

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

AMENDED

RECEIVED

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

1. Type of Well

☒ Oil Well ☐ Gas Well ☐ Other2. Name of Operator
Logos Operating, LLC3a. Address
4001 North Butler Avenue, Building 7101
Farmington, NM 874013b. Phone No. (include area code)
505-330-93334. Location of Well (Footage, Sec., T., R., M., or Survey Description)
440' FNL, 561' FWL BHL: 1980' FNL, 330' FNL
Section 8, T22N, R5W, UL D NW/NW Section 7, T22N, R5W, UL E SW/NW5. Lease, Serial No.
Jicarilla Apache Lease #4246. If Indian, Allottee or Tribe Name
Jicarilla Apache Nation7. If Unit of CA/Agreement, Name and/or No.
Farmington Field Office8. Well Name and No.
Logos #702H9. API Well No.
30-043-2121910. Field and Pool or Exploratory Area
WC 22N5W7; Gallup (O)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
☐ Subsequent Report	☐ Alter Casing	☐ Fracture Treat	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☒ Other <u>Drilling Plans</u>
	☒ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	revised
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	

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

Logos Operating would like to revise the bottom hole location from 2336' FNL & 330' FWL to 1980' FNL & 330' FWL of the same section, township and range. The landing point will be moved from 2336' FNL & 623' FEL of section 7 to 1980' FNL & 10' FWL of section 8 to better ensure the proper development of the reservoir based on new spacing data and well capabilities. Logos owns the Jicarilla Lease 424 which covers both section 7 and 8.

The hole sizes and casing weight/grade, will remain the same. The cement will be adjusted accordingly.

Please see the attached revised C-102, drilling program and horizontal planning report.

OIL CONS. DIV DIST. 3

MAY 21 2014

ACCEPTED FOR RECORD

MAY 20 2014

FARMINGTON FIELD OFFICE
BY: William Tambekou

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

Tamra Sessions

Title Operations Technician

Signature

Date 05/14/2014

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by

Title

Date

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

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)

NMCCD AV

DISTRICT I
1005 S. French Dr., Hobbs, N.M. 88240
Phone: (505) 823-6181 Fax: (505) 823-6780

DISTRICT II
611 S. First St., Artesia, N.M. 88210
Phone: (505) 748-1838 Fax: (505) 748-0780

DISTRICT III
1000 Elia Dr., Aztec, N.M. 87410
Phone: (505) 834-6178 Fax: (505) 834-6170

DISTRICT IV
1280 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-6460 Fax: (505) 476-6468

State of New Mexico
Energy, Minerals & Natural Resources Department

OIL CONSERVATION DIVISION

1220 South St. Francis Dr.
Santa Fe, NM 87505

RECEIVED

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

MAY 19 2014

Farmington Field Office
Bureau of Land Management
AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

*API Number		*Pool Code 98067	*Pool Name WC 22/5W7 WILDCAT GALLUP
*Property Code 311963	*Property Name LOGOS		*Well Number 702H
*OCHRD No. 289408	*Operator Name LOGOS OPERATING, LLC		*Elevation 6961'

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
D	8	22-N	5-W		440	NORTH	561	WEST	SANDOVAL

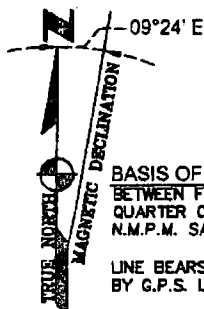
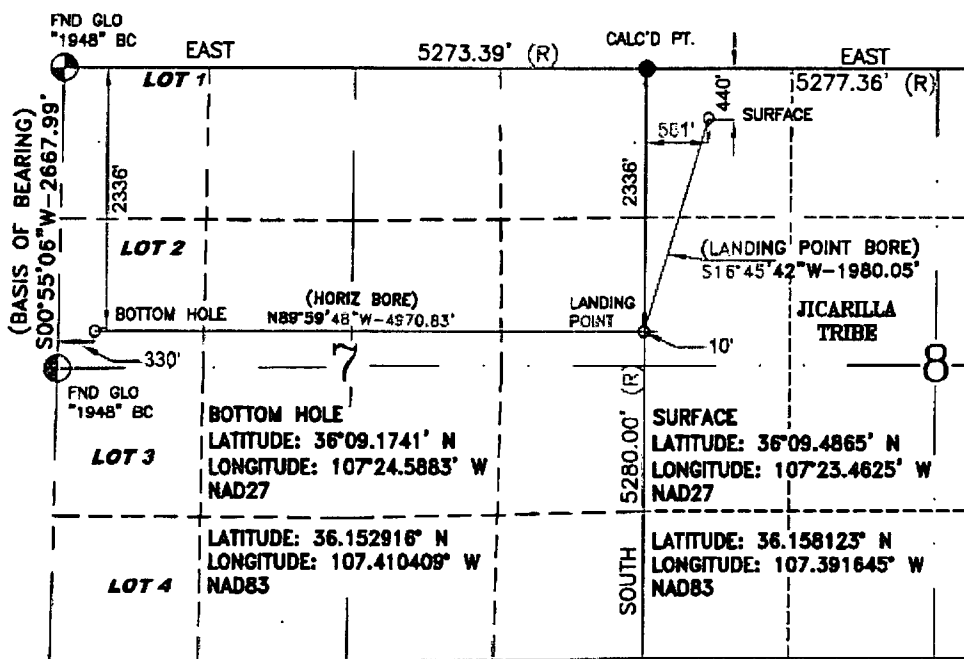
11 Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
E	7	22-N	5-W		2336	NORTH	330	WEST	SANDOVAL

*Dedicated Acres 159.78 acres S2/NE, SE/NW, Lot 2	*Joint or Infill	*Consolidation Code	*Order No.
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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



BASIS OF BEARING:
BETWEEN FOUND MONUMENTS AT THE NORTHWEST CORNER AND THE WEST
QUARTER CORNER OF SECTION 7, TOWNSHIP 22 NORTH, RANGE 5 WEST,
N.M.P.M. SANDOVAL COUNTY, NEW MEXICO.

