

State of New Mexico
Energy, Minerals and Natural Resources Department

Susana Martinez
Governor

David Martin
Cabinet Secretary-Designate

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 3160-3 APD form.

Operator Signature Date: 9/25/13

Well information;

Operator Encana, Well Name and Number Lybrook M28-2306 2H

API# 30-043-21175, Section 28, Township 23 NS, Range 6 E W

Conditions of Approval:

(See the below checked and handwritten conditions)

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

NMOCD Approved by Signature

2-25-2014
Date ca

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

CONFIDENTIAL
RECEIVED

FORM APPROVED
OMB No. 1004-0137
Expires July 31, 2010

Lease Serial No.
NMNM 112953

APPLICATION FOR PERMIT TO DRILL OR REENTER

SEP 26 2013

1a. Type of work: ☒ DRILL ☐ REENTER		Farmington Field Office Bureau of Land Management	
1b. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other ☒ Single Zone ☐ Multiple Zone		7. If Unit or CA Agreement, Name and No. PENDING	
2. Name of Operator Encana Oil & Gas (USA) Inc.		8. Lease Name and Well No. Lybrook M28-2306 02H	
3a. Address 370 17th Street, Suite 1700 Denver, CO 80202		9. API Well No. 30-043-21175	
3b. Phone No. (include area code) 720-876-3989		10. Field and Pool, or Exploratory Lybrook Gallup	
4. Location of Well (Report location clearly and in accordance with any State requirements.) At surface 349' FSL and 1295' FWL Section 28, T23N, R6W At proposed prod. zone 330' FSL and 1875' FWL Section 33, T23N, R6W		11. Sec., T. R. M. or Blk. and Survey or Area Section 28, T23N, R6W NMPM	
14. Distance in miles and direction from nearest town or post office* +/- 54.8 miles southeast of the intersection of US Hwy 550 & US Hwy 64 in Bloomfield, NM		12. County or Parish Sandoval	13. State NM
15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any) BHL is 330' from south lease line Section 33, T23N, R6W	16. No. of acres in lease NMNM 112953-1760 acres	17. Spacing Unit dedicated to this well 160.0 acres - E/2 W/2 Section 33, T23N, R6W	
18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft. Pinon Tank ABZ FED is +/- 326' east of wellbore	19. Proposed Depth 5,641'TVD/10,805' MD	20. BLM/BIA Bond No. on file COB-000235 RCVD JAN 27 '14 OIL CONS. DIV.	
21. Elevations (Show whether DF, KDB, RT, GL., etc.) 7,220' GL, 7,236' KB	22. Approximate date work will start* 05/08/2014	23. Estimated duration 25 days DIST. 3	

24. Attachments

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

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

25. Signature <i>Brenda R. Linster</i>	Name (Printed/Typed) Brenda R. Linster	Date 09/25/13
Title Regulatory Lead		
Approved by (Signature) <i>[Signature]</i>	Name (Printed/Typed) AFM	Date 11/17/14
Title AFM	Office FFO	

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

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

(Continued on page 2)

*(Instructions on page 2)

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

NMCCD

AV

District I
1625 N. Lincoln Drive, Hobbs, NM 88240
Phone (575) 393-6151 Fax (575) 393-0720

District II
811 S. First Street, Artesia, NM 88210
Phone (575) 748-1293 Fax (575) 748-9720

District III
1000 Rio Aragon Road, Aztec, NM 87410
Phone (505) 334-6179 Fax (505) 334-5170

District IV
3200 S. St. Francis Drive, Santa Fe, NM 87505
Phone (505) 476-3460 Fax (505) 476-3462

State of New Mexico
Energy, Minerals & Natural Resources Department

Form O-102
Revised August 1, 2011

Submit one copy to
Appropriate District Office

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

AMENDED REPORT
RECEIVED

WELL LOCATION AND ACREAGE DEDICATION PLAT

SEP 26 2013

APT Number 30-043-21175	Pool Code 42289	Pool Name LYBROOK O&G Field
Property Code 40414	Property Name LYBROOK M28-2306	Well Name O&G
GORID No 108327	Operator Name ENCANA OIL & GAS (USA) INC.	Elevation 7280

Alamogordo Field Office
Bureau of Land Management

10 Surface Location

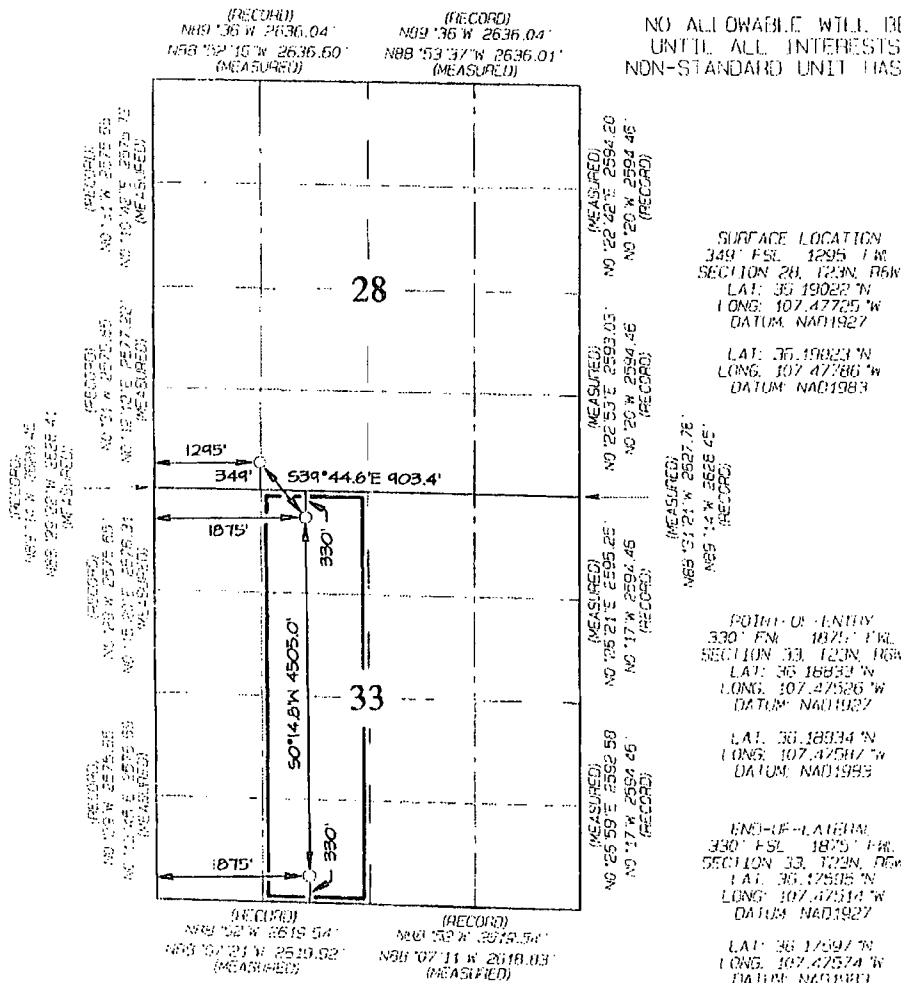
U. of Lot	Section	Township	Range	Lot No	Feet from the	North/South line	Feet from the	East/West line	County
M	28	23N	6W		349	SOUTH	1295	WEST	SANDOVAL

11 Bottom Hole Location If Different From Surface

U. of Lot	Section	Township	Range	Lot No	Feet from the	North/South line	Feet from the	East/West line	County
N	33	23N	6W		330	SOUTH	1875	WEST	SANDOVAL

12 Dedicated Acres 160.0 Acres E/2 W/2 - Section 33	13 Joint or Infill	14 Calculation 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



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 undivided 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 unitization pooling under the authority of the Division.

Signature: *Brenda R. Linster* Date: 09/25/13
Printed Name: Brenda R. Linster

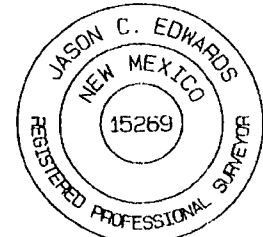
Printed Name: *brenda.linster@encana.com*
E-mail Address: *brenda.linster@encana.com*

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.

Date Provided: AUGUST 24, 2013
Survey Date: SEPTEMBER 5, 2012

Signature and Seal of Professional Surveyor



JASON C. EDWARDS
Certificate Number: 15269

Directions from the Intersection of US Hwy 550 & US Hwy 64
in Bloomfield, NM to Encana Oil & Gas (USA) Inc. Lybrook M28-2306 02H
349' FSL & 1295' FWL, Section 28, T23N, R6W, N.M.P.M., Sandoval County, NM

Latitude: 36.19023°N Longitude: 107.47786°W Datum: NAD1983

From the intersection of US Hwy 550 & US Hwy 64 in Bloomfield, NM, travel Southerly on US Hwy 550 for 50.4 miles to Mile Marker 100.9;

Go right (Southerly) for 200' to fork in road;

Go right which is straight (South-westerly) for 2.0 miles to "T" intersection;

Go right (South-easterly) for 0.8 miles to fork in road;

Go left (South-easterly) for 0.3 miles to fork in road;

Go right (Southerly) for 0.3 miles to fork in road;

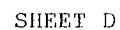
Go left (Easterly) for 0.6 miles to fork in road;

Go left (North-easterly) for 0.1 miles to new access on right-hand side of existing roadway which continues for 1882' to staked Encana Lybrook M28-2306 02H location.

