Form 3160-5
(March 2012)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

RECEIVED
MAY 22 2014
Farmington Field Office
Bureau of Land Management

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

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.

SUBMIT IN TRIPLICATE *– Other instructions on page 2.*

5. Lease Serial No.
Jicarilla Apache Lease #424

6. If Indian, Allottee or Tribe Name
Jicarilla Apache Nation

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

OIL CONS. DIV DIST. 3

1. Type of Well
☑ Oil Well ☐ Gas Well ☐ Other

8. Well Name and No.
Logos #702H

MAY 27 2014

2. Name of Operator
Logos Operating, LLC

9. API Well No.
30-043-21219

3a. Address
4001 North Butler Avenue, Building 7101
Farmington, NM 87401

3b. Phone No. *(include area code)*
505-330-9333

10. Field and Pool or Exploratory Area
WC 22N5W7; Gallup (O)

4. Location of Well *(Footage, Sec., T.,R.,M., or Survey Description)*
440' FNL, 561' FWL
Section 8, T22N, R5W, UL D NW/NW
BHL: 1980' FNL, 330' FWL
Section 7, T22N, R5W, UL E SW/NW

11. County or Parish, State
Sandoval 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
	☐ Alter Casing	☐ Fracture Treat	☐ Reclamation	☐ Well Integrity
☐ Subsequent Report	☐ Casing Repair	☐ New Construction	☐ Recomplete	☑ Other Change Drilling Plan & Revise Bottom Hole Location
	☑ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	
☐ Final Abandonment Notice	☐ 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.)

Logos Operating would like to revise the drilling plan that was submitted with the amended sundry dated 5/14/14. Adjustments are being made to the directional program based on geology. Also note theTMD has been adjusted to 11,250'.

Logos Operating is also revising the bottom hole location from the approved APD footages of 1980' FNL & 330' FWL of Section 7 T22N R05W -to- 1980' FNL & 250' FWL of Section 7 T22N R05W. Based on the following rulings we are going to TD the well at 250' from the FWL, but due to the length of the RSI sleeve the first perf will be greater than 330' FWL. Although this horizontal well will be drilled past the applicable setbacks, an unorthodox location application is not required because the completed interval in this well, as defined by 19.15.16.7 B(1) NMAC, will be entirely within the applicable setbacks. This approach complies with all applicable rules, including 19.15.16.14 A(3) NMAC, 19.15.16.14 B(2) NMAC, 19.15.16.15 B(2) NMAC, and 19.15.16.15 B(4) NMAC.

The hole sizes and casing weight/grade, will remain the same. The cement will be adjusted accordingly. The As Drilled Plat will reflect the finalized bottom hole footages.

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

CONDITIONS OF APPROVAL

Adhere to previously issued stipulations

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

Title Operations Technician

Signature Tamra Sessions

Date 05/21/2014

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by
William Tambekou

Title Petroleum Engineer

Date 5/22/2014

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 FFO

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

(Instructions on page 2)

NMOCD

Attachment To Application For Permit To Drill.
Drilling program

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

LOGOS #702H
Horizontal Gallup Oil and Gas Well
Surface Location: 440' FNL – 561' FWL
Section 8, T22N, R5W
Ungraded GL Elev = 6961'
Estimate KB Elev =6975.5'
Lat. = 36.158123 deg N
Long. = 107.391645 deg W
NAD83
Sandoval County, New Mexico

Proposed Bottom Hole Location: 1980' FNL – 250' FWL
Section 7, T22N, R5W
Sandoval 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	1386
Kirtland	1538
Pictured Cliff's	1907
Chacra	2336
Cliffs House	3368
Menefee	3417
Point Lookout	4197
Mancos	4406
Gallup	5225
T. Lower Gallup	5414
Landing Point	5436
Total Depth	5381

Drilling Plan

Drill 12 ¼" hole to 500' then set 9 5/8" casing. Drill 8 3/4" hole with fresh water mud from 500' MD to kick off point #1 2507' MD and build 2 degrees per 100' to 40 degrees, 180.80 degrees azimuth and hold to approximately 5329' MD.

Trip out of hole and pick up 8 ¾" kick off assembly at 5329 'MD. Build angle at 10 deg/100' to 85 degrees inclination and 270.00 degrees azimuth in the Gallup formation at 5667' MD / 5225' TVD, and 7" intermediate casing will be set @ 6173'.
7" casing will be set in a legal position 1980' FNL & 10' FEL in Section 8.
The 7" casing will be drilled out with a 6 1/8" drilling assembly building angle at 5 deg/100' to 90.65 degrees inclination and 270.01 degree azimuth to 6298' MD / 5436' TVD. Hold 90.65 degrees, 270.00 degrees azimuth and drill to a total depth at 11250' MD / 5381' TVD. Adjustments may be made to the directional program based on geology. Total depth will be 11250' MD / 5381' TVD- 90.65 degrees, 270.01 degrees Azimuth.
The Bottom hole location will be in a legal location at 11250' MD at 1980' FNL & 250' FWL of section 7.
A total of 4997' 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 5225' TVD at 7" casing point

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

3. MINIMUM SPECIFICATIONS FOR PRESSURE CONTROL EQUIPMENT

A. Wellhead Equipment 2,000 PSI System (See Exhibit A)

1. 9 5/8" slip-on / welded x 11" 2,000 psi casing head.
2. One 11" 2,000 psi WP double-ram preventer with one (1) set of blind rams on top & one (1) set of pipe rams on bottom complete with hand wheels and extension arms.
3. The choke and kill lines will be connected to outlets between the bottom and top rams, utilizing either the ram body outlet or a drilling spool with side outlets for 2" kill line and minimum 3" choke line
4. One 11" x 2,000 psi WP Hydril GK (or equivalent) annular preventer.
5. Accumulator - Four Station Koomey (or equivalent) 120 gallon closing unit with remote, backup. The accumulator shall have sufficient capacity to open the hydraulically-controlled gate valve and close all rams plus the annular preventer, with a 50% safety factor and retain a minimum of 200 psi above the precharge on the closing manifold without the use of the closing unit pumps. The reservoir capacity shall be double the usable accumulator capacity, and the fluid level shall be maintained at the manufacturer's recommendations.
6. The BOP system shall have two (2) independent power sources (electric and air) available for powering the closing unit pumps. Sufficient nitrogen bottles are suitable as a backup power source only, and shall be recharged when the pressure falls below manufacturer's specification.
7. A valve shall be installed in the closing line as close as possible to the annular preventer to act as a locking device. This valve shall be maintained in the open position and shall be closed only when the power source for the accumulator system is inoperative.

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 500'
8 3/4" = 500' to 6173' = 7" Casing point
6-1/8" Lateral = 6173' MD to 11250' 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	K-55	LT&C	0' - 500'	New casing. Cement to surface.
7" (8 ¾")	23 ppf	J-55	LT&C	0' - 6173' MD	New Casing. Cement to surface with foam cement.
4 ½" (6 1/8")	11.6 ppf	P-110	LT&C	5400' - 11250' MD	New Casing - Horizontal Hole Cemented full length with foam cement - TOL at 40°.

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.

a) 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 – (0-500'):
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)
0.4 % Halad(R)-344 (Low Fluid Loss Control)

Fluid Weight	15.80 lbm/gal
Slurry Yield:	1.15 ft^3/sk
Total Mixing Fluid:	4.94 Gal/sk
Top of Fluid:	0 ft
Calculated Fill:	500 ft
Volume:	55.8 bbl 313.2
Calculated Sacks:	273 sks

Intermediate Casing – ~~Single~~ Two Stage Job (0-6173'MD):
Excess – 50% over gauge hole – 8-3/4" hole and 7" casing (0.1503 ft3/ft)
Top of Cement – Surface.