LINE BEARS: S 00°55'06\" W A DISTANCE OF 2667.99 FEET AS MEASURED
BY G.P.S. LOCAL GRID NAD83.

LANDING POINT
LATITUDE: 36°09.1741' N
LONGITUDE: 107°23.5785' W
NAD27

LATITUDE: 36.152917° N
LONGITUDE: 107.393578° W
NAD83

17 OPERATOR CERTIFICATION

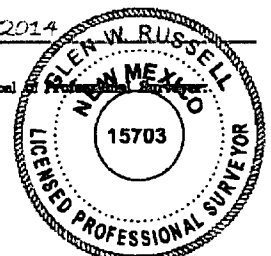
I hereby certify that the information contained herein
is true and complete to the best of my knowledge and
belief, and that this organization either owns
a working interest or unleased mineral interest in the
land including the proposed bottom hole location or
has a right to drill this well at this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

Tamara Sessions 5/5/14
Signature Date
Tamara 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.

APRIL 2, 2014
Date of Survey
Signature and Seal of Professional Surveyor
GLEN W. RUSSELL
Certificate Number 15703



**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 – 330' FWL
Section 7, T22N, R5W
Sandoval County, New Mexico

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

1. ESTIMATED TOPS FOR IMPORTANT GEOLOGICAL FORMATIONS

<u>Formation Tops</u>	<u>Surface (TVD)</u>
Ojo Alamo	1386
Kirtland	1534
Fruitland	1771
Pictured Cliff's	1902
Chacra	2319
Cliffs House	3413
Menefee	3426
Point Lookout	4128
Mancos	4320
Gallup	5212
T. Lower Gallup	5401
Landing Point	5423
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 2494' MD and build 2 degrees per 100' to 40 degrees, 180.80 degrees azimuth and hold to approximately 5316' MD.

Trip out of hole and pick up 8 ¾" kick off assembly at 5316' MD. Build angle at 10 deg/100' to 85 degrees inclination and 270.00 degrees azimuth in the Gallup formation at 5654' MD / 5212' TVD where 7" intermediate casing will be set.

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 10 deg/100' to 90.49 degrees inclination and 270.00 degree azimuth to 6282' MD / 5423' TVD. Hold 90.49 degrees, 270.00 degrees azimuth and drill to a total depth at 11157' MD / 5381' TVD. Adjustments may be made to the directional program based on geology. Total depth will be 11157' MD / 5381' TVD- 90.49 degrees, 270.00 degrees Azimuth.

The Bottom hole location will be in a legal location at 11157' MD at 1980' FNL & 330' FWL of section 7.

A total of 4726' 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 5212' 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 nipped-up on the 9-5/8" x 11" 2,000 psi WP casing head prior to drilling out from under surface casing. All ram preventers and related equipment will be tested to 2,000 psi for 10 minutes. Annular preventers will be tested to 50% of rated working pressure for 10 minutes. Surface casing will be tested to 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 11157' 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 3/4")	23 ppf	J-55	LT&C	0' - 6173' MD	New Casing. Cement to surface with foam cement.
4 1/2" (6 1/8")	11.6 ppf	P-110	LT&C	5600' - 11157' MD	New Casing - Horizontal Hole Cemented full length with foam cement - TOL at 15 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.

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 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 ft³/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 ft³/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 ft³/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 (5600' - 11157' 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 ft³/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 ft³/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 ft³/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	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

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'-5410'	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"	5410' (KOP)- 6173'	Fresh Water LSND	8.5-8.8	40-50	8-10'
6 1/8"	6173' – 11157'	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 5420' TVD of the landing point of the horizontal. No abnormal pressure or temperatures are anticipated.

No hydrogen sulfide gas is anticipated, however, if H₂S 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.

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. If a 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, H and I of 19.15.17.13 NMAC.

Well Control Equipment Schematic for 2M Service

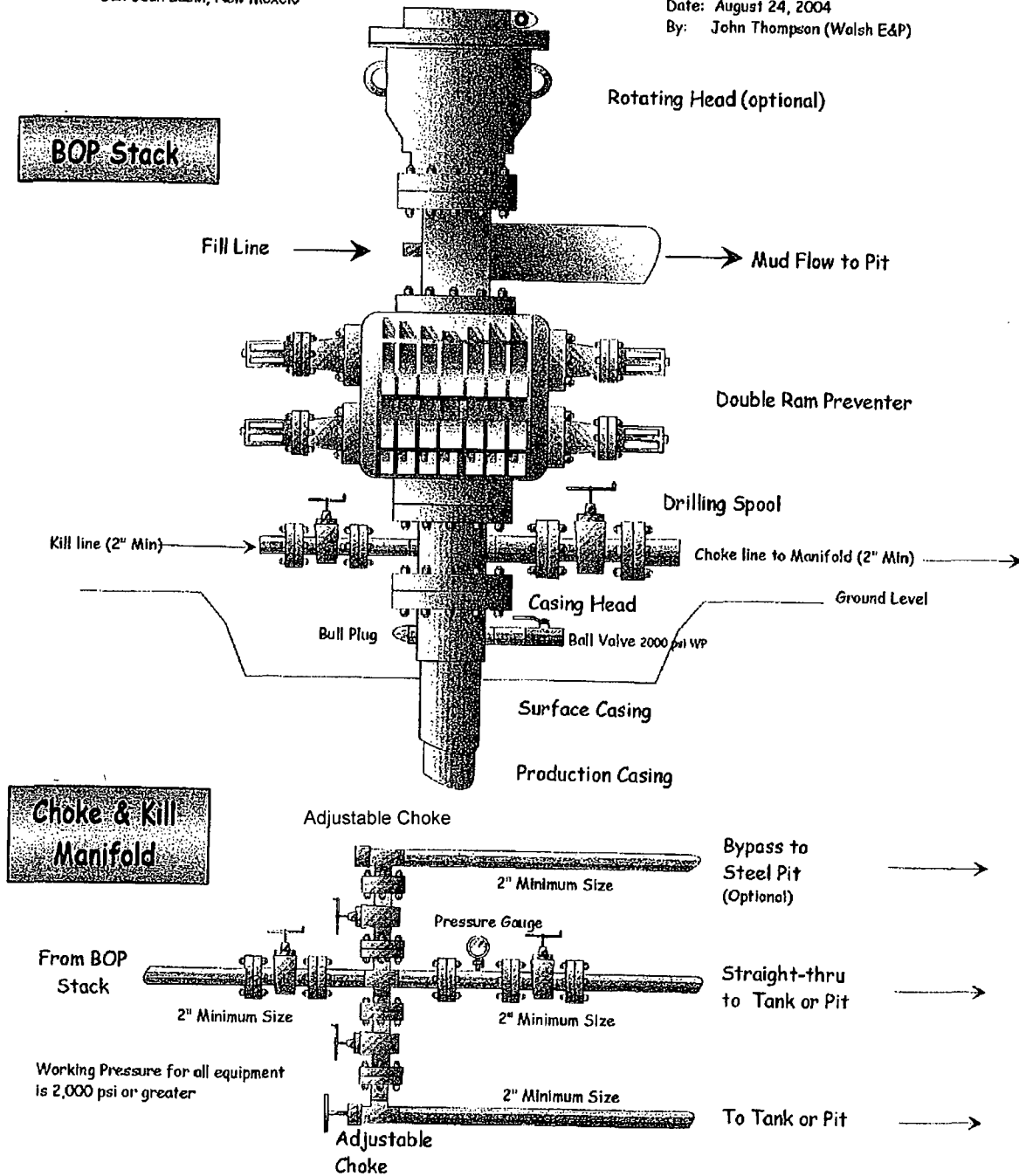
Attachment to Drilling Technical Program

