

State of New Mexico
Energy, Minerals and Natural Resources Department

Susana Martinez
Governor

Ken McQueen
Cabinet Secretary

Matthias Sayer
Deputy Cabinet Secretary

David R. Catanach, Division Director
Oil Conservation Division



New Mexico Oil Conservation Division approval and conditions listed below are made in accordance with OCD Rule 19.15.7.11 and are in addition to the actions approved by BLM on the following 3160-3 APD form.

Operator Signature Date: 12/9/2016

Well information;

Operator Enlana, Well Name and Number Nagazzi Unit 406H

API# 30-045-35842, Section 3, Township 23 N/S, Range 9 E/W

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

- ☒ Notify Aztec OCD 24hrs prior to casing & cement.
- ☒ Hold C-104 for directional survey & "As Drilled" Plat
- ☒ Hold C-104 for NSL, NSP, DHC
- ☐ Spacing rule violation. Operator must follow up with change of status notification on other well to be shut in or abandoned
- ☐ Regarding the use of a pit, closed loop system or below grade tank, the operator must comply with the following as applicable:
 - A pit requires a complete C-144 be submitted and approved prior to the construction or use of the pit, pursuant to 19.15.17.8.A
 - A closed loop system requires notification prior to use, pursuant to 19.15.17.9.A
 - A below grade tank requires a registration be filed prior to the construction or use of the below grade tank, pursuant to 19.15.17.8.C
- ☒ Once the well is spud, to prevent ground water contamination through whole or partial conduits from the surface, the operator shall drill without interruption through the fresh water zone or zones and shall immediately set in cement the water protection string
- ☐ Submit Gas Capture Plan form prior to spudding or initiating recompletion operations
- ☒ Regarding Hydraulic Fracturing, review EPA Underground Injection Control Guidance 84
- ☒ 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.

Charles Perin

NMOCD Approved by Signature

5-2-2017
Date

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

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

5. Lease Serial No.
NMNM 8005

6. If Indian, Allottee or Tribe Name
EASTERN NAVAJO

7. If Unit or CA Agreement, Name and No.
UA-NAGEEZI UNIT / NMNM132981A

8. Lease Name and Well No.
NAGEEZI UNIT 406H

9. API Well No.
30-045-35842

10. Field and Pool, or Exploratory
NAGEEZI UNIT HZ OIL POOL / NAGEEZI

11. Sec., T. R. M. or Blk. and Survey or Area
SEC 3 / T23N / R9W / NMP

12. County or Parish
SAN JUAN

13. State
NM

1a. Type of work: ☒ DRILL ☐ REENTER

1b. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other ☒ Single Zone ☐ Multiple Zone

2. Name of Operator
ENCANA OIL & GAS (USA) INC

3a. Address
370 17TH STREET, SUITE 1700 DENVER CO

3b. Phone No. (include area code)
(970)285-2600

4. Location of Well (Report location clearly and in accordance with any State requirements. *)
At surface NESW / 1999 FSL / 1724 FWL / LAT 36.254225 / LONG -107.779516
At proposed prod. zone NESE / 2400 FSL / 330 FEL / LAT 36.240725 / LONG -107.768216

14. Distance in miles and direction from nearest town or post office*
39 miles

15. Distance from proposed*
location to nearest 330 feet
property or lease line, ft.
(Also to nearest drig. unit line, if any)

16. No. of acres in lease
2083.66

17. Spacing Unit dedicated to this well
10415.12

18. Distance from proposed location*
to nearest well, drilling, completed, 30 feet
applied for, on this lease, ft.

19. Proposed Depth
4854 feet / 11000 feet

20. BLM/BIA Bond No. on file
FED: COB000235 / IND: 105073453

21. Elevations (Show whether DF, KDB, RT, GL, etc.)
6765 feet

22. Approximate date work will start*
04/01/2017

23. Estimated duration
20 days

24. Attachments

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

1. Well plat certified by a registered surveyor.
2. A Drilling Plan.
3. A Surface Use Plan (if the location is on National Forest System Lands, the SUPO must be filed with the appropriate Forest Service Office).

4. Bond to cover the operations unless covered by an existing bond on file (see Item 20 above).
5. Operator certification
6. Such other site specific information and/or plans as may be required by the BLM.

25. Signature
(Electronic Submission)

Name (Printed/Typed)
Katie Wegner / Ph: (720)876-3533

Date
12/09/2016

Title
Regulatory Analyst

Approved by (Signature)

Name (Printed/Typed)

Date
4/7/17

Title

Office
FARMINGTON

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

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

(Continued on page 2)

*(Instructions on page 2)

This action is subject to
technical and procedural review
pursuant to 43 CFR 3165.3 and
appeal pursuant to 43 CFR 3165.4

DRILLING OPERATIONS AUTHORIZED
ARE SUBJECT TO COMPLIANCE WITH
ATTACHED "GENERAL REQUIREMENTS"

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

NMCD IV

Phone: (505) 393-6161 Fax: (505) 393-0720

Energy, Minerals & Natural Resources Department

Revised August 1, 2011

DISTRICT II
811 S. First St., Artesia, N.M. 80210
Phone: (505) 748-1283 Fax: (505) 748-9720

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

DISTRICT IV
1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-5460 Fax: (505) 476-5462

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

Submit one copy to appropriate
District Office

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

*API Number 30-045-35842		*Pool Code 98080	*Pool Name NAGEEZI UNIT; Mancos
*Property Code 315244	*Property Name NAGEEZI UNIT		*Well Number 406H
*GRID No. 282327	*Operator Name ENCANA OIL & GAS (USA) INC.		*Elevation 6765.0'

¹⁰ Surface Location

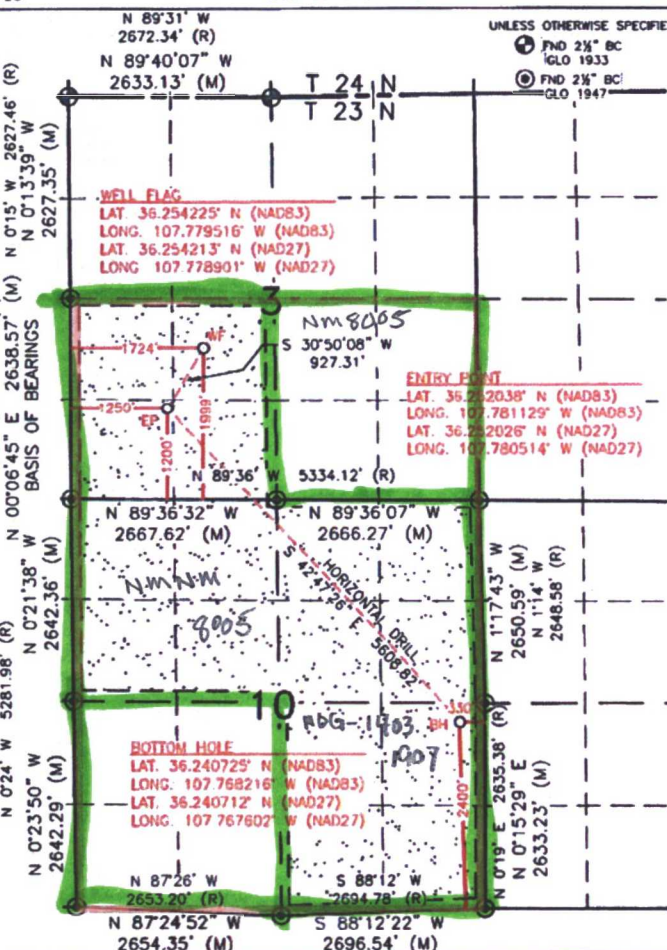
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	WEST/West line	County
K	3	23N	9W		1999'	SOUTH	1724'	WEST	SAN JUAN

¹¹ Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	WEST/West line	County
I	10	23N	9W		2400'	SOUTH	330'	EAST	SAN JUAN

*Dedicated Acres PENETRATED SPACING UNIT: S/2 SEC 3 (320 ACRES); ALL SEC 10 (640 ACRES) TOTAL 10,415.12 ACRES; SEC 21-23 (S/2), 25-28, 33-36, 1,4, 9-10 (ALL); 5 (W/2), 11 (NW/4) - UNDIVIDED UNIT Total = 9,600 acres		*Joint or Infill	*Consolidation Code	*Order No. R-13856-A (10,415.12 acres)
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NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED
OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION



E/4 CORNER SEC 4
LAT. 36.256011° N (NAD83)
LONG. 107.785359° W (NAD83)
LAT. 36.255998° N (NAD27)
LONG. 107.784745° W (NAD27)

SE CORNER SEC 4
LAT. 36.248765° N (NAD83)
LONG. 107.785377° W (NAD83)
LAT. 36.248753° N (NAD27)
LONG. 107.784762° W (NAD27)

W/4 CORNER SEC 10
LAT. 36.241510° N (NAD83)
LONG. 107.785320° W (NAD83)
LAT. 36.241497° N (NAD27)
LONG. 107.784705° W (NAD27)

SW CORNER SEC 10
LAT. 36.234254° N (NAD83)
LONG. 107.785258° W (NAD83)
LAT. 36.234241° N (NAD27)
LONG. 107.784643° W (NAD27)

S/4 CORNER SEC 10
LAT. 36.233925° N (NAD83)
LONG. 107.776270° W (NAD83)
LAT. 36.233913° N (NAD27)
LONG. 107.775656° W (NAD27)

SE CORNER SEC 10
LAT. 36.234156° N (NAD83)
LONG. 107.767135° W (NAD83)
LAT. 36.234144° N (NAD27)
LONG. 107.766521° W (NAD27)

E/4 CORNER SEC 10
LAT. 36.241387° N (NAD83)
LONG. 107.767093° W (NAD83)
LAT. 36.241374° N (NAD27)
LONG. 107.766479° W (NAD27)

SE CORNER SEC 3
LAT. 36.248664° N (NAD83)
LONG. 107.767295° W (NAD83)
LAT. 36.248651° N (NAD27)
LONG. 107.766681° W (NAD27)

S/4 CORNER SEC 3
LAT. 36.248715° N (NAD83)
LONG. 107.776333° W (NAD83)
LAT. 36.248703° N (NAD27)
LONG. 107.775719° W (NAD27)

N/4 CORNER SEC 11
LAT. 36.248604° N (NAD83)
LONG. 107.758235° W (NAD83)
LAT. 36.248592° N (NAD27)
LONG. 107.757621° W (NAD27)

17 OPERATOR CERTIFICATION

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

Katie Wegner 11/30/16
Signature Date

Katie Wegner
Printed Name

katie.wegner@encana.com
E-mail Address

SURVEYOR CERTIFICATION

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

NOVEMBER 9, 2016
Date of Survey

Signature and Seal of Professional Surveyor:

HENRY P. BROADHURST JR.
NEW MEXICO
PROFESSIONAL SURVEYOR
11/16/2016

DISTRICT I

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

DISTRICT II

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DISTRICT IV

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State of New Mexico
Energy, Minerals & Natural Resources Department

