State of New Mexico
Energy, Minerals and Natural Resources Department

Susana Martinez
Governor

David Martin
Cabinet Secretary

Brett F. Woods, Ph.D.
Deputy Cabinet Secretary

Jami Bailey, Division Director
Oil Conservation Division

New Mexico Oil Conservation Division approval and conditions listed below are made in accordance with OCD Rule 19.15.7.11 and are in addition to the actions approved by BLM on the following 3160-4 or 3160-5 form.

Operator Signature Date: 9/2/14
Well information:

API WELL #	Well Name	Well #	Operator Name	Type	Stat	County	Surf_Owner	UL	Sec	Twp	N/S	Rng	W/E	Feet	NS	Ft	EW
30-045-35553-00-00	Katie	1H	Logos Operating, LLC	O	N	San Juan	F	H	6	23	N	8	W	1687	N	291	E

Application Type:

☐ P&A ☒ Drilling/Casing Change ☒ Location Change

☐ Recomplete/DHC (For hydraulic fracturing operations review EPA Underground injection control Guidance #84)

☒ Other: Name change

Conditions of Approval:

Notify NMOCD 24hrs prior to beginning operations
Hold C-104 for as drilled plat, directional survey and NSL

(For hydraulic fracturing operations review EPA Underground injection control Guidance #84)

NMOCD Approved by Signature

9-4-14
Date

1220 South St. Francis Drive • Santa Fe, New Mexico 87505
Phone (505) 476-3460 • Fax (505) 476-3462 • www.emnrd.state.nm.us/ocd

Form 3160-5
(March 2012)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

AUG 28 2014

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

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to re-enter an abandoned well. Use Form 3160-3 (APD) for such proposals.

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

5. Lease Serial No.
NM 109399

6. If Indian, Allottee or Tribe Name

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

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

8. Well Name and No.
Katie 1H

2. Name of Operator
Logos Operating, LLC

9. API Well No.
30-045-35553

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

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

10. Field and Pool or Exploratory Area
Nageezi Gallup

4. Location of Well *(Footage, Sec., T.,R.,M., or Survey Description)*
1687' FNL, 291' FEL (SE/NE) Section 6, T23N, R8W, UL H
BHL: 330' FNL & 300' FWL (NW/NW) Section 6, T23N, R8W, UL D

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

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

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

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

Logos proposes to change the landing point and length to TD for the Katie 1H. The reason for the change is to minimize the drilling risk with reduced tangent and directional build for reservoir optimization. The intermediate cement job will be changed from a two stage to a one stage cement job and cement will be adjusted accordingly. Please see below:

RCVD SEP 3'14
OIL CONS. DIV.

Original Well Information:
LP in Sec 6, 330' FNL & 1176' FEL (6028' MD/5316' TVD)
BHL in Sec 6, 330' FNL & 300' FWL (9868' MD/5277' TVD)

New Well Information:
7" in Sec 6, 330' FNL & 985' FEL (6529' MD/5227' TVD)
LP in Sec 6, 330' FNL & 1073' FEL (6617' MD/5232' TVD)
BHL in Sec 6, 330' FNL & 300' FWL (10,559' MD/5271' TVD)

BLM'S APPROVAL OR ACCEPTANCE OF THIS ACTION DOES NOT RELIEVE THE LESSEE AND OPERATOR FROM OBTAINING ANY OTHER AUTHORIZATION REQUIRED FOR OPERATIONS ON FEDERAL AND INDIAN LANDS

Based on additional mapping from the surrounding area, Logos has slightly adjusted the formation tops.

DIST. 3

CONDITIONS OF APPROVAL

Adhere to previously issued stipulations

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

Title Operations Technician

Signature Tamra Sessions

Date 08/28/2014

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by William Tambekou

Title Petroleum Engineer

Date 9/2/2014

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

Office

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

(Instructions on page 2)

NMOCD

DISTRICT I
1625 N. French Dr., Hobbs, N.M. 88240
Phone: (575) 393-6161 Fax: (575) 393-0720

DISTRICT II
811 S. First St., Artesia, N.M. 88210
Phone: (575) 748-1283 Fax: (575) 748-9720

DISTRICT III
1000 Rio Brazos Rd., Aztec, N.M. 87410
Phone: (505) 334-6178 Fax: (505) 334-6170

DISTRICT IV
1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico
Energy, Minerals & Natural Resources Department

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

AUG 28 2014

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

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

1 API Number	2 Pool Code	3 Pool Name
30-045-35553	47540	NAGEEZI GALLUP

4 Property Code	5 Property Name	6 Well Number
313429	KATIE	001H

7 OGRID No.	8 Operator Name	9 Elevation
289408	LOGOS OPERATING, LLC	6929'

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
H	6	23-N	8-W		1687	NORTH	291	EAST	SAN JUAN

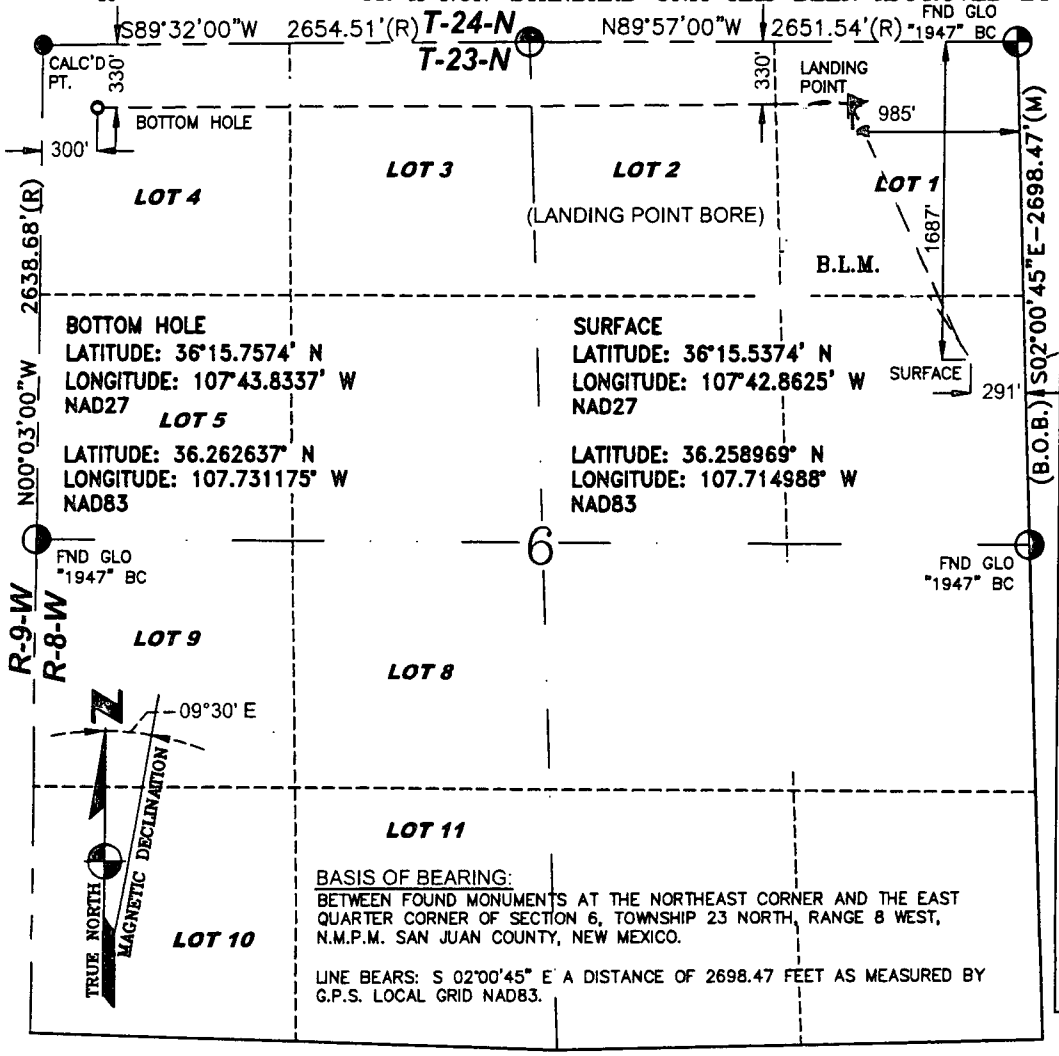
11 Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
D	6	23N	8-W		330	NORTH	300	WEST	SAN JUAN

12 Dedicated Acres	13 Joint or Infill	14 Consolidation Code	15 Order No.
Lots 1-4, 163.34 acres			RCVD SEP 3'14 OIL CONS. DIV.