Exhibit #1 Typical BOP setup

Location: San Juan Basin, New Mexico

Date: August 24, 2004

By: John Thompson (Walsh E&P)





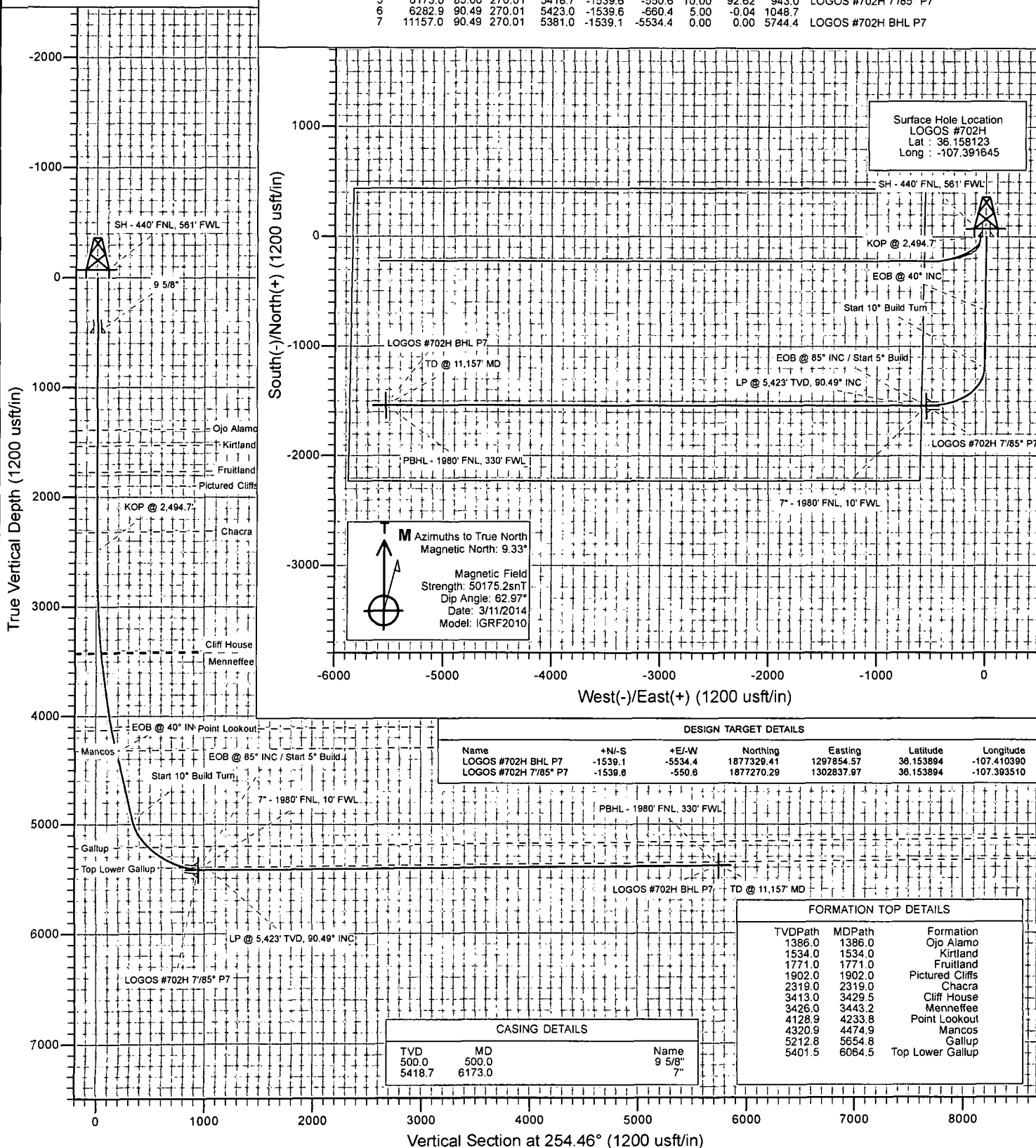
Project: Sandoval County, NM
Site: S8-T22N-R5W
Well: LOGOS #702H
Wellbore: HZ
Design: Plan #7



