

State of New Mexico  
Energy, Minerals and Natural Resources Department

**Susana Martinez**  
Governor

**Ken McQueen**  
Cabinet Secretary

**Matthias Sayer**  
Deputy Cabinet Secretary

**Heather Riley**, 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 2/7/2018**

Well Information:

| API WELL #         | Well Name        | Well # | Operator Name               | Type | Stat | County   | Surf_Owner | UL | Sec | Twp | N/S | Rng | W/E |
|--------------------|------------------|--------|-----------------------------|------|------|----------|------------|----|-----|-----|-----|-----|-----|
| 30-043-21214-00-00 | LYBROOK J31-2307 | 001H   | ENCANA OIL & GAS (USA) INC. | G    | P    | Sandoval | F          | J  | 31  | 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

March 1, 2018

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

**\*\*Name change and E-permitting not updated with new changes due to the well being in plugged status. Once the well is spud the name change and well information will be updated at that time.**



\_\_\_\_\_  
NMOCD Approved by Signature

2/26/18

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 6681; NM LG-9090

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: 2215' FSL and 2531' FEL Section 31, T23N, R7W  
BHL: 2620' FSL and 2287' FWL Section 5, T22N, R7W

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

NMNM 135229X

8. Well Name and No.

North Alamito Unit 333H (FKA Lybrook J31-2307 01H)

9. API Well No.

30-043-21214

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                                |                                               |                                                    |                                                                              |
|------------------------------------------------------|-----------------------------------------------|-----------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> Notice of Intent | <input type="checkbox"/> Acidize              | <input type="checkbox"/> Deepen               | <input type="checkbox"/> Production (Start/Resume) | <input type="checkbox"/> Water Shut-Off                                      |
| <input type="checkbox"/> Subsequent Report           | <input type="checkbox"/> Alter Casing         | <input type="checkbox"/> Hydraulic Fracturing | <input type="checkbox"/> Reclamation               | <input type="checkbox"/> Well Integrity                                      |
| <input type="checkbox"/> Final Abandonment Notice    | <input type="checkbox"/> Casing Repair        | <input type="checkbox"/> New Construction     | <input type="checkbox"/> Recomplete                | <input checked="" type="checkbox"/> Other - Revised name change & BHL change |
|                                                      | <input type="checkbox"/> Change Plans         | <input type="checkbox"/> Plug and Abandon     | <input type="checkbox"/> Temporarily Abandon       |                                                                              |
|                                                      | <input type="checkbox"/> Convert to Injection | <input type="checkbox"/> Plug Back            | <input type="checkbox"/> 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 J31-2307 01H well, which was approved by the OCD on August 18, 2014, will now be a part of the North Alamito Unit. Encana is submitting this sundry to change the well name from the Lybrook J31-2307 01H to the North Alamito Unit 333H.

In addition to the name change, the BHL was modified to change 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.

NMOC

FEB 26 2018

DISTRICT III

RECEIVED

FEB 09 2018

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

Jevin Croteau

Title Senior Regulatory Analyst

Farmington Field Office  
Bureau of Land Management

Signature

Date

02/07/2018

**THE SPACE FOR FEDERAL OR STATE OFFICE USE**

Approved by

Title

PE

Date

2/22/18

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

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)

**ADHERE TO PREVIOUS NMOC**  
**NMOC** **CONDITIONS OF APPROVAL**



DISTRICT I  
1825 N. French Dr., Hobbs, N.M. 88240  
Phone: (575) 393-6181 Fax: (575) 393-0720

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

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

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

State of New Mexico  
Energy, Minerals & Natural Resources Department

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

WELL LOCATION AND ACREAGE DEDICATION PLAT

|                              |  |                                                |  |                                       |  |
|------------------------------|--|------------------------------------------------|--|---------------------------------------|--|
| 1 API Number<br>30-043-21214 |  | 2 Pool Code<br>98174                           |  | 3 Pool Name<br>ALAMITO MANCOS N (OIL) |  |
| 4 Property Code              |  | 5 Property Name<br>NORTH ALAMITO UNIT          |  | 6 Well Number<br>333H                 |  |
| 7 OGRID No.<br>282327        |  | 8 Operator Name<br>ENCANA OIL & GAS (USA) INC. |  | 9 Elevation<br>6979'                  |  |

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   |
|---------------|---------|----------|-------|---------|---------------|------------------|---------------|----------------|----------|
| J             | 31      | 23N      | 7W    |         | 2215'         | SOUTH            | 2531'         | EAST           | SANDOVAL |

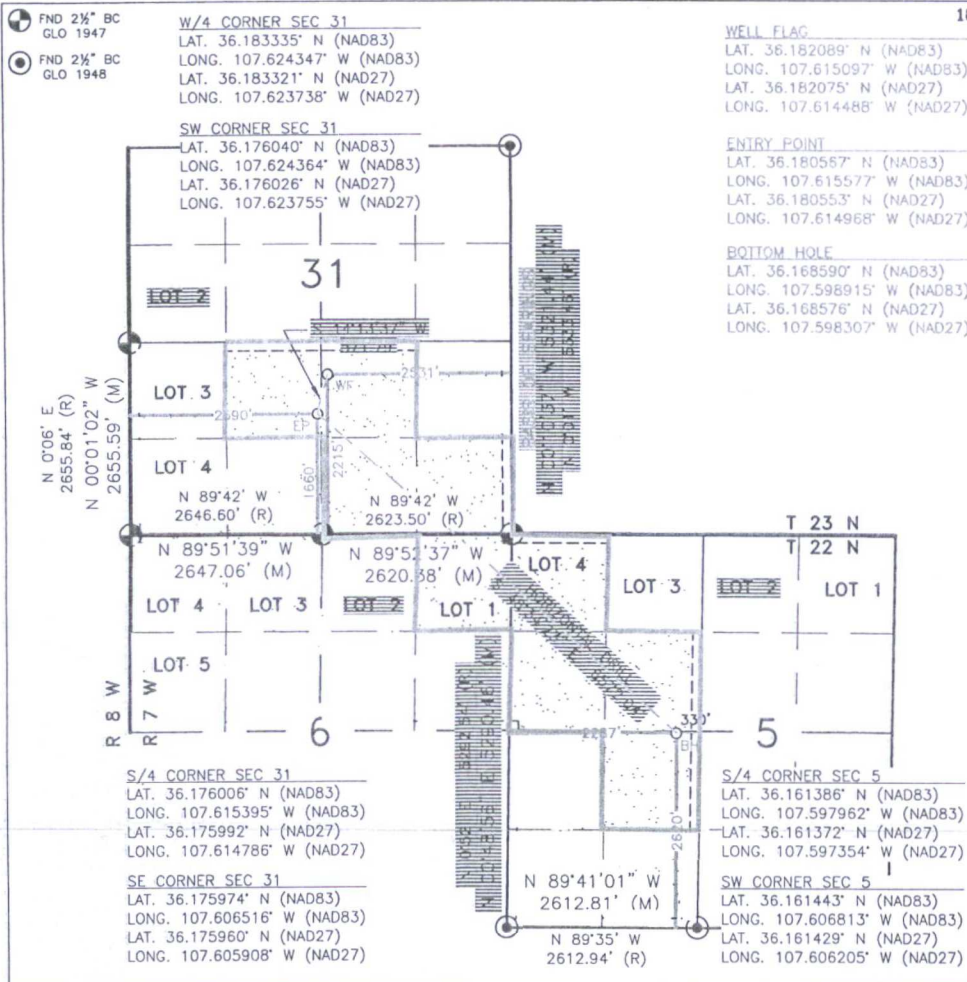
11 Bottom Hole Location If Different From Surface

| UL or lot no. | Section | Township | Range | Lot Idn | Feet from the | North/South line | Feet from the | East/West line | County   |
|---------------|---------|----------|-------|---------|---------------|------------------|---------------|----------------|----------|
| K             | 5       | 22N      | 7W    |         | 2620'         | SOUTH            | 2287'         | WEST           | SANDOVAL |

|                                                                                                                                                                             |                    |                       |                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------|---------------------------------------------|
| 12 Dedicated Acres<br>PENETRATED SPACING UNIT: NESW, S/2 of SE/4, NWSE of Sec 31 (160 acres); NENE of Sec 6 (40.21 acres); S/2 of NW/4, NWNW & NESW of Sec 5 (160.29 acres) | 13 Joint or Infill | 14 Consolidation Code | 15 Order No.<br>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

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State of New Mexico  
Energy, Minerals & Natural Resources Department

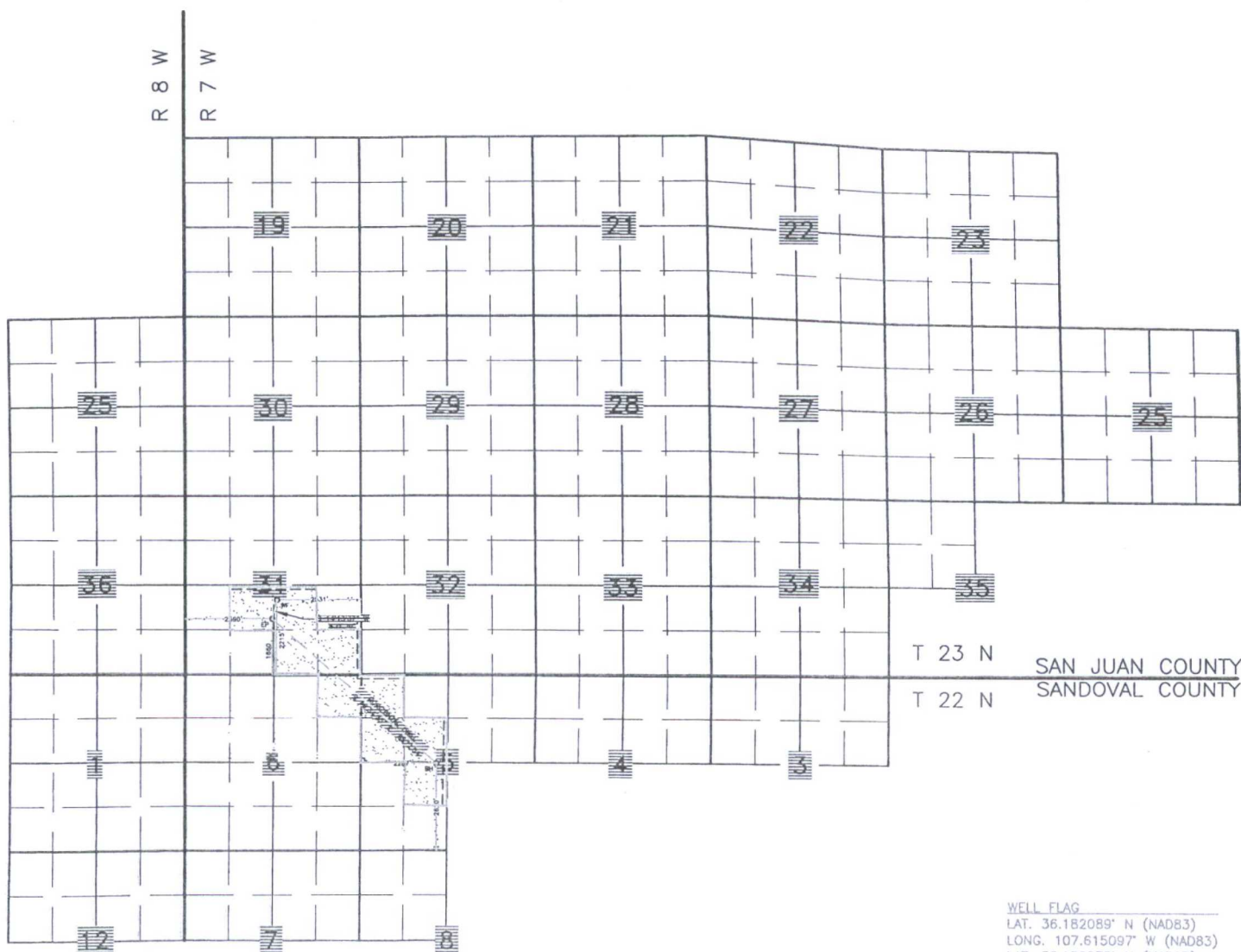
Form C-102  
Revised August 1, 2011

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 #333H



WELL FLAG  
LAT. 36.182089° N (NAD83)  
LONG. 107.615097° W (NAD83)  
LAT. 36.182075° N (NAD27)  
LONG. 107.614488° W (NAD27)