Form C-102
Revised August 1, 2011

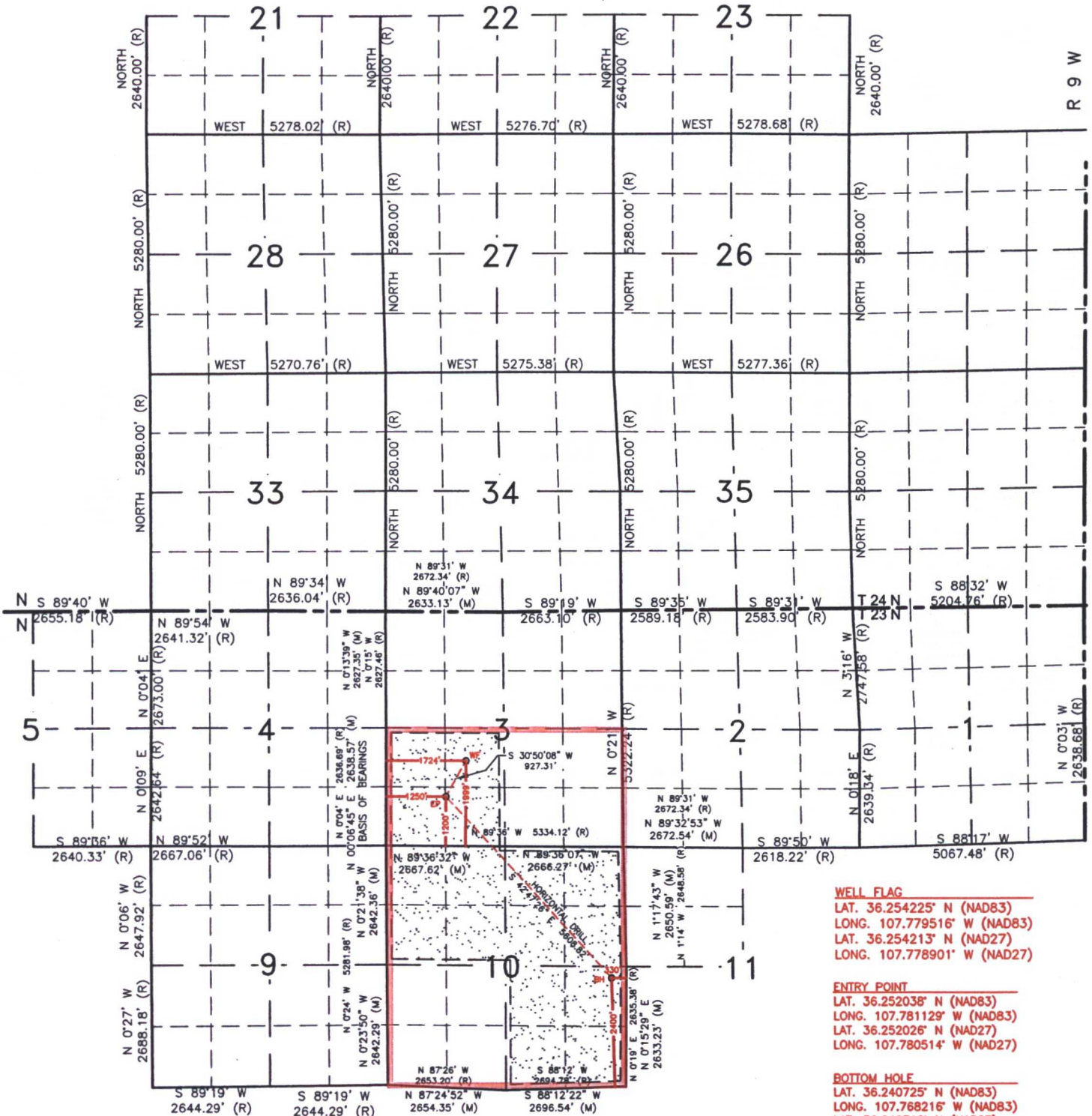
Submit one copy to appropriate
District Office

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

☐ AMENDED REPORT

ENCANA OIL & GAS (USA) INC.
NAGEEZI UNIT #406H

PENETRATED SPACING UNIT: S/2 SEC 3 (320 ACRES), ALL SEC 10
(640 ACRES)
TOTAL 10,415.12 ACRES: SEC 21-23 (S/2); 25-28, 33-36, 1-4, 9-10
(ALL); 5 (W/2); 11 (NW/4) - UNDIVIDED UNIT



WELL FLAG
LAT. 36.254225° N (NAD83)
LONG. 107.779516° W (NAD83)
LAT. 36.254213° N (NAD27)
LONG. 107.778901° W (NAD27)

ENTRY POINT
LAT. 36.252038° N (NAD83)
LONG. 107.781129° W (NAD83)
LAT. 36.252026° N (NAD27)
LONG. 107.780514° W (NAD27)

BOTTOM HOLE
LAT. 36.240725° N (NAD83)
LONG. 107.768216° W (NAD83)
LAT. 36.240712° N (NAD27)
LONG. 107.767602° W (NAD27)

Nageezi Unit 406H**SHL: NESW Section 3, T23N, R9W
1999' FSL and 1724' FWL****BHL: NWSW Section 33, T24N, R9W
2050' FSL and 850' FWL****San Juan County, New Mexico****Unit Number: NMNM 132981A****Lease Numbers: NM 8005, NO-G-1402-1883, NMNM 12374 & NMNM 90843****CASING & CEMENTING PROGRAM**

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

a) The proposed casing design is as follows:

Casing	Depth (MD)	Hole Size	Csg Size	Weight	Grade
Conductor	0'-60'	26"	16"	42	
Surface	0'-500'	12 1/4"	9 5/8"	32.3	J55, STC New
Intermediate	0'-5150'	8 3/4"	7"	26	J55, LTC New
Production Liner	4950'-11000'	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	J55	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.

Nageezi Unit 406H
SHL: NESW Section 3, T23N, R9W
1999' FSL and 1724' FWL
BHL: NWSW Section 33, T24N, R9W
2050' FSL and 850' FWL
San Juan County, New Mexico
Unit Number: NMNM 132981A

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	588
Kirtland Shale	717
Fruitland Coal	1,154
Pictured Cliffs Ss.	1,328
Lewis Shale	1,456
Cliffhouse Ss.	2,007
Menefee Fn.	2,723
Point Lookout Ss.	3,696
Mancos Shale	3,890
Mancos Silt	4,340
Gallup Fn.	4,616

The referenced surface elevation is 6765', KB 6781'

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

Substance	Formation	Depth (TVD) units = feet
Water/Gas	Fruitland Coal	1,154
Water/Gas	Pictured Cliffs Ss.	1,328
Water/Gas	Cliffhouse Ss.	2,007
Water/Gas	Menefee Fn.	2,723
Water/Gas	Point Lookout Ss.	3,696
Oil/Gas	Mancos Shale	3,890
Oil/Gas	Mancos Silt	4,340
Oil/Gas	Gallup Fn.	4,616

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.

Nageezi Unit 406H
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2050' FSL and 850' FWL
San Juan County, New Mexico
Unit Number: NMNM 132981A

- g) BOP controls must be installed prior to drilling the surface casing plug and will remain in use until the well is completed or abandoned.
- h) BOP testing procedures and testing frequency will conform to Onshore Order No. 2.
- i) BOP remote controls shall be located on the rig floor at a location readily accessible to the driller. Master controls shall be on the ground at the accumulator and shall have the capability to function all preventers.
- j) The kill line shall be 2-inch minimum and contain two kill line valves, one of which shall be a check valve.
- k) The choke line shall be a 2-inch minimum and contain two choke line valves (2-inch minimum).
- l) The choke and manifold shall contain two adjustable chokes.
- m) Hand wheels shall be installed on all ram preventers.
- n) Safety valves and wrenches (with subs for drill string connections) shall be available on the rig floor at all
- o) Inside BOP or float sub shall also be available on the rig floor at all times.

Proposed BOP and choke manifold arrangements are attached.

4. CASING & CEMENTING PROGRAM

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

- a) The proposed casing design is as follows:

Casing	Depth (MD)	Hole Size	Csg Size	Weight	Grade
Conductor	0'-60'	26"	16"	42	
Surface	0'-500'	12 1/4"	9 5/8"	32.3	J55, STC New
Intermediate	0'-5150'	8 3/4"	7"	26	J55, LTC New
Production Liner	4950'-11000'	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	J55	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.

Nageezi Unit 406H**SHL: NESW Section 3, T23N, R9W****1999' FSL and 1724' FWL****BHL: NWSW Section 33, T24N, R9W****2050' FSL and 850' FWL****San Juan County, New Mexico****Unit Number: NMNM 132981A**

b) The proposed cementing program is as follows

Casing	Depth (MD)	Cement Volume (sacks)	Cement Type & Yield	Designed TOC	Centralizers
Conductor	0'-60'	100 sks	Type I Neat 16 ppg	Surface	None
Surface	0'-500'	248 sks	Class G w/ 2% CaCl Weight: 14.6ppg Yield: 13.8 ft ³ /sk	Surface	1 per joint on bottom 3 joints
Intermediate	0'-5150'	100% open hole excess Stage 1 Lead: 567 sks Stage 1 Tail: 292 sks	Lead: Extended Class G w/ 6% BWOC bentonite + 5 lb/sk Kol-Seal + 0.125 lb/sk Poly-flake + 0.3% BWOC HR-5 Weight: 12.1ppg Yield: 2.038 ft ³ /sk Tail: Extended Class G w/ 1% BWOC bentonite + 0.3% BWOC Halad-567 + 0.2% BWOC Versaset + 0.05% SA-1015 Weight: 14.6ppg Yield: 1.059 ft ³ /sk	Surface	1 every 3 joints through water bearing zones
Production Liner	4950'-11000'	30% open hole excess Cement Vol: 573 sks	Extended Class G w/ 2.5 lb/sk Kol-seal + 0.7% BWOC Halad-567 + 0.20% BWOC Halad-9 + 0.05% SA-1015 Weight: 13.5ppg Yield: 1.302 ft ³ /sk	Top of Liner	N/A

Nageezi Unit 406H**SHL: NESW Section 3, T23N, R9W****1999' FSL and 1724' FWL****BHL: NWSW Section 33, T24N, R9W****2050' FSL and 850' FWL****San Juan County, New Mexico****Unit Number: NMNM 132981A**

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 4214'. Directional plans are attached.

Description	Proposed Depth (TVD/MD)	Formation
Horizontal Lateral TD	4854'/11000'	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)
26"	0-60'/60'	Fresh Water	8.3-9.2	38-100	NC
12 1/4"	0'-500'/500'	Fresh Water	8.3-10	60-70	NC
8 3/4"	500'/500'-4864'/5150'	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"	4864'/5150'- 4854'/11000'	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 - Top Mancos to TD
- d) Logging - See below

Nageezi Unit 406H

SHL: NESW Section 3, T23N, R9W

1999' FSL and 1724' FWL

BHL: NWSW Section 33, T24N, R9W

2050' FSL and 850' FWL

San Juan County, New Mexico

Unit Number: NMNM 132981A

Cased Hole:

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

8. ABNORMAL PRESSURES & HYDROGEN SULFIDE

The anticipated bottom hole pressure is +/- 2289 psi based on a 9.0 ppg at 4892' TVD of the horizontal lateral target. No abnormal pressure or temperatures are anticipated.