Plan #7
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	VSeet	Target
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	2494.7	0.00	0.00	2494.7	0.0	0.0	0.00	0.00	0.0	
3	4494.8	40.00	180.80	4336.3	-670.3	-9.4	2.00	180.80	188.6	
4	5316.3	40.00	180.80	4965.5	-1198.3	-16.7	0.00	0.00	337.2	
5	6173.0	85.00	270.01	5418.7	-1539.6	-550.6	10.00	92.62	943.0	LOGOS #702H 7/85° P7
6	6282.9	90.49	270.01	5423.0	-1539.6	-660.4	5.00	-0.04	1048.7	
7	11157.0	90.49	270.01	5381.0	-1539.1	-5534.4	0.00	0.00	5744.4	LOGOS #702H BHL P7



DESIGN TARGET DETAILS

Name	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
LOGOS #702H BHL P7	-1539.1	-5534.4	1877329.41	1297854.57	36.153894	-107.410390
LOGOS #702H 7/85° P7	-1539.6	-550.6	1877270.29	1302837.97	36.153894	-107.393510

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
1386.0	1386.0	Ojo Alamo
1534.0	1534.0	Kirtland
1771.0	1771.0	Fruitland
1902.0	1902.0	Pictured Cliffs
2319.0	2319.0	Chacra
3413.0	3429.5	Cliff House
3426.0	3443.2	Menefee
4128.9	4233.8	Point Lookout
4320.9	4474.9	Mancos
5212.8	5654.8	Gallup
5401.5	6064.5	Top Lower Gallup

CASING DETAILS

TVD	MD	Name
500.0	500.0	9 5/8"
5418.7	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 #7		

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 #7			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.0	0.0	0.0	254.46

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	
2,494.7	0.00	0.00	2,494.7	0.0	0.0	0.00	0.00	0.00	0.00	
4,494.8	40.00	180.80	4,336.3	-670.3	-9.4	2.00	2.00	0.00	180.80	
5,316.3	40.00	180.80	4,965.5	-1,198.3	-16.7	0.00	0.00	0.00	0.00	
6,173.0	85.00	270.01	5,418.7	-1,539.6	-550.6	10.00	5.25	10.41	92.62	LOGOS #702H 7°/85°
6,282.9	90.49	270.01	5,423.0	-1,539.6	-660.4	5.00	5.00	0.00	-0.04	
11,157.0	90.49	270.01	5,381.0	-1,539.1	-5,534.4	0.00	0.00	0.00	0.00	LOGOS #702H BHL F

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 #7		

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	
1,386.0	0.00	0.00	1,386.0	0.0	0.0	0.0	0.00	0.00	Ojo Alamo
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	
1,534.0	0.00	0.00	1,534.0	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	
1,771.0	0.00	0.00	1,771.0	0.0	0.0	0.0	0.00	0.00	Fruitland
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	
1,902.0	0.00	0.00	1,902.0	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	
2,319.0	0.00	0.00	2,319.0	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	
2,494.7	0.00	0.00	2,494.7	0.0	0.0	0.0	0.00	0.00	KOP @ 2,494.7'
2,500.0	0.11	180.80	2,500.0	0.0	0.0	0.0	2.00	2.00	
2,600.0	2.11	180.80	2,600.0	-1.9	0.0	0.5	2.00	2.00	
2,700.0	4.11	180.80	2,699.8	-7.4	-0.1	2.1	2.00	2.00	
2,800.0	6.11	180.80	2,799.4	-16.3	-0.2	4.6	2.00	2.00	
2,900.0	8.11	180.80	2,898.6	-28.6	-0.4	8.1	2.00	2.00	
3,000.0	10.11	180.80	2,997.4	-44.4	-0.6	12.5	2.00	2.00	
3,100.0	12.11	180.80	3,095.5	-63.7	-0.9	17.9	2.00	2.00	
3,200.0	14.11	180.80	3,192.9	-86.4	-1.2	24.3	2.00	2.00	
3,300.0	16.11	180.80	3,289.4	-112.4	-1.6	31.6	2.00	2.00	
3,400.0	18.11	180.80	3,385.0	-141.8	-2.0	39.9	2.00	2.00	
3,429.5	18.70	180.80	3,413.0	-151.1	-2.1	42.5	2.00	2.00	Cliff House
3,443.2	18.97	180.80	3,426.0	-155.6	-2.2	43.8	2.00	2.00	Menneffee
3,500.0	20.11	180.80	3,479.5	-174.6	-2.4	49.1	2.00	2.00	
3,600.0	22.11	180.80	3,572.8	-210.6	-2.9	59.2	2.00	2.00	
3,700.0	24.11	180.80	3,664.8	-249.8	-3.5	70.3	2.00	2.00	
3,800.0	26.11	180.80	3,755.3	-292.2	-4.1	82.2	2.00	2.00	
3,900.0	28.11	180.80	3,844.3	-337.8	-4.7	95.0	2.00	2.00	
4,000.0	30.11	180.80	3,931.7	-386.4	-5.4	108.7	2.00	2.00	
4,100.0	32.11	180.80	4,017.3	-438.1	-6.1	123.3	2.00	2.00	
4,200.0	34.11	180.80	4,101.1	-492.7	-6.9	138.6	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 #7		