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 DIST. 3

16



BASIS OF BEARING:
BETWEEN FOUND MONUMENTS AT THE NORTHEAST CORNER AND THE EAST QUARTER CORNER OF SECTION 6, TOWNSHIP 23 NORTH, RANGE 8 WEST, N.M.P.M. SAN JUAN COUNTY, NEW MEXICO.

LINE BEARS: S 02°00'45" E A DISTANCE OF 2698.47 FEET AS MEASURED BY G.P.S. LOCAL GRID 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.

Tamra Sessions 8-28-14
Signature Date

Tamra Sessions
Printed Name

tsessions@logosresourcesllc.com
E-mail Address

18 SURVEYOR CERTIFICATION

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

MARCH 12, 2014
Date of Survey

Signature and Seal of Professional Surveyor:

GLEN W. RUSSELL
NEW MEXICO
15703
LICENSED 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

KATIE #01H
Horizontal Gallup Oil and Gas Well
Surface Location: 1687' FNL – 291' FEL
Section 6, T23N, R8W
Ungraded GL Elev = 6929'
Estimate KB Elev =6944'
Lat. = 36.258969 deg N
Long. = 107.714988 deg W
NAD83
San Juan County, New Mexico

Proposed Bottom Hole Location: 330' FNL – 300' FWL
Section 6, T23N, R8W
San Juan County, New Mexico

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

- **ESTIMATED TOPS FOR IMPORTANT GEOLOGICAL FORMATIONS**

Formation Tops	Surface (TVD)
Ojo Alamo	1358
Kirtland	1404
Fruitland	1510
Pictured Cliffs	1620
Lewis	1740
Chacra	2000
Cliffs House	3106
Menefee	3157
Point Lookout	4067
Mancos	4257
Gallup	4937
Landing Point	5320
Total Depth	5277

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 4300' MD.

Trip out of hole and pick up 8 ¾" kick off assembly at 4300' MD. Build angle at 7.63 deg/100' to 80 degrees inclination and 359.95 degrees azimuth and then build 1 deg/100' from 6200' to 6529' in the Gallup formation at 5061' MD / 4937' TVD where 7" intermediate casing will be set at 6529' MD / 5227 TVD.
7" casing will be set in a legal position 330' FNL & 985' FEL in Section 6.
The 7" casing will be drilled out with a 6 1/8" drilling assembly building angle at 5 deg/100' to 89.42 degrees inclination and 269.68 degree azimuth to 6617' MD / 5232' TVD. Hold 89.42 degrees, 269.68 degrees azimuth and drill to a total depth at 10559' MD / 5271' TVD. Adjustments may be made to the directional program based on geology. Total depth will be 10559' MD / 5271' TVD – 89.42 degrees, 269.68 degrees Azimuth.
The Bottom hole location will be in a legal location at 10559' MD at 330' FNL & 300' FWL of section 6.
A total of 4030' of horizontal hole will be drilled.

- **ANTICIPATED DEPTHS OF PROSPECTIVE OIL GAS AND OTHER HYDROCARBONS**

  Primary objective is the Gallup formation encountered first at 4937' TVD at 7" casing point

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

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

- **PROPOSED BIT AND CASING PROGRAM**

  - Bit Program
    12 1/4" Surface Hole = Surface to 320'
    8 3/4" = 320' to 6529' = 7" Casing point
    6-1/8" Lateral = 6529' MD to 10559' MD = Gallup Pay Zone Horizontal

- 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' - 320'	New casing. Cement to surface.
7" (8 ¾")	23 ppf	J-55	LT&C	0' - 6529' MD	New Casing. Cement to surface with foam cement.
4 ½" (6 1/8")	11.6 ppf	P-110	LT&C	5100' - 10559' MD	New Casing - Horizontal Hole Cemented full length with foam cement - TOL at 60°.

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.

- **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

Stage 1

Fluid 1: Water Spacer

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

Fluid 2: Lead Slurry

HALCEM (TM) SYSTEM	Fluid Weight:	15.8 lbm/gal
94 lbm Premium Cement	Volume:	35.7 bbl
0.1250 lbm Poly-E-Flake	Slurry Yield:	1.174 ft3/sack
5.13 Gal FRESH WATER	Total Mixing Fluid:	5.13 Gal/sack
	Top Of Fluid:	0 ft
	Calculated Fill:	320 ft
	Calculated sack:	170.73 sack
	Proposed sack:	175 sack

Fluid 3: Water Based Spacer

Displacement	Fluid Density:	8.33 lbm/gal
	Volume :	24.7 bbl

Fluid #	Fluid Type	Fluid Name	Surface Density lbm/gal	Estimated Avg Rate	Downhole Volume
1	SPACER	Fresh Water	8.33		10 bbl
2	CEMENT	HalCem Primary	15.8		175 sack
3	SPACER	Displacement	8.33		24.7 bbl

Intermediate Casing – One Stage Stage Job (0-6529' 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:	219.8 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:	5929 ft
	Calculated sack:	603.38 sack
	Proposed sack:	620 sack
Fluid 5: Tail Slurry		
HALCEM (TM) SYSTEM	Fluid Weight:	13.5 lbm/gal
5.70 Gal FRESH WATER	Volume:	22.5 bbl
	Slurry Yield:	1.291 ft3/sack
	Total Mixing Fluid:	5.7 Gal/sack
	Top Of Fluid:	5929 ft
	Calculated Fill:	600 ft
	Calculated sack:	97.85 sack
	Proposed sack:	100 sack
Fluid 6: Water Based Spacer		
Displacement	Fluid Density:	8.4 lbm/gal
	Volume :	257 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

Stage 1

Fluid #	Fluid Type	Fluid Name	Surface Density lbm/gal	Estimated Avg Rate	Downhole Volume
1	SPACER	Fresh Water	8.33		10 bbl
2	SPACER	Chemical Wash	8.4		40 bbl
3	SPACER	Fresh Water	8.33		10 bbl
4	CEMENT	Foamed Lead Cement	13		620 sack
5	CEMENT	Unfoamed Tail	13.5		100 sack
6	SPACER	Displacement	8.4		257 bbl
7	CEMENT	Cap Cement	15.8		100 sack

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

Production Casing – Single Stage Job (5100' - 10559' 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.

Stage 1		
Fluid 1: Water Based Spacer		
KCL Spacer	Fluid Density:	8.4 lbm/gal
	Volume :	40 bbl
Fluid 2: Water Spacer		
Fresh Water	Fluid Density:	8.33 lbm/gal
	Volume :	10 bbl
Fluid 3: Rheologically Enhanced Spacer		
9 lb/gal Tuned Spacer III	Fluid Density:	9 lbm/gal
38.32 gal/bbl FRESH WATER	Volume :	40 bbl
1 gal/bbl SEM-7		
1 gal/bbl Musol(R) A		
45 gal/bbl BAROID 41 - 50 LB BAG		
Fluid 4: Water Spacer		
Fresh Water	Fluid Density:	8.33 lbm/gal
	Volume :	10 bbl
Fluid 5: Lead Slurry		
ELASTISEAL (TM) SYSTEM	Fluid Weight:	13 lbm/gal
6.91 Gal FRESH WATER	Volume:	11.9 bbl
	Slurry Yield:	1.457 ft3/sack
	Total Mixing Fluid:	6.91 Gal/sack
	Top Of Fluid:	4600 ft
	Calculated Fill:	500 ft
	Calculated sack:	45.86 sack
	Proposed sack:	50 sack
Fluid 6: Foamed		
ELASTISEAL (TM) SYSTEM	Fluid Weight:	13 lbm/gal
1.50 % CHEM - FOAMER 760. TOTETANK	Volume:	83.7 bbl
6.81 Gal FRESH WATER	Slurry Yield:	1.458 ft3/sack
	Total Mixing Fluid:	6.92 Gal/sack
	Top Of Fluid:	5100 ft
	Calculated Fill:	4309 ft
	Calculated sack:	235.32 sack
	Proposed sack:	260 sack
Fluid 7: Tail Slurry		