ENTRY POINT  
LAT. 36.180567° N (NAD83)  
LONG. 107.615577° W (NAD83)  
LAT. 36.180553° N (NAD27)  
LONG. 107.614968° W (NAD27)

BOTTOM HOLE  
LAT. 36.168590° N (NAD83)  
LONG. 107.598915° W (NAD83)  
LAT. 36.168576° N (NAD27)  
LONG. 107.598307° W (NAD27)

PENETRATED SPACING UNIT: NESW, S/2 of SE/4, NWSE of Sec 31  
(160 acres); NENE of Sec 6 (40.21 acres); S/2 of NW/4, NWNW &  
NESW of Sec 5 (160.29 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 333H  
SHL: 2215' FSL, 2531' FEL  
Sec 31, T23N, R7W  
BHL: 2620' FSL, 2287' FWL  
Sec 5, T22N, 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           | 907                      |
| Kirtland Shale      | 1,075                    |
| Fruitland Coal      | 1,337                    |
| Pictured Cliffs Ss. | 1,470                    |
| Lewis Shale         | 1,583                    |
| Cliffhouse Ss.      | 2,226                    |
| Menefee Fn.         | 3,106                    |
| Point Lookout Ss.   | 3,857                    |
| Mancos Shale        | 4,030                    |
| Mancos Silt         | 4,542                    |
| Gallup Fn.          | 4,802                    |

The referenced surface elevation is 6979', KB 6995'

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

| Substance | Formation           | Depth (TVD) units = feet |
|-----------|---------------------|--------------------------|
| Water/Gas | Fruitland Coal      | 1,337                    |
| Water/Gas | Pictured Cliffs Ss. | 1,470                    |
| Water/Gas | Cliffhouse Ss.      | 2,226                    |
| Water/Gas | Menefee Fn.         | 3,106                    |
| Water/Gas | Point Lookout Ss.   | 3,857                    |
| Oil/Gas   | Mancos Shale        | 4,030                    |
| Oil/Gas   | Mancos Silt         | 4,542                    |
| Oil/Gas   | Gallup Fn.          | 4,802                    |

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.

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 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'-5350'     | 8 3/4"    | 7"       | 26     | J55, LTC New  |
| Production Liner | 5150'-12227' | 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.

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 Sec 5, T22N, 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/<br>2% CaCl<br>Weight 15.6ppg<br>Yield: 1.21 ft <sup>3</sup> /sk                                                                                                                                                                                                                                                                | Surface      | 1 per joint on bottom 3 joints               |
| Intermediate     | 0'-5350'     | 100% open hole excess<br>Stage 1 Lead:<br>649 sks<br>Stage 1 Tail:<br>237 sks | Lead:<br>Extended Class G w/<br>6% BWOC bentonite +<br>2.5 lb/sk Kol-Seal +<br>0.125 lb/sk Poly-flake<br>Weight: 12.3ppg<br>Yield: 1.952 ft <sup>3</sup> /sk<br><br>Tail:<br>Extended Class G w/<br>1% BWOC bentonite +<br>0.3% BWOC Halad-567<br>+ 0.2% BWOC Versaset<br>+ 0.05% SA-1015<br>Weight: 13.5ppg<br>Yield: 1.305 ft <sup>3</sup> /sk | Surface      | 1 every 3 joints through water bearing zones |
| Production Liner | 5150'-12227' | 30% open hole excess<br>Cement Vol:<br>641 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<br>Weight: 13.3ppg<br>Yield: 1.36 ft <sup>3</sup> /sk                                                                                                                                                                                          | Top of Liner | N/A                                          |



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Sandoval County, NM

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

All waiting on cement times shall be a minimum of 8 hours or adequate to achieve 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 4254'. Directional plans are attached.

| Description           | Proposed Depth (TVD/MD) | Formation |
|-----------------------|-------------------------|-----------|
| Horizontal Lateral TD | 5061'/12227'            | 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'-5032'/5350' | 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"         | 5032'/5350'-<br>5061'/12227' | 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

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**8. ABNORMAL PRESSURES & HYDROGEN SULFIDE**

The anticipated bottom hole pressure is +/- 2374 psi based on a 9.0 ppg at 5073' TVD of the horizontal lateral target. No abnormal pressure or temperatures are anticipated.

No hydrogen sulfide gas is anticipated, however, if H<sub>2</sub>S is encountered, the guidelines in Onshore Order No. 6 will be followed.

**9. ANTICIPATED START DATE AND DURATION OF OPERATIONS**

Drilling is estimated to commence on June 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.

|                                                                                                                                                       |                      |                                                                                                                                                                           |                                                                                             |        |  |  |              |                                                                                                        |                                                               |                               |        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|--------|--|--|--------------|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-------------------------------|--------|
| LOC: 2215' FSL, 2531' FEL Sec 31 23N 01                                                                                                               |                      |                                                                                                                                                                           | Encana Natural Gas                                                                          |        |  |  |              |                                                                                                        | ENG: L. Hubbard<br>RIG: Unassigned<br>GLE: 6979<br>RKBE: 6995 |                               | 6/6/17 |
| County: Sandoval<br>WELL: NAU 333H                                                                                                                    |                      |                                                                                                                                                                           | WELL SUMMARY                                                                                |        |  |  |              |                                                                                                        |                                                               |                               |        |
| MWD<br>LWD                                                                                                                                            | OPEN HOLE<br>LOGGING | FORM                                                                                                                                                                      | DEPTH                                                                                       |        |  |  | HOLE<br>SIZE | CASING<br>SPECS                                                                                        | MW<br>MUD TYPE                                                | DEVIATION<br>INFORMATION      |        |
|                                                                                                                                                       |                      |                                                                                                                                                                           | TVD                                                                                         | MD     |  |  |              |                                                                                                        |                                                               |                               |        |
| Run survey tool at TD and update anticollision scan                                                                                                   | None                 | Nacimiento<br>9 5/8" Csg                                                                                                                                                  | 0<br>320                                                                                    | 320    |  |  | 12 1/4       | 9 5/8" 32.3ppf H40 STC<br><br>TOC to Surface<br>15.6ppg type V cement<br>w/ 2% CaCl                    | Fresh wtr<br>8.3-9.2                                          | Vertical<br><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<br>Kirtland Shale<br><br>Fruitland Coal<br><br>Pictured Cliffs Ss.<br>Lewis Shale<br><br>Cliffhouse Ss.<br>Menefee Fn.<br><br>Point Lookout Ss.<br>Mancos Shale | 907<br>1,075<br><br>1,337<br><br>1,470<br>1,583<br><br>2,226<br>3,106<br><br>3,857<br>4,030 |        |  |  | 8 3/4        | 7" 26ppf J55 LTC<br><br>TOC @ surface (100% OH excess)<br>Stage 1 Total: 887sks                        | Fresh Wtr<br><br>8.3-10                                       | Directional<br>6.2°           |        |
| Surveys every 30' through the curve                                                                                                                   | MWD GR<br>Mud Log    | KOP<br><br>Mancos Silt<br><br>Gallup Fn.<br>7" Csg                                                                                                                        | 4,254<br><br>4,542<br><br>4,802<br>5,032                                                    | 4,324  |  |  |              |                                                                                                        |                                                               |                               |        |
| Surveys every stand to TD unless directed otherwise by Geologist                                                                                      | No OH Logs           | Horizontal Target<br>TD<br><br>Base Gallup                                                                                                                                | 5,073<br>5,061<br><br>5,142                                                                 | 12,227 |  |  | 6 1/8        | 200' overlap at liner top<br><br>6877' Drilled Lateral<br>TOC @ Top of Liner<br>(30% open hole excess) |                                                               | Horz Inc/TVD<br>90.1deg/5073' |        |
| MWD<br>Gamma<br>Directional                                                                                                                           |                      |                                                                                                                                                                           |                                                                                             |        |  |  |              |                                                                                                        | WBM<br>8.3-10                                                 | TD = 12226.7' MD              |        |



# ENCANA

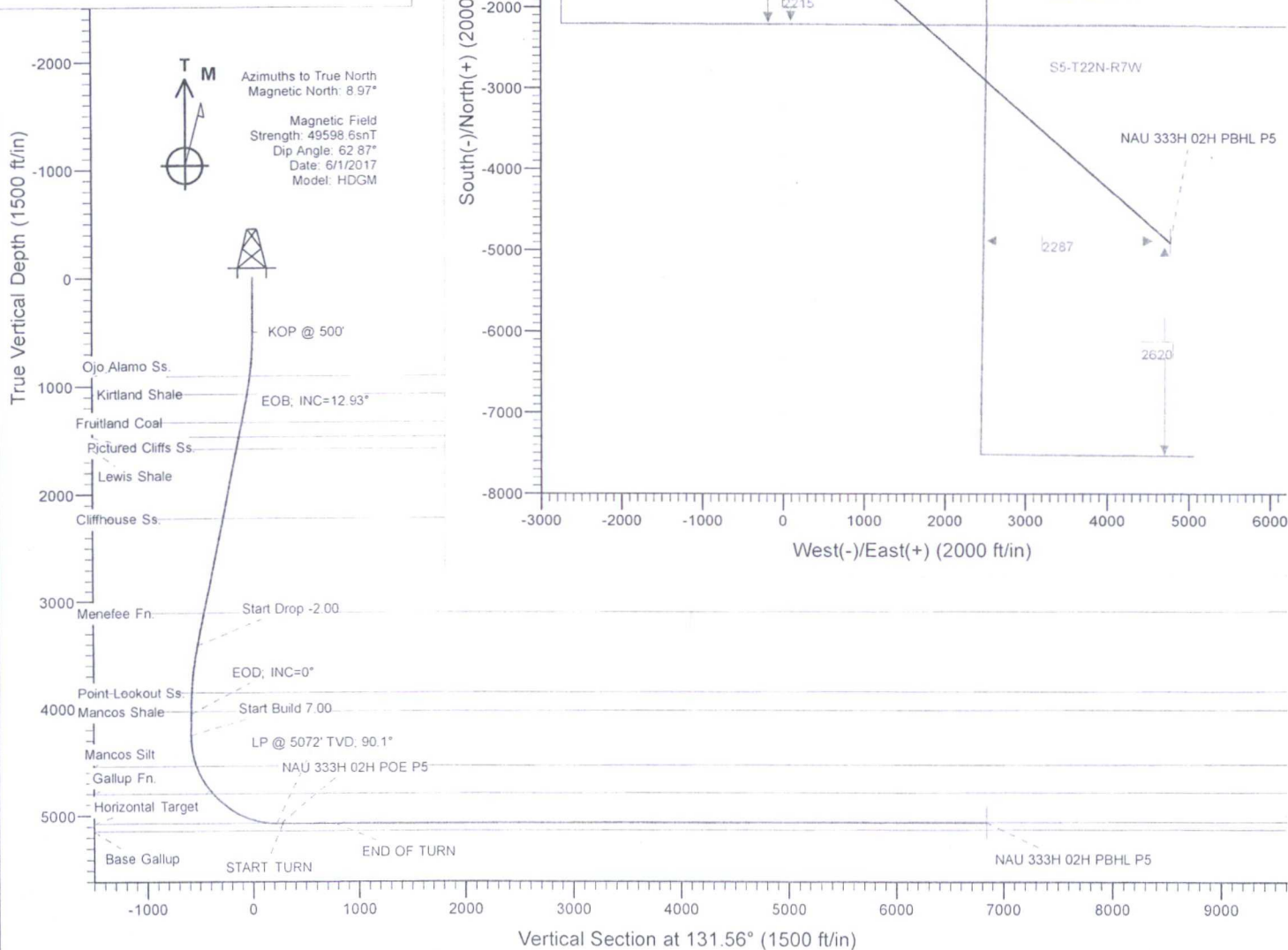
Project: Sandoval County, NM  
 Site: S31-T23N-R7W  
 Well: NAU 333H-J31-2307 02H  
 Wellbore: OH  
 Design: PLAN #5