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
4,233.8	34.78	180.80	4,128.9	-511.8	-7.1	144.0	2.00	2.00	Point Lookout
4,300.0	36.11	180.80	4,182.9	-550.2	-7.7	154.8	2.00	2.00	
4,400.0	38.11	180.80	4,262.6	-610.5	-8.5	171.8	2.00	2.00	
4,474.9	39.60	180.80	4,320.9	-657.5	-9.2	185.0	2.00	2.00	Mancos
4,494.8	40.00	180.80	4,336.2	-670.2	-9.4	188.6	2.00	2.00	EOB @ 40° INC
4,500.0	40.00	180.80	4,340.2	-673.6	-9.4	189.5	0.02	0.02	
4,600.0	40.00	180.80	4,416.8	-737.9	-10.3	207.6	0.00	0.00	
4,700.0	40.00	180.80	4,493.4	-802.1	-11.2	225.7	0.00	0.00	
4,800.0	40.00	180.80	4,570.0	-866.4	-12.1	243.8	0.00	0.00	
4,900.0	40.00	180.80	4,646.6	-930.7	-13.0	261.9	0.00	0.00	
5,000.0	40.00	180.80	4,723.2	-995.0	-13.9	279.9	0.00	0.00	
5,100.0	40.00	180.80	4,799.8	-1,059.2	-14.8	298.0	0.00	0.00	
5,200.0	40.00	180.80	4,876.4	-1,123.5	-15.7	316.1	0.00	0.00	
5,300.0	40.00	180.80	4,953.0	-1,187.8	-16.6	334.2	0.00	0.00	
5,316.3	40.00	180.80	4,965.5	-1,198.3	-16.7	337.2	0.00	0.00	Start 10° Build Turn
5,350.0	39.97	186.04	4,991.3	-1,219.9	-18.0	344.2	9.99	-0.11	
5,400.0	40.35	193.78	5,029.6	-1,251.6	-23.6	358.0	10.00	0.76	
5,450.0	41.23	201.31	5,067.5	-1,282.7	-33.4	375.8	10.00	1.77	
5,500.0	42.59	208.52	5,104.7	-1,312.9	-47.5	397.5	10.00	2.71	
5,550.0	44.37	215.31	5,141.0	-1,342.0	-65.7	422.8	10.00	3.57	
5,600.0	46.53	221.64	5,176.1	-1,369.9	-87.9	451.7	10.00	4.32	
5,650.0	49.01	227.51	5,209.7	-1,396.2	-113.8	483.8	10.00	4.97	
5,654.8	49.27	228.04	5,212.8	-1,398.6	-116.5	487.0	10.00	5.28	Gallup
5,700.0	51.77	232.92	5,241.6	-1,420.8	-143.4	518.9	10.00	5.54	
5,750.0	54.76	237.93	5,271.5	-1,443.5	-176.4	556.7	10.00	5.98	
5,800.0	57.94	242.57	5,299.2	-1,464.1	-212.6	597.1	10.00	6.36	
5,850.0	61.28	246.88	5,324.5	-1,482.5	-251.6	639.6	10.00	6.67	
5,900.0	64.74	250.93	5,347.2	-1,498.5	-293.1	683.9	10.00	6.93	
5,950.0	68.31	254.75	5,367.1	-1,512.0	-336.9	729.7	10.00	7.14	
6,000.0	71.96	258.38	5,384.1	-1,522.9	-382.6	776.7	10.00	7.30	
6,050.0	75.68	261.86	5,398.1	-1,531.1	-429.9	824.5	10.00	7.43	
6,064.5	76.77	262.85	5,401.5	-1,533.0	-443.9	838.4	10.00	7.50	Top Lower Gallup
6,100.0	79.44	265.23	5,408.8	-1,536.6	-478.4	872.7	10.00	7.54	
6,150.0	83.25	268.52	5,416.3	-1,539.3	-527.8	920.9	10.00	7.60	
6,173.0	85.00	270.01	5,418.7	-1,539.6	-550.7	943.0	9.99	7.63	7" - 1980' FNL, 10' FWL - EOB @ 85° INC / Sta
6,200.0	86.35	270.01	5,420.7	-1,539.6	-577.6	969.0	5.01	5.01	
6,282.9	90.49	270.01	5,423.0	-1,539.6	-660.4	1,048.8	5.00	5.00	LP @ 5,423' TVD, 90.49° INC
6,300.0	90.49	270.01	5,422.9	-1,539.6	-677.5	1,065.3	0.00	0.00	
6,400.0	90.49	270.01	5,422.0	-1,539.6	-777.5	1,161.6	0.00	0.00	
6,500.0	90.49	270.01	5,421.1	-1,539.6	-877.5	1,257.9	0.00	0.00	
6,600.0	90.49	270.01	5,420.3	-1,539.6	-977.5	1,354.3	0.00	0.00	
6,700.0	90.49	270.01	5,419.4	-1,539.5	-1,077.5	1,450.6	0.00	0.00	
6,800.0	90.49	270.01	5,418.6	-1,539.5	-1,177.5	1,546.9	0.00	0.00	
6,900.0	90.49	270.01	5,417.7	-1,539.5	-1,277.5	1,643.3	0.00	0.00	
7,000.0	90.49	270.01	5,416.8	-1,539.5	-1,377.5	1,739.6	0.00	0.00	
7,100.0	90.49	270.01	5,416.0	-1,539.5	-1,477.5	1,836.0	0.00	0.00	
7,200.0	90.49	270.01	5,415.1	-1,539.5	-1,577.5	1,932.3	0.00	0.00	
7,300.0	90.49	270.01	5,414.2	-1,539.5	-1,677.5	2,028.6	0.00	0.00	
7,400.0	90.49	270.01	5,413.4	-1,539.5	-1,777.5	2,125.0	0.00	0.00	
7,500.0	90.49	270.01	5,412.5	-1,539.5	-1,877.5	2,221.3	0.00	0.00	
7,600.0	90.49	270.01	5,411.7	-1,539.4	-1,977.5	2,317.6	0.00	0.00	
7,700.0	90.49	270.01	5,410.8	-1,539.4	-2,077.5	2,414.0	0.00	0.00	