ELASTISEAL (TM) SYSTEM 5.72 Gal FRESH WATER	Fluid Weight: Volume: Slurry Yield: Total Mixing Fluid: Top Of Fluid: Calculated Fill: Calculated sack: Proposed sack:	13.5 lbm/gal 22.2 bbl 1.285 ft3/sack 5.72 Gal/sack 9409 ft 1150 ft 97 sack 100 sack
Fluid 8: Water Based Spacer MMCR Displacement 0.25 gal/bbl Micro Matrix Retarder	Fluid Density: Volume :	8.4 lbm/gal 40 bbl
Fluid 9: Water Based Spacer KCL Displacement	Fluid Density: Volume :	8.4 lbm/gal 20 bbl
Fluid 10: Water Spacer Fresh Water Displacement	Fluid Density: Volume :	8.3 lbm/gal 30 bbl
Fluid 11: Water Based Spacer KCL Displacement	Fluid Density: Volume :	8.4 lbm/gal 50.1 bbl

Stage 1

Fluid #	Fluid Type	Fluid Name	Surface Density lbm/gal	Estimated Avg Rate	Downhole Volume
1	SPACER	KCL Spacer	8.4		40 bbl
2	SPACER	Fresh Water	8.33		10 bbl
3	SPACER	9 lb/gal Tuned Spacer III	9		40 bbl
4	SPACER	Fresh Water	8.33		10 bbl
5	CEMENT	Unfoamed Lead	13		50 sack
6	CEMENT	Foamed Cement	13		260 sack
7	CEMENT	Unfoamed Tail	13.5		100 sack
8	SPACER	MMCR Displacement	8.4		40 bbl
9	SPACER	KCL Displacement	8.4		20 bbl
10	SPACER	Fresh Water Displacement	8.3		30 bbl
11	SPACER	KCL Displacement	8.4		50.1 bbl

Foam Output Parameter Summary:

Stage 1

Foam Calculation Method : Constant Density
Annulus Back Pressure : 20 psig
Bottom Hole Circulating Temp : 145degF
Mud Outlet Temperature : 100degF

Calculated Gas : 21877.7 scf
Additional Gas : 50000 scf
Total Gas : 71877.7 scf

Fluid #	Fluid Name	Unfoamed Liquid Volume (bbl)	Beginning Density (lbm/gal)	Ending Density (lbm/gal)	Beginning Rate (scf/bbl)	Ending Rate (scf/bbl)
3	9 lb/gal Tuned Spacer III	44.9	10		-35.12	-35.9
6	Foamed Cement	4.5	10		275.27	278.06
6	Foamed Cement	16.3	10		288.48	292.75
6	Foamed Cement	40.3	10		358.58	362.69

Foam Output Parameter Summary:

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

Foam Design Specifications:

Foam Calculation Method: Constant Density
Backpressure: 14 psig
Bottom Hole Circulating Temp: 158 degF
Mud Outlet Temperature: 100 degF

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

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

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

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

- **PROPOSED DRILLING FLUIDS PROGRAM**
  - 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'-4300'	Fresh Water LSND	8.5-8.8	40-50	8-10

  - Kick off to Horizontal Lateral:

Hole Size (in)	MD (ft)	Mud Type	Density (lb/gal)	Viscosity (sec/qt)	Fluid Loss (CC)	
8 3/4"	4300' MD (KOP)-6609' MD	Fresh Water LSND	8.5-8.8	40-50	8-10	
6 1/8"	6609' MD - 10559' 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 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.

- **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

- **ABNORMAL PRESSURES & HYDROGEN SULFIDE**

  The anticipated bottom hole pressure is +/- 2448 psi based on a 9.0 ppg at 5231' 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.

- **ANTICIPATED START DATE AND DURATION OF OPERATIONS**

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

It is anticipated that the drilling of this well will take approximately 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, Hand I of 19.15.17.13 NMAC.

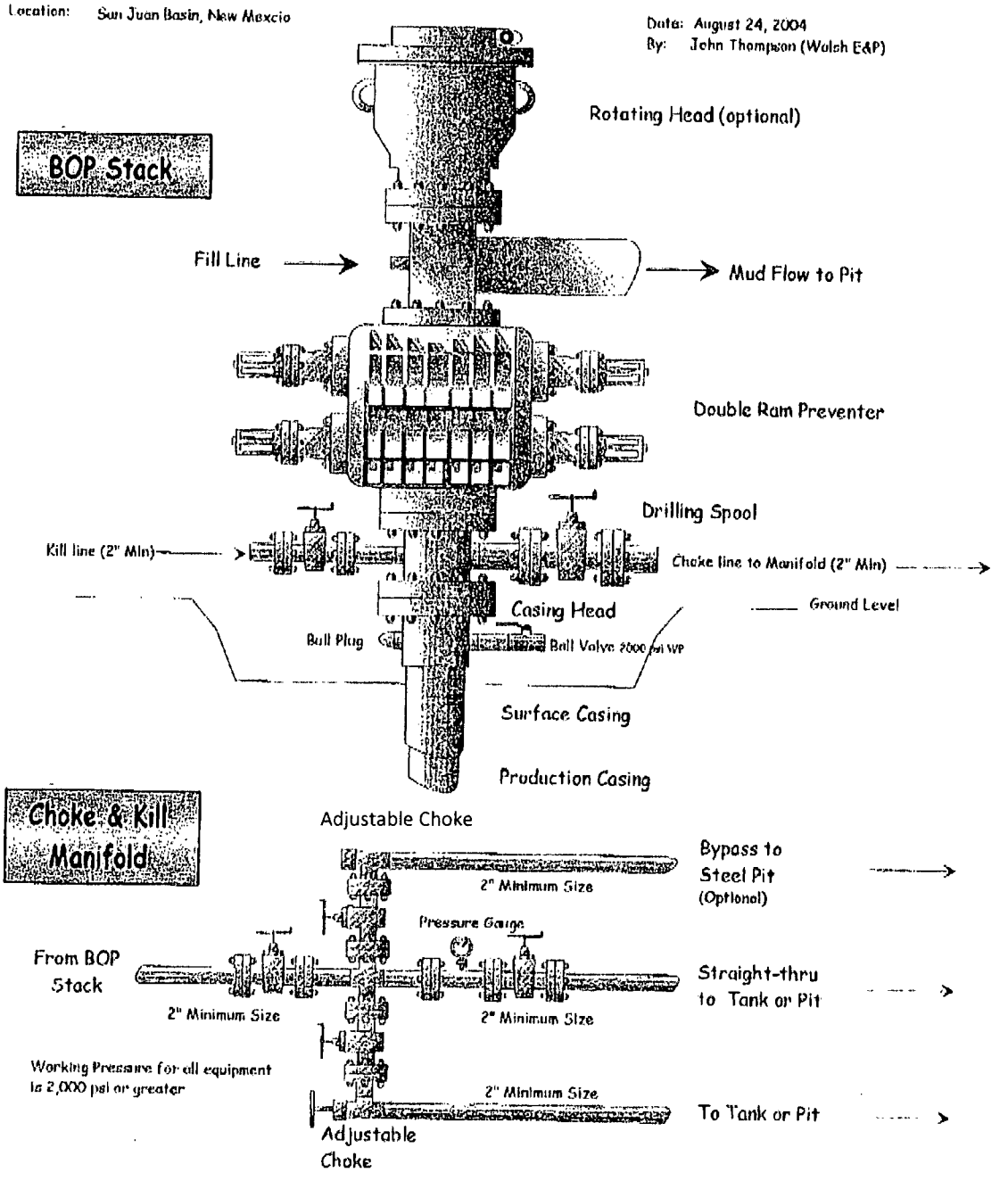
Well Control Equipment Schematic for 2M Service

