

EFFECTS OF IRON SULFIDE AND TRACE ELEMENT CONTENT OF MISSISSIPPI VALLEY-TYPE LEAD-ZINC ORES ON WATER QUALITY IN THE CRACOW-SILESIA DISTRICT, POLAND.

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The environmental effects associated with mining Mississippi Valley-type lead-zinc ores are poorly known due to the assumption that acid-buffering of the host carbonate rocks will control the mobility of ore-related metals. The presence of iron sulfide minerals is important because they readily oxidize to produce acid that can enhance the migration of metals into the environment. Approximately 190 samples of waters from mine seeps, ground and surface waters in the Polish Cracow-Silesia MVT zinc-lead district were analyzed for their major, minor, and trace element content. The study focused on two sub-districts, the Olkusz and Trzebionka areas because of their contrasting concentration of iron sulfides and Tl, As, and other trace elements. Ores in the two areas contain approximately the same amounts of sphalerite and galena but differ in the amount of iron sulfides (6 to 15 wt.% for Olkusz and less than 2 wt% for Trzebionka). As and Tl are especially abundant in the Olkusz ores. Results show that waters from the Olkusz area contain significantly greater contents of sulfate, magnesium, calcium, and zinc but have nearly identical pH values that range from 6.2 to 8.2 and average 7.2, attesting to the effective acid buffering by the carbonate host rocks. Contents of Tl, As, Ni and Cd are about a factor of 2 to 5 greater in waters that have interacted with ore in the Olkusz area relative to Trzebionka whereas the Pb content is lower for Trzebionka.