

State of New Mexico
Energy, Minerals and Natural Resources Department

Susana Martinez
Governor

Ken McQueen
Cabinet Secretary

Matthias Sayer
Deputy Cabinet Secretary

David R. Catanach, 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 3160-5 form.
Operator Signature Date: Original APD 3/24/2014 **Sundry Date 7/17/2017**

API WELL #	Well Name	Well #	Operator Name	Type	Stat	County	Surf_Owner	UL	Sec	Twp	N/S	Rng	W/E
30-043-21237-00-00	LYBROOK G30 2307	003H	ENCANA OIL & GAS (USA) INC.	G	N	Sandoval	F	G	30	23	N	7	W

Conditions of Approval:
(See the below checked and handwritten conditions)

- ✓ Notify Aztec OCD 24hrs prior to casing & cement. Run CBL if cement does not circulate
- ✓ 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
- ✓ Submit Gas Capture Plan form prior to spudding or initiating recompletions operations.
- ✓ Regarding Hydraulic Fracturing, review EPA Underground Injection Control Guidance 84

August 18, 2017

Page 2

- ✓ 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. Oil based mud, drilling fluids and solids must be contained in a steel closed loop system.
- ✓ Well-bore communication is regulated under 19.15.29 NMAC. This requires well-bore Communication to be reported in accordance with 19.15.29.8.
- ✓ Comply with current regulations at time of spud
Prior to production operator needs to be in compliance with RULE 19.15.5.9



NMOCD Approved by Signature

8/17/17

Date

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB No. 1004-0137
Expires: January 31, 2018

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.**

5. Lease Serial No.
NMNM 036943 & NMNM 081638

6. If Indian, Allottee or Tribe Name

N/A

SUBMIT IN TRIPLICATE - Other instructions on page 2

1. Type of Well

☒ Oil Well ☐ Gas Well ☐ Other

2. Name of Operator

Encana Oil & Gas (USA) Inc.

3a. Address

370 17th Street, Suite 1700
Denver, CO 80202

3b. Phone No. (include area code)

(720) 876-3533

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)

SHL: 1389' FNL and 2098' FEL Section 30, T23N, R7W
BHL: 2280' FSL and 330' FWL Section 19, T23N, R7W

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

NMNM 135229X

8. Well Name and No.

North Alamito Unit 236H (FKA Lybrook G30-2307 03H)

9. API Well No.

30-043-21237

10. Field and Pool or Exploratory Area

Alamito Mancos N (OIL)

11. Country or Parish, State

Sandoval County, NM

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

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

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

Encana Oil & Gas (USA) Inc. (Encana) recently finalized the formation of a 14,262.78 acre Federal exploratory unit named the North Alamito Unit, which became effective December 1, 2012.

The proposed Lybrook G30-2307 03H well, which was approved by the OCD on June 20, 2014, will now be a part of the North Alamito Unit. Encana is submitting this sundry to change the well name from the Lybrook G30-2307 03H to the North Alamito Unit 236H.

In addition to the name change, the BHL was modified to change the wellbore's orientation from oblique to transverse. Please note, the SHL footages changed slightly due to using a different surveyor to re-survey the location - the footprint of the pad is not affected.

Please find attached an updated C-102, directional drilling plan, 10-Point drilling plan, and wellbore diagram that reflect these changes. Note, the drilling plans were also updated to remove the conductor.

OIL CONS. DIV DIST. 8

AUG 10 2017

RECEIVED

JUL 21 2017

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

Katie Wegner

Title **Senior Regulatory Analyst**

**Farmington Field Office
Bureau of Land Management**

Signature

Katie Wegner

Date

07/20/2017

THE SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by

Dave Mankiewicz

Title

AFM-Min

Date

07/31/17

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

BLM-FFO

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

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

DISTRICT III
1000 Rio Brazos Rd., Artec, 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

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

**Submit one copy to appropriate
District Office**

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

¹ API Number 30-043-21237		² Pool Code 98174	³ Pool Name ALAMITO MANCOS N (OIL)
⁴ Property Code	⁵ Property Name NORTH ALAMITO UNIT		⁶ Well Number 236H
⁷ OGRID No. 282327	⁸ Operator Name ENCANA OIL & GAS (USA) INC.		⁹ Elevation 7076'

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
G	30	23N	7W		1389'	NORTH	2098'	EAST	SANDOVAL

¹¹ Bottom Hole Location If Different From Surface

UL or lot no. L	Section 19	Township 23N	Range 7W	Lot Idn 3	Feet from the 2280'	North/South line SOUTH	Feet from the 330'	East/West line WEST	County SANDOVAL
¹³ Dedicated Acres PENETRATED SPACING UNIT: SESW, N/2 of SW/4 & SWSE of Sec 19 (160.76 acres); NWNE of Sec 30 (40 acres)				¹³ Joint or Infill	¹⁴ Consolidation Code		¹⁵ Order No. R-14081-A (14,262.78 acres)		

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

FND 2 1/2" BC
GLO 1947
 FND 2 1/2" BC
GLO 1948

W/4 CORNER SEC 19

LAT. 36.212511' N (NAD83)
 LONG. 107.624291' W (NAD83)
 LAT. 36.212497' N (NAD27)
 LONG. 107.623682' W (NAD27)

NW CORNER SEC 30

LAT. 36.205211' N (NAD83)
 LONG. 107.624305' W (NAD83)
 LAT. 36.205197' N (NAD27)
 LONG. 107.623696' W (NAD27)

N/4 CORNER SEC 30

LAT. 36.205193' N (NAD83)
 LONG. 107.615396' W (NAD83)
 LAT. 36.205179' N (NAD27)
 LONG. 107.614787' W (NAD27)

WELL FLAG

LAT. 36.201373' N (NAD83)
 LONG. 107.613657' W (NAD83)
 LAT. 36.201359' N (NAD27)
 LONG. 107.613048' W (NAD27)

ENTRY POINT

LAT. 36.203621' N (NAD83)
 LONG. 107.612246' W (NAD83)
 LAT. 36.203607' N (NAD27)
 LONG. 107.611637' W (NAD27)

BOTTOM HOLE

LAT. 36.211472' N (NAD83)
 LONG. 107.623174' W (NAD83)
 LAT. 36.211458' N (NAD27)
 LONG. 107.622565' W (NAD27)

NE CORNER SEC 30

LAT. 36.205176' N (NAD83)
 LONG. 107.606555' W (NAD83)
 LAT. 36.205162' N (NAD27)
 LONG. 107.605946' W (NAD27)

17 OPERATOR CERTIFICATION

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

Katie Wegner

Signature

1/20/17

Date

Katie Wegner

Printed Name

katie.wegner@encana.com

E-mail Address

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.

FEBRUARY 9, 2017

Date of Survey

Signature and Seal of Professional Surveyor:

E/4 CORNER SEC 30

LAT. 36.197877' N (NAD83)
 LONG. 107.606539' W (NAD83)
 LAT. 36.197863' N (NAD27)
 LONG. 107.605930' W (NAD27)

Certificate Number

11393

DISTRICT I

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

DISTRICT II

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

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Phone: (505) 334-6178 Fax: (505) 334-6170

DISTRICT IV

1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3480 Fax: (505) 476-3482

State of New Mexico
Energy, Minerals & Natural Resources Department

Form C-102
Revised August 1, 2011

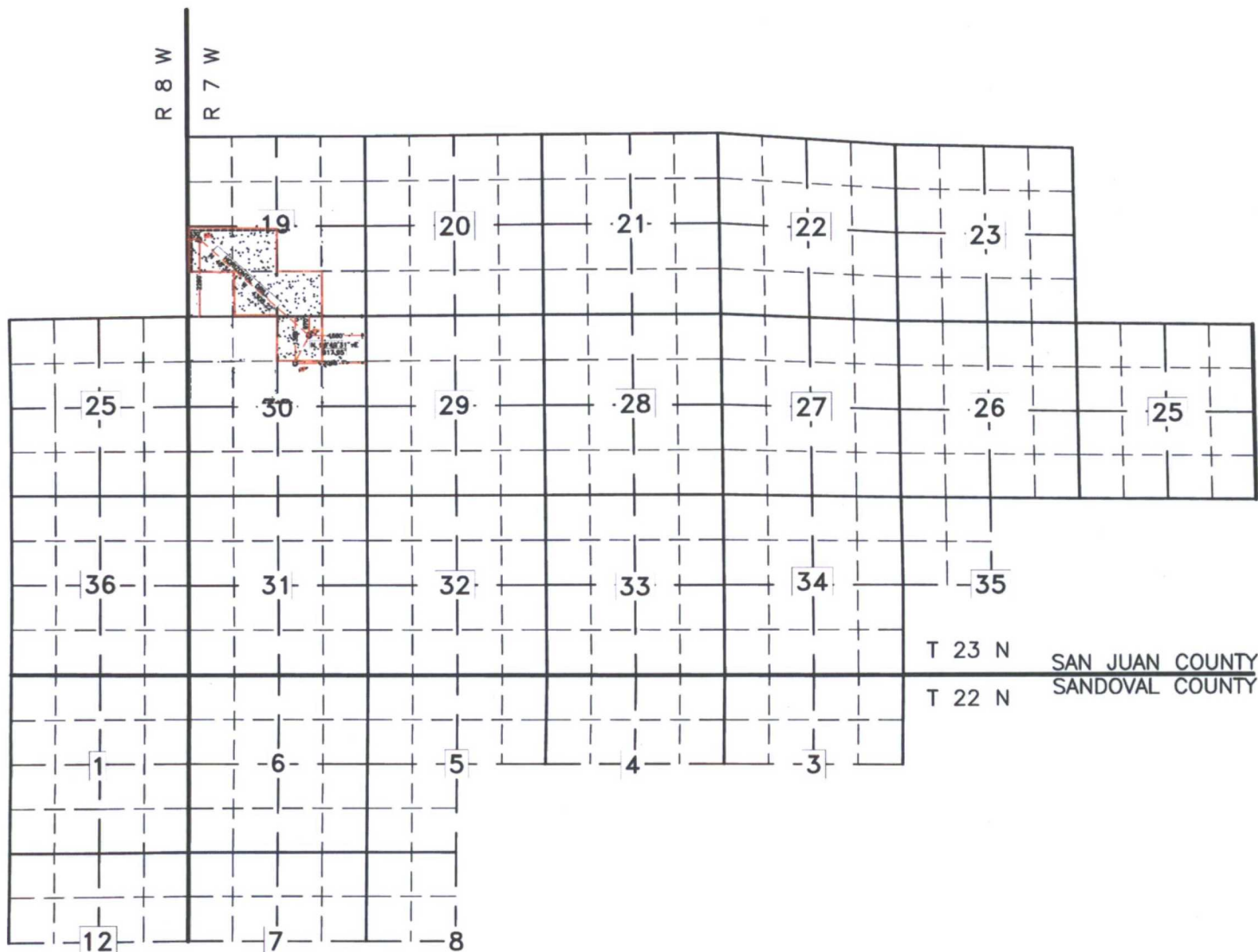
Submit one copy to appropriate
District Office