SANDOVAL COUNTY,
NEW MEXICO

-  Abandoned  Basin Mancos Gas Pool
 Abandoned Gas
 Abandoned Oil
 Dry Hole
 GAS
 Injection
 OIL 1 inch = 2,167 feet

1 inch = 2.167 feet



Lybrook M28-2306 02H
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 349 FSL and 1295 FWL
 BHL: SESW Section 33, T23N, R6W
 330 FSL and 1875 FWL
 Sandoval, New Mexico
 Lease Number: NMNM 112953

Encana Oil & Gas (USA) Inc. Drilling Plan

1. ESTIMATED TOPS OF GEOLOGICAL MARKERS (TVD)

The estimated tops of important geologic markers are as follows:

Formation	Depth (TVD) units = feet
Ojo Alamo Ss.	1,504
Kirtland Shale	1,714
Fruitland Coal	1,842
Pictured Cliffs Ss.	2,068
Lewis Shale	2,192
Cliffhouse Ss.	2,916
Menefee Fn.	3,600
Point Lookout Ss.	4,320
Mancos Shale	4,509
Mancos Silt	5,097
Gallup Fn.	5,426

The referenced surface elevation is 7220', KB 7236'

2. ESTIMATED DEPTH OF POTENTIAL WATER, OIL, GAS, & OTHER MINERAL BEARING FORMATIONS

Substance	Formation	Depth (TVD) units = feet
Water/Gas	Fruitland Coal	1,842
Oil/Gas	Pictured Cliffs Ss.	2,068
Oil/Gas	Cliffhouse Ss.	2,916
Gas	Menefee Fn.	3,600
Oil/Gas	Point Lookout Ss.	4,320
Oil/Gas	Mancos Shale	4,509
Oil/Gas	Mancos Silt	5,097
Oil/Gas	Gallup Fn.	5,426

All shows of fresh water and minerals will be reported and protected.

3. PRESSURE CONTROL

- a) Pressure control equipment and configuration will be designed to meet 2M standards.
- b) Working pressure on rams and BOPE will be 3,000 psi
- c) Function test and visual inspection of the BOP will be conducted daily and noted in the IADC Daily Drilling Report.

Lybrook M28-2306 02H

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330 FSL and 1875 FWL

Sandoval, New Mexico

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- d) The Annular BOP will be pressure tested to a minimum of 50 percent of its rated working pressure.
- e) Blind and Pipe Rams/BOP will be tested against a test plug to 100 percent of rated working pressure.
- f) Pressure tests are required before drilling out from under all casing strings set and cemented in place.
- g) BOP controls must be installed prior to drilling the surface casing plug and will remain in use until the well is completed or abandoned.
- h) BOP testing procedures and testing frequency will conform to Onshore Order No. 2.
- i) BOP remote controls shall be located on the rig floor at a location readily accessible to the driller. Master controls shall be on the ground at the accumulator and shall have the capability to function all preventers.
- j) The kill line shall be 2-inch minimum and contain two kill line valves, one of which shall be a check valve.
- k) The choke line shall be a 2-inch minimum and contain two choke line valves (2-inch minimum).
- l) The choke and manifold shall contain two adjustable chokes.
- m) Hand wheels shall be installed on all ram preventers.
- n) Safety valves and wrenches (with subs for drill string connections) shall be available on the rig floor at all times.
- o) Inside BOP or float sub shall also be available on the rig floor at all times.

Proposed BOP and choke manifold arrangements are attached.

4. CASING & CEMENTING PROGRAM

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

- a) The proposed casing design is as follows:

Casing	Depth	Hole Size	Csg Size	Weight	Grade
Conductor	0-60'	30"	20"	94#	H40, STC New
Surface	0'-500'	12 1/4"	9 5/8"	36#	J55, STC New
Intermediate	0'-6205'MD	8 3/4"	7"	26#	J55, LTC New
Production Liner	6005'-10805'MD	6 1/8"	4 1/2"	11.6#	B80*, LTC New

Casing String				Casing Strength Properties			Minimum Design Factors		
Size	Weight (lb/ft)	Grade	Connection	Collapse (psi)	Burst (psi)	Tensile (1000lb)	Collapse	Burst	Tension
9 5/8"	36	J55	STC	2020	3520	394	1.125	1.1	1.5
7"	26	J55	LTC	4320	4980	367	1.125	1.1	1.5
4 1/2"	11.6	B80	LTC	6350	7780	201	1.125	1.1	1.5

*B80 pipe specifications are attached

Casing design is subject to revision based on geologic conditions encountered.

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All casing strings below the conductor shall be pressure tested to 0.22 psi per foot of casing string length or 1,500 psi, whichever is greater, but not to exceed 70 percent of the minimum internal yield. If pressure declines more than 10 percent in 30 minutes, corrective action shall be taken.

b) 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.

Casing	Depth	Cement Volume (sacks)	Cement Type&Yield	Designed TOC	Centralizers
Conductor	60'	100sk	Type I Neat 14.8 ppg	Surface	None
Surface	500'	178sk	Type III Cement + 1% CaCl + 0.25lb/sk Cello Flake + 0.2% FL, 14.6ppg, 1.38cuf/sk	Surface	1 per joint on bottom 3 joints
Intermediate	6205'MD	30% open hole excess Stage 1 Lead: 221sks Stage 1 Tail: 153sks Stage 2 Lead: 164sks	Lead (Stages 1 and 2): PremLite + 3% CaCl + 0.25lb/sk CelloFlake + 5lb/sk LCM, 12.1ppg 2.13cuf/sk Tail (Stage 1): Type III Cmt + 1% CaCl + 0.25lb/sk Cello Flake 14.5ppg 1.38cuf/sk	Surface	1 per joint for bottom 3 joints, 1 every 3 joints for remaining joints
Production Liner*	6005'-10805'	None – External casing packers	N/A	N/A	N/A

*Production liner clarification: Utilizing external swell casing packer system for zonal isolation will not use cement 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.

5. WELL PLAN & DIRECTIONAL DRILLING PROGRAM

The proposed horizontal well will have a kick off point of 5002'. Directional plans are attached.

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 Sandoval, New Mexico
 Lease Number: NMNM 112953

Description	Proposed Depth (TVD/MD)	Formation
Horizontal Lateral TD	5641'/10805'	Gallup

6. DRILLING FLUIDS PROGRAM

a) Surface through Intermediate Casing Point:

Hole Size (in)	Depth (ft)	Mud Type	Density (lb/gal)	Viscosity (sec/qt)	Fluid Loss (cc)
30"	0-60' TVD	Fresh Water	8.3-9.2	38-100	4-28
12 1/4"	0-500' TVD	Fresh Water	8.4-8.6	60-70	NC
8 3/4"	500'TVD- 5654'TVD/6205'MD	Fresh Water LSND	8.5-8.8	40-50	8-10

b) Intermediate Casing Point to TD:

Hole Size (in)	MD (ft)	Mud Type	Density (lb/gal)	Viscosity (sec/qt)	Fluid Loss (cc)
6 1/8"	6205'-10805'	Synthetic Oil Based Mud	8.6-9.0	15-25	<15

- c) There will be sufficient mud on location to control a blowout should one occur. Mud flow and volume will be monitored both visually and with electronic pit volume totalizers. Mud tests shall be performed every 24 hours after mudding up to determine, as applicable: density, viscosity, gel strength, filtration, and pH.
- d) A closed-loop system will be used to recover drilling fluid and dry cuttings in both phases of the well and on all hole intervals, including fresh water and oil-based operations. Above-ground tanks will be utilized to hold cuttings and fluids for rig operations. A frac tank will be on location to store fresh water. Waste will be disposed of properly at an EPA-approved hazardous waste facility. Fresh water cuttings will be disposed of at Basin Disposal, Inc. and/or Industrial Ecosystems, Inc. The location will be lined in accordance with the Surface Use Plan of Operations.

