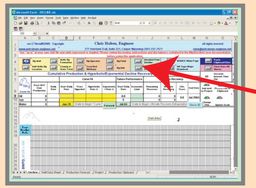
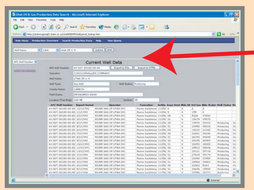
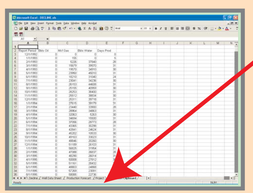
Decline Analysis



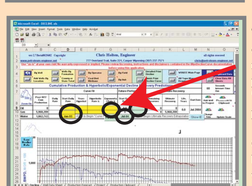
Production curves were created for 630 wells using Wyodecline software. Wyodecline is a Microsoft Excel spreadsheet created by Chris Holten, Petroleum Engineer. The software was originally created for the Wyoming Oil and Gas Conservation Commission, but with the capability to be used by any organization with gas or oil data. It was selected because it was free and easily learned.



The process of data analysis began by downloading production data from the Utah Division of Oil, Gas, and Mining (DOGM) database for each well. The database is located at www.ogm.utah.gov.



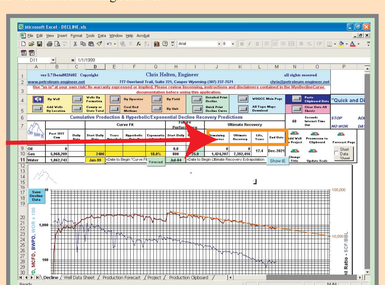
Each data set was sorted according to time since completion, copied and pasted into the production worksheet in Wyodecline. Note: In order to correctly read-in the data pasted into the "Production Clipboard," the columns must be arranged in the order as seen here.



Wyodecline creates curves with daily mcf rate, daily bbls water, and days drilled versus time in months on a logarithmic time scale. Decline curves were then created by manipulating the following parameters: peak daily gas rate in mcf, month of peak production, exponential decline percentage, and economic cutoff limit. The decline rates were used to extrapolate future production to an economic limit of 25 mcf daily. At this low rate of gas production, it is economically inefficient to continue operating the well. Curve interpretation then determines remaining lifetime of well and remaining reserves.

The exponential decline curves were created by modifying the cicled parameters in order to get a "best-fit" match to the production data.

Once a satisfactory curve had been created, the calculated well projections were tabulated well-by-well for further data processing.

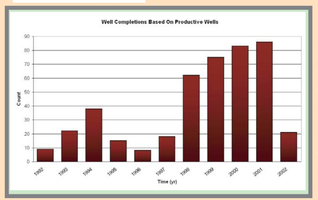


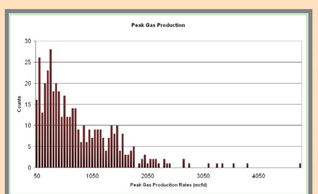
Tabulated Data & Results

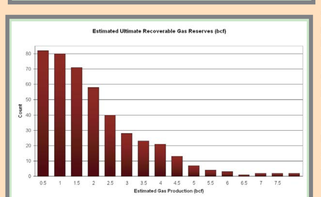
	Cumulative Production, Gas (mcf)	Cumulative Production, Water (bbls)	Peak Gas Production Starting Rate (mcf daily)	Remaining life from peak production (yrs)	Approximate Months to Peak Gas Production	Estimated Remaining Reserves (bcf)	Estimated Ultimate Recovery (bcf)	Total Lifetime (yrs)	Total Thickness (ft)	Average Coal Thickness (ft)/Well	Coal Beds/Well	Bore Hole Depth (ft)	Bottom Hole Temperature (deg F)	Peak Water (bbls)
SUM	428,091,979	135,868,180				337.0	764.86		3,777	699.2	960.0			6,749,325
AVERAGE	977,379	310,201	813	15.8	28	0.77	1.75	18.1	22.5	4.2	5.7	3110	101	15,409
MODE			200	9.9	1			18.3	20.0	6.0	6.0	3860	103.0	12,375
MEDIAN	641,283	154,513	603	15.8	21	0.6	1.37	18.0	22.1	3.8	6.0	3174	101.0	9,646
STD. DEV.	1,000,645	418,827	669	5.9	23	0.66	1.43	6.5	7.1	1.4	2.0	527	3.2	22,304

Analyzed Wells	437
Immature Production Data	113
No data available in UDOGM database	73
No data available due to well shut-in	7
total:	630

Once all of the wells had been processed for decline curve analysis and the data had been compiled and tabulated, we applied a simple statistical analysis in order to determine data precision and accuracy. Although some of the data returned skewed deviations, overall, we feel confident that the values reported provide an accurate statistical description of coal bed methane gas production in the Drunkards Wash field. We also included well log information in our data set such as coal bed information (based on density logs), bottom hole temperature recorded at initial logging, and bore hole depth. The well logs provided valuable information necessary for the spatial distribution analysis.