Attachment to Drilling Technical Program

Exhibit #1
Typical BOP setup

Location: San Juan Basin, New Mexcio

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



LOGOS RESOURCES LLC

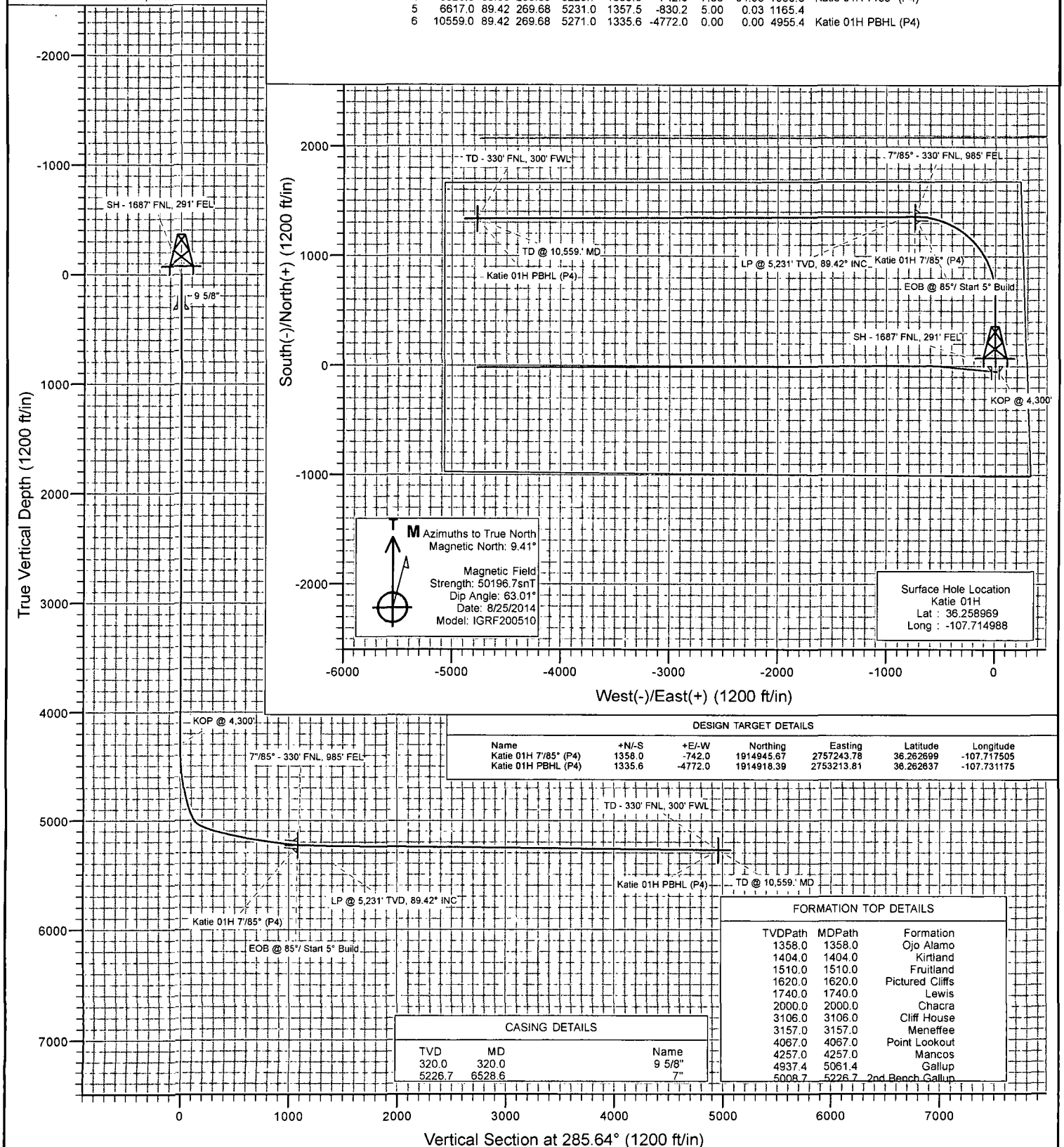
Project: San Juan County, NM
Site: S6--T23N-R8W (Katie Pad)
Well: Katie 01H
Wellbore: HZ
Design: Plan #6

CATHEDRAL

Plan #6
Katie 01H
145280/27537; SC
KB=15' @ 6944.0ft
Ground Elevation @ 6929.0
North American Datum 1983
Well Katie 01H, 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	4300.0	0.00	0.00	4300.0	0.0	0.0	0.00	0.00	0.0	
3	5356.5	80.62	359.95	5040.8	628.5	-0.6	7.63	359.95	169.9	
4	6528.6	85.00	269.68	5226.7	1358.0	-742.0	7.63	-94.98	1080.6	Katie 01H 7'/85° (P4)
5	6617.0	89.42	269.68	5231.0	1357.5	-830.2	5.00	0.03	1165.4	
6	10559.0	89.42	269.68	5271.0	1335.6	-4772.0	0.00	0.00	4955.4	Katie 01H PBHL (P4)



DESIGN TARGET DETAILS

Name	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Katie 01H 7'/85° (P4)	1358.0	-742.0	1914945.67	2757243.78	36.262699	-107.717505
Katie 01H PBHL (P4)	1335.6	-4772.0	1914918.39	2753213.81	36.262637	-107.731175

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
1358.0	1358.0	Ojo Alamo
1404.0	1404.0	Kirtland
1510.0	1510.0	Fruitland
1620.0	1620.0	Pictured Cliffs
1740.0	1740.0	Lewis
2000.0	2000.0	Chacra
3106.0	3106.0	Cliff House
3157.0	3157.0	Meneffee
4067.0	4067.0	Point Lookout
4257.0	4257.0	Mancos
4937.4	5061.4	Gallup
5008.7	5226.7	2nd Bench Gallup

CASING DETAILS

TVD	MD	Name
320.0	320.0	9 5/8"
5226.7	6528.6	7"

Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	**Local Co-ordinate Reference:**	Well Katie 01H
Company:	LOGOS Operating LLC	**TVD Reference:**	KB=15' @ 6944.0ft
Project:	San Juan County, NM	**MD Reference:**	KB=15' @ 6944.0ft
Site:	S6--T23N-R8W (Katie Pad)	**North Reference:**	True
Well:	Katie 01H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	HZ		
Design:	Plan #6		

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 S6--T23N-R8W (Katie Pad)

Site Position:		**Northing:**	1,913,588.57 ft	**Latitude:**	36.258969
From:	Lat/Long	**Easting:**	2,757,987.44 ft	**Longitude:**	-107.714988
Position Uncertainty:	0.0 ft	**Slot Radius:**	13.200 in	**Grid Convergence:**	0.07 °

Well Katie 01H

Well Position	**+N/-S**	0.0 ft	**Northing:**	1,913,588.57 ft	**Latitude:**	36.258969
	+E/-W	0.0 ft	**Easting:**	2,757,987.44 ft	**Longitude:**	-107.714988
Position Uncertainty		0.0 ft	**Wellhead Elevation:**	0.0 ft	**Ground Level:**	6,929.0 ft

Wellbore HZ

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	8/25/2014	9.41	63.01	50,197

Design Plan #6

Audit Notes:

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

Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.0	0.0	0.0	285.64

Plan Sections

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
4,300.0	0.00	0.00	4,300.0	0.0	0.0	0.00	0.00	0.00	0.00	
5,356.5	80.62	359.95	5,040.8	628.5	-0.6	7.63	7.63	0.00	359.95	
6,528.6	85.00	269.68	5,226.7	1,358.0	-742.0	7.63	0.37	-7.70	-94.98	Katie 01H 7'/85° (P4)
6,617.0	89.42	269.68	5,231.0	1,357.5	-830.2	5.00	5.00	0.00	0.03	
10,559.0	89.42	269.68	5,271.0	1,335.6	-4,772.0	0.00	0.00	0.00	0.00	Katie 01H PBHL (P4)