7. TESTING, CORING and LOGGING

- a) Drill Stem Testing – None anticipated
 b) Coring – None anticipated.
 c) Mud Logging – Mud loggers will be on location from kick off point to TD.
 d) Logging – See Below

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

Lybrook M28-2306 02H

SHL: SWSW Section 28, T23N, R6W
349 FSL and 1295 FWL

BHL: SESW Section 33, T23N, R6W
330 FSL and 1875 FWL

Sandoval, New Mexico

Lease Number: NMNM 112953

8. ABNORMAL PRESSURES & HYDROGEN SULFIDE

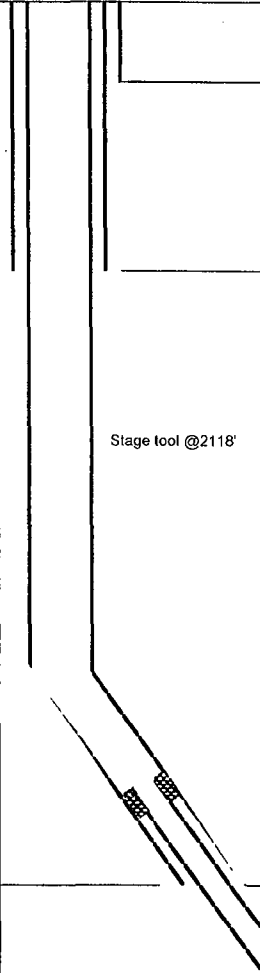
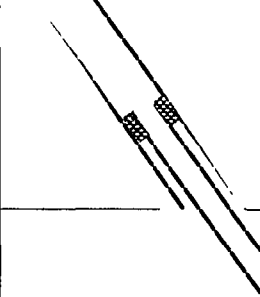
The anticipated bottom hole pressure is +/- 2647 psi based on a 9.0 ppg at 5657' TVD of the landing point of the horizontal lateral. No abnormal pressure or temperatures are anticipated.

No hydrogen sulfide gas is anticipated, however, if H₂S is encountered, the guidelines in Onshore Order No. 6 will be followed.

9. ANTICIPATED START DATE AND DURATION OF OPERATIONS

Drilling is estimated to commence on May 8, 2014. It is anticipated that completion operations will begin within 30 days after the well has been drilled depending on fracture treatment schedules with various pumping service companies.

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

LOC: Sec 28-T23N-R6W County: Sandoval WELL: Lybrook M28-2306 02H			Encana Natural Gas WELL SUMMARY					ENG: 9/12/13 RIG: GLE: 7220 RKBE: 7236	
MWD LWD	OPEN HOLE LOGGING	FORM	DEPTH			HOLE SIZE	CASING SPECS	MW MUD TYPE	DEVIATION INFORMATION
			TVD	MD					
			60	60'		30	20" 94# 100sx Type I Neat 14.8ppg cmt	Fresh wtr 8.3-9.2	
Surveys After csg is run	None					12 1/4	9 5/8" 36ppf J55 STC TOC @ surface 178 sks Type III Cmt	Fresh wtr 8.4-8.6	Vertical <1°
Surveys every 500'	No OH logs	Ojo Alamo Kirtland Fruitland Coal Pictured Cliffs Ss Lewis Shale Cliffhouse Ss Menefee Fn	1504 1714 1842 2068 2192 2916 3600			8 3/4	7" 26ppf J55 LTC TOC @ surface 30% OH excess: 538 sksTotal. Stage 1 Lead: 221sks Stage 1 Tail: 153sks. Stage 2 Lead: 164sks	Fresh Wtr 8.5-8.8	Vertical <1°
	Mud logger onsite	Point Lookout Ss Mancos Sh KICK OFF PT Mancos Silt Gallup Top 7" csg setting	4320 4509 5002 5097 5426 5654	6205					KOP 5002 10 deg/100'
Surveys every 500' Gyro at CP MWD Gamma Directional	No OH Logs	horz target	5657	6301		6 1/8	200' overlap at liner top		25deg updip 5641'TVD TD = 10805' MD
		Base Gallup	5719				4504' Lateral	8.6-9.0 OBM	Switch to OBM 8.6-9.0
						4 1/2" 11.6ppf SB80 LTC Running external swellable csg packers for isolation of prod string Plan on setting top packer within 100' of intermediate casing shoe			

NOTES:

- 1) Drill with 30" bit to 60', set 20" 94# conductor pipe
- 2) Drill surface to 500', R&C 9 5/8" casing
- 3) N/U BOP and surface equipment
- 4) Drill to KOP of 5002', 8 3/4" hole size.
- 5) PU directional tools and start curve at 10deg/100' build rate
- 6) Drill to casing point of 6205' MD
- 7) R&C 7" casing, circ cmt to surface, switch to OBM
- 8) Land at 90deg, drill 4504' lateral to 10805', run 4 1/2" liner with external swellable csg packers



Boomerang Tube LLC

CASING (OR) TUBING DESCRIPTION AND PERFORMANCE PROPERTIES

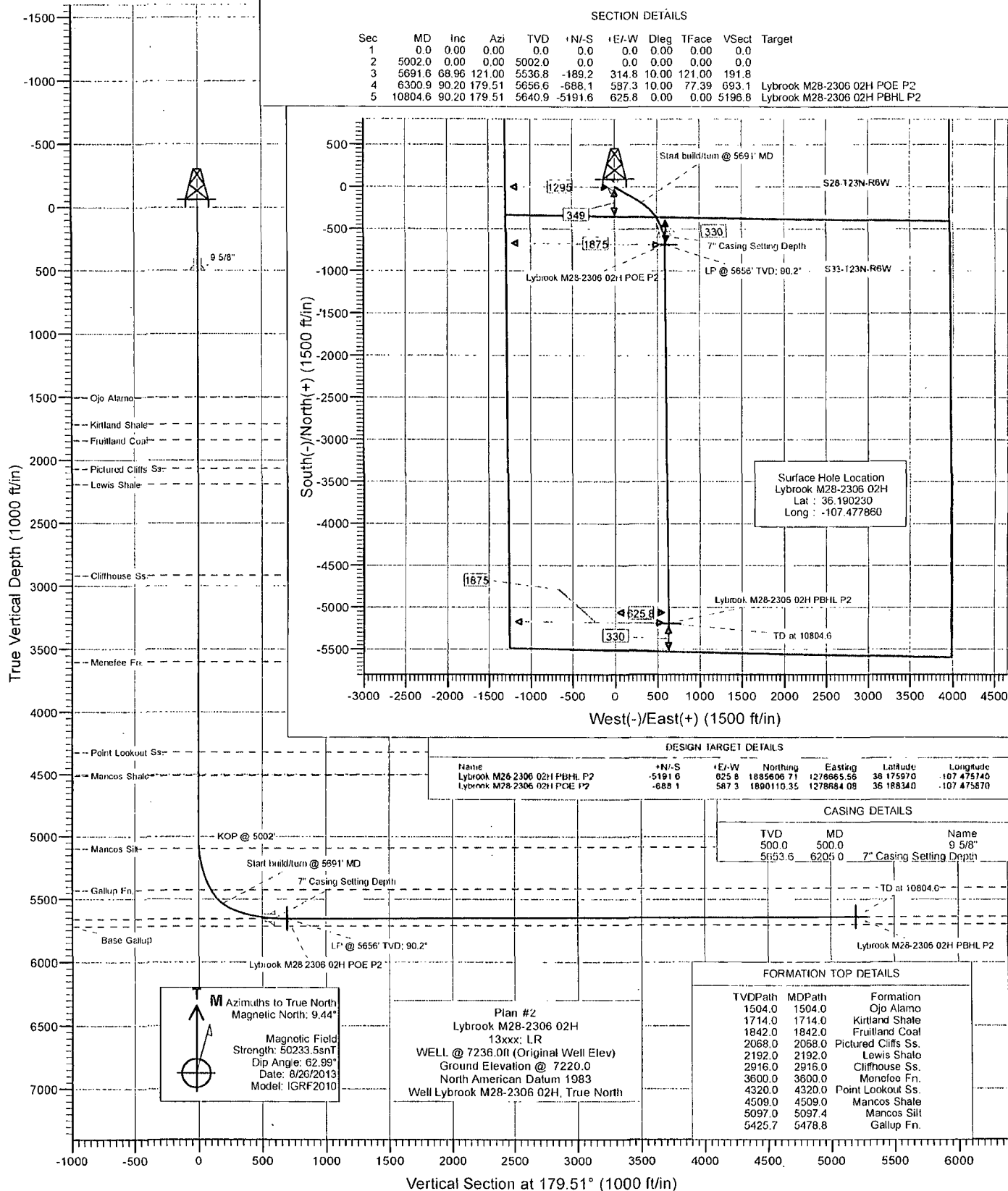
Pipe Outside Diameter (ins)	_____	4.500
Pipe Wall Thickness (ins)	_____	0.250
Nominal Weight Per Foot (lbs)	_____	11.60
Thread Name	_____	Long Thread CSG
Grade Name	_____	SB-80
Pipe Minimum Yield (psi)	_____	80,000
Pipe Minimum Ultimate (psi)	_____	90,000
Coupling Minimum Yield (psi)	_____	80,000
Coupling Minimum Ultimate (psi)	_____	100,000
Coupling or Joint Outside Diameter (ins)	_____	5.000
Drift Diameter (ins)	_____	3.875
Plain End Weight per Foot (lbs)	_____	11.36
Joint Strength (lbs)	_____	201,000
Internal Yield (psi)	_____	7,780
Collapse Rating (psi)	_____	6,350

