

Submit 1 Copy To Appropriate District Office
District I - (575) 393-6161
1625 N. French Dr., Hobbs, NM 88240
District II - (575) 748-1283
811 S. First St., Artesia, NM 88210
District III - (505) 334-6178
1000 Rio Brazos Rd., Aztec, NM 87410
District IV - (505) 476-3460
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

Form C-103
Revised August 1, 2011

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

WELL API NO. 30-045-35522
5. Indicate Type of Lease STATE ☒ FEE ☐
6. State Oil & Gas Lease No. LG-1916
7. Lease Name or Unit Agreement Name Roadrunner
8. Well Number 1H
9. OGRID Number 289408
10. Pool name or Wildcat Dufers Point-Gallup Dakota

SUNDRY NOTICES AND REPORTS ON WELLS
(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)

1. Type of Well: Oil Well ☒ Gas Well ☐ Other ☐

2. Name of Operator **Logos Operating, LLC**

3. Address of Operator
4001 North Butler Ave, Bldg. 7101, Farmington, NM 87401

4. Well Location
Unit Letter A : 904 feet from the N line and 336 feet from the E line
Section 2 Township 24N Range 8W NMPM County San Juan

11. Elevation (Show whether DR, RKB, RT, GR, etc.)
7334' GL

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK ☐	PLUG AND ABANDON ☐	REMEDIAL WORK ☐	ALTERING CASING ☐
TEMPORARILY ABANDON ☐	CHANGE PLANS ☒	COMMENCE DRILLING OPNS. ☐	P AND A ☐
PULL OR ALTER CASING ☐	MULTIPLE COMPL ☐	CASING/CEMENT JOB ☐	
DOWNHOLE COMMINGLE ☐			
OTHER: ☐		OTHER: ☐	

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 19.15.7.14 NMAC. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

Logos has adjusted the surface hole location to accommodate a slightly larger well pad to drill, complete and produce this horizontal well. Please see the attached revised C-102, Drilling Plans and Directional Plans. The Gallup will still be the target zone. Anticipated bottom hole remains the same at 330' FNL & 330' FWL, UL D, Section 2, T24N, R08W. Hole sizes will remain the same and cement will be adjusted accordingly

OIL CONS. DIV DIST. 3

AUG 04 2014

Spud Date:

Rig Release Date:

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE

Tamra Sessions

TITLE

Operations Tech

DATE 08/01/2014

Type or print name Tamra Sessions

E-mail address: tsessions@logosresourcesllc.com

PHONE: 505-330-9333

For State Use Only

APPROVED BY:

Chunther

TITLE

SUPERVISOR DISTRICT #3

DATE

AUG 08 2014

Conditions of Approval (if any):

AV

District I
1625 N. French Dr., Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720
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1000 Rio Brazos Road, Aztec, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170
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Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

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

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

¹ API Number 30-045-35522	² Pool Code 19859	³ Pool Name Dufers Point - Gallup Dakota
⁴ Property Code 40163	⁵ Property Name ROADRUNNER	⁶ Well Number 1H
⁷ OGRID No. 289408	⁸ Operator Name Logos Operating, LLC.	⁹ Elevation 7344'

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
A	2	T24N	R8W	1	904'	NORTH	336'	EAST	SAN JUAN

¹¹ Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
D	2	T24N	R8W	4	330'	NORTH	330'	WEST	SAN JUAN

¹² Dedicated Acres 336.80	¹³ Joint or Infill	¹⁴ Consolidation Code	¹⁵ 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.

FD. 2 1/2" B.C. 1947 G.L.O. 330' B.H.L. 330' S89°41'16"E 2653.89' FD. 2 1/2" B.C. 1947 G.L.O. N88°57'02"W 4548.65' B.H.L. - NAD 83 LAT: N36.34927 LONG: W107.66025 GPS: PDOP 1.4		FD. 2 1/2" B.C. 1947 G.L.O. N89°58'57"W 2649.20' LANDING N09°47'28"W 511.43' S.H.L. 336' FD. 2 1/2" B.C. 1947 G.L.O.		17 OPERATOR CERTIFICATION I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division. <i>Tamra Sessions</i> 8/1/14 Signature Date Tamra Sessions Printed Name tsessions@logosresourcesllc.com E-mail Address
2		FD. 2 1/2" B.C. 1947 G.L.O.		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 the best of my belief. 03/03/2014 REV: 10/24/2014 Date of Survey Signature and Seal of Professional Surveyor 9673 NEW MEXICO PROFESSIONAL SURVEYOR Certificate Number N.M. PLS #9673

Attachment To Application For Permit To Drill.
Drilling program

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

ROADRUNNER 1H
Horizontal Gallup Oil and Gas Well
Surface Location: 904' FNL – 336' FEL
Section 2, T24N, R8W
Ungraded GL Elev = 7334'
Estimate KB Elev =7349'
Lat. = 36.349270 deg N
Long. = 107.660250 deg W
NAD83
San Juan County, New Mexico

Proposed Bottom Hole Location: 330' FNL – 330' FWL
Section 2, T24N, R8W
San Juan County, New Mexico

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

1. ESTIMATED TOPS FOR IMPORTANT GEOLOGICAL FORMATIONS

<u>Formation Tops</u>	<u>Surface (TVD)</u>
Kirtland	2177
Fruitland	2565
Pictured Cliffs	2696
Chacra	3135
Cliffs House	4269
Menefee	4285
Point Lookout	5002
Mancos	5197
Gallup	6131
Top Lower Gallup	6302

Drilling Plan

Drill 12 ¼" hole to 320' then set 9 5/8" casing. Drill 8 3/4" hole with fresh water mud from 320' MD to kick off point #1 3633' MD and build 2 degrees per 100' to 20 degrees, 51.01 degrees azimuth and hold to approximately 5700' MD.

Trip out of hole and pick up 8 ¾" kick off assembly at 5700' MD. Build angle at 10 deg/100' to 85 degrees inclination and 271.34 degrees azimuth in the Gallup formation at 6266' MD / 6131' TVD where 7" intermediate casing will be set at 6702' MD / 6320' TVD.

7" casing will be set in a legal position 400' FNL & 420' FEL in Section 2.

The 7" casing will be drilled out with a 6 1/8" drilling assembly building angle at 5 deg/100' to 90.34 degrees inclination and 271.34 degree azimuth to 6809' MD / 6324' TVD. Hold 90.34 degrees, 271.34 degrees azimuth and drill to a total depth at 11256' MD / 6298' TVD. Adjustments may be made to the directional program based on geology. Total depth will be 11256' MD / 6298' TVD - 90.34 degrees, 271.34 degrees Azimuth.

The Bottom hole location will be in a legal location at 11256' MD at 330' FNL & 330' FWL of section 2.