Database:	USA EDM 5000 Multi Users DB	**Local Co-ordinate Reference:**	Well Katie 01H
Company:	LOGOS Operating LLC	**TVD Reference:**	KB=15' @ 6944.0ft
Project:	San Juan County, NM	**MD Reference:**	KB=15' @ 6944.0ft
Site:	S6--T23N-R8W (Katie Pad)	**North Reference:**	True
Well:	Katie 01H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	HZ		
Design:	Plan #6		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Comments / Formations
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	
0.5	0.00	0.00	0.5	0.0	0.0	0.0	0.00	0.00	SH - 1687' FNL, 291' FEL
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	
320.0	0.00	0.00	320.0	0.0	0.0	0.0	0.00	0.00	9 5/8"
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	
1,100.0	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	
1,358.0	0.00	0.00	1,358.0	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	
1,404.0	0.00	0.00	1,404.0	0.0	0.0	0.0	0.00	0.00	Kirtland
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	
1,510.0	0.00	0.00	1,510.0	0.0	0.0	0.0	0.00	0.00	Fruitland
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	
1,620.0	0.00	0.00	1,620.0	0.0	0.0	0.0	0.00	0.00	Pictured Cliffs
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	0.00	
1,740.0	0.00	0.00	1,740.0	0.0	0.0	0.0	0.00	0.00	Lewis
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	Chacra
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	
2,400.0	0.00	0.00	2,400.0	0.0	0.0	0.0	0.00	0.00	
2,500.0	0.00	0.00	2,500.0	0.0	0.0	0.0	0.00	0.00	
2,600.0	0.00	0.00	2,600.0	0.0	0.0	0.0	0.00	0.00	
2,700.0	0.00	0.00	2,700.0	0.0	0.0	0.0	0.00	0.00	
2,800.0	0.00	0.00	2,800.0	0.0	0.0	0.0	0.00	0.00	
2,900.0	0.00	0.00	2,900.0	0.0	0.0	0.0	0.00	0.00	
3,000.0	0.00	0.00	3,000.0	0.0	0.0	0.0	0.00	0.00	
3,100.0	0.00	0.00	3,100.0	0.0	0.0	0.0	0.00	0.00	
3,106.0	0.00	0.00	3,106.0	0.0	0.0	0.0	0.00	0.00	Cliff House
3,157.0	0.00	0.00	3,157.0	0.0	0.0	0.0	0.00	0.00	Meneffee
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	
3,700.0	0.00	0.00	3,700.0	0.0	0.0	0.0	0.00	0.00	
3,800.0	0.00	0.00	3,800.0	0.0	0.0	0.0	0.00	0.00	
3,900.0	0.00	0.00	3,900.0	0.0	0.0	0.0	0.00	0.00	
4,000.0	0.00	0.00	4,000.0	0.0	0.0	0.0	0.00	0.00	
4,067.0	0.00	0.00	4,067.0	0.0	0.0	0.0	0.00	0.00	Point Lookout
4,100.0	0.00	0.00	4,100.0	0.0	0.0	0.0	0.00	0.00	

Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	**Local Co-ordinate Reference:**	Well Katie 01H
Company:	LOGOS Operating LLC	**TVD Reference:**	KB=15' @ 6944.0ft
Project:	San Juan County, NM	**MD Reference:**	KB=15' @ 6944.0ft
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Well:	Katie 01H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	HZ		
Design:	Plan #6		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Comments / Formations
4,200.0	0.00	0.00	4,200.0	0.0	0.0	0.0	0.00	0.00	
4,257.0	0.00	0.00	4,257.0	0.0	0.0	0.0	0.00	0.00	Mancos
4,300.0	0.00	0.00	4,300.0	0.0	0.0	0.0	0.00	0.00	KOP @ 4,300'
4,350.0	3.82	359.95	4,350.0	1.7	0.0	0.4	7.63	7.63	
4,400.0	7.63	359.95	4,399.7	6.6	0.0	1.8	7.63	7.63	
4,450.0	11.45	359.95	4,449.0	14.9	0.0	4.0	7.63	7.63	
4,500.0	15.26	359.95	4,497.6	26.5	0.0	7.2	7.63	7.63	
4,550.0	19.08	359.95	4,545.4	41.2	0.0	11.2	7.63	7.63	
4,600.0	22.89	359.95	4,592.1	59.1	-0.1	16.0	7.63	7.63	
4,650.0	26.71	359.95	4,637.5	80.1	-0.1	21.7	7.63	7.63	
4,700.0	30.53	359.95	4,681.3	104.1	-0.1	28.1	7.63	7.63	
4,750.0	34.34	359.95	4,723.5	130.9	-0.1	35.4	7.63	7.63	
4,800.0	38.16	359.95	4,763.9	160.4	-0.1	43.4	7.63	7.63	
4,850.0	41.97	359.95	4,802.1	192.6	-0.2	52.1	7.63	7.63	
4,900.0	45.79	359.95	4,838.1	227.3	-0.2	61.5	7.63	7.63	
4,950.0	49.60	359.95	4,871.8	264.2	-0.2	71.4	7.63	7.63	
5,000.0	53.42	359.95	4,902.9	303.4	-0.3	82.0	7.63	7.63	
5,050.0	57.24	359.95	4,931.3	344.5	-0.3	93.1	7.63	7.63	
5,061.4	58.10	359.95	4,937.4	354.1	-0.3	95.7	7.63	7.63	Gallup
5,100.0	61.05	359.95	4,957.0	387.4	-0.4	104.8	7.63	7.63	
5,150.0	64.87	359.95	4,979.7	431.9	-0.4	116.8	7.63	7.63	
5,200.0	68.68	359.95	4,999.4	477.8	-0.4	129.2	7.63	7.63	
5,226.7	70.72	359.95	5,008.7	502.9	-0.5	136.0	7.63	7.63	2nd Bench Gallup
5,250.0	72.50	359.95	5,016.0	525.0	-0.5	142.0	7.63	7.63	
5,300.0	76.31	359.95	5,029.5	573.1	-0.5	155.0	7.63	7.63	
5,350.0	80.13	359.95	5,039.7	622.1	-0.6	168.2	7.63	7.63	
5,356.5	80.62	359.95	5,040.8	628.5	-0.6	169.9	7.63	7.63	
5,400.0	80.35	356.59	5,048.0	671.4	-1.9	182.8	7.63	-0.63	
5,450.0	80.08	352.73	5,056.5	720.4	-6.5	200.4	7.63	-0.55	
5,500.0	79.85	348.86	5,065.2	769.0	-14.3	221.1	7.63	-0.46	
5,550.0	79.67	344.99	5,074.1	816.9	-25.5	244.7	7.63	-0.37	
5,600.0	79.53	341.11	5,083.1	864.0	-39.8	271.2	7.63	-0.27	
5,650.0	79.44	337.23	5,092.2	909.9	-57.3	300.4	7.63	-0.18	
5,700.0	79.40	333.35	5,101.4	954.5	-77.8	332.2	7.63	-0.08	
5,750.0	79.40	329.47	5,110.6	997.7	-101.3	366.5	7.63	0.01	
5,800.0	79.46	325.59	5,119.8	1,039.1	-127.7	403.1	7.63	0.11	
5,850.0	79.56	321.71	5,128.9	1,078.7	-156.8	441.8	7.63	0.20	
5,900.0	79.70	317.83	5,137.9	1,116.3	-188.6	482.5	7.63	0.29	
5,950.0	79.90	313.96	5,146.7	1,151.6	-222.8	525.0	7.63	0.39	
6,000.0	80.13	310.09	5,155.4	1,184.6	-259.4	569.1	7.63	0.48	
6,050.0	80.42	306.23	5,163.9	1,215.0	-298.2	614.6	7.63	0.56	
6,100.0	80.74	302.38	5,172.1	1,242.8	-338.9	661.3	7.63	0.65	
6,150.0	81.11	298.53	5,179.9	1,267.8	-381.5	709.1	7.63	0.73	
6,200.0	81.51	294.69	5,187.5	1,289.9	-425.6	757.6	7.63	0.81	
6,250.0	81.95	290.86	5,194.7	1,309.1	-471.2	806.7	7.63	0.88	
6,300.0	82.43	287.04	5,201.5	1,325.2	-518.1	856.1	7.63	0.96	
6,350.0	82.94	283.23	5,207.9	1,338.1	-566.0	905.7	7.63	1.02	
6,400.0	83.48	279.42	5,213.8	1,347.9	-614.6	955.2	7.63	1.08	
6,450.0	84.05	275.63	5,219.2	1,354.4	-663.9	1,004.4	7.63	1.14	
6,500.0	84.65	271.84	5,224.1	1,357.6	-713.5	1,053.1	7.63	1.19	
6,528.6	85.00	269.68	5,226.7	1,358.0	-742.0	1,080.6	7.62	1.23	EOB @ 85°/ Start 5° Build - 7"/85° - 330' FNL, 9
6,600.0	88.57	269.68	5,230.7	1,357.6	-813.3	1,149.1	5.00	5.00	

Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	**Local Co-ordinate Reference:**	Well Katie 01H
Company:	LOGOS Operating LLC	**TVD Reference:**	KB=15' @ 6944.0ft
Project:	San Juan County, NM	**MD Reference:**	KB=15' @ 6944.0ft
Site:	S6--T23N-R8W (Katie Pad)	**North Reference:**	True
Well:	Katie 01H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	HZ		
Design:	Plan #6		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Comments / Formations
6,616.9	89.42	269.68	5,231.0	1,357.5	-830.2	1,165.4	5.00	5.00	LP @ 5,231' TVD, 89.42° INC
6,700.0	89.42	269.68	5,231.9	1,357.1	-913.3	1,245.3	0.00	0.00	
6,800.0	89.42	269.68	5,232.9	1,356.5	-1,013.3	1,341.4	0.00	0.00	
6,900.0	89.42	269.68	5,233.9	1,355.9	-1,113.3	1,437.5	0.00	0.00	
7,000.0	89.42	269.68	5,234.9	1,355.4	-1,213.3	1,533.7	0.00	0.00	
7,100.0	89.42	269.68	5,235.9	1,354.8	-1,313.3	1,629.8	0.00	0.00	
7,200.0	89.42	269.68	5,236.9	1,354.3	-1,413.2	1,726.0	0.00	0.00	
7,300.0	89.42	269.68	5,237.9	1,353.7	-1,513.2	1,822.1	0.00	0.00	
7,400.0	89.42	269.68	5,239.0	1,353.2	-1,613.2	1,918.3	0.00	0.00	
7,500.0	89.42	269.68	5,240.0	1,352.6	-1,713.2	2,014.4	0.00	0.00	
7,600.0	89.42	269.68	5,241.0	1,352.1	-1,813.2	2,110.5	0.00	0.00	
7,700.0	89.42	269.68	5,242.0	1,351.5	-1,913.2	2,206.7	0.00	0.00	
7,800.0	89.42	269.68	5,243.0	1,350.9	-2,013.2	2,302.8	0.00	0.00	
7,900.0	89.42	269.68	5,244.0	1,350.4	-2,113.2	2,399.0	0.00	0.00	
8,000.0	89.42	269.68	5,245.0	1,349.8	-2,213.2	2,495.1	0.00	0.00	
8,100.0	89.42	269.68	5,246.1	1,349.3	-2,313.2	2,591.3	0.00	0.00	
8,200.0	89.42	269.68	5,247.1	1,348.7	-2,413.2	2,687.4	0.00	0.00	
8,300.0	89.42	269.68	5,248.1	1,348.2	-2,513.2	2,783.5	0.00	0.00	
8,400.0	89.42	269.68	5,249.1	1,347.6	-2,613.2	2,879.7	0.00	0.00	
8,500.0	89.42	269.68	5,250.1	1,347.1	-2,713.2	2,975.8	0.00	0.00	
8,600.0	89.42	269.68	5,251.1	1,346.5	-2,813.2	3,072.0	0.00	0.00	
8,700.0	89.42	269.68	5,252.1	1,346.0	-2,913.1	3,168.1	0.00	0.00	
8,800.0	89.42	269.68	5,253.2	1,345.4	-3,013.1	3,264.3	0.00	0.00	
8,900.0	89.42	269.68	5,254.2	1,344.8	-3,113.1	3,360.4	0.00	0.00	
9,000.0	89.42	269.68	5,255.2	1,344.3	-3,213.1	3,456.5	0.00	0.00	
9,100.0	89.42	269.68	5,256.2	1,343.7	-3,313.1	3,552.7	0.00	0.00	
9,200.0	89.42	269.68	5,257.2	1,343.2	-3,413.1	3,648.8	0.00	0.00	
9,300.0	89.42	269.68	5,258.2	1,342.6	-3,513.1	3,745.0	0.00	0.00	
9,400.0	89.42	269.68	5,259.3	1,342.1	-3,613.1	3,841.1	0.00	0.00	
9,500.0	89.42	269.68	5,260.3	1,341.5	-3,713.1	3,937.3	0.00	0.00	
9,600.0	89.42	269.68	5,261.3	1,341.0	-3,813.1	4,033.4	0.00	0.00	
9,700.0	89.42	269.68	5,262.3	1,340.4	-3,913.1	4,129.5	0.00	0.00	
9,800.0	89.42	269.68	5,263.3	1,339.9	-4,013.1	4,225.7	0.00	0.00	
9,900.0	89.42	269.68	5,264.3	1,339.3	-4,113.1	4,321.8	0.00	0.00	
10,000.0	89.42	269.68	5,265.3	1,338.7	-4,213.1	4,418.0	0.00	0.00	
10,100.0	89.42	269.68	5,266.4	1,338.2	-4,313.1	4,514.1	0.00	0.00	
10,200.0	89.42	269.68	5,267.4	1,337.6	-4,413.0	4,610.3	0.00	0.00	
10,300.0	89.42	269.68	5,268.4	1,337.1	-4,513.0	4,706.4	0.00	0.00	
10,400.0	89.42	269.68	5,269.4	1,336.5	-4,613.0	4,802.5	0.00	0.00	
10,500.0	89.42	269.68	5,270.4	1,336.0	-4,713.0	4,898.7	0.00	0.00	
10,559.0	89.42	269.68	5,271.0	1,335.6	-4,772.0	4,955.4	0.00	0.00	TD - 330' FNL, 300' FWL - TD @ 10,559.' MD

Database:	USA EDM 5000 Multi Users DB	**Local Co-ordinate Reference:**	Well Katie 01H
Company:	LOGOS Operating LLC	**TVD Reference:**	KB=15' @ 6944.0ft
Project:	San Juan County, NM	**MD Reference:**	KB=15' @ 6944.0ft
Site:	S6--T23N-R8W (Katie Pad)	**North Reference:**	True
Well:	Katie 01H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	HZ		
Design:	Plan #6		

Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Katie 01H 7'/85°	0.00	0.00	5,226.7	1,357.1	-932.5	1,914,944.53	2,757,053.32	36.262697	-107.718151
- plan misses target center by 5.3ft at 6719.1ft MD (5232.0 TVD, 1356.9 N, -932.4 E)									
- Point									
Katie 01H 7'/85° (LG)	0.00	0.00	5,315.7	1,357.1	-932.5	1,914,944.53	2,757,053.32	36.262697	-107.718151
- plan misses target center by 83.7ft at 6720.0ft MD (5232.1 TVD, 1356.9 N, -933.3 E)									
- Point									
Katie 01H PBHL (P5)	0.00	0.00	5,277.0	1,335.6	-4,772.0	1,914,918.39	2,753,213.81	36.262637	-107.731175
- plan misses target center by 6.0ft at 10559.0ft MD (5271.0 TVD, 1335.6 N, -4772.0 E)									
- Point									
Katie 01H 7'/85° (P4)	0.00	0.00	5,226.7	1,358.0	-742.0	1,914,945.67	2,757,243.78	36.262699	-107.717505
- plan hits target center									
- Point									
Katie 02H PBHL	0.00	0.00	5,271.0	-18.5	-4,770.5	1,913,564.22	2,753,217.01	36.258917	-107.731169
- plan misses target center by 1354.2ft at 10559.0ft MD (5271.0 TVD, 1335.6 N, -4772.0 E)									
- Point									
Katie 01H PBHL	0.00	0.00	5,271.0	1,335.6	-4,772.0	1,914,918.39	2,753,213.81	36.262637	-107.731175
- plan hits target center									
- Point									
Katie 01H PBHL (LG)	0.00	0.00	5,277.0	1,335.6	-4,772.0	1,914,918.39	2,753,213.81	36.262637	-107.731175
- plan misses target center by 6.0ft at 10559.0ft MD (5271.0 TVD, 1335.6 N, -4772.0 E)									
- Point									
Katie 01H 7'/85° (P5)	0.00	0.00	5,312.7	1,358.0	-742.0	1,914,945.67	2,757,243.78	36.262699	-107.717505
- plan misses target center by 85.7ft at 6533.4ft MD (5227.1 TVD, 1358.0 N, -746.8 E)									
- Point									
Katie 01H PBHL (P4)	0.00	0.00	5,271.0	1,335.6	-4,772.0	1,914,918.39	2,753,213.81	36.262637	-107.731175
- plan hits target center									
- Point									
Katie 02H 7'/85°	0.00	0.00	5,226.7	0.7	-899.2	1,913,588.22	2,757,088.25	36.258971	-107.718038
- plan misses target center by 1001.5ft at 4965.3ft MD (4881.6 TVD, 276.0 N, -0.3 E)									
- Point									

