ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Office of Oil and Gas Resource Management
One Natural Resources Way Springfield, Illinois 62702-1271

HIGH VOLUME HORIZONTAL HYDRAULIC FRACTURING PERMIT APPLICATION HVHHF-10

References to "1-xx" or "§1-xx" are to the Hydraulic Fracturing Regulatory Act., 225 ILCS 732/1-1 et seq. References to "240.xxx" and "245.xxx" are to 62 Ill. Admin. Code 240 and 245, respectively

Attachment: CasingandCementingPlan

Please save attachment and use the file name above.

Casing and Cementing Plan §1-35(b)(14); 245.210(a)(14), 245.530, 245.560, 245.570.

NOTE: review 245.530, 245.560 and 245.570, surface casing requirements, intermediate casing requirements, and production casing requirements.

Describe the casing and cementing practices to be employed, including, at minimum,

(a) The casing and cementing practices used
(b) The size of each string of pipe
(c) The starting point
(d) The depth to which each string is to be set, and
(e) The extent to which each string is cemented
(f) If any part of the well or well site is in an area identified by the U.S. Geological Service as having a 2% or greater probability of exceedance in 50 years of peak ground acceleration of 0.4 standard gravity or more, identify measures you will take to protect the components in this plan against earthquakes of M4.5 or more.

WOOLSEY OPERATING COMPANY, LLC
125 NORTH MARKET, SUITE 1000, WICHITA, KANSAS 67202-1775
(316) -267-4379 FAX (316) 267-4383

Woolsey Operating Company, LLC
Woodrow #1H-310408-193
White County, Illinois
High Volume Horizontal Hydraulic Fracturing Permit Application
HVHHF-10: Casing & Cementing Plan

Surface Casing:

A 17 ½" hole will be drilled to +/-800' or such depth to be 100' below the base of the deepest fresh water. The hole will be conditioned prior to running casing. 13 3/8", 54.5#/ft. J-55 grade steel casing will be set to bottom using approved centralizers at the bottom of the string and through the fresh water zone(s) and every 4th joint to the last joint. The hole will then be circulated and a pre-flush pumped ahead of the cement slurry consisting of 775 sacks of Class A Cement, 500# of Calcium Chloride, 3 sacks of Flake. Cement will be circulated to surface with an estimated 65% excess. No operations will be conducted for a minimum of 8 hrs. to allow for the cement to cure. A mechanical integrity test will be run in accordance with 245.540(b) prior to drilling ahead. Cementing activities will conform to Section 245.520 including a compressive strength test.

7" Frac String/Intermediate Casing/Production Casing:

A 9 7/8" hole will be drilled from the base of surface casing to a point where the wellbore is at or near 90°. This is estimated to be 5,800' MD / 5,280' TVD. At that point the well will be conditioned in preparation for running casing. 7", 26#/ft. P-110 grade casing will be run to TD using approved centralizers from the base of the verticle portion of the hole (KOP) to base of surface casing on every 4th joint. This casing will be cemented to the surface and thus, fulfills the requirement of intermediate casing and will serve as both the frac and production string casing. During different phases of the drilling, completion and production process, this casing will be used as intermediate casing, frac string and production casing. The hole will again be conditioned and a pre-flush spacer pumped ahead of the cement slurry. Due to the depth there will be two different slurry's pumped. The lead will be 65-35-10 Blend – 11.4 to 11.6 ppg with a yield of 2.5 ft^3 / sack. The tail slurry will be ESC 10-10 L.F.L Blend – 14.6 to 14.8 ppg "Schwartz Class A Equivalent" with a yield of 1.6 $ft.^3$ / sack. The tail slurry will be raised to a depth of 2,900' or 600' above the shallowest hydrocarbon producing zone. The cement will be brought to surface. After allowing the cement to set a temperature survey will be conducted to verify cement placement. Following this the casing will be

tested as a production string in accordance with 245.540(c). Cementing activities will conform to Section 245.520 including a compressive strength test.

4 ½" Liner (also to be used as production casing): A 6 1/8" hole will be drilled from the 7" casing shoe to RTD (10,580' MD). At RTD the hole will be conditioned in preparation for running casing. 4 ½", 11.6 #/ft N-80 grade casing will be run to TD with rigid solid turbulizing centralizers spaced along the lateral portion on the hole. The casing will be secured into the cemented 7" intermediate casing with a liner hanger assembly positioned approximately 150' above the 7" shoe (5,550'MD). The hole will once again be circulated and conditioned and followed by a flush and cement slurry consisting of 550 sacks of Class H 3% KCL L.F.L with Gilsonite and 2.5 sacks of Flake. Prior to HVHHF operations the liner will be tested tested as a production string in accordance with 245.540(c). Cementing activities will conform to Section 245.520 including a compressive strength test.