Foamed Lead Cement
ELASTISEAL (TM) SYSTEM
0.2 % Versaset (Thixotropic Additive)
0.15 % HALAD-766 (Low Fluid Loss Control)
1.5 % CHEM - FOAMER 760, TOTETANK (Foamer)

Fluid Weight	13 lbm/gal
Slurry Yield:	1.43 ft^3/sk
Total Mixing Fluid:	6.74 Gal/sk
Top of Fluid:	0 ft
Calculated Fill:	5760 ft
Volume:	231 bbl
Calculated Sacks:	908 sks

Tail Cement
HALCEM (TM) SYSTEM
0.2 % Versaset (Thixotropic Additive)
0.15 % HALAD-766 (Low Fluid Loss Control)

Fluid Weight	13.50 lbm/gal
Slurry Yield:	1.29 ft^3/sk
Total Mixing Fluid:	5.70 Gal/sk
Top of Fluid:	5760 ft
Calculated Fill:	500 ft
Volume:	20
Calculated Sacks:	90 sks

Primary Cement – Cap Cement
HALCEM (TM) SYSTEM
2 % Calcium Chloride (Accelerator)

Fluid Weight	15.80 lbm/gal
Slurry Yield:	1.17 ft^3/sk
Total Mixing Fluid:	5.02 Gal/sk
Calculated Fill:	500 ft
Volume:	20.77 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	Foamed Lead Cement	13.0		908 sks
5	Cement	Tail Cement	13.5		90 sks
6	Spacer	Displacement	8.3		
7	Cement	Cap Cement	15.8		100 sks

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						
4	Foamed Lead Cement	200bbl	9.5	9.5	4.2	372.9

Foam Design Specifications:

Foam Calculation Method: Constant Density
Backpressure: 14 psig
Bottom Hole Circulating Temp: 105 degF
Mud Outlet Temperature: 85 degF

Calculated Gas = 23129.9 scf
Additional Gas = 50000 scf
Total Gas = 73129.9 scf

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

Production Casing – Single Stage Job (5400' - 11250'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: 5300 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: 5600 ft
Calculated Fill: 3914 ft
Volume: 99 bbl
Calculated Sacks: 387 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: 9514 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		387 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
Backpressure: 14 psig
Bottom Hole Circulating Temp: 158 degF
Mud Outlet Temperature: 100 degF

Calculated Gas = 20792.1 scf
Additional Gas = 50000 scf
Total Gas = 70792.1 scf

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

a) Vertical Portion

Hole Size (in)	TVD (ft)	Mud Type	Density (lb/gal)	Viscosity (sec/qt)	Fluid Loss (cc)
12 1/4"	0-500'	Fresh Water	8.4-8.6	60-70	NC
8 3/4"	500'-5329'	Fresh Water LSND	8.5-8.8	40-50	8-10

b) Kick off to Horizontal Lateral:

Hole Size (in)	TVD/MD (ft)	Mud Type	Density (lb/gal)	Viscosity (sec/qt)	Fluid Loss (CC)
8 3/4"	5329' (KOP)-6298'	Fresh Water LSND	8.5-8.8	40-50	8-10
6 1/8"	6298' – 11250'	Synthetic Oil Based Mud	7.0-9.0	15-25	<1

c) 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.

d) 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.

7. TESTING, CORING and LOGGING

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

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

8. ABNORMAL PRESSURES & HYDROGEN SULFIDE

The anticipated bottom hole pressure is +/- 2537 psi based on a 9.0 ppg at 5436' 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.

9. ANTICIPATED START DATE AND DURATION OF OPERATIONS

Drilling is estimated to commence on May 16, 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 45 days.

**Although this well will be drilled past the applicable setbacks, an unorthodox location application is not required because the completed interval in this well, as defined by 19.15.16.7 B(1) NMAC, will be entirely within the applicable setbacks. This approach complies with all applicable rules, including 19.15.16.14 A(3) NMAC, 19.15.16.14 B(2) NMAC, 19.15.16.15 B(2) NMAC, and 19.15.16.15 B(4) NMAC.

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 19.15.17.13 NMAC.

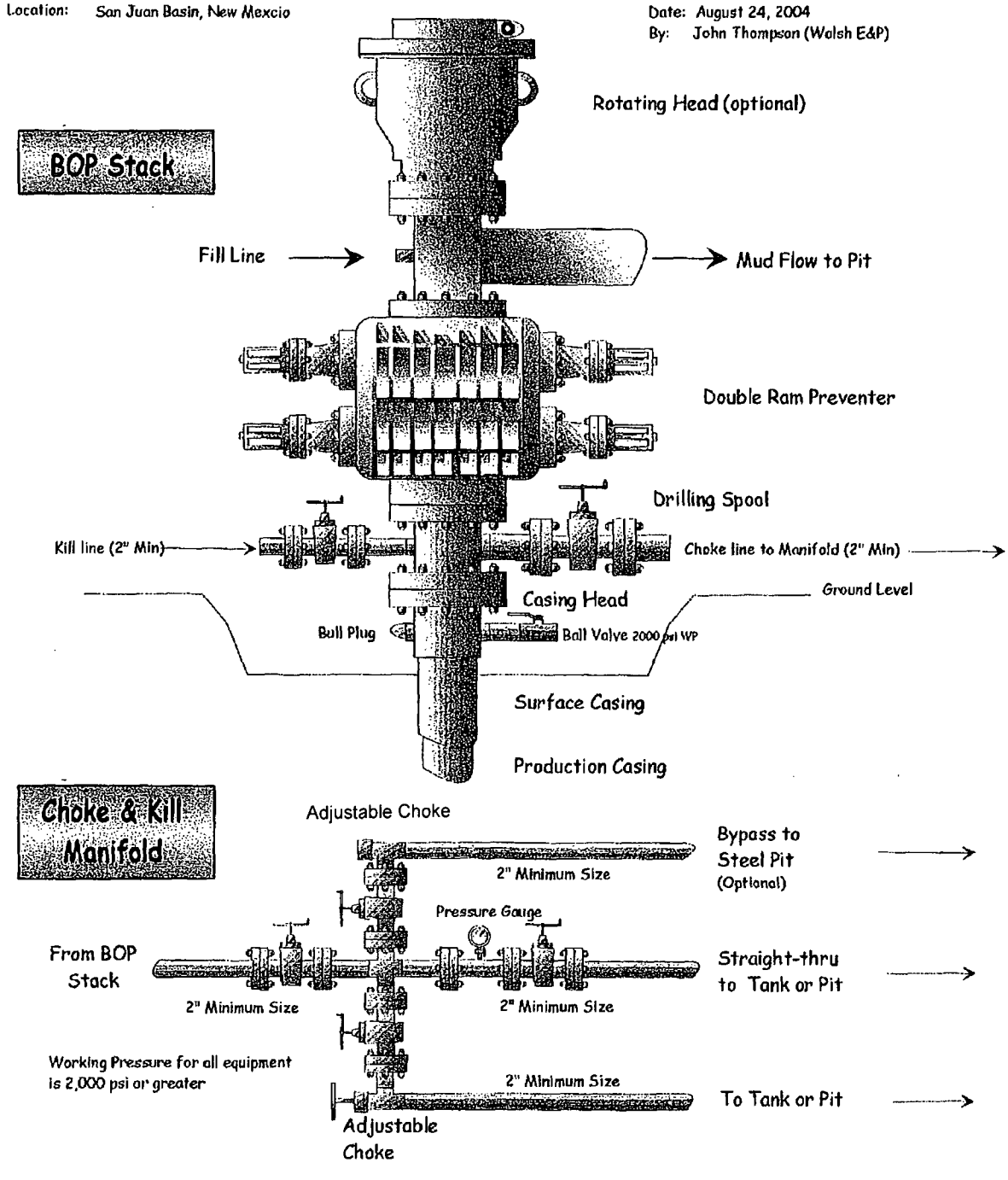
Well Control Equipment Schematic for 2M Service