MAXIMUM DEPTH/LENGTH BASED ON MUD WTS & SAFETY FACTORS

Drilling Mud Weight (ppg)	_____	9.625
Tension Safety Factor	_____	1.80
Maximum Tension Length (ft)	_____	9,630
Internal Yield Safety Factor	_____	1.10
Maximum Depth for Internal Yield (ft)	_____	14,150
Collapse Safety Factor	_____	1.125
Maximum Collapse Depth (ft)	_____	11,290

API RELATED VALUES and INTERMEDIATE CALCULATION RESULTS

Coupling Thread Fracture Strength	_____	464,000
Pipe Thread Fracture Strength (lbs)	_____	201,000
Pipe Body Plain End Yield (lbs)	_____	267,000
Round Thread Pull-Out (lbs)	_____	219,000
Minimum Make-up Torque (ft-lbs)	_____	1,640
Nominal Make-up Torque (ft-lbs)	_____	2,190
Maximum Make-up Torque (ft-lbs)	_____	2,740
Coupling Internal Yield (psi)	_____	10,660
Pipe Body Internal Yield (psi)	_____	7,780
Leak @ E1 or E7 plane (psi)	_____	17,920
Pipe Hydrostatic Test Pressure @ 80 % SMYS	_____	7,100



Cathedral Energy Services

Planning Report

Database: USA EDM 5000 Multi Users DB
 Company: EnCana Oil & Gas (USA) Inc
 Project: Sandoval County, NM
 Site: Lybrook
 Well: Lybrook M28-2306 02H
 Wellbore: Hz
 Design: Plan #2

Local Co-ordinate Reference: Well Lybrook M28-2306 02H
 TVD Reference: WELL @ 7236.0ft (Original Well Elev)
 MD Reference: WELL @ 7236.0ft (Original Well Elev)
 North Reference: True
 Survey Calculation Method: Minimum Curvature

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

Site	Lybrook				
Site Position:		Northing:	1,882,676.45 ft	Latitude:	36.168210
From:	Lat/Long	Easting:	1,287,068.90 ft	Longitude:	-107.447150
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence:	-0.71 °

Well	Lybrook M28-2306 02H					
Well Position	+N/-S	0.0 ft	Northing:	1,890,805.81 ft	Latitude:	36.190230
	+E/-W	0.0 ft	Easting:	1,278,105.54 ft	Longitude:	-107.477860
Position Uncertainty	0.0 ft	Wellhead Elevation:	ft	Ground Level:	7,220.0 ft	

Wellbore	Hz				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	8/26/2013	9.44	62.99	50,234

Design	Plan #2			
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	179.51

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	
5,002.0	0.00	0.00	5,002.0	0.0	0.0	0.00	0.00	0.00	0.00	
5,691.6	68.96	121.00	5,536.8	-189.2	314.8	10.00	10.00	0.00	121.00	
6,300.9	90.20	179.51	5,656.6	-688.1	587.3	10.00	3.49	9.60	77.39	Lybrook M28-2306 02
10,804.6	90.20	179.51	5,640.9	-5,191.6	625.8	0.00	0.00	0.00	0.00	Lybrook M28-2306 02

Cathedral Energy Services

Planning Report

Database: USA EDM 5000 Multi Users DB
Company: EnCana Oil & Gas (USA) Inc
Project: Sandoval County, NM
Site: Lybrook
Well: Lybrook M28-2306 02H
Wellbore: Hz
Design: Plan #2

Local Co-ordinate Reference: Well Lybrook M28-2306 02H
TVD Reference: WELL @ 7236.0ft (Original Well Elev)
MD Reference: WELL @ 7236.0ft (Original Well Elev)
North Reference: True
Survey Calculation Method: Minimum Curvature

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	
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	9 5/8"
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	
1,504.0	0.00	0.00	1,504.0	0.0	0.0	0.0	0.00	0.00	Ojo Alamo
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	
1,714.0	0.00	0.00	1,714.0	0.0	0.0	0.0	0.00	0.00	Kirtland Shale
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.0	0.00	0.00	
1,842.0	0.00	0.00	1,842.0	0.0	0.0	0.0	0.00	0.00	Fruitland Coal
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	
2,068.0	0.00	0.00	2,068.0	0.0	0.0	0.0	0.00	0.00	Pictured Cliffs Ss.
2,100.0	0.00	0.00	2,100.0	0.0	0.0	0.0	0.00	0.00	
2,192.0	0.00	0.00	2,192.0	0.0	0.0	0.0	0.00	0.00	Lewis Shale
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	
2,916.0	0.00	0.00	2,916.0	0.0	0.0	0.0	0.00	0.00	Cliffhouse Ss.
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	
3,200.0	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	Menefee Fn.
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	
4,100.0	0.00	0.00	4,100.0	0.0	0.0	0.0	0.00	0.00	
4,200.0	0.00	0.00	4,200.0	0.0	0.0	0.0	0.00	0.00	
4,300.0	0.00	0.00	4,300.0	0.0	0.0	0.0	0.00	0.00	
4,320.0	0.00	0.00	4,320.0	0.0	0.0	0.0	0.00	0.00	Point Lookout Ss.
4,400.0	0.00	0.00	4,400.0	0.0	0.0	0.0	0.00	0.00	

Cathedral Energy Services

Planning Report

Database: USA EDM 5000 Multi Users DB
Company: EnCana Oil & Gas (USA) Inc
Project: Sandoval County, NM
Site: Lybrook
Well: Lybrook M28-2306 02H
Wellbore: Hz
Design: Plan #2

Local Co-ordinate Reference: Well Lybrook M28-2306 02H
TVD Reference: WELL @ 7236.0ft (Original Well Elev)
MD Reference: WELL @ 7236.0ft (Original Well Elev)
North Reference: True
Survey Calculation Method: Minimum Curvature