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

9. ANTICIPATED START DATE AND DURATION OF OPERATIONS

Drilling is estimated to commence on March 1st, 2017. 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: SE/4 SW/4 Sec 03 T23N R9W, 1200' FSL, 1250' FWL			Encana Natural Gas						ENG: L. Hubbard RIG: Unassigned GLE: 6765 RKBE: 6781		12-9-16
County: San Juan WELL: Nageezi Unit 406H			WELL SUMMARY								
MWD LWD	OPEN HOLE LOGGING	FORM	DEPTH			HOLE SIZE	CASING SPECS	MW MUD TYPE	DEVIATION INFORMATION		
			TVD	MD							
			60	60'		26	16" 42# 100sx Type I Neat 16.0ppg cmt	Fresh wtr 8.3-9.2			
Multi-Well pad take survey every stand and run anti-collision report prior to spud	None	Nacimiento 9 5/8" Csg	0 500	500.00		12 1/4	9 5/8" 32.3ppf J55 STC TOC to Surface 100% OHE	Fresh wtr 8.3-10	Vertical <1°		
Survey Every 60'-120', updating anticollision report after surveys. Stop operations and contact drilling engineer if separation factor approaches 1.5	No OH logs	Ojo Alamo Kirtland Shale Fruitland Coal Pictured Cliffs Ss. Lewis Shale Cliffhouse Ss. Menefee Fn. Point Lookout Ss. Mancos Shale	588 717 1,154 1,328 1,456 2,007 2,723 3,696 3,890			8 3/4	7" 26ppf J55 LTC TOC @ surface (100% OH excess) Stage 1 Total: 860sk	Fresh Wtr 8.3-10	Vertical <1°		
Surveys every 30' through the curve	MWD GR Mud Log	KOP Mancos Silt Gallup Fn. 7" Csg	4,214 4,340 4,616 4,864	4,291 5,150'							
Surveys every stand to TD unless directed otherwise by Geologist	No OH Logs	Horizontal Target TD Base Gallup	4,892 4,854 4,947	11,000		6 1/8	200' overlap at liner top 5850' Drilled Lateral TOC @ Top of Liner (30% open hole excess)			Horz Inc/TVD 90.4deg/4895' TD = 10999.59' MD	
MWD Gamma Directional								WBM 8.3-10			



SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	
3	1111.77	12.24	259.21	1107.14	-12.19	-63.92	2.00	259.21	-34.45	
4	4290.77	12.24	259.21	4213.92	-138.35	-725.73	0.00	0.00	-391.14	
5	5351.38	90.40	144.60	4893.44	-736.98	-465.85	9.00	-114.03	224.81	
6	5551.38	90.40	144.60	4892.04	-900.00	-350.00	0.00	0.00	423.16	
7	5891.37	90.40	137.24	4889.66	-1163.73	-135.83	2.16	-89.98	762.20	
8	10999.59	90.40	137.24	4854.01	-4914.11	3332.21	0.00	0.00	5870.30	NAGEEZI UNIT 406H PBHL

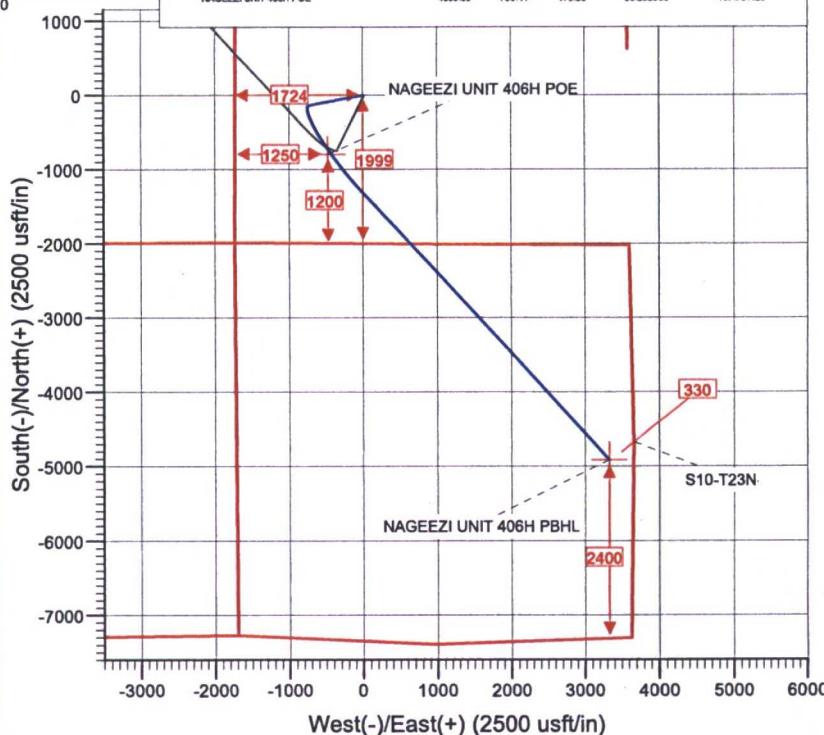
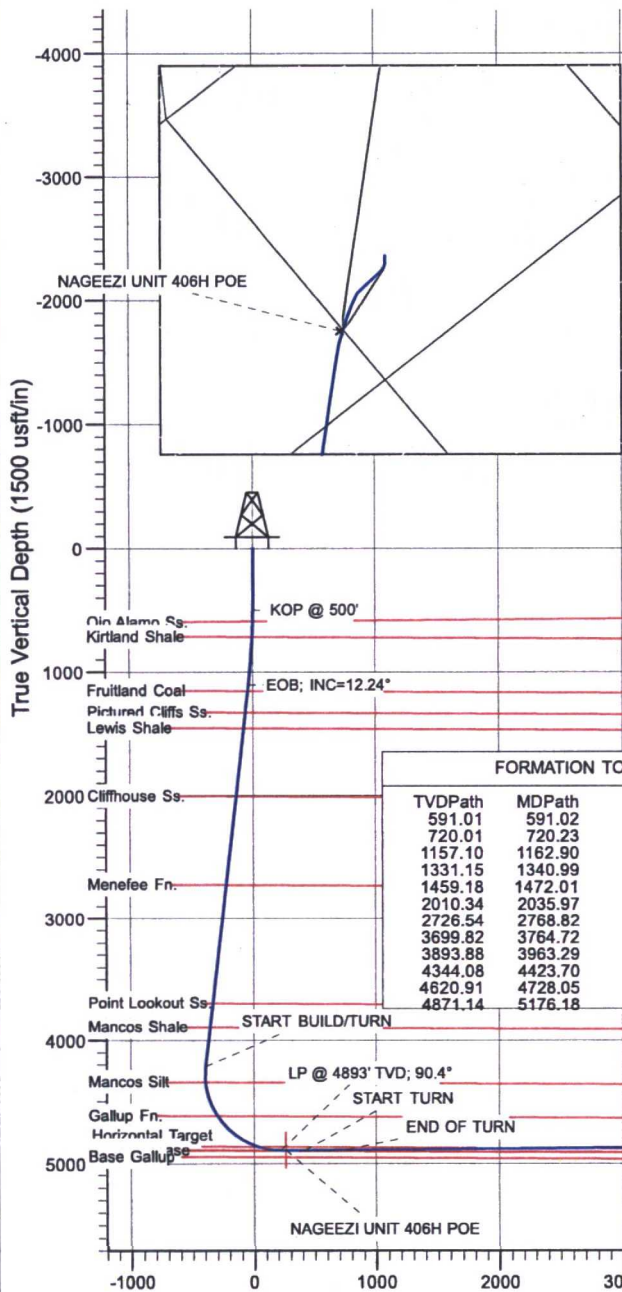
Project: San Juan County, NM
Site: S3-T23N-R9W
Well: NAGEEZI UNIT 406H
Wellbore: OH
Design: PLAN #2



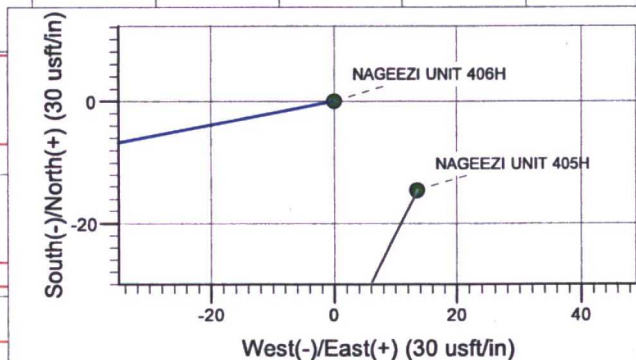
Azimuths to True North
Magnetic North: 9.18°

Magnetic Field
Strength: 49913.8nT
Dip Angle: 62.91°
Date: 11/29/2016
Model: IGRF2010

PLAN #2 NAGEEZI UNIT 406H 10000 L/R 10' KB @ 8784.00uH Ground Level @ 6768.00 North American Datum 1983 Well NAGEEZI UNIT 406H, True North									
Type	Target	No Target (Freshhand)	Admuth	Origin Type	N/S	E/W	From TVD		
Name	TV	D	+N/-S	+E/-W	Latitude	Longitude			
NAGEEZI UNIT 406H PBHL	4854.01	-4914.11	3332.21	-475.58	36.254225	-107.779516			
NAGEEZI UNIT 406H POE	4890.00	-798.11							



FORMATION TOP DETAILS		
TVDPPath	MDPath	Formation
591.01	591.02	Ojo Alamo Ss.
720.01	720.23	Kirtland Shale
1157.10	1162.90	Fruitland Coal
1331.15	1340.99	Pictured Cliffs Ss.
1459.18	1472.01	Lewis Shale
2010.34	2035.97	Cliffhouse Ss.
2726.54	2768.82	Menefee Fr.
3699.82	3764.72	Point Lookout Ss.
3893.88	3963.29	Mancos Shale
4344.08	4423.70	Mancos Silt
4620.91	4728.05	Gallup Fr.
4871.14	5176.18	Payzone Top



Vertical Section at 137.24° (1500 usft/in)



CATHEDRAL

WELL DETAILS: NAGEEZI UNIT 406H

+N/-S	+E/-W	Northing	Ground Level: Easting	6768.00	Latitude	Longitude
0.00	0.00	1911840.92	2738958.91		36.254225	-107.779516



Cathedral Energy Services

Planning Report

Database: USA EDM 5000 Multi Users DB
Company: EnCana Oil & Gas (USA) Inc
Project: San Juan County, NM
Site: S3-T23N-R9W
Well: NAGEEZI UNIT 406H
Wellbore: OH
Design: PLAN #2