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)



W

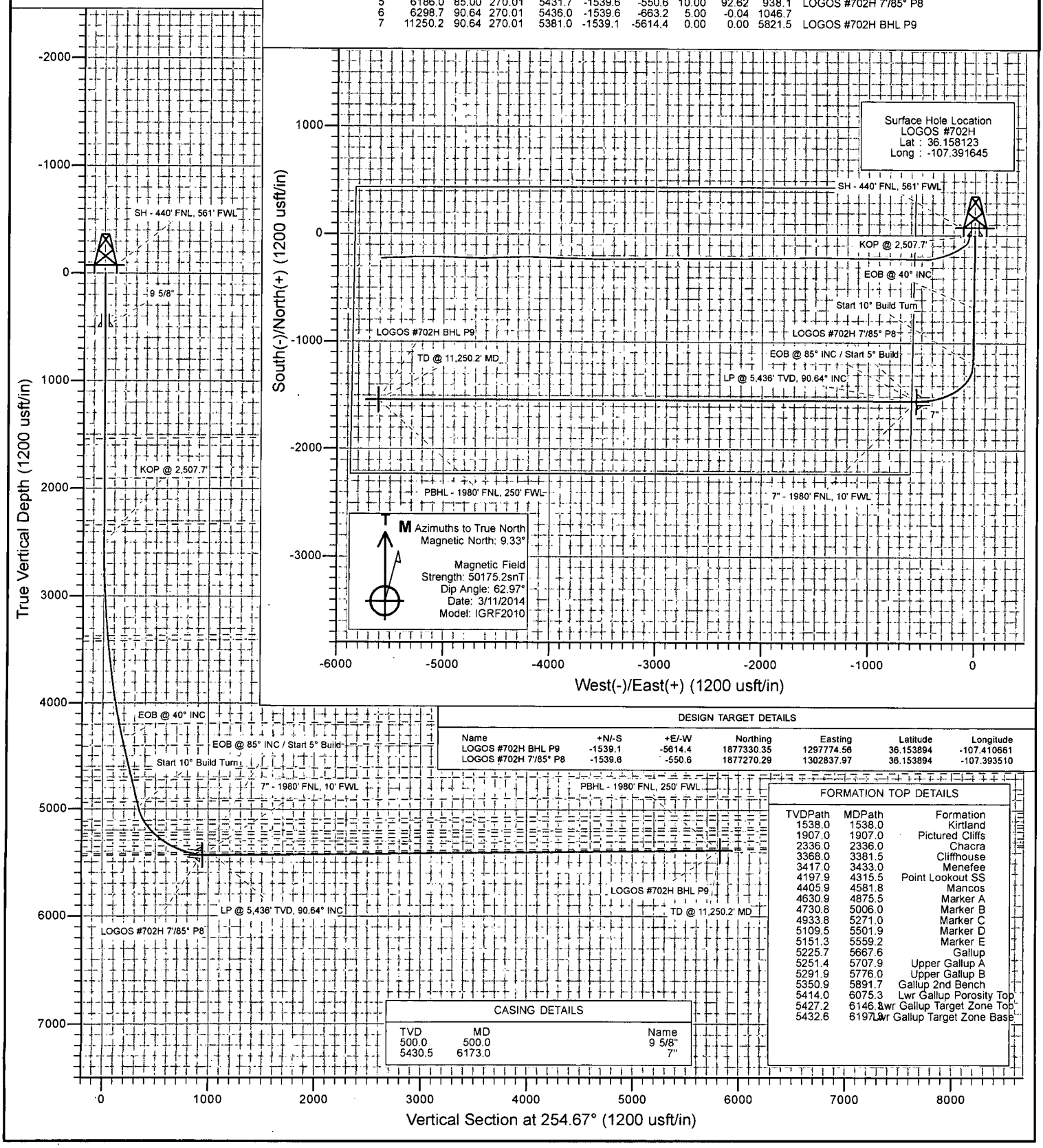
Project: Sandoval County, NM
Site: S8-T22N-R5W
Well: LOGOS #702H
Wellbore: HZ
Design: Plan #9

CATHEDRAL

Plan #9
LOGOS #702H
KB=14.5' @ 6975.5usft (Original Well Elev)
Ground Elevation @ 6961.0
North American Datum 1983
Well LOGOS #702H, 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	2507.7	0.00	0.00	2507.7	0.0	0.0	0.00	0.00	0.0	
3	4507.8	40.00	180.80	4349.3	-670.3	-9.4	2.00	180.80	186.2	
4	5329.3	40.00	180.80	4978.5	-1198.3	-16.7	0.00	0.00	332.9	
5	6186.0	85.00	270.01	5431.7	-1539.6	-550.6	10.00	92.62	938.1	LOGOS #702H 7'/85° P8
6	6298.7	90.64	270.01	5436.0	-1539.6	-663.2	5.00	-0.04	1046.7	
7	11250.2	90.64	270.01	5381.0	-1539.1	-5614.4	0.00	0.00	5821.5	LOGOS #702H BHL P9



DESIGN TARGET DETAILS

Name	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
LOGOS #702H BHL P9	-1539.1	-5614.4	1877330.35	1297774.56	36.153894	-107.410661
LOGOS #702H 7'/85° P8	-1539.6	-550.6	1877270.29	1302837.97	36.153894	-107.393510

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
1538.0	1538.0	Kirtland
1907.0	1907.0	Pictured Cliffs
2336.0	2336.0	Chacra
3368.0	3381.5	Cliffhouse
3417.0	3433.0	Menefee
4197.9	4315.5	Point Lookout SS
4405.9	4581.8	Mancos
4630.9	4875.5	Marker A
4730.8	5006.0	Marker B
4933.8	5271.0	Marker C
5109.5	5501.9	Marker D
5151.3	5559.2	Marker E
5225.7	5667.6	Gallup
5251.4	5707.9	Upper Gallup A
5291.9	5776.0	Upper Gallup B
5350.9	5891.7	Gallup 2nd Bench
5414.0	6075.3	Lwr Gallup Porosity Top
5427.2	6146.3	Lwr Gallup Target Zone Top
5432.6	6197.9	Lwr Gallup Target Zone Base

CASING DETAILS

TVD	MD	Name
500.0	500.0	9 5/8"
5430.5	6173.0	7"

Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	**Local Co-ordinate Reference:**	Well LOGOS #702H
Company:	LOGOS Operating LLC	**TVD Reference:**	KB=14.5' @ 6975.5usft (Original Well Elev)
Project:	Sandoval County, NM	**MD Reference:**	KB=14.5' @ 6975.5usft (Original Well Elev)
Site:	S8-T22N-R5W	**North Reference:**	True
Well:	LOGOS #702H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	HZ		
Design:	Plan #9		

Project Sandoval County, NM

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

Site S8-T22N-R5W

Site Position:		**Northing:**	1,878,793.72 usft	**Latitude:**	36.158095
From:	Lat/Long	**Easting:**	1,303,355.47 usft	**Longitude:**	-107.391818
Position Uncertainty:	0.0 usft	**Slot Radius:**	13-3/16"	**Grid Convergence:**	-0.67 °

Well LOGOS #702H

Well Position	**+N/-S**	0.0 usft	**Northing:**	1,878,803.31 usft	**Latitude:**	36.158123
	+E/-W	0.0 usft	**Easting:**	1,303,406.66 usft	**Longitude:**	-107.391645
Position Uncertainty		0.0 usft	**Wellhead Elevation:**	usft	**Ground Level:**	6,961.0 usft

