

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 3/20/2014 **Sundry Date 5/31/2017**

frmWellFilterSub													
API WELL #	Well Name	Well #	Operator Name	Type	Stat	County	Surf_Owner	UL	Sec	Twp	N/S	Rng	W/E
30-043-21210-00-00	NORTH ALAMITO UNIT	239H	ENCANA OIL & GAS (USA) INC.	G	N	Sandoval	F	O	30	23	N	7	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
- ✓ Submit Gas Capture Plan form prior to spudding or initiating recompletions operations.
- ✓ Regarding Hydraulic Fracturing, review EPA Underground Injection Control Guidance 84

August 17, 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

7/6/17

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.
NM 36943

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: 411' FSL and 1317' FEL Section 30, T23N, R7W
BHL: 330' FNL and 190' FEL Section 25, T23N, R8W

Bureau of Land Management
Farmington Field Office

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

NMNM 135229X

8. Well Name and No.

North Alamito Unit 239H (FKA Lybrook O30-2307 02H)

9. API Well No.

80-043-21210

10. Field and Pool or Exploratory Area

Alamito Mancos N (OIL)

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 O30-2307 02H well, which was approved by the OCD on April 29, 2014, will now be a part of the North Alamito Unit. Encana is submitting this sundry to change the well name from the Lybrook O30-2307 02H to the North Alamito Unit 239H.

In addition to the name change, the surface hole location also changed because the wellheads were changed from a square orientation to a line orientation. Also, the BHL to modify the wellbore's orientation from oblique to transverse.

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 eliminate the conductor pipe.

OIL CONS. DIV DIST. 3

JUN 29 2017

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

Katie Wegner

Title Senior Regulatory Analyst

Signature

Date

05/31/2017

THE SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by

Dave Mankiewicz

Title AFM Min.

Date 6/26/17

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.

(Instructions on page 2)

NMOCDA

JUL 14 2017

Form C-102

Revised August 1, 2011

DISTRICT I1625 N. French Dr., Hobbs, N.M. 88240
Phone: (575) 393-6161 Fax: (575) 393-0720**DISTRICT II**611 S. First St., Artesia, N.M. 86210
Phone: (575) 748-1283 Fax: (575) 748-9720**DISTRICT III**1000 Rio Brazos Rd., Artesia, N.M. 87410
Phone: (505) 334-6178 Fax: (505) 334-6170**DISTRICT IV**1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3480 Fax: (505) 476-3482State of New Mexico
Energy, Minerals & Natural Resources Department

OIL CONSERVATION DIVISION

1220 South St. Francis Dr.
Santa Fe, NM 87505Submit one copy to appropriate
District Office☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

¹ API Number 30-043-21210	² Pool Code 98174	³ Pool Name ALAMITO <i>Nj Mancos</i>
⁴ Property Code	⁵ Property Name NORTH ALAMITO UNIT	⁶ Well Number 239H
⁷ GRID No. 282327	⁸ Operator Name ENCANA OIL & GAS (USA) INC.	⁹ Elevation 7029'

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
0	30	23N	7W		411'	SOUTH	1317'	EAST	SANDOVAL

¹¹ Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
A	25	23N	8W		330'	NORTH	190'	EAST	SAN JUAN

¹² Dedicated Acres

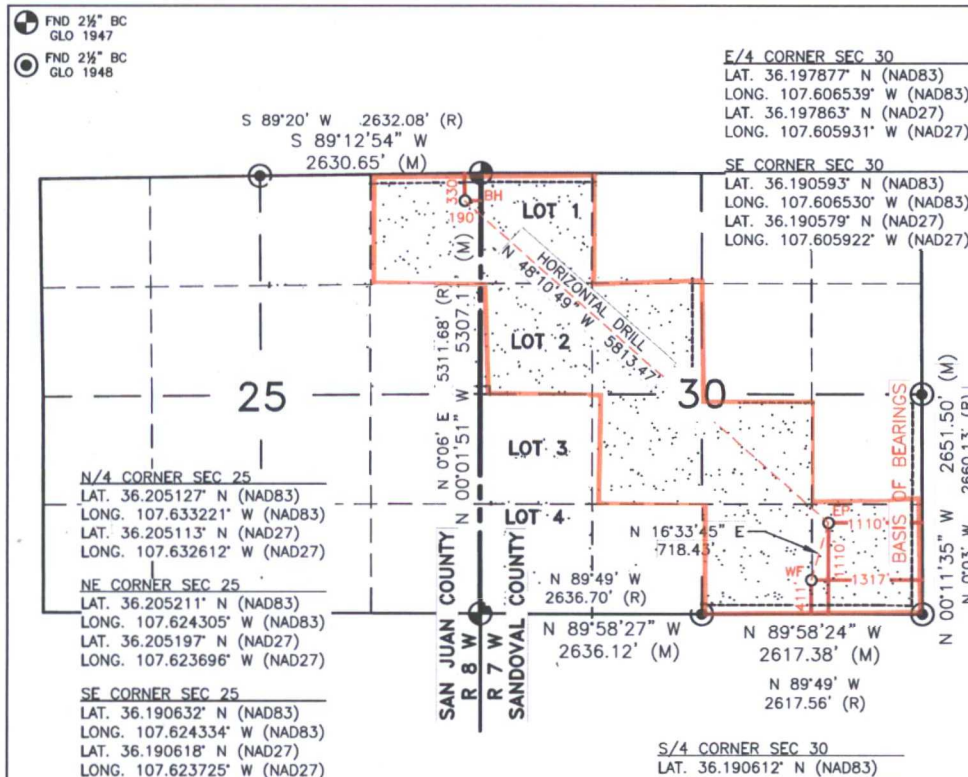
PENETRATED SPACING UNIT:

NENE Sec 25 (40 acres); NWNW, S/2 of NW/4, NESW,
NWSE, & S/2 of SE/4 of Sec 30 (281.24 acres)¹³ Joint or Infill¹⁴ Consolidation Code¹⁵ 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

16

**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 7/13/17
Signature Date

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 14, 2017

Date of Survey

Signature and Seal of Professional Surveyor:



Certificate Number

11393

BOTTOM HOLE

LAT. 36.204298° N (NAD83)
LONG. 107.624951° W (NAD83)
LAT. 36.204284° N (NAD27)
LONG. 107.624342° W (NAD27)

ENTRY POINT

LAT. 36.193623° N (NAD83)
LONG. 107.610296° W (NAD83)
LAT. 36.193609° N (NAD27)
LONG. 107.609687° W (NAD27)

WELL FLAG

LAT. 36.191732° N (NAD83)
LONG. 107.610995° W (NAD83)
LAT. 36.191718° N (NAD27)
LONG. 107.610386° W (NAD27)

DISTRICT I

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

DISTRICT II

811 S. First St., Artesia, N.M. 88210
Phone: (575) 748-1263 Fax: (575) 748-9720

DISTRICT III

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

DISTRICT IV

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

State of New Mexico
Energy, Minerals & Natural Resources Department

OIL CONSERVATION DIVISION

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

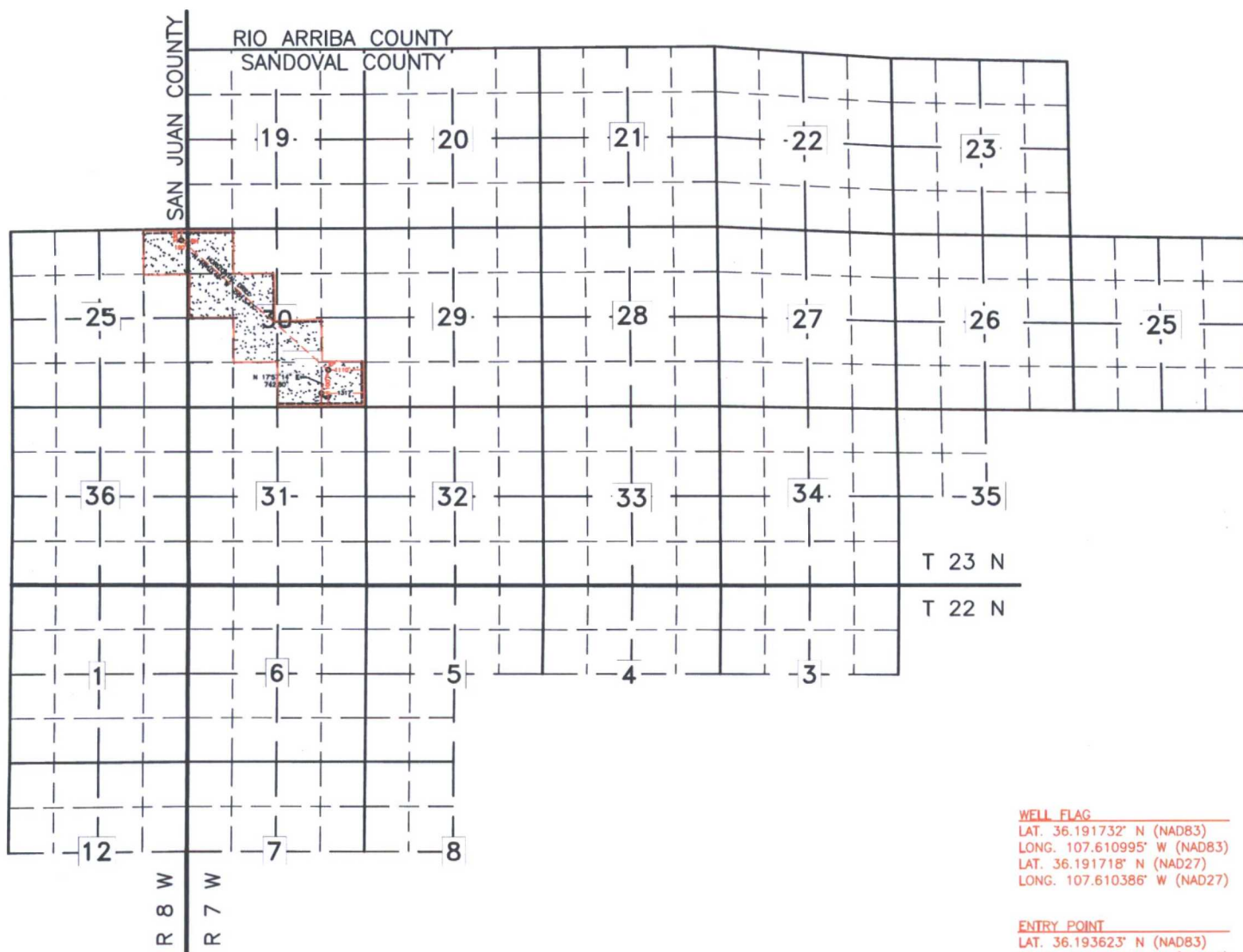
Form C-102

Revised August 1, 2011

Submit one copy to appropriate
District Office

☐ AMENDED REPORT

ENCANA OIL & GAS (USA) INC.
NORTH ALAMITO UNIT #239H

**WELL FLAG**

LAT. 36.191732° N (NAD83)
LONG. 107.610995° W (NAD83)
LAT. 36.191718° N (NAD27)
LONG. 107.610386° W (NAD27)