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
4,500.0	0.00	0.00	4,500.0	0.0	0.0	0.0	0.00	0.00	
4,509.0	0.00	0.00	4,509.0	0.0	0.0	0.0	0.00	0.00	Mancos Shale
4,600.0	0.00	0.00	4,600.0	0.0	0.0	0.0	0.00	0.00	
4,700.0	0.00	0.00	4,700.0	0.0	0.0	0.0	0.00	0.00	
4,800.0	0.00	0.00	4,800.0	0.0	0.0	0.0	0.00	0.00	
4,900.0	0.00	0.00	4,900.0	0.0	0.0	0.0	0.00	0.00	
5,000.0	0.00	0.00	5,000.0	0.0	0.0	0.0	0.00	0.00	
5,002.0	0.00	0.00	5,002.0	0.0	0.0	0.0	0.00	0.00	KOP @ 5002'
5,097.4	9.54	121.00	5,097.0	-4.1	6.8	4.1	10.00	10.00	Mancos Silt
5,100.0	9.80	121.00	5,099.5	-4.3	7.2	4.4	10.00	10.00	
5,200.0	19.80	121.00	5,196.1	-17.4	29.0	17.7	10.00	10.00	
5,300.0	29.80	121.00	5,286.7	-39.0	64.9	39.6	10.00	10.00	
5,400.0	39.80	121.00	5,368.8	-68.4	113.8	69.3	10.00	10.00	
5,478.8	47.68	121.00	5,425.7	-96.4	160.5	97.8	10.00	10.00	Gallup Fn.
5,500.0	49.80	121.00	5,439.6	-104.6	174.1	106.1	10.00	10.00	
5,600.0	59.80	121.00	5,497.2	-146.6	244.1	148.7	10.00	10.00	
5,691.6	68.96	121.00	5,536.8	-189.2	314.8	191.8	10.00	10.00	Start build/turn @ 5691' MD
5,700.0	69.15	121.87	5,539.8	-193.2	321.5	196.0	10.00	2.21	
5,800.0	71.68	132.14	5,573.4	-249.9	396.6	253.3	10.00	2.54	
5,900.0	74.75	142.08	5,602.3	-320.0	461.6	323.9	10.00	3.07	
6,000.0	78.24	151.72	5,625.7	-401.3	514.5	405.7	10.00	3.49	
6,100.0	82.04	161.10	5,642.9	-491.5	553.9	496.2	10.00	3.80	
6,200.0	86.05	170.31	5,653.3	-587.8	578.4	592.7	10.00	4.01	
6,205.0	86.26	170.77	5,653.6	-592.7	579.2	597.6	10.00	4.08	7" Casing Setting Depth
6,300.0	90.16	179.43	5,656.6	-687.2	587.3	692.2	10.00	4.11	
6,300.8	90.20	179.50	5,656.6	-688.0	587.3	693.0	10.00	4.13	Lybrook M28-2306 02H POE
6,300.9	90.20	179.51	5,656.6	-688.1	587.3	693.1	10.00	4.13	LP @ 5656' TVD; 90.2° - Lybrook M28-2306 02
6,400.0	90.20	179.51	5,656.2	-787.2	588.1	792.2	0.00	0.00	
6,500.0	90.20	179.51	5,655.9	-887.2	589.0	892.2	0.00	0.00	
6,600.0	90.20	179.51	5,655.5	-987.2	589.8	992.2	0.00	0.00	
6,700.0	90.20	179.51	5,655.2	-1,087.2	590.7	1,092.2	0.00	0.00	
6,800.0	90.20	179.51	5,654.8	-1,187.2	591.6	1,192.2	0.00	0.00	
6,900.0	90.20	179.51	5,654.5	-1,287.2	592.4	1,292.2	0.00	0.00	
7,000.0	90.20	179.51	5,654.1	-1,387.2	593.3	1,392.2	0.00	0.00	
7,100.0	90.20	179.51	5,653.8	-1,487.2	594.1	1,492.2	0.00	0.00	
7,200.0	90.20	179.51	5,653.4	-1,587.2	595.0	1,592.2	0.00	0.00	
7,300.0	90.20	179.51	5,653.1	-1,687.2	595.8	1,692.2	0.00	0.00	
7,400.0	90.20	179.51	5,652.7	-1,787.1	596.7	1,792.2	0.00	0.00	
7,500.0	90.20	179.51	5,652.4	-1,887.1	597.5	1,892.2	0.00	0.00	
7,600.0	90.20	179.51	5,652.0	-1,987.1	598.4	1,992.2	0.00	0.00	
7,700.0	90.20	179.51	5,651.7	-2,087.1	599.2	2,092.2	0.00	0.00	
7,800.0	90.20	179.51	5,651.3	-2,187.1	600.1	2,192.2	0.00	0.00	
7,900.0	90.20	179.51	5,651.0	-2,287.1	601.0	2,292.2	0.00	0.00	
8,000.0	90.20	179.51	5,650.6	-2,387.1	601.8	2,392.2	0.00	0.00	
8,100.0	90.20	179.51	5,650.3	-2,487.1	602.7	2,492.2	0.00	0.00	
8,200.0	90.20	179.51	5,649.9	-2,587.1	603.5	2,592.2	0.00	0.00	
8,300.0	90.20	179.51	5,649.6	-2,687.1	604.4	2,692.2	0.00	0.00	
8,400.0	90.20	179.51	5,649.2	-2,787.1	605.2	2,792.2	0.00	0.00	
8,500.0	90.20	179.51	5,648.9	-2,887.1	606.1	2,892.2	0.00	0.00	
8,600.0	90.20	179.51	5,648.5	-2,987.1	606.9	2,992.2	0.00	0.00	
8,700.0	90.20	179.51	5,648.2	-3,087.1	607.8	3,092.2	0.00	0.00	
8,800.0	90.20	179.51	5,647.9	-3,187.1	608.6	3,192.2	0.00	0.00	

Cathedral Energy Services

Planning Report

Database: USA EDM 5000 Multi Users DB
Company: EnCana Oil & Gas (USA) Inc
Project: Sandoval County, NM
Site: Lybrook
Well: Lybrook M28-2306 02H
Wellbore: Hz
Design: Plan #2

Local Co-ordinate Reference: Well Lybrook M28-2306 02H
TVD Reference: WELL @ 7236.0ft (Original Well Elev)
MD Reference: WELL @ 7236.0ft (Original Well Elev)
North Reference: True
Survey Calculation Method: Minimum Curvature

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
8,900.0	90.20	179.51	5,647.5	-3,287.1	609.5	3,292.2	0.00	0.00	
9,000.0	90.20	179.51	5,647.2	-3,387.1	610.4	3,392.2	0.00	0.00	
9,100.0	90.20	179.51	5,646.8	-3,487.1	611.2	3,492.2	0.00	0.00	
9,200.0	90.20	179.51	5,646.5	-3,587.1	612.1	3,592.2	0.00	0.00	
9,300.0	90.20	179.51	5,646.1	-3,687.1	612.9	3,692.2	0.00	0.00	
9,400.0	90.20	179.51	5,645.8	-3,787.1	613.8	3,792.2	0.00	0.00	
9,500.0	90.20	179.51	5,645.4	-3,887.1	614.6	3,892.2	0.00	0.00	
9,600.0	90.20	179.51	5,645.1	-3,987.1	615.5	3,992.2	0.00	0.00	
9,700.0	90.20	179.51	5,644.7	-4,087.1	616.3	4,092.2	0.00	0.00	
9,800.0	90.20	179.51	5,644.4	-4,187.0	617.2	4,192.2	0.00	0.00	
9,900.0	90.20	179.51	5,644.0	-4,287.0	618.0	4,292.2	0.00	0.00	
10,000.0	90.20	179.51	5,643.7	-4,387.0	618.9	4,392.2	0.00	0.00	
10,100.0	90.20	179.51	5,643.3	-4,487.0	619.8	4,492.2	0.00	0.00	
10,200.0	90.20	179.51	5,643.0	-4,587.0	620.6	4,592.2	0.00	0.00	
10,300.0	90.20	179.51	5,642.6	-4,687.0	621.5	4,692.2	0.00	0.00	
10,400.0	90.20	179.51	5,642.3	-4,787.0	622.3	4,792.2	0.00	0.00	
10,500.0	90.20	179.51	5,641.9	-4,887.0	623.2	4,892.2	0.00	0.00	
10,600.0	90.20	179.51	5,641.6	-4,987.0	624.0	4,992.2	0.00	0.00	
10,700.0	90.20	179.51	5,641.2	-5,087.0	624.9	5,092.2	0.00	0.00	
10,800.0	90.20	179.51	5,640.9	-5,187.0	625.7	5,192.2	0.00	0.00	
10,804.5	90.20	179.51	5,640.9	-5,191.5	625.8	5,196.6	0.00	0.00	Lybrook M28-2306 02H PBHL
10,804.6	90.20	179.51	5,640.9	-5,191.6	625.8	5,196.8	0.00	0.00	TD at 10804.6 - Lybrook M28-2306 02H PBHL I

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
Lybrook M28-2306 02H - plan misses target center by 39.0ft at 6300.8ft MD (5656.6 TVD, -688.0 N, 587.3 E) - Point	0.00	0.00	5,695.6	-688.1	587.3	1,890,110.35	1,278,684.08	36.188340	-107.475870
Lybrook M28-2306 02H - plan hits target center - Point	0.00	0.00	5,640.9	-5,191.6	625.8	1,885,606.71	1,278,665.56	36.175970	-107.475740
Lybrook M28-2306 02H - plan misses target center by 39.0ft at 10804.5ft MD (5640.9 TVD, -5191.5 N, 625.8 E) - Point	0.00	0.00	5,679.9	-5,191.6	625.8	1,885,606.71	1,278,665.56	36.175970	-107.475740
Lybrook M28-2306 02H - plan hits target center - Point	0.00	0.00	5,656.6	-688.1	587.3	1,890,110.35	1,278,684.08	36.188340	-107.475870

Casing Points

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (in)	Hole Diameter (in)
500.0	500.0	9 5/8"	0.000	0.000
6,205.0	5,653.6	7" Casing Setting Depth	0.000	0.000

Cathedral Energy Services

Planning Report

Database: USA EDM 5000 Multi Users DB
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 Project: Sandoval County, NM
 Site: Lybrook
 Well: Lybrook M28-2306 02H
 Wellbore: Hz
 Design: Plan #2

Local Co-ordinate Reference: Well Lybrook M28-2306 02H
 TVD Reference: WELL @ 7236.0ft (Original Well Elev)
 MD Reference: WELL @ 7236.0ft (Original Well Elev)
 North Reference: True
 Survey Calculation Method: Minimum Curvature

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,504.0	1,504.0	Ojo Alamo		-0.20	179.51
1,714.0	1,714.0	Kirtland Shale		-0.20	179.51
1,842.0	1,842.0	Fruitland Coal		-0.20	179.51
2,068.0	2,068.0	Pictured Cliffs Ss.		-0.20	179.51
2,192.0	2,192.0	Lewis Shale		-0.20	179.51
2,916.0	2,916.0	Cliffhouse Ss.		-0.20	179.51
3,600.0	3,600.0	Menefee Fn.		-0.20	179.51
4,320.0	4,320.0	Point Lookout Ss.		-0.20	179.51
4,509.0	4,509.0	Mancos Shale		-0.20	179.51
5,097.4	5,097.0	Mancos Silt		-0.20	179.51
5,478.8	5,426.0	Gallup Fn.		-0.20	179.51

