

Aurora Power Resources, Inc.
CC Karval 1
1,980' FNL 1,980' FEL (SW/4 NE/4)
Sec. 23 T17S R53W
Lincoln County, Colorado
Surface: Fee
Mineral Lease: Fee

DRILLING PROGRAM

Please contact Mr. Scott Pfoff at 281-495-9957 and/or Dave Banko, Consulting Engineer, 303-489-7100 (mobile), if there are any questions or concerns regarding this Drilling Program.

SURFACE ELEVATION – 4,457' (Un-graded ground elevation)

SURFACE FORMATION – Lower Pierre Shale – Fresh water possible

ESTIMATED FORMATION TOPS

Formation	TVD
Dakota	1,620'
Marmaton	4,830'
Cherokee	5,000'
Atoka	5,340'
Morrow	5,750'
Keyes Lime	5,950'
Mississippian	5,987'
Mississippian Valley	6,350'
Total Depth	6,700'

All fresh water and prospectively valuable minerals encountered during drilling will be recorded by depth and protected.

CASING/CEMENT PROGRAM

Total Depth	Hole Diameter	Casing Diameter	Casing Weight and Grade	Cement
0 – 30'	24"	20"	Conductor Casing	Cement with ± 75 sxs redi-mix
0' – 400'	12-1/4"	8-5/8"	J-55 24# ST&C New	To surface (± 250 sxs Premium)*
0' – T.D. (+/-6,700')	7-7/8"	5-1/2"	J-55 15.5# LT&C	TD to 4,200' (± 330 sxs 50/50 Poz C)**

* Cement volume calculated with 100% excess.

** Cement volume calculated with 30% excess.

Casing Design Criteria:

Size	Grade	Weight (lbs/ft)	Thread/Coupling	Tension/Joint Strength	Burst	Collapse
8-5/8"	J-55	24	ST&C	244,000	2,950	1,370
5-1/2"	J-55	15.5	LT&C	202,000	4,810	4,040

Cement Yields:

Surface:	Premium yield = 1.34 ft ³ /sx (14.8 ppg)
Production:	50/50 Poz C yield = 1.52 ft ³ /sx (13.8 ppg)
2nd Stage for Dakota:	A second stage to cover the Dakota formation may or may not be used subject to mudlog and e-log shows. The 2 nd stage cement program, if used, will be designed based on actual shows after the well has been logged. COGCC will be contacted if this is added to the Drilling Program.

PRESSURE CONTROL

- See attached blowout preventer diagram.

BOPs and choke manifold will be installed and pressure tested before drilling out of surface casing (subsequent pressure test will be performed whenever pressure seals are broken), and then will be checked daily as to mechanical operating condition. BOPs will be pressure tested at least once every 30 days. Ram type preventers and related pressure control equipment will be pressure tested to related 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 70% of the minimum internal yield of the casing, whichever is less. Annular type preventers will be pressure tested to 50% of their working pressure. All casing strings will be pressure tested to 0.22 psi/ft or 1,500 psi, whichever is greater, not to exceed 70% of the internal yield.

A manual locking device (i.e. hand wheels) or automatic locking devices shall be installed on the BOP stack. Remote controls capable of both opening and closing all preventers shall be readily accessible to the driller.

The BOP equipment will be tested after any repairs to the equipment. Pipe rams, blind rams and annular preventer will be activated on each trip and weekly BOP drills will be conducted with each crew. All tests, maintenance, and BOP drills will be documented on rig “tower sheets”.

A remote accumulator may or may not be used subject to the drilling rig selection.

MUD PROGRAM (MD)

0'	-	400'	Water Based Mud with Gel as required M.W.: 8.4 – 9.0 ppg Visc.: 30 – 45 Ph: 8 WL: NC
400'	-	1,500'	Water Based Mud with Gel as required M.W.: 8.4 – 9.0 ppg Visc.: 30 – 45 Ph: 8 WL: NC
1,500'	-	T.D	Low Solids, non-dispersed M.W.: 8.7 – 9.3 ppg Visc.: 38 - 65 WL: 15 LCM: As needed Solids: <8% YP: 13-20

Sufficient mud materials to maintain mud properties, control lost circulation and to contain a “kick” will be available on location.