ENTRY POINT

LAT. 36.193623° N (NAD83)
LONG. 107.610296° W (NAD83)
LAT. 36.193609° N (NAD27)
LONG. 107.609687° W (NAD27)

BOTTOM HOLE

LAT. 36.204298° N (NAD83)
LONG. 107.624951° W (NAD83)
LAT. 36.204284° N (NAD27)
LONG. 107.624342° W (NAD27)

PENETRATED SPACING UNIT: NENE Sec 25 (40 acres)

NWNW, S/2 of NW/4, NESW, NWSE, & S/2 of SE/4 of Sec 30 (281.24 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 Alamo Unit 239H
SHL: 411' FSL, 1317' FEL
BHL: 330' FNL, 190' FEL
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	1,070
Kirtland Shale	1,217
Fruitland Coal	1,454
Pictured Cliffs Ss.	1,587
Lewis Shale	1,679
Cliffhouse Ss.	2,346
Menefee Fn.	3,071
Point Lookout Ss.	3,960
Mancos Shale	4,146
Mancos Silt	4,686
Gallup Fn.	4,952

The referenced surface elevation is 7029', KB 7045'

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

Substance	Formation	Depth (TVD) units = feet
Water/Gas	Fruitland Coal	1,454
Water/Gas	Pictured Cliffs Ss.	1,587
Water/Gas	Cliffhouse Ss.	2,346
Water/Gas	Menefee Fn.	3,071
Water/Gas	Point Lookout Ss.	3,960
Oil/Gas	Mancos Shale	4,146
Oil/Gas	Mancos Silt	4,686
Oil/Gas	Gallup Fn.	4,952

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.
- BOP testing procedures and testing frequency will conform to Onshore Order No. 2.

North Alamito Unit 239H
SHL: 411' FSL, 1317' FEL
BHL: 330' FNL, 190' FEL
Sandoval County, NM

- 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'-5500'	8 3/4"	7"	26	J55, LTC New
Production Liner	5300'-11579'	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 239H
SHL: 411' FSL, 1317' FEL
BHL: 330' FNL, 190' FEL
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'-5500'	100% open hole excess Stage 1 Lead: 672 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	5300'- 11579'	30% open hole excess Cement Vol: 569 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 239H
SHL: 411' FSL, 1317' FEL
BHL: 330' FNL, 190' FEL
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 4287'. Directional plans are attached.

Description	Proposed Depth (TVD/MD)	Formation
Horizontal Lateral TD	5214'/11579'	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'-5172'/5500'	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"	5172'/5500'- 5214'/11579'	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 +/- 2440 psi based on a 9.0 ppg at 5214' 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.

North Alamito Unit 239H
SHL: 411' FSL, 1317' FEL
BHL: 330' FNL, 190' FEL
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 239H (O30-2307 02H)
 Wellbore: Hz
 Design: PLAN #7



Azimuths to True North
 Magnetic North: 8.95°

Magnetic Field
 Strength: 49615.6snT
 Dip Angle: 62.88°
 Date: 5/5/2017
 Model: HDGM

SECTION DETAILS

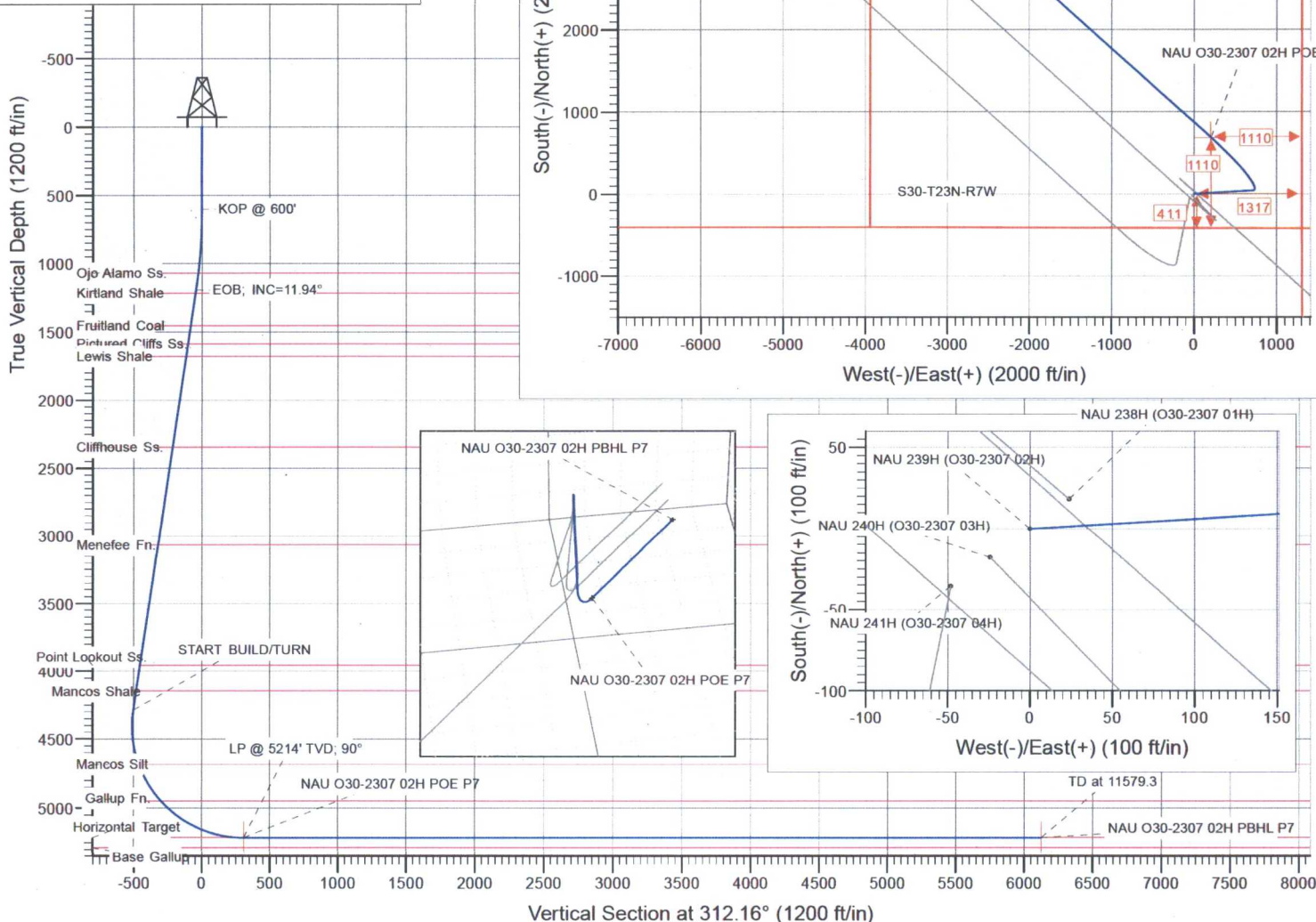
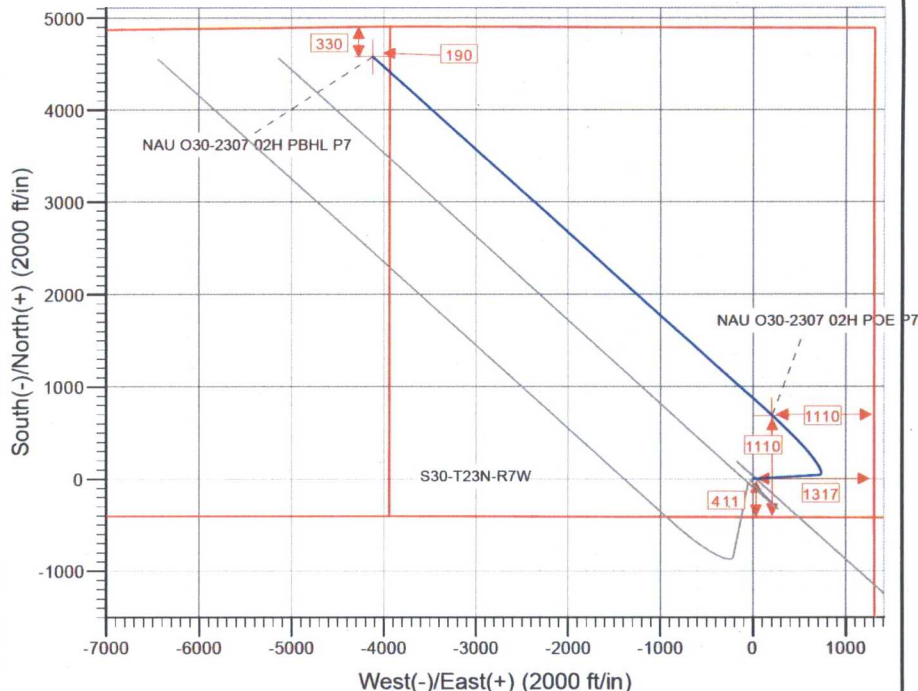
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Target
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	600.0	0.00	0.00	600.0	0.0	0.0	0.00	0.00	0.0	
3	1197.2	11.94	86.54	1192.9	3.7	61.9	2.00	86.54	-43.4	
4	4359.8	11.94	86.54	4287.0	43.3	715.2	0.00	0.00	-501.1	
5	5764.9	90.00	311.95	5214.0	688.5	206.3	7.00	-133.96	309.2	NAU O30-2307 02H POE P7
6	11579.3	90.00	311.95	5214.0	4575.4	-4118.0	0.00	0.00	6123.6	NAU O30-2307 02H PBHL P7

PLAN #7
 NAU 239H (O30-2307 02H)
 14ax LR
 16' KB @ 7045.00 (AZTEC 500)
 Ground Level @ 7029.0
 North American Datum 1983
 Well NAU 239H (O30-2307 02H), True North

Name	Type	User	Target	No Target (Freehand)	Azimuth	Origin	Type	N/S	E/W	From TVD	Latitude	Longitude
Lyonsok O30-2307 02H PBHL P3					312.16			0.0	0.0	0.0	36.176900	-107.612105
Lyonsok O30-2307 02H POE P3					4908.7			0.0	0.0	0.0	36.176900	-107.612105
Lyonsok O30-2307 02H PBHL P2					5109.4			0.0	0.0	0.0	36.176900	-107.612105
Lyonsok O30-2307 02H POE P2					5114.3			0.0	0.0	0.0	36.176900	-107.612105
Lyonsok O30-2307 02H PBHL P1					5182.6			0.0	0.0	0.0	36.176900	-107.612105
Lyonsok O30-2307 02H POE P1					5187.6			0.0	0.0	0.0	36.176900	-107.612105
NAU O30-2307 02H PBHL P6					5214.0			0.0	0.0	0.0	36.204298	-107.611887
NAU O30-2307 02H POE P6					5214.0			0.0	0.0	0.0	36.204298	-107.611887
NAU O30-2307 02H PBHL P7					5214.0			0.0	0.0	0.0	36.192143	-107.611887
NAU O30-2307 02H POE P7					5214.0			0.0	0.0	0.0	36.192143	-107.611887

