

## NOTE

## Evolution of the mental picture of shale reservoir completion – 3<sup>rd</sup> Shale Science Conference (Warsaw, 9–10 June 2014)

Bartłomiej Liana, Piotr Hadro

*AGH University of Science and Technology; al. Mickiewicza 30, 30-059 Krakow, Poland*

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The 3<sup>rd</sup> edition of ShaleScience conference held on 9–10 June 2014 in Warsaw, Poland, was a very successful event. It was organized by Orlen Upstream and partner Institutions – EGI, AGH and INIG – under the Honorary Patronage of the Polish Ministry of Environment (Fig. 1).

The conference brought together world-class specialists in fields of geology, geophysics, geomechanics, drilling, reservoir completion and environmental protection. They all contributed greatly to a better understanding of the Polish shale reservoirs of moderate quality.



*Fig. 1. Minister of Environment, Maciej Grabowski during the opening speech (phot. by ORLEN Upstream)*

Consistently with topics of previous editions, the theme of this one was “Evolution of the Mental Picture of Shale Reservoir Completion”. The Moderators who watched over the conference agenda were Dr. Raymond Levey and Prof. John McLennan from Energy & Geoscience Institute at the University of Utah. The conference was focused on three domains: Geology, Drilling and Completion, and Environmental Protection, which were reflected by three relevant sessions that constituted the meeting programme

The first session was entitled “Geology of Polish Lower Paleozoic Shales – Polish and American Experience”. Mr. Paweł Poprawa started with a paper presenting the geological conditions of the Lower Palaeozoic shale gas plays occurrences in the most prospective Baltic-Podlasie-Lublin Basin. He pointed out similarities and differences between unconventional deposits around the world and the Polish Palaeozoic shales. The participants agreed that the data collected from the wells drilled so far do not allow for reliable assessment of the potential of unconventional resources in Poland but should form foundations for the development of effective methods of both exploration and exploitation. Further presentations on the first day of the conference dealt with the mineral and geochemical composition of Palaeozoic shales, stress state and geomechanical parameters – all three considered as the most important aspects pertaining to the exploitation of unconventional gas deposits. Mr. Richard Lewis of the Schlumberger presented a quantitative comparison between the reservoir and completion quality of the organic shales from Poland and shales developed in North America. The stress state in the Lublin Basin, where Orlen Upstream conducts exploration, was introduced by Dr. Birger Hansen on the basis of FMI profiles.

The next session, entitled “Drilling and Completing Wells in Moderate Quality Shale Reservoirs”, was opened by a talk by Prof. John McLennan and Mr. Vincenzo de Gennaro who presented geomechanical aspects of shale collectors stimulation and consequences of shale anisotropy and heterogeneity in the design of the wells. After that Prof. Milind Deo from University of Utah gave his conclusions about the fluid flow in very low permeability reservoirs and showed the differences compared to conventional permeable collectors.

He also outlined how different pore media affect important reservoir parameters (Fig. 2). Discussion panel closed the first day of the conference. Talks on the same theme continued on the second day. Mr. Piotr Kenar gave a speech on behalf of Mr. John Ely, in which he discussed hydraulic fracturing as the essential issue of shale reservoir completion. He introduced the stimulation solutions chosen by Orlen Upstream and stated that the lack of commercial success is not the fault of rock characteristics but is related to reservoir under-pressure. After that Dr. Piotr Kasza raised the issue of fracturing fluid selection and explained the role of different additives in the mixture. The last presentation of the second session was “Advantages and disadvantages of microseismic monitoring” given by Mr. Pierre-François Roux who discussed the results of microseismic measurements done during stimulation in Syczyn OU2K well by Orlen Upstream. Based upon these results he compared the surface and downhole microseismic data and showed differences between them. He also stated that because of different nature of the surface and downhole data these two datasets should be analyzed separately.



*Fig. 2. Prof. Milind Deo presenting his lecture (phot. by ORLEN Upstream)*

The last session title was “Hydraulic Fracturing Environment Risk Management”, which is one of the key problems in relations between the public and industry. Therefore, it is necessary to provide scientific information about these issues. At the beginning, Dr. Jan Macuda presented a speech on the environment assessment of hydraulic fracturing



*Fig. 3. Discussion was an important part of each presentation (phot. by ORLEN Upstream)*

and production tests. He talked about both qualitative and quantitative potential impacts on field works for solid, groundwater, atmospheric air and acoustic climate. Next, Dr. Ewa Krogulec from Warsaw University introduced important issues of water management during hydraulic fracturing process, current degree of groundwater usage and re-use of flowback water for future fracturing operations. The last presentation of the second day, and of the whole conference, was given by Mr. Didier Bigeonneau who discussed waste management problems during the stimulation process. He devoted special attention to methods of handling the extraction waste generated during the prospecting and exploration of unconventional reservoirs.

The conference proceedings comprise 12 papers, which together constitute a comprehensive overview of our up-to-date knowledge on Polish moderate quality shale reservoirs, especially in the Lublin basin. It is worth highlighting that conference participants took active part in discussions on the presented papers not only during discussion panel after the successive talks but also in smaller groups during lunch and coffee breaks (Fig. 3).

In his closing address, Dr. Wiesław Prugar, the President of the Management Board of Orlen

Upstream said: “This year’s ShaleScience conference was unique in that we no longer talked about probable assumptions, but about facts and a realistic picture of the Polish deposits. Having shared experiences and listened to unbiased opinions, we are convinced that we need to focus on the optimisation of the hydraulic fracturing methods, taking into account the geological obstacles we know of” (Fig. 4).



*Fig. 4. Souvenir snapshot of the conference participants (phot. by ORLEN Upstream)*