Local Co-ordinate Reference: Well NAGEEZI UNIT 406H
TVD Reference: 16' KB @ 6784.00usft
MD Reference: 16' KB @ 6784.00usft
North Reference: True
Survey Calculation Method: Minimum Curvature

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

Site		S3-T23N-R9W			
Site Position:		Northing:	1,911,826.36 usft	Latitude:	36.254185
From:	Lat/Long	Easting:	2,738,972.48 usft	Longitude:	-107.779470
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16"	Grid Convergence:	0.03 °

Well	NAGEEZI UNIT 406H					
Well Position	+N/-S	0.00 usft	Northing:	1,911,840.92 usft	Latitude:	36.254225
	+E/-W	0.00 usft	Easting:	2,738,958.91 usft	Longitude:	-107.779516
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	6,768.00 usft	

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	11/29/2016	9.18	62.91	49,914

Design	PLAN #2			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	137.24

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,111.77	12.24	259.21	1,107.14	-12.19	-63.92	2.00	2.00	0.00	259.21	
4,290.77	12.24	259.21	4,213.92	-138.35	-725.73	0.00	0.00	0.00	0.00	
5,351.38	90.40	144.60	4,893.44	-736.98	-465.85	9.00	7.37	-10.81	-114.03	
5,551.38	90.40	144.60	4,892.04	-900.00	-350.00	0.00	0.00	0.00	0.00	
5,891.37	90.40	137.24	4,889.66	-1,163.73	-135.83	2.16	0.00	-2.16	-89.98	
10,999.59	90.40	137.24	4,854.01	-4,914.11	3,332.21	0.00	0.00	0.00	0.00	NAGEEZI UNIT 406H

Cathedral Energy Services

Planning Report

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Project: San Juan County, NM
Site: S3-T23N-R9W
Well: NAGEEZI UNIT 406H
Wellbore: OH
Design: PLAN #2

Local Co-ordinate Reference: Well NAGEEZI UNIT 406H
TVD Reference: 16' KB @ 6784.00usft
MD Reference: 16' KB @ 6784.00usft
North Reference: True
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100u)	Comments / Formations
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	KOP @ 500'
591.02	1.82	259.21	591.01	-0.27	-1.42	-0.77	2.00	2.00	Ojo Alamo Ss.
600.00	2.00	259.21	599.98	-0.33	-1.71	-0.92	2.00	2.00	
700.00	4.00	259.21	699.84	-1.31	-6.86	-3.69	2.00	2.00	
720.23	4.40	259.21	720.01	-1.58	-8.31	-4.48	2.00	2.00	Kirtland Shale
800.00	6.00	259.21	799.45	-2.94	-15.42	-8.31	2.00	2.00	
900.00	8.00	259.21	898.70	-5.22	-27.39	-14.76	2.00	2.00	
1,000.00	10.00	259.21	997.47	-8.15	-42.75	-23.04	2.00	2.00	
1,100.00	12.00	259.21	1,095.62	-11.72	-61.49	-33.14	2.00	2.00	
1,111.77	12.24	259.21	1,107.14	-12.19	-63.92	-34.45	2.00	2.00	EOB; INC=12.24°
1,162.90	12.24	259.21	1,157.10	-14.22	-74.57	-40.19	0.00	0.00	Fruitland Coal
1,200.00	12.24	259.21	1,193.36	-15.69	-82.29	-44.35	0.00	0.00	
1,300.00	12.24	259.21	1,291.09	-19.66	-103.11	-55.57	0.00	0.00	
1,340.99	12.24	259.21	1,331.15	-21.28	-111.64	-60.17	0.00	0.00	Pictured Cliffs Ss.
1,400.00	12.24	259.21	1,388.81	-23.63	-123.93	-66.79	0.00	0.00	
1,472.01	12.24	259.21	1,459.18	-26.48	-138.92	-74.87	0.00	0.00	Lewis Shale
1,500.00	12.24	259.21	1,486.54	-27.59	-144.74	-78.01	0.00	0.00	
1,600.00	12.24	259.21	1,584.27	-31.56	-165.56	-89.23	0.00	0.00	
1,700.00	12.24	259.21	1,682.00	-35.53	-186.38	-100.45	0.00	0.00	
1,800.00	12.24	259.21	1,779.73	-39.50	-207.20	-111.67	0.00	0.00	
1,900.00	12.24	259.21	1,877.46	-43.47	-228.02	-122.89	0.00	0.00	
2,000.00	12.24	259.21	1,975.18	-47.44	-248.83	-134.11	0.00	0.00	
2,035.97	12.24	259.21	2,010.34	-48.87	-256.32	-138.15	0.00	0.00	Cliffhouse Ss.
2,100.00	12.24	259.21	2,072.91	-51.41	-269.65	-145.33	0.00	0.00	
2,200.00	12.24	259.21	2,170.64	-55.38	-290.47	-156.55	0.00	0.00	
2,300.00	12.24	259.21	2,268.37	-59.34	-311.29	-167.77	0.00	0.00	
2,400.00	12.24	259.21	2,366.10	-63.31	-332.11	-178.99	0.00	0.00	
2,500.00	12.24	259.21	2,463.83	-67.28	-352.92	-190.21	0.00	0.00	
2,600.00	12.24	259.21	2,561.56	-71.25	-373.74	-201.43	0.00	0.00	
2,700.00	12.24	259.21	2,659.28	-75.22	-394.56	-212.65	0.00	0.00	
2,768.82	12.24	259.21	2,726.54	-77.95	-408.89	-220.37	0.00	0.00	Menefee Fn.
2,800.00	12.24	259.21	2,757.01	-79.19	-415.38	-223.87	0.00	0.00	
2,900.00	12.24	259.21	2,854.74	-83.16	-436.20	-235.09	0.00	0.00	
3,000.00	12.24	259.21	2,952.47	-87.13	-457.02	-246.31	0.00	0.00	
3,100.00	12.24	259.21	3,050.20	-91.10	-477.83	-257.53	0.00	0.00	
3,200.00	12.24	259.21	3,147.93	-95.06	-498.65	-268.75	0.00	0.00	
3,300.00	12.24	259.21	3,245.65	-99.03	-519.47	-279.97	0.00	0.00	
3,400.00	12.24	259.21	3,343.38	-103.00	-540.29	-291.19	0.00	0.00	
3,500.00	12.24	259.21	3,441.11	-106.97	-561.11	-302.41	0.00	0.00	
3,600.00	12.24	259.21	3,538.84	-110.94	-581.92	-313.63	0.00	0.00	
3,700.00	12.24	259.21	3,636.57	-114.91	-602.74	-324.85	0.00	0.00	
3,764.72	12.24	259.21	3,699.82	-117.48	-616.22	-332.11	0.00	0.00	Point Lookout Ss.
3,800.00	12.24	259.21	3,734.30	-118.88	-623.56	-336.07	0.00	0.00	
3,900.00	12.24	259.21	3,832.03	-122.85	-644.38	-347.29	0.00	0.00	
3,963.29	12.24	259.21	3,893.88	-125.36	-657.55	-354.39	0.00	0.00	Mancos Shale
4,000.00	12.24	259.21	3,929.75	-126.81	-665.20	-358.51	0.00	0.00	
4,100.00	12.24	259.21	4,027.48	-130.78	-686.01	-369.73	0.00	0.00	

Cathedral Energy Services

Planning Report

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Site: S3-T23N-R9W
Well: NAGEEZI UNIT 406H
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TVD Reference: 16' KB @ 6784.00usft
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North Reference: True
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100u)	Comments / Formations
4,200.00	12.24	259.21	4,125.21	-134.75	-706.83	-380.95	0.00	0.00	
4,290.77	12.24	259.21	4,213.92	-138.35	-725.73	-391.14	0.00	0.00	START BUILD/TURN
4,300.00	11.92	255.53	4,222.95	-138.78	-727.61	-392.11	9.00	-3.41	
4,400.00	12.13	211.30	4,320.95	-150.36	-743.10	-394.12	9.00	0.21	
4,423.70	13.11	202.60	4,344.08	-154.97	-745.43	-392.32	9.00	4.12	Mancos Silt
4,500.00	17.67	182.95	4,417.68	-174.54	-749.36	-380.61	9.00	5.98	
4,600.00	25.24	169.42	4,510.74	-210.72	-746.22	-351.91	9.00	7.57	
4,700.00	33.49	162.03	4,597.84	-258.02	-733.76	-308.73	9.00	8.25	
4,728.05	35.86	160.52	4,620.91	-273.13	-728.63	-294.16	9.00	8.46	Gallup Fn.
4,800.00	42.02	157.32	4,676.85	-315.27	-712.30	-252.13	9.00	8.56	
4,900.00	50.69	153.97	4,745.81	-381.05	-682.36	-183.50	9.00	8.67	
5,000.00	59.44	151.37	4,803.02	-453.76	-644.68	-104.54	9.00	8.74	
5,100.00	68.23	149.20	4,847.08	-531.59	-600.18	-17.18	9.00	8.79	
5,176.18	74.94	147.72	4,871.14	-593.15	-562.38	53.67	9.00	8.81	Payzone Top
5,200.00	77.04	147.28	4,876.91	-612.64	-549.97	76.41	9.00	8.82	
5,300.00	85.86	145.50	4,891.76	-694.90	-495.27	173.94	9.00	8.83	
5,351.38	90.40	144.60	4,893.44	-736.98	-465.85	224.81	9.00	8.83	LP @ 4893' TVD; 90.4°
5,400.00	90.40	144.60	4,893.10	-776.61	-437.69	273.03	0.00	0.00	
5,500.00	90.40	144.60	4,892.40	-858.12	-379.77	372.20	0.00	0.00	
5,551.38	90.40	144.60	4,892.04	-900.00	-350.00	423.16	0.00	0.00	START TURN
5,600.00	90.40	143.55	4,891.70	-939.37	-321.48	471.43	2.16	0.00	
5,700.00	90.40	141.38	4,891.00	-1,018.66	-260.56	571.00	2.16	0.00	
5,800.00	90.40	139.22	4,890.30	-1,095.59	-196.69	670.85	2.16	0.00	
5,891.37	90.40	137.24	4,889.66	-1,163.73	-135.83	762.20	2.16	0.00	END OF TURN
5,900.00	90.40	137.24	4,889.60	-1,170.07	-129.96	770.83	0.00	0.00	
6,000.00	90.40	137.24	4,888.91	-1,243.49	-62.07	870.83	0.00	0.00	
6,100.00	90.40	137.24	4,888.21	-1,316.90	5.82	970.83	0.00	0.00	
6,200.00	90.40	137.24	4,887.51	-1,390.32	73.71	1,070.82	0.00	0.00	
6,300.00	90.40	137.24	4,886.81	-1,463.74	141.60	1,170.82	0.00	0.00	
6,400.00	90.40	137.24	4,886.11	-1,537.16	209.49	1,270.82	0.00	0.00	
6,500.00	90.40	137.24	4,885.42	-1,610.58	277.38	1,370.82	0.00	0.00	
6,600.00	90.40	137.24	4,884.72	-1,684.00	345.27	1,470.81	0.00	0.00	
6,700.00	90.40	137.24	4,884.02	-1,757.42	413.17	1,570.81	0.00	0.00	
6,800.00	90.40	137.24	4,883.32	-1,830.84	481.06	1,670.81	0.00	0.00	
6,900.00	90.40	137.24	4,882.62	-1,904.25	548.95	1,770.81	0.00	0.00	
7,000.00	90.40	137.24	4,881.93	-1,977.67	616.84	1,870.81	0.00	0.00	
7,100.00	90.40	137.24	4,881.23	-2,051.09	684.73	1,970.80	0.00	0.00	
7,200.00	90.40	137.24	4,880.53	-2,124.51	752.62	2,070.80	0.00	0.00	
7,300.00	90.40	137.24	4,879.83	-2,197.93	820.51	2,170.80	0.00	0.00	
7,400.00	90.40	137.24	4,879.13	-2,271.35	888.40	2,270.80	0.00	0.00	
7,500.00	90.40	137.24	4,878.44	-2,344.77	956.30	2,370.79	0.00	0.00	
7,600.00	90.40	137.24	4,877.74	-2,418.18	1,024.19	2,470.79	0.00	0.00	
7,700.00	90.40	137.24	4,877.04	-2,491.60	1,092.08	2,570.79	0.00	0.00	
7,800.00	90.40	137.24	4,876.34	-2,565.02	1,159.97	2,670.79	0.00	0.00	
7,900.00	90.40	137.24	4,875.64	-2,638.44	1,227.86	2,770.78	0.00	0.00	
8,000.00	90.40	137.24	4,874.95	-2,711.86	1,295.75	2,870.78	0.00	0.00	
8,100.00	90.40	137.24	4,874.25	-2,785.28	1,363.64	2,970.78	0.00	0.00	
8,200.00	90.40	137.24	4,873.55	-2,858.70	1,431.53	3,070.78	0.00	0.00	
8,300.00	90.40	137.24	4,872.85	-2,932.11	1,499.43	3,170.77	0.00	0.00	
8,400.00	90.40	137.24	4,872.15	-3,005.53	1,567.32	3,270.77	0.00	0.00	
8,500.00	90.40	137.24	4,871.46	-3,078.95	1,635.21	3,370.77	0.00	0.00	
8,600.00	90.40	137.24	4,870.76	-3,152.37	1,703.10	3,470.77	0.00	0.00	