Wellbore HZ

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	3/11/2014	9.33	62.97	50,175

Design Plan #9

Audit Notes:

Version:		**Phase:**	PLAN	**Tie On Depth:**	0.0
Vertical Section:	**Depth From (TVD) (usft)**	**+N/-S (usft)**	**+E/-W (usft)**	**Direction (°)**	
	0.0	0.0	0.0	254.67	

Plan Sections

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
2,507.7	0.00	0.00	2,507.7	0.0	0.0	0.00	0.00	0.00	0.00	
4,507.8	40.00	180.80	4,349.3	-670.3	-9.4	2.00	2.00	0.00	180.80	
5,329.3	40.00	180.80	4,978.5	-1,198.3	-16.7	0.00	0.00	0.00	0.00	
6,186.0	85.00	270.01	5,431.7	-1,539.6	-550.6	10.00	5.25	10.41	92.62	LOGOS #702H 7'/85°
6,298.7	90.64	270.01	5,436.0	-1,539.6	-663.2	5.00	5.00	0.00	-0.04	
11,250.2	90.64	270.01	5,381.0	-1,539.1	-5,614.4	0.00	0.00	0.00	0.00	LOGOS #702H BHL F

Cathedral Energy Services

Planning Report

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Company:	LOGOS Operating LLC	**TVD Reference:**	KB=14.5' @ 6975.5usft (Original Well Elev)
Project:	Sandoval County, NM	**MD Reference:**	KB=14.5' @ 6975.5usft (Original Well Elev)
Site:	S8-T22N-R5W	**North Reference:**	True
Well:	LOGOS #702H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	HZ		
Design:	Plan #9		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft	Build Rate (°/100u	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 - 440' FNL, 561' 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	
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	9 5/8"
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	
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	
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	
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	
1,538.0	0.00	0.00	1,538.0	0.0	0.0	0.0	0.00	0.00	Kirtland
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	
1,800.0	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	
1,907.0	0.00	0.00	1,907.0	0.0	0.0	0.0	0.00	0.00	Pictured Cliffs
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	
2,200.0	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	
2,336.0	0.00	0.00	2,336.0	0.0	0.0	0.0	0.00	0.00	Chacra
2,400.0	0.00	0.00	2,400.0	0.0	0.0	0.0	0.00	0.00	
2,507.7	0.00	0.00	2,507.7	0.0	0.0	0.0	0.00	0.00	KOP @ 2,507.7'
2,600.0	1.85	180.80	2,600.0	-1.5	0.0	0.4	2.00	2.00	
2,700.0	3.85	180.80	2,699.9	-6.5	-0.1	1.8	2.00	2.00	
2,800.0	5.85	180.80	2,799.5	-14.9	-0.2	4.1	2.00	2.00	
2,900.0	7.85	180.80	2,898.8	-26.8	-0.4	7.5	2.00	2.00	
3,000.0	9.85	180.80	2,997.6	-42.2	-0.6	11.7	2.00	2.00	
3,100.0	11.85	180.80	3,095.8	-61.0	-0.9	16.9	2.00	2.00	
3,200.0	13.85	180.80	3,193.3	-83.2	-1.2	23.1	2.00	2.00	
3,300.0	15.85	180.80	3,289.9	-108.9	-1.5	30.2	2.00	2.00	
3,381.5	17.48	180.80	3,368.0	-132.2	-1.8	36.7	2.00	2.00	Cliffhouse
3,400.0	17.85	180.80	3,385.6	-137.8	-1.9	38.3	2.00	2.00	
3,433.0	18.51	180.80	3,417.0	-148.1	-2.1	41.2	2.00	2.00	Menefee
3,500.0	19.85	180.80	3,480.3	-170.1	-2.4	47.3	2.00	2.00	
3,600.0	21.85	180.80	3,573.7	-205.7	-2.9	57.2	2.00	2.00	
3,700.0	23.85	180.80	3,665.9	-244.5	-3.4	67.9	2.00	2.00	
3,800.0	25.85	180.80	3,756.6	-286.5	-4.0	79.6	2.00	2.00	
3,900.0	27.85	180.80	3,845.8	-331.7	-4.6	92.2	2.00	2.00	
4,000.0	29.85	180.80	3,933.4	-379.9	-5.3	105.6	2.00	2.00	
4,100.0	31.85	180.80	4,019.3	-431.2	-6.0	119.8	2.00	2.00	
4,200.0	33.85	180.80	4,103.3	-485.4	-6.8	134.9	2.00	2.00	
4,300.0	35.85	180.80	4,185.3	-542.6	-7.6	150.7	2.00	2.00	
4,315.5	36.16	180.80	4,197.9	-551.7	-7.7	153.3	2.00	2.00	Point Lookout SS
4,400.0	37.85	180.80	4,265.4	-602.5	-8.4	167.4	2.00	2.00	