## 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   | 500.0   | 0.00  | 0.00   | 500.0  | 0.0     | 0.0    | 0.00 | 0.00   | 0.0    |                      |
| 3   | 1146.7  | 12.93 | 282.99 | 1141.3 | 16.3    | -70.8  | 2.00 | 282.99 | -63.8  |                      |
| 4   | 3477.4  | 12.93 | 282.99 | 3412.7 | 133.7   | -579.2 | 0.00 | 0.00   | -522.0 |                      |
| 5   | 4124.1  | 0.00  | 0.00   | 4054.0 | 150.0   | -650.0 | 2.00 | 180.00 | -585.9 |                      |
| 6   | 4324.1  | 0.00  | 0.00   | 4254.0 | 150.0   | -650.0 | 0.00 | 0.00   | -585.9 |                      |
| 7   | 5611.2  | 90.10 | 141.25 | 5072.5 | -489.5  | -136.8 | 7.00 | 141.25 | 222.4  |                      |
| 8   | 5671.2  | 90.10 | 141.25 | 5072.4 | -536.3  | -99.2  | 0.00 | 0.00   | 281.5  |                      |
| 9   | 6155.7  | 90.10 | 131.56 | 5071.6 | -886.7  | 234.4  | 2.00 | -90.00 | 763.6  |                      |
| 10  | 12226.7 | 90.10 | 131.56 | 5061.1 | -4914.3 | 4777.0 | 0.00 | 0.00   | 6834.6 | NAU 333H 02H PBHL P5 |

## FORMATION TOP DETAILS

| TVDPath | MDPath | Formation           |
|---------|--------|---------------------|
| 907.0   | 908.4  | Ojo Alamo Ss.       |
| 1075.1  | 1079.0 | Kirtland Shale      |
| 1337.2  | 1347.8 | Fruitland Coal      |
| 1470.2  | 1484.3 | Pictured Cliffs Ss. |
| 1583.3  | 1600.3 | Lewis Shale         |
| 2226.5  | 2260.2 | Cliffhouse Ss.      |
| 3106.8  | 3163.5 | Menefee Fn.         |
| 3858.0  | 3928.0 | Point Lookout Ss.   |
| 4031.0  | 4101.1 | Mancos Shale        |
| 4542.9  | 4619.4 | Mancos Silt         |
| 4802.7  | 4925.4 | Gallup Fn.          |



## WELL DETAILS: NAU 333H-J31-2307 02H

| +N/-S | +E/-W | Northing   | Ground Level: Easting | 6979.0 | Latitude  | Longitude   |
|-------|-------|------------|-----------------------|--------|-----------|-------------|
| 0.0   | 0.0   | 1888383.31 | 1237566.00            |        | 36.182089 | -107.615097 |

# CATHEDRAL



# Cathedral Energy Services

## Planning Report

Database: USA EDM 5000 Multi Users DB  
 Company: EnCana Oil & Gas (USA) Inc  
 Project: Sandoval County, NM  
 Site: S31-T23N-R7W  
 Well: NAU 333H-J31-2307 02H  
 Wellbore: OH  
 Design: PLAN #5

Local Co-ordinate Reference: Well NAU 333H-J31-2307 02H  
 TVD Reference: 16' KB @ 6995.0ft  
 MD Reference: 16' KB @ 6995.0ft  
 North Reference: True  
 Survey Calculation Method: Minimum Curvature

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

|                       |              |              |                 |                   |             |
|-----------------------|--------------|--------------|-----------------|-------------------|-------------|
| Site                  | S31-T23N-R7W |              |                 |                   |             |
| Site Position:        |              | Northing:    | 1,890,125.34 ft | Latitude:         | 36.186880   |
| From:                 | Lat/Long     | Easting:     | 1,237,740.16 ft | Longitude:        | -107.614590 |
| Position Uncertainty: | 0.0 ft       | Slot Radius: | 13.200 in       | Grid Convergence: | -0.81 °     |

|                      |                       |                     |           |                 |            |             |
|----------------------|-----------------------|---------------------|-----------|-----------------|------------|-------------|
| Well                 | NAU 333H-J31-2307 02H |                     |           |                 |            |             |
| Well Position        | +N/-S                 | 0.0 ft              | Northing: | 1,888,383.31 ft | Latitude:  | 36.182089   |
|                      | +E/-W                 | 0.0 ft              | Easting:  | 1,237,566.00 ft | Longitude: | -107.615097 |
| Position Uncertainty | 0.0 ft                | Wellhead Elevation: | ft        | Ground Level:   | 6,979.0 ft |             |

|           |            |             |                 |               |                     |
|-----------|------------|-------------|-----------------|---------------|---------------------|
| Wellbore  | OH         |             |                 |               |                     |
| Magnetics | Model Name | Sample Date | Declination (°) | Dip Angle (°) | Field Strength (nT) |
|           | HDGM       | 6/1/2017    | 8.97            | 62.87         | 49,598.60000000     |

|                   |                          |               |               |                  |
|-------------------|--------------------------|---------------|---------------|------------------|
| Design            | PLAN #5                  |               |               |                  |
| Audit Notes:      |                          |               |               |                  |
| Version:          | Phase:                   | PLAN          | Tie On Depth: | 0.0              |
| Vertical Section: | Depth From (TVD)<br>(ft) | +N/-S<br>(ft) | +E/-W<br>(ft) | Direction<br>(°) |
|                   | 0.0                      | 0.0           | 0.0           | 131.56           |

| 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    |                   |
| 500.0               | 0.00            | 0.00        | 500.0               | 0.0        | 0.0        | 0.00                  | 0.00                 | 0.00                | 0.00    |                   |
| 1,146.7             | 12.93           | 282.99      | 1,141.3             | 16.3       | -70.8      | 2.00                  | 2.00                 | 0.00                | 282.99  |                   |
| 3,477.4             | 12.93           | 282.99      | 3,412.7             | 133.7      | -579.2     | 0.00                  | 0.00                 | 0.00                | 0.00    |                   |
| 4,124.1             | 0.00            | 0.00        | 4,054.0             | 150.0      | -650.0     | 2.00                  | -2.00                | 0.00                | 180.00  |                   |
| 4,324.1             | 0.00            | 0.00        | 4,254.0             | 150.0      | -650.0     | 0.00                  | 0.00                 | 0.00                | 0.00    |                   |
| 5,611.2             | 90.10           | 141.25      | 5,072.5             | -489.5     | -136.8     | 7.00                  | 7.00                 | 0.00                | 141.25  |                   |
| 5,671.2             | 90.10           | 141.25      | 5,072.4             | -536.3     | -99.2      | 0.00                  | 0.00                 | 0.00                | 0.00    |                   |
| 6,155.7             | 90.10           | 131.56      | 5,071.6             | -886.7     | 234.4      | 2.00                  | 0.00                 | -2.00               | -90.00  |                   |
| 12,226.7            | 90.10           | 131.56      | 5,061.1             | -4,914.3   | 4,777.0    | 0.00                  | 0.00                 | 0.00                | 0.00    | NAU 333H 02H PBHL |

# Cathedral Energy Services

## Planning Report

Database: USA EDM 5000 Multi Users DB  
 Company: EnCana Oil & Gas (USA) Inc  
 Project: Sandoval County, NM  
 Site: S31-T23N-R7W  
 Well: NAU 333H-J31-2307 02H  
 Wellbore: OH  
 Design: PLAN #5

Local Co-ordinate Reference: Well NAU 333H-J31-2307 02H  
 TVD Reference: 16' KB @ 6995.0ft  
 MD Reference: 16' KB @ 6995.0ft  
 North Reference: True  
 Survey Calculation Method: Minimum Curvature