FORMATION TOP DETAILS

TVDPPath	MDPath	Formation
1070.0	1072.1	Ojo Alamo Ss.
1217.0	1221.8	Kirtland Shale
1454.0	1464.1	Fruitland Coal
1587.0	1600.0	Pictured Cliffs Ss.
1679.0	1694.1	Lewis Shale
2346.0	2375.8	Cliffhouse Ss.
3071.0	3116.9	Menefee Fn.
3960.0	4025.5	Point Lookout Ss.
4146.0	4215.7	Mancos Shale
4686.0	4769.8	Mancos Silt
4952.0	5087.1	Gallup Fn.
5214.0	5764.9	Horizontal Target



WELL DETAILS: NAU 239H (O30-2307 02H)

+N/-S	+E/-W	Northing	Ground Level:	7029.0	Latitude	Longitude
0.0	0.0	1891876.79	Easting	1238825.86	36.191732	-107.610995

CATHEDRAL



Cathedral Energy Services

Planning Report

Database: USA EDM 5000 Multi Users DB
Company: EnCana Oil & Gas (USA) Inc
Project: Sandoval County, NM
Site: S30-T23N-R7W
Well: NAU 239H (O30-2307 02H)
Wellbore: Hz
Design: PLAN #7

Local Co-ordinate Reference: Well NAU 239H (O30-2307 02H)
TVD Reference: 16' KB @ 7045.0ft (AZTEC 920)
MD Reference: 16' KB @ 7045.0ft (AZTEC 920)
North Reference: True
Survey Calculation Method: Minimum Curvature

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

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 239H (O30-2307 02H)
Well Position +N/-S 0.0 ft Northing: 1,891,876.79 ft Latitude: 36.191732
 +E/-W 0.0 ft Easting: 1,238,825.86 ft Longitude: -107.610995
Position Uncertainty 0.0 ft Wellhead Elevation: ft Ground Level: 7,029.0 ft

Wellbore Hz
Magnetics Model Name Sample Date Declination (°) Dip Angle (°) Field Strength (nT)
 HDGM 5/5/2017 8.95 62.88 49,616

Design PLAN #7
Audit Notes:
Version: Phase: PLAN Tie On Depth: 0.0
Vertical Section: Depth From (TVD) +N/-S +E/-W Direction (°)
 0.0 0.0 0.0 312.16

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	
1,197.2	11.94	86.54	1,192.9	3.7	61.9	2.00	2.00	0.00	86.54	
4,359.8	11.94	86.54	4,287.0	43.3	715.2	0.00	0.00	0.00	0.00	
5,764.9	90.00	311.95	5,214.0	688.5	206.3	7.00	5.56	-9.58	-133.96	NAU O30-2307 02H F
11,579.3	90.00	311.95	5,214.0	4,575.4	-4,118.0	0.00	0.00	0.00	0.00	NAU O30-2307 02H F

Cathedral Energy Services

Planning Report

Database: USA EDM 5000 Multi Users DB
 Company: EnCana Oil & Gas (USA) Inc
 Project: Sandoval County, NM
 Site: S30-T23N-R7W
 Well: NAU 239H (O30-2307 02H)
 Wellbore: Hz
 Design: PLAN #7

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

Well NAU 239H (O30-2307 02H)
 16' KB @ 7045.0ft (AZTEC 920)
 16' KB @ 7045.0ft (AZTEC 920)
 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	86.54	700.0	0.1	1.7	-1.2	2.00	2.00	
800.0	4.00	86.54	799.8	0.4	7.0	-4.9	2.00	2.00	
900.0	6.00	86.54	899.5	0.9	15.7	-11.0	2.00	2.00	
1,000.0	8.00	86.54	998.7	1.7	27.8	-19.5	2.00	2.00	
1,072.1	9.44	86.54	1,070.0	2.3	38.7	-27.1	2.00	2.00	Ojo Alamo Ss.
1,100.0	10.00	86.54	1,097.5	2.6	43.4	-30.4	2.00	2.00	
1,197.2	11.94	86.54	1,192.9	3.7	61.9	-43.4	2.00	2.00	EOB; INC=11.94°
1,200.0	11.94	86.54	1,195.6	3.8	62.5	-43.8	0.00	0.00	
1,221.8	11.94	86.54	1,217.0	4.1	67.0	-46.9	0.00	0.00	Kirtland Shale
1,300.0	11.94	86.54	1,293.5	5.0	83.1	-58.3	0.00	0.00	
1,400.0	11.94	86.54	1,391.3	6.3	103.8	-72.7	0.00	0.00	
1,464.1	11.94	86.54	1,454.0	7.1	117.0	-82.0	0.00	0.00	Fruitland Coal
1,500.0	11.94	86.54	1,489.1	7.5	124.5	-87.2	0.00	0.00	
1,600.0	11.94	86.54	1,587.0	8.8	145.1	-101.7	0.00	0.00	Pictured Cliffs Ss.
1,694.1	11.94	86.54	1,679.0	10.0	164.5	-115.3	0.00	0.00	Lewis Shale
1,700.0	11.94	86.54	1,684.8	10.0	165.8	-116.2	0.00	0.00	
1,800.0	11.94	86.54	1,782.6	11.3	186.4	-130.6	0.00	0.00	
1,900.0	11.94	86.54	1,880.5	12.5	207.1	-145.1	0.00	0.00	
2,000.0	11.94	86.54	1,978.3	13.8	227.7	-159.6	0.00	0.00	
2,100.0	11.94	86.54	2,076.1	15.0	248.4	-174.0	0.00	0.00	
2,200.0	11.94	86.54	2,174.0	16.3	269.1	-188.5	0.00	0.00	
2,300.0	11.94	86.54	2,271.8	17.5	289.7	-203.0	0.00	0.00	
2,375.8	11.94	86.54	2,346.0	18.5	305.4	-214.0	0.00	0.00	Cliffhouse Ss.
2,400.0	11.94	86.54	2,369.6	18.8	310.4	-217.5	0.00	0.00	
2,500.0	11.94	86.54	2,467.5	20.0	331.0	-231.9	0.00	0.00	
2,600.0	11.94	86.54	2,565.3	21.3	351.7	-246.4	0.00	0.00	
2,700.0	11.94	86.54	2,663.2	22.5	372.3	-260.9	0.00	0.00	
2,800.0	11.94	86.54	2,761.0	23.8	393.0	-275.4	0.00	0.00	
2,900.0	11.94	86.54	2,858.8	25.0	413.7	-289.8	0.00	0.00	
3,000.0	11.94	86.54	2,956.7	26.3	434.3	-304.3	0.00	0.00	
3,100.0	11.94	86.54	3,054.5	27.5	455.0	-318.8	0.00	0.00	
3,116.9	11.94	86.54	3,071.0	27.7	458.5	-321.2	0.00	0.00	Menefee Fn.
3,200.0	11.94	86.54	3,152.3	28.8	475.6	-333.3	0.00	0.00	
3,300.0	11.94	86.54	3,250.2	30.0	496.3	-347.7	0.00	0.00	
3,400.0	11.94	86.54	3,348.0	31.3	516.9	-362.2	0.00	0.00	
3,500.0	11.94	86.54	3,445.8	32.5	537.6	-376.7	0.00	0.00	
3,600.0	11.94	86.54	3,543.7	33.8	558.3	-391.2	0.00	0.00	
3,700.0	11.94	86.54	3,641.5	35.0	578.9	-405.6	0.00	0.00	
3,800.0	11.94	86.54	3,739.3	36.3	599.6	-420.1	0.00	0.00	
3,900.0	11.94	86.54	3,837.2	37.5	620.2	-434.6	0.00	0.00	
4,000.0	11.94	86.54	3,935.0	38.8	640.9	-449.1	0.00	0.00	
4,025.5	11.94	86.54	3,960.0	39.1	646.2	-452.8	0.00	0.00	Point Lookout Ss.
4,100.0	11.94	86.54	4,032.9	40.0	661.6	-463.5	0.00	0.00	
4,200.0	11.94	86.54	4,130.7	41.3	682.2	-478.0	0.00	0.00	
4,215.7	11.94	86.54	4,146.0	41.5	685.4	-480.3	0.00	0.00	Mancos Shale

Cathedral Energy Services

Planning Report

Database: USA EDM 5000 Multi Users DB
Company: EnCana Oil & Gas (USA) Inc
Project: Sandoval County, NM
Site: S30-T23N-R7W
Well: NAU 239H (O30-2307 02H)
Wellbore: Hz
Design: PLAN #7