OIL CONSERVATION DIVISION

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

☐ AMENDED REPORT

ENCANA OIL & GAS (USA) INC.
NORTH ALAMITO UNIT #236H

**WELL FLAG**

LAT. 36.201373° N (NAD83)
LONG. 107.613657° W (NAD83)
LAT. 36.201359° N (NAD27)
LONG. 107.613048° W (NAD27)

ENTRY POINT

LAT. 36.203621° N (NAD83)
LONG. 107.612246° W (NAD83)
LAT. 36.203607° N (NAD27)
LONG. 107.611637° W (NAD27)

BOTTOM HOLE

LAT. 36.211472° N (NAD83)
LONG. 107.623174° W (NAD83)
LAT. 36.211458° N (NAD27)
LONG. 107.622565° W (NAD27)

PENETRATED SPACING UNIT: NWSE & S/2 of SW/4 of Sec 19 (121.5 acres); NENW & NWNE of Sec 30 (80 acres)

TOTAL 14,262.78 ACRES: T23N R7W SEC. 19-23, 25, 26-34 (ALL); 35 (NW/4); T22N R7W SEC. 3 & 4 (N/2); 5 (N/2, SW/4); 6 (ALL); 7 (N/2); 8 (NW/4); T23N R8W SEC. 25, 36 (ALL); T22N R8W SEC. 1 (ALL); SEC. 12 (N/2) - UNDIVIDED UNIT

North Alamito Unit 236H
SHL: 1389' FNL, 2098' FEL
Sec 30, T23N, R7W
BHL: 2280' FSL, 330' FWL
Sec 19, T23N, R7W
Sandoval County, NM

**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	1,087
Kirtland Shale	1,297
Fruitland Coal	1,565
Pictured Cliffs Ss.	1,683
Lewis Shale	1,805
Cliffhouse Ss.	2,499
Menefee Fn.	3,207
Point Lookout Ss.	4,041
Mancos Shale	4,245
Mancos Silt	4,768
Gallup Fn.	5,027

The referenced surface elevation is 7076', KB 7092'

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

Substance	Formation	Depth (TVD) units = feet
Water/Gas	Fruitland Coal	1,565
Water/Gas	Pictured Cliffs Ss.	1,683
Water/Gas	Cliffhouse Ss.	2,499
Water/Gas	Menefee Fn.	3,207
Water/Gas	Point Lookout Ss.	4,041
Oil/Gas	Mancos Shale	4,245
Oil/Gas	Mancos Silt	4,768
Oil/Gas	Gallup Fn.	5,027

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

3. PRESSURE CONTROL

- Pressure control equipment and configuration will be designed to meet 2M standards.
- Working pressure on rams and BOPE will be 3,000 psi.
- Function test and visual inspection of the BOP will be conducted daily and noted in the IADC Daily Drilling Report.
- The Annular BOP will be pressure tested to a minimum of 50 percent of its rated working pressure.
- Blind and Pipe Rams/BOP will be tested against a test plug to 100 percent of rated working pressure.
- Pressure tests are required before drilling out from under all casing strings set and cemented in place.
- BOP controls must be installed prior to drilling the surface casing plug and will remain in use until the well is completed or abandoned.

North Alamito Unit 236H
 SHL: 1389' FNL, 2098' FEL
 Sec 30, T23N, R7W
 BHL: 2280' FSL, 330' FWL
 Sec 19, T23N, R7W
 Sandoval County, NM

- 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
- 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 higher grade of casing may be run at the Operator's discretion, but a lower grade will not be substituted without prior approval of the BLM.

- a) The proposed casing design is as follows:

Casing	Depth (MD)	Hole Size	Csg Size	Weight	Grade
Surface	0'-320'	12 1/4"	9 5/8"	32.3	H40, STC New
Intermediate	0'-5400'	8 3/4"	7"	26	J55, LTC New
Production Liner	5200'-10011'	6 1/8"	4 1/2"	11.6	B80*, BTC New

Casing String				Casing Strength Properties			Minimum Design Factors		
Size	Weight (ppf)	Grade	Connection	Collapse (psi)	Burst (psi)	Tensile (1000lbs)	Collapse	Burst	Tension
9 5/8"	32.3	H40	STC	1370	2270	365	1.0	1.1	1.5
7"	26	J55	LTC	4330	4980	367	1.0	1.1	1.5
4.5"	11.6	B80	BTC	6350	7780	267	1.0	1.1	1.5

*B80 pipe specifications are attached

Casing design is subject to revision based on geologic conditions encountered

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.

North Alamito Unit 236H
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Sec 30, T23N, R7W
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Sec 19, T23N, R7W
Sandoval County, NM

b) The proposed cementing program is as follows

Casing	Depth (MD)	Cement Volume (sacks)	Cement Type & Yield	Designed TOC	Centralizers
Surface	0'-320'	132 sks	Class V cement w/ 2% CaCl Weight 15.6ppg Yield: 1.21 ft ³ /sk	Surface	1 per joint on bottom 3 joints
Intermediate	0'-5400'	100% open hole excess Stage 1 Lead: 657 sks Stage 1 Tail: 237 sks	Lead: Extended Class G w/ 6% BWOC bentonite + 2.5 lb/sk Kol-Seal + 0.125 lb/sk Poly-flake Weight: 12.3ppg Yield: 1.952 ft ³ /sk Tail: Extended Class G w/ 1% BWOC bentonite + 0.3% BWOC Halad-567 + 0.2% BWOC Versaset + 0.05% SA-1015 Weight: 13.5ppg Yield: 1.305 ft ³ /sk	Surface	1 every 3 joints through water bearing zones
Production Liner	5200'- 10011'	30% open hole excess Cement Vol: 437 sks	Extended Class G w/ 2.5 lb/sk Kol-seal + 0.7% BWOC Halad-567 + 0.20% BWOC Halad-9 + 0.05% SA-1015 Weight: 13.3ppg Yield: 1.36 ft ³ /sk	Top of Liner	N/A

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

North Alamito Unit 236H
 SHL: 1389' FNL, 2098' FEL
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 Sec 19, T23N, R7W
 Sandoval County, NM

All waiting on cement times shall be a minimum of 8 hours or adequate to achieve 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 4157'. Directional plans are attached.

Description	Proposed Depth (TVD/MD)	Formation
Horizontal Lateral TD	5112'/10011'	Gallup

6. DRILLING FLUIDS PROGRAM

a) Surface through Intermediate Casing Point:

Hole Size (in)	Depth (TVD/MD)	Mud Type	Density (ppg)	Viscosity (sec/qt)	Fluid Loss (cc)
12 1/4"	0'-320'/320'	Fresh Water	0	60-70	NC
8 3/4"	320'/320'-5042'/5400'	Fresh Water LSND	8.3-10	40-50	8-10

b) Intermediate Casing Point to TD:

Hole Size (in)	Depth (TVD/MD)	Mud Type	Density (ppg)	Viscosity (sec/qt)	Fluid Loss (cc)
6 1/8"	5042'/5400'- 5112'/10011'	Fresh Water LSND	8.3-10	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. 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, & LOGGING

- a) Drill Stem Testing - None anticipated.
- b) Coring - None anticipated.
- c) Mud Logging - Mancos Top to TD
- d) Logging - See below
- Cased Hole:
 CBL/CCL/GR/VDL will be run as needed for perforating control

8. ABNORMAL PRESSURES & HYDROGEN SULFIDE

The anticipated bottom hole pressure is +/- 2489 psi based on a 9.0 ppg at 5319' TVD of the horizontal lateral target. 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.

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Sandoval County, NM

9. ANTICIPATED START DATE AND DURATION OF OPERATIONS

Drilling is estimated to commence on January 1st, 2018. 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 10 days.

