**TVD Reference:**	KB=15' @ 6907.0ft
Project:	San Juan County, NM	**MD Reference:**	KB=15' @ 6907.0ft
Site:	S3-T23N-R8W (Heros Pad)	**North Reference:**	True
Well:	Heros 1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	HZ		
Design:	Plan #1		

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	Local Coordinates +E/-W (ft)	Comment
0.5	0.5	0.0	0.0	SH - 1906' FNL, 817' FWL
4,325.0	4,325.0	0.0	0.0	KOP @ 4,325'
6,826.6	5,337.7	1,556.6	-747.2	7°/85° - 350' FNL, 102' FWL
6,826.6	5,337.7	1,556.6	-747.2	EOB @ 85°/Start 5° Build
6,934.5	5,342.0	1,556.8	-854.9	LP - 350' FNL, 6' FEL
6,934.5	5,342.0	1,556.8	-855.0	LP @ 5,342' TVD, 90.39° INC
11,928.3	5,308.0	1,563.3	-5,848.6	PBHL - 350' FNL, 300' FWL
11,928.3	5,308.0	1,563.3	-5,848.6	TD @ 11,928.3' MD

LOGOS Operating LLC

San Juan County, NM
S3-T23N-R8W (Heros Pad)
Heros 1H
HZ
Plan #1

Anticollision Report

27 August, 2014

Cathedral Energy Services

Anticollision Report

Company:	LOGOS Operating LLC	**Local Co-ordinate Reference:**	Well Heros 1H
Project:	San Juan County, NM	**TVD Reference:**	KB=15' @ 6907.0ft
Reference Site:	S3-T23N-R8W (Heros Pad)	**MD Reference:**	KB=15' @ 6907.0ft
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Heros 1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	HZ	**Database:**	USA EDM 5000 Multi Users DB
Reference Design:	Plan #1	**Offset TVD Reference:**	Offset Datum

Reference Plan #1

Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD Interval 100.0ft	**Error Model:**	ISCWSA
Depth Range:	Unlimited	**Scan Method:**	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 500.0ft	**Error Surface:**	Elliptical Conic
Warning Levels Evaluated at:	2.00 **Sigma**		

Survey Tool Program **Date** 8/27/2014

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.0	11,928.3	Plan #1 (HZ)	ISCWSA MWD	MWD - Standard

Summary

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
S3-T23N-R8W (Heros Pad)						
Heros 2H - HZ - FINAL						Out of range
Heros 3H - HZ - FINAL						Out of range