Cathedral Energy Services

Planning Report

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Company:	LOGOS Operating LLC	**TVD Reference:**	KB=14.5' @ 6975.5usft (Original Well Elev)
Project:	Sandoval County, NM	**MD Reference:**	KB=14.5' @ 6975.5usft (Original Well Elev)
Site:	S8-T22N-R5W	**North Reference:**	True
Well:	LOGOS #702H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	HZ		
Design:	Plan #9		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft	Build Rate (°/100u	Comments / Formations
4,507.8	40.00	180.80	4,349.2	-670.2	-9.4	186.2	2.00	2.00	EOB @ 40° INC
4,581.8	40.00	180.80	4,405.9	-717.8	-10.0	199.4	0.00	0.00	Mancos
4,600.0	40.00	180.80	4,419.9	-729.5	-10.2	202.7	0.00	0.00	
4,700.0	40.00	180.80	4,496.5	-793.8	-11.1	220.5	0.00	0.00	
4,800.0	40.00	180.80	4,573.1	-858.0	-12.0	238.4	0.00	0.00	
4,875.5	40.00	180.80	4,630.9	-906.5	-12.6	251.9	0.00	0.00	Marker A
4,900.0	40.00	180.80	4,649.7	-922.3	-12.9	256.3	0.00	0.00	
5,000.0	40.00	180.80	4,726.3	-986.6	-13.8	274.1	0.00	0.00	
5,006.0	40.00	180.80	4,730.8	-990.4	-13.8	275.2	0.00	0.00	Marker B
5,100.0	40.00	180.80	4,802.9	-1,050.9	-14.7	292.0	0.00	0.00	
5,200.0	40.00	180.80	4,879.5	-1,115.2	-15.6	309.8	0.00	0.00	
5,271.0	40.00	180.80	4,933.8	-1,160.8	-16.2	322.5	0.00	0.00	Marker C
5,300.0	40.00	180.80	4,956.1	-1,179.4	-16.5	327.7	0.00	0.00	
5,329.3	40.00	180.80	4,978.5	-1,198.3	-16.7	332.9	0.00	0.00	Start 10° Build Turn
5,350.0	39.95	184.02	4,994.4	-1,211.5	-17.3	337.0	9.99	-0.24	
5,400.0	40.20	191.78	5,032.7	-1,243.4	-21.7	349.6	10.00	0.49	
5,450.0	40.96	199.38	5,070.7	-1,274.7	-30.4	366.3	10.00	1.51	
5,500.0	42.19	206.68	5,108.1	-1,305.1	-43.4	386.9	10.00	2.47	
5,501.9	42.25	206.96	5,109.5	-1,306.3	-44.0	387.8	10.00	2.95	Marker D
5,550.0	43.87	213.59	5,144.6	-1,334.6	-60.6	411.2	10.00	3.37	
5,559.2	44.22	214.81	5,151.3	-1,339.9	-64.2	416.1	10.00	3.83	Marker E
5,600.0	45.94	220.04	5,180.1	-1,362.8	-81.7	439.1	10.00	4.20	
5,650.0	48.34	226.03	5,214.1	-1,389.5	-106.7	470.3	10.00	4.81	
5,667.6	49.26	228.02	5,225.7	-1,398.5	-116.4	482.0	10.00	5.21	Gallup
5,700.0	51.03	231.56	5,246.5	-1,414.6	-135.4	504.6	10.00	5.48	
5,707.9	51.48	232.39	5,251.4	-1,418.4	-140.3	510.3	10.00	5.68	Upper Gallup A
5,750.0	53.96	236.66	5,276.9	-1,437.8	-167.5	541.7	10.00	5.90	
5,776.0	55.57	239.16	5,291.9	-1,449.1	-185.5	562.0	10.00	6.18	Upper Gallup B
5,800.0	57.10	241.39	5,305.2	-1,459.0	-202.9	581.4	10.00	6.36	
5,850.0	60.39	245.79	5,331.2	-1,478.0	-241.2	623.3	10.00	6.60	
5,891.7	63.25	249.24	5,350.9	-1,492.0	-275.1	659.8	10.00	6.85	Gallup 2nd Bench
5,900.0	63.83	249.90	5,354.6	-1,494.6	-282.1	667.2	10.00	6.97	
5,950.0	67.37	253.78	5,375.2	-1,508.8	-325.3	712.6	10.00	7.09	
6,000.0	71.00	257.45	5,393.0	-1,520.3	-370.6	759.4	10.00	7.26	
6,050.0	74.71	260.97	5,407.7	-1,529.3	-417.5	807.0	10.00	7.40	
6,075.3	76.60	262.70	5,414.0	-1,532.7	-441.7	831.2	10.00	7.49	Lwr Gallup Porosity Top
6,100.0	78.46	264.37	5,419.3	-1,535.5	-465.7	855.1	10.00	7.53	
6,146.3	81.97	267.43	5,427.2	-1,538.7	-511.3	899.9	10.00	7.58	Lwr Gallup Target Zone Top
6,150.0	82.25	267.67	5,427.7	-1,538.9	-514.9	903.4	10.00	7.61	
6,173.0	84.01	269.17	5,430.5	-1,539.5	-537.7	925.6	10.00	7.63	7"
6,186.0	85.00	270.01	5,431.7	-1,539.6	-550.7	938.1	9.98	7.62	7" - 1980' FNL, 10' FWL - EOB @ 85° INC / Sta
6,197.3	85.56	270.01	5,432.6	-1,539.6	-561.9	948.9	5.01	5.01	Lwr Gallup Target Zone Base
6,200.0	85.70	270.01	5,432.8	-1,539.6	-564.6	951.6	5.00	5.00	
6,298.7	90.64	270.01	5,436.0	-1,539.6	-663.2	1,046.7	5.00	5.00	LP @ 5,436' TVD, 90.64° INC
6,300.0	90.64	270.01	5,436.0	-1,539.6	-664.5	1,047.9	0.00	0.00	
6,400.0	90.64	270.01	5,434.9	-1,539.6	-764.5	1,144.4	0.00	0.00	
6,500.0	90.64	270.01	5,433.8	-1,539.6	-864.5	1,240.8	0.00	0.00	
6,600.0	90.64	270.01	5,432.6	-1,539.6	-964.5	1,337.2	0.00	0.00	
6,700.0	90.64	270.01	5,431.5	-1,539.5	-1,064.5	1,433.7	0.00	0.00	
6,800.0	90.64	270.01	5,430.4	-1,539.5	-1,164.5	1,530.1	0.00	0.00	
6,900.0	90.64	270.01	5,429.3	-1,539.5	-1,264.5	1,626.5	0.00	0.00	
7,000.0	90.64	270.01	5,428.2	-1,539.5	-1,364.5	1,723.0	0.00	0.00	

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Site:	S8-T22N-R5W	**North Reference:**	True
Well:	LOGOS #702H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	HZ		
Design:	Plan #9		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft	Build Rate (°/100u	Comments / Formations
7,100.0	90.64	270.01	5,427.1	-1,539.5	-1,464.5	1,819.4	0.00	0.00	
7,200.0	90.64	270.01	5,426.0	-1,539.5	-1,564.5	1,915.8	0.00	0.00	
7,300.0	90.64	270.01	5,424.9	-1,539.5	-1,664.5	2,012.3	0.00	0.00	
7,400.0	90.64	270.01	5,423.8	-1,539.5	-1,764.5	2,108.7	0.00	0.00	
7,500.0	90.64	270.01	5,422.6	-1,539.5	-1,864.5	2,205.1	0.00	0.00	
7,600.0	90.64	270.01	5,421.5	-1,539.5	-1,964.5	2,301.6	0.00	0.00	
7,700.0	90.64	270.01	5,420.4	-1,539.4	-2,064.4	2,398.0	0.00	0.00	
7,800.0	90.64	270.01	5,419.3	-1,539.4	-2,164.4	2,494.4	0.00	0.00	
7,900.0	90.64	270.01	5,418.2	-1,539.4	-2,264.4	2,590.9	0.00	0.00	
8,000.0	90.64	270.01	5,417.1	-1,539.4	-2,364.4	2,687.3	0.00	0.00	
8,100.0	90.64	270.01	5,416.0	-1,539.4	-2,464.4	2,783.7	0.00	0.00	
8,200.0	90.64	270.01	5,414.9	-1,539.4	-2,564.4	2,880.2	0.00	0.00	
8,300.0	90.64	270.01	5,413.8	-1,539.4	-2,664.4	2,976.6	0.00	0.00	
8,400.0	90.64	270.01	5,412.7	-1,539.4	-2,764.4	3,073.0	0.00	0.00	
8,500.0	90.64	270.01	5,411.5	-1,539.4	-2,864.4	3,169.4	0.00	0.00	
8,600.0	90.64	270.01	5,410.4	-1,539.3	-2,964.4	3,265.9	0.00	0.00	
8,700.0	90.64	270.01	5,409.3	-1,539.3	-3,064.4	3,362.3	0.00	0.00	
8,800.0	90.64	270.01	5,408.2	-1,539.3	-3,164.4	3,458.7	0.00	0.00	
8,900.0	90.64	270.01	5,407.1	-1,539.3	-3,264.4	3,555.2	0.00	0.00	
9,000.0	90.64	270.01	5,406.0	-1,539.3	-3,364.4	3,651.6	0.00	0.00	
9,100.0	90.64	270.01	5,404.9	-1,539.3	-3,464.4	3,748.0	0.00	0.00	
9,200.0	90.64	270.01	5,403.8	-1,539.3	-3,564.4	3,844.5	0.00	0.00	
9,300.0	90.64	270.01	5,402.7	-1,539.3	-3,664.3	3,940.9	0.00	0.00	
9,400.0	90.64	270.01	5,401.5	-1,539.3	-3,764.3	4,037.3	0.00	0.00	
9,500.0	90.64	270.01	5,400.4	-1,539.3	-3,864.3	4,133.8	0.00	0.00	
9,600.0	90.64	270.01	5,399.3	-1,539.2	-3,964.3	4,230.2	0.00	0.00	
9,700.0	90.64	270.01	5,398.2	-1,539.2	-4,064.3	4,326.6	0.00	0.00	
9,800.0	90.64	270.01	5,397.1	-1,539.2	-4,164.3	4,423.1	0.00	0.00	
9,900.0	90.64	270.01	5,396.0	-1,539.2	-4,264.3	4,519.5	0.00	0.00	
10,000.0	90.64	270.01	5,394.9	-1,539.2	-4,364.3	4,615.9	0.00	0.00	
10,100.0	90.64	270.01	5,393.8	-1,539.2	-4,464.3	4,712.4	0.00	0.00	
10,200.0	90.64	270.01	5,392.7	-1,539.2	-4,564.3	4,808.8	0.00	0.00	
10,300.0	90.64	270.01	5,391.6	-1,539.2	-4,664.3	4,905.2	0.00	0.00	
10,400.0	90.64	270.01	5,390.4	-1,539.2	-4,764.3	5,001.7	0.00	0.00	
10,500.0	90.64	270.01	5,389.3	-1,539.2	-4,864.3	5,098.1	0.00	0.00	
10,600.0	90.64	270.01	5,388.2	-1,539.1	-4,964.3	5,194.5	0.00	0.00	
10,700.0	90.64	270.01	5,387.1	-1,539.1	-5,064.3	5,291.0	0.00	0.00	
10,800.0	90.64	270.01	5,386.0	-1,539.1	-5,164.3	5,387.4	0.00	0.00	
10,900.0	90.64	270.01	5,384.9	-1,539.1	-5,264.2	5,483.8	0.00	0.00	
11,000.0	90.64	270.01	5,383.8	-1,539.1	-5,364.2	5,580.3	0.00	0.00	
11,100.0	90.64	270.01	5,382.7	-1,539.1	-5,464.2	5,676.7	0.00	0.00	
11,200.0	90.64	270.01	5,381.6	-1,539.1	-5,564.2	5,773.1	0.00	0.00	
11,250.2	90.64	270.01	5,381.0	-1,539.1	-5,614.4	5,821.5	0.00	0.00	PBHL - 1980' FNL, 250' FWL - TD @ 11,250.2' I