ENCANA™

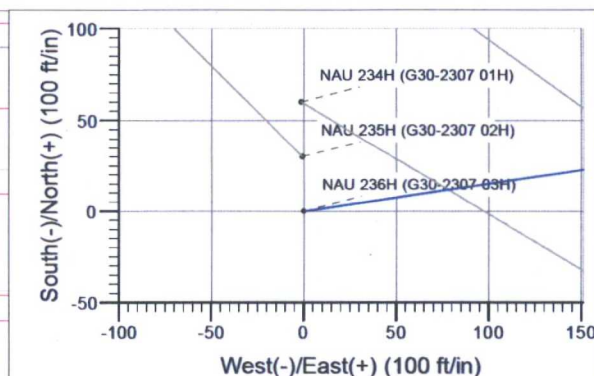
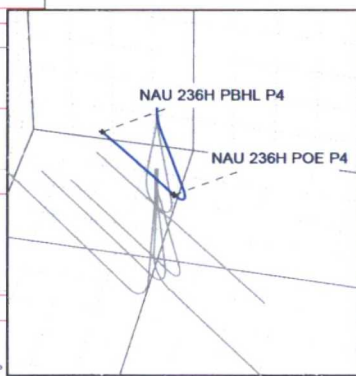
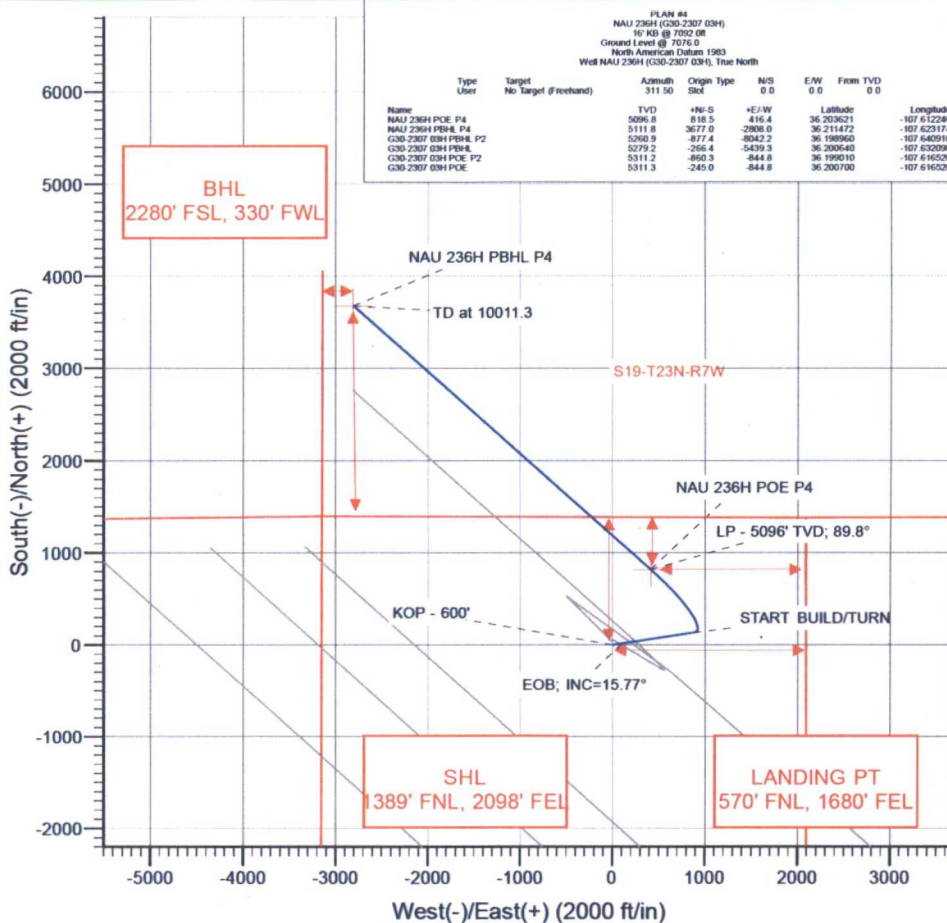
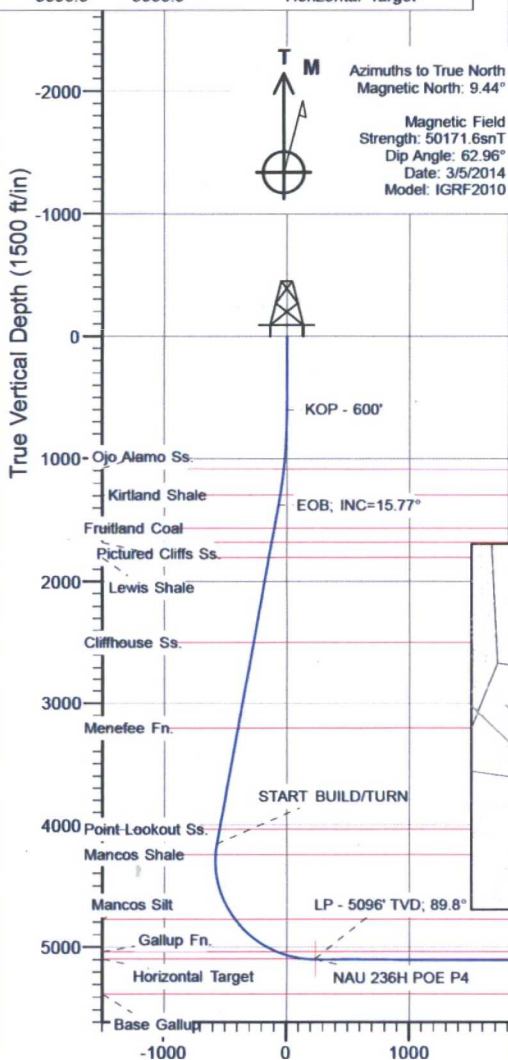
Project: Sandoval County, NM
 Site: S30-T23N-R7W
 Well: NAU 236H (G30-2307 03H)
 Wellbore: HZ
 Design: PLAN #4

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	600.0	0.00	0.00	600.0	0.0	0.0	0.00	0.00	0.0	
3	1388.6	15.77	81.39	1378.7	16.2	106.7	2.00	81.39	-69.2	
4	4276.1	15.77	81.39	4157.5	133.7	882.7	0.00	0.00	-572.5	
5	5702.3	89.80	311.56	5096.8	818.5	416.4	7.00	-128.79	230.5	NAU 236H POE P4
6	10011.3	89.80	311.56	5111.8	3677.0	-2808.0	0.00	0.00	4539.5	NAU 236H PBHL P4

FORMATION TOP DETAILS

TVDPATH	MDPATH	FORMATION
1087.0	1089.4	Ojo Alamo Ss.
1297.0	1304.1	Kirtland Shale
1565.0	1582.2	Fruitland Coal
1683.0	1704.8	Pictured Cliffs Ss.
1805.0	1831.6	Lewis Shale
2499.0	2552.8	Cliffhouse Ss.
3207.0	3288.5	Menefee Fn.
4041.0	4155.1	Point Lookout Ss.
4245.0	4366.4	Mancos Shale
4779.0	4949.0	Mancos Silt
5038.0	5389.4	Gallup Fn.
5096.0	5668.5	Horizontal Target



Vertical Section at 311.50° (1500 ft/in)

WELL DETAILS: NAU 236H (G30-2307 03H)

+N/-S	+E/-W	Northing	Ground Level:	Easting	Latitude	Longitude
0.0	0.0	1895397.58	7076.0	1238089.67	36.201373	-107.613657

CATHEDRAL



Cathedral Energy Services

Planning Report

Database:	USA EDM 5000 Multi Users DB	Local Co-ordinate Reference:	Well NAU 236H (G30-2307 03H)
Company:	EnCana Oil & Gas (USA) Inc	TVD Reference:	16' KB @ 7092.0ft
Project:	Sandoval County, NM	MD Reference:	16' KB @ 7092.0ft
Site:	S30-T23N-R7W	North Reference:	True
Well:	NAU 236H (G30-2307 03H)	Survey Calculation Method:	Minimum Curvature
Wellbore:	HZ		
Design:	PLAN #4		

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	S30-T23N-R7W			
Site Position:		Northing:	1,891,883.94 ft	Latitude: 36.191750
From:	Lat/Long	Easting:	1,238,783.16 ft	Longitude: -107.611140
Position Uncertainty:	0.0 ft	Slot Radius:	13.200 in	Grid Convergence: -0.80 °

Well	NAU 236H (G30-2307 03H)			
Well Position	+N/-S	0.0 ft	Northing:	1,895,397.58 ft
	+E/-W	0.0 ft	Easting:	1,238,089.67 ft
Position Uncertainty	0.0 ft	Wellhead Elevation:	ft	Ground Level: 7,076.0 ft

Wellbore	HZ				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	3/5/2014	9.44	62.96	50,171.58408916

Design	PLAN #4			
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	311.50

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	
600.0	0.00	0.00	600.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,388.6	15.77	81.39	1,378.7	16.2	106.7	2.00	2.00	0.00	81.39	
4,276.1	15.77	81.39	4,157.5	133.7	882.7	0.00	0.00	0.00	0.00	
5,702.3	89.80	311.56	5,096.8	818.5	416.4	7.00	5.19	-9.10	-128.79	NAU 236H POE P4
10,011.3	89.80	311.56	5,111.8	3,677.0	-2,808.0	0.00	0.00	0.00	0.00	NAU 236H PBHL P4

Cathedral Energy Services

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Wellbore: HZ
Design: PLAN #4

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:

Well NAU 236H (G30-2307 03H)
16' KB @ 7092.0ft
16' KB @ 7092.0ft
True
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	
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	KOP - 600'
700.0	2.00	81.39	700.0	0.3	1.7	-1.1	2.00	2.00	
800.0	4.00	81.39	799.8	1.0	6.9	-4.5	2.00	2.00	
900.0	6.00	81.39	899.5	2.4	15.5	-10.1	2.00	2.00	
1,000.0	8.00	81.39	998.7	4.2	27.6	-17.9	2.00	2.00	
1,089.4	9.79	81.39	1,087.0	6.2	41.2	-26.7	2.00	2.00	Ojo Alamo Ss.
1,100.0	10.00	81.39	1,097.5	6.5	43.0	-27.9	2.00	2.00	
1,200.0	12.00	81.39	1,195.6	9.4	61.9	-40.1	2.00	2.00	
1,300.0	14.00	81.39	1,293.1	12.7	84.1	-54.6	2.00	2.00	
1,304.1	14.08	81.39	1,297.0	12.9	85.1	-55.2	2.00	2.00	Kirtland Shale
1,388.6	15.77	81.39	1,378.7	16.2	106.7	-69.2	2.00	2.00	EOB; INC=15.77°
1,400.0	15.77	81.39	1,389.6	16.6	109.7	-71.2	0.00	0.00	
1,500.0	15.77	81.39	1,485.9	20.7	136.6	-88.6	0.00	0.00	
1,582.2	15.77	81.39	1,565.0	24.0	158.7	-102.9	0.00	0.00	Fruitland Coal
1,600.0	15.77	81.39	1,582.1	24.8	163.5	-106.0	0.00	0.00	
1,700.0	15.77	81.39	1,678.4	28.8	190.3	-123.4	0.00	0.00	
1,704.8	15.77	81.39	1,683.0	29.0	191.6	-124.3	0.00	0.00	Pictured Cliffs Ss.
1,800.0	15.77	81.39	1,774.6	32.9	217.2	-140.9	0.00	0.00	
1,831.6	15.77	81.39	1,805.0	34.2	225.7	-146.4	0.00	0.00	Lewis Shale
1,900.0	15.77	81.39	1,870.8	37.0	244.1	-158.3	0.00	0.00	
2,000.0	15.77	81.39	1,967.1	41.0	271.0	-175.7	0.00	0.00	
2,100.0	15.77	81.39	2,063.3	45.1	297.8	-193.2	0.00	0.00	
2,200.0	15.77	81.39	2,159.5	49.2	324.7	-210.6	0.00	0.00	
2,300.0	15.77	81.39	2,255.8	53.3	351.6	-228.0	0.00	0.00	
2,400.0	15.77	81.39	2,352.0	57.3	378.5	-245.5	0.00	0.00	
2,500.0	15.77	81.39	2,448.2	61.4	405.3	-262.9	0.00	0.00	
2,552.8	15.77	81.39	2,499.0	63.5	419.5	-272.1	0.00	0.00	Cliffhouse Ss.
2,600.0	15.77	81.39	2,544.5	65.5	432.2	-280.3	0.00	0.00	
2,700.0	15.77	81.39	2,640.7	69.5	459.1	-297.8	0.00	0.00	
2,800.0	15.77	81.39	2,736.9	73.6	486.0	-315.2	0.00	0.00	
2,900.0	15.77	81.39	2,833.2	77.7	512.8	-332.6	0.00	0.00	
3,000.0	15.77	81.39	2,929.4	81.7	539.7	-350.1	0.00	0.00	
3,100.0	15.77	81.39	3,025.6	85.8	566.6	-367.5	0.00	0.00	
3,200.0	15.77	81.39	3,121.9	89.9	593.5	-384.9	0.00	0.00	
3,288.5	15.77	81.39	3,207.0	93.5	617.2	-400.3	0.00	0.00	Menefee Fn.
3,300.0	15.77	81.39	3,218.1	94.0	620.3	-402.4	0.00	0.00	
3,400.0	15.77	81.39	3,314.3	98.0	647.2	-419.8	0.00	0.00	
3,500.0	15.77	81.39	3,410.6	102.1	674.1	-437.2	0.00	0.00	
3,600.0	15.77	81.39	3,506.8	106.2	701.0	-454.6	0.00	0.00	
3,700.0	15.77	81.39	3,603.0	110.2	727.9	-472.1	0.00	0.00	
3,800.0	15.77	81.39	3,699.3	114.3	754.7	-489.5	0.00	0.00	
3,900.0	15.77	81.39	3,795.5	118.4	781.6	-506.9	0.00	0.00	
4,000.0	15.77	81.39	3,891.7	122.5	808.5	-524.4	0.00	0.00	
4,100.0	15.77	81.39	3,988.0	126.5	835.4	-541.8	0.00	0.00	
4,155.1	15.77	81.39	4,041.0	128.8	850.2	-551.4	0.00	0.00	Point Lookout Ss.
4,200.0	15.77	81.39	4,084.2	130.6	862.2	-559.2	0.00	0.00	