Cathedral Energy Services

Planning Report

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Project: San Juan County, NM
Site: S3-T23N-R9W
Well: NAGEEZI UNIT 406H
Wellbore: OH
Design: PLAN #2

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

Well NAGEEZI UNIT 406H
16' KB @ 6784.00usft
16' KB @ 6784.00usft
True
Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100u)	Comments / Formations
8,700.00	90.40	137.24	4,870.06	-3,225.79	1,770.99	3,570.76	0.00	0.00	
8,800.00	90.40	137.24	4,869.36	-3,299.21	1,838.88	3,670.76	0.00	0.00	
8,900.00	90.40	137.24	4,868.66	-3,372.63	1,906.77	3,770.76	0.00	0.00	
9,000.00	90.40	137.24	4,867.97	-3,446.04	1,974.66	3,870.76	0.00	0.00	
9,100.00	90.40	137.24	4,867.27	-3,519.46	2,042.56	3,970.75	0.00	0.00	
9,200.00	90.40	137.24	4,866.57	-3,592.88	2,110.45	4,070.75	0.00	0.00	
9,300.00	90.40	137.24	4,865.87	-3,666.30	2,178.34	4,170.75	0.00	0.00	
9,400.00	90.40	137.24	4,865.17	-3,739.72	2,246.23	4,270.75	0.00	0.00	
9,500.00	90.40	137.24	4,864.48	-3,813.14	2,314.12	4,370.74	0.00	0.00	
9,600.00	90.40	137.24	4,863.78	-3,886.56	2,382.01	4,470.74	0.00	0.00	
9,700.00	90.40	137.24	4,863.08	-3,959.97	2,449.90	4,570.74	0.00	0.00	
9,800.00	90.40	137.24	4,862.38	-4,033.39	2,517.79	4,670.74	0.00	0.00	
9,900.00	90.40	137.24	4,861.68	-4,106.81	2,585.69	4,770.73	0.00	0.00	
10,000.00	90.40	137.24	4,860.99	-4,180.23	2,653.58	4,870.73	0.00	0.00	
10,100.00	90.40	137.24	4,860.29	-4,253.65	2,721.47	4,970.73	0.00	0.00	
10,200.00	90.40	137.24	4,859.59	-4,327.07	2,789.36	5,070.73	0.00	0.00	
10,300.00	90.40	137.24	4,858.89	-4,400.49	2,857.25	5,170.72	0.00	0.00	
10,400.00	90.40	137.24	4,858.19	-4,473.90	2,925.14	5,270.72	0.00	0.00	
10,500.00	90.40	137.24	4,857.50	-4,547.32	2,993.03	5,370.72	0.00	0.00	
10,600.00	90.40	137.24	4,856.80	-4,620.74	3,060.92	5,470.72	0.00	0.00	
10,700.00	90.40	137.24	4,856.10	-4,694.16	3,128.82	5,570.71	0.00	0.00	
10,800.00	90.40	137.24	4,855.40	-4,767.58	3,196.71	5,670.71	0.00	0.00	
10,900.00	90.40	137.24	4,854.71	-4,841.00	3,264.60	5,770.71	0.00	0.00	
10,999.59	90.40	137.24	4,854.01	-4,914.11	3,332.21	5,870.30	0.00	0.00	TD at 10999.59

Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
NAGEEZI UNIT 406H PI - plan hits target center - Point	0.00	0.00	4,854.01	-4,914.11	3,332.21	1,906,928.65	2,742,293.85	36.240725	-107.768216
NAGEEZI UNIT 406H PI - plan misses target center by 42.30usft at 5393.97usft MD (4893.14 TVD, -771.69 N, -441.18 E) - Point	0.00	0.00	4,890.00	-796.11	-475.58	1,911,044.54	2,738,483.77	36.252038	-107.781129

Cathedral Energy Services

Planning Report

Database: USA EDM 5000 Multi Users DB
 Company: EnCana Oil & Gas (USA) Inc
 Project: San Juan County, NM
 Site: S3-T23N-R9W
 Well: NAGEEZI UNIT 406H
 Wellbore: OH
 Design: PLAN #2

Local Co-ordinate Reference: Well NAGEEZI UNIT 406H
 TVD Reference: 16' KB @ 6784.00usft
 MD Reference: 16' KB @ 6784.00usft
 North Reference: True
 Survey Calculation Method: Minimum Curvature

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
591.02	591.00	Ojo Alamo Ss.		-0.40	137.24
720.23	720.00	Kirtland Shale		-0.40	
1,162.90	1,157.00	Fruitland Coal		-0.40	
1,340.99	1,331.00	Pictured Cliffs Ss.		-0.40	
1,472.01	1,459.00	Lewis Shale		-0.40	
2,035.97	2,010.00	Cliffhouse Ss.		-0.40	
2,768.82	2,726.00	Menefee Fn.		-0.40	
3,764.72	3,699.00	Point Lookout Ss.		-0.40	
3,963.29	3,893.00	Mancos Shale		-0.40	
4,423.70	4,343.00	Mancos Silt		-0.40	
4,728.05	4,619.00	Gallup Fn.		-0.40	
5,176.18	4,867.00	Payzone Top		-0.40	

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
500.00	500.00	0.00	0.00	KOP @ 500'
1,111.77	1,107.14	-12.19	-63.92	EOB; INC=12.24°
4,290.77	4,213.92	-138.35	-725.73	START BUILD/TURN
5,351.38	4,893.44	-736.98	-465.85	LP @ 4893' TVD; 90.4°
5,551.38	4,892.04	-900.00	-350.00	START TURN
5,891.37	4,889.66	-1,163.73	-135.83	END OF TURN
10,999.59	4,854.01	-4,914.11	3,332.21	TD at 10999.59

EnCana Oil & Gas (USA) Inc

San Juan County, NM

S3-T23N-R9W

NAGEEZI UNIT 406H

OH

PLAN #2

Anticollision Report

01 December, 2016

Cathedral Energy Services

Anticollision Report

Company: EnCana Oil & Gas (USA) Inc
Project: San Juan County, NM
Reference Site: S3-T23N-R9W
Site Error: 0.00usft
Reference Well: NAGEEZI UNIT 406H
Well Error: 0.00usft
Reference Wellbore: OH
Reference Design: PLAN #2

Local Co-ordinate Reference: Well NAGEEZI UNIT 406H
TVD Reference: 16' KB @ 6784.00usft
MD Reference: 16' KB @ 6784.00usft
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 #2
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria
Interpolation Method:	Stations
Depth Range:	Unlimited
Results Limited by:	Maximum center-center distance of 1,500.00usft
Warning Levels Evaluated at:	2.00 Sigma
Error Model:	Systematic Ellipse
Scan Method:	Closest Approach 3D
Error Surface:	Elliptical Conic

Survey Tool Program		Date	12/1/2016		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.00	10,999.59	PLAN #2 (OH)	MWD+HDGM	OWSG MWD + HDGM	

Summary						
Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
S3-T23N-R9W						
NAGEEZI UNIT 405H - OH - PLAN #1	500.00	500.00	19.90	16.73	6.279	CC, ES
NAGEEZI UNIT 405H - OH - PLAN #1	5,123.76	5,052.33	63.54	25.42	1.667	SF
South Huerfano #1 - DUGAN WELL - NO SURVEYS						Out of range

Cathedral Energy Services

Anticollision Report

Company: EnCana Oil & Gas (USA) Inc
Project: San Juan County, NM
Reference Site: S3-T23N-R9W
Site Error: 0.00usft
Reference Well: NAGEEZI UNIT 406H
Well Error: 0.00usft
Reference Wellbore: OH
Reference Design: PLAN #2