A total of 4554' 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 6131' TVD

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)

- 9 5/8" slip-on / welded x 11" 2,000 psi casing head.
- 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.
- 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
- One 11" x 2,000 psi WP Hydril GK (or equivalent) annular preventer.
- 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.
- 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.
- 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 320'

8-3/4" = 320' to 6702' = 7" Casing point

6-1/8" Lateral = 6702' MD to 11256' MD = Gallup Pay Zone Horizontal

B. Casing Program – all casing strings are new casing

Casing & Hole Size	Weight	Grade	Coupling	Setting Depth (MD)	Comments
9-5/8" (12 1/4")	36 ppf	K or J-55	LT&C	0' - 320'	New casing. Cement to surface.
7" (8 3/4")	23 ppf	K or J-55	LT&C	0' - 6702' MD	New Casing. Cement to surface with cement.
4-1/2" (6 1/8")	11.6 ppf	P-110	LT&C	6450'-11256' MD	New Casing - Horizontal Hole Cemented full length with foam cement - TOL at 60 degrees.

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

Minimum casing design factors used:

Collapse -	1.125
Burst -	1.0
Jt. Strength -	1.60

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

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

5. PROPOSED CEMENTING PROGRAM

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

- The proposed cementing program is as follows:

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

Surface Casing Single Stage Job – (0-320'):

Excess – 100% over gauge hole – 12-1/4" hole and 9-5/8" casing (0.3132ft³/ft)

Top of Cement - Surface

Primary Cement

HALCEM (TM) SYSTEM

0.125 lbm/sk Poly-E-Flake (Lost Circulation Additive)

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 – One Stage Stage Job (0-6702' MD):
Excess – 50% over gauge hole – 8-3/4" hole and 7" casing (0.1503 ft3/ft)
Top of Cement – Surface.

Stage 1

Fluid 1: Water Spacer

Fresh Water	Fluid Density:	8.33 lbm/gal
	Volume :	10 bbl

Fluid 2: Reactive Spacer

Chemical Wash	Fluid Density:	8.4 lbm/gal
1000 gal/Mgal FRESH WATER	Volume :	40 bbl

Fluid 3: Water Spacer

Fresh Water	Fluid Density:	8.33 lbm/gal
	Volume :	10 bbl

Fluid 4: Foamed

ELASTISEAL (TM) SYSTEM	Fluid Weight:	13 lbm/gal
1.50 % CHEM - FOAMER 760, TOTETANK	Volume:	193.5 bbl
6.73 Gal FRESH WATER	Slurry Yield:	1.438 ft3/sack
	Total Mixing Fluid:	6.83 Gal/sack
	Top Of Fluid:	0 ft
	Calculated Fill:	5267 ft
	Calculated sack:	42.26 sack
	Proposed sack:	560 sack

Fluid 5: Tail Slurry

HALCEM (TM) SYSTEM	Fluid Weight:	13.5 lbm/gal
5.70 Gal FRESH WATER	Volume:	18.7 bbl
	Slurry Yield:	1.291 ft3/sack
	Total Mixing Fluid:	5.7 Gal/sack
	Top Of Fluid:	5267 ft
	Calculated Fill:	500 ft
	Calculated sack:	81.33 sack
	Proposed sack:	85 sack

Fluid 6: Water Based Spacer

Displacement	Fluid Density:	8.4 lbm/gal
	Volume :	227 bbl

Fluid 7: Top Off Annulus

HALCEM (TM) SYSTEM	Fluid Weight:	15.8 lbm/gal
2 % Calcium Chloride	Volume:	20.9 bbl
5.15 Gal FRESH WATER	Slurry Yield:	1.174 ft3/sack

Total Mixing Fluid:	5.15 Gal/sack
Calculated sack:	0 sack
Proposed sack:	100 sack

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	Calculated Gas =	23129.9 scf
Backpressure:	14 psig	Additional Gas =	50000 scf
Bottom Hole Circulating Temp:	105 degF	Total Gas =	73129.9 scf
Mud Outlet Temperature:	85 degF		

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

Production Casing – Single Stage Job (6450' - 11256' 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	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"	0-320'	Fresh Water	8.4-8.6	60-70	NC
8 3/4"	320'-5615'	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"	5700' MD (KOP)- 6782' MD	Fresh Water LSND	8.5-8.8	40-50	8-10	
6 1/8"	6782' MD - 11256' MD	Synthetic Oil Based Mud	7.0-9.0	15-25	<1	

- There will be sufficient mud on location to control a blowout should one occur. Mud flow and volume will be monitored both visually and with electronic pit volume totalizers. Mud tests shall be performed every 24 hours after mudding up to determine, as applicable: density, viscosity, gel strength, filtration, and pH.
- A temporary pit will be used during the vertical drilling of the well. The drill cuttings and drilling fluids will be placed in a reserve pit. The reserve pit will be lined with a 20 mil string re-enforced material and constructed to meet the NMOCD pit guidelines. The reserve pit will be fenced prior to drilling. After drilling, any free liquids in the pit will be disposed of at the appropriate waste disposal facilities. The solids in the reserve pit will be allowed to dry, tested, and buried according to NMOCD pit rules.
- A closed-loop system will be used to recover drilling fluid in the horizontal phase of the well during 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.

7. TESTING, CORING and LOGGING

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

Cased Hole:

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

8. ABNORMAL PRESSURES & HYDROGEN SULFIDE

The anticipated bottom hole pressure is +/- 2947 psi based on a 9.0 ppg at 6298' 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 August 30, 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.

✓CS

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, Hand I of 19.15.17.13 NMAC.