AUXILIARY EQUIPMENT

- A. Upper Kelly cock; lower Kelly cock will be installed while drilling and tested at the time of the BOP test.
- B. Inside BOP or stabbing valve with handle (available on rig floor).
- C. Safety valve(s) and subs to fit all string connections in use.
- D. Mud monitoring will be with visual observation. A pit level indicator may be used if the drilling rig is appropriately equipped.

LOGGING, CORING TESTING PROGRAM

- A. Logging: Triple Combo: Gamma Ray, Density Neutron, Induction, Caliper
- B. Coring: None planned -Sidewall cores may be taken on shows of interest.
- C. Testing: None planned – Drill Stem tests may be run on shows of interest.

ABNORMAL CONDITIONS

- A. Pressures: No abnormal conditions are anticipated.
Anticipated BHP gradient: 0.44 psi/ft or less
- B. Temperatures: No abnormal conditions are anticipated.
- C. H₂S: None Anticipated.
- D. Estimated bottomhole pressure: 2,948 psi

ANTICIPATED START DATE

June 24, 2013

COMPLETION

The location pad will be sufficient size to accommodate all completion equipment activities and equipment. A string of 2-7/8", 6.5#, J-55, EUE 8rnd will be run as production tubing, or a string of 2-7/8" 6.5# J-55 or N-80 EUE 8rd will be run as a pumping string. A Sundry Notice (SN) will be submitted with a revised completion program if warranted.

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SURFACE CASING AND CENTRALIZER DESIGN

Proposed Total Depth: 6,700 '
 Proposed Depth of Surface Casing: 400 '
 Estimated Pressure Gradient: 0.44 psi/ft
 Bottom Hole Pressure at 6,700 '
 0.44 psi/ft x 6,700 ' = 2,948 psi
 Hydrostatic Head of gas/oil mud: 0.22 psi/ft
 0.22 psi/ft x 6,700 ' = 1,474 psi

Maximum Design Surface Pressure

Bottom Hole Pressure – Hydrostatic Head =
 (0.44 psi/ft x 6,700 ') – (0.22 psi/ft x 6,700 ') =
 2,948 psi – 1,474 psi = 1,474 psi

Casing Strengths 8-5/8" J-55 24# ST&C

Wt.	Tension (lbs)	Burst (psi)	Collapse (psi)
24 #	244,000	2,950	1,370

Safety Factors

Tension (Dry): 1.8 Burst: 1.0 Collapse: 1.125

Tension (Dry): 24 # / ft x 400 ' = 9,600 #
 Safety Factor = $\frac{244,000}{9,600} = 25.42$ ok

Burst: Safety Factor = $\frac{2,950 \text{ psi}}{1,474 \text{ psi}} = 2.00$ ok

Collapse: Hydrostatic = 0.052 x 9.0 ppg x 400 ' = 187 psi
 Safety Factor = $\frac{1,370 \text{ psi}}{187 \text{ psi}} = 7.32$ ok