Local Co-ordinate Reference: Well NAU 239H (O30-2307 02H)
TVD Reference: 16' KB @ 7045.0ft (AZTEC 920)
MD Reference: 16' KB @ 7045.0ft (AZTEC 920)
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
4,300.0	11.94	86.54	4,228.5	42.5	702.9	-492.5	0.00	0.00	
4,359.8	11.94	86.54	4,287.0	43.3	715.2	-501.1	0.00	0.00	START BUILD/TURN
4,400.0	10.19	75.02	4,326.5	44.4	722.8	-506.0	7.00	-4.36	
4,500.0	8.69	32.25	4,425.2	53.1	735.4	-509.5	7.00	-1.50	
4,600.0	12.02	357.00	4,523.7	69.9	738.9	-500.8	7.00	3.33	
4,700.0	17.62	340.26	4,620.4	94.6	733.2	-480.0	7.00	5.61	
4,769.8	22.00	333.84	4,686.0	116.3	723.9	-458.5	7.00	6.28	Mancos Silt
4,800.0	23.96	331.77	4,713.8	126.8	718.5	-447.5	7.00	6.47	
4,900.0	30.57	326.72	4,802.7	166.0	694.9	-403.7	7.00	6.61	
5,000.0	37.32	323.35	4,885.6	211.6	662.8	-349.3	7.00	6.74	
5,087.1	43.25	321.17	4,952.0	256.1	628.3	-293.9	7.00	6.81	Gallup Fn.
5,100.0	44.13	320.88	4,961.4	263.0	622.7	-285.1	6.99	6.83	
5,200.0	50.99	318.96	5,028.8	319.4	575.2	-212.0	7.00	6.86	
5,300.0	57.87	317.38	5,086.9	379.9	520.9	-131.1	7.00	6.88	
5,400.0	64.76	316.02	5,134.9	443.7	460.8	-43.7	7.00	6.90	
5,500.0	71.67	314.81	5,172.0	509.8	395.6	48.9	7.00	6.91	
5,600.0	78.59	313.69	5,197.6	577.2	326.4	145.4	7.00	6.92	
5,700.0	85.51	312.63	5,211.5	644.9	254.2	244.4	7.00	6.92	
5,764.9	90.00	311.95	5,214.0	688.5	206.3	309.2	7.00	6.92	LP @ 5214' TVD; 90° - Horizontal Target
5,800.0	90.00	311.95	5,214.0	712.0	180.1	344.3	0.00	0.00	
5,900.0	90.00	311.95	5,214.0	778.8	105.8	444.3	0.00	0.00	
6,000.0	90.00	311.95	5,214.0	845.7	31.4	544.3	0.00	0.00	
6,100.0	90.00	311.95	5,214.0	912.5	-43.0	644.3	0.00	0.00	
6,200.0	90.00	311.95	5,214.0	979.4	-117.3	744.3	0.00	0.00	
6,300.0	90.00	311.95	5,214.0	1,046.2	-191.7	844.3	0.00	0.00	
6,400.0	90.00	311.95	5,214.0	1,113.1	-266.1	944.3	0.00	0.00	
6,500.0	90.00	311.95	5,214.0	1,179.9	-340.5	1,044.3	0.00	0.00	
6,600.0	90.00	311.95	5,214.0	1,246.8	-414.8	1,144.3	0.00	0.00	
6,700.0	90.00	311.95	5,214.0	1,313.6	-489.2	1,244.3	0.00	0.00	
6,800.0	90.00	311.95	5,214.0	1,380.5	-563.6	1,344.3	0.00	0.00	
6,900.0	90.00	311.95	5,214.0	1,447.3	-638.0	1,444.3	0.00	0.00	
7,000.0	90.00	311.95	5,214.0	1,514.2	-712.3	1,544.3	0.00	0.00	
7,100.0	90.00	311.95	5,214.0	1,581.0	-786.7	1,644.3	0.00	0.00	
7,200.0	90.00	311.95	5,214.0	1,647.9	-861.1	1,744.3	0.00	0.00	
7,300.0	90.00	311.95	5,214.0	1,714.7	-935.4	1,844.3	0.00	0.00	
7,400.0	90.00	311.95	5,214.0	1,781.6	-1,009.8	1,944.3	0.00	0.00	
7,500.0	90.00	311.95	5,214.0	1,848.4	-1,084.2	2,044.3	0.00	0.00	
7,600.0	90.00	311.95	5,214.0	1,915.3	-1,158.6	2,144.3	0.00	0.00	
7,700.0	90.00	311.95	5,214.0	1,982.1	-1,232.9	2,244.3	0.00	0.00	
7,800.0	90.00	311.95	5,214.0	2,049.0	-1,307.3	2,344.3	0.00	0.00	
7,900.0	90.00	311.95	5,214.0	2,115.8	-1,381.7	2,444.3	0.00	0.00	
8,000.0	90.00	311.95	5,214.0	2,182.7	-1,456.0	2,544.3	0.00	0.00	
8,100.0	90.00	311.95	5,214.0	2,249.5	-1,530.4	2,644.3	0.00	0.00	
8,200.0	90.00	311.95	5,214.0	2,316.3	-1,604.8	2,744.3	0.00	0.00	
8,300.0	90.00	311.95	5,214.0	2,383.2	-1,679.2	2,844.3	0.00	0.00	
8,400.0	90.00	311.95	5,214.0	2,450.0	-1,753.5	2,944.3	0.00	0.00	
8,500.0	90.00	311.95	5,214.0	2,516.9	-1,827.9	3,044.3	0.00	0.00	
8,600.0	90.00	311.95	5,214.0	2,583.7	-1,902.3	3,144.3	0.00	0.00	
8,700.0	90.00	311.95	5,214.0	2,650.6	-1,976.7	3,244.3	0.00	0.00	
8,800.0	90.00	311.95	5,214.0	2,717.4	-2,051.0	3,344.3	0.00	0.00	
8,900.0	90.00	311.95	5,214.0	2,784.3	-2,125.4	3,444.3	0.00	0.00	
9,000.0	90.00	311.95	5,214.0	2,851.1	-2,199.8	3,544.3	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: S30-T23N-R7W
Well: NAU 239H (O30-2307 02H)
Wellbore: Hz
Design: PLAN #7

Local Co-ordinate Reference: Well NAU 239H (O30-2307 02H)
TVD Reference: 16' KB @ 7045.0ft (AZTEC 920)
MD Reference: 16' KB @ 7045.0ft (AZTEC 920)
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
9,100.0	90.00	311.95	5,214.0	2,918.0	-2,274.1	3,644.3	0.00	0.00	
9,200.0	90.00	311.95	5,214.0	2,984.8	-2,348.5	3,744.3	0.00	0.00	
9,300.0	90.00	311.95	5,214.0	3,051.7	-2,422.9	3,844.3	0.00	0.00	
9,400.0	90.00	311.95	5,214.0	3,118.5	-2,497.3	3,944.3	0.00	0.00	
9,500.0	90.00	311.95	5,214.0	3,185.4	-2,571.6	4,044.3	0.00	0.00	
9,600.0	90.00	311.95	5,214.0	3,252.2	-2,646.0	4,144.3	0.00	0.00	
9,700.0	90.00	311.95	5,214.0	3,319.1	-2,720.4	4,244.3	0.00	0.00	
9,800.0	90.00	311.95	5,214.0	3,385.9	-2,794.7	4,344.3	0.00	0.00	
9,900.0	90.00	311.95	5,214.0	3,452.8	-2,869.1	4,444.3	0.00	0.00	
10,000.0	90.00	311.95	5,214.0	3,519.6	-2,943.5	4,544.3	0.00	0.00	
10,100.0	90.00	311.95	5,214.0	3,586.5	-3,017.9	4,644.3	0.00	0.00	
10,200.0	90.00	311.95	5,214.0	3,653.3	-3,092.2	4,744.3	0.00	0.00	
10,300.0	90.00	311.95	5,214.0	3,720.2	-3,166.6	4,844.3	0.00	0.00	
10,400.0	90.00	311.95	5,214.0	3,787.0	-3,241.0	4,944.3	0.00	0.00	
10,500.0	90.00	311.95	5,214.0	3,853.9	-3,315.4	5,044.3	0.00	0.00	
10,600.0	90.00	311.95	5,214.0	3,920.7	-3,389.7	5,144.3	0.00	0.00	
10,700.0	90.00	311.95	5,214.0	3,987.6	-3,464.1	5,244.3	0.00	0.00	
10,800.0	90.00	311.95	5,214.0	4,054.4	-3,538.5	5,344.3	0.00	0.00	
10,900.0	90.00	311.95	5,214.0	4,121.3	-3,612.8	5,444.3	0.00	0.00	
11,000.0	90.00	311.95	5,214.0	4,188.1	-3,687.2	5,544.3	0.00	0.00	
11,100.0	90.00	311.95	5,214.0	4,255.0	-3,761.6	5,644.3	0.00	0.00	
11,200.0	90.00	311.95	5,214.0	4,321.8	-3,836.0	5,744.3	0.00	0.00	
11,300.0	90.00	311.95	5,214.0	4,388.7	-3,910.3	5,844.3	0.00	0.00	
11,400.0	90.00	311.95	5,214.0	4,455.5	-3,984.7	5,944.3	0.00	0.00	
11,500.0	90.00	311.95	5,214.0	4,522.4	-4,059.1	6,044.3	0.00	0.00	
11,579.3	90.00	311.95	5,214.0	4,575.4	-4,118.0	6,123.6	0.00	0.00	TD at 11579.3

Cathedral Energy Services

Planning Report

Database: USA EDM 5000 Multi Users DB
Company: EnCana Oil & Gas (USA) Inc
Project: Sandoval County, NM
Site: S30-T23N-R7W
Well: NAU 239H (O30-2307 02H)
Wellbore: Hz
Design: PLAN #7

Local Co-ordinate Reference: Well NAU 239H (O30-2307 02H)
TVD Reference: 16' KB @ 7045.0ft (AZTEC 920)
MD Reference: 16' KB @ 7045.0ft (AZTEC 920)
North Reference: True
Survey Calculation Method: Minimum Curvature

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 O30-2307 02H I - plan misses target center by 1379.6ft at 4964.6ft MD (4857.0 TVD, 194.7 N, 675.1 E) - Point	0.00	0.00	4,981.9	-740.2	-331.7	1,891,141.34	1,238,483.79	36.189699	-107.612119
Lybrook O30-2307 02H I - plan misses target center by 5543.5ft at 4500.0ft MD (4425.2 TVD, 53.1 N, 735.4 E) - Point	0.00	0.00	5,109.4	-5,400.0	10.3	1,886,477.13	1,238,760.45	36.176900	-107.610960
Lybrook O30-2307 02H I - plan misses target center by 1192.9ft at 5000.4ft MD (4885.9 TVD, 211.8 N, 662.7 E) - Point	0.00	0.00	5,182.6	-739.8	7.4	1,891,136.94	1,238,822.86	36.189700	-107.610970
NAU O30-2307 02H POI - plan hits target center - Point	0.00	0.00	5,214.0	688.5	206.3	1,892,562.30	1,239,041.78	36.193623	-107.610296
Lybrook O30-2307 02H I - plan misses target center by 5500.6ft at 4500.0ft MD (4425.2 TVD, 53.1 N, 735.4 E) - Point	0.00	0.00	5,114.3	-5,403.7	662.7	1,886,464.35	1,239,412.68	36.176890	-107.608750
Lybrook O30-2307 02H I - plan misses target center by 5575.4ft at 4400.0ft MD (4326.5 TVD, 44.4 N, 722.8 E) - Point	0.00	0.00	4,908.7	-5,400.0	-327.6	1,886,481.87	1,238,422.51	36.176900	-107.612105
Lybrook O30-2307 02H I - plan misses target center by 984.8ft at 4896.0ft MD (4799.2 TVD, 164.3 N, 696.0 E) - Point	0.00	0.00	5,187.6	-739.8	656.7	1,891,127.84	1,239,472.08	36.189700	-107.608770
NAU O30-2307 02H POI - plan misses target center by 714.6ft at 5749.6ft MD (5213.9 TVD, 678.3 N, 217.6 E) - Point	0.00	0.00	5,214.0	149.6	-263.2	1,892,030.10	1,238,564.74	36.192143	-107.611887
NAU O30-2307 02H PBI - plan misses target center by 1020.1ft at 11579.3ft MD (5214.0 TVD, 4575.4 N, -4118.0 E) - Point	0.00	0.00	5,214.0	4,563.9	-5,138.1	1,896,512.29	1,233,752.28	36.204266	-107.628408
NAU O30-2307 02H PBI - plan hits target center - Point	0.00	0.00	5,214.0	4,575.4	-4,118.0	1,896,509.47	1,234,772.41	36.204298	-107.624951

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,072.1	1,070.0	Ojo Alamo Ss.			
1,221.8	1,217.0	Kirtland Shale			
1,464.1	1,454.0	Fruitland Coal			
1,600.0	1,587.0	Pictured Cliffs Ss.			
1,694.1	1,679.0	Lewis Shale			
2,375.8	2,346.0	Cliffhouse Ss.			
3,116.9	3,071.0	Menefee Fn.			
4,025.5	3,960.0	Point Lookout Ss.			
4,215.7	4,146.0	Mancos Shale			
4,769.8	4,686.0	Mancos Silt			
5,087.1	4,952.0	Gallup Fn.			
5,764.9	5,214.0	Horizontal Target			