Local Co-ordinate Reference: Well NAGEEZI UNIT 406H
TVD Reference: 16' KB @ 6784.00usft
MD Reference: 16' KB @ 6784.00usft
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 S3-T23N-R9W - NAGEEZI UNIT 405H - OH - PLAN #1													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error: 0.00 usft
Reference	Offset	Semi Major Axis		Distance		Total		Separation		Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Uncertainty Axis	Factor	
0.00	0.00	0.00	0.00	0.00	0.00	137.03	-14.56	13.56	19.90				
100.00	100.00	100.00	100.00	0.15	0.15	137.03	-14.56	13.56	19.90	19.80	0.30	66.083	
200.00	200.00	200.00	200.00	0.51	0.51	137.03	-14.56	13.56	19.90	18.88	1.02	19.546	
300.00	300.00	300.00	300.00	0.87	0.87	137.03	-14.56	13.56	19.90	18.16	1.74	11.469	
400.00	400.00	400.00	400.00	1.23	1.23	137.03	-14.56	13.56	19.90	17.45	2.45	8.115	
500.00	500.00	500.00	500.00	1.58	1.58	137.03	-14.56	13.56	19.90	16.73	3.17	6.279	CC, ES
600.00	599.98	599.73	599.71	1.93	1.93	-121.75	-16.12	12.80	21.45	17.58	3.86	5.551	
700.00	699.84	699.32	699.16	2.28	2.26	-120.76	-20.78	10.50	26.09	21.54	4.55	5.730	
800.00	799.45	798.62	798.07	2.63	2.61	-119.70	-28.51	6.69	33.83	28.56	5.27	6.424	
900.00	898.70	897.49	896.21	3.00	2.96	-118.79	-39.26	1.39	44.64	38.64	6.00	7.440	
1,000.00	897.47	895.80	893.33	3.39	3.33	-118.07	-52.95	-5.36	58.50	51.75	6.76	8.657	
1,100.00	1,095.62	1,093.42	1,089.19	3.79	3.72	-117.48	-69.50	-13.51	75.38	67.83	7.54	9.994	
1,111.77	1,107.14	1,104.87	1,100.38	3.84	3.76	-117.41	-71.63	-14.56	77.56	69.92	7.64	10.154	
1,200.00	1,193.36	1,190.89	1,184.28	4.21	4.12	-116.71	-88.69	-22.97	94.50	86.15	8.35	11.317	
1,300.00	1,281.09	1,288.98	1,279.84	4.65	4.55	-115.96	-108.52	-32.74	113.90	104.73	9.17	12.421	
1,400.00	1,388.81	1,387.07	1,375.41	5.09	4.98	-115.43	-128.34	-42.51	133.32	123.31	10.01	13.325	
1,500.00	1,486.54	1,485.16	1,470.98	5.54	5.42	-115.03	-148.17	-52.28	152.74	141.89	10.85	14.074	
1,600.00	1,584.27	1,583.25	1,566.55	6.00	5.86	-114.73	-168.00	-62.05	172.17	160.46	11.71	14.702	
1,700.00	1,682.00	1,681.34	1,662.11	6.46	6.31	-114.48	-187.83	-71.82	191.61	179.03	12.58	15.236	
1,800.00	1,779.73	1,779.43	1,757.68	6.92	6.77	-114.28	-207.66	-81.59	211.04	197.59	13.45	15.693	
1,900.00	1,877.46	1,877.53	1,853.25	7.38	7.22	-114.12	-227.48	-91.37	230.48	216.15	14.33	16.089	
2,000.00	1,975.18	1,975.62	1,948.82	7.85	7.68	-113.98	-247.31	-101.14	249.92	234.71	15.21	16.435	
2,100.00	2,072.91	2,073.71	2,044.38	8.31	8.14	-113.86	-267.14	-110.91	269.36	253.27	16.09	16.738	
2,200.00	2,170.64	2,171.80	2,139.95	8.78	8.60	-113.75	-286.97	-120.68	288.80	271.82	16.98	17.007	
2,300.00	2,268.37	2,269.89	2,235.52	9.25	9.07	-113.66	-306.80	-130.45	308.24	290.37	17.87	17.247	
2,400.00	2,366.10	2,367.98	2,331.09	9.72	9.53	-113.58	-326.62	-140.22	327.69	308.92	18.77	17.462	
2,500.00	2,463.83	2,466.07	2,426.65	10.20	10.00	-113.51	-346.45	-149.99	347.13	327.47	19.66	17.655	
2,600.00	2,561.56	2,564.16	2,522.22	10.67	10.46	-113.45	-366.28	-159.76	366.57	346.02	20.56	17.830	
2,700.00	2,659.28	2,662.25	2,617.79	11.14	10.93	-113.39	-386.11	-169.53	386.02	364.56	21.46	17.989	
2,800.00	2,757.01	2,760.34	2,713.36	11.61	11.40	-113.34	-405.94	-179.31	405.46	383.11	22.36	18.135	
2,900.00	2,854.74	2,858.43	2,808.92	12.09	11.87	-113.29	-425.77	-189.08	424.91	401.65	23.26	18.268	
3,000.00	2,952.47	2,956.52	2,904.49	12.56	12.34	-113.25	-445.59	-198.85	444.35	420.19	24.16	18.390	
3,100.00	3,050.20	3,054.61	3,000.06	13.04	12.81	-113.21	-465.42	-208.62	463.80	438.73	25.07	18.503	
3,200.00	3,147.93	3,152.70	3,095.63	13.51	13.28	-113.18	-485.25	-218.39	483.25	457.28	25.97	18.608	
3,300.00	3,245.65	3,250.79	3,191.19	13.99	13.75	-113.14	-505.08	-228.16	502.69	475.82	26.88	18.704	
3,400.00	3,343.38	3,348.89	3,286.76	14.47	14.22	-113.11	-524.91	-237.93	522.14	494.36	27.78	18.795	
3,500.00	3,441.11	3,446.98	3,382.33	14.94	14.69	-113.08	-544.73	-247.70	541.58	512.90	28.69	18.879	
3,600.00	3,538.84	3,545.07	3,477.90	15.42	15.16	-113.06	-564.56	-257.47	561.03	531.44	29.59	18.957	
3,700.00	3,636.57	3,643.16	3,573.46	15.90	15.63	-113.03	-584.39	-267.25	580.48	549.97	30.50	19.031	
3,800.00	3,734.30	3,741.25	3,669.03	16.37	16.10	-113.01	-604.22	-277.02	599.92	568.51	31.41	19.100	
3,900.00	3,832.03	3,839.34	3,764.60	16.85	16.57	-112.99	-624.05	-286.79	619.37	587.05	32.32	19.164	
4,000.00	3,929.75	3,937.43	3,860.17	17.33	17.04	-112.97	-643.87	-296.56	638.82	605.59	33.23	19.226	
4,100.00	4,027.48	4,035.52	3,955.73	17.81	17.52	-112.95	-663.70	-306.33	658.26	624.13	34.14	19.283	
4,200.00	4,125.21	4,133.61	4,051.30	18.28	17.99	-112.93	-683.53	-316.10	677.71	642.66	35.05	19.338	
4,290.77	4,213.92	4,222.65	4,138.05	18.72	18.42	-112.91	-701.53	-324.97	695.36	659.49	35.87	19.385	
4,300.00	4,222.95	4,231.71	4,146.88	18.76	18.46	-109.32	-703.36	-325.87	697.09	661.14	35.96	19.388	
4,350.00	4,271.96	4,279.69	4,197.00	18.99	18.69	-12.53	-307.67	-914.04	670.32	657.33	12.99	51.590	
4,400.00	4,320.95	4,328.76	4,247.00	19.19	18.89	33.07	-308.35	-913.41	621.13	607.82	13.31	46.683	
4,450.00	4,369.62	4,377.43	4,295.00	19.38	19.08	67.70	-311.88	-910.14	572.19	558.57	13.62	42.026	
4,500.00	4,417.68	4,425.49	4,343.00	19.55	19.25	90.44	-318.23	-904.24	523.82	509.89	13.93	37.595	
4,550.00	4,464.81	4,472.62	4,389.00	19.70	19.40	105.07	-327.37	-895.76	476.33	462.05	14.27	33.372	
4,600.00	4,510.74	4,518.55	4,435.00	19.83	19.53	114.68	-339.24	-884.75	430.01	415.36	14.65	29.346	

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

Cathedral Energy Services

Anticollision Report

Company: EnCana Oil & Gas (USA) Inc
 Project: San Juan County, NM
 Reference Site: S3-T23N-R9W
 Site Error: 0.00usft
 Reference Well: NAGEEZI UNIT 406H
 Well Error: 0.00usft
 Reference Wellbore: OH
 Reference Design: PLAN #2

Local Co-ordinate Reference: Well NAGEEZI UNIT 406H
 TVD Reference: 16' KB @ 6784.00usft
 MD Reference: 16' KB @ 6784.00usft
 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 S3-T23N-R9W - NAGEEZI UNIT 405H - OH - PLAN #1													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis			Distance				Total Uncertainty Axis	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
4,650.00	4,555.17	5,394.81	4,897.00	19.95	23.34	121.10	-353.77	-871.27	385.17	370.07	15.09	25.521	
4,700.00	4,597.84	5,371.48	4,897.00	20.06	23.03	125.37	-370.87	-855.41	342.09	326.48	15.61	21.909	
4,750.00	4,638.48	5,344.80	4,897.00	20.16	22.71	128.09	-390.43	-837.26	301.07	284.80	16.27	18.504	
4,800.00	4,676.85	5,306.09	4,896.64	20.24	22.29	128.59	-418.75	-810.88	262.17	244.83	17.34	15.117	
4,850.00	4,712.69	5,256.93	4,892.85	20.31	21.83	126.48	-454.11	-776.96	223.76	204.37	19.39	11.540	
4,900.00	4,745.81	5,213.04	4,886.01	20.37	21.53	123.09	-484.87	-746.41	185.84	163.93	21.91	8.480	
4,950.00	4,775.98	5,172.99	4,876.96	20.42	21.34	117.82	-512.09	-718.49	149.10	124.03	25.07	5.948	
5,000.00	4,803.02	5,135.83	4,866.21	20.46	21.21	109.62	-536.53	-692.65	114.65	85.57	29.08	3.942	
5,050.00	4,826.77	5,100.87	4,854.05	20.50	21.12	97.03	-558.69	-668.50	84.99	50.82	34.17	2.488	
5,100.00	4,847.08	5,067.63	4,840.71	20.52	21.05	78.98	-578.95	-645.78	66.05	27.66	38.39	1.721	
5,123.76	4,855.49	5,052.33	4,834.00	20.52	21.03	68.94	-587.99	-635.42	63.54	25.42	38.12	1.667 SF	
5,150.00	4,863.83	5,035.75	4,826.32	20.53	21.00	57.68	-597.56	-624.27	66.53	30.85	35.68	1.865	
5,200.00	4,876.91	5,004.96	4,810.99	20.54	20.95	38.64	-614.73	-603.83	85.15	55.02	30.13	2.826	
5,250.00	4,886.24	4,975.07	4,794.79	20.55	20.90	24.83	-630.58	-584.34	112.47	84.69	27.78	4.049	
5,300.00	4,891.76	4,950.00	4,780.25	20.79	20.87	16.39	-643.23	-568.32	142.97	114.53	28.44	5.027	
5,351.38	4,893.44	4,916.57	4,759.54	21.39	20.82	9.04	-659.14	-547.46	175.07	146.67	28.39	6.166	
5,400.00	4,893.10	4,890.25	4,742.21	22.01	20.77	5.71	-670.86	-531.48	206.75	177.40	29.35	7.043	
5,500.00	4,892.40	4,850.00	4,714.08	23.42	20.71	1.76	-687.34	-507.90	278.17	246.23	31.94	8.709	
5,551.38	4,892.04	4,821.54	4,693.06	24.20	20.65	-0.40	-697.92	-491.90	317.12	285.02	32.10	9.879	
5,600.00	4,891.70	4,800.00	4,676.56	24.97	20.61	-3.01	-705.30	-480.18	355.33	322.73	32.60	10.900	
5,700.00	4,891.00	4,769.08	4,652.05	26.66	20.54	-7.22	-714.95	-464.01	436.73	402.67	34.05	12.825	
5,800.00	4,890.30	4,750.00	4,636.46	28.48	20.50	-11.00	-720.34	-454.42	521.23	485.76	35.47	14.696	
5,891.37	4,889.66	4,716.55	4,608.33	30.25	20.42	-14.41	-728.70	-438.36	599.94	564.15	35.79	16.763	
5,900.00	4,889.60	4,714.49	4,606.57	30.42	20.41	-14.40	-729.17	-437.41	607.47	571.61	35.85	16.944	
6,000.00	4,888.91	4,700.00	4,594.07	32.45	20.37	-14.31	-732.33	-430.79	695.81	659.10	36.71	18.953	
6,100.00	4,888.21	4,673.37	4,570.68	34.54	20.30	-14.16	-737.45	-419.15	785.61	748.59	37.03	21.217	
6,200.00	4,887.51	4,650.00	4,549.73	36.69	20.23	-14.05	-741.20	-409.49	876.89	839.57	37.32	23.496	
6,300.00	4,886.81	4,650.00	4,549.73	38.88	20.23	-14.05	-741.20	-409.49	969.22	931.27	37.95	25.539	
6,400.00	4,886.11	4,628.84	4,530.46	41.11	20.17	-13.96	-744.00	-401.22	1,062.34	1,024.24	38.10	27.881	
6,500.00	4,885.42	4,617.19	4,519.73	43.38	20.13	-13.91	-745.29	-396.86	1,156.31	1,117.96	38.35	30.152	
6,600.00	4,884.72	4,600.00	4,503.77	45.67	20.08	-13.84	-746.88	-390.68	1,250.98	1,212.50	38.48	32.514	
6,700.00	4,884.02	4,600.00	4,503.77	47.99	20.08	-13.84	-746.88	-390.68	1,346.09	1,307.31	38.77	34.717	
6,800.00	4,883.32	4,600.00	4,503.77	50.33	20.08	-13.84	-746.88	-390.68	1,441.86	1,402.84	39.02	36.955	

