ATTACHMENT TO FORM 3160-3
10 POINT DRILLING PLAN
Orchard Unit 21-7 (F21OU)

1. **OPERATOR:** EnCana Oil & Gas (USA).
WELL NAME: Orchard Unit 21-7 (F21OU)

LOCATION (SHL): Sec 21, T8S, R96W
1706' FNL & 1730' FWL
Mesa County, CO

LOCATION (BHL): Sec 21, T8S, R96W
2612' FNL & 1883' FWL
Mesa County, CO

2. **ESTIMATED TOPS OF GEOLOGICAL MARKERS (MD/TVD)**

Wasatch Fm	SURF' / SURF'
Mesa Verde	2381' / 2323'
Williams Fork Fm	2857' / 2783'
TD	3960' / 3848'
Top of Gas	4063' / 3948

3. **ESTIMATED TOPS OF POSSIBLE WATER, OIL, GAS OR MINERALS**

The estimated depths at which possible water, oil, gas or minerals will be encountered are as follows:

Substance	Formation	Depth (TVD)
Gas	Williams Fork	3848

The surface casing shall be cemented back to surface either during the primary cement job or by remedial cementing. The surface casing is designed to isolate and protect any fresh water zones encountered.

The TD of the well is above the top of gas in the Williams Fork such that no potential oil, gas or minerals are expected to be encountered during the drilling of this well.

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.

4. **OPERATOR'S SPECIFICATIONS FOR PRESSURE CONTROL EQUIPMENT**

a. Minimum working pressure on rams and BOPE will be 3,000 psi.
b. Function test and visual inspection of the BOP will be conducted daily and noted in the IADC Daily Drilling Report.
c. Both high and low pressure tests of the BOPE will be conducted.
d. The Annular BOP will be pressure tested to a minimum of 50% of its rated working pressure.
e. Blind and Pipe Rams/BOP will be tested to a minimum of 100% of rated working pressure (against a test plug).
f. Surface casing will be tested from surface to TD (float collar) at 1,000 psi surface pressure (prior to drilling out the float collar).
g. All other casing will be pressure tested to 0.22 psi/ft or 1,500 psi, whichever is greater, but not to exceed 70% of the internal yield.
h. BOP testing procedures and testing frequency will conform to Onshore Order No. 2.

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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 preventors.
j. The kill line shall be 2" minimum and contain two kill line valves, one of which shall be a check valve.
k. The choke line shall be 3" minimum and contain two choke line valves (3" minimum).
l. The choke and manifold shall contain two adjustable chokes.
m. Hand wheels shall be installed on all ram preventors,
n. Safety valves and wrenches (with subs for all drill string connections) shall be available on the rig floor at all times.
o. Inside BOP or float sub shall also be available on the rig floor at all times.
p. Upper kelly cock valve (with handle) shall be available at all times.

Proposed BOP and Choke Manifold arrangements are attached.

5. PROPOSED CASING AND CEMENTING PROGRAM (Measured Depths)

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 surface casing shall be cemented back to surface either during the primary cement job or by remedial cementing.

Casing	Depth	Hole Size	Size	Weight	Grade	Cement Volume
Conductor	0-40'	+/- 24"	16"	0.25" Wall	X42	+/- 5 yds ready mix (to surface)
Surface	0' – 1000'	12-1/4"	9 5/8"	36.00#	J-55, STC All New	Tail: 540 sxs Class G 15.8 ppg 1.16 ft^3/sx
Production	0' – TD	7 7/8"	5 ½"	17.00#	I-80 LTC New	Tail: 735 sx 13.5 ppg 1.26 ft^3/sx TXI

Casing String				Casing Strength Properties			Minimum Design Factors		
Size	Weight (lb/ft)	Grade	Connection	Collapse (psi)	Burst (psi)	Tensile (1000 lb)	Collapse	Burst	Tension
9-5/8"	36	J/K-55	STC	2020	3520	423	1.00	1.10	1.50
5-1/2"	17.00	I-80	LTC	6290	7740	348	1.00	1.10	1.10

Casing Design Considerations/Safety Factors:

A. Surface casing @ 1000' MD / 1000' TVD; 9-5/8" 36# J-55
Purpose: Protect shallow fresh water and contain MASP to TD
Maximum anticipated mud weight at surface casing depth: = 9.0 ppg
Maximum anticipated mud weight at TD: = 9.5 ppg
Maximum anticipated equivalent formation pressure at TD = 7.7 ppg

Collapse Design:
Evacuated 9-5/8" 36# J-55 casing with 9.0 ppg drilling fluid density:
Load = 9.0*0.052*1000' = 468 psig
Rating = = 2020

S.F. = **4.3**

Burst Design: Assume kick with partially evacuated hole and an influx gradient of 0.22 psi/ft.