Casing Points

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (in)	Hole Diameter (in)
320.0	320.0	9 5/8"	0.000	0.000
6,528.6	5,226.7	7"	0.000	0.000

Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	**Local Co-ordinate Reference:**	Well Katie 01H
Company:	LOGOS Operating LLC	**TVD Reference:**	KB=15' @ 6944.0ft
Project:	San Juan County, NM	**MD Reference:**	KB=15' @ 6944.0ft
Site:	S6--T23N-R8W (Katie Pad)	**North Reference:**	True
Well:	Katie 01H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	HZ		
Design:	Plan #6		

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,358.0	1,358.0	Ojo Alamo		89.42	269.68
1,404.0	1,404.0	Kirtland		89.42	269.68
1,510.0	1,510.0	Fruitland		89.42	269.68
1,620.0	1,620.0	Pictured Cliffs		89.42	269.68
1,740.0	1,740.0	Lewis		89.42	269.68
2,000.0	2,000.0	Chacra		89.42	269.68
3,106.0	3,106.0	Cliff House		89.42	269.68
3,157.0	3,157.0	Meneffee		89.42	269.68
4,067.0	4,067.0	Point Lookout		89.42	269.68
4,257.0	4,257.0	Mancos		89.42	269.68
5,061.4	5,101.0	Gallup		89.42	269.68
5,226.7	5,241.0	2nd Bench Gallup		89.42	269.68

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	Local Coordinates +E/-W (ft)	Comment
0.5	0.5	0.0	0.0	SH - 1687' FNL, 291' FEL
4,300.0	4,300.0	0.0	0.0	KOP @ 4,300'
6,528.6	5,226.7	1,358.0	-742.0	EOB @ 85°/ Start 5° Build
6,528.6	5,226.7	1,358.0	-742.0	7"/85° - 330' FNL, 985' FEL
6,616.9	5,231.0	1,357.5	-830.2	LP @ 5,231' TVD, 89.42° INC
10,559.0	5,271.0	1,335.6	-4,772.0	TD - 330' FNL, 300' FWL
10,559.0	5,271.0	1,335.6	-4,772.0	TD @ 10,559.' MD

LOGOS Operating LLC

San Juan County, NM
S6--T23N-R8W (Katie Pad)
Katie 01H
HZ
Plan #6

Anticollision Report

25 August, 2014

Cathedral Energy Services

Anticollision Report

Company:	LOGOS Operating LLC	**Local Co-ordinate Reference:**	Well Katie 01H
Project:	San Juan County, NM	**TVD Reference:**	KB=15' @ 6944.0ft
Reference Site:	S6--T23N-R8W (Katie Pad)	**MD Reference:**	KB=15' @ 6944.0ft
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Katie 01H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	HZ	**Database:**	USA EDM 5000 Multi Users DB
Reference Design:	Plan #6	**Offset TVD Reference:**	Offset Datum

Reference Plan #6

Filter type:	GLOBAL FILTER APPLIED: All wellpaths within 200'+ 100/1000 of reference		
Interpolation Method:	MD Interval 100.0ft	**Error Model:**	ISCWSA
Depth Range:	Unlimited	**Scan Method:**	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 500.0ft	**Error Surface:**	Elliptical Conic
Warning Levels Evaluated at:	2.00 **Sigma**		

Survey Tool Program **Date** 8/25/2014

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.0	10,559.0	Plan #6 (HZ)	Geolink MWD	Geolink MWD

Summary

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
S32-T24N-R8W (Escrito)						
Escrito M32-2408 01H - Hz - Plan #2						Out of range
S6--T23N-R8W (Katie Pad)						
Katie 02H - HZ - Plan #4	4,300.0	4,300.0	53.0	38.0	3.541	CC, ES, SF

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

Cathedral Energy Services

Anticollision Report

Company:	LOGOS Operating LLC	**Local Co-ordinate Reference:**	Well Katie 01H
Project:	San Juan County, NM	**TVD Reference:**	KB=15' @ 6944.0ft
Reference Site:	S6--T23N-R8W (Katie Pad)	**MD Reference:**	KB=15' @ 6944.0ft
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Katie 01H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	HZ	**Database:**	USA EDM 5000 Multi Users DB
Reference Design:	Plan #6	**Offset TVD Reference:**	Offset Datum

Offset Design S6--T23N-R8W (Katie Pad) - Katie 02H - HZ - Plan #4 — Offset Site Error: 0.0 ft