Well Control Equipment Schematic for 2M Service

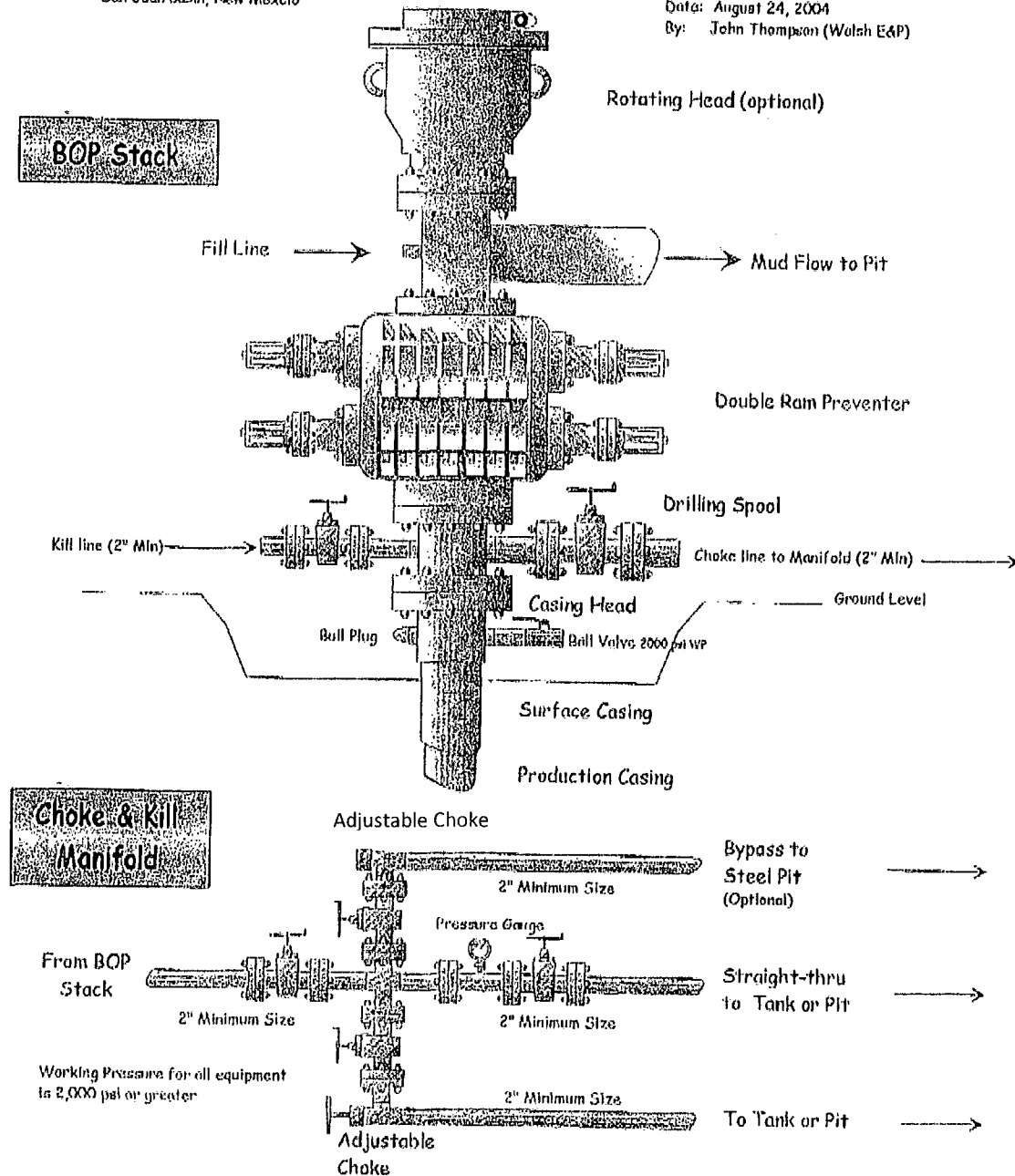
Attachment to Drilling Technical Program

Exhibit #1 Typical BOP setup

Location: San Juan Basin, New Mexico

Date: August 24, 2004

By: John Thompson (Walsh E&P)





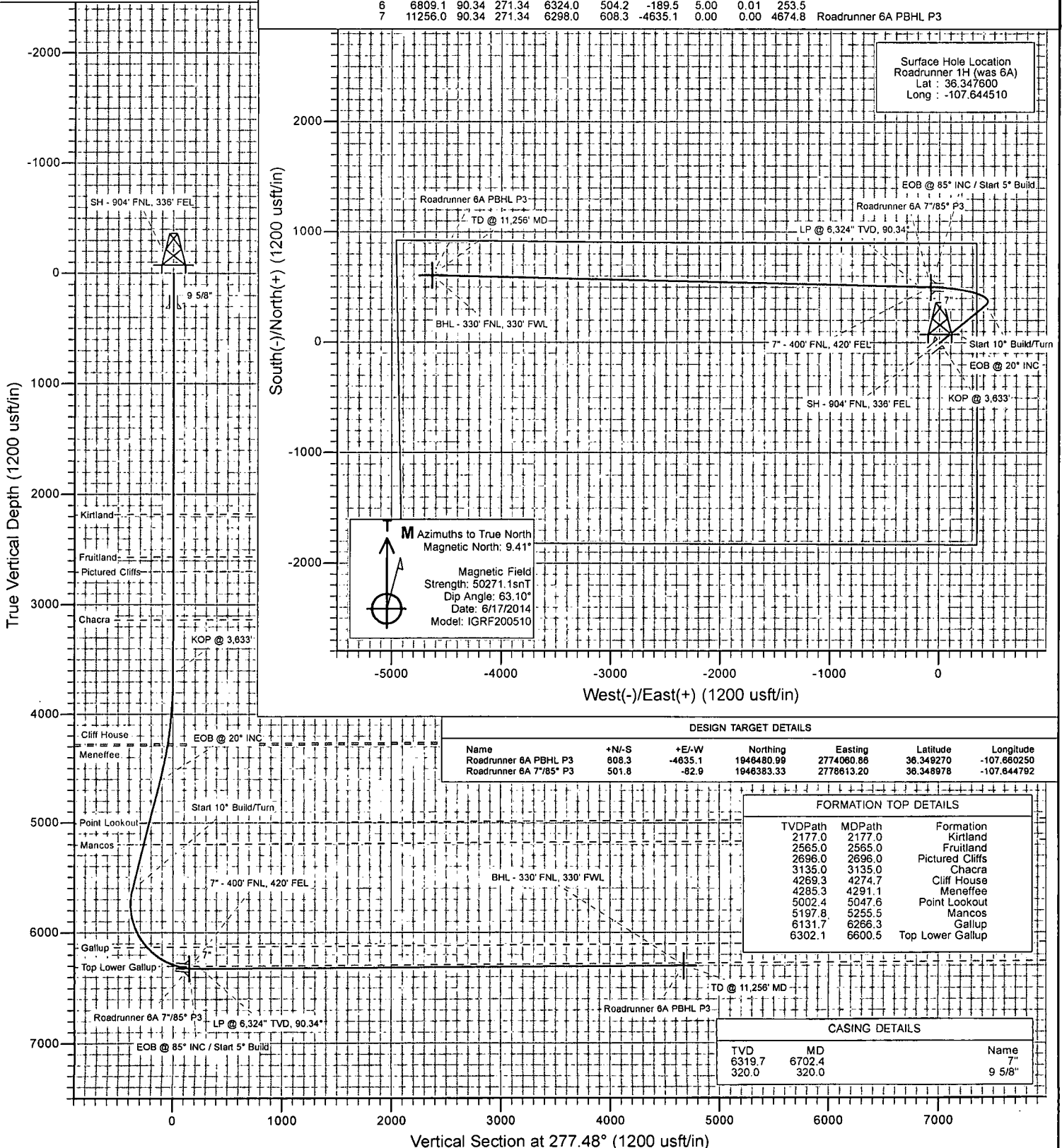
Project: San Juan County, NM
Site: S2-T24N-R8W (Roadrunner Pad)
Well: Roadrunner 1H (was 6A)
Wellbore: HZ
Design: Plan #4



