

EnCana Oil & Gas (USA) Inc.
Drilling Program

CB Fed DH08-29 A28 6100

Surface Location: NENE Sec. 28 T6S R100W
 Bottom Hole Location: Tract 46 SENW Sec. 29 T6S R100W
 Surface County: Garfield

1. Estimated Tops of Important Geologic Markers

FORMATION	ESTIMATED TOP – TVD	Lithology	Oil/Gas/Water
Green River	Surface	SS & Shale	Possible Water
Top of Parachute Creek	n/a	Sand	Possible Water
Mahogany Bench Top	n/a	Oil Shale	Oil Shale
Base B Groove	n/a	Sand	Possible Water
Wasatch	20	SS & Shale	No Potential Gas
Williams Fork	1,058	SS & Shale	No Potential Gas
Rollins	3,203	SS & Shale	No Potential Gas
Top of Continuous Gas	3,763	SS & Shale	Top of Continuous Gas
Cozzette	4,641	SS & Shale	Potential Gas
Corcoran	6,443	SS & Shale	Potential Gas
Mancos A	4,641	SS & Shale	Potential Gas
Permit TD	6,583	13955	Est. MD

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 set at 1800' and cemented back to surface either during the primary cement job or by remedial cementing. Cementing to surface will isolate all potential fresh water zones. Production casing is designed to have cement lifted at least 500' above the top of gas.

2. Proposed Casing and Cementing Program

A. Casing Program: All New

Hole Size	Casing Size	Depth Set MD	Wt./Ft., Grade, & Joint	Cement
30	20	120	Line Pipe	To surface w/Class 3
13.5	10.75	1800	40.50#, J55, ST&C	Cemented to surface w/ Lead: 291 sx TXI (12.5 ppg) Tail: 154 sx TXI (14 ppg)
9.875	7.625	5972	29.7#, P-110, LTC	Cemented to 500' above TOG w/ Tail: 289 sx Class A (13.5 ppg)
6.5	4-1/2 x 5-1/2 Tapered String (x-over at 5922')	13955	4-1/2: 13.5#, P-110, BTC 5-1/2: 20#, P-110, BTC	Cemented into 200' into Intermediate w/ Tail: 620 sx Class G (15 ppg)

Yields: Surface Lead	TXI	Yield = 2.11 ft ³ /sx (12.5 ppg)
Surface Tail	TXI	Yield = 1.54 ft ³ /sx (14 ppg)
Intermediate	Class A	Yield = 2.5 ft ³ /sx (13.5 ppg)
Longstring	Class G	Yield = 1.98 ft ³ /sx (15 ppg)

-2500 psi compressive in 72 hours

Actual cement volumes will be determined by caliper log. If caliper logs are not available then surface casing cement volumes will be calculated at 30% excess and intermediate and production casing cement volumes will be calculated at 25% excess.

-Centralizers will be installed per approved centralizer program from cement vendor.

Casing String			
Size	Weight (lb/ft)	Grade	Connection
10-3/4"	40.5	J/K-55	STC
7-5/8"	29.7	P-110	LTC
5-1/2"	20	P-110	BTC
4-1/2"	13.5	P-110	BTC

Casing Strength Properties			
Size	Collapse (psi)	Burst (psi)	Tensile (1000 lb)
10-3/4"	1580	3130	420
7-5/8"	5350	9460	769
5-1/2"	11100	12460	641
4-1/2"	10690	12420	422

Minimum Design Factors			
Size	Collapse	Burst	Tension
10-3/4"	1.10	1.10	1.80
7-5/8"	1.10	1.10	1.80
5-1/2"	1.10	1.10	1.80
4-1/2"	1.10	1.10	1.80

Casing Design Considerations/Safety Factors:

A.	Surface casing @ 1800' MD; 10-3/4" 40.5# J/K-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 intermediate TD:	11.3 ppg
	Maximum anticipated equivalent formation pressure at TD:	11.0 ppg
	TVD at production casing point:	5,972 ft
	Surface setting depth	1,800 ft
	Max pore pressure	.45 psi/ft psi/ft
	<u>Collapse Design:</u>	
	Evacuated 10-3/4" 40.5# J/K-55 casing with 9 ppg drilling fluid density:	
	Load = $9 * 0.052 * 1800'$	842 psig
	Rating	1,580 psig
	S.F.	1.9
	<u>Burst Design:</u>	
	Assume kick with partially evacuated hole and influx gradient of 0.22 psi/ft (Calculations assumes shoe will not break down)	
	MASP (Load) = $5972 * (0.45-0.22)$ psi/ft	1,374 psig
	Rating	3,130 psig
	S.F.	2.3
	<u>Tensile Design:</u>	
	10-3/4" 40.5# J/K-55: Designed on Air Weight * Buoyancy + overpull margin	
	Load = $1800' 40.5# * 0.862 + 100,000$ lbs (OPM)	162,840 lbs
	Rating:	420,000 lbs
	S.F.	2.6
	Overpull with S.F. = 420000 lbs / 1.8 - 62840 lbs	170,494 lbs

B.	Intermediate Casing @ 5972' MD; 7-5/8" 29.7# P-110	
	Maximum Anticipated Mud Weight at Total Depth	11.30 ppg
	Maximum Anticipated Equivalent Formation Pressure at Total Depth	11.0 ppg
	Maximum Surface Treating Pressure for Fracture Operations	10,000
	Assumed Gas Gradient for Production Operations	.115 psi/ft
	<u>Collapse Design:</u>	
	Designed on evacuated casing properties with 11.3 ppg drilling fluid density with no internal back-up	
	Load = $11.3 * 0.052 * 5972'$	3,509 psig
	Rating	5,350 psig
	S.F.	1.5
	<u>Burst Design:</u>	

