

November 16, 2013  
Sent via email: dherrell@blm.gov

Thomas W. Engler, Ph.D, P.E. and Martha Cather, New Mexico Tech

Re: Response to comments on the DEIS for the Ochoa Mine Project

The Bureau of Land Management (BLM) opened for public comment the Ochoa Mine Project Draft Environmental Impact Statement on August 9<sup>th</sup>, 2013. In response to the draft statement, several oil companies indicated shortcomings and misinterpretations in the reasonable foreseeable development (RFD). Since New Mexico Tech originally drafted the RFD, it is only prudent and reasonable to review the comments and provide a response to the BLM to the questions posed. This document is to address those concerns.

One of the questions was with regards to the timing of the RFD. The RFD final report was submitted to the BLM in May of 2012. Within the report, the ending date for all production was December 2010; i.e., the end of the 2010 calendar year. This date was chosen because all reporting was based on annual numbers and thus 2010 was the last full year of production available at the time.

As a result of this cutoff date, the major criticism of the RFD was the lack of capturing the dramatic growth in development since 2010. Most of this recent growth was in the Bone Spring/Avalon play and thus this play was investigated to assess the level of activity. Figure 1 illustrates the cumulative completions of the Bone Spring from January 2011 through May of 2013. A total of 741 new completions have occurred over the 2.5 year time frame, of which 82% were horizontal.

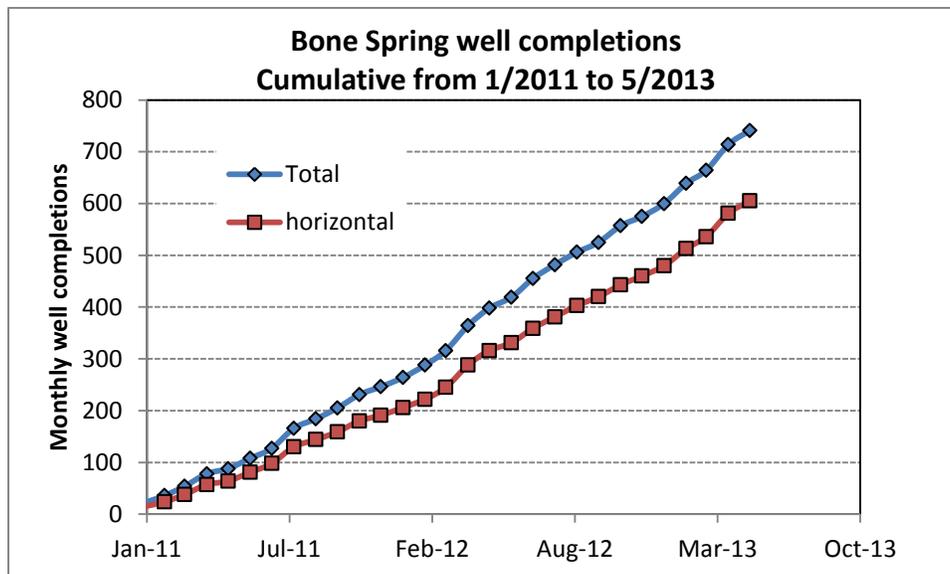


Figure 1. Cumulative monthly well completions for the Bone Spring/Avalon play. (Source I.H.S. Energy)

A map view of the wells referred to in Figure 1 is shown in Figure 2. Also included in the figure are the boundaries delineating the areas of potential recommended in the RFD. Note that 60% of the new wells reside within the high potential boundary, with 74% in the high, medium and low potential regions.