### Planned Survey

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Comments / Formations |
|---------------------|-----------------|-------------|---------------------|------------|------------|-----------------------|-----------------------|----------------------|-----------------------|
| 0.0                 | 0.00            | 0.00        | 0.0                 | 0.0        | 0.0        | 0.0                   | 0.00                  | 0.00                 |                       |
| 100.0               | 0.00            | 0.00        | 100.0               | 0.0        | 0.0        | 0.0                   | 0.00                  | 0.00                 |                       |
| 200.0               | 0.00            | 0.00        | 200.0               | 0.0        | 0.0        | 0.0                   | 0.00                  | 0.00                 |                       |
| 300.0               | 0.00            | 0.00        | 300.0               | 0.0        | 0.0        | 0.0                   | 0.00                  | 0.00                 |                       |
| 400.0               | 0.00            | 0.00        | 400.0               | 0.0        | 0.0        | 0.0                   | 0.00                  | 0.00                 |                       |
| 500.0               | 0.00            | 0.00        | 500.0               | 0.0        | 0.0        | 0.0                   | 0.00                  | 0.00                 | KOP @ 500' - 9 5/8"   |
| 600.0               | 2.00            | 282.99      | 600.0               | 0.4        | -1.7       | -1.5                  | 2.00                  | 2.00                 |                       |
| 700.0               | 4.00            | 282.99      | 699.8               | 1.6        | -6.8       | -6.1                  | 2.00                  | 2.00                 |                       |
| 800.0               | 6.00            | 282.99      | 799.5               | 3.5        | -15.3      | -13.8                 | 2.00                  | 2.00                 |                       |
| 900.0               | 8.00            | 282.99      | 898.7               | 6.3        | -27.2      | -24.5                 | 2.00                  | 2.00                 |                       |
| 908.4               | 8.17            | 282.99      | 907.0               | 6.5        | -28.3      | -25.5                 | 2.00                  | 2.00                 | Ojo Alamo Ss.         |
| 1,000.0             | 10.00           | 282.99      | 997.5               | 9.8        | -42.4      | -38.2                 | 2.00                  | 2.00                 |                       |
| 1,079.0             | 11.58           | 282.99      | 1,075.1             | 13.1       | -56.8      | -51.2                 | 2.00                  | 2.00                 | Kirtland Shale        |
| 1,100.0             | 12.00           | 282.99      | 1,095.6             | 14.1       | -61.0      | -55.0                 | 2.00                  | 2.00                 |                       |
| 1,146.7             | 12.93           | 282.99      | 1,141.3             | 16.3       | -70.8      | -63.8                 | 2.00                  | 2.00                 | EOB; INC=12.93°       |
| 1,200.0             | 12.93           | 282.99      | 1,193.2             | 19.0       | -82.4      | -74.3                 | 0.00                  | 0.00                 |                       |
| 1,300.0             | 12.93           | 282.99      | 1,290.6             | 24.1       | -104.3     | -94.0                 | 0.00                  | 0.00                 |                       |
| 1,347.8             | 12.93           | 282.99      | 1,337.2             | 26.5       | -114.7     | -103.4                | 0.00                  | 0.00                 | Fruitland Coal        |
| 1,400.0             | 12.93           | 282.99      | 1,388.1             | 29.1       | -126.1     | -113.6                | 0.00                  | 0.00                 |                       |
| 1,484.3             | 12.93           | 282.99      | 1,470.2             | 33.3       | -144.5     | -130.2                | 0.00                  | 0.00                 | Pictured Cliffs Ss.   |
| 1,500.0             | 12.93           | 282.99      | 1,485.6             | 34.1       | -147.9     | -133.3                | 0.00                  | 0.00                 |                       |
| 1,600.0             | 12.93           | 282.99      | 1,583.0             | 39.2       | -169.7     | -153.0                | 0.00                  | 0.00                 |                       |
| 1,600.3             | 12.93           | 282.99      | 1,583.3             | 39.2       | -169.7     | -153.0                | 0.00                  | 0.00                 | Lewis Shale           |
| 1,700.0             | 12.93           | 282.99      | 1,680.5             | 44.2       | -191.5     | -172.6                | 0.00                  | 0.00                 |                       |
| 1,800.0             | 12.93           | 282.99      | 1,777.9             | 49.2       | -213.3     | -192.3                | 0.00                  | 0.00                 |                       |
| 1,900.0             | 12.93           | 282.99      | 1,875.4             | 54.3       | -235.1     | -211.9                | 0.00                  | 0.00                 |                       |
| 2,000.0             | 12.93           | 282.99      | 1,972.9             | 59.3       | -256.9     | -231.6                | 0.00                  | 0.00                 |                       |
| 2,100.0             | 12.93           | 282.99      | 2,070.3             | 64.3       | -278.8     | -251.3                | 0.00                  | 0.00                 |                       |
| 2,200.0             | 12.93           | 282.99      | 2,167.8             | 69.4       | -300.6     | -270.9                | 0.00                  | 0.00                 |                       |
| 2,260.2             | 12.93           | 282.99      | 2,226.5             | 72.4       | -313.7     | -282.8                | 0.00                  | 0.00                 | Cliffhouse Ss.        |
| 2,300.0             | 12.93           | 282.99      | 2,265.3             | 74.4       | -322.4     | -290.6                | 0.00                  | 0.00                 |                       |
| 2,400.0             | 12.93           | 282.99      | 2,362.7             | 79.4       | -344.2     | -310.2                | 0.00                  | 0.00                 |                       |
| 2,500.0             | 12.93           | 282.99      | 2,460.2             | 84.5       | -366.0     | -329.9                | 0.00                  | 0.00                 |                       |
| 2,600.0             | 12.93           | 282.99      | 2,557.6             | 89.5       | -387.8     | -349.6                | 0.00                  | 0.00                 |                       |
| 2,700.0             | 12.93           | 282.99      | 2,655.1             | 94.5       | -409.6     | -369.2                | 0.00                  | 0.00                 |                       |
| 2,800.0             | 12.93           | 282.99      | 2,752.6             | 99.6       | -431.4     | -388.9                | 0.00                  | 0.00                 |                       |
| 2,900.0             | 12.93           | 282.99      | 2,850.0             | 104.6      | -453.2     | -408.5                | 0.00                  | 0.00                 |                       |
| 3,000.0             | 12.93           | 282.99      | 2,947.5             | 109.6      | -475.1     | -428.2                | 0.00                  | 0.00                 |                       |
| 3,100.0             | 12.93           | 282.99      | 3,045.0             | 114.7      | -496.9     | -447.9                | 0.00                  | 0.00                 |                       |
| 3,163.5             | 12.93           | 282.99      | 3,106.8             | 117.9      | -510.7     | -460.3                | 0.00                  | 0.00                 | Menefee Fn.           |
| 3,200.0             | 12.93           | 282.99      | 3,142.4             | 119.7      | -518.7     | -467.5                | 0.00                  | 0.00                 |                       |
| 3,300.0             | 12.93           | 282.99      | 3,239.9             | 124.7      | -540.5     | -487.2                | 0.00                  | 0.00                 |                       |
| 3,400.0             | 12.93           | 282.99      | 3,337.4             | 129.8      | -562.3     | -506.8                | 0.00                  | 0.00                 |                       |
| 3,477.4             | 12.93           | 282.99      | 3,412.7             | 133.7      | -579.2     | -522.0                | 0.00                  | 0.00                 | Start Drop -2.00      |
| 3,500.0             | 12.48           | 282.99      | 3,434.8             | 134.8      | -584.0     | -526.4                | 2.00                  | -2.00                |                       |
| 3,600.0             | 10.48           | 282.99      | 3,532.8             | 139.3      | -603.4     | -543.9                | 2.00                  | -2.00                |                       |
| 3,700.0             | 8.48            | 282.99      | 3,631.5             | 143.0      | -619.5     | -558.4                | 2.00                  | -2.00                |                       |
| 3,800.0             | 6.48            | 282.99      | 3,730.6             | 145.9      | -632.2     | -569.8                | 2.00                  | -2.00                |                       |
| 3,900.0             | 4.48            | 282.99      | 3,830.1             | 148.0      | -641.5     | -578.2                | 2.00                  | -2.00                |                       |
| 3,928.0             | 3.92            | 282.99      | 3,858.0             | 148.5      | -643.5     | -580.0                | 2.00                  | -2.00                | Point Lookout Ss.     |
| 4,000.0             | 2.48            | 282.99      | 3,929.9             | 149.4      | -647.4     | -583.5                | 2.00                  | -2.00                |                       |
| 4,100.0             | 0.48            | 282.99      | 4,029.9             | 150.0      | -649.9     | -585.8                | 2.00                  | -2.00                |                       |



# Cathedral Energy Services

## Planning Report

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Project: Sandoval County, NM  
Site: S31-T23N-R7W  
Well: NAU 333H-J31-2307 02H  
Wellbore: OH  
Design: PLAN #5

Local Co-ordinate Reference: Well NAU 333H-J31-2307 02H  
TVD Reference: 16' KB @ 6995.0ft  
MD Reference: 16' KB @ 6995.0ft  
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 |
|---------------------|-----------------|-------------|---------------------|------------|------------|-----------------------|-----------------------|----------------------|-----------------------|
| 4,101.1             | 0.46            | 282.99      | 4,031.0             | 150.0      | -649.9     | -585.8                | 2.01                  | -2.01                | Mancos Shale          |
| 4,124.1             | 0.00            | 0.00        | 4,054.0             | 150.0      | -650.0     | -585.9                | 2.00                  | -2.00                | EOD; INC=0°           |
| 4,200.0             | 0.00            | 0.00        | 4,129.9             | 150.0      | -650.0     | -585.9                | 0.00                  | 0.00                 |                       |
| 4,300.0             | 0.00            | 0.00        | 4,229.9             | 150.0      | -650.0     | -585.9                | 0.00                  | 0.00                 |                       |
| 4,324.1             | 0.00            | 0.00        | 4,254.0             | 150.0      | -650.0     | -585.9                | 0.00                  | 0.00                 | Start Build 7.00      |
| 4,400.0             | 5.31            | 141.25      | 4,329.8             | 147.3      | -647.8     | -582.4                | 7.00                  | 7.00                 |                       |
| 4,500.0             | 12.31           | 141.25      | 4,428.6             | 135.3      | -638.2     | -567.3                | 7.00                  | 7.00                 |                       |
| 4,600.0             | 19.31           | 141.25      | 4,524.7             | 114.1      | -621.2     | -540.5                | 7.00                  | 7.00                 |                       |
| 4,619.4             | 20.67           | 141.25      | 4,542.9             | 108.9      | -617.0     | -533.9                | 7.00                  | 7.00                 | Mancos Silt           |
| 4,700.0             | 26.31           | 141.25      | 4,616.8             | 83.9       | -596.9     | -502.3                | 7.00                  | 7.00                 |                       |
| 4,749.5             | 29.78           | 141.25      | 4,660.5             | 65.7       | -582.4     | -479.3                | 7.00                  | 7.00                 | ICP @ 55°             |
| 4,800.0             | 33.31           | 141.25      | 4,703.5             | 45.1       | -565.8     | -453.3                | 7.00                  | 7.00                 |                       |
| 4,900.0             | 40.31           | 141.25      | 4,783.6             | -1.6       | -528.3     | -394.3                | 7.00                  | 7.00                 |                       |
| 4,925.4             | 42.09           | 141.25      | 4,802.7             | -14.6      | -517.9     | -377.8                | 7.00                  | 7.00                 | Gallup Fn.            |
| 5,000.0             | 47.31           | 141.25      | 4,855.7             | -55.6      | -485.0     | -326.1                | 7.00                  | 7.00                 |                       |
| 5,100.0             | 54.31           | 141.25      | 4,918.8             | -116.0     | -436.5     | -249.7                | 7.00                  | 7.00                 |                       |
| 5,200.0             | 61.31           | 141.25      | 4,972.0             | -181.9     | -383.6     | -166.3                | 7.00                  | 7.00                 |                       |
| 5,300.0             | 68.31           | 141.25      | 5,014.6             | -252.5     | -327.0     | -77.2                 | 7.00                  | 7.00                 |                       |
| 5,400.0             | 75.31           | 141.25      | 5,045.8             | -326.5     | -267.6     | 16.4                  | 7.00                  | 7.00                 |                       |
| 5,500.0             | 82.31           | 141.25      | 5,065.2             | -403.0     | -206.2     | 113.0                 | 7.00                  | 7.00                 |                       |
| 5,600.0             | 89.31           | 141.25      | 5,072.5             | -480.7     | -143.8     | 211.3                 | 7.00                  | 7.00                 |                       |
| 5,611.2             | 90.10           | 141.25      | 5,072.5             | -489.5     | -136.8     | 222.4                 | 7.01                  | 7.01                 | LP @ 5072' TVD; 90.1° |
| 5,671.2             | 90.10           | 141.25      | 5,072.4             | -536.3     | -99.2      | 281.5                 | 0.00                  | 0.00                 | START TURN            |
| 5,700.0             | 90.10           | 140.67      | 5,072.4             | -558.6     | -81.1      | 309.9                 | 2.00                  | 0.00                 |                       |
| 5,800.0             | 90.10           | 138.67      | 5,072.2             | -634.8     | -16.4      | 408.9                 | 2.00                  | 0.00                 |                       |
| 5,900.0             | 90.10           | 136.67      | 5,072.0             | -708.8     | 50.9       | 508.3                 | 2.00                  | 0.00                 |                       |
| 6,000.0             | 90.10           | 134.67      | 5,071.8             | -780.3     | 120.8      | 608.0                 | 2.00                  | 0.00                 |                       |
| 6,100.0             | 90.10           | 132.67      | 5,071.7             | -849.3     | 193.1      | 708.0                 | 2.00                  | 0.00                 |                       |
| 6,155.7             | 90.10           | 131.56      | 5,071.6             | -886.7     | 234.4      | 763.6                 | 2.00                  | 0.00                 | END OF TURN           |
| 6,200.0             | 90.10           | 131.56      | 5,071.5             | -916.1     | 267.6      | 808.0                 | 0.00                  | 0.00                 |                       |
| 6,300.0             | 90.10           | 131.56      | 5,071.3             | -982.4     | 342.4      | 908.0                 | 0.00                  | 0.00                 |                       |
| 6,400.0             | 90.10           | 131.56      | 5,071.1             | -1,048.8   | 417.2      | 1,008.0               | 0.00                  | 0.00                 |                       |
| 6,500.0             | 90.10           | 131.56      | 5,071.0             | -1,115.1   | 492.1      | 1,108.0               | 0.00                  | 0.00                 |                       |
| 6,600.0             | 90.10           | 131.56      | 5,070.8             | -1,181.5   | 566.9      | 1,208.0               | 0.00                  | 0.00                 |                       |
| 6,700.0             | 90.10           | 131.56      | 5,070.6             | -1,247.8   | 641.7      | 1,308.0               | 0.00                  | 0.00                 |                       |
| 6,800.0             | 90.10           | 131.56      | 5,070.4             | -1,314.1   | 716.5      | 1,408.0               | 0.00                  | 0.00                 |                       |
| 6,900.0             | 90.10           | 131.56      | 5,070.3             | -1,380.5   | 791.4      | 1,508.0               | 0.00                  | 0.00                 |                       |
| 7,000.0             | 90.10           | 131.56      | 5,070.1             | -1,446.8   | 866.2      | 1,608.0               | 0.00                  | 0.00                 |                       |
| 7,100.0             | 90.10           | 131.56      | 5,069.9             | -1,513.2   | 941.0      | 1,708.0               | 0.00                  | 0.00                 |                       |
| 7,200.0             | 90.10           | 131.56      | 5,069.8             | -1,579.5   | 1,015.8    | 1,808.0               | 0.00                  | 0.00                 |                       |
| 7,300.0             | 90.10           | 131.56      | 5,069.6             | -1,645.9   | 1,090.7    | 1,908.0               | 0.00                  | 0.00                 |                       |
| 7,400.0             | 90.10           | 131.56      | 5,069.4             | -1,712.2   | 1,165.5    | 2,008.0               | 0.00                  | 0.00                 |                       |
| 7,500.0             | 90.10           | 131.56      | 5,069.2             | -1,778.5   | 1,240.3    | 2,108.0               | 0.00                  | 0.00                 |                       |
| 7,600.0             | 90.10           | 131.56      | 5,069.1             | -1,844.9   | 1,315.1    | 2,208.0               | 0.00                  | 0.00                 |                       |
| 7,700.0             | 90.10           | 131.56      | 5,068.9             | -1,911.2   | 1,390.0    | 2,308.0               | 0.00                  | 0.00                 |                       |
| 7,800.0             | 90.10           | 131.56      | 5,068.7             | -1,977.6   | 1,464.8    | 2,408.0               | 0.00                  | 0.00                 |                       |
| 7,900.0             | 90.10           | 131.56      | 5,068.5             | -2,043.9   | 1,539.6    | 2,508.0               | 0.00                  | 0.00                 |                       |
| 8,000.0             | 90.10           | 131.56      | 5,068.4             | -2,110.2   | 1,614.4    | 2,608.0               | 0.00                  | 0.00                 |                       |
| 8,100.0             | 90.10           | 131.56      | 5,068.2             | -2,176.6   | 1,689.3    | 2,708.0               | 0.00                  | 0.00                 |                       |
| 8,200.0             | 90.10           | 131.56      | 5,068.0             | -2,242.9   | 1,764.1    | 2,808.0               | 0.00                  | 0.00                 |                       |
| 8,300.0             | 90.10           | 131.56      | 5,067.9             | -2,309.3   | 1,838.9    | 2,908.0               | 0.00                  | 0.00                 |                       |
| 8,400.0             | 90.10           | 131.56      | 5,067.7             | -2,375.6   | 1,913.7    | 3,008.0               | 0.00                  | 0.00                 |                       |