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 #7		

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
7,800.0	90.49	270.01	5,409.9	-1,539.4	-2,177.5	2,510.3	0.00	0.00	
7,900.0	90.49	270.01	5,409.1	-1,539.4	-2,277.5	2,606.7	0.00	0.00	
8,000.0	90.49	270.01	5,408.2	-1,539.4	-2,377.5	2,703.0	0.00	0.00	
8,100.0	90.49	270.01	5,407.4	-1,539.4	-2,477.5	2,799.3	0.00	0.00	
8,200.0	90.49	270.01	5,406.5	-1,539.4	-2,577.5	2,895.7	0.00	0.00	
8,300.0	90.49	270.01	5,405.6	-1,539.4	-2,677.5	2,992.0	0.00	0.00	
8,400.0	90.49	270.01	5,404.8	-1,539.4	-2,777.5	3,088.3	0.00	0.00	
8,500.0	90.49	270.01	5,403.9	-1,539.4	-2,877.4	3,184.7	0.00	0.00	
8,600.0	90.49	270.01	5,403.0	-1,539.3	-2,977.4	3,281.0	0.00	0.00	
8,700.0	90.49	270.01	5,402.2	-1,539.3	-3,077.4	3,377.4	0.00	0.00	
8,800.0	90.49	270.01	5,401.3	-1,539.3	-3,177.4	3,473.7	0.00	0.00	
8,900.0	90.49	270.01	5,400.5	-1,539.3	-3,277.4	3,570.0	0.00	0.00	
9,000.0	90.49	270.01	5,399.6	-1,539.3	-3,377.4	3,666.4	0.00	0.00	
9,100.0	90.49	270.01	5,398.7	-1,539.3	-3,477.4	3,762.7	0.00	0.00	
9,200.0	90.49	270.01	5,397.9	-1,539.3	-3,577.4	3,859.0	0.00	0.00	
9,300.0	90.49	270.01	5,397.0	-1,539.3	-3,677.4	3,955.4	0.00	0.00	
9,400.0	90.49	270.01	5,396.1	-1,539.3	-3,777.4	4,051.7	0.00	0.00	
9,500.0	90.49	270.01	5,395.3	-1,539.3	-3,877.4	4,148.1	0.00	0.00	
9,600.0	90.49	270.01	5,394.4	-1,539.2	-3,977.4	4,244.4	0.00	0.00	
9,700.0	90.49	270.01	5,393.6	-1,539.2	-4,077.4	4,340.7	0.00	0.00	
9,800.0	90.49	270.01	5,392.7	-1,539.2	-4,177.4	4,437.1	0.00	0.00	
9,900.0	90.49	270.01	5,391.8	-1,539.2	-4,277.4	4,533.4	0.00	0.00	
10,000.0	90.49	270.01	5,391.0	-1,539.2	-4,377.4	4,629.7	0.00	0.00	
10,100.0	90.49	270.01	5,390.1	-1,539.2	-4,477.4	4,726.1	0.00	0.00	
10,200.0	90.49	270.01	5,389.3	-1,539.2	-4,577.4	4,822.4	0.00	0.00	
10,300.0	90.49	270.01	5,388.4	-1,539.2	-4,677.4	4,918.8	0.00	0.00	
10,400.0	90.49	270.01	5,387.5	-1,539.2	-4,777.4	5,015.1	0.00	0.00	
10,500.0	90.49	270.01	5,386.7	-1,539.1	-4,877.4	5,111.4	0.00	0.00	
10,600.0	90.49	270.01	5,385.8	-1,539.1	-4,977.4	5,207.8	0.00	0.00	
10,700.0	90.49	270.01	5,384.9	-1,539.1	-5,077.4	5,304.1	0.00	0.00	
10,800.0	90.49	270.01	5,384.1	-1,539.1	-5,177.4	5,400.4	0.00	0.00	
10,900.0	90.49	270.01	5,383.2	-1,539.1	-5,277.4	5,496.8	0.00	0.00	
11,000.0	90.49	270.01	5,382.4	-1,539.1	-5,377.4	5,593.1	0.00	0.00	
11,100.0	90.49	270.01	5,381.5	-1,539.1	-5,477.4	5,689.5	0.00	0.00	
11,156.5	90.49	270.01	5,381.0	-1,539.1	-5,533.9	5,743.9	0.00	0.00	PBHL - 1980' FNL, 330' FWL - TD @ 11,157' MI
11,157.0	90.49	270.01	5,381.0	-1,539.1	-5,534.4	5,744.4	0.00	0.00	

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 #7		

Targets										
Target Name	- hit/miss target	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- Shape	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)	(usft)		
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 357.5usft at 11157.0usft MD (5381.0 TVD, -1539.1 N, -5534.4 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 hits target center										
- 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 356.8usft at 6582.5usft MD (5420.4 TVD, -1539.6 N, -960.1 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 356.8usft at 6282.3usft MD (5423.0 TVD, -1539.6 N, -659.8 E)										
- Point										
LOGOS #702H 7/85° P:		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 hits target center										
- 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 451.2usft at 11157.0usft MD (5381.0 TVD, -1539.1 N, -5534.4 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 357.6usft at 11157.0usft MD (5381.0 TVD, -1539.1 N, -5534.4 E)										
- 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 356.1usft at 11157.0usft MD (5381.0 TVD, -1539.1 N, -5534.4 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 748.3usft at 6328.2usft MD (5422.6 TVD, -1539.6 N, -705.7 E)										
- Point										
LOGOS #702H 7/85° P:		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 355.7usft at 6192.9usft MD (5420.3 TVD, -1539.6 N, -570.5 E)										
- Point										

Casing Points					
Measured Depth	Vertical Depth	Name	Casing Diameter	Hole Diameter	
(usft)	(usft)		(")	(")	
6,173.0	5,418.7	7"	0	0	
500.0	500.0	9 5/8"	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 #7		

Formations					
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction
1,386.0	1,386.0	Ojo Alamo		-0.58	270.00
1,534.0	1,534.0	Kirtland		-0.58	270.00
1,771.0	1,771.0	Fruitland		-0.58	270.00
1,902.0	1,902.0	Pictured Cliffs		-0.58	270.00
2,319.0	2,319.0	Chacra		-0.58	270.00
3,429.5	3,413.0	Cliff House		-0.58	270.00
3,443.2	3,426.0	Mennefee		-0.58	270.00
4,233.8	4,129.0	Point Lookout		-0.58	270.00
4,474.9	4,321.0	Mancos		-0.58	270.00
5,654.8	5,214.0	Gallup		-0.58	270.00
6,064.5	5,406.0	Top Lower Gallup		-0.58	270.00