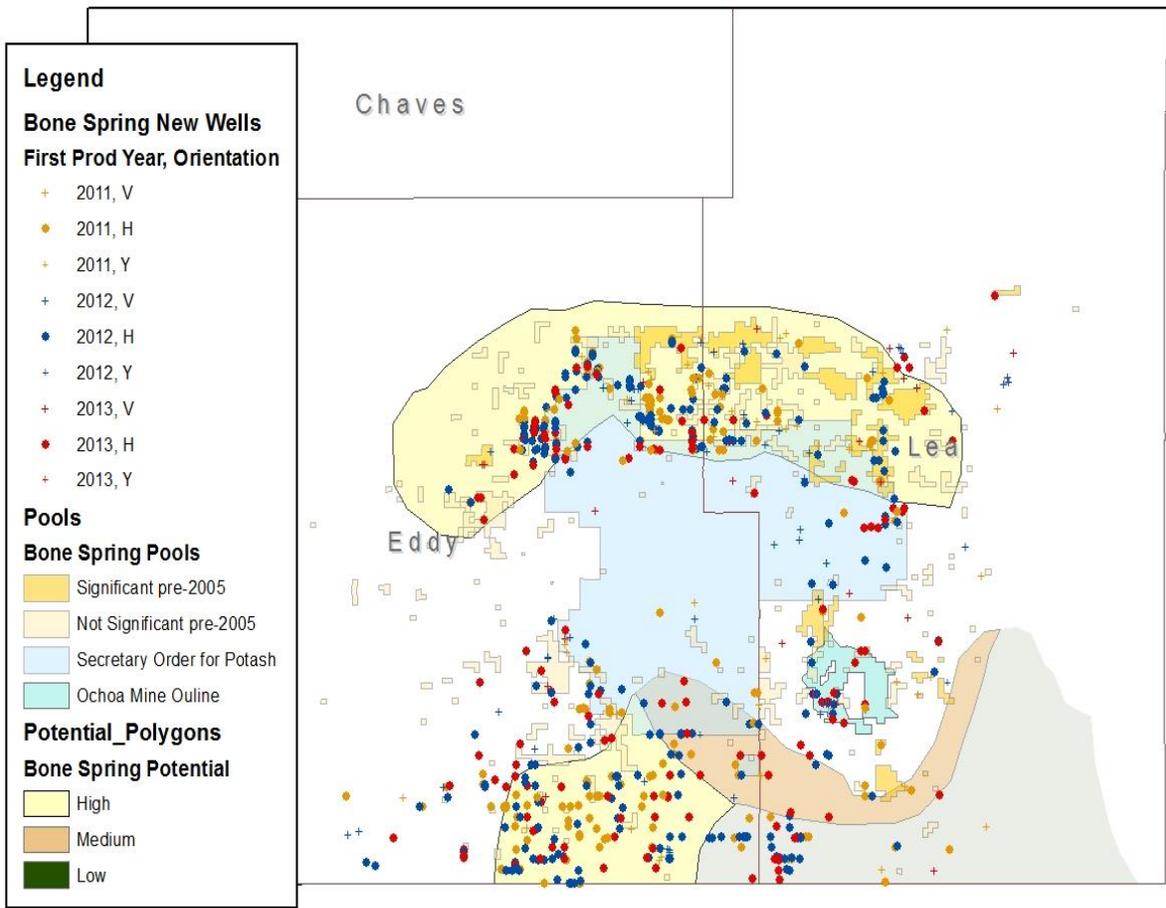


Figure 2. Map view of the Bone Spring/Avalon completions from Jan 2011 through May 2013. Included are the potential boundaries from the RFD and the Ochoa mine project for reference.

The area of most concern is known as the Ochoa Mine project, a proposed potash mine in Lea County. The surface footprint of this mine is also shown on the map in Figure 2. As can be observed this mine lies outside the potential boundaries. It also resides in an area of high activity, known as the Triple xxx (Bone Spring/Avalon) field. The activity and production performance of this field is shown in Figure 3.



Figure 3. Production for the Triple XXX (Bone Spring) Field in Lea County, New Mexico (Source: I.H.S. Energy)

As can be observed in Figure 3, the success in this area has been very high. In 2012, half of the top ten (by cumulative production) horizontal wells were in the Triple XXX field.

Horizontal drilling coupled with hydraulic fracturing has been a game changer in proving economic production from previously believed unproductive rock. As mentioned, the majority (82%) of all new completions in the Bone Spring/Avalon are horizontal. It was also suggested in the reviews that the majority of the RFD was based on vertical well data only. However, the benefit of horizontal wells was recognized and discussed in the RFD in general (Sec 4.5, pg 30) and specifically with regards to the Bone Spring/Avalon (Appendix). Figure 4 is an update to Figure 10 in the Bone Spring appendix of the RFD.

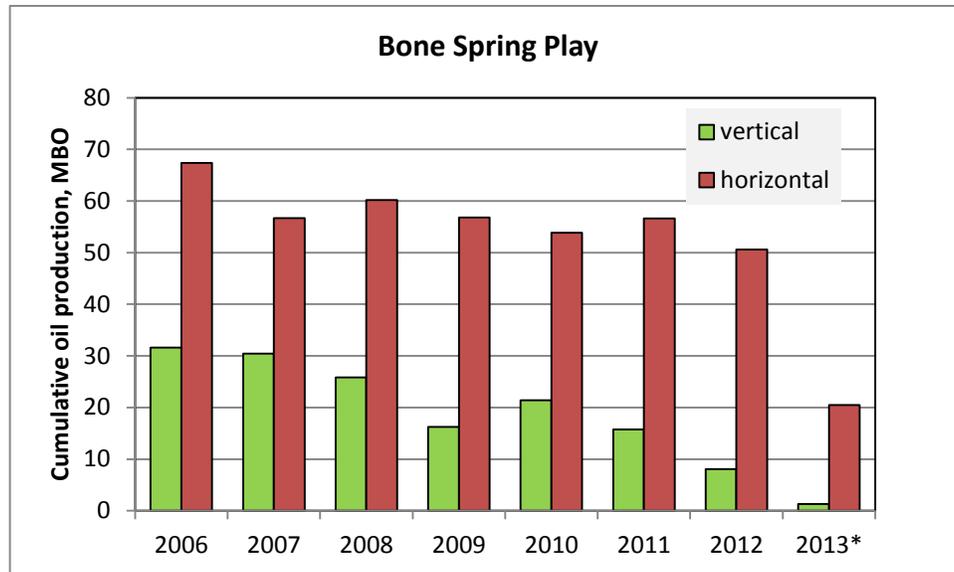


Figure 4. Comparison of average horizontal and vertical cumulative oil production per well based on year of beginning of production. (Data source: I.H. S. Energy)

\* 2013 partial year, through May

From 2006 through 2012, performance in horizontal wells has averaged 3.2 times better than vertical wells. And in the last full year of data (2012), the ratio was over 6:1, the best to date. The trend indicates an increase in success of horizontal wells in the Bone Spring/Avalon play and confirms the likelihood of future activity with horizontal wells.

### Summary

The areas of high, moderate, and low potential predicted for the Bone Spring was based on the available information at the time. With approximately 60% of the development from 2011 through May 2013 residing within the high potential boundary and 74% in the high, medium and low potential regions; confirms on a large scale the reasonable accuracy of the prediction.

However, on a local scale, updated information identified areas missed in the RFD. One such area is the Ochoa Mine Project. Neither the potash mine nor the oil and gas development; i.e., Triple XXX field were known at the time the RFD was compiled and thus not included. As previously mentioned, evidence demonstrates the success of oil and gas development in the Bone Spring in this area, and thus should be given a high potential rating.

As a final note, the development of the Bone Spring/Avalon is still in the appraisal stage. It is a dynamic play, always changing as more information is gathered. There is a high likelihood that with several more years of data, new prospects will emerge and modifications to any prediction will be required.