# Cathedral Energy Services

## Planning Report

Database: USA EDM 5000 Multi Users DB  
 Company: EnCana Oil & Gas (USA) Inc  
 Project: Sandoval County, NM  
 Site: S31-T23N-R7W  
 Well: NAU 333H-J31-2307 02H  
 Wellbore: OH  
 Design: PLAN #5

Local Co-ordinate Reference: Well NAU 333H-J31-2307 02H  
 TVD Reference: 16' KB @ 6995.0ft  
 MD Reference: 16' KB @ 6995.0ft  
 North Reference: True  
 Survey Calculation Method: Minimum Curvature

### Planned Survey

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Comments / Formations |
|---------------------|-----------------|-------------|---------------------|------------|------------|-----------------------|-----------------------|----------------------|-----------------------|
| 8,500.0             | 90.10           | 131.56      | 5,067.5             | -2,442.0   | 1,988.6    | 3,108.0               | 0.00                  | 0.00                 |                       |
| 8,600.0             | 90.10           | 131.56      | 5,067.3             | -2,508.3   | 2,063.4    | 3,208.0               | 0.00                  | 0.00                 |                       |
| 8,700.0             | 90.10           | 131.56      | 5,067.2             | -2,574.6   | 2,138.2    | 3,308.0               | 0.00                  | 0.00                 |                       |
| 8,800.0             | 90.10           | 131.56      | 5,067.0             | -2,641.0   | 2,213.0    | 3,408.0               | 0.00                  | 0.00                 |                       |
| 8,900.0             | 90.10           | 131.56      | 5,066.8             | -2,707.3   | 2,287.9    | 3,508.0               | 0.00                  | 0.00                 |                       |
| 9,000.0             | 90.10           | 131.56      | 5,066.6             | -2,773.7   | 2,362.7    | 3,608.0               | 0.00                  | 0.00                 |                       |
| 9,100.0             | 90.10           | 131.56      | 5,066.5             | -2,840.0   | 2,437.5    | 3,708.0               | 0.00                  | 0.00                 |                       |
| 9,200.0             | 90.10           | 131.56      | 5,066.3             | -2,906.3   | 2,512.3    | 3,808.0               | 0.00                  | 0.00                 |                       |
| 9,300.0             | 90.10           | 131.56      | 5,066.1             | -2,972.7   | 2,587.2    | 3,908.0               | 0.00                  | 0.00                 |                       |
| 9,400.0             | 90.10           | 131.56      | 5,066.0             | -3,039.0   | 2,662.0    | 4,008.0               | 0.00                  | 0.00                 |                       |
| 9,500.0             | 90.10           | 131.56      | 5,065.8             | -3,105.4   | 2,736.8    | 4,108.0               | 0.00                  | 0.00                 |                       |
| 9,600.0             | 90.10           | 131.56      | 5,065.6             | -3,171.7   | 2,811.6    | 4,208.0               | 0.00                  | 0.00                 |                       |
| 9,700.0             | 90.10           | 131.56      | 5,065.4             | -3,238.1   | 2,886.5    | 4,308.0               | 0.00                  | 0.00                 |                       |
| 9,800.0             | 90.10           | 131.56      | 5,065.3             | -3,304.4   | 2,961.3    | 4,408.0               | 0.00                  | 0.00                 |                       |
| 9,900.0             | 90.10           | 131.56      | 5,065.1             | -3,370.7   | 3,036.1    | 4,508.0               | 0.00                  | 0.00                 |                       |
| 10,000.0            | 90.10           | 131.56      | 5,064.9             | -3,437.1   | 3,110.9    | 4,608.0               | 0.00                  | 0.00                 |                       |
| 10,100.0            | 90.10           | 131.56      | 5,064.7             | -3,503.4   | 3,185.8    | 4,708.0               | 0.00                  | 0.00                 |                       |
| 10,200.0            | 90.10           | 131.56      | 5,064.6             | -3,569.8   | 3,260.6    | 4,808.0               | 0.00                  | 0.00                 |                       |
| 10,300.0            | 90.10           | 131.56      | 5,064.4             | -3,636.1   | 3,335.4    | 4,908.0               | 0.00                  | 0.00                 |                       |
| 10,400.0            | 90.10           | 131.56      | 5,064.2             | -3,702.5   | 3,410.2    | 5,008.0               | 0.00                  | 0.00                 |                       |
| 10,500.0            | 90.10           | 131.56      | 5,064.1             | -3,768.8   | 3,485.1    | 5,108.0               | 0.00                  | 0.00                 |                       |
| 10,600.0            | 90.10           | 131.56      | 5,063.9             | -3,835.1   | 3,559.9    | 5,208.0               | 0.00                  | 0.00                 |                       |
| 10,700.0            | 90.10           | 131.56      | 5,063.7             | -3,901.5   | 3,634.7    | 5,308.0               | 0.00                  | 0.00                 |                       |
| 10,800.0            | 90.10           | 131.56      | 5,063.5             | -3,967.8   | 3,709.5    | 5,408.0               | 0.00                  | 0.00                 |                       |
| 10,900.0            | 90.10           | 131.56      | 5,063.4             | -4,034.2   | 3,784.4    | 5,508.0               | 0.00                  | 0.00                 |                       |
| 11,000.0            | 90.10           | 131.56      | 5,063.2             | -4,100.5   | 3,859.2    | 5,608.0               | 0.00                  | 0.00                 |                       |
| 11,100.0            | 90.10           | 131.56      | 5,063.0             | -4,166.8   | 3,934.0    | 5,708.0               | 0.00                  | 0.00                 |                       |
| 11,200.0            | 90.10           | 131.56      | 5,062.8             | -4,233.2   | 4,008.8    | 5,808.0               | 0.00                  | 0.00                 |                       |
| 11,300.0            | 90.10           | 131.56      | 5,062.7             | -4,299.5   | 4,083.7    | 5,908.0               | 0.00                  | 0.00                 |                       |
| 11,400.0            | 90.10           | 131.56      | 5,062.5             | -4,365.9   | 4,158.5    | 6,008.0               | 0.00                  | 0.00                 |                       |
| 11,500.0            | 90.10           | 131.56      | 5,062.3             | -4,432.2   | 4,233.3    | 6,108.0               | 0.00                  | 0.00                 |                       |
| 11,600.0            | 90.10           | 131.56      | 5,062.2             | -4,498.6   | 4,308.1    | 6,208.0               | 0.00                  | 0.00                 |                       |
| 11,700.0            | 90.10           | 131.56      | 5,062.0             | -4,564.9   | 4,383.0    | 6,308.0               | 0.00                  | 0.00                 |                       |
| 11,800.0            | 90.10           | 131.56      | 5,061.8             | -4,631.2   | 4,457.8    | 6,408.0               | 0.00                  | 0.00                 |                       |
| 11,900.0            | 90.10           | 131.56      | 5,061.6             | -4,697.6   | 4,532.6    | 6,508.0               | 0.00                  | 0.00                 |                       |
| 12,000.0            | 90.10           | 131.56      | 5,061.5             | -4,763.9   | 4,607.4    | 6,608.0               | 0.00                  | 0.00                 |                       |
| 12,100.0            | 90.10           | 131.56      | 5,061.3             | -4,830.3   | 4,682.3    | 6,708.0               | 0.00                  | 0.00                 |                       |
| 12,200.0            | 90.10           | 131.56      | 5,061.1             | -4,896.6   | 4,757.1    | 6,808.0               | 0.00                  | 0.00                 |                       |
| 12,226.7            | 90.10           | 131.56      | 5,061.1             | -4,914.3   | 4,777.0    | 6,834.6               | 0.00                  | 0.00                 | TD at 12226.7         |

