

Groundwater Hydraulic Protection system of SLOVNAFT – present state and results of decontamination



Short information

Slovnaft refinery was built on upper Žitný ostrov (Rye Island) in the 50th of the last century – in the region of high-quality groundwater and after only hygienic adjustment - potable water sources of European significance. By production activities and oil leakages to subsoil Slovnaft caused a breakdown of the 2nd Water source in Podunajské Biskupice during years 1971 – 1972.

In order to solve the pollution issues the company GEOtest Brno launched exploration works in 1971. From three professionally multidisciplinary reviewed alternatives (infiltration channel, underground wall, hydraulic curtain) a concept of Groundwater Hydraulic Protection (GWHP) system designed by GEOtest Brno was accepted, representing a dynamic way of remedial measures against oil pollution and groundwater protection. There are two functions of the GWHP system operation, i.e. remediation of the existing pollution at the site and groundwater protection of the upper Žitný ostrov against the escape of contaminants from the area of Slovnaft refinery.

The GWHP system is operated since 1973. The wells of GWHP system are positioned in the area of 80 km² in total number of 756, from this number there are 60 hydraulic active – pumping wells and 696 monitoring ones. Pumping wells of hydraulic curtain and solo wells, situated in the Slovnaft area, create hydraulic depression with yearly pumping amount of 28 - 29 millions m³ of groundwater at present and along with it the remediation is realized by free oil pumping from groundwater table in amount of about 1,5 millions liters annually. Decontamination works are accompanied by hydrological measurements and hydrochemical monitoring.

Area of free oil pollution on groundwater table was decreased by this remedial pumping since 1973 from 4,2 km² to 0,7 km² at present. Dissolved oil in groundwater represents another type of pollution, which original area of 18 km² in 1973 was decreased after 37 years of the GWHP system operation to about 3,4 km². By remedial works within the GWHP system in a period of years 1974 to 2011 there were exploited from a subsoil of Slovnaft 146 654 m³ of free oil, which were given back into production to processing.

The GWHP system of Slovnaft is an utmost important environmental activity and it should stay in operation also after finishing of production, i.e. processing of crude oil in this area. It is the high efficiency of the GWHP system, which has enabled the Slovnaft refinery to follow-up in the production. The significance of the Slovnaft GWHP system increases also in the context of strategic importance of groundwater sources.

