

Appendix 1

Industry Survey of Exploration and Development in the Valle Vidal Unit, Carson National Forest, Colfax County, New Mexico

The Carson National Forest (NFS) has requested from New Mexico Tech an estimation of the *Reasonable Foreseeable Development* (RFD) for the eastern Valle Vidal Unit, Colfax County, New Mexico. The study begins with an effective date of January 1, 2005 with a duration of 20 years. The RFD characterizes potential oil and gas resources, describes options for subsurface development needed to access and drain reservoirs, and estimates the probable surface disturbance that would result from subsurface development. The final RFD will be used to support an environmental analysis through an Environmental Impact Statement (EIS) that will lead to a leasing decision and amend the Carson National Forest's Forest Plan. Industry's participation is solicited to better develop a plan that is mutually beneficial to all concerned.

Description of study area

The eastern Valle Vidal Unit is located approximately 24 miles northwest of Cimarron, New Mexico and 17 miles east of Costilla, New Mexico in the Sangre de Cristo Mountains on Forest System Road 1950. The area of study encompasses 40,000 acres within the Forest Service boundary east of a linear geologic feature (an igneous dike) called the Rock Wall. The area falls within the geologic boundaries of the Raton Basin, a region of current coalbed methane (CBM) development activity.

Summary of current management and oil and gas development of the Valle Vidal Unit

Prior to 1999, there was no commercial oil or gas production from the New Mexico part of the Raton Basin. From 1999 to May, 2003 some 256 wells have been drilled that produce CBM at the Vermejo Park Ranch in Colfax County, New Mexico. The Vermejo Park Ranch is adjacent to the northern and eastern boundary of the Valle Vidal Unit. Currently there is no oil or gas production from the Valle Vidal Unit. In addition, there is

no infrastructure (pipelines, electric power) other than access roads to support production. Historically, exploration there has been limited to drilling to evaluate the coal and water resources. The federal oil and gas (including CBM) mineral estate encompassed by the Valle Vidal Unit is not currently leased. Recent adjacent coalbed methane development coupled with industry requests for leases has prompted the Carson National Forest to consider amending the Forest Plan to include oil and gas development.

Development potential base assumptions

The following list of general constraints is provided as a baseline for answering the following questions.

- There is a “shallow” (generally less than 2000 feet depth) petroleum system play that yields coalbed methane from coal and sandstone beds in the Raton and Vermejo Formations in the Raton Basin. Much or all of the RFD study lies within a moderate to high probability area for production from this system. Exploration and production activity associated with this play will dominate the RFD scenario.
- There is a “mid-depth” (generally between 2000 feet and 8000 feet depth) petroleum system play that could yield oil or natural gas from Mesozoic sandstone and shale formations ranging from the Trinidad Sandstone to the Morrison Formation. There has been no commercial production to date from this system, but the number and quality of oil and gas shows from these formations suggests that the play would be an attractive target for future exploration, conducted through drilling of wildcat wells. The RFD scenario will consider a limited number of such wells.
- There is potential for a “deep” (generally greater than 8000 feet depth) play in Paleozoic rocks that may cause seismic exploration activity to be conducted with the possibility of one or more exploratory wells.

Confidentiality Statement

Information gathered in this survey to be used solely by New Mexico Tech for the purposes of the RFD and the identity of the person or company responding to the survey will not be disclosed to or used by any other party.

Survey

Please answer each question below by circling your choice. Please feel free to attach a narrative answer or further discussion on a separate sheet.

Question 1: Do you agree with the base assumptions?

YES

NO (important to attach a narrative explanation).

Question 2: Do you currently operate CBM wells in the Raton Basin?

YES

NO

Question 3: Do you currently operate CBM wells in other basins but not Raton Basin?

YES

NO

Question 4: Current CBM well spacing in the Raton Basin is 160 acres per well. Considering the 20-year timeframe of the RFD, do you anticipate an increase in well density to 80 acre spacing?

YES

NO

Question 5: Current CBM wells in the Raton Basin are vertical wells. Do you anticipate horizontal drilling becoming a viable option for such shallow reserves in the coming 20 years?

YES

NO

Question 6: Noise and exhaust emissions from production and transportation equipment could be a critical consideration for allowing/denying development. On the Vermejo Park Ranch, buried electric power is used to run pumpjacks, compressors, and other motors. Would you consider this to be an acceptable alternative to lease-gas powered equipment if necessary?

YES

NO

Question 7: What gas compression option would you prefer for this type of production?

A) Wellhead

B) Centralized

Question 8: What water disposal options would you prefer for produced water less than 2000 ppm total dissolved solids?

A) Surface disposal: to settling pits, then to natural drainages

B) Subsurface injection into deep saline aquifers

C) Trucking (at minimum 30 miles) to off-site approved disposal facilities

Question 9: If productive, mid-depth Mesozoic targets will most likely yield gas with producing wells spaced 320 acres per well.

YES

NO

Question 10: Seismic exploration methods in the area will likely be:

A) 2-D

B) 3-D

Probable spacing between lines/cross-lines: _____

We would appreciate any further comments or suggestions pertaining to future development plans.

Name: _____

Company: _____

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