# Cathedral Energy Services

## Planning Report

Database: USA EDM 5000 Multi Users DB  
 Company: EnCana Oil & Gas (USA) Inc  
 Project: Sandoval County, NM  
 Site: S31-T23N-R7W  
 Well: NAU 333H-J31-2307 02H  
 Wellbore: OH  
 Design: PLAN #5

Local Co-ordinate Reference: Well NAU 333H-J31-2307 02H  
 TVD Reference: 16' KB @ 6995.0ft  
 MD Reference: 16' KB @ 6995.0ft  
 North Reference: True  
 Survey Calculation Method: Minimum Curvature

### Targets

| Target Name                                                                            | Dip Angle<br>(°) | Dip Dir.<br>(°) | TVD<br>(ft) | +N/-S<br>(ft) | +E/-W<br>(ft) | Northing<br>(ft) | Easting<br>(ft) | Latitude  | Longitude   |
|----------------------------------------------------------------------------------------|------------------|-----------------|-------------|---------------|---------------|------------------|-----------------|-----------|-------------|
| - hit/miss target                                                                      |                  |                 |             |               |               |                  |                 |           |             |
| - Shape                                                                                |                  |                 |             |               |               |                  |                 |           |             |
| Lybrook J31-2307 02H F                                                                 | 0.00             | 0.00            | 5,019.3     | -1,011.3      | -5,024.6      | 1,887,442.74     | 1,232,527.64    | 36.179310 | -107.632120 |
| - plan misses target center by 4571.1ft at 4563.9ft MD (4490.4 TVD, 122.8 N, -628.2 E) |                  |                 |             |               |               |                  |                 |           |             |
| - Point                                                                                |                  |                 |             |               |               |                  |                 |           |             |
| NAU 333H 02H PBHL P                                                                    | 0.00             | 0.00            | 5,061.1     | -4,914.3      | 4,777.0       | 1,883,402.29     | 1,242,273.44    | 36.168590 | -107.598915 |
| - plan hits target center                                                              |                  |                 |             |               |               |                  |                 |           |             |
| - Point                                                                                |                  |                 |             |               |               |                  |                 |           |             |
| Lybrook J31-2307 01H F                                                                 | 0.00             | 0.00            | 5,076.3     | -90.7         | -420.0        | 1,888,298.57     | 1,237,144.76    | 36.181840 | -107.616520 |
| - plan misses target center by 140.2ft at 5176.0ft MD (4960.2 TVD, -165.6 N, -396.7 E) |                  |                 |             |               |               |                  |                 |           |             |
| - Point                                                                                |                  |                 |             |               |               |                  |                 |           |             |
| Lybrook J31-2307 02H F                                                                 | 0.00             | 0.00            | 5,059.5     | -1,030.0      | -417.1        | 1,887,359.29     | 1,237,134.49    | 36.179260 | -107.616510 |
| - plan misses target center by 562.1ft at 5822.4ft MD (5072.1 TVD, -651.6 N, -1.6 E)   |                  |                 |             |               |               |                  |                 |           |             |
| - Point                                                                                |                  |                 |             |               |               |                  |                 |           |             |
| Lybrook J31-2307 02H F                                                                 | 0.00             | 0.00            | 4,996.6     | -996.2        | -7,633.9      | 1,887,494.58     | 1,229,918.82    | 36.179350 | -107.640960 |
| - plan misses target center by 7109.4ft at 4500.0ft MD (4428.6 TVD, 135.3 N, -638.2 E) |                  |                 |             |               |               |                  |                 |           |             |
| - Point                                                                                |                  |                 |             |               |               |                  |                 |           |             |
| NAU 333H 02H POE P5                                                                    | 0.00             | 0.00            | 5,072.5     | -554.1        | -141.7        | 1,887,831.22     | 1,237,416.55    | 36.180567 | -107.615577 |
| - plan misses target center by 44.3ft at 5658.6ft MD (5072.4 TVD, -526.4 N, -107.1 E)  |                  |                 |             |               |               |                  |                 |           |             |
| - Point                                                                                |                  |                 |             |               |               |                  |                 |           |             |

### Casing Points

| Measured<br>Depth<br>(ft) | Vertical<br>Depth<br>(ft) | Name      | Casing<br>Diameter<br>(in) | Hole<br>Diameter<br>(in) |
|---------------------------|---------------------------|-----------|----------------------------|--------------------------|
| 4,749.5                   | 4,660.5                   | ICP @ 55° | 0.000                      | 0.000                    |
| 500.0                     | 500.0                     | 9 5/8"    | 0.000                      | 0.000                    |

### Formations

| Measured<br>Depth<br>(ft) | Vertical<br>Depth<br>(ft) | Name                | Lithology | Dip<br>(°) | Dip<br>Direction<br>(°) |
|---------------------------|---------------------------|---------------------|-----------|------------|-------------------------|
| 908.4                     | 907.0                     | Ojo Alamo Ss.       |           | -0.10      | 131.56                  |
| 1,079.0                   | 1,075.0                   | Kirtland Shale      |           | -0.10      | 131.56                  |
| 1,347.8                   | 1,337.0                   | Fruitland Coal      |           | -0.10      | 131.56                  |
| 1,484.3                   | 1,470.0                   | Pictured Cliffs Ss. |           | -0.10      | 131.56                  |
| 1,600.3                   | 1,583.0                   | Lewis Shale         |           | -0.10      | 131.56                  |
| 2,260.2                   | 2,226.0                   | Cliffhouse Ss.      |           | -0.10      | 131.56                  |
| 3,163.5                   | 3,106.0                   | Menefee Fn.         |           | -0.10      | 131.56                  |
| 3,928.0                   | 3,857.0                   | Point Lookout Ss.   |           | -0.10      | 131.56                  |
| 4,101.1                   | 4,030.0                   | Mancos Shale        |           | -0.10      | 131.56                  |
| 4,619.4                   | 4,542.0                   | Mancos Silt         |           | -0.10      | 131.56                  |
| 4,925.4                   | 4,802.0                   | Gallup Fn.          |           | -0.10      | 131.56                  |



# Cathedral Energy Services

## Planning Report

Database: USA EDM 5000 Multi Users DB  
Company: EnCana Oil & Gas (USA) Inc  
Project: Sandoval County, NM  
Site: S31-T23N-R7W  
Well: NAU 333H-J31-2307 02H  
Wellbore: OH  
Design: PLAN #5

Local Co-ordinate Reference: Well NAU 333H-J31-2307 02H  
TVD Reference: 16' KB @ 6995.0ft  
MD Reference: 16' KB @ 6995.0ft  
North Reference: True  
Survey Calculation Method: Minimum Curvature

### Plan Annotations

| Measured<br>Depth<br>(ft) | Vertical<br>Depth<br>(ft) | Local Coordinates |               | Comment               |
|---------------------------|---------------------------|-------------------|---------------|-----------------------|
|                           |                           | +N/-S<br>(ft)     | +E/-W<br>(ft) |                       |
| 500.0                     | 500.0                     | 0.0               | 0.0           | KOP @ 500'            |
| 1,146.7                   | 1,141.3                   | 16.3              | -70.8         | EOB; INC=12.93°       |
| 3,477.4                   | 3,412.7                   | 133.7             | -579.2        | Start Drop -2.00      |
| 4,124.1                   | 4,054.0                   | 150.0             | -650.0        | EOD; INC=0°           |
| 4,324.1                   | 4,254.0                   | 150.0             | -650.0        | Start Build 7.00      |
| 5,611.2                   | 5,072.5                   | -489.5            | -136.8        | LP @ 5072' TVD; 90.1° |
| 5,671.2                   | 5,072.4                   | -536.3            | -99.2         | START TURN            |
| 6,155.7                   | 5,071.6                   | -886.7            | 234.4         | END OF TURN           |
| 12,226.7                  | 5,061.1                   | -4,914.3          | 4,777.0       | TD at 12226.7         |

# **EnCana Oil & Gas (USA) Inc**

Sandoval County, NM

S31-T23N-R7W

NAU 333H-J31-2307 02H

OH

PLAN #5

## **Anticollision Report**

05 June, 2017

# Cathedral Energy Services

## Anticollision Report

Company: EnCana Oil & Gas (USA) Inc  
 Project: Sandoval County, NM  
 Reference Site: S31-T23N-R7W  
 Site Error: 0.0ft  
 Reference Well: NAU 333H-J31-2307 02H  
 Well Error: 0.0ft  
 Reference Wellbore: OH  
 Reference Design: PLAN #5

Local Co-ordinate Reference: Well NAU 333H-J31-2307 02H  
 TVD Reference: 16' KB @ 6995.0ft  
 MD Reference: 16' KB @ 6995.0ft  
 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                    | PLAN #5                                                             |                |                     |
| 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 6/5/2017

| From<br>(ft) | To<br>(ft) | Survey (Wellbore) | Tool Name   | Description |
|--------------|------------|-------------------|-------------|-------------|
| 0.0          | 12,225.9   | PLAN #5 (OH)      | Geolink MWD | Geolink MWD |

| Summary                              |                                        |                                     |                                        |                                         |                      |         |
|--------------------------------------|----------------------------------------|-------------------------------------|----------------------------------------|-----------------------------------------|----------------------|---------|
| Site Name                            | Reference<br>Measured<br>Depth<br>(ft) | Offset<br>Measured<br>Depth<br>(ft) | Distance<br>Between<br>Centres<br>(ft) | Distance<br>Between<br>Ellipses<br>(ft) | Separation<br>Factor | Warning |
| Offset Well - Wellbore - Design      |                                        |                                     |                                        |                                         |                      |         |
| S31-T23N-R7W                         |                                        |                                     |                                        |                                         |                      |         |
| NAU 332H-J31-2307 01H - OH - PLAN #4 | 500.0                                  | 500.0                               | 29.7                                   | 27.3                                    | 12.242               | CC      |
| NAU 332H-J31-2307 01H - OH - PLAN #4 | 600.0                                  | 599.3                               | 30.2                                   | 27.2                                    | 10.242               | ES      |
| NAU 332H-J31-2307 01H - OH - PLAN #4 | 5,352.6                                | 5,361.5                             | 86.5                                   | 55.2                                    | 2.768                | SF      |



# Cathedral Energy Services

## Anticollision Report

Company: EnCana Oil & Gas (USA) Inc  
Project: Sandoval County, NM  
Reference Site: S31-T23N-R7W  
Site Error: 0.0ft  
Reference Well: NAU 333H-J31-2307 02H  
Well Error: 0.0ft  
Reference Wellbore: OH  
Reference Design: PLAN #5