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Well NAU 236H (G30-2307 03H)
16' KB @ 7092.0ft
16' KB @ 7092.0ft
True
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
4,276.1	15.77	81.39	4,157.5	133.7	882.7	-572.5	0.00	0.00	START BUILD/TURN
4,300.0	14.78	76.28	4,180.5	134.9	888.9	-576.3	7.00	-4.15	
4,366.4	12.78	58.57	4,245.0	140.7	903.4	-583.3	7.00	-3.02	Mancos Shale
4,400.0	12.31	47.93	4,277.8	145.1	909.2	-584.8	7.00	-1.40	
4,500.0	13.45	16.54	4,375.4	163.4	920.4	-581.1	7.00	1.14	
4,600.0	17.52	354.90	4,471.9	189.6	922.4	-565.2	7.00	4.07	
4,700.0	23.01	342.22	4,565.7	223.2	915.1	-537.5	7.00	5.49	
4,800.0	29.12	334.42	4,655.5	263.8	898.6	-498.2	7.00	6.12	
4,900.0	35.54	329.18	4,740.0	310.8	873.2	-448.0	7.00	6.42	
4,949.0	38.75	327.18	4,779.0	335.9	857.6	-419.7	7.00	6.55	Mancos Silt
5,000.0	42.13	325.38	4,817.8	363.4	839.2	-387.7	7.00	6.62	
5,100.0	48.81	322.45	4,887.9	420.9	797.1	-318.1	7.00	6.68	
5,200.0	55.55	320.07	4,949.2	482.4	747.7	-240.3	7.00	6.74	
5,300.0	62.34	318.04	5,000.8	547.1	691.5	-155.4	7.00	6.78	
5,389.4	68.42	316.43	5,038.0	606.7	636.4	-74.6	7.00	6.81	Gallup Fn.
5,400.0	69.14	316.25	5,041.8	613.8	629.5	-64.8	7.00	6.82	
5,500.0	75.97	314.62	5,071.8	681.7	562.6	30.4	7.00	6.82	
5,600.0	82.80	313.08	5,090.2	749.8	491.8	128.5	7.00	6.84	
5,668.5	87.49	312.06	5,096.0	795.9	441.5	196.7	7.00	6.84	Horizontal Target
5,700.0	89.64	311.59	5,096.8	816.9	418.1	228.2	7.00	6.84	
5,702.3	89.80	311.56	5,096.8	818.5	416.4	230.5	7.00	6.84	LP - 5096' TVD; 89.8°
5,800.0	89.80	311.56	5,097.1	883.3	343.2	328.2	0.00	0.00	
5,900.0	89.80	311.56	5,097.5	949.6	268.4	428.2	0.00	0.00	
6,000.0	89.80	311.56	5,097.8	1,016.0	193.6	528.2	0.00	0.00	
6,100.0	89.80	311.56	5,098.2	1,082.3	118.8	628.2	0.00	0.00	
6,200.0	89.80	311.56	5,098.5	1,148.6	43.9	728.2	0.00	0.00	
6,300.0	89.80	311.56	5,098.9	1,215.0	-30.9	828.2	0.00	0.00	
6,400.0	89.80	311.56	5,099.2	1,281.3	-105.7	928.2	0.00	0.00	
6,500.0	89.80	311.56	5,099.6	1,347.7	-180.6	1,028.2	0.00	0.00	
6,600.0	89.80	311.56	5,099.9	1,414.0	-255.4	1,128.2	0.00	0.00	
6,700.0	89.80	311.56	5,100.3	1,480.3	-330.2	1,228.2	0.00	0.00	
6,800.0	89.80	311.56	5,100.6	1,546.7	-405.0	1,328.2	0.00	0.00	
6,900.0	89.80	311.56	5,101.0	1,613.0	-479.9	1,428.2	0.00	0.00	
7,000.0	89.80	311.56	5,101.3	1,679.3	-554.7	1,528.2	0.00	0.00	
7,100.0	89.80	311.56	5,101.7	1,745.7	-629.5	1,628.2	0.00	0.00	
7,200.0	89.80	311.56	5,102.0	1,812.0	-704.3	1,728.2	0.00	0.00	
7,300.0	89.80	311.56	5,102.4	1,878.4	-779.2	1,828.2	0.00	0.00	
7,400.0	89.80	311.56	5,102.7	1,944.7	-854.0	1,928.2	0.00	0.00	
7,500.0	89.80	311.56	5,103.1	2,011.0	-928.8	2,028.2	0.00	0.00	
7,600.0	89.80	311.56	5,103.4	2,077.4	-1,003.7	2,128.2	0.00	0.00	
7,700.0	89.80	311.56	5,103.8	2,143.7	-1,078.5	2,228.2	0.00	0.00	
7,800.0	89.80	311.56	5,104.1	2,210.1	-1,153.3	2,328.2	0.00	0.00	
7,900.0	89.80	311.56	5,104.5	2,276.4	-1,228.1	2,428.2	0.00	0.00	
8,000.0	89.80	311.56	5,104.8	2,342.7	-1,303.0	2,528.2	0.00	0.00	
8,100.0	89.80	311.56	5,105.2	2,409.1	-1,377.8	2,628.2	0.00	0.00	
8,200.0	89.80	311.56	5,105.5	2,475.4	-1,452.6	2,728.2	0.00	0.00	
8,300.0	89.80	311.56	5,105.9	2,541.8	-1,527.4	2,828.2	0.00	0.00	
8,400.0	89.80	311.56	5,106.2	2,608.1	-1,602.3	2,928.2	0.00	0.00	
8,500.0	89.80	311.56	5,106.6	2,674.4	-1,677.1	3,028.2	0.00	0.00	
8,600.0	89.80	311.56	5,106.9	2,740.8	-1,751.9	3,128.2	0.00	0.00	
8,700.0	89.80	311.56	5,107.3	2,807.1	-1,826.7	3,228.2	0.00	0.00	
8,800.0	89.80	311.56	5,107.6	2,873.4	-1,901.6	3,328.2	0.00	0.00	

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16' KB @ 7092.0ft
16' KB @ 7092.0ft
True
Minimum Curvature

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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	89.80	311.56	5,108.0	2,939.8	-1,976.4	3,428.2	0.00	0.00	
9,000.0	89.80	311.56	5,108.3	3,006.1	-2,051.2	3,528.2	0.00	0.00	
9,100.0	89.80	311.56	5,108.7	3,072.5	-2,126.1	3,628.2	0.00	0.00	
9,200.0	89.80	311.56	5,109.0	3,138.8	-2,200.9	3,728.2	0.00	0.00	
9,300.0	89.80	311.56	5,109.4	3,205.1	-2,275.7	3,828.2	0.00	0.00	
9,400.0	89.80	311.56	5,109.7	3,271.5	-2,350.5	3,928.2	0.00	0.00	
9,500.0	89.80	311.56	5,110.1	3,337.8	-2,425.4	4,028.2	0.00	0.00	
9,600.0	89.80	311.56	5,110.4	3,404.2	-2,500.2	4,128.2	0.00	0.00	
9,700.0	89.80	311.56	5,110.8	3,470.5	-2,575.0	4,228.2	0.00	0.00	
9,800.0	89.80	311.56	5,111.1	3,536.8	-2,649.8	4,328.2	0.00	0.00	
9,900.0	89.80	311.56	5,111.5	3,603.2	-2,724.7	4,428.2	0.00	0.00	
10,000.0	89.80	311.56	5,111.8	3,669.5	-2,799.5	4,528.2	0.00	0.00	
10,011.3	89.80	311.56	5,111.8	3,677.0	-2,808.0	4,539.5	0.00	0.00	TD at 10011.3