Maximum Surface Shut-In Pressure	
MASSIP (Load) = 5972' * (0.45-0.115) psi/ft	2,001 psig
Rating	12,420 psig
S.F.	6.2

Tensile Design:

Designed on Air Weight * Buoyancy	
Load = (5972 * 20 lb/ft * 0.832) + 100,000 lbs (OPM)	167,078 lbs
Rating	641,000 lbs
S.F.	3.8
Overpull with SF = 641000 lbs/1.8 - 67078 lbs	515,650 lbs

C. Production Casing @ 13955' MD; 5-1/2" 20# P-110 x 4-1/2" 13.5 P-110

Maximum Anticipated Mud Weight at Total Depth	11.30 ppg
Maximum Anticipated Equivalent Formation Pressure at Total Depth	11.0 ppg
TVD	6,934
X-over Location	5,922
Maximum Surface Treating Pressure for Fracture Operations	10,000
Assumed Gas Gradient for Production Operations	.115 psi/ft

Collapse Design:

Designed on evacuated casing properties with 11.3 ppg drilling fluid density with no internal back-up	
Load = 11.3 * 0.052 * 6933.7'	4,074 psig
Rating	10,690 psig
S.F.	2.6

Burst Design:

Design Consideration #1: Maximum Surface Shut-In Pressure

MASSIP (Load) = 0.45' * (6933.7-0.115) psi/ft	3,120 psig
Rating	12,420 psig
S.F.	4.0

Design Consideration #2: Maximum Surface Treating Pressure During Frac Operations

MATP:	10,000 psig
Rating	12,420 psig
S.F.	1.1

Tensile Design:

Designed on Air Weight * Buoyancy	
Load = (5922 * 20 lb/ft + 8033 * 13.5lb/ft) * 0.832 + 100,000 lbs (OPM)	288,769 lbs
Rating	641,000 lbs
S.F.	2.2
Overpull with SF = 641000 lbs/ - 188769 lbs	393,959 lbs

***Cementing Volume Design Clarification:**

Surface Casing @ 1800'

*Slurry designed for full coverage with 50% excess.

Intermediate Casing

*Slurry designed to for 500' above top of gas. Volume assumes 9-7/8" hole to TD plus 25%.

Production Casing

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

*Slurry designed to for 200' into intermediate. Volume assumes 6-1/2" hole to TD plus 25%.

3. Pressure Control Equipment (10,000 psi Schematic Attached)

The BOP and choke manifold system will have a minimum working pressure of 10,000 psi with the exception of the annular preventer, which will have a minimum working pressure of 5,000 psi. BOP's and choke manifold will be installed and pressure tested before drilling out under surface casing (subsequent pressure test will be performed whenever seals are broken), and then will be checked daily as to mechanical operating condition. BOP's will be pressure tested at least once every 30 days. Ram type preventers and related pressure control equipment will be pressure tested at rated working pressure of the stack assembly if a test plug is used. If a plug is not used, the stack assembly will be tested to the rated working pressure of the stack assembly or to 70% of the minimum internal yield on the casing, whichever is less. Annular type preventers will be pressure tested to 50% of their rated working pressure. All casing strings will be pressure tested to 0.22 psi/ft or 1500 psi, whichever is greater, not to exceed 70% of internal yield.

A PVT, Stroke Counter, and flow sensor will be installed to check for flow and monitor pit volume.

4. Mud Program

Interval	Mud Weight	Fluid Loss	Viscosity	Mud Type
0' – 2000'	8.5 - 9.5	NC	20 – 80	Spud Mud
3000' – 6000'	8.5 – 10.5	6 - NC	30 – 100	Gel/ Polymer
6000' – TD	8.5 – 11.5	4 - 10	30 – 100	Gel / Polymer

Sufficient mud material(s) to maintain mud properties, control lost circulation and contain a blowout will be available at the well site during drilling operations.

5. Auxiliary Equipment

1. Upper Kelly cock (lower Kelly cock – to be available on rig floor)
2. Inside BOP or stab-in valve (available on rig floor)
3. Mud Monitoring will be visually observed.

6. Evaluation Program

Logs: GR TD to 500' from Surface

DST's: None

Cores: Possible sidewall cores in Williams Fork/Cameo

The proposed Evaluation Program may change at the discretion of the well-site geologist.

Completion procedures will be determined after reviewing data. Whether the well is completed as a dry hole or as a producer, the Well Completion Report and Log will be submitted not later than thirty (30) days after the completion of the well or after completion of operations being performed.

7. Abnormal Conditions

1. Pressures: Cameo pressures are .4 psi/ft gradient. William Fork is normal to under pressured at .3 psi/ft gradient
2. Temperatures: No abnormal temperatures are anticipated.
3. H₂S: No H₂S has been encountered in or known to exist in the general area.
4. Estimated bottom-hole pressure: 4,200 psi.

8. Anticipated Starting Dates/ EnCana Oil & Gas (USA) Contact

- A. Anticipated Starting Dates: September 1, 2010
 Anticipated Commencement Date: 30 days from start date
 Drilling Days: Approximately 25 days
 Completion Days: Approximately 25 days

- B. Please contact Tony Kohake at phone no: 720-876-5281
 With any questions or concerns regarding this drilling program.

Cell Phone: 303-483-5575