Cathedral Energy Services

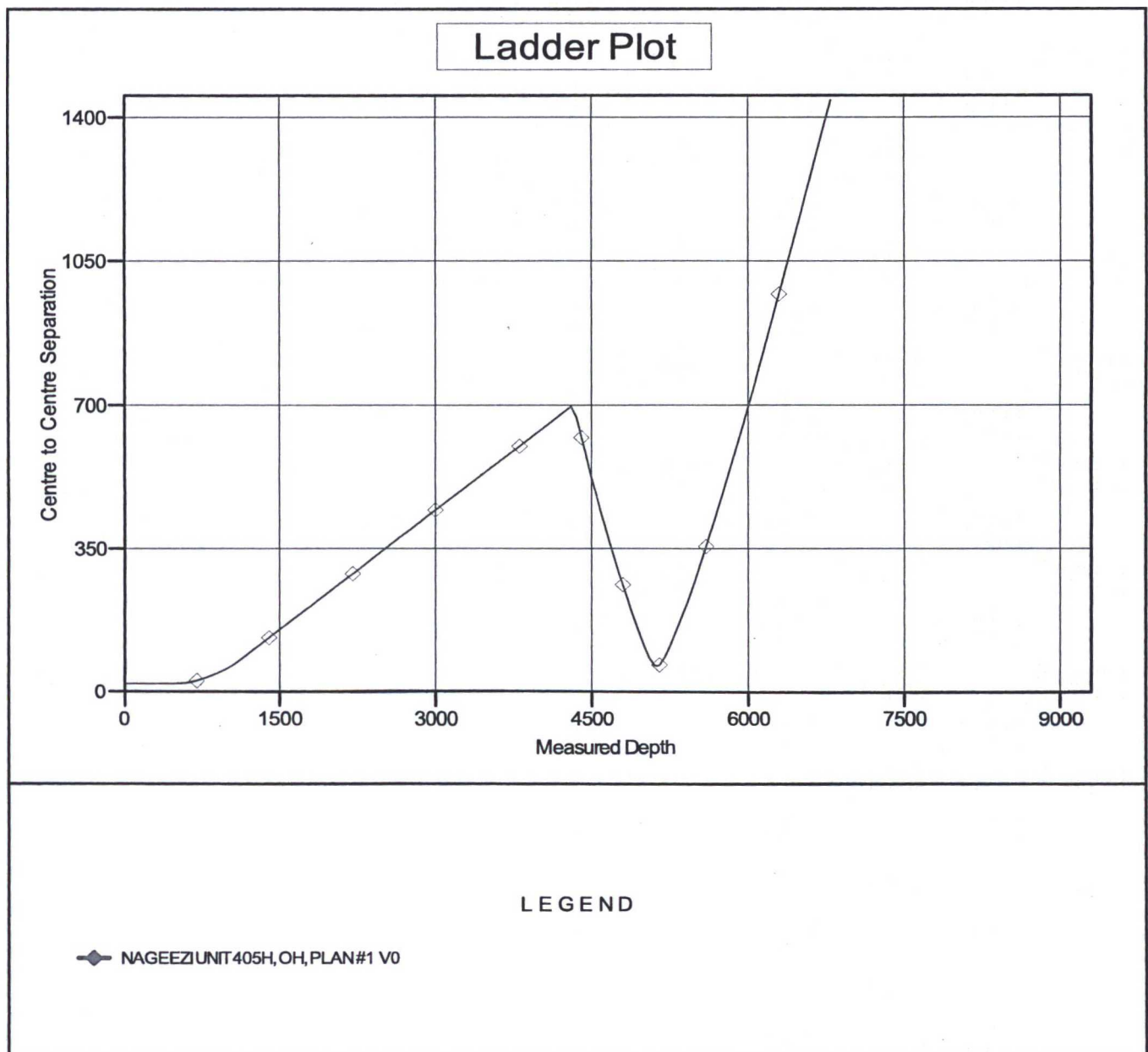
Anticollision Report

Company: EnCana Oil & Gas (USA) Inc
Project: San Juan County, NM
Reference Site: S3-T23N-R9W
Site Error: 0.00usft
Reference Well: NAGEEZI UNIT 406H
Well Error: 0.00usft
Reference Wellbore: OH
Reference Design: PLAN #2

Local Co-ordinate Reference: Well NAGEEZI UNIT 406H
TVD Reference: 16' KB @ 6784.00usft
MD Reference: 16' KB @ 6784.00usft
North Reference: True
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: USA EDM 5000 Multi Users DB
Offset TVD Reference: Offset Datum

Reference Depths are relative to 16' KB @ 6784.00usft
 Offset Depths are relative to Offset Datum
 Central Meridian is -107.833333 °

Coordinates are relative to: NAGEEZI UNIT 406H
 Coordinate System is US State Plane 1983, New Mexico Western Zone
 Grid Convergence at Surface is: 0.03°



Nageezi Unit 406H

SHL: NESW Section 3, T23N, R9W

1999' FSL and 1724' FWL

BHL: NWSW Section 33, T24N, R9W

2050' FSL and 850' FWL

San Juan County, New Mexico

Unit Number: NMNM 132981A

Lease Numbers: NM 8005, NO-G-1402-1883, NMNM 12374 & NMNM 90843

be hauled to an approved disposal site or stockpiled at the edge of the well pad and buried in the cut slopes of the pad during interim reclamation.

Any trees smaller than 3-inches in diameter, slash and brush will be chipped, shredded or mulched and incorporated into the topsoil for later use in interim reclamation.

Remaining brush will be brush-hogged or scalped at ground-level prior to ground disturbance.

4. After removal of vegetation, topsoil will be segregated and windrowed on the edge of the access road. Topsoil will be defined as the top six (6) inches of soil. The stockpiled topsoil will be free of brush and tree limbs, trunks and root balls, but may include chipped or mulched material so long as it is incorporated into the topsoil stockpile.

Topsoil will not be stripped when soils are moisture-saturated or frozen below the stripping depth.

5. All construction materials for the pipeline will consist of native borrow and subsoil accumulated during pipeline construction. If additional fill or surfacing material is required, it will be obtained from existing permitted or private sources and will be hauled in by trucks over existing access roads.
6. Construction equipment may include chain saws, a brush hog, scraper, maintainer, excavator, dozer, backhoe, hydrovac, welder, trencher, side-boom, and misc. specialty equipment. Construction of the pipeline will take approximately 2-4 weeks.

7. METHODS FOR HANDLING WASTE

A. Cuttings

1. A closed-loop system will be used. Cuttings will be moved through a shaker system on the drill rig that separates drilling fluids from the cuttings. Cuttings will be stored onsite in above-ground storage tanks. Cuttings will be pulled from the storage tanks, mixed with saw dust or similar absorbent material, and disposed of at the Envirotech, Inc. and/or Industrial Ecosystem, Inc. waste disposal facilities.
2. The closed-loop system storage tanks will be adequately sized to ensure confinement of all fluids and will provide sufficient freeboard to prevent uncontrolled releases.
3. A 20-mil liner will be installed under tanks, pumps, ancillary facilities, and truck loading/unloading areas associated with the closed-loop system.

B. Drilling Fluids

1. A closed-loop system will be used. Drilling fluids will be stored onsite in above-ground storage tanks. Upon termination of drilling operations, the drilling fluids will be recycled and transferred to other permitted closed-loop systems or returned to the vendor for reuse, as practical. Residual fluids will be vacuumed from the storage tanks and disposed of at Basin Disposal, Inc. and/or Industrial Ecosystem, Inc. waste disposal facilities.
2. The closed-loop system storage tanks will be adequately sized to ensure confinement of all fluids and will provide sufficient freeboard to prevent uncontrolled releases.
3. The closed-loop system storage tanks will be placed in bermed secondary containment sized to accommodate a minimum of 110 percent of the volume of the largest storage tank.



Appendix D: Standard Deep Anode Bed Procedure

Deep Anode Bed Procedure

I. Anode Bed Procedure

1. Location

The deep anode placement shall be determined and verified in the field.

A 40 X 110 Right-of-way will be requested for placement of Cathodic Bed adjacent to pipeline ROW. Area will be cleared by brush hogging all affected areas will be seeded. Solar panels and rectifier poles will be located near roadway to prevent damage to vegetation during maintenance.

2. Anode Hole Drilling

The anode hole shall be 7 7/8-inches diameter to the depth shown on the Drawings (top 20-feet shall be drilled to accommodate 8" casing). Drilling shall be accomplished with rotary bit. Driller shall use standard techniques (i.e. trough and vacuum truck) to capture and contain the drilling fluids, mud and cuttings at the top of the hole. The driller shall select the type and consistency of drilling fluids to be consistent with soil characteristics (bentonite and water). The drilling rig shall be leveled to provide a round, straight and plumb anode hole. If artesian H₂O flow is encountered depth will be recorded and casing will be installed and cemented. If any levels of H₂S are encountered, drilling will stop to record and analyse and determine mitigation.