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
0.5	0.5	0.0	0.0	SH - 440' FNL, 561' FWL	
2,494.7	2,494.7	0.0	0.0	KOP @ 2,494.7'	
4,494.8	4,336.2	-670.2	-9.4	EOB @ 40° INC	
5,316.3	4,965.5	-1,198.3	-16.7	Start 10° Build Turn	
6,173.0	5,418.7	-1,539.6	-550.7	7" - 1980' FNL, 10' FWL	
6,173.0	5,418.7	-1,539.6	-550.7	EOB @ 85° INC / Start 5° Build	
6,282.9	5,423.0	-1,539.6	-660.4	LP @ 5,423' TVD, 90.49° INC	
11,156.5	5,381.0	-1,539.1	-5,533.9	PBHL - 1980' FNL, 330' FWL	
11,156.5	5,381.0	-1,539.1	-5,533.9	TD @ 11,157' MD	

LOGOS Operating LLC

Sandoval County, NM

S8-T22N-R5W

LOGOS #702H

HZ

Plan #7

Anticollision Report

07 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 #7	Offset TVD Reference:	Offset Datum

Reference	Plan #7		
Filter type:	GLOBAL FILTER APPLIED: All wellpaths within 200'+ 100/1000 of reference		
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 5/7/2014			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	11,156.9	Plan #7 (HZ)	Geolink MWD	Geolink MWD

Summary						
Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
S1-T22N-R6W						
Lybrook G01-2206 02H - HZ - Plan #1						Out of range
S8-T22N-R5W						
LOGOS #701H - HZ - Plan #7	669.3	669.5	47.9	45.5	20.274	CC, ES
LOGOS #701H - HZ - Plan #7	2,800.0	2,800.0	56.6	46.8	5.805	SF
LOGOS #701H - HZ - SURVEYS	669.3	669.5	47.9	45.5	20.274	CC, ES
LOGOS #701H - HZ - SURVEYS	2,800.0	2,800.0	56.6	46.8	5.805	SF

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 #7	Offset TVD Reference:	Offset Datum

Offset Design S8-T22N-R5W - LOGOS #701H - HZ - Plan #7													Offset Site Error:	0.0 usft
Survey Program: 620-Geolink MWD, 4623-Geolink MWD													Offset Well Error:	0.0 usft
Reference	Offset	Semi Major Axis		Distance		Total		Separation		Warning				
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Uncertainty Axis	Factor		
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, ES		
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	1,420.0	1,419.5	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	8.047		
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	88.90	-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	90.97	-0.2	-54.8	54.8	45.8	9.04	6.062		
2,634.5	2,634.5	2,635.2	2,634.6	4.6	4.6	92.60	-0.2	-54.7	54.8	45.6	9.16	5.977		
2,700.0	2,699.8	2,700.5	2,699.9	4.7	4.7	96.88	0.0	-54.6	55.0	45.6	9.39	5.854		
2,800.0	2,799.4	2,800.0	2,799.4	4.9	4.9	105.94	0.1	-54.4	56.6	46.8	9.74	5.805 SF		
2,900.0	2,898.6	2,899.3	2,898.7	5.1	5.0	117.02	0.1	-54.4	61.2	51.1	10.10	6.057		
3,000.0	2,997.4	2,998.5	2,997.9	5.3	5.2	128.08	-0.6	-54.3	69.4	58.9	10.44	6.646		
3,100.0	3,095.5	3,097.0	3,096.4	5.5	5.4	137.87	-1.8	-54.3	81.7	70.9	10.76	7.594		
3,200.0	3,192.9	3,194.6	3,194.0	5.8	5.6	145.96	-3.2	-54.2	98.6	87.6	11.06	8.920		
3,300.0	3,289.4	3,291.2	3,290.6	6.1	5.7	152.28	-4.3	-54.4	120.4	109.0	11.34	10.613		
3,400.0	3,385.0	3,387.4	3,386.8	6.5	5.9	157.06	-5.7	-54.8	146.1	134.4	11.61	12.581		
3,500.0	3,479.5	3,481.9	3,481.3	6.9	6.1	160.75	-6.8	-55.1	175.9	164.0	11.86	14.824		
3,600.0	3,572.8	3,575.4	3,574.8	7.4	6.2	163.68	-7.8	-55.1	209.4	197.3	12.10	17.303		
3,700.0	3,664.8	3,668.5	3,667.9	8.0	6.4	165.96	-8.8	-55.3	246.6	234.2	12.33	19.991		
3,800.0	3,755.3	3,759.8	3,759.1	8.6	6.5	167.74	-10.0	-55.5	286.9	274.3	12.55	22.855		
3,900.0	3,844.3	3,849.4	3,848.8	9.3	6.7	169.13	-11.4	-55.7	330.4	317.7	12.76	25.901		
4,000.0	3,931.7	3,936.6	3,935.9	10.0	6.8	170.25	-12.5	-56.0	377.4	364.4	12.95	29.141		
4,100.0	4,017.3	4,023.6	4,022.9	10.8	7.0	171.22	-13.6	-56.1	427.4	414.3	13.13	32.551		
4,200.0	4,101.1	4,107.6	4,106.9	11.7	7.1	172.03	-14.7	-56.0	480.6	467.3	13.30	36.140		

CC - Min centre to center distance or convergent 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 #7	Offset TVD Reference:	Offset Datum