Plan #4
Roadrunner 1H (was 6A)
145XXX; SC
KB=15' @ 7349.0usft (Aztec #222)
Ground Elevation @ 7334.0
North American Datum 1983
Well Roadrunner 1H (was 6A), 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	3633.5	0.00	0.00	3633.5	0.0	0.0	0.00	0.00	0.0	
3	4633.4	20.00	51.01	4613.2	108.7	134.2	2.00	51.01	-119.0	
4	5700.0	20.00	51.01	5615.5	338.2	417.7	0.00	0.00	-370.2	
5	6702.4	85.00	271.34	6319.7	501.8	-82.9	10.00	-139.06	147.5	Roadrunner 6A 7°/85° P3
6	6809.1	90.34	271.34	6324.0	504.2	-189.5	5.00	0.01	253.5	
7	11256.0	90.34	271.34	6298.0	608.3	-4635.1	0.00	0.00	4674.8	Roadrunner 6A PBHL P3



Cathedral Energy Services

Survey Report

Company:	LOGOS Operating LLC	Local Co-ordinate Reference:	Well Roadrunner 1H (was 6A)
Project:	San Juan County, NM	TVD Reference:	KB=15' @ 7349.0usft (Aztec #222)
Site:	S2-T24N-R8W (Roadrunner Pad)	MD Reference:	KB=15' @ 7349.0usft (Aztec #222)
Well:	Roadrunner 1H (was 6A)	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	Plan #4	Database:	USA EDM 5000 Multi Users DB

Project	San Juan County, NM		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Western Zone		

Site S2-T24N-R8W (Roadrunner Pad)					
Site Position:		Northing:	1,945,823.49 usft	Latitude:	36.347440
From:	Lat/Long	Easting:	2,778,694.30 usft	Longitude:	-107.644520
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.11 °

Well	Roadrunner 1H (was 6A)					
Well Position	+N/-S	0.0 usft	Northing:	1,945,881.74 usft	Latitude:	36.347600
	+E/-W	0.0 usft	Easting:	2,778,697.13 usft	Longitude:	-107.644510
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	7,334.0 usft

Wellbore	HZ				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	6/17/2014	9.41	63.10	50,271

Design	Plan #4			
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	277.48

Survey Tool Program		Date	7/30/2014		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.0	11,256.0	Plan #4 (HZ)	ISCWSA MWD	MWD - Standard	

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usf	Build Rate (°/100u	Formations / Comments
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	SH - 904' FNL, 336' FEL
0.5	0.00	0.00	0.5	0.0	0.0	0.0	0.00	0.00	
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	
320.0	0.00	0.00	320.0	0.0	0.0	0.0	0.00	0.00	9 5/8"
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	

Cathedral Energy Services

Survey Report

Company:	LOGOS Operating LLC	Local Co-ordinate Reference:	Well Roadrunner 1H (was 6A)
Project:	San Juan County, NM	TVD Reference:	KB=15' @ 7349.0usft (Aztec #222)
Site:	S2-T24N-R8W (Roadrunner Pad)	MD Reference:	KB=15' @ 7349.0usft (Aztec #222)
Well:	Roadrunner 1H (was 6A)	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	Plan #4	Database:	USA EDM 5000 Multi Users DB

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)	Formations / Comments	
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		
1,600.0	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		
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		
2,177.0	0.00	0.00	2,177.0	0.0	0.0	0.0	0.00	0.00	Kirtland	
2,200.0	0.00	0.00	2,200.0	0.0	0.0	0.0	0.00	0.00		
2,300.0	0.00	0.00	2,300.0	0.0	0.0	0.0	0.00	0.00		
2,400.0	0.00	0.00	2,400.0	0.0	0.0	0.0	0.00	0.00		
2,500.0	0.00	0.00	2,500.0	0.0	0.0	0.0	0.00	0.00		
2,565.0	0.00	0.00	2,565.0	0.0	0.0	0.0	0.00	0.00	Fruitland	
2,600.0	0.00	0.00	2,600.0	0.0	0.0	0.0	0.00	0.00		
2,696.0	0.00	0.00	2,696.0	0.0	0.0	0.0	0.00	0.00	Pictured Cliffs	
2,700.0	0.00	0.00	2,700.0	0.0	0.0	0.0	0.00	0.00		
2,800.0	0.00	0.00	2,800.0	0.0	0.0	0.0	0.00	0.00		
2,900.0	0.00	0.00	2,900.0	0.0	0.0	0.0	0.00	0.00		
3,000.0	0.00	0.00	3,000.0	0.0	0.0	0.0	0.00	0.00		
3,100.0	0.00	0.00	3,100.0	0.0	0.0	0.0	0.00	0.00		
3,135.0	0.00	0.00	3,135.0	0.0	0.0	0.0	0.00	0.00	Chacra	
3,200.0	0.00	0.00	3,200.0	0.0	0.0	0.0	0.00	0.00		
3,300.0	0.00	0.00	3,300.0	0.0	0.0	0.0	0.00	0.00		
3,400.0	0.00	0.00	3,400.0	0.0	0.0	0.0	0.00	0.00		
3,500.0	0.00	0.00	3,500.0	0.0	0.0	0.0	0.00	0.00		
3,600.0	0.00	0.00	3,600.0	0.0	0.0	0.0	0.00	0.00		
3,633.5	0.00	0.00	3,633.5	0.0	0.0	0.0	0.00	0.00	KOP @ 3,633'	
3,700.0	1.33	51.01	3,700.0	0.5	0.6	-0.5	2.00	2.00		
3,800.0	3.33	51.01	3,799.9	3.0	3.8	-3.3	2.00	2.00		
3,900.0	5.33	51.01	3,899.6	7.8	9.6	-8.5	2.00	2.00		
4,000.0	7.33	51.01	3,999.0	14.7	18.2	-16.1	2.00	2.00		
4,100.0	9.33	51.01	4,097.9	23.8	29.5	-26.1	2.00	2.00		
4,200.0	11.33	51.01	4,196.3	35.1	43.4	-38.5	2.00	2.00		
4,274.7	12.82	51.01	4,269.3	45.0	55.5	-49.2	2.00	2.00	Cliff House	
4,291.1	13.15	51.01	4,285.3	47.3	58.4	-51.8	2.00	2.00	Meneffee	
4,300.0	13.33	51.01	4,294.0	48.6	60.0	-53.2	2.00	2.00		
4,400.0	15.33	51.01	4,390.9	64.1	79.2	-70.2	2.00	2.00		
4,500.0	17.33	51.01	4,486.8	81.8	101.1	-89.6	2.00	2.00		
4,600.0	19.33	51.01	4,581.8	101.6	125.5	-111.2	2.00	2.00		
4,633.4	20.00	51.01	4,613.2	108.7	134.3	-119.0	2.00	2.00	EOB @ 20° INC	
4,700.0	20.00	51.01	4,675.8	123.0	152.0	-134.7	0.00	0.00		
4,800.0	20.00	51.01	4,769.8	144.5	178.5	-158.2	0.00	0.00		
4,900.0	20.00	51.01	4,863.7	166.1	205.1	-181.8	0.00	0.00		
5,000.0	20.00	51.01	4,957.7	187.6	231.7	-205.3	0.00	0.00		
5,047.6	20.00	51.01	5,002.4	197.8	244.3	-216.5	0.00	0.00	Point Lookout	
5,100.0	20.00	51.01	5,051.7	209.1	258.3	-228.9	0.00	0.00		
5,200.0	20.00	51.01	5,145.7	230.6	284.8	-252.4	0.00	0.00		
5,255.5	20.00	51.01	5,197.8	242.5	299.6	-265.5	0.00	0.00	Mancos	
5,300.0	20.00	51.01	5,239.6	252.1	311.4	-276.0	0.00	0.00		

