

# Water chemical composition characteristic in the upper part of the Sztoła River

Kamil Juško, Agata Kasprzak, Damian Pietrzak

AGH University of Science and Technology, Faculty of Geology, Geophysics and Environmental Protection;  
al. A. Mickiewicza 30, 30-059 Krakow, Poland; e-mail: kamil.jusko@gmail.com

© 2016 Authors. This is an open access publication, which can be used, distributed and reproduced in any medium according to the Creative Commons CC-BY 4.0 License requiring that the original work has been properly cited.

The Sztoła River crosses Lesser Poland and Silesia voivodships in the region of Olkusz zinc and lead ores mining and sands extraction. It is one of the left-bank tributary of Biała Przemsza. Its sources are located southwest of Olkusz. In the geological structure of Sztoła water catchment area, on the basis of conducted drillings, the following deposits can be distinguished: Paleozoic, represented by Permian deposits, Mesozoic-Triassic deposits, and Cenozoic-Quaternary deposits (Buła 2000, Motyka 2010). Hydrodynamic conditions in the region of Sztoła have been strongly interrupted by the development of zinc and lead ores mining and a sand pit, which required an application of drainage. The first system of drainage was adits built in 16<sup>th</sup> century, which resulted in a decrease of the groundwater table level from few to over a dozen meters (Żukowski 1946, Górniewicz 1975, Molenda 1977, Kosiński 1882). The intensive development of mining in this region began in the first half of 19<sup>th</sup> century, along with appearance of new drainage techniques. The Sztoła River changed its character from draining to infiltrating on its the whole length as the effect of development of vast zinc and lead ores mine depression cone, related to the exploitation of the „Pomorzany” mine, and later with a gravitational drainage of sandpit „Szczakowa” (Witczak & Motyka 1975, Haładus et al. 2007). In the upper part of the river it resulted with a partial dry out of the riverbed. Water flowing in the river originated from the drainage of Olkusz zinc and lead ores mines and is directed there through Baba

channel. A research conducted in the summer of 2014 examined the upper part of the Sztoła River. Groundwater taken from springs, as well as surface water, was collected, and the areas of critical riverbed dry out were identified. A complete physicochemical analysis was carried out in the AGH hydrogeochemical laboratory in Cracow. On the basis of the received data, the characteristics of chemical composition of groundwater and surface water were prepared. Their hydrochemical type, pH values, electrolytical conductivity was determined. Chemical composition was also presented in the selected graphical forms (Piper, Collins, Pie Chart). Based on analysis, the statistical parameters of composition of water from the research region were calculated. Furthermore, the quality of underground and surface water was evaluated according to the existing standards, and suitability to consumption by people was determined.

The Obtained data were also compared with archival results of samples collected within the investigated area.

## REFERENCES

- Buła Z., 2000. *Dolny paleozoik Górnego Śląska i zachodniej Małopolski*. Prace Państwowego Instytutu Geologicznego 171, PIG, Warszawa.
- Górniewicz S., 1975. Z dziejów górnictwa i hutnictwa w Bukownie. *Rudy i Metale Nieżelazne*, 20, 6, 323–327.
- Haładus A., Kania J. & Kulma R., 2007. Badania modelowe zmian stosunków wodnych obrębie złoża piasków na obszarze górniczym Szczakowa. *Gospodarka Surowcami Mineralnymi*, 23, 1, 139–152.

- Kosiński W., 1882. Kopalnie olkuskie – ich przeszłość i przyszłość. *Pamiętnik Fizjograficzny*, 2, 124–133.
- Molenda D., 1971. Zarys historii górnictwa w powiecie olkuskim. [in:]: Krygier E., Molenda D. & Saładziak A. (red.), *Katalog zabytków budownictwa przemysłowego w Polsce. T. 3, Województwo krakowskie. Z. 4, Powiat Olkusz. Cz. 1*, Zakład Narodowy im. Ossolińskich, Wydawnictwo PAN, Wrocław, 13–31.
- Motyka J., 2010. *Opracowanie koncepcji wykorzystania zasobów wód podziemnych rejonu olkuskiego dla potrzeb zaopatrzenia w wodę pitną odbiorców przedsiębiorstwa wodociągów i kanalizacji sp. z o.o. w Olkuszu* [unpublished].
- Motyka J. & Witczak S., 1975. *Zasięg drenażu jednej z kopalń piasku podsadzowego w warunkach zasilania poziomu wodonośnego przez rzekę*. *Zeszyty Naukowe Akademii Górniczo-Hutniczej im. Stanisława Staszica* 524, Geologia 24, Kraków, 65–75.
- Żukowski W., 1946. Kilka wiadomości i danych odnośnie wydobywania kruszców ołowiu i cynku w dawnych kopalniach olkuskich. *Przegląd Górniczy*, 2, 127–137.