Local Co-ordinate Reference: Well NAU 333H-J31-2307 02H  
TVD Reference: 16' KB @ 6995.0ft  
MD Reference: 16' KB @ 6995.0ft  
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 S31-T23N-R7W - NAU 332H-J31-2307 01H - OH - PLAN #4 |                     |                     |                     |                |             |                      |                       |                                   |            |                      |                       |                        | 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) | Semi Major Axis (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         | 0.0                  | -138.32               | -22.2                             | -19.8      | 29.7                 |                       |                        |                    |         |
| 100.0                                                             | 100.0               | 100.0               | 100.0               | 0.1            | 0.2         | 0.1                  | -138.32               | -22.2                             | -19.8      | 29.7                 | 29.4                  | 0.30                   | 100.070            |         |
| 200.0                                                             | 200.0               | 200.0               | 200.0               | 0.3            | 0.5         | 0.3                  | -138.32               | -22.2                             | -19.8      | 29.7                 | 28.9                  | 0.83                   | 35.821             |         |
| 300.0                                                             | 300.0               | 300.0               | 300.0               | 0.5            | 0.9         | 0.5                  | -138.32               | -22.2                             | -19.8      | 29.7                 | 28.4                  | 1.36                   | 21.815             |         |
| 400.0                                                             | 400.0               | 400.0               | 400.0               | 0.7            | 1.2         | 0.7                  | -138.32               | -22.2                             | -19.8      | 29.7                 | 27.8                  | 1.90                   | 15.683             |         |
| 500.0                                                             | 500.0               | 500.0               | 500.0               | 0.8            | 1.6         | 0.8                  | -138.32               | -22.2                             | -19.8      | 29.7                 | 27.3                  | 2.43                   | 12.242 CC          |         |
| 600.0                                                             | 600.0               | 599.3               | 599.2               | 1.0            | 1.9         | 1.0                  | -66.69                | -23.9                             | -19.5      | 30.2                 | 27.2                  | 2.94                   | 10.242 ES          |         |
| 700.0                                                             | 699.8               | 698.0               | 697.9               | 1.2            | 2.3         | 1.2                  | -81.31                | -29.0                             | -18.8      | 32.9                 | 29.4                  | 3.46                   | 9.513              |         |
| 800.0                                                             | 799.5               | 795.8               | 795.3               | 1.4            | 2.6         | 1.4                  | -99.07                | -37.3                             | -17.6      | 41.1                 | 37.1                  | 3.99                   | 10.309             |         |
| 900.0                                                             | 898.7               | 892.2               | 891.0               | 1.7            | 2.9         | 1.7                  | -113.24               | -48.7                             | -16.0      | 56.7                 | 52.1                  | 4.53                   | 12.500             |         |
| 1,000.0                                                           | 997.5               | 986.7               | 984.4               | 1.9            | 3.3         | 1.9                  | -122.50               | -63.1                             | -14.0      | 79.3                 | 74.2                  | 5.09                   | 15.586             |         |
| 1,100.0                                                           | 1,095.6             | 1,079.1             | 1,075.1             | 2.3            | 3.7         | 2.3                  | -128.28               | -80.0                             | -11.6      | 108.2                | 102.5                 | 5.65                   | 19.147             |         |
| 1,200.0                                                           | 1,193.2             | 1,168.9             | 1,162.9             | 2.7            | 4.0         | 2.7                  | -132.07               | -99.2                             | -8.8       | 142.5                | 136.3                 | 6.22                   | 22.917             |         |
| 1,300.0                                                           | 1,290.6             | 1,258.5             | 1,249.7             | 3.1            | 4.4         | 3.1                  | -134.28               | -120.9                            | -5.8       | 180.0                | 173.2                 | 6.80                   | 26.477             |         |
| 1,400.0                                                           | 1,388.1             | 1,350.8             | 1,339.0             | 3.5            | 4.8         | 3.5                  | -135.70               | -143.9                            | -2.5       | 218.2                | 210.8                 | 7.43                   | 29.375             |         |
| 1,500.0                                                           | 1,485.6             | 1,443.1             | 1,428.3             | 3.9            | 5.3         | 3.9                  | -136.70               | -166.9                            | 0.8        | 256.5                | 248.4                 | 8.07                   | 31.805             |         |
| 1,600.0                                                           | 1,583.0             | 1,535.3             | 1,517.6             | 4.3            | 5.7         | 4.3                  | -137.44               | -189.9                            | 4.1        | 294.9                | 286.2                 | 8.71                   | 33.859             |         |
| 1,700.0                                                           | 1,680.5             | 1,627.6             | 1,607.0             | 4.7            | 6.1         | 4.7                  | -138.01               | -212.9                            | 7.3        | 333.3                | 323.9                 | 9.36                   | 35.614             |         |
| 1,800.0                                                           | 1,777.9             | 1,719.9             | 1,696.3             | 5.1            | 6.6         | 5.1                  | -138.46               | -236.0                            | 10.6       | 371.7                | 361.7                 | 10.01                  | 37.126             |         |
| 1,900.0                                                           | 1,875.4             | 1,812.2             | 1,785.6             | 5.6            | 7.0         | 5.6                  | -138.83               | -259.0                            | 13.9       | 410.1                | 399.4                 | 10.67                  | 38.441             |         |
| 2,000.0                                                           | 1,972.9             | 1,904.5             | 1,874.9             | 6.0            | 7.5         | 6.0                  | -139.13               | -282.0                            | 17.1       | 448.5                | 437.2                 | 11.33                  | 39.594             |         |
| 2,100.0                                                           | 2,070.3             | 2,003.2             | 1,964.2             | 6.4            | 8.0         | 6.4                  | -139.39               | -305.0                            | 20.4       | 487.0                | 475.0                 | 12.02                  | 40.521             |         |
| 2,200.0                                                           | 2,167.8             | 2,089.1             | 2,053.5             | 6.8            | 8.4         | 6.8                  | -139.61               | -328.0                            | 23.7       | 525.4                | 512.8                 | 12.66                  | 41.516             |         |
| 2,300.0                                                           | 2,265.3             | 2,181.4             | 2,142.9             | 7.3            | 8.8         | 7.3                  | -139.80               | -351.0                            | 26.9       | 563.9                | 550.6                 | 13.32                  | 42.325             |         |
| 2,400.0                                                           | 2,362.7             | 2,273.7             | 2,232.2             | 7.7            | 9.3         | 7.7                  | -139.96               | -374.0                            | 30.2       | 602.4                | 588.4                 | 13.99                  | 43.052             |         |
| 2,500.0                                                           | 2,460.2             | 2,366.0             | 2,321.5             | 8.1            | 9.8         | 8.1                  | -140.11               | -397.1                            | 33.5       | 640.8                | 626.2                 | 14.66                  | 43.708             |         |
| 2,600.0                                                           | 2,557.6             | 2,458.3             | 2,410.8             | 8.6            | 10.2        | 8.6                  | -140.24               | -420.1                            | 36.7       | 679.3                | 664.0                 | 15.33                  | 44.305             |         |
| 2,700.0                                                           | 2,655.1             | 2,550.6             | 2,500.1             | 9.0            | 10.7        | 9.0                  | -140.35               | -443.1                            | 40.0       | 717.8                | 701.8                 | 16.00                  | 44.848             |         |
| 2,800.0                                                           | 2,752.6             | 2,642.9             | 2,589.4             | 9.4            | 11.1        | 9.4                  | -140.46               | -466.1                            | 43.3       | 756.3                | 739.6                 | 16.68                  | 45.345             |         |
| 2,900.0                                                           | 2,850.0             | 2,735.2             | 2,678.8             | 9.9            | 11.6        | 9.9                  | -140.55               | -489.1                            | 46.6       | 794.7                | 777.4                 | 17.35                  | 45.802             |         |
| 3,000.0                                                           | 2,947.5             | 2,827.5             | 2,768.1             | 10.3           | 12.1        | 10.3                 | -140.63               | -512.1                            | 49.8       | 833.2                | 815.2                 | 18.03                  | 46.223             |         |
| 3,100.0                                                           | 3,045.0             | 2,919.7             | 2,857.4             | 10.7           | 12.5        | 10.7                 | -140.71               | -535.1                            | 53.1       | 871.7                | 853.0                 | 18.70                  | 46.612             |         |
| 3,200.0                                                           | 3,142.4             | 3,012.0             | 2,946.7             | 11.2           | 13.0        | 11.2                 | -140.78               | -558.1                            | 56.4       | 910.2                | 890.8                 | 19.38                  | 46.972             |         |
| 3,300.0                                                           | 3,239.9             | 3,104.3             | 3,036.0             | 11.6           | 13.5        | 11.6                 | -140.85               | -581.2                            | 59.6       | 948.7                | 928.6                 | 20.05                  | 47.307             |         |
| 3,400.0                                                           | 3,337.3             | 3,203.4             | 3,125.4             | 12.0           | 14.0        | 12.0                 | -140.90               | -604.2                            | 62.9       | 987.1                | 966.4                 | 20.76                  | 47.552             |         |
| 3,500.0                                                           | 3,434.8             | 3,288.9             | 3,214.7             | 12.5           | 14.4        | 12.5                 | -141.07               | -627.2                            | 66.2       | 1,025.6              | 1,004.2               | 21.41                  | 47.910             |         |
| 3,600.0                                                           | 3,532.8             | 3,385.0             | 3,307.6             | 12.8           | 14.9        | 12.8                 | -141.52               | -651.1                            | 69.6       | 1,062.2              | 1,040.1               | 22.08                  | 48.102             |         |
| 3,700.0                                                           | 3,631.4             | 3,524.5             | 3,443.6             | 13.1           | 15.6        | 13.1                 | -141.82               | -682.2                            | 74.0       | 1,094.1              | 1,071.1               | 23.02                  | 47.533             |         |
| 3,800.0                                                           | 3,730.6             | 3,668.9             | 3,585.7             | 13.4           | 16.2        | 13.4                 | -142.05               | -707.4                            | 77.6       | 1,119.3              | 1,095.4               | 23.88                  | 46.867             |         |
| 3,900.0                                                           | 3,830.1             | 3,817.1             | 3,732.7             | 13.6           | 16.8        | 13.6                 | -142.22               | -725.9                            | 80.2       | 1,137.6              | 1,112.9               | 24.66                  | 46.129             |         |
| 4,000.0                                                           | 3,929.9             | 3,909.6             | 3,817.1             | 13.8           | 17.4        | 13.8                 | -142.35               | -744.9                            | 83.0       | 1,155.9              | 1,129.9               | 25.44                  | 45.391             |         |
| 4,100.0                                                           | 4,029.9             | 3,912.2             | 3,817.1             | 13.9           | 17.9        | 13.9                 | -142.44               | -764.9                            | 85.8       | 1,174.2              | 1,147.9               | 26.22                  | 44.643             |         |
| 4,200.0                                                           | 4,129.9             | 3,912.7             | 3,817.1             | 13.9           | 18.4        | 13.9                 | -142.50               | -785.2                            | 88.6       | 1,192.5              | 1,165.1               | 27.00                  | 43.895             |         |
| 4,300.0                                                           | 4,229.9             | 3,913.0             | 3,817.1             | 14.0           | 18.9        | 14.0                 | -142.53               | -805.5                            | 91.4       | 1,210.8              | 1,182.4               | 27.78                  | 43.147             |         |
| 4,400.0                                                           | 4,329.8             | 3,909.9             | 3,817.1             | 14.1           | 19.4        | 14.1                 | -142.55               | -825.8                            | 94.2       | 1,229.1              | 1,200.0               | 28.56                  | 42.399             |         |
| 4,500.0                                                           | 4,428.5             | 3,904.9             | 3,817.1             | 14.0           | 19.9        | 14.0                 | -142.56               | -846.1                            | 97.0       | 1,247.4              | 1,217.1               | 29.34                  | 41.651             |         |
| 4,600.0                                                           | 4,524.7             | 3,868.6             | 3,768.8             | 13.7           | 20.5        | 13.7                 | -142.55               | -866.4                            | 99.8       | 1,265.7              | 1,234.4               | 30.12                  | 40.903             |         |
| 4,700.0                                                           | 4,616.8             | 3,830.7             | 3,727.7             | 13.4           | 21.1        | 13.4                 | -142.52               | -886.7                            | 102.6      | 1,284.0              | 1,251.6               | 30.90                  | 40.155             |         |
| 4,800.0                                                           | 4,703.5             | 3,782.0             | 3,685.7             | 13.0           | 21.7        | 13.0                 | -142.47               | -907.0                            | 105.4      | 1,302.3              | 1,268.9               | 31.68                  | 39.407             |         |
| 4,900.0                                                           | 4,783.5             | 3,723.2             | 3,617.1             | 12.5           | 22.3        | 12.5                 | -142.40               | -927.3                            | 108.2      | 1,320.6              | 1,285.6               | 32.46                  | 38.659             |         |
| 5,000.0                                                           | 4,855.7             | 3,655.2             | 3,543.4             | 12.1           | 22.9        | 12.1                 | -142.32               | -947.6                            | 111.0      | 1,338.9              | 1,304.9               | 33.24                  | 37.911             |         |
| 5,100.0                                                           | 4,918.8             | 3,576.7             | 3,474.9             | 11.8           | 23.5        | 11.8                 | -142.22               | -967.9                            | 113.8      | 1,357.2              | 1,322.2               | 34.02                  | 37.163             |         |