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
5,002.0	5,002.0	0.0	0.0	KOP @ 5002'
5,691.6	5,536.8	-189.2	314.8	Start build/turn @ 5691' MD
6,300.9	5,656.6	-688.1	587.3	LP @ 5656' TVD; 90.2°
10,804.6	5,640.9	-5,191.6	625.8	TD at 10804.6

Cathedral Energy Services

Anticollision Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well Lybrook M28-2306 02H
Project:	Sandoval County, NM	TVD Reference:	WELL @ 7236.0ft (Original Well Elev)
Reference Site:	Lybrook	MD Reference:	WELL @ 7236.0ft (Original Well Elev)
Site Error:	0.0ft	North Reference:	True
Reference Well:	Lybrook M28-2306 02H	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 #2	Offset TVD Reference:	Offset Datum

Reference	Plan #2		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD Interval 100.0ft	Error Model:	Systematic Ellipse
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 1,536.2ft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma		

Survey Tool Program	Date	9/3/2013		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.0	10,804.6	Plan #2 (Hz)	Geolink MWD	Geolink MWD

Summary						
Site Name	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Lybrook						
Lybrook M28-2306 01H - Hz - Plan #2	4,954.4	4,954.4	29.7	12.5	1.725	CC, ES, SF

Cathedral Energy Services

Anticollision Report

Company: EnCana Oil & Gas (USA) Inc
Project: Sandoval County, NM
Reference Site: Lybrook
Site Error: 0.0ft
Reference Well: Lybrook M28-2306 02H
Well Error: 0.0ft
Reference Wellbore: Hz
Reference Design: Plan #2

Local Co-ordinate Reference: Well Lybrook M28-2306 02H
TVD Reference: WELL @ 7236.0ft (Original Well Elev)
MD Reference: WELL @ 7236.0ft (Original Well Elev)
North Reference: True
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA EDM 5000 Multi Users DB
Offset TVD Reference: Offset Datum

Offset Design Lybrook - Lybrook M28-2306 01H - Hz - Plan #2													Offset Site Error: 0.0 ft
Survey Program: 0-Geolink MWD													Offset Well Error: 0.0 ft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Total Uncertainty Axis	Separation Factor	Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)		+N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)			
0.0	0.0	0.0	0.0	0.0	0.0	-82.97	3.6	-29.5	29.7				
100.0	100.0	100.0	100.0	0.1	0.1	-82.97	3.6	-29.5	29.7	29.4	0.29	101.411	
200.0	200.0	200.0	200.0	0.3	0.3	-82.97	3.6	-29.5	29.7	29.1	0.64	46.296	
300.0	300.0	300.0	300.0	0.5	0.5	-82.97	3.6	-29.5	29.7	28.7	0.99	29.995	
400.0	400.0	400.0	400.0	0.7	0.7	-82.97	3.6	-29.5	29.7	28.4	1.34	22.184	
500.0	500.0	500.0	500.0	0.8	0.8	-82.97	3.6	-29.5	29.7	28.0	1.69	17.600	
600.0	600.0	600.0	600.0	1.0	1.0	-82.97	3.6	-29.5	29.7	27.7	2.04	14.587	
700.0	700.0	700.0	700.0	1.2	1.2	-82.97	3.6	-29.5	29.7	27.3	2.39	12.454	
800.0	800.0	800.0	800.0	1.4	1.4	-82.97	3.6	-29.5	29.7	27.0	2.74	10.865	
900.0	900.0	900.0	900.0	1.5	1.5	-82.97	3.6	-29.5	29.7	26.6	3.09	9.636	
1,000.0	1,000.0	1,000.0	1,000.0	1.7	1.7	-82.97	3.6	-29.5	29.7	26.3	3.43	8.657	
1,100.0	1,100.0	1,100.0	1,100.0	1.9	1.9	-82.97	3.6	-29.5	29.7	26.0	3.78	7.858	
1,200.0	1,200.0	1,200.0	1,200.0	2.1	2.1	-82.97	3.6	-29.5	29.7	25.6	4.13	7.195	
1,300.0	1,300.0	1,300.0	1,300.0	2.2	2.2	-82.97	3.6	-29.5	29.7	25.3	4.48	6.634	
1,400.0	1,400.0	1,400.0	1,400.0	2.4	2.4	-82.97	3.6	-29.5	29.7	24.9	4.83	6.155	
1,500.0	1,500.0	1,500.0	1,500.0	2.6	2.6	-82.97	3.6	-29.5	29.7	24.6	5.18	5.740	
1,600.0	1,600.0	1,600.0	1,600.0	2.8	2.8	-82.97	3.6	-29.5	29.7	24.2	5.53	5.378	
1,700.0	1,700.0	1,700.0	1,700.0	2.9	2.9	-82.97	3.6	-29.5	29.7	23.9	5.88	5.059	
1,800.0	1,800.0	1,800.0	1,800.0	3.1	3.1	-82.97	3.6	-29.5	29.7	23.5	6.23	4.775	
1,900.0	1,900.0	1,900.0	1,900.0	3.3	3.3	-82.97	3.6	-29.5	29.7	23.2	6.58	4.522	
2,000.0	2,000.0	2,000.0	2,000.0	3.5	3.5	-82.97	3.6	-29.5	29.7	22.8	6.93	4.294	
2,100.0	2,100.0	2,100.0	2,100.0	3.6	3.6	-82.97	3.6	-29.5	29.7	22.5	7.27	4.088	
2,200.0	2,200.0	2,200.0	2,200.0	3.8	3.8	-82.97	3.6	-29.5	29.7	22.1	7.62	3.900	
2,300.0	2,300.0	2,300.0	2,300.0	4.0	4.0	-82.97	3.6	-29.5	29.7	21.8	7.97	3.730	
2,400.0	2,400.0	2,400.0	2,400.0	4.2	4.2	-82.97	3.6	-29.5	29.7	21.4	8.32	3.573	
2,500.0	2,500.0	2,500.0	2,500.0	4.3	4.3	-82.97	3.6	-29.5	29.7	21.1	8.67	3.429	
2,600.0	2,600.0	2,600.0	2,600.0	4.5	4.5	-82.97	3.6	-29.5	29.7	20.7	9.02	3.297	
2,700.0	2,700.0	2,700.0	2,700.0	4.7	4.7	-82.97	3.6	-29.5	29.7	20.4	9.37	3.174	
2,800.0	2,800.0	2,800.0	2,800.0	4.9	4.9	-82.97	3.6	-29.5	29.7	20.0	9.72	3.060	
2,900.0	2,900.0	2,900.0	2,900.0	5.0	5.0	-82.97	3.6	-29.5	29.7	19.7	10.07	2.954	
3,000.0	3,000.0	3,000.0	3,000.0	5.2	5.2	-82.97	3.6	-29.5	29.7	19.3	10.42	2.855	
3,100.0	3,100.0	3,100.0	3,100.0	5.4	5.4	-82.97	3.6	-29.5	29.7	19.0	10.77	2.762	
3,200.0	3,200.0	3,200.0	3,200.0	5.6	5.6	-82.97	3.6	-29.5	29.7	18.6	11.11	2.675	
3,300.0	3,300.0	3,300.0	3,300.0	5.7	5.7	-82.97	3.6	-29.5	29.7	18.3	11.46	2.594	
3,400.0	3,400.0	3,400.0	3,400.0	5.9	5.9	-82.97	3.6	-29.5	29.7	17.9	11.81	2.517	
3,500.0	3,500.0	3,500.0	3,500.0	6.1	6.1	-82.97	3.6	-29.5	29.7	17.6	12.16	2.445	
3,600.0	3,600.0	3,600.0	3,600.0	6.3	6.3	-82.97	3.6	-29.5	29.7	17.2	12.51	2.377	
3,700.0	3,700.0	3,700.0	3,700.0	6.4	6.4	-82.97	3.6	-29.5	29.7	16.9	12.86	2.312	
3,800.0	3,800.0	3,800.0	3,800.0	6.6	6.6	-82.97	3.6	-29.5	29.7	16.5	13.21	2.251	
3,900.0	3,900.0	3,900.0	3,900.0	6.8	6.8	-82.97	3.6	-29.5	29.7	16.2	13.56	2.193	
4,000.0	4,000.0	4,000.0	4,000.0	7.0	7.0	-82.97	3.6	-29.5	29.7	15.8	13.91	2.138	
4,100.0	4,100.0	4,100.0	4,100.0	7.1	7.1	-82.97	3.6	-29.5	29.7	15.5	14.26	2.086	
4,200.0	4,200.0	4,200.0	4,200.0	7.3	7.3	-82.97	3.6	-29.5	29.7	15.1	14.60	2.036	
4,300.0	4,300.0	4,300.0	4,300.0	7.5	7.5	-82.97	3.6	-29.5	29.7	14.8	14.95	1.988	
4,400.0	4,400.0	4,400.0	4,400.0	7.7	7.7	-82.97	3.6	-29.5	29.7	14.4	15.30	1.943	
4,500.0	4,500.0	4,500.0	4,500.0	7.8	7.8	-82.97	3.6	-29.5	29.7	14.1	15.65	1.900	
4,600.0	4,600.0	4,600.0	4,600.0	8.0	8.0	-82.97	3.6	-29.5	29.7	13.7	16.00	1.858	
4,700.0	4,700.0	4,700.0	4,700.0	8.2	8.2	-82.97	3.6	-29.5	29.7	13.4	16.35	1.819	
4,800.0	4,800.0	4,800.0	4,800.0	8.3	8.3	-82.97	3.6	-29.5	29.7	13.0	16.70	1.781	
4,900.0	4,900.0	4,900.0	4,900.0	8.5	8.5	-82.97	3.6	-29.5	29.7	12.7	17.05	1.744	
4,954.4	4,954.4	4,954.4	4,954.4	8.6	8.6	-82.97	3.6	-29.5	29.7	12.5	17.24	1.725 CC, ES, SF	
5,000.0	5,000.0	4,998.6	4,998.8	8.7	8.7	-83.46	3.4	-30.1	30.3	12.9	17.40	1.741	