9-5/8" 36# J-55	
MASP (Load) = 3848'*(0.40-0.22)psi/ft	= 692 psig
Rating:	= 3520 psig
S.F.	**= 4.9**

Tensile Design: Designed on Air Weight * Buoyancy + overpull margin

9-5/8" 36# J-55	
Rating:	= 423,000 lbs
Load: 1000'*36#*0.862+100,000 lbs (OPM)	= 131,000 lbs
S.F.	**= 3.2**

B. Production Casing @ 3960' MD/ 3848' TVD; 5-1/2", 17.0#, I-80, LTC

Maximum Anticipated Mud Weight at Total Depth	**= 9.5 ppg**
Maximum Anticipated Equivalent Formation Pressure at Total Depth	**= 7.7 ppg**
Maximum Anticipated Injection Pressure	**=3200 psig**

Collapse Design: Designed on evacuated casing properties with 9.5 ppg drilling fluid density with no internal back-up.

5-1/2" 17.0# I-80 from 0' to 3960'	
Load = 9.5*0.052*3960'	= 1956 psig
Rating	= 6290 psig
S.F.	**= 3.2**

Burst Design: Assume maximum surface shut-in pressure during production, and maximum surface treating pressure during fracture stimulation operations.

Design Consideration: Maximum Surface Injection Pressure for MIT	
5-1/2" 17.0# I-80 from 0' to 3960'	
MAIP:	= 3200 psig
Rating:	= 7740 psig
S.F.	**= 2.4**

Tensile Design: Designed on Air Weight * Buoyancy + overpull margin

Design Point #1 – 4-1/2" 11.6# I-80 at surface	
Load = (3960'*17.0 lb/ft*0.854)+ 100,000 lbs (OPM)	= 157,491 lbs
Rating	= 348,000 lbs
S.F.	**= 2.2**

***Cementing Volume Design Clarification:**

Surface Casing @ 1000':

*Slurry designed for full coverage with 100% excess.

Production Casing

*Slurry designed to surface. Volume assumes 7-7/8" hole to TD plus 30%.

*If open hole logs are run, cement volumes will be determined from the caliper plus 10% excess.

6. DIRECTIONAL DRILLING PROGRAM

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The proposed well will be directionally drilled with an slant well type configuration to the bottom hole location at 2612' FNL & 1883' FWL of Section 21, T8S, R96W. Directional plans are attached.

7. PROPOSED DRILLING FLUIDS PROGRAM

DEPTH	MUD TYPE	DENSITY lbs/gal	VISCOSTIY (sec/qt)	FLUID LOSS (cc)
0' – 500'	Fresh Water Gel	8.8 - 9.0	28 – 35	NC
500' – TD	LSND	8.8 – 10.5	35 – 60	4 - 15 cc

Mud flow and volume will be monitored both visually and with electronic pit volume totalizers.

8. TESTING, CORING AND LOGGING

a. Drill Stem Testing – None anticipated
b. Coring – None.
c. Mud Logging – Optional
d. Logging – See Below:

Open Hole	Logging Interval
PEX	AIT-GR from TD –Surface Casing.
Sidewall Cores	Williams Fork
(Both logs optional-at operators' discretion)	
Neutron/Litho-Density	From TD to surface casing.

Cased Hole	
CBL/CCL/GR/VDL	As needed for perforating control
RST	In lieu of PEX.

9. ABNORMAL PRESSURES OR TEMPERATURES; POTENTIAL HAZARDS

Lost circulation has been experienced in offset wells. Barite and a selection of 'sized' lost circulation materials will be kept on location during drilling operations.

The anticipated bottom hole pressure is 3848'*0.40 psi/ft =	1539 psi
The maximum anticipated surface pressure is 3848'*(0.40 – 0.22)psi/ft =	692 psi

10. ANTICIPATED STARTING DATE AND DURATION OF OPERATIONS

The SHL is Federal and the BHL is Federal. The location will be constructed such that a standard open pit mud system is used. The desired target spud date is currently upon approval. However, the spud date could possibly be delayed to fit rig schedules.

The drilling operation is anticipated to require ± 5 days on this well. Completion operations are anticipated to after finishing the drilling portion of this well. Completion operations require approximately 30 days.

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ATTACHMENT A