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
NAU 236H POE P4 - plan hits target center - Point	0.00	0.00	5,096.8	818.5	416.4	1,896,210.11	1,238,517.48	36.203621	-107.612246
G30-2307 03H PBHL P2 - plan misses target center by 6939.9ft at 10011.3ft MD (5111.8 TVD, 3677.0 N, -2808.0 E) - Point	0.00	0.00	5,260.9	-877.4	-8,042.2	1,894,633.32	1,230,035.93	36.198960	-107.640910
NAU 236H PBHL P4 - plan hits target center - Point	0.00	0.00	5,111.8	3,677.0	-2,808.0	1,899,113.71	1,235,333.69	36.211472	-107.623174
G30-2307 03H POE P2 - plan misses target center by 2101.3ft at 5466.3ft MD (5063.0 TVD, 658.8 N, 585.7 E) - Point	0.00	0.00	5,311.2	-860.3	-844.8	1,894,549.23	1,237,232.81	36.199010	-107.616520
G30-2307 03H POE - plan misses target center by 1646.4ft at 5941.2ft MD (5097.6 TVD, 977.0 N, 237.5 E) - Point	0.00	0.00	5,311.3	-245.0	-844.8	1,895,164.47	1,237,241.47	36.200700	-107.616520
G30-2307 03H PBHL - plan misses target center by 4699.4ft at 9364.9ft MD (5109.6 TVD, 3248.2 N, -2324.3 E) - Point	0.00	0.00	5,279.2	-266.4	-5,439.3	1,895,207.72	1,232,647.12	36.200640	-107.632090

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Well NAU 236H (G30-2307 03H)
 16' KB @ 7092.0ft
 16' KB @ 7092.0ft
 True
 Minimum Curvature

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,089.4	1,087.0	Ojo Alamo Ss.		0.20	
1,304.1	1,297.0	Kirtland Shale			
1,582.2	1,565.0	Fruitland Coal			
1,704.8	1,683.0	Pictured Cliffs Ss.			
1,831.6	1,805.0	Lewis Shale			
2,552.8	2,499.0	Cliffhouse Ss.			
3,288.5	3,207.0	Menefee Fn.			
4,155.1	4,041.0	Point Lookout Ss.			
4,366.4	4,245.0	Mancos Shale			
4,949.0	4,779.0	Mancos Silt			
5,389.4	5,038.0	Gallup Fn.			
5,668.5	5,096.0	Horizontal Target			

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
600.0	600.0	0.0	0.0	KOP - 600'
1,388.6	1,378.7	16.2	106.7	EOB; INC=15.77°
4,276.1	4,157.5	133.7	882.7	START BUILD/TURN
5,702.3	5,096.8	818.5	416.4	LP - 5096' TVD; 89.8°
10,011.3	5,111.8	3,677.0	-2,808.0	TD at 10011.3

EnCana Oil & Gas (USA) Inc

Sandoval County, NM

S30-T23N-R7W

NAU 236H (G30-2307 03H)

HZ

PLAN #4

Anticollision Report

22 June, 2017

Cathedral Energy Services

Anticollision Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well NAU 236H (G30-2307 03H)
Project:	Sandoval County, NM	TVD Reference:	16' KB @ 7092.0ft
Reference Site:	S30-T23N-R7W	MD Reference:	16' KB @ 7092.0ft
Site Error:	0.0ft	North Reference:	True
Reference Well:	NAU 236H (G30-2307 03H)	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 #4	Offset TVD Reference:	Offset Datum

Reference	PLAN #4		
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 1,195.9ft	Error Surface:	Pedal Curve
Warning Levels Evaluated at:	2.00 Sigma		

Survey Tool Program	Date 6/22/2017				
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
0.0	10,011.3	PLAN #4 (HZ)	MWD+HDGM	OWSG MWD + HDGM	

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						
S30-T23N-R7W						
NAU 234H (G30-2307 01H) - HZ - PLAN #5	811.8	811.7	59.6	54.2	11.057	CC
NAU 234H (G30-2307 01H) - HZ - PLAN #5	900.0	900.5	60.1	54.1	9.982	ES
NAU 234H (G30-2307 01H) - HZ - PLAN #5	9,406.7	9,579.6	722.9	496.7	3.196	SF
NAU 235H (G30-2307 02H) - HZ - PLAN #5	709.6	709.6	30.0	25.4	6.437	CC, ES
NAU 235H (G30-2307 02H) - HZ - PLAN #5	800.0	798.9	31.6	26.3	5.969	SF
NAU 238H (O30-2307 01H) - OH - PLAN #5						Out of range
NAU 239H (O30-2307 02H) - Hz - PLAN #7						Out of range
NAU 240H (O30-2307 03H) - Hz - PLAN #4						Out of range
NAU 241H (O30-2307 04H) - HZ - PLAN #3						Out of range

Cathedral Energy Services

Anticollision Report

Company: EnCana Oil & Gas (USA) Inc
Project: Sandoval County, NM
Reference Site: S30-T23N-R7W
Site Error: 0.0ft
Reference Well: NAU 236H (G30-2307 03H)
Well Error: 0.0ft
Reference Wellbore: HZ
Reference Design: PLAN #4

Local Co-ordinate Reference: Well NAU 236H (G30-2307 03H)
TVD Reference: 16' KB @ 7092.0ft
MD Reference: 16' KB @ 7092.0ft
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 S30-T23N-R7W - NAU 234H (G30-2307 01H) - HZ - PLAN #5													Offset Site Error:	0.0 ft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.0 ft
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	Warning	
0.0	0.0	0.0	0.0	0.0	0.0	-1.13	60.1	-1.2	60.1					
100.0	100.0	100.0	100.0	0.2	0.2	-1.13	60.1	-1.2	60.1	59.8	0.30	199.541		
200.0	200.0	200.0	200.0	0.5	0.5	-1.13	60.1	-1.2	60.1	59.1	1.02	59.019		
300.0	300.0	300.0	300.0	0.9	0.9	-1.13	60.1	-1.2	60.1	58.4	1.74	34.631		
400.0	400.0	400.0	400.0	1.2	1.2	-1.13	60.1	-1.2	60.1	57.6	2.45	24.505		
500.0	500.0	500.0	500.0	1.6	1.6	-1.13	60.1	-1.2	60.1	56.9	3.17	18.961		
600.0	600.0	600.0	600.0	1.9	1.9	-1.13	60.1	-1.2	60.1	56.2	3.89	15.463		
700.0	700.0	700.0	700.0	2.3	2.3	-84.17	60.1	-1.2	59.9	55.3	4.60	13.029		
800.0	799.8	800.2	799.8	2.6	2.7	-89.18	60.1	-1.2	59.6	54.3	5.30	11.232		
811.8	811.7	811.7	811.7	2.7	2.7	-90.00	60.1	-1.2	59.6	54.2	5.39	11.057 CC		
900.0	899.5	900.5	899.5	3.0	3.0	-97.48	60.1	-1.2	60.1	54.1	6.02	9.982 ES		
1,000.0	998.7	998.7	998.7	3.4	3.4	-108.43	60.1	-1.2	62.9	56.1	6.74	9.333		
1,100.0	1,097.5	1,099.7	1,099.7	3.7	3.7	-120.35	59.2	0.3	67.8	60.4	7.45	9.107		
1,200.0	1,195.6	1,200.9	1,200.8	4.1	4.1	-131.88	56.4	4.8	74.1	66.0	8.15	9.094		
1,300.0	1,293.1	1,302.3	1,301.7	4.6	4.4	-142.88	51.8	12.4	82.1	73.3	8.85	9.281		
1,400.0	1,389.6	1,403.6	1,402.3	5.0	4.8	-153.16	45.3	23.1	92.1	82.6	9.54	9.657		
1,500.0	1,485.9	1,505.2	1,502.6	5.5	5.1	-162.27	37.0	36.8	102.5	92.3	10.23	10.015		
1,600.0	1,582.1	1,606.5	1,602.0	6.0	5.5	-170.41	26.9	53.4	111.8	100.9	10.95	10.213		
1,700.0	1,678.4	1,704.9	1,698.3	6.5	5.9	-177.33	16.4	70.6	122.0	110.3	11.71	10.418		
1,800.0	1,774.6	1,803.4	1,794.7	7.0	6.3	176.86	6.0	87.8	133.7	121.2	12.50	10.696		
1,900.0	1,870.8	1,901.9	1,891.1	7.5	6.7	172.02	-4.5	104.9	146.6	133.3	13.32	11.007		
2,000.0	1,967.1	2,000.3	1,987.5	8.0	7.1	167.97	-15.0	122.1	160.3	146.2	14.15	11.327		
2,100.0	2,063.3	2,098.8	2,083.9	8.5	7.6	164.57	-25.4	139.3	174.7	159.7	15.01	11.642		
2,200.0	2,159.5	2,202.8	2,180.3	9.1	8.0	161.69	-35.9	156.5	189.6	173.7	15.90	11.927		
2,300.0	2,255.8	2,304.3	2,276.7	9.6	8.5	159.23	-46.3	173.7	205.0	188.2	16.79	12.204		
2,400.0	2,352.0	2,405.8	2,373.1	10.1	8.9	157.12	-56.8	190.8	220.6	202.9	17.70	12.465		
2,500.0	2,448.2	2,507.4	2,469.5	10.7	9.4	155.28	-67.2	208.0	236.5	217.9	18.61	12.708		
2,600.0	2,544.5	2,608.9	2,565.8	11.2	9.8	153.68	-77.7	225.2	252.6	233.1	19.53	12.934		
2,700.0	2,640.7	2,689.6	2,662.2	11.7	10.2	152.27	-88.1	242.4	268.9	248.5	20.36	13.204		
2,800.0	2,736.9	2,788.0	2,758.6	12.3	10.6	151.02	-98.6	259.6	285.3	264.0	21.28	13.408		
2,900.0	2,833.2	2,886.5	2,855.0	12.8	11.1	149.90	-109.0	276.7	301.8	279.6	22.20	13.597		
3,000.0	2,929.4	2,985.0	2,951.4	13.4	11.5	148.91	-119.5	293.9	318.4	295.3	23.12	13.774		
3,100.0	3,025.6	3,083.4	3,047.8	13.9	12.0	148.01	-129.9	311.1	335.1	311.1	24.04	13.939		
3,200.0	3,121.9	3,181.9	3,144.2	14.4	12.4	147.19	-140.4	328.3	351.9	327.0	24.97	14.093		
3,300.0	3,218.1	3,280.3	3,240.6	15.0	12.9	146.45	-150.8	345.5	368.8	342.9	25.90	14.237		
3,400.0	3,314.3	3,378.8	3,336.9	15.5	13.3	145.78	-161.3	362.6	385.7	358.8	26.83	14.373		
3,500.0	3,410.6	3,477.3	3,433.3	16.1	13.8	145.16	-171.7	379.8	402.6	374.9	27.77	14.499		
3,600.0	3,506.8	3,575.7	3,529.7	16.6	14.2	144.59	-182.2	397.0	419.6	390.9	28.70	14.619		
3,700.0	3,603.0	3,674.2	3,626.1	17.2	14.7	144.07	-192.6	414.2	436.7	407.0	29.64	14.731		
3,800.0	3,699.3	3,772.7	3,722.5	17.7	15.1	143.58	-203.1	431.4	453.7	423.1	30.58	14.837		
3,900.0	3,795.5	3,871.1	3,818.9	18.2	15.6	143.13	-213.6	448.5	470.8	439.3	31.52	14.937		
4,000.0	3,891.7	3,969.6	3,915.3	18.8	16.0	142.71	-224.0	465.7	487.9	455.5	32.46	15.032		
4,100.0	3,988.0	4,068.1	4,011.7	19.3	16.5	142.32	-234.5	482.9	505.1	471.7	33.40	15.121		
4,200.0	4,084.2	4,166.5	4,108.0	19.9	16.9	141.96	-244.9	500.1	522.2	487.9	34.34	15.206		
4,300.0	4,180.5	4,265.0	4,204.4	20.4	17.4	146.80	-255.4	517.2	539.4	504.1	35.29	15.287		
4,400.0	4,277.8	4,362.7	4,300.1	20.9	17.8	174.37	-265.7	534.3	556.6	520.4	36.23	15.362		
4,500.0	4,375.4	4,459.2	4,394.8	21.3	18.3	-155.94	-274.9	550.0	574.2	537.1	37.16	15.453		
4,600.0	4,471.9	4,558.0	4,493.2	21.6	18.6	-136.04	-277.4	558.3	592.5	554.6	37.96	15.608		
4,700.0	4,565.7	4,659.9	4,594.8	21.8	18.9	-125.04	-271.7	557.6	611.2	572.6	38.64	15.818		
4,800.0	4,655.5	4,765.2	4,698.5	22.0	19.2	-118.85	-257.0	546.9	629.9	590.7	39.23	16.058		
4,900.0	4,740.0	4,874.3	4,802.6	22.2	19.4	-115.16	-232.7	525.3	648.3	608.5	39.76	16.306		
5,000.0	4,817.8	4,987.4	4,905.0	22.3	19.6	-112.87	-198.1	492.2	665.8	625.5	40.27	16.533		