Cathedral Energy Services

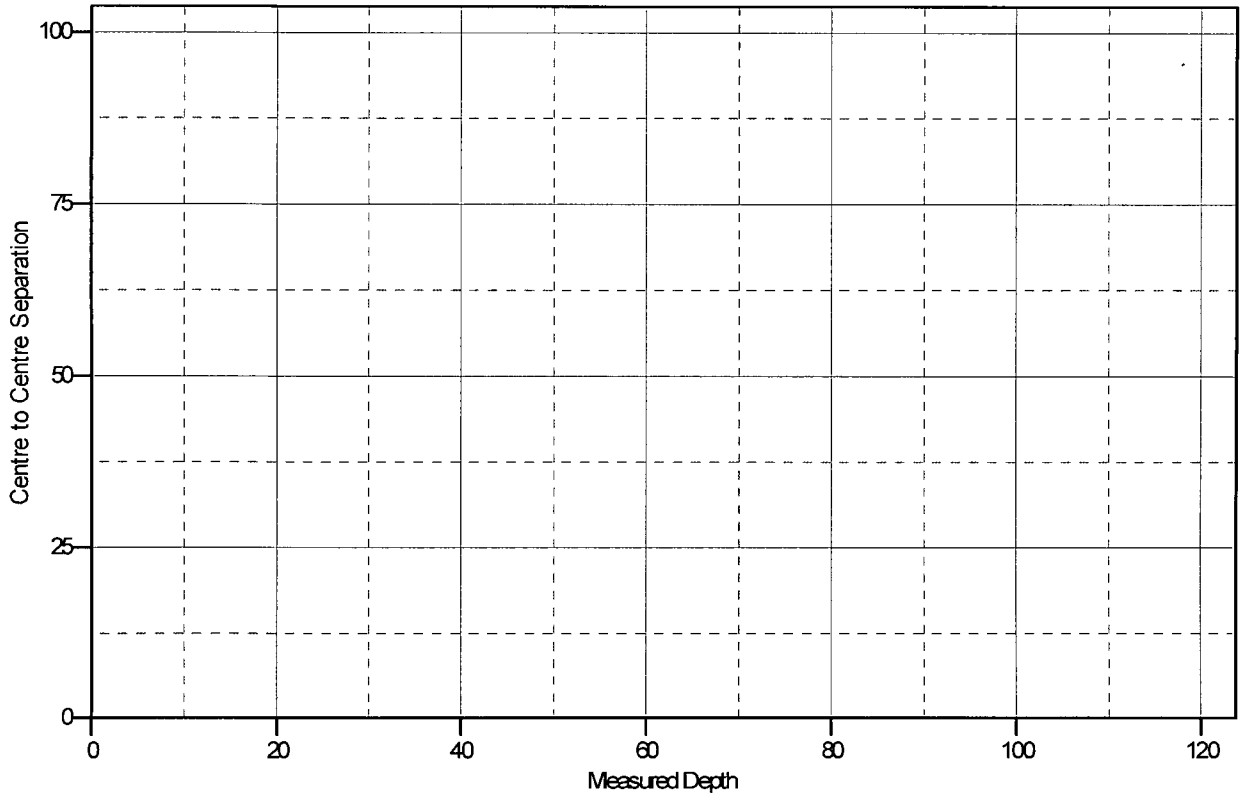
Anticollision Report

Company:	LOGOS Operating LLC	**Local Co-ordinate Reference:**	Well Heros 1H
Project:	San Juan County, NM	**TVD Reference:**	KB=15' @ 6907.0ft
Reference Site:	S3-T23N-R8W (Heros Pad)	**MD Reference:**	KB=15' @ 6907.0ft
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Heros 1H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	HZ	**Database:**	USA EDM 5000 Multi Users DB
Reference Design:	Plan #1	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to KB=15' @ 6907.0ft
Offset Depths are relative to Offset Datum
Central Meridian is -107.833333 °

Coordinates are relative to: Heros 1H
Coordinate System is US State Plane 1983, New Mexico Western Zone
Grid Convergence at Surface is: 0.09°

Ladder Plot



LEGEND

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

d. As determined during the onsite on March 11, 2014, the following Best Management Practices (BMPs) will be implemented:
    1. Water will be diverted around the pad and silt traps installed as needed upon interim reclamation.

e. Construction equipment may include chain saws, a brush hog, scraper, maintainer, excavator, and dozer. Construction of the access road and well pad will take approximately 2 weeks.

3. Pipeline - See the Plan of Development to be submitted with the final Standard Form SF-299 Application for authorization to construct, operate, maintain, and terminate an approximate 1465 foot, up to 3-inch outside diameter, buried, steel well connect pipeline that will be submitted to the BLM at a later date.

G. Methods for Handling Waste Disposal:

1. Cuttings

a. The drill cuttings and drilling fluids will be placed in a reserve pit. The reserve pit will be lined with a 20 mil string re-enforced material and constructed to meet the NMOCD pit guidelines. The reserve pit will be fenced prior to drilling. After drilling, any free liquids in the pit will be disposed of at the appropriate waste disposal facilities. The solids in the reserve pit will be allowed to dry, tested, and buried according to NMOCD pit rules.

b. A 20-mil liner will be installed under tanks, pumps, ancillary facilities, and truck loading/unloading area.