Survey Program: 0-Geolink MWD — Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Total Uncertainty Axis	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	161.50	-50.2	16.8	53.0				
100.0	100.0	100.0	100.0	0.1	0.1	161.50	-50.2	16.8	53.0	52.7	0.30	178.532	
200.0	200.0	200.0	200.0	0.3	0.3	161.50	-50.2	16.8	53.0	52.3	0.65	82.028	
300.0	300.0	300.0	300.0	0.5	0.5	161.50	-50.2	16.8	53.0	52.0	0.99	53.246	
400.0	400.0	400.0	400.0	0.7	0.7	161.50	-50.2	16.8	53.0	51.6	1.34	39.416	
500.0	500.0	500.0	500.0	0.8	0.8	161.50	-50.2	16.8	53.0	51.3	1.69	31.289	
600.0	600.0	600.0	600.0	1.0	1.0	161.50	-50.2	16.8	53.0	50.9	2.04	25.941	
700.0	700.0	700.0	700.0	1.2	1.2	161.50	-50.2	16.8	53.0	50.6	2.39	22.154	
800.0	800.0	800.0	800.0	1.4	1.4	161.50	-50.2	16.8	53.0	50.2	2.74	19.332	
900.0	900.0	900.0	900.0	1.5	1.5	161.50	-50.2	16.8	53.0	49.9	3.09	17.147	
1,000.0	1,000.0	1,000.0	1,000.0	1.7	1.7	161.50	-50.2	16.8	53.0	49.5	3.44	15.406	
1,100.0	1,100.0	1,100.0	1,100.0	1.9	1.9	161.50	-50.2	16.8	53.0	49.2	3.79	13.986	
1,200.0	1,200.0	1,200.0	1,200.0	2.1	2.1	161.50	-50.2	16.8	53.0	48.8	4.14	12.806	
1,300.0	1,300.0	1,300.0	1,300.0	2.2	2.2	161.50	-50.2	16.8	53.0	48.5	4.49	11.810	
1,400.0	1,400.0	1,400.0	1,400.0	2.4	2.4	161.50	-50.2	16.8	53.0	48.1	4.83	10.957	
1,500.0	1,500.0	1,500.0	1,500.0	2.6	2.6	161.50	-50.2	16.8	53.0	47.8	5.18	10.219	
1,600.0	1,600.0	1,600.0	1,600.0	2.8	2.8	161.50	-50.2	16.8	53.0	47.4	5.53	9.574	
1,700.0	1,700.0	1,700.0	1,700.0	2.9	2.9	161.50	-50.2	16.8	53.0	47.1	5.88	9.006	
1,800.0	1,800.0	1,800.0	1,800.0	3.1	3.1	161.50	-50.2	16.8	53.0	46.7	6.23	8.502	
1,900.0	1,900.0	1,900.0	1,900.0	3.3	3.3	161.50	-50.2	16.8	53.0	46.4	6.58	8.051	
2,000.0	2,000.0	2,000.0	2,000.0	3.5	3.5	161.50	-50.2	16.8	53.0	46.0	6.93	7.645	
2,100.0	2,100.0	2,100.0	2,100.0	3.6	3.6	161.50	-50.2	16.8	53.0	45.7	7.28	7.278	
2,200.0	2,200.0	2,200.0	2,200.0	3.8	3.8	161.50	-50.2	16.8	53.0	45.3	7.63	6.945	
2,300.0	2,300.0	2,300.0	2,300.0	4.0	4.0	161.50	-50.2	16.8	53.0	45.0	7.98	6.641	
2,400.0	2,400.0	2,400.0	2,400.0	4.2	4.2	161.50	-50.2	16.8	53.0	44.6	8.33	6.363	
2,500.0	2,500.0	2,500.0	2,500.0	4.3	4.3	161.50	-50.2	16.8	53.0	44.3	8.67	6.107	
2,600.0	2,600.0	2,600.0	2,600.0	4.5	4.5	161.50	-50.2	16.8	53.0	43.9	9.02	5.871	
2,700.0	2,700.0	2,700.0	2,700.0	4.7	4.7	161.50	-50.2	16.8	53.0	43.6	9.37	5.652	
2,800.0	2,800.0	2,800.0	2,800.0	4.9	4.9	161.50	-50.2	16.8	53.0	43.3	9.72	5.449	
2,900.0	2,900.0	2,900.0	2,900.0	5.0	5.0	161.50	-50.2	16.8	53.0	42.9	10.07	5.260	
3,000.0	3,000.0	3,000.0	3,000.0	5.2	5.2	161.50	-50.2	16.8	53.0	42.6	10.42	5.084	
3,100.0	3,100.0	3,100.0	3,100.0	5.4	5.4	161.50	-50.2	16.8	53.0	42.2	10.77	4.919	
3,200.0	3,200.0	3,200.0	3,200.0	5.6	5.6	161.50	-50.2	16.8	53.0	41.9	11.12	4.765	
3,300.0	3,300.0	3,300.0	3,300.0	5.7	5.7	161.50	-50.2	16.8	53.0	41.5	11.47	4.620	
3,400.0	3,400.0	3,400.0	3,400.0	5.9	5.9	161.50	-50.2	16.8	53.0	41.2	11.82	4.483	
3,500.0	3,500.0	3,500.0	3,500.0	6.1	6.1	161.50	-50.2	16.8	53.0	40.8	12.16	4.354	
3,600.0	3,600.0	3,600.0	3,600.0	6.3	6.3	161.50	-50.2	16.8	53.0	40.5	12.51	4.233	
3,700.0	3,700.0	3,700.0	3,700.0	6.4	6.4	161.50	-50.2	16.8	53.0	40.1	12.86	4.118	
3,800.0	3,800.0	3,800.0	3,800.0	6.6	6.6	161.50	-50.2	16.8	53.0	39.8	13.21	4.009	
3,900.0	3,900.0	3,900.0	3,900.0	6.8	6.8	161.50	-50.2	16.8	53.0	39.4	13.56	3.906	
4,000.0	4,000.0	4,000.0	4,000.0	7.0	7.0	161.50	-50.2	16.8	53.0	39.1	13.91	3.808	
4,100.0	4,100.0	4,100.0	4,100.0	7.1	7.1	161.50	-50.2	16.8	53.0	38.7	14.26	3.715	
4,200.0	4,200.0	4,200.0	4,200.0	7.3	7.3	161.50	-50.2	16.8	53.0	38.4	14.61	3.626	
4,300.0	4,300.0	4,300.0	4,300.0	7.5	7.5	161.50	-50.2	16.8	53.0	38.0	14.96	3.541	CC, ES, SF
4,400.0	4,399.7	4,399.7	4,399.7	7.7	7.7	163.45	-50.2	16.8	59.3	44.1	15.22	3.896	
4,500.0	4,497.6	4,497.6	4,497.6	7.8	7.8	167.24	-50.2	16.8	78.5	63.2	15.31	5.130	
4,600.0	4,592.1	4,592.1	4,592.1	8.1	8.0	170.56	-50.2	16.8	110.7	95.5	15.21	7.278	
4,700.0	4,681.3	4,681.6	4,681.6	8.4	8.1	172.83	-50.2	16.8	155.2	140.3	14.93	10.397	
4,800.0	4,763.9	4,768.5	4,768.2	8.9	8.3	176.59	-49.6	10.0	210.3	195.8	14.49	14.520	
4,900.0	4,838.1	4,845.6	4,843.6	9.5	8.4	-178.32	-48.1	-5.7	275.5	261.6	13.93	19.772	
5,000.0	4,902.9	4,910.8	4,905.5	10.4	8.6	-172.94	-46.3	-26.0	350.6	337.2	13.41	26.135	
5,100.0	4,957.0	4,963.5	4,953.8	11.4	8.7	-167.15	-44.3	-47.0	434.2	421.1	13.13	33.069	

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

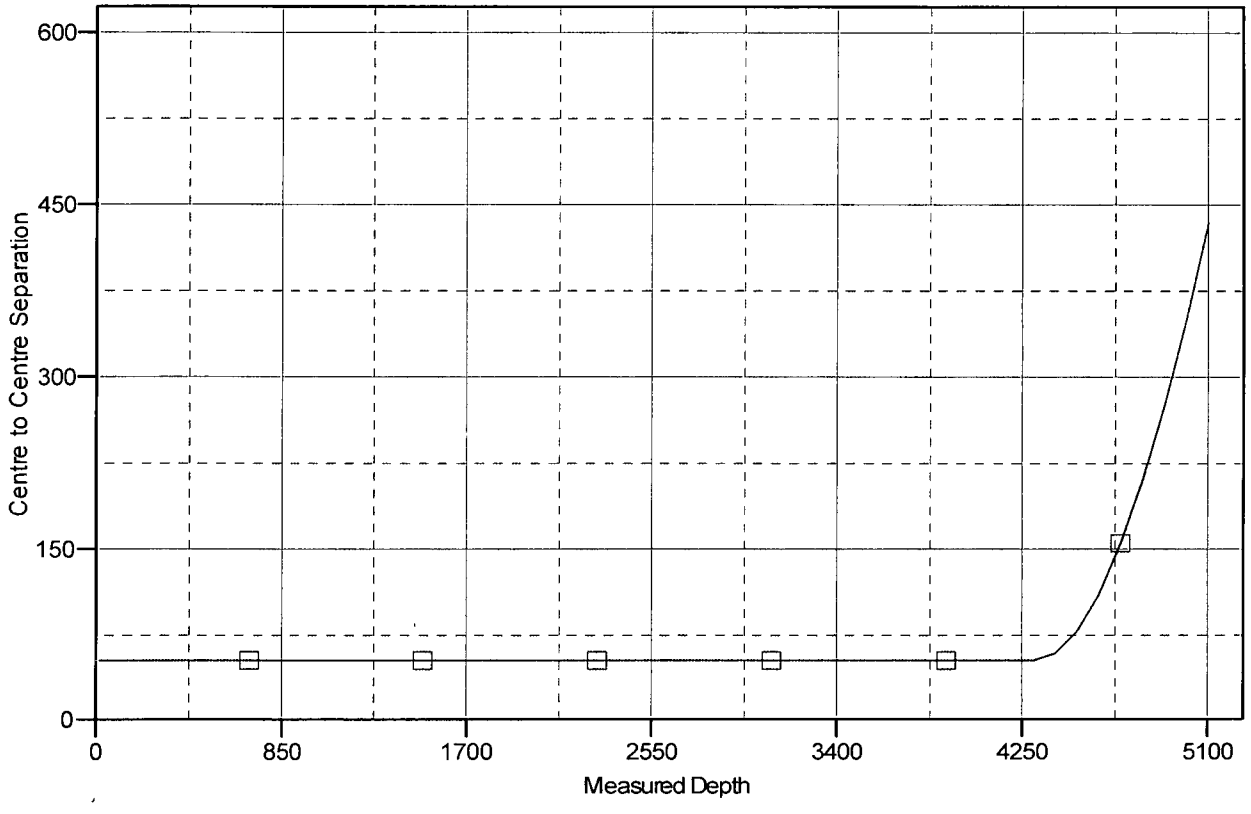
Cathedral Energy Services

Anticollision Report

Company:	LOGOS Operating LLC	**Local Co-ordinate Reference:**	Well Katie 01H
Project:	San Juan County, NM	**TVD Reference:**	KB=15' @ 6944.0ft
Reference Site:	S6--T23N-R8W (Katie Pad)	**MD Reference:**	KB=15' @ 6944.0ft
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Katie 01H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	HZ	**Database:**	USA EDM 5000 Multi Users DB
Reference Design:	Plan #6	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to KB=15' @ 6944.0ft	Coordinates are relative to: Katie 01H
Offset Depths are relative to Offset Datum	Coordinate System is US State Plane 1983, New Mexico Western Zone
Central Meridian is -107.833333 °	Grid Convergence at Surface is: 0.07°

Ladder Plot



LEGEND

Katie 02H, HZ, Plan #4 V0

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