

Krzysztof DROP¹, Paloma CABANAS², Honorata RUTKOWSKA¹

¹Halliburton Consulting, Kraków

²Halliburton Consulting, Milan

DIFFERENCE BETWEEN UKRAINE AND USA CBM PROJECTS IN TERMS OF DATA QUALITY AND EVALUATION

Summary. The differences in approaches to CBM play between USA CBM project (San Juan Basin) and Ukraine CBM/CMM in Doneck area will be discussed in the presented paper. Generally, USA play is really CBM farm focused on methane production without underground mine activities. The main goal of the Ukrainian project based on research made in the Doneck mine area is degasification of excavating coal and overburden sandstone layers which is performed for the safety purposes. The gas production is only a secondary objective.

RÓŻNICE POMIĘDZY UKRAIŃSKIM I AMERYKAŃSKIM PROJEKTEM CBM Z PUNKTU WIDZENIA JAKOŚCI DANYCH

Streszczenie. W artykule przedstawiono zróżnicowanie podejście do projektów CBM w USA - projekt (San Juan Basin) i na Ukrainie CBM/CMM w Zagłębiu Donieckim. Generalnie w przypadku USA preferuje się przedsięwzięcia typu farm CBM, ukierunkowane na produkcję metanu z wyłączeniem podziemnej działalności górniczej. Zasadniczym celem projektu ukraińskiego, opartego na badaniach przeprowadzonych w Zagłębiu Donieckim, jest odgazowanie eksploatowanych węgla oraz tworzących nadkład piaskowców, prowadzone dla zwiększania bezpieczeństwa. Eksploatacja gazu odgrywa tu rolę drugorzędną.

1. Introduction

The Ukrainian project is very complex and embraced Coal Mine Methane (CMM), Abandoned Mine Methane (AMM) and Coal Bed Methane (CBM) areas, whereas USA project is typical CBM one.

Even in terms of available and possible technology the differences are substantial: USA project has modern wells logging and huge amount of interpretation was based on logs,

whereas Ukrainian project has a lot of typical old style mine data which required translation/conversion into G&G format. The low quality of Ukrainian data is the reason of high uncertainty of carried out evaluation.

The Colorado portion of the San Juan Basin includes portions of La Plata and Archuleta Counties. The coals of the Upper Cretaceous Fruitland Formation range from 20 to over 40 feet thick. Total net thickness of all coal beds ranges from 20ft (6m) to over 80ft (24m) throughout the San Juan Basin.

Ukraine Carboniferous Doneck Basin in Lugansk area (Molodogvardieyskaya Mine) consists of sequences of sand, shale and limestone in following proportion: 71, 15 and 11%. There are around 17 coal seams but only two of them: K2 and I3 have been extracted by mining. The Carboniferous sequence in Main Central Area is diversified due to the influence of the Samsonovsky thrust, the fault has a direction east-west and dips (0-15 degrees) towards the south. The Carboniferous sequence was eroded during the Cretaceous presenting an unconformity with these levels. The coal strata in the mine area include several coal seams but only four of them have been included for the model: K7, K5, K2 and I3. Due to their thickness and continuity, the total thickness of the coal seams is about 5 m.

The study of the logs carried out for several wells showed that the sand bodies were divided in seven levels: S1, S2, S3, S4, S5, S6 and S7, with thickness ranging from 15 to 45 m and a total gross thickness of 190 m.

There are numerous historic records of naturally occurring methane gas in both project areas in the surface water and groundwater dating back far before CBM development began.

2. Research and Practice

The data quality and project nature forced us to perform different scope of work and workflows as well as utilizing different tools (tab.1).

For USA San Juan Basin the project was resolved using Geographix software (fig.2).

For Ukraine project (fig.3) we decided perform petrophysical evaluation with OpenWorks workstation then next transfer outputs to Petrel to build 3D model which was finally used to GIIP calculation. GIIP was a sum of Coal gas reserves and gas reserves in sandstone.

Table 1

The differences in CBM plays in USA San Juan basin and Ukrainian Doneck Basin – Molodogvardieyskaya mine

Items	Ukraine (Doneck Basin – Molodogvardieyskaya mine)	USA (San Juan – Fruitland Formation)
Age of coal	Carboniferous	Upper Cretaceous
Geological trap for HC	No traps – syncline	No traps – syncline
Coal total thickness	Above 5 m to (10?)	Up to 24 m
Gas reservoir rocks	Coal and surrounding sandstone	Coal
Play type	CBM/AMM/CMM/Conventional	CBM
GG data characteristic	400 wells. Old style Russian logs. A few core samples from coal and sandstone. A lot of mine data need to be transform to G&G format.	Thousands of wells, high quality logging, a lot of coal samples.
Project characteristic	Low data quality, Gas contents from mine data,	High data quality, Gas content as function of coal density computed from density log.
Coal properties	% of Weigh Wash 0.38 WMoi 0.01 W100C 0.61 % of Volume Vash 0.23 VMoi 0.016 V100C 0.75	% of Weigh Wash 0.45 WMoi 0.07 W100C 0.4 % of Volume Vash 0.3 VMoi 0.1 V100C 0.5
Langmuir isotherm Fig.1.	VI=20m3/T PI=3.3 MPa Pc=? InitP=6.8MPa	VI=22m3/T PI=2.3MPa Pc=6Mpa InitP=11Mpa