Database:	USA EDM 5000 Multi Users DB	**Local Co-ordinate Reference:**	Well LOGOS #702H
Company:	LOGOS Operating LLC	**TVD Reference:**	KB=14.5' @ 6975.5usft (Original Well Elev)
Project:	Sandoval County, NM	**MD Reference:**	KB=14.5' @ 6975.5usft (Original Well Elev)
Site:	S8-T22N-R5W	**North Reference:**	True
Well:	LOGOS #702H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	HZ		
Design:	Plan #9		

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
LOGOS #702H BHL P2	0.00	0.00	5,381.0	-1,896.4	-5,545.9	1,876,972.28	1,297,838.84	36.152913	-107.410429
- plan misses target center by 357.3usft at 11181.7usft MD (5381.8 TVD, -1539.1 N, -5545.9 E)									
- Point									
LOGOS #702H BHL P7	0.00	0.00	5,381.0	-1,539.1	-5,534.4	1,877,329.41	1,297,854.57	36.153894	-107.410390
- plan misses target center by 0.9usft at 11170.2usft MD (5381.9 TVD, -1539.1 N, -5534.4 E)									
- Point									
LOGOS #702H POE	0.00	0.00	5,418.7	-1,896.4	-960.1	1,876,918.34	1,302,424.35	36.152914	-107.394897
- plan misses target center by 357.1usft at 6595.7usft MD (5432.7 TVD, -1539.6 N, -960.2 E)									
- Point									
LOGOS #702H 7'/85°	0.00	0.00	5,418.7	-1,896.4	-660.0	1,876,914.81	1,302,724.43	36.152914	-107.393880
- plan misses target center by 357.2usft at 6294.8usft MD (5436.0 TVD, -1539.6 N, -659.4 E)									
- Point									
LOGOS #702H 7'/85° P1	0.00	0.00	5,418.7	-1,539.6	-550.6	1,877,270.29	1,302,837.97	36.153894	-107.393510
- plan misses target center by 13.0usft at 6184.7usft MD (5431.6 TVD, -1539.6 N, -549.4 E)									
- Point									
LOGOS #702H BHL P4	0.00	0.00	5,381.0	-1,896.4	-5,810.0	1,876,975.38	1,297,574.79	36.152912	-107.411323
- plan misses target center by 407.3usft at 11250.2usft MD (5381.0 TVD, -1539.1 N, -5614.4 E)									
- Point									
LOGOS #702H BHL	0.00	0.00	5,392.0	-1,896.4	-5,545.9	1,876,972.28	1,297,838.84	36.152913	-107.410429
- plan misses target center by 357.4usft at 11181.5usft MD (5381.8 TVD, -1539.1 N, -5545.8 E)									
- Point									
LOGOS #702H 7'/85° P1	0.00	0.00	5,431.7	-1,539.6	-550.6	1,877,270.29	1,302,837.97	36.153894	-107.393510
- plan hits target center									
- Point									
LOGOS #702H BHL P5	0.00	0.00	5,381.0	-1,895.1	-5,540.1	1,876,973.45	1,297,844.71	36.152916	-107.410409
- plan misses target center by 356.0usft at 11175.8usft MD (5381.8 TVD, -1539.1 N, -5540.0 E)									
- Point									
LOGOS #702H VP	0.00	0.00	4,764.9	-1,896.4	-700.1	1,876,915.29	1,302,684.34	36.152914	-107.394016
- plan misses target center by 759.6usft at 6343.0usft MD (5435.5 TVD, -1539.6 N, -707.5 E)									
- Point									
LOGOS #702H 7'/85° P1	0.00	0.00	5,418.7	-1,895.3	-570.7	1,876,914.87	1,302,813.71	36.152917	-107.393578
- plan misses target center by 356.0usft at 6205.6usft MD (5433.2 TVD, -1539.6 N, -570.2 E)									
- Point									
LOGOS #702H BHL P9	0.00	0.00	5,381.0	-1,539.1	-5,614.4	1,877,330.35	1,297,774.56	36.153894	-107.410661
- plan hits target center									
- Point									

500.0	500.0	9 5/8"	0	0
6,173.0	5,430.5	7"	0	0

Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	**Local Co-ordinate Reference:**	Well LOGOS #702H
Company:	LOGOS Operating LLC	**TVD Reference:**	KB=14.5' @ 6975.5usft (Original Well Elev)
Project:	Sandoval County, NM	**MD Reference:**	KB=14.5' @ 6975.5usft (Original Well Elev)
Site:	S8-T22N-R5W	**North Reference:**	True
Well:	LOGOS #702H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	HZ		
Design:	Plan #9		

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,538.0	1,538.0	Kirtland		-0.65	270.01
1,907.0	1,907.0	Pictured Cliffs		-0.65	270.01
2,336.0	2,336.0	Chacra		-0.65	270.01
3,381.5	3,368.0	Cliffhouse		-0.65	270.01
3,433.0	3,417.0	Menefee		-0.65	270.01
4,315.5	4,198.0	Point Lookout SS		-0.65	270.01
4,581.8	4,406.0	Mancos		-0.65	270.01
4,875.5	4,631.0	Marker A		-0.65	270.01
5,006.0	4,731.0	Marker B		-0.65	270.01
5,271.0	4,934.0	Marker C		-0.65	270.01
5,501.9	5,110.0	Marker D		-0.65	270.01
5,559.2	5,152.0	Marker E		-0.65	270.01
5,667.6	5,227.0	Gallup		-0.65	270.01
5,707.9	5,253.0	Upper Gallup A		-0.65	270.01
5,776.0	5,294.0	Upper Gallup B		-0.65	270.01
5,891.7	5,354.0	Gallup 2nd Bench		-0.65	270.01
6,075.3	5,419.0	Lwr Gallup Porosity Top		-0.65	270.01
6,146.3	5,433.0	Lwr Gallup Target Zone Top		-0.65	270.01
6,197.3	5,439.0	Lwr Gallup Target Zone Base		-0.65	270.01