Cathedral Energy Services

Planning Report

Database: USA EDM 5000 Multi Users DB
Company: EnCana Oil & Gas (USA) Inc
Project: Sandoval County, NM
Site: S30-T23N-R7W
Well: NAU 239H (O30-2307 02H)
Wellbore: Hz
Design: PLAN #7

Local Co-ordinate Reference: Well NAU 239H (O30-2307 02H)
TVD Reference: 16' KB @ 7045.0ft (AZTEC 920)
MD Reference: 16' KB @ 7045.0ft (AZTEC 920)
North Reference: True
Survey Calculation Method: Minimum Curvature

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'
1,197.2	1,192.9	3.7	61.9	EOB; INC=11.94°
4,359.8	4,287.0	43.3	715.2	START BUILD/TURN
5,764.9	5,214.0	688.5	206.3	LP @ 5214' TVD; 90°
11,579.3	5,214.0	4,575.4	-4,118.0	TD at 11579.3

EnCana Oil & Gas (USA) Inc

Sandoval County, NM

S30-T23N-R7W

NAU 239H (O30-2307 02H)

Hz

PLAN #7

Anticollision Report

17 May, 2017

Cathedral Energy Services

Anticollision Report

Company:	EnCana Oil & Gas (USA) Inc	Local Co-ordinate Reference:	Well NAU 239H (O30-2307 02H)
Project:	Sandoval County, NM	TVD Reference:	16' KB @ 7045.0ft (AZTEC 920)
Reference Site:	S30-T23N-R7W	MD Reference:	16' KB @ 7045.0ft (AZTEC 920)
Site Error:	0.0ft	North Reference:	True
Reference Well:	NAU 239H (O30-2307 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 #7	Offset TVD Reference:	Offset Datum

Reference	PLAN #7		
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 820.4ft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma		

Survey Tool Program	Date 5/17/2017			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.0	11,506.9	PLAN #7 (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 238H (O30-2307 01H) - OH - PLAN #5	587.2	587.3	29.4	25.6	7.762	CC
NAU 238H (O30-2307 01H) - OH - PLAN #5	700.0	699.7	29.7	25.0	6.442	ES
NAU 238H (O30-2307 01H) - OH - PLAN #5	800.0	799.1	31.6	26.3	5.927	SF
NAU 240H (O30-2307 03H) - Hz - PLAN #4	600.0	600.0	30.1	26.2	7.737	CC, ES
NAU 240H (O30-2307 03H) - Hz - PLAN #4	11,579.3	11,259.0	726.7	399.0	2.218	SF
NAU 241H (O30-2307 04H) - HZ - PLAN #3	600.0	600.0	59.9	56.0	15.413	CC, ES
NAU 241H (O30-2307 04H) - HZ - PLAN #3	800.0	798.2	67.1	61.8	12.674	SF

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 239H (O30-2307 02H)
 Well Error: 0.0ft
 Reference Wellbore: Hz
 Reference Design: PLAN #7

Local Co-ordinate Reference: Well NAU 239H (O30-2307 02H)
 TVD Reference: 16' KB @ 7045.0ft (AZTEC 920)
 MD Reference: 16' KB @ 7045.0ft (AZTEC 920)
 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 238H (O30-2307 01H) - OH - PLAN #5													Offset Site Error: 0.0 ft
Survey Program: O-MWD+HDGM													Offset Well Error: 0.0 ft
Reference	Offset		Semi Major Axis		Distance		Total		Separation		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	Factor	
0.0	0.0	0.0	0.0	0.0	0.0	52.71	18.2	23.9	30.0				
100.0	100.0	100.0	100.0	0.2	0.2	52.71	18.2	23.9	30.0	29.7	0.30	99.785	
200.0	200.0	200.0	200.0	0.5	0.5	52.71	18.2	23.9	30.0	29.0	1.02	29.514	
300.0	300.0	300.0	300.0	0.9	0.9	52.71	18.2	23.9	30.0	28.3	1.74	17.318	
400.0	400.0	400.0	400.0	1.2	1.2	52.71	18.2	23.9	30.0	27.6	2.45	12.254	
500.0	500.0	500.2	500.2	1.6	1.6	49.40	19.4	22.6	29.7	26.6	3.17	9.388	
587.2	587.2	587.3	587.2	1.9	1.9	40.96	22.2	19.3	29.4	25.6	3.79	7.762 CC	
600.0	600.0	600.1	599.9	1.9	1.9	39.27	22.8	18.6	29.4	25.5	3.88	7.582	
700.0	700.0	699.7	699.3	2.3	2.3	-63.55	27.4	13.3	29.7	25.0	4.60	6.442 ES	
800.0	799.8	799.1	798.4	2.6	2.7	-84.50	32.0	8.0	31.6	26.3	5.34	5.927 SF	
900.0	899.5	898.0	897.1	3.0	3.0	-106.06	36.6	2.7	38.0	31.9	6.07	6.261	
1,000.0	998.7	996.4	995.2	3.4	3.4	-123.39	41.2	-2.5	49.9	43.1	6.78	7.359	
1,100.0	1,097.5	1,094.1	1,092.7	3.7	3.7	-135.54	45.7	-7.8	67.1	59.6	7.49	8.957	
1,200.0	1,195.6	1,191.1	1,189.4	4.1	4.1	-143.85	50.2	-12.9	88.8	80.6	8.19	10.834	
1,300.0	1,293.5	1,287.6	1,285.7	4.6	4.5	-149.46	54.7	-18.1	113.0	104.1	8.89	12.713	
1,400.0	1,391.3	1,384.2	1,382.0	5.0	4.8	-153.09	59.1	-23.2	137.9	128.3	9.59	14.383	
1,500.0	1,489.1	1,480.7	1,478.3	5.4	5.2	-155.60	63.6	-28.4	163.2	152.9	10.29	15.854	
1,600.0	1,587.0	1,577.2	1,574.6	5.9	5.5	-157.44	68.1	-33.6	188.7	177.7	11.00	17.152	
1,700.0	1,684.8	1,673.8	1,670.9	6.3	5.9	-158.84	72.6	-38.7	214.3	202.6	11.71	18.301	
1,800.0	1,782.6	1,770.3	1,767.2	6.8	6.2	-159.94	77.0	-43.9	240.0	227.6	12.42	19.322	
1,900.0	1,880.5	1,866.9	1,863.5	7.2	6.6	-160.83	81.5	-49.0	265.8	252.7	13.14	20.235	
2,000.0	1,978.3	1,963.4	1,959.9	7.7	6.9	-161.56	86.0	-54.2	291.6	277.8	13.85	21.055	
2,100.0	2,076.1	2,060.0	2,056.2	8.1	7.3	-162.17	90.5	-59.3	317.5	302.9	14.57	21.795	
2,200.0	2,174.0	2,156.5	2,152.5	8.6	7.7	-162.69	94.9	-64.5	343.4	328.1	15.28	22.466	
2,300.0	2,271.8	2,253.1	2,248.8	9.0	8.0	-163.14	99.4	-69.7	369.3	353.3	16.00	23.077	
2,400.0	2,369.6	2,349.6	2,345.1	9.5	8.4	-163.53	103.9	-74.8	395.3	378.5	16.72	23.635	
2,500.0	2,467.5	2,446.2	2,441.4	10.0	8.7	-163.87	108.4	-80.0	421.2	403.8	17.44	24.147	
2,600.0	2,565.3	2,542.7	2,537.7	10.4	9.1	-164.17	112.8	-85.1	447.2	429.0	18.16	24.618	
2,700.0	2,663.2	2,639.2	2,634.0	10.9	9.4	-164.44	117.3	-90.3	473.1	454.3	18.89	25.053	
2,800.0	2,761.0	2,735.8	2,730.3	11.3	9.8	-164.68	121.8	-95.4	499.1	479.5	19.61	25.456	
2,900.0	2,858.8	2,832.3	2,826.6	11.8	10.2	-164.90	126.3	-100.6	525.1	504.8	20.33	25.830	
3,000.0	2,956.7	2,928.9	2,922.9	12.3	10.5	-165.09	130.7	-105.8	551.1	530.1	21.05	26.178	
3,100.0	3,054.5	3,025.4	3,019.2	12.7	10.9	-165.27	135.2	-110.9	577.1	555.4	21.78	26.503	
3,200.0	3,152.3	3,122.0	3,115.5	13.2	11.2	-165.44	139.7	-116.1	603.1	580.6	22.50	26.807	
3,300.0	3,250.2	3,218.5	3,211.8	13.7	11.6	-165.58	144.2	-121.2	629.2	605.9	23.22	27.092	
3,400.0	3,348.0	3,315.1	3,308.1	14.1	12.0	-165.72	148.7	-126.4	655.2	631.2	23.95	27.359	
3,500.0	3,445.8	3,411.6	3,404.4	14.6	12.3	-165.85	153.1	-131.5	681.2	656.5	24.67	27.611	
3,600.0	3,543.7	3,508.1	3,500.7	15.1	12.7	-165.97	157.6	-136.7	707.2	681.8	25.40	27.848	
3,700.0	3,641.5	3,604.7	3,597.0	15.6	13.0	-166.08	162.1	-141.9	733.2	707.1	26.12	28.072	
3,800.0	3,739.3	3,701.2	3,693.3	16.0	13.4	-166.18	166.6	-147.0	759.3	732.4	26.85	28.283	
3,900.0	3,837.2	3,797.8	3,789.6	16.5	13.7	-166.27	171.0	-152.2	785.3	757.7	27.57	28.484	
4,000.0	3,935.0	3,894.3	3,885.9	17.0	14.1	-166.36	175.5	-157.3	811.3	783.0	28.30	28.674	
4,500.0	4,425.2	5,294.5	4,977.2	19.2	21.7	-159.67	-242.4	304.6	760.0	730.8	29.21	26.018	
4,600.0	4,523.7	5,324.4	4,983.1	19.5	22.1	-132.89	-262.1	326.4	701.0	668.8	32.22	21.755	
4,700.0	4,620.4	5,319.0	4,982.1	19.8	22.1	-120.17	-258.5	322.5	651.3	616.3	35.05	18.585	
4,800.0	4,713.8	5,297.4	4,977.8	20.0	21.7	-112.96	-244.3	306.8	613.9	576.5	37.42	16.407	
4,900.0	4,802.7	5,267.1	4,970.8	20.2	21.3	-107.25	-224.6	284.8	590.7	551.6	39.07	15.119	
5,000.0	4,885.6	5,231.5	4,961.2	20.4	20.8	-101.69	-201.7	259.4	582.5	542.6	39.82	14.628	
5,006.1	4,890.4	5,229.2	4,960.6	20.4	20.7	-101.35	-200.2	257.8	582.4	542.6	39.84	14.621	
5,100.0	4,961.3	5,192.7	4,949.1	20.5	20.3	-95.85	-177.0	232.0	588.5	548.8	39.69	14.828	
5,200.0	5,028.8	5,150.0	4,933.7	20.8	19.7	-89.52	-150.3	202.4	607.1	568.2	38.91	15.601	
5,300.0	5,086.9	5,108.9	4,917.0	21.1	19.3	-83.22	-125.2	174.5	635.6	597.7	37.94	16.753	