Cathedral Energy Services

Survey Report

Company:	LOGOS Operating LLC	Local Co-ordinate Reference:	Well Roadrunner 1H (was 6A)
Project:	San Juan County, NM	TVD Reference:	KB=15' @ 7349.0usft (Aztec #222)
Site:	S2-T24N-R8W (Roadrunner Pad)	MD Reference:	KB=15' @ 7349.0usft (Aztec #222)
Well:	Roadrunner 1H (was 6A)	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	Plan #4	Database:	USA EDM 5000 Multi Users DB

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usf)	Build Rate (°/100u)	Formations / Comments	
5,400.0	20.00	51.01	5,333.6	273.7	338.0	-299.5	0.00	0.00		
5,500.0	20.00	51.01	5,427.6	295.2	364.6	-323.1	0.00	0.00		
5,600.0	20.00	51.01	5,521.5	316.7	391.2	-346.6	0.00	0.00		
5,700.0	20.00	51.01	5,615.5	338.2	417.7	-370.2	0.00	0.00	Start 10° Build/Turn	
5,750.0	16.53	39.43	5,663.0	349.1	428.9	-379.8	10.00	-6.93		
5,800.0	14.00	22.95	5,711.3	360.2	435.8	-385.2	10.00	-5.07		
5,850.0	12.95	1.85	5,759.9	371.3	438.3	-386.3	10.00	-2.09		
5,900.0	13.74	340.33	5,808.6	382.5	436.5	-383.0	10.00	1.57		
5,950.0	16.09	323.06	5,856.9	393.7	430.4	-375.5	10.00	4.70		
6,000.0	19.44	310.83	5,904.5	404.7	419.9	-363.7	10.00	6.71		
6,050.0	23.37	302.33	5,951.1	415.4	405.2	-347.7	10.00	7.86		
6,100.0	27.64	296.24	5,996.2	425.8	386.4	-327.7	10.00	8.53		
6,150.0	32.10	291.69	6,039.6	435.9	363.6	-303.8	10.00	8.92		
6,200.0	36.68	288.16	6,080.8	445.5	337.1	-276.3	10.00	9.18		
6,250.0	41.36	285.33	6,119.7	454.5	307.0	-245.2	10.00	9.34		
6,266.3	42.89	284.52	6,131.7	457.3	296.4	-234.4	10.00	9.43	Gallup	
6,300.0	46.09	282.98	6,155.8	462.9	273.5	-210.9	10.00	9.47		
6,350.0	50.86	280.97	6,188.9	470.6	236.9	-173.6	10.00	9.54		
6,400.0	55.66	279.23	6,218.9	477.7	197.4	-133.6	10.00	9.60		
6,450.0	60.48	277.67	6,245.3	483.9	155.5	-91.2	10.00	9.64		
6,500.0	65.32	276.25	6,268.1	489.2	111.3	-46.7	10.00	9.68		
6,550.0	70.17	274.94	6,287.0	493.8	65.2	-0.5	10.00	9.70		
6,600.0	75.03	273.71	6,301.9	497.3	17.7	47.2	10.00	9.72		
6,600.5	75.08	273.70	6,302.1	497.4	17.2	47.7	10.00	9.73	Top Lower Gallup	
6,650.0	79.89	272.54	6,312.8	500.0	-31.0	95.8	10.00	9.73		
6,702.4	85.00	271.34	6,319.7	501.8	-82.9	147.5	10.00	9.74	EOB @ 85° INC / Start 5° Build - 7" - 400' FNL, 4	
6,809.1	90.33	271.34	6,324.0	504.2	-189.5	253.5	5.00	5.00	LP @ 6,324" TVD, 90.34°	
6,900.0	90.34	271.34	6,323.5	506.4	-280.3	343.8	0.00	0.00		
7,000.0	90.34	271.34	6,322.9	508.7	-380.3	443.3	0.00	0.00		
7,100.0	90.34	271.34	6,322.3	511.1	-480.3	542.7	0.00	0.00		
7,200.0	90.34	271.34	6,321.7	513.4	-580.3	642.1	0.00	0.00		
7,300.0	90.34	271.34	6,321.2	515.7	-680.2	741.6	0.00	0.00		
7,400.0	90.34	271.34	6,320.6	518.1	-780.2	841.0	0.00	0.00		
7,500.0	90.34	271.34	6,320.0	520.4	-880.2	940.4	0.00	0.00		
7,600.0	90.34	271.34	6,319.4	522.8	-980.1	1,039.8	0.00	0.00		
7,700.0	90.34	271.34	6,318.8	525.1	-1,080.1	1,139.3	0.00	0.00		
7,800.0	90.34	271.34	6,318.2	527.4	-1,180.1	1,238.7	0.00	0.00		
7,900.0	90.34	271.34	6,317.6	529.8	-1,280.1	1,338.1	0.00	0.00		
8,000.0	90.34	271.34	6,317.1	532.1	-1,380.0	1,437.5	0.00	0.00		
8,100.0	90.34	271.34	6,316.5	534.5	-1,480.0	1,537.0	0.00	0.00		
8,200.0	90.34	271.34	6,315.9	536.8	-1,580.0	1,636.4	0.00	0.00		
8,300.0	90.34	271.34	6,315.3	539.1	-1,679.9	1,735.8	0.00	0.00		
8,400.0	90.34	271.34	6,314.7	541.5	-1,779.9	1,835.2	0.00	0.00		
8,500.0	90.34	271.34	6,314.1	543.8	-1,879.9	1,934.7	0.00	0.00		
8,600.0	90.34	271.34	6,313.5	546.2	-1,979.9	2,034.1	0.00	0.00		
8,700.0	90.34	271.34	6,313.0	548.5	-2,079.8	2,133.5	0.00	0.00		
8,800.0	90.34	271.34	6,312.4	550.8	-2,179.8	2,232.9	0.00	0.00		
8,900.0	90.34	271.34	6,311.8	553.2	-2,279.8	2,332.4	0.00	0.00		
9,000.0	90.34	271.34	6,311.2	555.5	-2,379.7	2,431.8	0.00	0.00		
9,100.0	90.34	271.34	6,310.6	557.9	-2,479.7	2,531.2	0.00	0.00		
9,200.0	90.34	271.34	6,310.0	560.2	-2,579.7	2,630.6	0.00	0.00		
9,300.0	90.34	271.34	6,309.4	562.5	-2,679.6	2,730.1	0.00	0.00		
9,400.0	90.34	271.34	6,308.9	564.9	-2,779.6	2,829.5	0.00	0.00		