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

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Reference Well: Lybrook M28-2306 02H
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Reference Wellbore: Hz
Reference Design: Plan #2

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Offset Design Lybrook - Lybrook M28-2306 01H - Hz - Plan #2														Offset Site Error: 0.0 ft
Survey Program: 0-Geolink MWD														Offset Well Error: 0.0 ft
Reference		Offset		Semi Major Axis			Distance				Total		Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Uncertainty Axis	Separation Factor		
5,100.0	5,099.5	5,091.2	5,090.3	8.9	8.9	152.34	-0.5	-40.9	49.1	31.5	17.60	2.792		
5,200.0	5,198.1	5,170.6	5,168.7	9.1	9.0	150.48	-7.8	-61.3	95.4	77.9	17.52	5.447		
5,300.0	5,286.7	5,231.6	5,222.9	9.4	9.2	147.57	-15.8	-83.5	163.2	146.0	17.26	9.456		
5,400.0	5,368.8	5,273.8	5,260.1	9.8	9.3	141.62	-22.5	-102.1	248.0	228.9	17.12	14.364		
5,500.0	5,439.6	5,300.0	5,282.5	10.5	9.4	128.53	-27.2	-114.9	338.0	320.0	17.95	18.831		
5,600.0	5,497.2	5,312.3	5,292.8	11.5	9.5	97.29	-29.5	-121.3	434.7	414.0	20.70	20.997		
5,700.0	5,539.8	5,314.2	5,294.4	12.8	9.5	56.03	-29.8	-122.3	532.8	513.0	19.81	26.895		
5,800.0	5,573.4	5,313.7	5,294.0	14.3	9.5	62.06	-29.7	-122.0	628.9	607.0	21.82	28.825		
5,900.0	5,602.3	5,315.3	5,295.3	15.8	9.5	63.41	-30.0	-122.9	721.0	697.9	23.13	31.180		
6,000.0	5,625.7	5,318.7	5,298.1	17.3	9.5	63.57	-30.7	-124.7	808.3	784.2	24.03	33.632		
6,100.0	5,642.9	5,323.8	5,302.3	18.7	9.5	63.56	-31.7	-127.4	889.7	865.1	24.58	36.197		
6,200.0	5,653.3	5,330.7	5,307.9	19.9	9.6	63.77	-33.1	-131.2	964.6	939.8	24.79	38.911		
6,300.0	5,656.6	5,350.0	5,323.4	21.0	9.6	65.13	-37.0	-142.0	1,032.4	1,007.5	24.84	41.557		
6,400.0	5,656.2	5,350.0	5,323.4	22.2	9.6	65.13	-37.0	-142.0	1,098.5	1,072.4	26.10	42.087		
6,500.0	5,655.9	5,350.0	5,323.4	23.4	9.6	65.13	-37.0	-142.0	1,169.6	1,142.1	27.42	42.646		
6,600.0	5,655.5	5,371.0	5,339.7	24.7	9.8	66.56	-41.4	-154.4	1,244.2	1,215.1	29.09	42.768		
6,700.0	5,655.2	5,382.5	5,340.5	26.0	9.8	67.33	-43.9	-161.4	1,322.1	1,291.5	30.67	43.108		
6,800.0	5,654.8	5,412.2	5,353.8	27.4	28.9	89.96	-1,198.4	-733.3	1,324.9	1,274.9	49.99	26.504		
6,900.0	5,654.5	7,012.2	5,653.5	28.8	30.2	89.96	-1,298.4	-732.5	1,324.9	1,271.8	53.15	24.926		
7,000.0	5,654.1	7,112.2	5,653.1	30.3	31.6	89.96	-1,398.4	-731.6	1,324.9	1,268.6	56.36	23.508		
7,100.0	5,653.8	7,212.2	5,652.8	31.8	33.0	89.96	-1,498.4	-730.8	1,324.9	1,265.3	59.60	22.230		
7,200.0	5,653.4	7,312.2	5,652.4	33.3	34.5	89.96	-1,598.4	-729.9	1,324.9	1,262.1	62.87	21.074		
7,300.0	5,653.1	7,412.2	5,652.1	34.9	36.0	89.96	-1,698.4	-729.1	1,324.9	1,258.8	66.16	20.025		
7,400.0	5,652.7	7,512.2	5,651.7	36.4	37.5	89.96	-1,798.4	-728.2	1,324.9	1,255.5	69.48	19.070		
7,500.0	5,652.4	7,612.2	5,651.4	38.0	39.0	89.96	-1,898.4	-727.3	1,324.9	1,252.1	72.81	18.197		
7,600.0	5,652.0	7,712.2	5,651.0	39.0	40.5	89.96	-1,998.4	-726.5	1,324.9	1,248.8	76.16	17.397		
7,700.0	5,651.7	7,812.2	5,650.7	41.2	42.1	89.96	-2,098.4	-725.6	1,324.9	1,245.4	79.52	16.662		
7,800.0	5,651.3	7,912.2	5,650.3	42.8	43.7	89.96	-2,198.4	-724.8	1,324.9	1,242.1	82.89	15.984		
7,900.0	5,651.0	8,012.2	5,650.0	44.4	45.3	89.96	-2,298.4	-723.9	1,324.9	1,238.7	86.28	15.357		
8,000.0	5,650.6	8,112.2	5,649.6	46.1	46.9	89.96	-2,398.4	-723.1	1,325.0	1,235.3	89.67	14.775		
8,100.0	5,650.3	8,212.2	5,649.3	47.7	48.5	89.96	-2,498.4	-722.2	1,325.0	1,231.9	93.08	14.235		
8,200.0	5,649.9	8,312.2	5,648.9	49.4	50.2	89.96	-2,598.4	-721.4	1,325.0	1,228.5	96.49	13.732		
8,300.0	5,649.6	8,412.2	5,648.6	51.1	51.8	89.96	-2,698.4	-720.5	1,325.0	1,225.1	99.90	13.262		
8,400.0	5,649.2	8,512.2	5,648.2	52.7	53.4	89.96	-2,798.4	-719.7	1,325.0	1,221.6	103.33	12.823		
8,500.0	5,648.9	8,612.2	5,647.9	54.4	55.1	89.96	-2,898.4	-718.8	1,325.0	1,218.2	106.76	12.411		
8,600.0	5,648.5	8,712.2	5,647.5	56.1	56.8	89.96	-2,998.4	-718.0	1,325.0	1,214.8	110.19	12.024		
8,700.0	5,648.2	8,812.2	5,647.2	57.8	58.4	89.96	-3,098.4	-717.1	1,325.0	1,211.3	113.63	11.661		
8,800.0	5,647.9	8,912.2	5,646.8	59.5	60.1	89.96	-3,198.4	-716.3	1,325.0	1,207.9	117.07	11.318		
8,900.0	5,647.5	9,012.2	5,646.5	61.2	61.8	89.96	-3,298.4	-715.4	1,325.0	1,204.5	120.52	10.994		
9,000.0	5,647.2	9,112.2	5,646.1	62.9	63.4	89.96	-3,398.4	-714.6	1,325.0	1,201.0	123.97	10.688		
9,100.0	5,646.8	9,212.2	5,645.8	64.0	65.1	89.96	-3,498.4	-713.7	1,325.0	1,197.0	127.42	10.399		
9,200.0	5,646.5	9,312.2	5,645.4	66.3	66.8	89.96	-3,598.3	-712.9	1,325.0	1,194.1	130.88	10.124		
9,300.0	5,646.1	9,412.2	5,645.1	68.0	68.5	89.96	-3,698.3	-712.0	1,325.0	1,190.7	134.33	9.863		
9,400.0	5,645.8	9,512.2	5,644.7	69.7	70.2	89.96	-3,798.3	-711.2	1,325.0	1,187.2	137.80	9.616		
9,500.0	5,645.4	9,612.2	5,644.4	71.4	71.9	89.96	-3,898.3	-710.3	1,325.0	1,183.7	141.26	9.380		
9,600.0	5,645.1	9,712.2	5,644.0	73.1	73.6	89.96	-3,998.3	-709.5	1,325.0	1,180.3	144.72	9.155		
9,700.0	5,644.7	9,812.2	5,643.7	74.8	75.3	89.96	-4,098.3	-708.6	1,325.0	1,176.8	148.19	8.941		
9,800.0	5,644.4	9,912.2	5,643.3	76.5	77.0	89.96	-4,198.3	-707.8	1,325.0	1,173.3	151.66	8.737		
9,900.0	5,644.0	10,012.2	5,643.0	78.2	78.7	89.96	-4,298.3	-706.9	1,325.0	1,169.9	155.13	8.541		
10,000.0	5,643.7	10,112.2	5,642.7	80.0	80.4	89.96	-4,398.3	-706.1	1,325.0	1,166.4	158.61	8.354		
10,100.0	5,643.3	10,212.2	5,642.3	81.7	82.1	89.96	-4,498.3	-705.2	1,325.0	1,162.9	162.08	8.175		
10,200.0	5,643.0	10,312.2	5,642.0	83.4	83.9	89.96	-4,598.3	-704.4	1,325.0	1,159.5	165.56	8.004		