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 239H (O30-2307 02H)
Well Error: 0.0ft
Reference Wellbore: Hz
Reference Design: PLAN #7

Local Co-ordinate Reference: Well NAU 239H (O30-2307 02H)
TVD Reference: 16' KB @ 7045.0ft (AZTEC 920)
MD Reference: 16' KB @ 7045.0ft (AZTEC 920)
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 238H (O30-2307 01H) - OH - 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 Toolface (°)	Offset Wellbore Centre		Distance				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)	Total Uncertainty Axis	Separation Factor		
5,400.0	5,134.9	5,065.0	4,897.0	21.7	18.8	-76.77	-99.0	145.5	671.2	634.2	36.97	18.153		
5,500.0	5,172.0	5,020.4	4,874.6	22.6	18.4	-70.56	-73.1	116.9	711.3	675.0	36.26	19.618		
5,600.0	5,197.6	4,975.0	4,849.8	23.8	18.0	-64.83	-47.8	88.7	753.7	717.8	35.87	21.014		
5,700.0	5,211.5	4,929.3	4,822.6	25.3	17.7	-59.71	-23.1	61.4	796.6	760.8	35.81	22.243		

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 239H (O30-2307 02H)
Well Error: 0.0ft
Reference Wellbore: Hz
Reference Design: PLAN #7

Local Co-ordinate Reference: Well NAU 239H (O30-2307 02H)
TVD Reference: 16' KB @ 7045.0ft (AZTEC 920)
MD Reference: 16' KB @ 7045.0ft (AZTEC 920)
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 240H (O30-2307 03H) - Hz - PLAN #4													Offset Site Error: 0.0 ft
Survey Program: O-MWD+HDGM													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	-126.40	-17.8	-24.2	30.1				
100.0	100.0	100.0	100.0	0.2	0.2	-126.40	-17.8	-24.2	30.1	29.8	0.30	99.845	
200.0	200.0	200.0	200.0	0.5	0.5	-126.40	-17.8	-24.2	30.1	29.0	1.02	29.532	
300.0	300.0	300.0	300.0	0.9	0.9	-126.40	-17.8	-24.2	30.1	28.3	1.74	17.328	
400.0	400.0	400.0	400.0	1.2	1.2	-126.40	-17.8	-24.2	30.1	27.6	2.45	12.262	
500.0	500.0	500.0	500.0	1.6	1.6	-126.40	-17.8	-24.2	30.1	26.9	3.17	9.488	
600.0	600.0	600.0	600.0	1.9	1.9	-126.40	-17.8	-24.2	30.1	26.2	3.89	7.737 CC, ES	
700.0	700.0	700.1	700.1	2.3	2.3	147.96	-18.2	-23.9	31.5	26.9	4.59	6.860	
800.0	799.8	800.1	800.1	2.6	2.6	146.62	-20.8	-21.4	35.4	30.1	5.27	6.715	
900.0	899.5	900.0	899.7	3.0	3.0	143.30	-26.0	-16.4	41.9	35.9	5.97	7.015	
1,000.0	998.7	999.6	998.7	3.4	3.3	139.25	-33.7	-8.9	51.0	44.4	6.68	7.641	
1,100.0	1,097.5	1,098.9	1,097.2	3.7	3.7	137.07	-42.6	-0.4	63.0	55.6	7.41	8.499	
1,200.0	1,195.6	1,197.8	1,195.3	4.1	4.0	137.32	-51.5	8.1	77.5	69.4	8.16	9.498	
1,300.0	1,293.5	1,296.6	1,293.3	4.6	4.4	138.31	-60.4	16.7	93.3	84.3	8.92	10.459	
1,400.0	1,391.3	1,395.3	1,391.3	5.0	4.8	139.02	-69.2	25.2	109.0	99.3	9.68	11.260	
1,500.0	1,489.1	1,494.0	1,489.3	5.4	5.2	139.54	-78.1	33.7	124.8	114.3	10.45	11.936	
1,600.0	1,587.0	1,592.8	1,587.3	5.9	5.6	139.95	-86.9	42.2	140.5	129.3	11.23	12.513	
1,700.0	1,684.8	1,691.5	1,685.2	6.3	5.9	140.28	-95.8	50.7	156.3	144.3	12.02	13.010	
1,800.0	1,782.6	1,790.3	1,783.2	6.8	6.3	140.55	-104.6	59.2	172.1	159.3	12.80	13.442	
1,900.0	1,880.5	1,889.0	1,881.2	7.2	6.7	140.77	-113.5	67.7	187.9	174.3	13.59	13.821	
2,000.0	1,978.3	1,987.8	1,979.2	7.7	7.1	140.95	-122.3	76.2	203.7	189.3	14.39	14.156	
2,100.0	2,076.1	2,086.5	2,077.1	8.1	7.5	141.12	-131.2	84.7	219.5	204.3	15.18	14.454	
2,200.0	2,174.0	2,185.2	2,175.1	8.6	7.9	141.25	-140.0	93.2	235.3	219.3	15.98	14.721	
2,300.0	2,271.8	2,284.0	2,273.1	9.0	8.3	141.38	-148.9	101.7	251.1	234.3	16.78	14.960	
2,400.0	2,369.6	2,382.7	2,371.1	9.5	8.7	141.48	-157.7	110.2	266.9	249.3	17.58	15.177	
2,500.0	2,467.5	2,481.5	2,469.1	10.0	9.0	141.58	-166.6	118.7	282.7	264.3	18.39	15.374	
2,600.0	2,565.3	2,580.2	2,567.0	10.4	9.4	141.66	-175.4	127.2	298.5	279.3	19.19	15.554	
2,700.0	2,663.2	2,679.0	2,665.0	10.9	9.8	141.74	-184.3	135.7	314.3	294.3	19.99	15.718	
2,800.0	2,761.0	2,777.7	2,763.0	11.3	10.2	141.81	-193.1	144.3	330.1	309.3	20.80	15.869	
2,900.0	2,858.8	2,876.5	2,861.0	11.8	10.6	141.87	-202.0	152.8	345.9	324.2	21.60	16.008	
3,000.0	2,956.7	2,975.2	2,958.9	12.3	11.0	141.93	-210.9	161.3	361.6	339.2	22.41	16.137	
3,100.0	3,054.5	3,073.9	3,056.9	12.7	11.4	141.98	-219.7	169.8	377.4	354.2	23.22	16.256	
3,200.0	3,152.3	3,172.7	3,154.9	13.2	11.8	142.03	-228.6	178.3	393.2	369.2	24.03	16.367	
3,300.0	3,250.2	3,271.4	3,252.9	13.7	12.2	142.07	-237.4	186.8	409.0	384.2	24.83	16.471	
3,400.0	3,348.0	3,370.2	3,350.8	14.1	12.6	142.12	-246.3	195.3	424.8	399.2	25.64	16.567	
3,500.0	3,445.8	3,468.9	3,448.8	14.6	13.0	142.15	-255.1	203.8	440.6	414.2	26.45	16.658	
3,600.0	3,543.7	3,567.7	3,546.8	15.1	13.4	142.19	-264.0	212.3	456.4	429.2	27.26	16.743	
3,700.0	3,641.5	3,666.4	3,644.8	15.6	13.8	142.22	-272.8	220.8	472.2	444.2	28.07	16.822	
3,800.0	3,739.3	3,765.1	3,742.8	16.0	14.2	142.25	-281.7	229.3	488.0	459.2	28.88	16.898	
3,900.0	3,837.2	3,863.9	3,840.7	16.5	14.6	142.28	-290.5	237.8	503.8	474.2	29.69	16.969	
4,000.0	3,935.0	3,962.6	3,938.7	17.0	15.0	142.31	-299.4	246.3	519.6	489.1	30.50	17.036	
4,100.0	4,032.8	4,061.4	4,036.7	17.4	15.4	142.34	-308.2	254.8	535.4	504.1	31.31	17.099	
4,200.0	4,130.7	4,160.1	4,134.7	17.9	15.7	142.36	-317.1	263.4	551.2	519.1	32.13	17.159	
4,300.0	4,228.5	4,258.0	4,228.9	18.4	16.1	142.49	-324.9	270.8	567.2	534.3	32.89	17.243	
4,400.0	4,326.5	4,343.1	4,317.0	18.8	16.4	155.22	-326.1	270.9	584.4	550.9	33.50	17.447	
4,500.0	4,425.2	4,429.5	4,402.7	19.2	16.6	-160.25	-320.1	263.2	602.3	568.3	33.96	17.736	
4,600.0	4,523.7	4,514.4	4,485.4	19.5	16.8	-123.36	-307.6	248.3	620.2	585.9	34.31	18.075	
4,700.0	4,620.4	4,600.0	4,565.7	19.8	17.0	-105.10	-288.4	226.0	637.9	603.3	34.61	18.430	
4,800.0	4,713.8	4,680.6	4,637.6	20.0	17.2	-95.28	-264.5	198.8	655.0	620.2	34.84	18.801	
4,900.0	4,802.7	4,762.0	4,705.7	20.2	17.4	-89.06	-235.0	165.3	671.3	636.2	35.09	19.129	
5,000.0	4,885.6	4,842.7	4,767.7	20.4	17.7	-84.69	-200.8	126.8	686.6	651.1	35.42	19.385	
5,100.0	4,961.3	4,922.5	4,823.0	20.5	18.1	-81.44	-162.6	83.8	700.5	664.6	35.89	19.518	

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 239H (O30-2307 02H)
Project:	Sandoval County, NM	TVD Reference:	16' KB @ 7045.0ft (AZTEC 920)
Reference Site:	S30-T23N-R7W	MD Reference:	16' KB @ 7045.0ft (AZTEC 920)
Site Error:	0.0ft	North Reference:	True
Reference Well:	NAU 239H (O30-2307 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 #7	Offset TVD Reference:	Offset Datum