Cathedral Energy Services

Survey Report

Company:	LOGOS Operating LLC	Local Co-ordinate Reference:	Well Roadrunner 1H (was 6A)
Project:	San Juan County, NM	TVD Reference:	KB=15' @ 7349.0usft (Aztec #222)
Site:	S2-T24N-R8W (Roadrunner Pad)	MD Reference:	KB=15' @ 7349.0usft (Aztec #222)
Well:	Roadrunner 1H (was 6A)	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	Plan #4	Database:	USA EDM 5000 Multi Users DB

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usf)	Build Rate (°/100u)	Formations / Comments
9,500.0	90.34	271.34	6,308.3	567.2	-2,879.6	2,928.9	0.00	0.00	
9,600.0	90.34	271.34	6,307.7	569.6	-2,979.6	3,028.3	0.00	0.00	
9,700.0	90.34	271.34	6,307.1	571.9	-3,079.5	3,127.8	0.00	0.00	
9,800.0	90.34	271.34	6,306.5	574.2	-3,179.5	3,227.2	0.00	0.00	
9,900.0	90.34	271.34	6,305.9	576.6	-3,279.5	3,326.6	0.00	0.00	
10,000.0	90.34	271.34	6,305.4	578.9	-3,379.4	3,426.0	0.00	0.00	
10,100.0	90.34	271.34	6,304.8	581.3	-3,479.4	3,525.5	0.00	0.00	
10,200.0	90.34	271.34	6,304.2	583.6	-3,579.4	3,624.9	0.00	0.00	
10,300.0	90.34	271.34	6,303.6	585.9	-3,679.4	3,724.3	0.00	0.00	
10,400.0	90.34	271.34	6,303.0	588.3	-3,779.3	3,823.7	0.00	0.00	
10,500.0	90.34	271.34	6,302.4	590.6	-3,879.3	3,923.2	0.00	0.00	
10,600.0	90.34	271.34	6,301.8	593.0	-3,979.3	4,022.6	0.00	0.00	
10,700.0	90.34	271.34	6,301.3	595.3	-4,079.2	4,122.0	0.00	0.00	
10,800.0	90.34	271.34	6,300.7	597.6	-4,179.2	4,221.4	0.00	0.00	
10,900.0	90.34	271.34	6,300.1	600.0	-4,279.2	4,320.9	0.00	0.00	
11,000.0	90.34	271.34	6,299.5	602.3	-4,379.2	4,420.3	0.00	0.00	
11,100.0	90.34	271.34	6,298.9	604.7	-4,479.1	4,519.7	0.00	0.00	
11,200.0	90.34	271.34	6,298.3	607.0	-4,579.1	4,619.1	0.00	0.00	
11,256.0	90.34	271.34	6,298.0	608.3	-4,635.1	4,674.8	0.00	0.00	BHL - 330' FNL, 330' FWL - TD @ 11,256' MD

Cathedral Energy Services

Survey Report

Company:	LOGOS Operating LLC	Local Co-ordinate Reference:	Well Roadrunner 1H (was 6A)
Project:	San Juan County, NM	TVD Reference:	KB=15' @ 7349.0usft (Aztec #222)
Site:	S2-T24N-R8W (Roadrunner.Pad)	MD Reference:	KB=15' @ 7349.0usft (Aztec #222)
Well:	Roadrunner 1H (was 6A)	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	Plan #4	Database:	USA EDM 5000 Multi Users DB

Targets									
Target Name	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
- Shape									
Roadrunner 6A PBHL P:	0.00	0.00	6,298.0	608.3	-4,635.1	1,946,480.99	2,774,060.86	36.349270	-107.660250
- plan hits target center									
- Point									
Roadrunner 6A PBHL	0.00	0.00	6,298.0	594.4	-4,627.8	1,946,467.08	2,774,068.15	36.349232	-107.660225
- plan misses target center by 13.8usft at 11248.4usft MD (6298.0 TVD, 608.1 N, -4627.5 E)									
- Point									
Roadrunner 6A 7"/85° P:	0.00	0.00	6,319.7	501.8	-82.9	1,946,383.33	2,778,613.20	36.348978	-107.644792
- plan hits target center									
- Point									
Roadrunner 6A 7"/85°	0.00	0.00	6,319.7	572.5	-163.3	1,946,453.88	2,778,532.67	36.349173	-107.645065
- plan misses target center by 68.9usft at 6784.4usft MD (6323.9 TVD, 503.7 N, -164.8 E)									
- Point									

Casing Points				
Measured Depth	Vertical Depth	Name	Casing Diameter	Hole Diameter
(usft)	(usft)		(")	(")
6,702.4	6,319.7	7"	0	0
320.0	320.0	9 5/8"	0	0

Formations					
Measured Depth	Vertical Depth	Name	Lithology	Dip	Dip Direction
(usft)	(usft)			(°)	(°)
2,177.0	2,177.0	Kirtland		-0.34	270.00
2,565.0	2,565.0	Fruitland		-0.34	270.00
2,696.0	2,696.0	Pictured Cliffs		-0.34	270.00
3,135.0	3,135.0	Chacra		-0.34	270.00
4,274.7	4,269.0	Cliff House		-0.34	270.00
4,291.1	4,285.0	Meneffee		-0.34	270.00
5,047.6	5,001.0	Point Lookout		-0.34	270.00
5,255.5	5,196.0	Mancos		-0.34	270.00
6,266.3	6,130.0	Gallup		-0.34	270.00
6,600.5	6,302.0	Top Lower Gallup		-0.34	270.00