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
0.5	0.5	0.0	0.0	SH - 440' FNL, 561' FWL
2,507.7	2,507.7	0.0	0.0	KOP @ 2,507.7'
4,507.8	4,349.2	-670.2	-9.4	EOB @ 40° INC
5,329.3	4,978.5	-1,198.3	-16.7	Start 10° Build Turn
6,186.0	5,431.7	-1,539.6	-550.7	7" - 1980' FNL, 10' FWL
6,186.0	5,431.7	-1,539.6	-550.7	EOB @ 85° INC / Start 5° Build
6,298.7	5,436.0	-1,539.6	-663.2	LP @ 5,436' TVD, 90.64° INC
11,250.2	5,381.0	-1,539.1	-5,614.4	PBHL - 1980' FNL, 250' FWL
11,250.2	5,381.0	-1,539.1	-5,614.4	TD @ 11,250.2' MD

LOGOS Operating LLC

Sandoval County, NM
S8-T22N-R5W
LOGOS #702H
HZ
Plan #9

Anticollision Report

19 May, 2014

Cathedral Energy Services

Anticollision Report

Company:	LOGOS Operating LLC	**Local Co-ordinate Reference:**	Well LOGOS #702H
Project:	Sandoval County, NM	**TVD Reference:**	KB=14.5' @ 6975.5usft (Original Well Elev)
Reference Site:	S8-T22N-R5W	**MD Reference:**	KB=14.5' @ 6975.5usft (Original Well Elev)
Site Error:	0.0usft	**North Reference:**	True
Reference Well:	LOGOS #702H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0usft	**Output errors are at**	2.00 sigma
Reference Wellbore	HZ	**Database:**	USA EDM 5000 Multi Users DB
Reference Design:	Plan #9	**Offset TVD Reference:**	Offset Datum

Reference Plan #9

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

Survey Tool Program **Date** 5/19/2014

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	11,250.2	Plan #9 (HZ)	Geolink MWD	Geolink MWD

Summary

Site Name / Offset Well - Wellbore - Design	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
S1-T22N-R6W						
Lybrook G01-2206 02H - Hz - Plan #1						Out of range
S8-T22N-R5W						
LOGOS #701H - HZ - FINAL	669.3	669.5	47.9	45.5	20.274	CC
LOGOS #701H - HZ - FINAL	2,700.0	2,700.6	54.9	45.5	5.844	ES
LOGOS #701H - HZ - FINAL	2,800.0	2,800.1	56.2	46.5	5.769	SF

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

Cathedral Energy Services

Anticollision Report

Company:	LOGOS Operating LLC	**Local Co-ordinate Reference:**	Well LOGOS #702H
Project:	Sandoval County, NM	**TVD Reference:**	KB=14.5' @ 6975.5usft (Original Well Elev)
Reference Site:	S8-T22N-R5W	**MD Reference:**	KB=14.5' @ 6975.5usft (Original Well Elev)
Site Error:	0.0usft	**North Reference:**	True
Reference Well:	LOGOS #702H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0usft	**Output errors are at**	2.00 sigma
Reference Wellbore	HZ	**Database:**	USA EDM 5000 Multi Users DB
Reference Design:	Plan #9	**Offset TVD Reference:**	Offset Datum

Offset Design S8-T22N-R5W - LOGOS #701H - HZ - FINAL — Offset Site Error: 0.0 usft

Survey Program: 620-Geolink MWD — Offset Well Error: 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Total Uncertainty Axis	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	-101.29	-10.2	-51.1	52.1				
100.0	100.0	100.1	100.1	0.1	0.2	-100.99	-9.9	-51.0	52.0	51.6	0.33	158.005	
200.0	200.0	200.3	200.3	0.3	0.4	-100.11	-9.0	-50.8	51.6	50.9	0.68	75.482	
300.0	300.0	300.4	300.4	0.5	0.5	-98.60	-7.6	-50.4	50.9	49.9	1.04	49.085	
400.0	400.0	400.5	400.4	0.7	0.7	-96.43	-5.6	-49.8	50.1	48.8	1.39	35.986	
500.0	500.0	500.5	500.5	0.8	0.9	-93.55	-3.0	-49.1	49.2	47.5	1.75	28.131	
600.0	600.0	600.6	600.4	1.0	1.1	-89.89	0.1	-48.3	48.3	46.2	2.11	22.911	
669.3	669.3	669.5	669.3	1.1	1.2	-86.62	2.8	-47.8	47.9	45.5	2.36	20.274 CC	
700.0	700.0	699.8	699.5	1.2	1.3	-84.75	4.4	-47.8	48.0	45.5	2.48	19.379	
800.0	800.0	799.3	798.9	1.4	1.5	-77.91	10.5	-49.0	50.2	47.3	2.85	17.603	
900.0	900.0	900.0	899.5	1.5	1.7	-75.12	13.2	-49.8	51.5	48.4	3.20	16.132	
1,000.0	1,000.0	1,000.1	999.6	1.7	1.8	-74.38	14.1	-50.5	52.4	48.9	3.54	14.817	
1,100.0	1,100.0	1,100.2	1,099.7	1.9	2.0	-74.82	13.8	-51.0	52.8	49.0	3.87	13.638	
1,200.0	1,200.0	1,200.7	1,200.2	2.1	2.1	-76.01	12.8	-51.3	52.8	48.6	4.21	12.548	
1,300.0	1,300.0	1,300.5	1,300.0	2.2	2.3	-77.55	11.3	-51.2	52.4	47.9	4.55	11.527	
1,400.0	1,400.0	1,400.6	1,400.1	2.4	2.5	-79.03	10.0	-51.4	52.3	47.4	4.89	10.701	
1,419.5	1,419.5	1,420.1	1,419.6	2.5	2.5	-79.30	9.7	-51.4	52.3	47.4	4.96	10.554	
1,500.0	1,500.0	1,500.3	1,499.8	2.6	2.6	-80.43	8.7	-51.8	52.5	47.3	5.23	10.041	
1,600.0	1,600.0	1,600.2	1,599.7	2.8	2.8	-81.98	7.4	-52.5	53.0	47.4	5.57	9.506	
1,700.0	1,700.0	1,700.2	1,699.6	2.9	3.0	-83.82	5.8	-53.3	53.6	47.7	5.92	9.069	
1,800.0	1,800.0	1,800.4	1,799.8	3.1	3.1	-85.25	4.5	-53.9	54.1	47.9	6.26	8.646	
1,900.0	1,900.0	1,900.6	1,900.0	3.3	3.3	-86.39	3.4	-54.3	54.4	47.8	6.61	8.237	
1,943.6	1,943.6	1,944.2	1,943.6	3.4	3.4	-86.92	2.9	-54.3	54.4	47.6	6.76	8.046	
2,000.0	2,000.0	2,000.4	1,999.9	3.5	3.5	-87.48	2.4	-54.4	54.5	47.5	6.95	7.834	
2,100.0	2,100.0	2,100.4	2,099.8	3.6	3.7	-88.99	1.0	-54.7	54.7	47.4	7.30	7.491	
2,200.0	2,200.0	2,200.6	2,200.0	3.8	3.8	-90.74	-0.7	-54.7	54.7	47.1	7.64	7.163	
2,300.0	2,300.0	2,300.8	2,300.2	4.0	4.0	-91.24	-1.2	-54.7	54.7	46.7	7.99	6.840	
2,330.2	2,330.2	2,330.8	2,330.2	4.0	4.1	-91.18	-1.1	-54.6	54.6	46.5	8.10	6.745	
2,400.0	2,400.0	2,400.5	2,399.9	4.2	4.2	-90.78	-0.7	-54.8	54.8	46.4	8.34	6.568	
2,500.0	2,500.0	2,500.5	2,499.9	4.3	4.4	-90.30	-0.3	-55.0	55.0	46.3	8.69	6.329	
2,600.0	2,600.0	2,600.7	2,600.1	4.5	4.5	90.51	-0.2	-54.8	54.8	45.8	9.04	6.062	
2,644.0	2,643.9	2,644.6	2,644.0	4.6	4.6	92.44	-0.1	-54.7	54.7	45.5	9.19	5.953	
2,700.0	2,699.9	2,700.6	2,700.0	4.7	4.7	95.95	0.0	-54.6	54.9	45.5	9.39	5.844 ES	
2,800.0	2,799.5	2,800.1	2,799.5	4.9	4.9	104.63	0.1	-54.4	56.2	46.5	9.74	5.769 SF	
2,900.0	2,898.8	2,899.5	2,898.9	5.1	5.0	115.52	0.1	-54.4	60.4	50.3	10.10	5.978	
3,000.0	2,997.6	2,998.7	2,998.1	5.3	5.2	126.62	-0.6	-54.3	68.0	57.5	10.44	6.512	
3,100.0	3,095.8	3,097.3	3,096.6	5.5	5.4	136.60	-1.8	-54.3	79.7	68.9	10.76	7.405	
3,200.0	3,193.3	3,194.9	3,194.3	5.8	5.6	144.95	-3.2	-54.2	96.0	85.0	11.07	8.678	
3,300.0	3,289.9	3,291.7	3,291.0	6.1	5.7	151.50	-4.3	-54.4	117.2	105.8	11.35	10.324	
3,400.0	3,385.6	3,388.0	3,387.3	6.5	5.9	156.46	-5.7	-54.8	142.3	130.7	11.62	12.250	
3,500.0	3,480.3	3,482.6	3,482.0	6.9	6.1	160.29	-6.8	-55.1	171.6	159.8	11.87	14.454	
3,600.0	3,573.7	3,576.3	3,575.7	7.4	6.2	163.33	-7.8	-55.1	204.7	192.6	12.12	16.897	
3,700.0	3,665.9	3,669.6	3,669.0	7.9	6.4	165.68	-8.8	-55.3	241.4	229.0	12.35	19.550	
3,800.0	3,756.6	3,761.0	3,760.4	8.5	6.5	167.51	-10.1	-55.5	281.3	268.7	12.57	22.382	
3,900.0	3,845.8	3,850.8	3,850.2	9.2	6.7	168.95	-11.4	-55.7	324.4	311.6	12.77	25.396	
4,000.0	3,933.4	3,938.3	3,937.6	9.9	6.8	170.10	-12.5	-56.0	370.9	358.0	12.97	28.606	
4,100.0	4,019.3	4,025.5	4,024.8	10.7	7.0	171.10	-13.6	-56.1	420.6	407.4	13.15	31.985	
4,200.0	4,103.3	4,109.7	4,109.0	11.6	7.1	171.93	-14.7	-56.0	473.3	460.0	13.32	35.544	