Offset Design S30-T23N-R7W - NAU 240H (O30-2307 03H) - Hz - PLAN #4														Offset Site Error:	0.0 ft
Survey Program: O-MWD+HDGM														Offset Well Error:	0.0 ft
Reference		Offset		Semi Major Axis		Distance		Total		Separation		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	Factor			
5,200.0	5,028.8	5,000.0	4,870.2	20.8	18.5	-78.94	-121.7	38.0	712.9	676.3	36.56	19.498			
5,300.0	5,086.9	5,080.4	4,911.9	21.1	19.1	-76.98	-75.8	-13.2	723.6	686.0	37.60	19.244			
5,400.0	5,134.9	5,158.6	4,944.9	21.7	19.9	-75.49	-28.4	-65.9	732.4	693.4	38.99	18.787			
5,500.0	5,172.0	5,236.5	4,969.8	22.6	20.8	-74.37	20.9	-120.7	739.3	698.5	40.78	18.128			
5,600.0	5,197.6	5,314.1	4,986.5	23.8	21.8	-73.60	71.6	-176.9	744.0	701.0	42.98	17.313			
5,700.0	5,211.5	5,391.4	4,994.9	25.3	23.0	-73.15	123.1	-233.9	746.6	701.1	45.52	16.402			
5,800.0	5,214.0	5,479.7	4,996.0	27.0	24.5	-73.03	182.4	-299.4	747.0	698.4	48.54	15.388			
5,900.0	5,214.0	5,579.7	4,996.0	28.8	26.3	-73.02	249.5	-373.5	746.6	694.6	52.04	14.346			
6,000.0	5,214.0	5,679.7	4,996.0	30.7	28.2	-73.01	316.6	-447.6	746.3	690.5	55.79	13.376			
6,100.0	5,214.0	5,779.7	4,996.0	32.8	30.3	-73.01	383.7	-521.8	745.9	686.2	59.74	12.487			
6,200.0	5,214.0	5,879.7	4,996.0	34.9	32.4	-73.00	450.9	-595.9	745.6	681.7	63.84	11.678			
6,300.0	5,214.0	5,979.7	4,996.0	37.1	34.6	-72.99	518.0	-670.0	745.2	677.1	68.08	10.946			
6,400.0	5,214.0	6,079.7	4,996.0	39.3	36.9	-72.98	585.1	-744.1	744.9	672.4	72.43	10.284			
6,500.0	5,214.0	6,179.7	4,996.0	41.6	39.2	-72.97	652.2	-818.3	744.5	667.6	76.87	9.685			
6,600.0	5,214.0	6,279.7	4,996.0	44.0	41.6	-72.97	719.3	-892.4	744.2	662.8	81.39	9.143			
6,700.0	5,214.0	6,379.7	4,996.0	46.4	43.9	-72.96	786.5	-966.5	743.8	657.8	85.97	8.652			
6,800.0	5,214.0	6,479.7	4,996.0	48.8	46.4	-72.95	853.6	-1,040.7	743.5	652.9	90.60	8.206			
6,900.0	5,214.0	6,579.7	4,996.0	51.2	48.8	-72.94	920.7	-1,114.8	743.1	647.8	95.28	7.799			
7,000.0	5,214.0	6,679.7	4,996.0	53.6	51.3	-72.93	987.8	-1,188.9	742.7	642.7	100.00	7.427			
7,100.0	5,214.0	6,779.7	4,996.0	56.1	53.7	-72.92	1,055.0	-1,263.0	742.4	637.6	104.75	7.087			
7,200.0	5,214.0	6,879.7	4,996.0	58.6	56.2	-72.92	1,122.1	-1,337.2	742.0	632.5	109.54	6.774			
7,300.0	5,214.0	6,979.7	4,996.0	61.1	58.8	-72.91	1,189.2	-1,411.3	741.7	627.3	114.34	6.486			
7,400.0	5,214.0	7,079.7	4,996.0	63.6	61.3	-72.90	1,256.3	-1,485.4	741.3	622.2	119.18	6.221			
7,500.0	5,214.0	7,179.7	4,996.0	66.1	63.8	-72.89	1,323.4	-1,559.5	741.0	617.0	124.03	5.974			
7,600.0	5,214.0	7,279.7	4,996.0	68.6	66.3	-72.88	1,390.6	-1,633.7	740.6	611.7	128.90	5.746			
7,700.0	5,214.0	7,379.7	4,996.0	71.2	68.9	-72.87	1,457.7	-1,707.8	740.3	606.5	133.78	5.534			
7,800.0	5,214.0	7,479.7	4,996.0	73.7	71.5	-72.87	1,524.8	-1,781.9	739.9	601.3	138.68	5.336			
7,900.0	5,214.0	7,579.7	4,996.0	76.3	74.0	-72.86	1,591.9	-1,856.0	739.6	596.0	143.59	5.151			
8,000.0	5,214.0	7,679.7	4,996.0	78.9	76.6	-72.85	1,659.0	-1,930.2	739.2	590.7	148.51	4.978			
8,100.0	5,214.0	7,779.7	4,996.0	81.4	79.2	-72.84	1,726.2	-2,004.3	738.9	585.4	153.45	4.815			
8,200.0	5,214.0	7,879.7	4,996.0	84.0	81.7	-72.83	1,793.3	-2,078.4	738.5	580.1	158.39	4.663			
8,300.0	5,214.0	7,979.7	4,996.0	86.6	84.3	-72.82	1,860.4	-2,152.5	738.2	574.8	163.34	4.519			
8,400.0	5,214.0	8,079.7	4,996.0	89.2	86.9	-72.81	1,927.5	-2,226.7	737.8	569.5	168.29	4.384			
8,500.0	5,214.0	8,179.7	4,996.0	91.7	89.5	-72.81	1,994.6	-2,300.8	737.5	564.2	173.26	4.257			
8,600.0	5,214.0	8,279.7	4,996.0	94.3	92.1	-72.80	2,061.8	-2,374.9	737.1	558.9	178.23	4.136			
8,700.0	5,214.0	8,379.7	4,996.0	96.9	94.7	-72.79	2,128.9	-2,449.0	736.8	553.6	183.20	4.022			
8,800.0	5,214.0	8,479.7	4,996.0	99.5	97.3	-72.78	2,196.0	-2,523.2	736.4	548.2	188.18	3.913			
8,900.0	5,214.0	8,579.7	4,996.0	102.1	99.9	-72.77	2,263.1	-2,597.3	736.1	542.9	193.17	3.811			
9,000.0	5,214.0	8,679.7	4,996.0	104.7	102.5	-72.76	2,330.3	-2,671.4	735.7	537.6	198.16	3.713			
9,100.0	5,214.0	8,779.7	4,996.0	107.3	105.1	-72.76	2,397.4	-2,745.5	735.4	532.2	203.15	3.620			
9,200.0	5,214.0	8,879.7	4,996.0	109.9	107.7	-72.75	2,464.5	-2,819.7	735.0	526.9	208.15	3.531			
9,300.0	5,214.0	8,979.7	4,996.0	112.6	110.3	-72.74	2,531.6	-2,893.8	734.7	521.5	213.15	3.447			
9,400.0	5,214.0	9,079.7	4,996.0	115.2	113.0	-72.73	2,598.7	-2,967.9	734.3	516.2	218.16	3.366			
9,500.0	5,214.0	9,179.7	4,996.0	117.8	115.6	-72.72	2,665.9	-3,042.0	734.0	510.8	223.16	3.289			
9,600.0	5,214.0	9,279.7	4,996.0	120.4	118.2	-72.71	2,733.0	-3,116.2	733.6	505.4	228.17	3.215			
9,700.0	5,214.0	9,379.7	4,996.0	123.0	120.8	-72.70	2,800.1	-3,190.3	733.3	500.1	233.18	3.145			
9,800.0	5,214.0	9,479.7	4,996.0	125.6	123.4	-72.70	2,867.2	-3,264.4	732.9	494.7	238.20	3.077			
9,900.0	5,214.0	9,579.7	4,996.0	128.3	126.1	-72.69	2,934.3	-3,338.5	732.6	489.3	243.22	3.012			
10,000.0	5,214.0	9,679.7	4,996.0	130.9	128.7	-72.68	3,001.5	-3,412.7	732.2	484.0	248.23	2.950			
10,100.0	5,214.0	9,779.7	4,996.0	133.5	131.3	-72.67	3,068.6	-3,486.8	731.9	478.6	253.25	2.890			
10,200.0	5,214.0	9,879.7	4,996.0	136.1	133.9	-72.66	3,135.7	-3,560.9	731.5	473.2	258.28	2.832			
10,300.0	5,214.0	9,979.7	4,996.0	138.8	136.6	-72.65	3,202.8	-3,635.0	731.2	467.9	263.30	2.777			

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 239H (O30-2307 02H)
Well Error: 0.0ft
Reference Wellbore: Hz
Reference Design: PLAN #7

Local Co-ordinate Reference: Well NAU 239H (O30-2307 02H)
TVD Reference: 16' KB @ 7045.0ft (AZTEC 920)
MD Reference: 16' KB @ 7045.0ft (AZTEC 920)
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 240H (O30-2307 03H) - Hz - PLAN #4													Offset Site Error:	0.0 ft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.0 ft
Reference	Offset	Semi Major Axis		Distance		Total		Separation		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	Factor		
10,400.0	5,214.0	10,079.7	4,996.0	141.4	139.2	-72.64	3,270.0	-3,709.2	730.8	462.5	268.32	2.724		
10,500.0	5,214.0	10,179.7	4,996.0	144.0	141.8	-72.64	3,337.1	-3,783.3	730.5	457.1	273.35	2.672		
10,600.0	5,214.0	10,279.7	4,996.0	146.6	144.4	-72.63	3,404.2	-3,857.4	730.1	451.7	278.38	2.623		
10,700.0	5,214.0	10,379.7	4,996.0	149.3	147.1	-72.62	3,471.3	-3,931.5	729.8	446.4	283.41	2.575		
10,800.0	5,214.0	10,479.7	4,996.0	151.9	149.7	-72.61	3,538.4	-4,005.7	729.4	441.0	288.44	2.529		
10,900.0	5,214.0	10,579.7	4,996.0	154.5	152.3	-72.60	3,605.6	-4,079.8	729.1	435.6	293.47	2.484		
11,000.0	5,214.0	10,679.7	4,996.0	157.2	155.0	-72.59	3,672.7	-4,153.9	728.7	430.2	298.50	2.441		
11,100.0	5,214.0	10,779.7	4,996.0	159.8	157.6	-72.58	3,739.8	-4,228.0	728.4	424.8	303.53	2.400		
11,200.0	5,214.0	10,879.7	4,996.0	162.4	160.2	-72.58	3,806.9	-4,302.2	728.0	419.4	308.56	2.359		
11,300.0	5,214.0	10,979.7	4,996.0	165.1	162.9	-72.57	3,874.0	-4,376.3	727.7	414.1	313.60	2.320		
11,400.0	5,214.0	11,079.7	4,996.0	167.7	165.5	-72.56	3,941.2	-4,450.4	727.3	408.7	318.63	2.283		
11,500.0	5,214.0	11,179.7	4,996.0	170.3	168.1	-72.55	4,008.3	-4,524.5	727.0	403.3	323.67	2.246		
11,579.3	5,214.0	11,259.0	4,996.0	172.4	170.2	-72.54	4,061.5	-4,583.3	726.7	399.0	327.66	2.218 SF		

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 239H (O30-2307 02H)
Well Error: 0.0ft
Reference Wellbore: HZ
Reference Design: PLAN #7