Plan Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(usft)	(usft)	+N/-S	+E/-W	
(usft)	(usft)	(usft)	(usft)	
0.5	0.5	0.0	0.0	SH - 904' FNL, 336' FEL
3,633.5	3,633.5	0.0	0.0	KOP @ 3,633'
4,633.4	4,613.2	108.7	134.3	EOB @ 20° INC
5,700.0	5,615.5	338.2	417.7	Start 10° Build/Turn
6,702.4	6,319.7	501.8	-82.9	EOB @ 85° INC / Start 5° Build
6,702.4	6,319.7	501.8	-82.9	7" - 400' FNL, 420' FEL
6,809.1	6,324.0	504.2	-189.5	LP @ 6,324" TVD, 90.34°
11,256.0	6,298.0	608.3	-4,635.1	BHL - 330' FNL, 330' FWL
11,256.0	6,298.0	608.3	-4,635.1	TD @ 11,256' MD

Cathedral Energy Services

Survey Report

Company:	LOGOS Operating LLC	Local Co-ordinate Reference:	Well Roadrunner 1H (was 6A)
Project:	San Juan County, NM	TVD Reference:	KB=15' @ 7349.0usft (Aztec #222)
Site:	S2-T24N-R8W (Roadrunner Pad)	MD Reference:	KB=15' @ 7349.0usft (Aztec #222)
Well:	Roadrunner 1H (was 6A)	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	Plan #4	Database:	USA EDM 5000 Multi Users DB

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
Roadrunner 6A PBHL P: - plan hits target center - Point	0.00	0.00	6,298.0	608.3	-4,635.1	1,946,480.99	2,774,060.86	36.349270	-107.660250
Roadrunner 6A PBHL - plan misses target center by 13.8usft at 11248.4usft MD (6298.0 TVD, 608.1 N, -4627.5 E) - Point	0.00	0.00	6,298.0	594.4	-4,627.8	1,946,467.08	2,774,068.15	36.349232	-107.660225
Roadrunner 6A 7"/85° P: - plan hits target center - Point	0.00	0.00	6,319.7	501.8	-82.9	1,946,383.33	2,778,613.20	36.348978	-107.644792
Roadrunner 6A 7"/85° - plan misses target center by 68.9usft at 6784.4usft MD (6323.9 TVD, 503.7 N, -164.8 E) - Point	0.00	0.00	6,319.7	572.5	-163.3	1,946,453.88	2,778,532.67	36.349173	-107.645065

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
6,702.4	6,319.7	7"	0	0
320.0	320.0	9 5/8"	0	0

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,177.0	2,177.0	Kirtland		-0.34	270.00
2,565.0	2,565.0	Fruitland		-0.34	270.00
2,696.0	2,696.0	Pictured Cliffs		-0.34	270.00
3,135.0	3,135.0	Chacra		-0.34	270.00
4,274.7	4,269.0	Cliff House		-0.34	270.00
4,291.1	4,285.0	Menefee		-0.34	270.00
5,047.6	5,001.0	Point Lookout		-0.34	270.00
5,255.5	5,196.0	Mancos		-0.34	270.00
6,266.3	6,130.0	Gallup		-0.34	270.00
6,600.5	6,302.0	Top Lower Gallup		-0.34	270.00

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
0.5	0.5	0.0	0.0	SH - 904' FNL, 336' FEL
3,633.5	3,633.5	0.0	0.0	KOP @ 3,633'
4,633.4	4,613.2	108.7	134.3	EOB @ 20° INC
5,700.0	5,615.5	338.2	417.7	Start 10° Build/Turn
6,702.4	6,319.7	501.8	-82.9	EOB @ 85° INC / Start 5° Build
6,702.4	6,319.7	501.8	-82.9	7" - 400' FNL, 420' FEL
6,809.1	6,324.0	504.2	-189.5	LP @ 6,324" TVD, 90.34°
11,256.0	6,298.0	608.3	-4,635.1	BHL - 330' FNL, 330' FWL
11,256.0	6,298.0	608.3	-4,635.1	TD @ 11,256' MD

Cathedral Energy Services

Survey Report

Company:	LOGOS Operating LLC	Local Co-ordinate Reference:	Well Roadrunner 1H (was 6A)
Project:	San Juan County, NM	TVD Reference:	KB=15' @ 7349.0usft (Aztec #222)
Site:	S2-T24N-R8W (Roadrunner Pad)	MD Reference:	KB=15' @ 7349.0usft (Aztec #222)
Well:	Roadrunner 1H (was 6A)	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	Plan #4	Database:	USA EDM 5000 Multi Users DB

Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Roadrunner 6A PBHL P: - hit/miss target - Shape - Point	0.00	0.00	6,298.0	608.3	-4,635.1	1,946,480.99	2,774,060.86	36.349270	-107.660250
Roadrunner 6A PBHL - plan misses target center by 13.8usft at 11248.4usft MD (6298.0 TVD, 608.1 N, -4627.5 E) - Point	0.00	0.00	6,298.0	594.4	-4,627.8	1,946,467.08	2,774,068.15	36.349232	-107.660225
Roadrunner 6A 7°/85° P: - plan hits target center - Point	0.00	0.00	6,319.7	501.8	-82.9	1,946,383.33	2,778,613.20	36.348978	-107.644792
Roadrunner 6A 7°/85° - plan misses target center by 68.9usft at 6784.4usft MD (6323.9 TVD, 503.7 N, -164.8 E) - Point	0.00	0.00	6,319.7	572.5	-163.3	1,946,453.88	2,778,532.67	36.349173	-107.645065

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")	
6,702.4	6,319.7	7"	0	0	
320.0	320.0	9 5/8"	0	0	

Formations					
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,177.0	2,177.0	Kirtland		-0.34	270.00
2,565.0	2,565.0	Fruitland		-0.34	270.00
2,696.0	2,696.0	Pictured Cliffs		-0.34	270.00
3,135.0	3,135.0	Chacra		-0.34	270.00
4,274.7	4,269.0	Cliff House		-0.34	270.00
4,291.1	4,285.0	Meneffee		-0.34	270.00
5,047.6	5,001.0	Point Lookout		-0.34	270.00
5,255.5	5,196.0	Mancos		-0.34	270.00
6,266.3	6,130.0	Gallup		-0.34	270.00
6,600.5	6,302.0	Top Lower Gallup		-0.34	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 - 904' FNL, 336' FEL	
3,633.5	3,633.5	0.0	0.0	KOP @ 3,633'	
4,633.4	4,613.2	108.7	134.3	EOB @ 20° INC	
5,700.0	5,615.5	338.2	417.7	Start 10° Build/Turn	
6,702.4	6,319.7	501.8	-82.9	EOB @ 85° INC / Start 5° Build	
6,702.4	6,319.7	501.8	-82.9	7" - 400' FNL, 420' FEL	
6,809.1	6,324.0	504.2	-189.5	LP @ 6,324" TVD, 90.34°	
11,256.0	6,298.0	608.3	-4,635.1	BHL - 330' FNL, 330' FWL	
11,256.0	6,298.0	608.3	-4,635.1	TD @ 11,256' MD	

