



## **Determination of hydrogeological conditions in large unconfined aquifer: A case study in central Drava plain (NE Slovenia)**

Teja Keršmanc (1) and Mihael Brenčič (1,2)

(1) University of Ljubljana, Faculty of Natural Sciences and Engineering, Department of Geology, Aškerčeva ulica 12, SI-1000, Ljubljana, Slovenia (teja.kersmanc@ntf.uni-lj.si), (2) Geological Survey of Slovenia, Dimičeva ulica 14, SI-1000, Ljubljana (mihael.brencic@ntf.uni-lj.si)

In several countries, many unregulated landfills exist which releasing harmful contaminations to the underlying aquifer. The Kidričevo industrial complex is located in southeastern part of Drava plain in NW Slovenia. In the past during the production of alumina and aluminum approximately 11.2 million tons of wastes were deposited directly on the ground on two landfills covering an area of 61 hectares. Hydrogeological studies were intended to better characterized conditions below the landfill.

Geological and hydrogeological conditions of Quaternary unconfined aquifer were analyzed with lithological characterization of well logs and cutting debris and XRF diffraction of silty sediments on 9 boreholes. Hydrogeological conditions: hydraulic permeability aquifer was determined with hydraulic tests and laboratory grain size analyses where empirical USBR and Hazen methods were applied. Dynamics of groundwater was determined by groundwater contour maps and groundwater level fluctuations. The impact of landfill was among chemical analyses of groundwater characterised by electrical conductivity measurements and XRF spectrometry of sand sediments.

The heterogeneous Quaternary aquifer composed mainly of gravel and sand, is between 38 m and 47.5 m thick. Average hydraulic permeability of aquifer is within the decade  $10^{-3}$  m/s. Average hydraulic permeability estimated on grain size curves is  $6.29 \cdot 10^{-3}$  m/s, and for the pumping tests is  $4.0 \cdot 10^{-3}$  m/s. General direction of groundwater flow is from west to east. During high water status the groundwater flow slightly changes flow direction to the southwest and when pumping station in Kidričevo (NW of landfill) is active groundwater flows to northeast. Landfills have significant impact on groundwater quality.