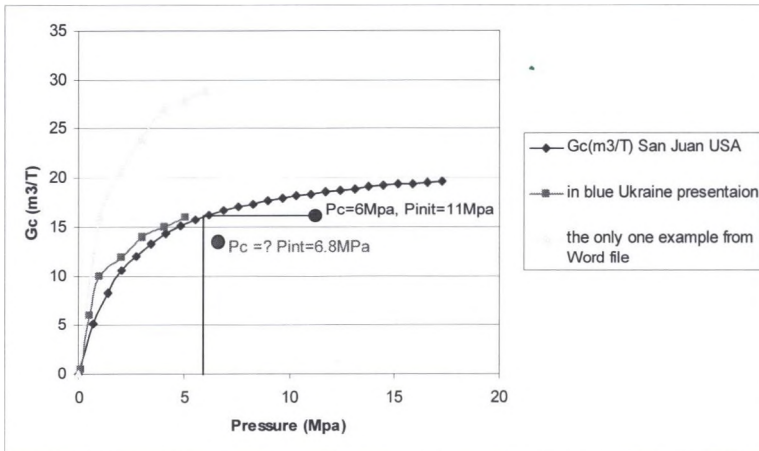


Fig. 1. Langmuir isotherms comparison between USA and Ukraine project

Rys.1. Izotermi Langmuira w projektach USA i Ukrainy

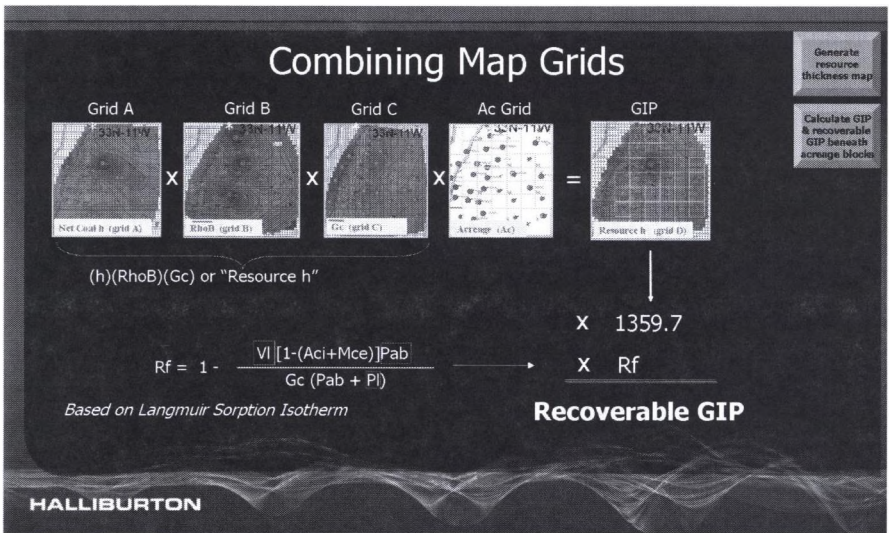


Fig. 2. San Juan workflow using GeoGraphix (Prizm and Discovery)

Rys. 2. Graf typu workflow dla basenu San Juan z wykorzystaniem GeoGraphix (Prizm & Discovery)

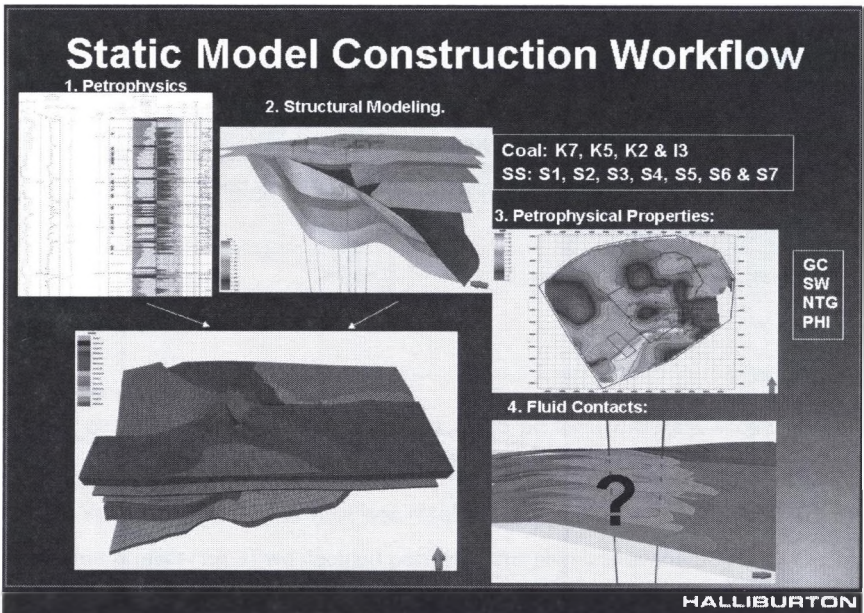


Fig. 3. Ukraine Molodogvardieyskaya workflow. Petrophysics was done in OW PetroWorks, GIP calculation in Petrel

Rys. 3. Graf typu workflow dla ukraińskiej kopalni Molodogvardieyskaya. Petrofizyka opracowano w pakiecie OW PetroWorks, obliczenia GIIP w pakiecie Petrel

3. Conclusion

The San Juan Basin project was developed for really methane production plant but our Ukrainian project is still under construction. During the project work new questions aroused:

- Could we take into consideration the sandstone gas reserves if we have no structural trap for accumulation gas during migration? From the mine experience we know that degasification wells produce gas in short period of time and it is depleting quickly.
- Is degasification just before underground coal exploitation a safe procedure? On one hand the rocks are freed from gas but on the other hand strong fracturing disturbs stress regime which could cause the formation brakes, fall down the ceiling of a shaft.
- More data is still required for developing the project: more Langmuir isotherms, coal and sandstone laboratory analysis.

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Recenzent: Doc. Ing. Josef Mazáč, CSc., HGF, VŠB-TU OSTRAVA