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: S30-T23N-R7W
Site Error: 0.0ft
Reference Well: NAU 236H (G30-2307 03H)
Well Error: 0.0ft
Reference Wellbore: HZ
Reference Design: PLAN #4

Local Co-ordinate Reference: Well NAU 236H (G30-2307 03H)
TVD Reference: 16' KB @ 7092.0ft
MD Reference: 16' KB @ 7092.0ft
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 S30-T23N-R7W - NAU 234H (G30-2307 01H) - HZ - PLAN #5														Offset Site Error: 0.0 ft	
Survey Program: 0-MWD+HDGM														Offset Well Error: 0.0 ft	
Reference		Offset		Semi Major Axis			Distance							Warning	
Measured Depth	Vertical Depth	Measured Depth	Vertical Depth	Reference	Offset	Highside Toolface	Offset Wellbore Centre		Between Centres	Between Ellipses	Total Uncertainty Axis	Separation Factor			
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(°)	+N/-S (ft)	+E/-W (ft)	(ft)	(ft)					
5,100.0	4,887.9	5,104.7	5,003.1	22.4	19.9	-111.38	-152.9	446.8	682.1	641.2	40.85	16.699			
5,200.0	4,949.2	5,226.1	5,094.0	22.6	20.3	-110.40	-97.1	389.1	696.7	655.1	41.61	16.743			
5,300.0	5,000.8	5,351.3	5,174.3	22.9	21.0	-109.73	-31.1	319.4	709.2	666.4	42.71	16.602			
5,400.0	5,041.8	5,480.0	5,240.6	23.4	22.0	-109.25	43.8	238.8	719.1	674.7	44.35	16.215			
5,500.0	5,071.8	5,611.2	5,289.6	24.2	23.4	-108.88	126.0	149.1	726.2	679.5	46.63	15.575			
5,600.0	5,090.2	5,744.1	5,318.9	25.4	25.3	-108.59	212.8	53.1	730.2	680.6	49.58	14.726			
5,700.0	5,096.8	5,873.0	5,327.0	26.9	27.4	-108.36	298.4	-42.8	731.0	677.9	53.05	13.778			
5,800.0	5,097.1	5,973.0	5,327.0	28.6	29.2	-108.33	364.8	-117.5	730.7	674.3	56.42	12.951			
5,900.0	5,097.5	6,073.0	5,327.0	30.4	31.1	-108.31	431.2	-192.3	730.5	670.5	60.03	12.170			
6,000.0	5,097.8	6,173.0	5,327.0	32.4	33.1	-108.29	497.6	-267.0	730.3	666.5	63.83	11.441			
6,100.0	5,098.2	6,273.0	5,327.0	34.5	35.1	-108.26	564.1	-341.8	730.1	662.3	67.80	10.768			
6,200.0	5,098.5	6,373.0	5,327.0	36.7	37.3	-108.24	630.5	-416.5	729.9	657.9	71.91	10.149			
6,300.0	5,098.9	6,473.0	5,327.0	38.9	39.5	-108.22	696.9	-491.3	729.6	653.5	76.14	9.583			
6,400.0	5,099.2	6,573.0	5,327.0	41.1	41.8	-108.19	763.3	-566.0	729.4	649.0	80.47	9.065			
6,500.0	5,099.6	6,673.0	5,327.0	43.5	44.1	-108.17	829.8	-640.8	729.2	644.3	84.88	8.591			
6,600.0	5,099.9	6,773.0	5,327.0	45.8	46.5	-108.15	896.2	-715.5	729.0	639.6	89.36	8.157			
6,700.0	5,100.3	6,873.0	5,327.0	48.2	48.8	-108.12	962.6	-790.3	728.8	634.9	93.91	7.760			
6,800.0	5,100.6	6,973.0	5,327.0	50.6	51.3	-108.10	1,029.0	-865.0	728.6	630.0	98.51	7.396			
6,900.0	5,101.0	7,073.0	5,327.0	53.1	53.7	-108.08	1,095.5	-939.8	728.3	625.2	103.15	7.061			
7,000.0	5,101.3	7,173.0	5,327.0	55.5	56.1	-108.06	1,161.9	-1,014.5	728.1	620.3	107.84	6.752			
7,100.0	5,101.7	7,273.0	5,327.0	58.0	58.6	-108.03	1,228.3	-1,089.3	727.9	615.3	112.56	6.467			
7,200.0	5,102.0	7,373.0	5,327.0	60.5	61.1	-108.01	1,294.7	-1,164.0	727.7	610.4	117.31	6.203			
7,300.0	5,102.4	7,473.0	5,327.0	63.0	63.6	-107.99	1,361.2	-1,238.8	727.5	605.4	122.09	5.958			
7,400.0	5,102.7	7,573.0	5,327.0	65.5	66.1	-107.96	1,427.6	-1,313.5	727.2	600.3	126.90	5.731			
7,500.0	5,103.1	7,673.0	5,327.0	68.0	68.6	-107.94	1,494.0	-1,388.3	727.0	595.3	131.73	5.519			
7,600.0	5,103.4	7,773.0	5,327.0	70.5	71.2	-107.92	1,560.4	-1,463.0	726.8	590.2	136.57	5.322			
7,700.0	5,103.8	7,873.0	5,327.0	73.1	73.7	-107.89	1,626.9	-1,537.8	726.6	585.2	141.44	5.137			
7,800.0	5,104.1	7,973.0	5,327.0	75.6	76.2	-107.87	1,693.3	-1,612.5	726.4	580.0	146.32	4.964			
7,900.0	5,104.5	8,073.0	5,327.0	78.2	78.8	-107.84	1,759.7	-1,687.3	726.2	574.9	151.22	4.802			
8,000.0	5,104.8	8,173.0	5,327.0	80.8	81.4	-107.82	1,826.1	-1,762.0	725.9	569.8	156.13	4.650			
8,100.0	5,105.2	8,273.0	5,327.0	83.3	83.9	-107.80	1,892.6	-1,836.8	725.7	564.7	161.06	4.506			
8,200.0	5,105.5	8,373.0	5,327.0	85.9	86.5	-107.77	1,959.0	-1,911.5	725.5	559.5	165.99	4.371			
8,300.0	5,105.9	8,473.0	5,327.0	88.5	89.1	-107.75	2,025.4	-1,986.3	725.3	554.4	170.94	4.243			
8,400.0	5,106.2	8,573.0	5,327.0	91.1	91.7	-107.73	2,091.8	-2,061.0	725.1	549.2	175.89	4.122			
8,500.0	5,106.6	8,673.0	5,327.0	93.6	94.2	-107.70	2,158.3	-2,135.8	724.9	544.0	180.86	4.008			
8,600.0	5,106.9	8,773.0	5,327.0	96.2	96.8	-107.68	2,224.7	-2,210.5	724.6	538.8	185.83	3.899			
8,700.0	5,107.3	8,873.0	5,327.0	98.8	99.4	-107.66	2,291.1	-2,285.3	724.4	533.6	190.81	3.796			
8,800.0	5,107.6	8,973.0	5,327.0	101.4	102.0	-107.63	2,357.5	-2,360.0	724.2	528.4	195.80	3.699			
8,900.0	5,108.0	9,073.0	5,327.0	104.0	104.6	-107.61	2,424.0	-2,434.8	724.0	523.2	200.80	3.606			
9,000.0	5,108.3	9,173.0	5,327.0	106.6	107.2	-107.59	2,490.4	-2,509.5	723.8	518.0	205.80	3.517			
9,100.0	5,108.7	9,273.0	5,327.0	109.2	109.8	-107.56	2,556.8	-2,584.3	723.6	512.7	210.81	3.432			
9,200.0	5,109.0	9,373.0	5,327.0	111.9	112.4	-107.54	2,623.2	-2,659.0	723.3	507.5	215.83	3.352			
9,300.0	5,109.4	9,473.0	5,327.0	114.5	115.0	-107.52	2,689.7	-2,733.8	723.1	502.3	220.85	3.274			
9,400.0	5,109.7	9,573.0	5,327.0	117.1	117.6	-107.49	2,756.1	-2,808.5	722.9	497.0	225.87	3.201			
9,406.7	5,109.7	9,579.6	5,327.0	117.2	117.8	-107.49	2,760.5	-2,813.5	722.9	496.7	226.21	3.196 SF			
9,500.0	5,110.1	9,574.3	5,327.0	119.7	117.7	-107.49	2,757.0	-2,809.5	729.4	503.4	226.00	3.227			
9,600.0	5,110.4	9,574.3	5,327.0	122.3	117.7	-107.49	2,757.0	-2,809.5	749.3	527.1	222.17	3.373			
9,700.0	5,110.8	9,574.3	5,327.0	124.9	117.7	-107.49	2,757.0	-2,809.5	781.6	566.4	215.21	3.632			
9,800.0	5,111.1	9,574.3	5,327.0	127.5	117.7	-107.49	2,757.0	-2,809.5	824.8	618.7	206.13	4.001			
9,900.0	5,111.5	9,574.3	5,327.0	130.2	117.7	-107.49	2,757.0	-2,809.5	877.3	681.4	195.97	4.477			
10,000.0	5,111.8	9,574.3	5,327.0	132.8	117.7	-107.49	2,757.0	-2,809.5	937.6	752.1	185.49	5.055			
10,011.3	5,111.8	9,574.3	5,327.0	133.1	117.7	-107.49	2,757.0	-2,809.5	944.9	760.5	184.32	5.126			