Use 400 ' 8-5/8" J-55 24# ST&C

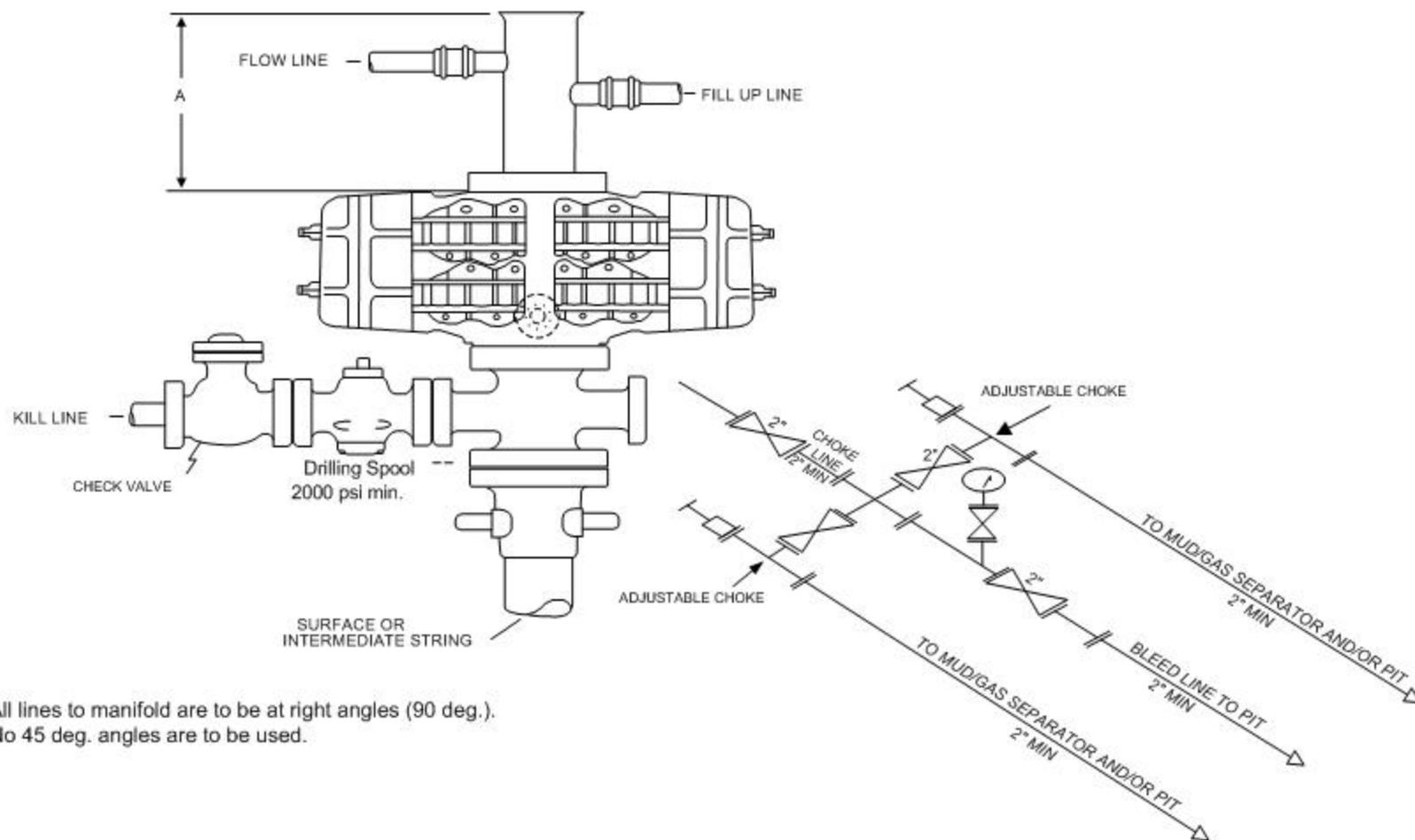
Use 2,000 psi minimum casinghead and BOP's

Centralizers

5 Total
 1 near surface at 160'
 3 -1 each at middle of bottom joint, second joint, third joint
 1 -1 each at every other joint ±80' spacing
 Total centralized ± 360 ' (40 ' – 400 ')

Note that field experience indicates that additional centralizers greatly increase the chance of "sticking" the surface casing prior to reaching surface casing total depth.

ANNULAR PREVENTER MAY BE SUBSTITUTED FOR DOUBLE GATE PREVENTERS



All lines to manifold are to be at right angles (90 deg.).
No 45 deg. angles are to be used.

2M CHOKE MANIFOLD EQUIPMENT – CONFIGURATION MAY VARY

BLOWOUT PREVENTER

2,000 psi minimum