3. Casing

Install a 8" diameter casing to a depth of 20-feet.

4. Anode Hole Geological Logs

As the hole is drilled, the driller shall maintain a record describing the depth and type of the geological formations encountered.

5. Anode Hole Resistance Log

Record electric log of the hole using one of the anodes. The anode lead wire shall be manually lowered into hole, with a counter reel, while taking measurements every 5 feet. The anode lead wire shall be marked for a distance equaling or exceeding the maximum anticipated depth of the hole. As the anode is lowered into the hole, measure the resistance by temporarily impressing a minimum of 12-volts DC between the anode and a very well-grounded structure. A volt meter shall be used to perform this test. A recommended 12-volt DC power source is a heavy-duty, lead acid, automobile battery. Lower the anode into the hole and at ten-foot increments, hold in place while the voltage and current output of the DC current source are measured and recorded. This information shall be recorded and submitted.

6. Vent Pipe Installation

The vent pipe (1-inch Allvent to the top of the coke breeze column) shall be installed in the hole with the first anode. One-inch PVC non-perforated pipe will be installed from the top of the coke breeze column to five feet above the top of the hole. The bottom of the vent pipe shall be capped. The top of the vent pipe shall be capped throughout the anode and coke breeze backfill installation procedure to prevent intrusion of foreign material. Drilling mud shall not be allowed to enter in the vent pipe.

7. Anode Installation

The deep anode shall consist of 10 - 2.2" x 84" long high silicon cast iron anodes spaced at 10-foot intervals. The anodes shall be centered in the hole. The anodes shall be installed by lowering them individually into the hole by the lead wire. The final depth shall be recorded with the first

anode in the hole (i.e. the bottom anode) identified as anode number one. The anode lead wires shall not be damaged during handling or lowering into the hole. Under no circumstances shall the anode lead wires be c tamped or pinched around another object while lowering. If the insulation for any anode lead wires are cut, broken, or nicked, the complete anode shall be rejected and shall be removed from the job site.

8. Anode Column Coke Backfill

The coke backfill shall be top loaded. A sufficient amount of backfill shall be used such that the coke breeze column will extend a minimum of 10-feet above the top of the uppermost anode and no closer than 30-feet from the top of the hole. Installation of the coke backfill shall be uniform with no voids around the anodes.

9. Vent Pipe Conditions

The 1-inch diameter internal vent pipe shall terminate with a glued slip-fit fitting then secured with a threaded vented plug. The top end of the vent pipe shall be left open to allow gases from the anode hole to exit.

10. Mud and Cuttings:

Drilling mud, cuttings and other waste shall be disposed of offsite at a licensed disposal facility in a manner which complies with the rules and regulations of the State, City and County.

II. ANODE LEAD JUNCTION BOX

1. Location:

Install anode lead junction box immediately adjacent to the deep anode. Place to allow ready access for testing with the bottom of the box at a minimum height of 3-feet above grade. Box will be kept locked when unattended.

2. Concrete Pad:

Junction box support (post or unistrut) shall be set in a Portland cement concrete anchor. Pour a minimum 4 inch thick by roughly 3-foot square concrete pad around the junction box.

III. HEADER CABLE

1. Installation:

Dig minimum 18-inch deep trench and up to 24-inches deep from the junction box to the power unit pole. Install the DC positive cable in the bottom of the trench. Leave slack in the cable and avoid damage to the cable during installation.

IV. NEGATIVE CABLE AND TEST LEAD

1. Installation:

Dig minimum 18-inch deep trench and up to 24-inches deep from the power unit to the structure. Install the DC negative cable in the bottom of the trench. Leave slack in the cable and avoid damage to the cable during installation, and attach to structure.

2. Method:

Attach negative DC cables to the structure by a mechanical clamp at the location shown on the Drawings.

3. Preparation:

Clean and dry the structure surface to which the negative cable is to be attached. Technician will remove all dirt, coating, oxide and mill scale from the structure surface. Use a solvent to remove oil and grease, if necessary. Clean the surface to bright metal.

NOTE: All cable connections will not be performed without the assistance of a certified/licensed low-voltage technician.

V. PLUG AND ABANDON - DEEP ANODE GROUND BED

1. Anode Hole/Surface Casing:

At the surface of the anode bed the surface casing shall be excavated or hydro-excavated at a depth of 4' below grade. All conduits and wires shall be terminated and removed. The surface casing and vent pipe will be cut down flush at 4' below grade. Anode leads, after terminated, will be removed 20-feet below grade down hole of anode bore. The anode bore shall be back filled with a cement mixture of Portland cement of a class determined by water characteristics testing. The excavation shall then be backfilled to grade with native soil.

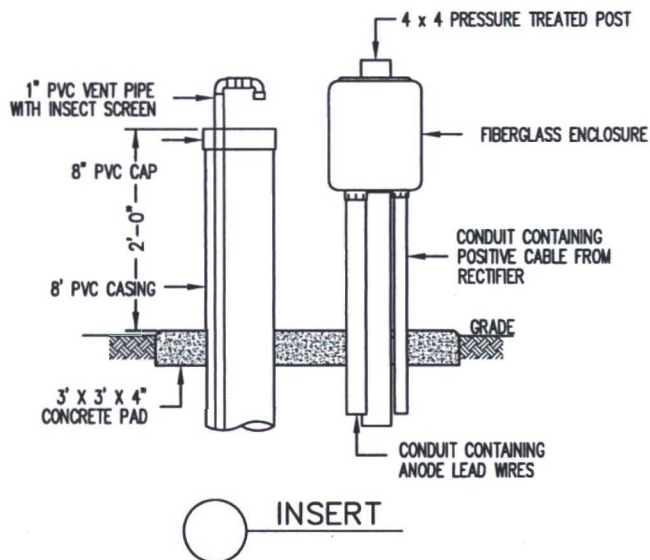
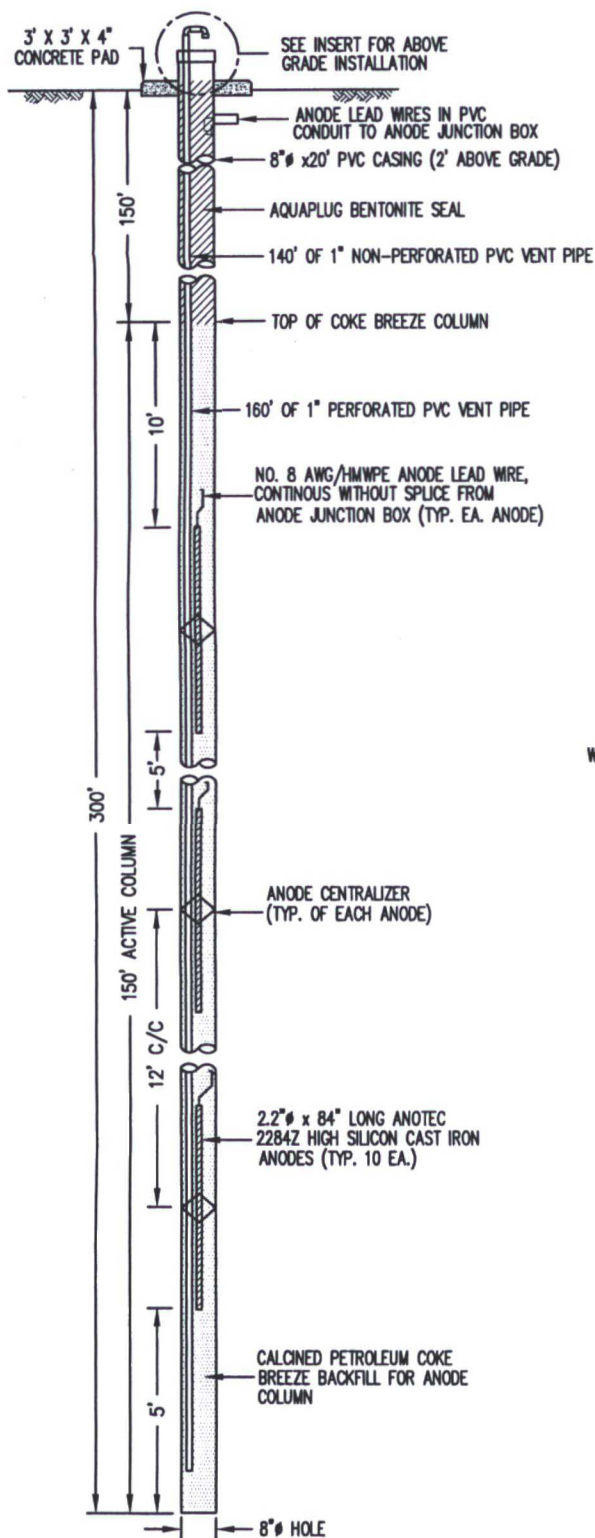
VI. ANODE LEAD JUNCTION BOX

1. Removal:

The anode lead junction box immediately adjacent to the deep anode bed will be removed along with all remaining conduits and wiring. The 4x4 post will be removed along with the concrete pad and backfilled to grade with native soil.

VII. NEGATIVE/POSITIVE CABLE

1. Terminated negative/positive leads will be removed from location after termination of anode bed back to power source.



NOTE: CATHODIC PROTECTION SYSTEM TO BE INSTALLED AT

REVISED		REVISIONS	REV.	CHK.	APP.	DRAWN BY:	ENCANA OIL & GAS (USA) INC. CATHODIC PROTECTION SYSTEM DEEP ANODE GROUND BED DETAILS
NO.	DATE:					DESIGNED BY:	
△						DATE:	
△						SCALE:	
△						JOB NO.	
△						DWG. NO.	

ENCANA OIL & GAS (USA) INC.
NAGEEZI UNIT 406H (FKA K03-2309 02H)

1999' FSL & 1724' FWL
LOCATED IN THE NE/4 SW/4 OF SECTION 3,
T23N, R9W, N.M.P.M.,
SAN JUAN COUNTY, NEW MEXICO

DIRECTIONS

- 1) FROM THE INTERSECTION OF HWY 64 & HWY 550 IN BLOOMFIELD, GO SOUTH ON HWY 550, 36.0 MILES TO C.R. 7800 (ISR 450) NEAR M.P. 115.6 AT THE NEEGEEZI POST OFFICE.
- 2) TURN RIGHT AT THE NAGEEZI POST OFFICE AND GO 3.0 MILES ON C.R. 7800 TO THE FLAGGED ACCESS ON THE LEFT SIDE OF THE ROAD.

WELL FLAG LOCATED AT LAT. 36.254225° N, LONG. 107.779516° W (NAD 83).



JOB No.: ENC364
DATE: 11/09/2016

CCI

CHENAULT CONSULTING INC.

4800 COLLEGE BLVD.
SUITE 201
FARMINGTON, NM 87402
(505)-325-7707

WELLHEAD BLOWOUT CONTROL SYSTEM

encana

Well Name and Number:
Nageezi Unit 406H