Offset Design S8-T22N-R5W- LOGOS #701H - HZ - SURVEYS														Offset Site Error:	0.0 usft
Survey Program: 620-Geolink MWD														Offset Well Error:	0.0 usft
Reference	Offset	Semi Major Axis		Distance		Total		Separation		Warning					
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Uncertainty Axis	Factor			
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, ES			
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	1,420.0	1,419.5	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	8.047			
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	88.90	-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	90.97	-0.2	-54.8	54.8	45.8	9.04	6.062			
2,634.5	2,634.5	2,635.2	2,634.6	4.6	4.6	92.60	-0.2	-54.7	54.8	45.6	9.16	5.977			
2,700.0	2,699.8	2,700.5	2,699.9	4.7	4.7	96.88	0.0	-54.6	55.0	45.6	9.39	5.854			
2,800.0	2,799.4	2,800.0	2,799.4	4.9	4.9	105.94	0.1	-54.4	56.6	46.8	9.74	5.805 SF			
2,900.0	2,898.6	2,899.3	2,898.7	5.1	5.0	117.02	0.1	-54.4	61.2	51.1	10.10	6.057			
3,000.0	2,997.4	2,998.5	2,997.9	5.3	5.2	128.08	-0.6	-54.3	69.4	58.9	10.44	6.646			
3,100.0	3,095.5	3,097.0	3,096.4	5.5	5.4	137.87	-1.8	-54.3	81.7	70.9	10.76	7.594			
3,200.0	3,192.9	3,194.6	3,194.0	5.8	5.6	145.96	-3.2	-54.2	98.6	87.6	11.06	8.920			
3,300.0	3,289.4	3,291.2	3,290.6	6.1	5.7	152.28	-4.3	-54.4	120.4	109.0	11.34	10.613			
3,400.0	3,385.0	3,387.4	3,386.8	6.5	5.9	157.06	-5.7	-54.8	146.1	134.4	11.61	12.581			
3,500.0	3,479.5	3,481.9	3,481.3	6.9	6.1	160.75	-6.8	-55.1	175.9	164.0	11.86	14.824			
3,600.0	3,572.8	3,575.4	3,574.8	7.4	6.2	163.68	-7.8	-55.1	209.4	197.3	12.10	17.303			
3,700.0	3,664.8	3,668.5	3,667.9	8.0	6.4	165.96	-8.8	-55.3	246.6	234.2	12.33	19.991			
3,800.0	3,755.3	3,759.8	3,759.1	8.6	6.5	167.74	-10.0	-55.5	286.9	274.3	12.55	22.855			
3,900.0	3,844.3	3,849.4	3,848.8	9.3	6.7	169.13	-11.4	-55.7	330.4	317.7	12.76	25.901			
4,000.0	3,931.7	3,936.6	3,935.9	10.0	6.8	170.25	-12.5	-56.0	377.4	364.4	12.95	29.141			
4,100.0	4,017.3	4,023.6	4,022.9	10.8	7.0	171.22	-13.6	-56.1	427.4	414.3	13.13	32.551			
4,200.0	4,101.1	4,107.6	4,106.9	11.7	7.1	172.03	-14.7	-56.0	480.6	467.3	13.30	36.140			

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

Cathedral Energy Services

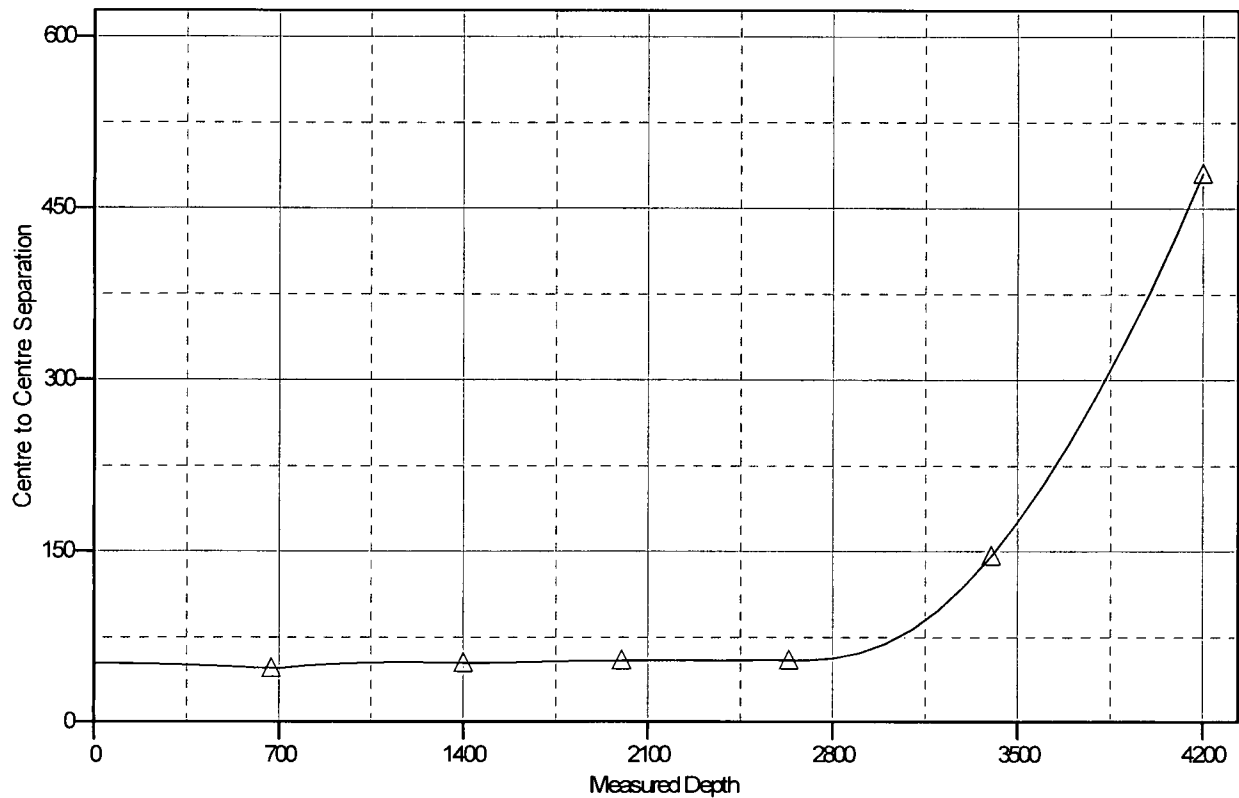
Anticollision Report

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 #7	Offset TVD Reference:	Offset Datum

Reference Depths are relative to KB=14.5' @ 6975.5usft (Original Well)
 Offset Depths are relative to Offset Datum
 Central Meridian is -106.250000 °

Coordinates are relative to: LOGOS #702H
 Coordinate System is US State Plane 1983, New Mexico Central Zone
 Grid Convergence at Surface is: -0.67°

Ladder Plot



LEGEND

LOGOS #701H,HZ,Plan#7 V0
 LOGOS #701H,HZ,SURVEYS V0