Cathedral Energy Services

Survey Report

Company:	LOGOS Operating LLC	Local Co-ordinate Reference:	Well Roadrunner 1H (was 6A)
Project:	San Juan County, NM	TVD Reference:	KB=15' @ 7349.0usft (Aztec #222)
Site:	S2-T24N-R8W (Roadrunner Pad)	MD Reference:	KB=15' @ 7349.0usft (Aztec #222)
Well:	Roadrunner 1H (was 6A)	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	Plan #4	Database:	USA EDM 5000 Multi Users DB

Targets									
Target Name	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
- Shape									
Roadrunner 6A PBHL P:	0.00	0.00	6,298.0	608.3	-4,635.1	1,946,480.99	2,774,060.86	36.349270	-107.660250
- plan hits target center									
- Point									
Roadrunner 6A PBHL	0.00	0.00	6,298.0	594.4	-4,627.8	1,946,467.08	2,774,068.15	36.349232	-107.660225
- plan misses target center by 13.8usft at 11248.4usft MD (6298.0 TVD, 608.1 N, -4627.5 E)									
- Point									
Roadrunner 6A 7°/85° P:	0.00	0.00	6,319.7	501.8	-82.9	1,946,383.33	2,778,613.20	36.348978	-107.644792
- plan hits target center									
- Point									
Roadrunner 6A 7°/85°	0.00	0.00	6,319.7	572.5	-163.3	1,946,453.88	2,778,532.67	36.349173	-107.645065
- plan misses target center by 68.9usft at 6784.4usft MD (6323.9 TVD, 503.7 N, -164.8 E)									
- Point									

Casing Points				
Measured Depth	Vertical Depth	Name	Casing Diameter	Hole Diameter
(usft)	(usft)		(")	(")
6,702.4	6,319.7	7"	0	0
320.0	320.0	9 5/8"	0	0

Formations					
Measured Depth	Vertical Depth	Name	Lithology	Dip	Dip Direction
(usft)	(usft)			(°)	(°)
2,177.0	2,177.0	Kirtland		-0.34	270.00
2,565.0	2,565.0	Fruitland		-0.34	270.00
2,696.0	2,696.0	Pictured Cliffs		-0.34	270.00
3,135.0	3,135.0	Chacra		-0.34	270.00
4,274.7	4,269.0	Cliff House		-0.34	270.00
4,291.1	4,285.0	Meneffee		-0.34	270.00
5,047.6	5,001.0	Point Lookout		-0.34	270.00
5,255.5	5,196.0	Mancos		-0.34	270.00
6,266.3	6,130.0	Gallup		-0.34	270.00
6,600.5	6,302.0	Top Lower Gallup		-0.34	270.00

Plan Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(usft)	(usft)	+N/-S	+E/-W	
(usft)	(usft)	(usft)	(usft)	
0.5	0.5	0.0	0.0	SH - 904' FNL, 336' FEL
3,633.5	3,633.5	0.0	0.0	KOP @ 3,633'
4,633.4	4,613.2	108.7	134.3	EOB @ 20° INC
5,700.0	5,615.5	338.2	417.7	Start 10° Build/Turn
6,702.4	6,319.7	501.8	-82.9	EOB @ 85° INC / Start 5° Build
6,702.4	6,319.7	501.8	-82.9	7" - 400' FNL, 420' FEL
6,809.1	6,324.0	504.2	-189.5	LP @ 6,324" TVD, 90.34°
11,256.0	6,298.0	608.3	-4,635.1	BHL - 330' FNL, 330' FWL
11,256.0	6,298.0	608.3	-4,635.1	TD @ 11,256' MD

Checked By:	Approved By:	Date:
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Cathedral Energy Services

Survey Report

Company:	LOGOS Operating LLC	Local Co-ordinate Reference:	Well Roadrunner 1H (was 6A)
Project:	San Juan County, NM	TVD Reference:	KB=15' @ 7349.0usft (Aztec #222)
Site:	S2-T24N-R8W (Roadrunner Pad)	MD Reference:	KB=15' @ 7349.0usft (Aztec #222)
Well:	Roadrunner 1H (was 6A)	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	Plan #4	Database:	USA EDM 5000 Multi Users DB

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
Roadrunner 6A PBHL P: - plan hits target center - Point	0.00	0.00	6,298.0	608.3	-4,635.1	1,946,480.99	2,774,060.86	36.349270	-107.660250
Roadrunner 6A PBHL - plan misses target center by 13.8usft at 11248.4usft MD (6298.0 TVD, 608.1 N, -4627.5 E) - Point	0.00	0.00	6,298.0	594.4	-4,627.8	1,946,467.08	2,774,068.15	36.349232	-107.660225
Roadrunner 6A 7"/85° P: - plan hits target center - Point	0.00	0.00	6,319.7	501.8	-82.9	1,946,383.33	2,778,613.20	36.348978	-107.644792
Roadrunner 6A 7"/85° - plan misses target center by 68.9usft at 6784.4usft MD (6323.9 TVD, 503.7 N, -164.8 E) - Point	0.00	0.00	6,319.7	572.5	-163.3	1,946,453.88	2,778,532.67	36.349173	-107.645065

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
6,702.4	6,319.7	7"	0	0
320.0	320.0	9 5/8"	0	0

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,177.0	2,177.0	Kirtland		-0.34	270.00
2,565.0	2,565.0	Fruitland		-0.34	270.00
2,696.0	2,696.0	Pictured Cliffs		-0.34	270.00
3,135.0	3,135.0	Chacra		-0.34	270.00
4,274.7	4,269.0	Cliff House		-0.34	270.00
4,291.1	4,285.0	Meneffee		-0.34	270.00
5,047.6	5,001.0	Point Lookout		-0.34	270.00
5,255.5	5,196.0	Mancos		-0.34	270.00
6,266.3	6,130.0	Gallup		-0.34	270.00
6,600.5	6,302.0	Top Lower Gallup		-0.34	270.00

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
0.5	0.5	0.0	0.0	SH - 904' FNL, 336' FEL
3,633.5	3,633.5	0.0	0.0	KOP @ 3,633'
4,633.4	4,613.2	108.7	134.3	EOB @ 20° INC
5,700.0	5,615.5	338.2	417.7	Start 10° Build/Turn
6,702.4	6,319.7	501.8	-82.9	EOB @ 85° INC / Start 5° Build
6,702.4	6,319.7	501.8	-82.9	7" - 400' FNL, 420' FEL
6,809.1	6,324.0	504.2	-189.5	LP @ 6,324" TVD, 90.34°
11,256.0	6,298.0	608.3	-4,635.1	BHL - 330' FNL, 330' FWL
11,256.0	6,298.0	608.3	-4,635.1	TD @ 11,256' MD