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

Cathedral Energy Services

Anticollision Report

Company: EnCana Oil & Gas (USA) Inc
 Project: Sandoval County, NM
 Reference Site: Lybrook
 Site Error: 0.0ft
 Reference Well: Lybrook M28-2306 02H
 Well Error: 0.0ft
 Reference Wellbore: Hz
 Reference Design: Plan #2

Local Co-ordinate Reference: Well Lybrook M28-2306 02H
 TVD Reference: WELL @ 7236.0ft (Original Well Elev)
 MD Reference: WELL @ 7236.0ft (Original Well Elev)
 North Reference: True
 Survey Calculation Method: Minimum Curvature
 Output errors are at 2.00 sigma
 Database: USA EDM 5000 Multi Users DB
 Offset TVD Reference: Offset Datum

Offset Design Lybrook - Lybrook M28-2306 01H - Hz - Plan #2													Offset Site Error:	0.0 ft
Survey Program: 0-Geolink MWD													Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis			Distance						Warning	
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Total Uncertainty Axis	Separation Factor		
10,300.0	5,642.0	10,412.2	5,641.6	85.1	85.6	89.96	-4,698.3	-703.5	1,325.0	1,156.0	169.03	7.839		
10,400.0	5,642.3	10,512.2	5,641.3	86.9	87.3	89.96	-4,798.3	-702.7	1,325.0	1,152.5	172.51	7.681		
10,500.0	5,641.9	10,612.2	5,640.9	88.6	89.0	89.96	-4,898.3	-701.8	1,325.0	1,149.0	175.99	7.529		
10,600.0	5,641.6	10,712.2	5,640.6	90.3	90.7	89.96	-4,998.3	-701.0	1,325.0	1,145.6	179.47	7.383		
10,700.0	5,641.2	10,812.2	5,640.2	92.0	92.5	89.96	-5,098.3	-700.1	1,325.0	1,142.1	182.95	7.243		
10,745.2	5,641.1	10,857.4	5,640.0	92.8	93.2	89.96	-5,143.5	-699.7	1,325.0	1,140.5	184.53	7.181		
10,800.0	5,640.9	10,880.0	5,640.0	93.8	93.6	89.96	-5,166.1	-699.5	1,325.4	1,139.6	185.88	7.131		
10,805.5	5,640.8	10,880.0	5,640.0	93.9	93.6	89.96	-5,166.1	-699.5	1,325.6	1,139.6	185.97	7.128		

Cathedral Energy Services

Anticollision Report

Company: EnCana Oil & Gas (USA) Inc
Project: Sandoval County, NM
Reference Site: Lybrook
Site Error: 0.0ft
Reference Well: Lybrook M28-2306 02H
Well Error: 0.0ft
Reference Wellbore: Hz
Reference Design: Plan #2

Local Co-ordinate Reference: Well Lybrook M28-2306 02H
TVD Reference: WELL @ 7236.0ft (Original Well Elev)
MD Reference: WELL @ 7236.0ft (Original Well Elev)
North Reference: True
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA EDM 5000 Multi Users DB
Offset TVD Reference: Offset Datum

Reference Depths are relative to WELL @ 7236.0ft (Original Well Elev)

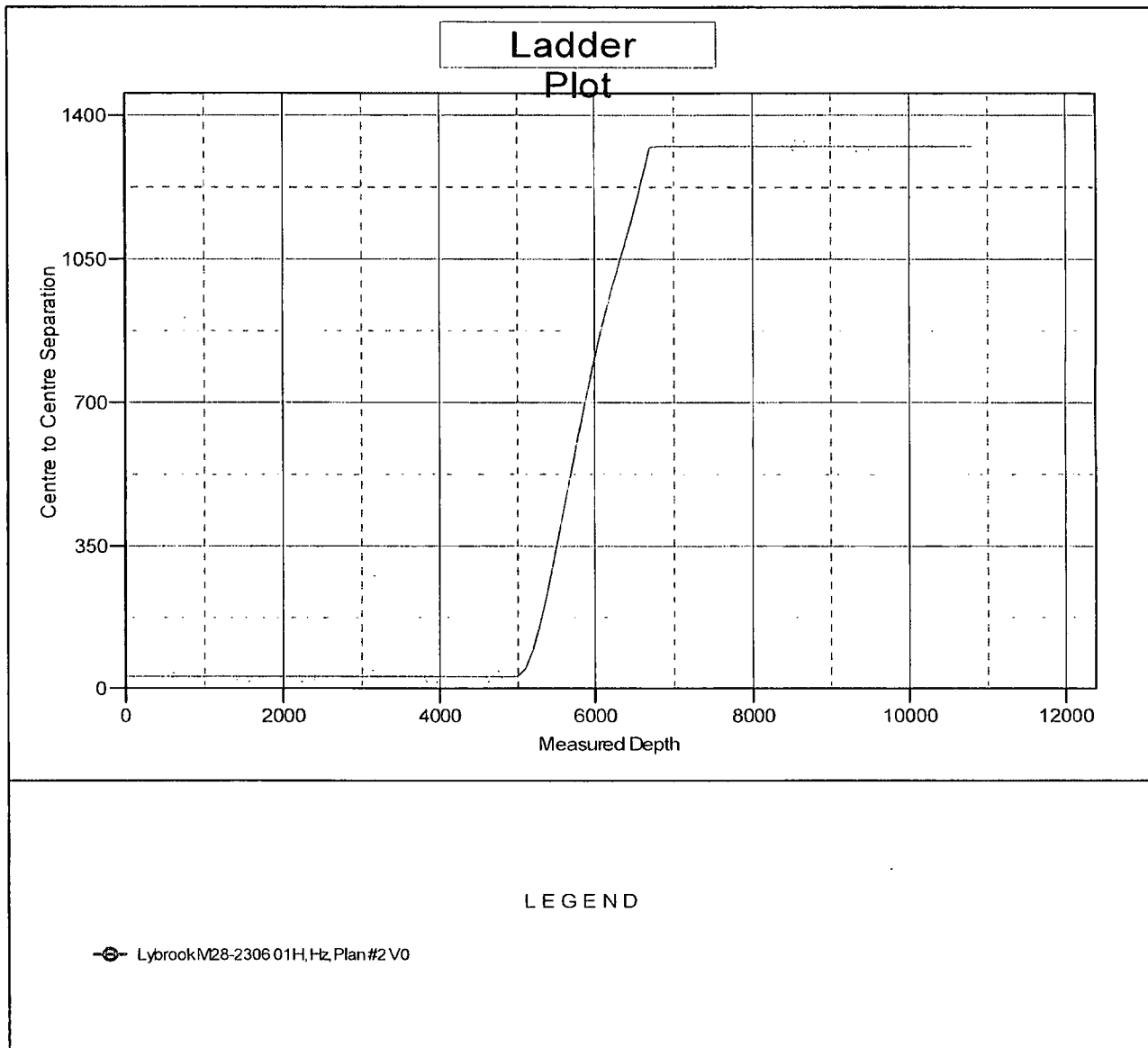
Offset Depths are relative to Offset Datum

Central Meridian is -106.250000 °

Coordinates are relative to: Lybrook M28-2306 02H

Coordinate System is US State Plane 1983, New Mexico Central Zone

Grid Convergence at Surface is: -0.73°



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

encana

Lybrook M28-2306 02H

