

Flowback Fluids Treatment Technology with Water Recycling and Valuable Metals Recovery

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Abstract : In Poland works related to the exploration and prospection of unconventional hydrocarbons (natural gas accumulated in the Silurian shale formations) started in 2007, based on the experience of the other countries that have created new possibilities for the use of existing hydrocarbons resources. The highly water-consuming process of hydraulic fracturing is required for the exploitation of shale gas which implies a need to ensure large volume of water available. As a result considerable amount of mining waste is generated, particularly liquid waste, i.e. flowback fluid with variable chemical composition. The chemical composition of the flowback fluid depends on the composition of the fracturing fluid and the chemistry of the fractured geological formations. Typically, flowback fluid is highly salinated, can be enriched in heavy metals, including rare earth elements, naturally occurring radioactive materials and organic compounds. The generated fluids considered as the extractive waste should be properly managed in the recovery or disposal facility. Problematic issue is both high hydration of waste as well as their variable chemical composition. Also the limited capacity of currently operating facilities is a growing problem. Based on the estimates, currently operating facilities will not be sufficient for the need of waste disposal when extraction of unconventional hydrocarbons starts. Further more, the content of metals in flowback fluids including rare earth elements is a considerable incentive to develop technology of metals recovery. Also recycling is a key factor in terms of selection of treatment process, which should provide that the thresholds required for reuse are met. The paper will present the study of the flowback fluids chemical composition, based on samples from hydraulic fracturing processes performed in Poland. The scheme of flowback fluid cleaning and recovering technology will be reviewed along with a discussion of the results and an assessment of environmental impact, including all generated by-products. The presented technology is innovative due to the metal recovery, as well as purified water supply for hydraulic fracturing process, which is significant contribution to reducing water consumption.

Keywords : environmental impact, flowback fluid, management of special waste streams, metals recovery, shale gas

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