2. Drilling Fluids

a. Drilling fluids will be stored onsite in above-ground storage tanks. Upon termination of drilling operations, the drilling fluids will be recycled and transferred to other permitted locations or returned to the vendor for re-use, as practical. Residual fluids will be vacuumed from the storage tanks and disposed of at Basin Disposal, Inc. and/or Industrial Ecosystem, Inc. waste disposal facilities.

b. Drilling fluid storage tanks will be adequately sized to ensure confinement of all fluids and will provide sufficient freeboard to prevent uncontrolled releases.

3. Flowback Water

a. The water-based solution that flows back to the surface during and after completion operations will be placed in storage tanks on location.

b. Flowback water will be confined to a storage tank for a period not to exceed 90 days after initial production and will be disposed of at Basin Disposal, Inc. and/or Industrial Ecosystem, Inc. waste disposal facilities or recycled.

4. Spills - any spills of non-freshwater fluids will be immediately cleaned up and removed to an approved disposal site.

5. Sewage - self-contained, chemical toilets will be provided for human waste disposal. The toilet holding tanks will be pumped, as needed, and the contents thereof disposed of in an approved sewage disposal facility. The toilets will be onsite during all operations.

6. Garbage and other waste material - garbage, trash, and other waste materials will be collected in a portable, self-contained and fully-enclosed trash container during drilling and completion operations. The accumulated trash will be removed, as needed, and will be disposed of at an authorized sanitary landfill. No trash will be buried or burned on location.

7. Immediately after removal of the drilling rig, all debris and other waste materials not contained in the trash container will be cleaned up and removed from the well location.

8. No chemicals subject to reporting under SARA Title III in an amount equal to or greater than 10,000 pounds will be used, produced, stored, transported, or disposed of in association with the drilling, testing, or completion of this well.

9. No extremely hazardous substances, as defined in 40 CFR 355, in threshold planning quantities, will be used, produced, stored, transported, or disposed of in association with the drilling, testing, or completion of this well.

H. Ancillary Facilities:

1. Standard drilling operation equipment that will be on location includes: drilling rig with associated equipment, temporary office trailers equipped sleeping quarters for essential company personnel, toilet facilities, and trash containers.

I. Well Site Layout:

1. The proposed well pad layout is shown in Sheet F1, F2, G1, and G2. Cross sections have been drafted to visualize cuts and fills across the location. Refer to Item F of this document for construction materials and methods.

2. No permanent living facilities are planned. Office trailers equipped with living quarters will be provided on location during drilling and completions operations.

Sheet C

LOGOS OPERATING, LLC

HEROS 001H

1906 FNL, 817' FWL (SURFACE) SECTION 3

350' FNL, 300' FWL (BOTTOM HOLE) SECTION 4

LATITUDE: 36.2583319° N

LONGITUDE: 107.6753346° W

NAD 83

T-23-N, R-8-W, N.M.P.M

SAN JUAN COUNTY, NEW MEXICO

FROM THE INTERSECTION OF U.S. HIGHWAY 550
AND U.S. HIGHWAY 64 IN BLOOMFIELD, NEW MEXICO.
TRAVEL SOUTHERLY ON U.S. HIGHWAY 550 FOR 40.5 MILES.
TURN LEFT OFF THE HIGHWAY GOING THROUGH THE CATTLE GUARD ONTO THE SIDE ROAD; TURN RIGHT AND TRAVEL NORTHEASTERLY 0.08 MILE.
TO HEROS 003H PROPOSED ACCESS ROAD.
FOLLOW HEROS 003H PROPOSED ACCESS 0.3 MILE TO PROPOSED HEROS 001H ACCESS ROAD LEADING TO HEROS 001H WELL LOCATION.

Well Control Equipment Schematic for 2M Service

Attachment to Drilling Technical Program

Exhibit #1
Typical BOP setup

Location: San Juan Basin, New Mexcio

Date: August 24, 2004
By: John Thompson (Walsh E&P)