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

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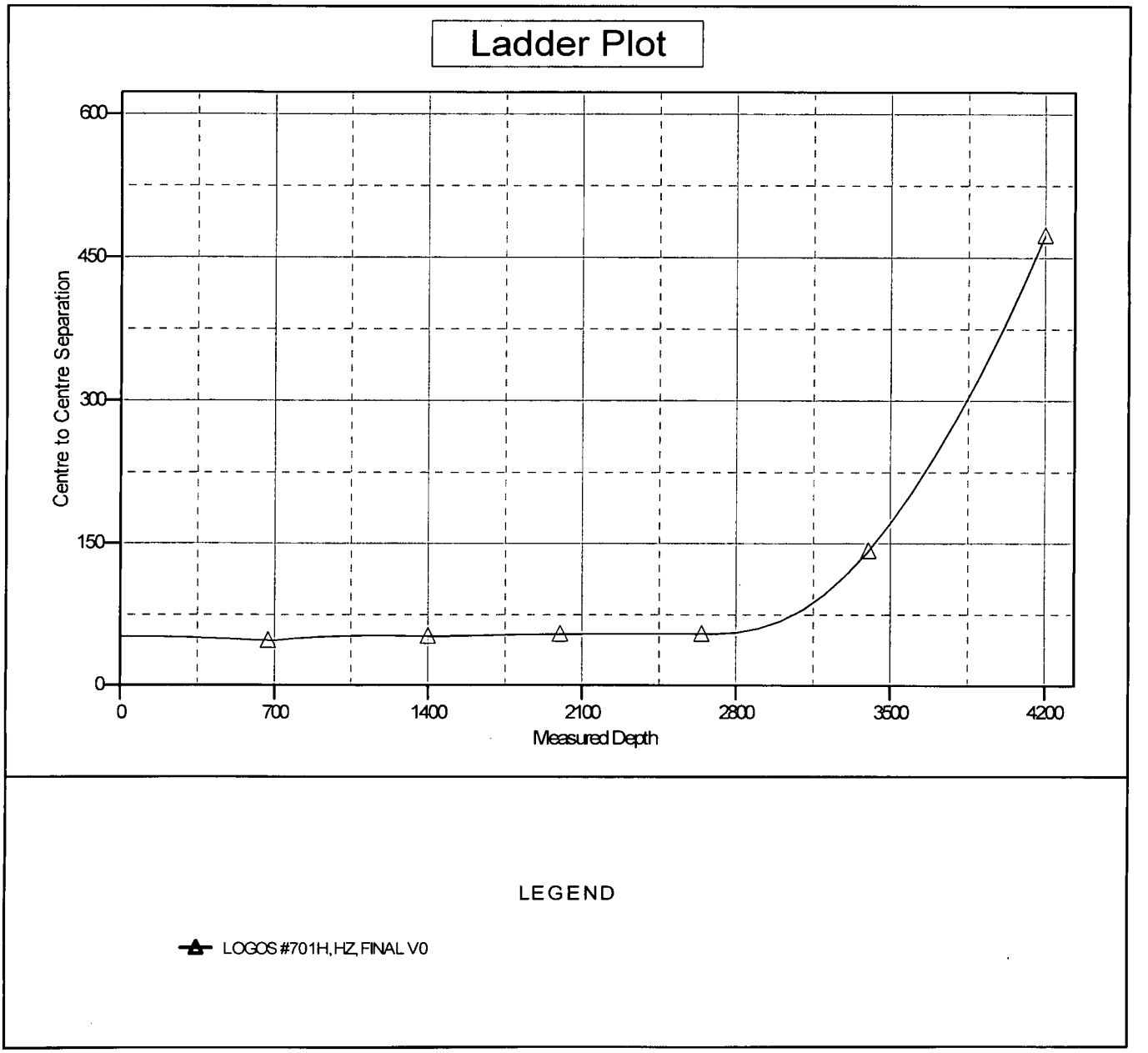
Cathedral Energy Services

Anticollision Report

Company:	LOGOS Operating LLC	**Local Co-ordinate Reference:**	Well LOGOS #702H
Project:	Sandoval County, NM	**TVD Reference:**	KB=14.5' @ 6975.5usft (Original Well Elev)
Reference Site:	S8-T22N-R5W	**MD Reference:**	KB=14.5' @ 6975.5usft (Original Well Elev)
Site Error:	0.0usft	**North Reference:**	True
Reference Well:	LOGOS #702H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0usft	**Output errors are at**	2.00 sigma
Reference Wellbore	HZ	**Database:**	USA EDM 5000 Multi Users DB
Reference Design:	Plan #9	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to KB=14.5' @ 6975.5usft (Original Well	Coordinates are relative to: LOGOS #702H
Offset Depths are relative to Offset Datum	Coordinate System is US State Plane 1983, New Mexico Central Zone
Central Meridian is -106.250000 °	Grid Convergence at Surface is: -0.67°



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