Spatial Analysis

Using ArcView GIS 3.2 software, the production data was spatially plotted and analyzed for possible production trends and sweet spots in the Drunkards Wash Field.

Plotted well locations showed many of the wells with immature production rates and no production were clustered near the field boundary in sections of the field and the gas field has a limited southward extent.

In terms of gas production, we see a correlation between log peak gas production rates and log peak water production rates. Based on this analysis, we conclude that wells with higher production rates may be produced ultimately be good gas producers, in the Drunkards Wash Field. This suggestion is also supported by other cross plots of cumulative gas and cumulative water production levels as seen to the right.

Coal thicknesses were recorded from density logs for several of the wells in the Drunkards Wash area. The concept of net coal thickness versus peak gas production rates also do not display an obvious correlation with the production data. However, we did not use any other parameters as seen to the right.

Instead other plots were tried, however, they displayed a wide array of scatter and were not useful in determining correlations between production parameters.

A similar east-west trending region was also noticed when we plotted the spatial distribution of the predicted EURs.

As noted earlier, thrust faulting occurs in the Drunkards Wash Field and may have caused a structural trapping component to the Ferron CBM deposit in this field. Thrust-faulted anticlines can be found near structurally faulted areas which may enhance gas probability because of increased fracturing.

By generating this plot, we were motivated to research local geologic features outside of structures that could also influence the high producing regions.

Conclusions

Table 1 presents the categorical, graphical, and spatial distribution studies of factors affecting gas production rates in the Drunkards Wash Field.

From the above-mentioned analysis, we have come to the following conclusions:

1. The average exponential decline rate for coal bed methane is 0.12 in the Drunkards Wash Field.

2. The approximate time from well completion to first production was highly variable, but varied between 6-12 months.

3. Wells that have high initial rates were productive, while low initial rates were not productive in the Drunkards Wash area.

4. The average cumulative drainage volumes per well were calculated to be 1.75 Bcf, which is a standard for CBM wells. However, the cumulative drainage volumes experienced a rapid increase between 1999 and 2001, which seems to be due to changes in stimulation practices.

5. Areas with low dikes and faults in the Drunkards Wash Field are likely to have greater fracturing and permeability, resulting in better gas and water productivity.

6. The forecast cumulative gas deposit has some potential importance to its location. Structurally high areas have better gas productivity because of conventional trapping of gas.