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	Local Co-ordinate Reference:	Well NAU 236H (G30-2307 03H)
Project:	Sandoval County, NM	TVD Reference:	16' KB @ 7092.0ft
Reference Site:	S30-T23N-R7W	MD Reference:	16' KB @ 7092.0ft
Site Error:	0.0ft	North Reference:	True
Reference Well:	NAU 236H (G30-2307 03H)	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 #4	Offset TVD Reference:	Offset Datum

Cathedral Energy Services

Anticollision Report

Company: EnCana Oil & Gas (USA) Inc
Project: Sandoval County, NM
Reference Site: S30-T23N-R7W
Site Error: 0.0ft
Reference Well: NAU 236H (G30-2307 03H)
Well Error: 0.0ft
Reference Wellbore: HZ
Reference Design: PLAN #4

Local Co-ordinate Reference: Well NAU 236H (G30-2307 03H)
TVD Reference: 16' KB @ 7092.0ft
MD Reference: 16' KB @ 7092.0ft
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 S30-T23N-R7W - NAU 235H (G30-2307 02H) - HZ - PLAN #5														Offset Site Error:	0.0 ft
Survey Program: 0-MWD+HDGM														Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis		Highside Tooface (")	Distance		Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Total Uncertainty Axis	Separation Factor	Warning
Measured Depth (ft)	Vertical Depth (ft)	Measured Depth (ft)	Vertical Depth (ft)	Reference (ft)	Offset (ft)										
0.0	0.0	0.0	0.0	0.0	0.0	-1.12	30.2	-0.6	30.2						
100.0	100.0	100.0	100.0	0.2	0.2	-1.12	30.2	-0.6	30.2		29.9	0.30	100.375		
200.0	200.0	200.0	200.0	0.5	0.5	-1.12	30.2	-0.6	30.2		29.2	1.02	29.688		
300.0	300.0	300.0	300.0	0.9	0.9	-1.12	30.2	-0.6	30.2		28.5	1.74	17.420		
400.0	400.0	400.0	400.0	1.2	1.2	-1.12	30.2	-0.6	30.2		27.8	2.45	12.327		
500.0	500.0	500.0	500.0	1.6	1.6	-1.12	30.2	-0.6	30.2		27.1	3.17	9.538		
600.0	600.0	600.0	600.0	1.9	1.9	-1.12	30.2	-0.6	30.2		26.3	3.89	7.778		
700.0	700.0	700.0	700.0	2.3	2.3	-85.81	30.2	-0.6	30.0		25.5	4.60	6.538		
709.6	709.6	709.6	709.6	2.3	2.3	-86.48	30.2	-0.6	30.0		25.4	4.66	6.437 CC, ES		
800.0	799.8	798.9	798.9	2.6	2.7	-97.22	31.4	-1.8	31.6		26.3	5.30	5.969 SF		
900.0	899.5	897.0	896.8	3.0	3.0	-113.51	35.0	-5.4	38.9		32.9	6.00	6.479		
1,000.0	998.7	993.7	993.2	3.4	3.4	-127.06	40.9	-11.2	53.7		47.0	6.69	8.020		
1,100.0	1,097.5	1,088.6	1,087.4	3.7	3.7	-135.80	48.8	-19.2	75.9		68.5	7.38	10.289		
1,200.0	1,195.6	1,181.1	1,178.8	4.1	4.0	-141.07	58.7	-29.1	104.9		96.8	8.05	13.020		
1,300.0	1,293.1	1,270.8	1,267.0	4.6	4.4	-144.27	70.3	-40.7	139.9		131.2	8.72	16.047		
1,400.0	1,389.6	1,357.6	1,351.8	5.0	4.7	-146.29	83.4	-53.7	180.5		171.2	9.37	19.262		
1,500.0	1,485.9	1,447.7	1,439.6	5.5	5.1	-148.01	97.8	-68.1	223.6		213.5	10.07	22.212		
1,600.0	1,582.1	1,537.8	1,527.3	6.0	5.5	-149.17	112.2	-82.6	266.8		256.0	10.77	24.769		
1,700.0	1,678.4	1,627.9	1,615.1	6.5	5.9	-150.01	126.6	-97.0	310.0		298.5	11.48	27.001		
1,800.0	1,774.6	1,717.9	1,702.8	7.0	6.3	-150.65	141.0	-111.4	353.3		341.1	12.20	28.960		
1,900.0	1,870.8	1,808.0	1,790.6	7.5	6.7	-151.14	155.4	-125.8	396.6		383.7	12.92	30.690		
2,000.0	1,967.1	1,901.9	1,878.3	8.0	7.1	-151.54	169.9	-140.2	439.9		426.3	13.67	32.192		
2,100.0	2,063.3	1,988.2	1,966.1	8.5	7.5	-151.87	184.3	-154.6	483.3		468.9	14.38	33.598		
2,200.0	2,159.5	2,078.3	2,053.8	9.1	8.0	-152.14	198.7	-169.1	526.6		511.5	15.12	34.830		
2,300.0	2,255.8	2,168.4	2,141.6	9.6	8.4	-152.37	213.1	-183.5	570.0		554.1	15.86	35.941		
2,400.0	2,352.0	2,258.5	2,229.3	10.1	8.8	-152.57	227.5	-197.9	613.4		596.8	16.60	36.947		
2,500.0	2,448.2	2,348.6	2,317.1	10.7	9.2	-152.74	241.9	-212.3	656.7		639.4	17.35	37.862		
2,600.0	2,544.5	2,438.6	2,404.8	11.2	9.6	-152.89	256.4	-226.7	700.1		682.0	18.09	38.698		
2,700.0	2,640.7	2,528.7	2,492.6	11.7	10.1	-153.03	270.8	-241.2	743.5		724.7	18.84	39.464		
2,800.0	2,736.9	2,618.8	2,580.3	12.3	10.5	-153.15	285.2	-255.6	786.9		767.3	19.59	40.168		
2,900.0	2,833.2	2,708.9	2,668.1	12.8	10.9	-153.25	299.6	-270.0	830.3		809.9	20.34	40.817		
3,000.0	2,929.4	2,801.0	2,755.8	13.4	11.4	-153.35	314.0	-284.4	873.7		852.6	21.10	41.402		
3,100.0	3,025.6	2,889.1	2,843.6	13.9	11.8	-153.43	328.5	-298.8	917.0		895.2	21.85	41.975		
3,200.0	3,121.9	2,979.2	2,931.3	14.4	12.2	-153.51	342.9	-313.2	960.4		937.8	22.60	42.492		
3,300.0	3,218.1	3,069.3	3,019.1	15.0	12.6	-153.59	357.3	-327.7	1,003.8		980.5	23.36	42.975		
3,400.0	3,314.3	3,159.3	3,106.8	15.5	13.1	-153.65	371.7	-342.1	1,047.2		1,023.1	24.12	43.425		
3,500.0	3,410.6	3,249.4	3,194.6	16.1	13.5	-153.71	386.1	-356.5	1,090.6		1,065.8	24.87	43.847		
3,600.0	3,506.8	3,339.5	3,282.3	16.6	13.9	-153.77	400.5	-370.9	1,134.0		1,108.4	25.63	44.242		
3,700.0	3,603.0	3,429.6	3,370.1	17.2	14.4	-153.82	415.0	-385.3	1,177.4		1,151.0	26.39	44.613		
4,400.0	4,277.8	6,391.5	5,317.6	20.9	38.7	172.91	-264.3	589.5	1,162.3		1,129.4	32.94	35.290		
4,500.0	4,375.4	6,389.3	5,317.6	21.3	38.7	-164.43	-263.0	587.8	1,086.3		1,051.0	35.35	30.729		
4,600.0	4,471.9	6,377.0	5,317.6	21.6	38.4	-149.44	-255.4	578.0	1,015.8		977.9	37.91	26.792		
4,700.0	4,565.7	6,354.9	5,317.7	21.8	37.9	-141.45	-241.9	560.5	952.6		912.1	40.55	23.494		
4,800.0	4,655.5	6,323.6	5,317.7	22.0	37.2	-136.62	-223.0	535.6	898.5		855.3	43.13	20.832		
4,900.0	4,740.0	6,283.9	5,317.8	22.2	36.3	-132.93	-199.4	503.7	854.8		809.3	45.52	18.778		
5,000.0	4,817.8	6,225.4	5,317.9	22.3	35.0	-128.91	-165.0	456.3	822.1		774.8	47.33	17.371		
5,100.0	4,887.9	6,157.4	5,318.0	22.4	33.5	-124.83	-125.1	401.4	799.8		751.2	48.61	16.455		
5,200.0	4,949.2	6,081.2	5,318.1	22.6	31.9	-120.69	-80.3	339.7	786.9		737.5	49.36	15.941		
5,300.0	5,000.8	6,002.3	5,318.3	22.9	30.3	-116.66	-31.2	272.1	781.7		731.9	49.78	15.703		
5,334.4	5,016.1	5,967.5	5,318.3	23.0	29.7	-115.33	-13.4	247.7	781.4		731.7	49.72	15.716		
5,400.0	5,041.8	5,908.2	5,318.4	23.4	28.6	-112.96	21.4	199.7	782.4		732.6	49.79	15.715		
5,500.0	5,071.8	5,793.3	5,315.7	24.2	26.5	-109.24	88.9	106.9	786.6		737.1	49.46	15.904		