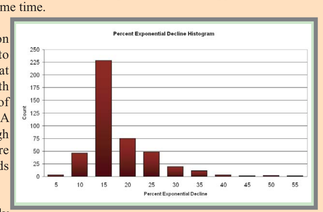


Histogram Analysis

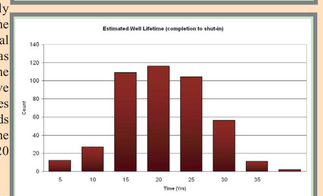
We created histograms from many of the calculated data in order to determine common trends among wells in the Drunkards Wash field.

The plot to the left displaying Well Completions over time shows a jump in the number of wells completed between 1997 and 1998. This jump was due to the approval of further drilling on BLM land at this same time.

The Peak Gas Production histogram was useful to visualize the scatter that appeared in our data set with respect to the wide array of production rates per well. A heavily right-skewed plot, high peak gas production rates are uncommon in the Drunkards Wash field.

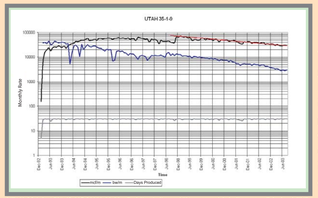


Another expected highly skewed plot can be seen to the right in the Percent Exponential Decline plot. This plot was created by grouping all decline rates into increments of five percent. This plot demonstates how gas wells in the Drunkards Wash field highly favor decline rates between 15 and 20 percent.

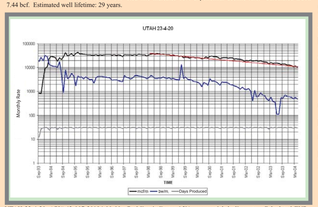


Possibly the smoothest of the best-fit curves to our histograms came from the Estimated Well Lifetime plot as seen above. Though slightly left skewed, this plot demonstrates a fairly good control over well lifetimes in the field.

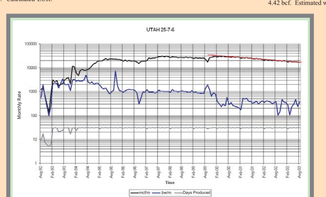
The Estimated Ultimate Recoverable Reserves (EURs) plot shows that gas wells in the Drunkards Wash unit will commonly produce between 0.5 and 2.5 bcf.



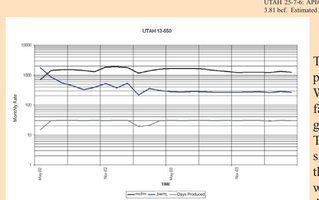
UTAH 35-1-9: API# 43-007-30180-00-00. Red line indicates 18% exponential decline rate. Calculated EUR: 7.44 bcf. Estimated well lifetime: 29 years.



UTAH 23-4-20: API# 43-007-30194-00-00. Red line indicates 15% exponential decline rate. Calculated EUR: 4.46 bcf. Estimated well lifetime: 29 years.



UTAH 25-7-6: API# 43-007-30156-00-00. Red line indicates 15% exponential decline rate. Calculated EUR: 3.81 bcf. Estimated well lifetime: 30 years.

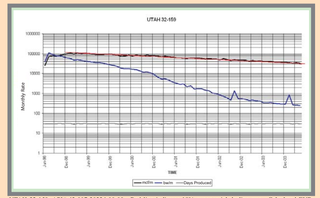


UTAH 13-550: API# 43-015-30301-00-00. Calculated EUR: 0.05 bcf. Estimated well lifetime: 4 years.

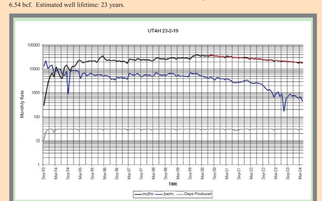
Good Producing Wells

These five wells are examples of good producing gas wells in the Drunkards Wash unit. The red line indicates the exponential decline percentage based on gas production data. These wells show a classic negative decline curve with increasing gas rates as the coals are dewatered.

Some of these specific plots show an increase in production rates between 1998 and 2000. Several other wells in our study also demonstrated this same trend. We believe that this trend comes as a result of increased stimulation practices over this period of time, though a history of stimulation practices was not included in our study.



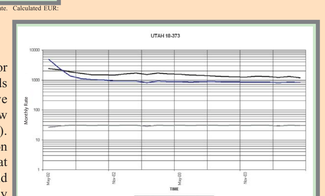
UTAH 32-159: API# 43-007-30334-00-00. Red line indicates 18% exponential decline rate. Calculated EUR: 6.54 bcf. Estimated well lifetime: 23 years.



UTAH 23-2-19: API# 43-007-30203-00-00. Red line indicates 15% exponential decline rate. Calculated EUR: 4.42 bcf. Estimated well lifetime: 31 years.

Poor Producing Wells

These two wells are examples of poor producing wells in the Drunkards Wash unit. Notice that they have fairly level production curves at low gas production rates (~30 mcfd). There are many wells with production similar to these two wells located at the edges of the Drunkards Wash field where production has only recently developed.



UTAH 13-550: API# 43-015-30298-00-00. Calculated EUR: 0.04 bcf. Estimated well lifetime: 3 years.