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

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|-------------------------------------------------------------------|---------------------------|---------------------------|---------------------------|-------------------|----------------|-----------------------------|------------------------|---------------|----------------------------|-----------------------------|------------------------------|----------------------|---------------------------|
| Survey Program: 0-MWD+HDGM                                        |                           |                           |                           |                   |                |                             |                        |               |                            |                             |                              |                      | Offset Well Error: 0.0 ft |
| Reference                                                         |                           | Offset                    |                           | Semi Major Axis   |                | Highside<br>Toolface<br>(°) | Offset Wellbore Centre |               | Distance                   |                             | Total<br>Uncertainty<br>Axis | Separation<br>Factor | Warning                   |
| Measured<br>Depth<br>(ft)                                         | Vertical<br>Depth<br>(ft) | Measured<br>Depth<br>(ft) | Vertical<br>Depth<br>(ft) | Reference<br>(ft) | Offset<br>(ft) |                             | +N/-S<br>(ft)          | +E/-W<br>(ft) | Between<br>Centres<br>(ft) | Between<br>Ellipses<br>(ft) |                              |                      |                           |
| 5,200.0                                                           | 4,972.0                   | 5,487.3                   | 5,036.1                   | 11.7              | 23.6           | 112.91                      | -266.9                 | -448.1        | 124.5                      | 96.3                        | 28.12                        | 4.426                |                           |
| 5,300.0                                                           | 5,014.6                   | 5,403.6                   | 5,020.9                   | 11.8              | 22.4           | 89.83                       | -321.7                 | -386.8        | 91.7                       | 60.2                        | 31.49                        | 2.911                |                           |
| 5,352.6                                                           | 5,032.4                   | 5,361.5                   | 5,010.1                   | 12.0              | 21.9           | 74.22                       | -348.8                 | -356.4        | 86.5                       | 55.2                        | 31.24                        | 2.768 SF             |                           |
| 5,400.0                                                           | 5,045.8                   | 5,324.5                   | 4,998.8                   | 12.2              | 21.5           | 60.07                       | -372.3                 | -330.0        | 90.6                       | 61.5                        | 29.08                        | 3.115                |                           |
| 5,500.0                                                           | 5,065.2                   | 5,248.7                   | 4,970.9                   | 13.0              | 20.7           | 36.44                       | -419.1                 | -277.5        | 119.3                      | 95.4                        | 23.93                        | 4.985                |                           |
| 5,600.0                                                           | 5,072.5                   | 5,175.8                   | 4,938.0                   | 14.1              | 20.2           | 22.38                       | -462.5                 | -229.0        | 160.2                      | 138.4                       | 21.78                        | 7.354                |                           |
| 5,700.0                                                           | 5,072.4                   | 5,107.0                   | 4,901.8                   | 15.3              | 19.9           | 14.58                       | -501.4                 | -185.3        | 207.9                      | 186.3                       | 21.54                        | 9.651                |                           |
| 5,800.0                                                           | 5,072.2                   | 5,044.9                   | 4,865.0                   | 16.8              | 19.6           | 8.97                        | -534.7                 | -148.1        | 265.1                      | 243.0                       | 22.09                        | 12.001               |                           |
| 5,900.0                                                           | 5,072.0                   | 4,989.3                   | 4,829.0                   | 18.3              | 19.5           | 5.09                        | -562.8                 | -116.5        | 329.2                      | 306.3                       | 22.91                        | 14.372               |                           |
| 6,000.0                                                           | 5,071.8                   | 4,939.7                   | 4,794.4                   | 20.0              | 19.4           | 2.14                        | -586.5                 | -90.0         | 398.7                      | 374.9                       | 23.78                        | 16.765               |                           |
| 6,100.0                                                           | 5,071.7                   | 4,900.0                   | 4,765.2                   | 21.7              | 19.3           | -0.33                       | -604.5                 | -69.9         | 472.3                      | 447.5                       | 24.80                        | 19.043               |                           |
| 6,200.0                                                           | 5,071.5                   | 4,850.0                   | 4,726.7                   | 23.5              | 19.2           | -1.52                       | -625.7                 | -46.1         | 549.2                      | 523.9                       | 25.26                        | 21.742               |                           |
| 6,300.0                                                           | 5,071.3                   | 4,821.0                   | 4,703.5                   | 25.4              | 19.2           | -1.42                       | -637.2                 | -33.1         | 628.9                      | 602.7                       | 26.17                        | 24.035               |                           |
| 6,400.0                                                           | 5,071.1                   | 4,789.6                   | 4,677.7                   | 27.3              | 19.1           | -1.32                       | -649.1                 | -19.8         | 711.0                      | 684.2                       | 26.80                        | 26.535               |                           |
| 6,500.0                                                           | 5,071.0                   | 4,761.5                   | 4,654.0                   | 29.3              | 19.1           | -1.24                       | -659.2                 | -8.5          | 795.1                      | 767.8                       | 27.35                        | 29.072               |                           |
| 6,600.0                                                           | 5,070.8                   | 4,736.1                   | 4,632.2                   | 31.2              | 19.0           | -1.17                       | -667.9                 | 1.2           | 881.0                      | 853.2                       | 27.84                        | 31.641               |                           |
| 6,700.0                                                           | 5,070.6                   | 4,713.3                   | 4,612.2                   | 33.3              | 19.0           | -1.11                       | -675.3                 | 9.5           | 968.3                      | 940.0                       | 28.28                        | 34.236               |                           |
| 6,800.0                                                           | 5,070.4                   | 4,700.0                   | 4,600.5                   | 35.3              | 19.0           | -1.08                       | -679.4                 | 14.1          | 1,057.0                    | 1,028.2                     | 28.78                        | 36.722               |                           |
| 6,900.0                                                           | 5,070.3                   | 4,673.7                   | 4,576.9                   | 37.3              | 19.0           | -1.03                       | -687.2                 | 22.8          | 1,146.6                    | 1,117.6                     | 29.04                        | 39.485               |                           |

# Cathedral Energy Services

## Anticollision Report

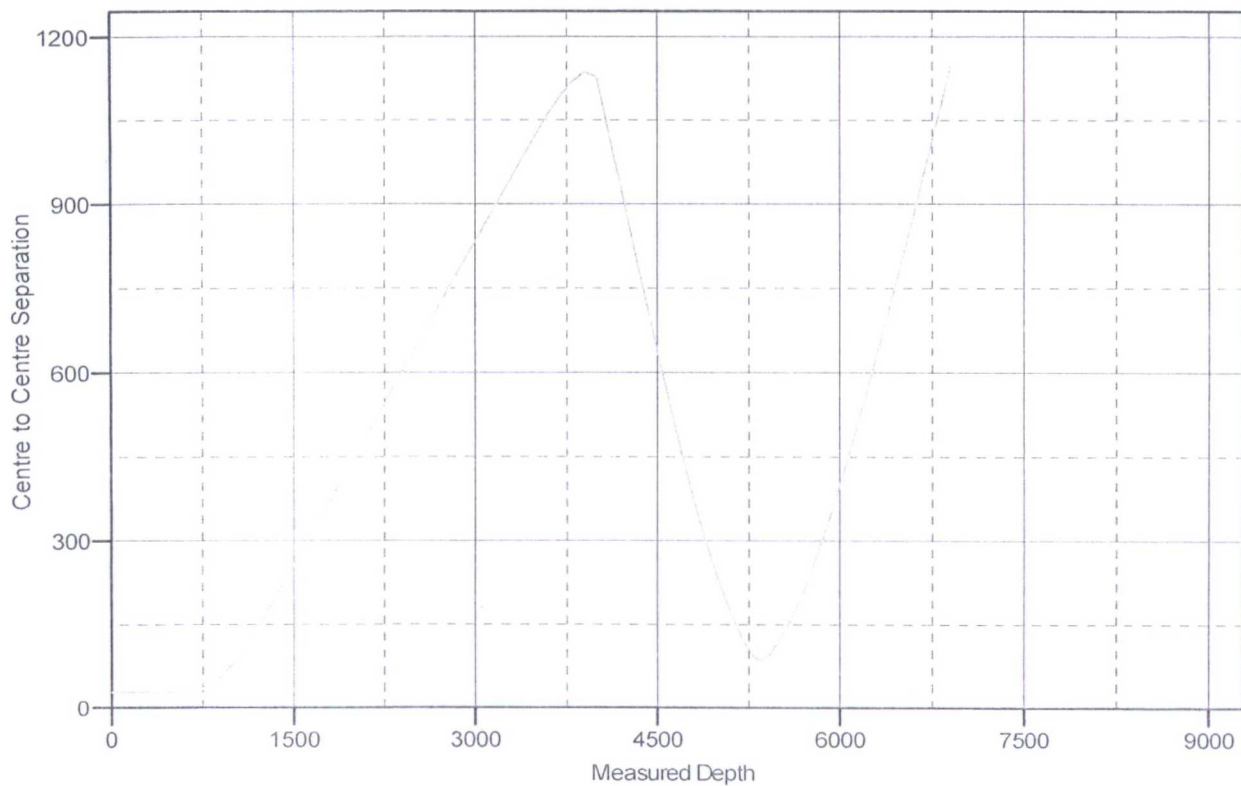
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Database: USA EDM 5000 Multi Users DB  
Offset TVD Reference: Offset Datum

Reference Depths are relative to 16' KB @ 6995.0ft  
Offset Depths are relative to Offset Datum  
Central Meridian is -106.250000 °

Coordinates are relative to: NAU 333H-J31-2307 02H  
Coordinate System is US State Plane 1983, New Mexico Central Zone  
Grid Convergence at Surface is: -0.81°

### Ladder Plot



### LEGEND

—x— NAU332H-J31-2307 01H, OH, PLAN#4 V0