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: S30-T23N-R7W
Site Error: 0.0ft
Reference Well: NAU 236H (G30-2307 03H)
Well Error: 0.0ft
Reference Wellbore: HZ
Reference Design: PLAN #4

Local Co-ordinate Reference: Well NAU 236H (G30-2307 03H)
TVD Reference: 16' KB @ 7092.0ft
MD Reference: 16' KB @ 7092.0ft
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 S30-T23N-R7W - NAU 235H (G30-2307 02H) - HZ - PLAN #5													Offset Site Error:	0.0 ft
Survey Program: 0-MWD+HDGM													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 Tooface (")	Offset Wellbore Centre +N/-S (ft)	+E/-W (ft)	Between Centres (ft)	Between Ellipses (ft)	Total Uncertainty Axis	Separation Factor		
5,600.0	5,090.2	5,664.2	5,295.0	25.4	24.5	-105.33	163.7	3.9	789.6	740.3	49.27	16.026		
5,700.0	5,096.8	5,543.6	5,257.7	26.9	23.0	-101.74	231.1	-88.9	791.3	741.6	49.65	15.938		
5,800.0	5,097.1	5,433.9	5,209.6	28.6	21.9	-98.16	288.9	-168.5	792.3	741.8	50.54	15.678		
5,900.0	5,097.5	5,339.0	5,157.6	30.4	21.2	-94.35	335.6	-232.7	794.8	743.1	51.78	15.350		
6,000.0	5,097.8	5,258.0	5,106.2	32.4	20.7	-90.62	372.4	-283.4	801.1	747.9	53.15	15.073		
6,100.0	5,098.2	5,189.3	5,058.0	34.5	20.4	-87.16	401.1	-322.9	812.8	758.4	54.45	14.929		
6,200.0	5,098.5	5,131.2	5,014.1	36.7	20.3	-84.07	423.5	-353.7	831.3	775.7	55.56	14.962		
6,300.0	5,098.9	5,081.9	4,974.8	38.9	20.1	-81.34	441.0	-377.8	857.2	800.8	56.42	15.192		
6,400.0	5,099.2	5,039.7	4,939.8	41.1	20.0	-78.96	454.9	-396.9	890.6	833.6	57.01	15.621		
6,500.0	5,099.6	5,000.0	4,905.8	43.5	19.9	-76.70	466.9	-413.5	931.4	874.1	57.33	16.247		
6,600.0	5,099.9	4,972.0	4,881.3	45.8	19.9	-75.09	474.8	-424.4	979.0	921.5	57.47	17.033		
6,700.0	5,100.3	4,950.0	4,861.7	48.2	19.8	-73.83	480.7	-432.4	1,032.8	975.3	57.46	17.974		
6,800.0	5,100.6	4,920.6	4,835.1	50.6	19.8	-72.14	488.1	-442.6	1,092.1	1,034.8	57.25	19.075		
6,900.0	5,101.0	4,900.0	4,816.2	53.1	19.7	-70.97	492.9	-449.2	1,156.2	1,099.2	57.00	20.285		

Cathedral Energy Services

Anticollision Report

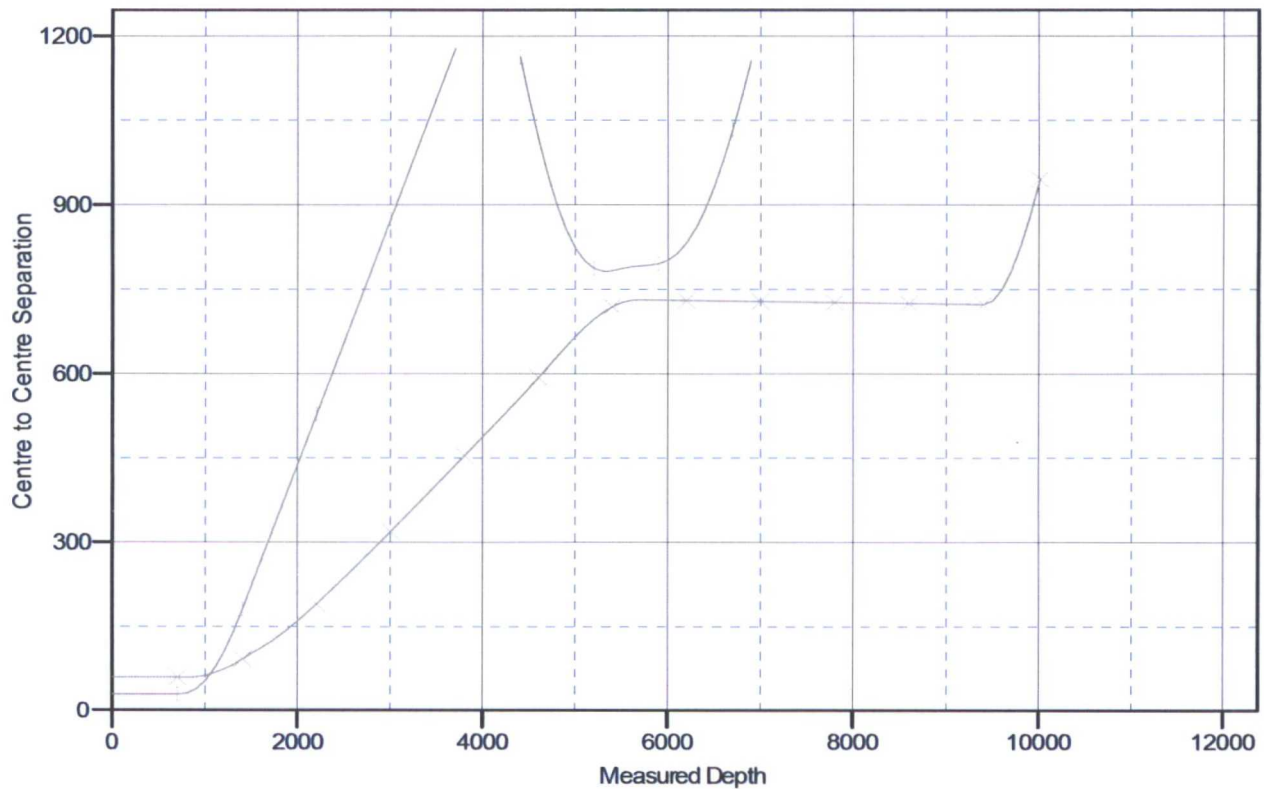
Company: EnCana Oil & Gas (USA) Inc
Project: Sandoval County, NM
Reference Site: S30-T23N-R7W
Site Error: 0.0ft
Reference Well: NAU 236H (G30-2307 03H)
Well Error: 0.0ft
Reference Wellbore: HZ
Reference Design: PLAN #4

Local Co-ordinate Reference: Well NAU 236H (G30-2307 03H)
TVD Reference: 16' KB @ 7092.0ft
MD Reference: 16' KB @ 7092.0ft
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 16' KB @ 7092.0ft
Offset Depths are relative to Offset Datum
Central Meridian is -106.250000 °

Coordinates are relative to: NAU 236H (G30-2307 03H)
Coordinate System is US State Plane 1983, New Mexico Central Zone
Grid Convergence at Surface is: -0.81°

Ladder Plot



LEGEND

✕ NAU 234H(G30-2307 01H), HZ, PLAN#5 V0 + NAU 235H(G30-2307 02H), HZ, PLAN#5 V0

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

LOC: 1389' FNL, 2098' FEL Sec 30 23N 07 County: Sandoval WELL: NAU 236H			Encana Natural Gas WELL SUMMARY				ENG: L Hubbard 6/26/17 RIG: Unassigned GLE: 7076 RKBE: 7092		
MWD LWD	OPEN HOLE LOGGING	FORM	DEPTH			HOLE SIZE	CASING SPECS	MW MUD TYPE	DEVIATION INFORMATION
			TVD	MD					
Run survey tool at TD and update anticollision scan	None	Nacimiento 9 5/8" Csg	0 320	320		12 1/4	9 5/8" 32.3ppf H40 STC TOC to Surface 15.6ppg type V cement w/ 2% CaCl	Fresh wtr 8.3-8.2	Vertical <1°
Survey Every 60'-120', updating anticollision report after surveys. Stop operations and contact drilling engineer if separation factor approaches 1.5 Surveys every 30' through the curve	No OH logs MWD GR Mud Log	Ojo Alamo Kirtland Shale Fruitland Coal Pictured Cliffs Ss. Lewis Shale Cliffhouse Ss. Manefee Fn. Point Lookout Ss. Mancos Shale KOP Mancos Silt Gallup Fn. 7" Csg	1,087 1,297 1,565 1,683 1,805 2,499 3,207 4,041 4,245 4,157 4,768 5,027 5,042	4,276 5,400'		8 3/4	7" 26ppf J55 LTC TOC @ surface (100% OH excess) Stage 1 Total: 895sks	Fresh Wtr 8.3-10	Directional 6.2°
Surveys every stand to TD unless directed otherwise by Geologist MWD Gamma Directional	No OH Logs	Horizontal Target TD Base Gallup	5,319 5,112 5,364	10,011		6 1/8	200' overlap at liner top 4611' Drilled Lateral TOC @ Top of Liner (30% open hole excess)	WBM 8.3-10	Horz Inc/TVD 89.8deg/5096' TD = 10011.3' MD