Local Co-ordinate Reference: Well NAU 239H (O30-2307 02H)
TVD Reference: 16' KB @ 7045.0ft (AZTEC 920)
MD Reference: 16' KB @ 7045.0ft (AZTEC 920)
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 241H (O30-2307 04H) - HZ - PLAN #3													Offset Site Error: 0.0 ft
Survey Program: 0-MWD+HDGM													Offset Well Error: 0.0 ft
Reference	Offset		Semi Major Axis		Distance		Total		Separation		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	Factor	
0.0	0.0	0.0	0.0	0.0	0.0	-126.56	-35.7	-48.1	59.9				
100.0	100.0	100.0	100.0	0.2	0.2	-126.56	-35.7	-48.1	59.9	59.6	0.30	198.901	
200.0	200.0	200.0	200.0	0.5	0.5	-126.56	-35.7	-48.1	59.9	58.9	1.02	58.830	
300.0	300.0	300.0	300.0	0.9	0.9	-126.56	-35.7	-48.1	59.9	58.2	1.74	34.520	
400.0	400.0	400.0	400.0	1.2	1.2	-126.56	-35.7	-48.1	59.9	57.4	2.45	24.427	
500.0	500.0	500.0	500.0	1.6	1.6	-126.56	-35.7	-48.1	59.9	56.7	3.17	18.900	
600.0	600.0	600.0	600.0	1.9	1.9	-126.56	-35.7	-48.1	59.9	56.0	3.89	15.413 CC, ES	
700.0	700.0	700.0	700.0	2.3	2.3	147.77	-35.7	-48.1	61.4	56.8	4.60	13.353	
800.0	799.8	798.2	798.2	2.6	2.6	149.08	-37.3	-48.4	67.1	61.8	5.29	12.674 SF	
900.0	899.5	895.8	895.7	3.0	3.0	149.61	-42.2	-49.4	78.2	72.2	5.99	13.049	
1,000.0	998.7	992.4	991.9	3.4	3.3	149.53	-50.3	-51.0	94.7	88.0	6.71	14.119	
1,100.0	1,097.5	1,087.5	1,086.4	3.7	3.6	149.09	-61.3	-53.2	116.4	109.0	7.43	15.676	
1,200.0	1,195.6	1,180.8	1,178.6	4.1	4.0	148.48	-75.2	-56.0	143.4	135.2	8.16	17.575	
1,300.0	1,293.5	1,272.4	1,268.6	4.6	4.3	147.82	-91.6	-59.2	173.8	165.0	8.88	19.587	
1,400.0	1,391.3	1,362.5	1,356.7	5.0	4.7	146.78	-110.5	-63.0	206.5	196.9	9.60	21.521	
1,500.0	1,489.1	1,454.9	1,446.4	5.4	5.1	145.63	-131.9	-67.3	240.9	230.6	10.31	23.363	
1,600.0	1,587.0	1,548.7	1,537.5	5.9	5.5	144.73	-153.8	-71.6	275.5	264.4	11.03	24.964	
1,700.0	1,684.8	1,642.5	1,628.6	6.3	5.9	144.04	-175.7	-76.0	310.0	298.3	11.77	26.349	
1,800.0	1,782.6	1,736.2	1,719.6	6.8	6.3	143.48	-197.6	-80.4	344.7	332.1	12.51	27.555	
1,900.0	1,880.5	1,830.0	1,810.7	7.2	6.7	143.02	-219.5	-84.7	379.3	366.0	13.26	28.612	
2,000.0	1,978.3	1,923.8	1,901.8	7.7	7.1	142.64	-241.4	-89.1	414.0	399.9	14.01	29.543	
2,100.0	2,076.1	2,017.6	1,992.9	8.1	7.6	142.32	-263.3	-93.4	448.6	433.9	14.77	30.368	
2,200.0	2,174.0	2,111.3	2,083.9	8.6	8.0	142.05	-285.2	-97.8	483.3	467.8	15.54	31.104	
2,300.0	2,271.8	2,205.1	2,175.0	9.0	8.5	141.81	-307.1	-102.2	518.0	501.7	16.31	31.763	
2,400.0	2,369.6	2,298.9	2,266.1	9.5	8.9	141.60	-329.0	-106.5	552.7	535.6	17.08	32.356	
2,500.0	2,467.5	2,392.6	2,357.1	10.0	9.3	141.42	-350.9	-110.9	587.4	569.5	17.86	32.893	
2,600.0	2,565.3	2,486.4	2,448.2	10.4	9.8	141.25	-372.8	-115.2	622.1	603.5	18.64	33.380	
2,700.0	2,663.2	2,580.2	2,539.3	10.9	10.2	141.11	-394.7	-119.6	656.8	637.4	19.42	33.823	
2,800.0	2,761.0	2,673.9	2,630.4	11.3	10.7	140.98	-416.6	-124.0	691.5	671.3	20.20	34.229	
2,900.0	2,858.8	2,767.7	2,721.4	11.8	11.1	140.86	-438.5	-128.3	726.3	705.3	20.99	34.602	
3,000.0	2,956.7	2,861.5	2,812.5	12.3	11.6	140.75	-460.4	-132.7	761.0	739.2	21.78	34.945	
3,100.0	3,054.5	2,955.2	2,903.6	12.7	12.0	140.65	-482.3	-137.0	795.7	773.1	22.57	35.262	

Cathedral Energy Services

Anticollision Report

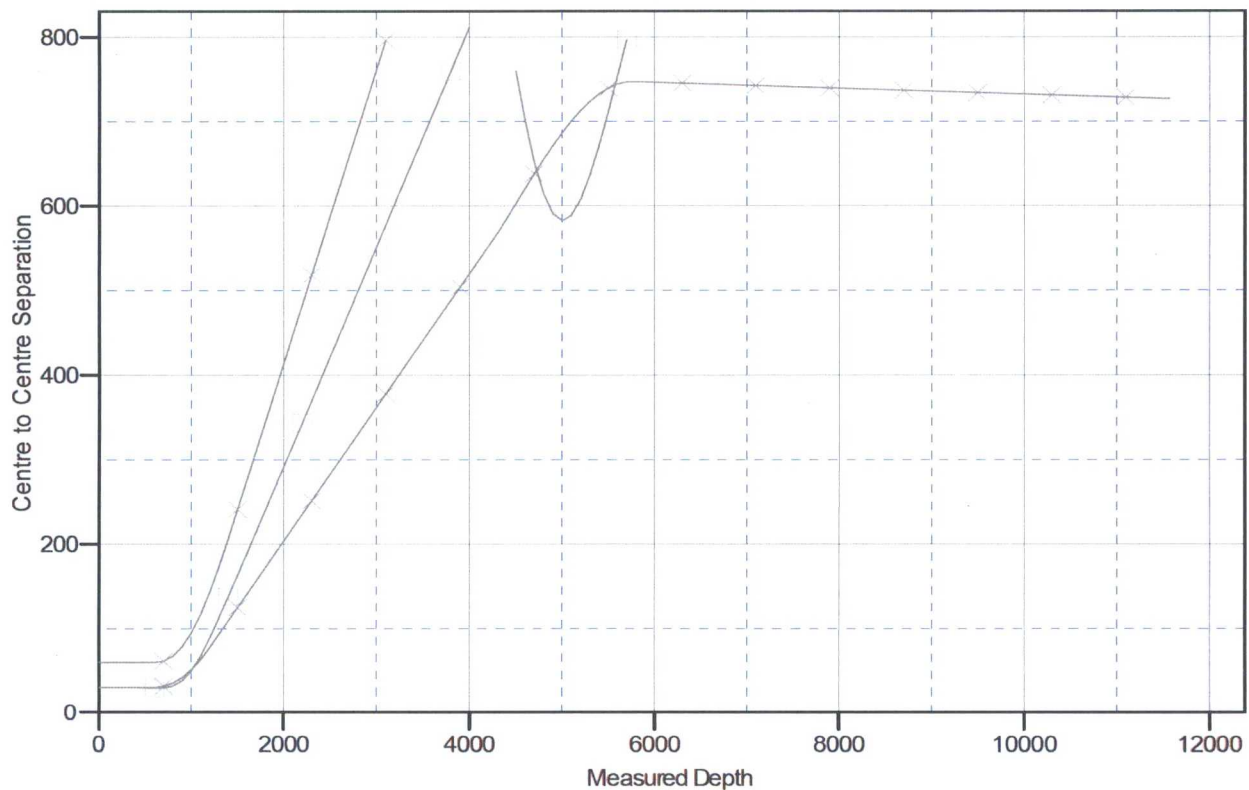
Company: EnCana Oil & Gas (USA) Inc
Project: Sandoval County, NM
Reference Site: S30-T23N-R7W
Site Error: 0.0ft
Reference Well: NAU 239H (O30-2307 02H)
Well Error: 0.0ft
Reference Wellbore: Hz
Reference Design: PLAN #7

Local Co-ordinate Reference: Well NAU 239H (O30-2307 02H)
TVD Reference: 16' KB @ 7045.0ft (AZTEC 920)
MD Reference: 16' KB @ 7045.0ft (AZTEC 920)
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 @ 7045.0ft (AZTEC 920)
 Offset Depths are relative to Offset Datum
 Central Meridian is -106.250000 °

Coordinates are relative to: NAU 239H (O30-2307 02H)
 Coordinate System is US State Plane 1983, New Mexico Central Zone
 Grid Convergence at Surface is: -0.80°

Ladder Plot



LEGEND

✕ NAU 241H (O30-2307 04H), Hz, PLAN#3 V0 □ NAU 238H (O30-2307 01H), OH, PLAN#5 V0 ✕ NAU 240H (O30-2307 03H), Hz, PLAN#4 V0

LOC: 411' FSL, 1317' FEL Sec 30 23N 07'			Encana Natural Gas							ENG: L. Hubbard RIG: Unassigned GLE: 7029 RKBE: 7045		5-30-17
County: Sandoval WELL: NAU 239H			WELL SUMMARY									
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 8.3-9.2	Vertical <1°		
Survey Every 60'-120', updating anticollision report after surveys. Stop operations and contact drilling engineer if separation factor approaches 1.5	No OH logs	Ojo Alamo Kirtland Shale Fruitland Coal Pictured Cliffs Ss. Lewis Shale Cliffhouse Ss. Menefee Fn. Point Lookout Ss. Mancos Shale	1,070 1,217 1,454 1,587 1,679 2,346 3,071 3,960 4,146				8 3/4	7" 26ppf J55 LTC TOC @ surface (100% OH excess) Stage 1 Total: 910sks	Fresh Wtr 8.3-10	Directional 6.2°		
Surveys every 30' through the curve	MWD GR Mud Log	KOP Mancos Silt Gallup Fn. 7" Csg	4,287 4,686 4,952 5,172	4,360 5,500'								
Surveys every stand to TD unless directed otherwise by Geologist	No OH Logs	Horizontal Target TD Base Gallup	5,214 5,214 5,288	11,579			6 1/8	200' overlap at liner top 6079' Drilled Lateral TOC @ Top of Liner (30% open hole excess)		Horz Inc/TVD 90deg/5214'		
MWD Gamma Directional									WBM 8.3-10	TD = 11579.3' MD		