

Environmental state and buffering properties of underground hydrosphere in waste landfill site of the largest petrochemical companies in Europe

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Abstract

© Published under licence by IOP Publishing Ltd. The article examines the waste landfill site of PJSC "Nizhnekamskneftekhim" built 1982. Particular attention is paid to the volume of disposed wastes and peculiarities of landfill operation. It has been revealed that the landfill negatively impacts groundwater. The increase in groundwater level and contamination degree is dependent on recharge from infiltration of precipitation that interacts with the waste in the landfill cells. Groundwater contamination follows the longitudinal distribution pattern, with maximum intensity reaching in the nearest area of the landfill. With increasing distance, concentration of all pollutants sharply reduces. Within three kilometers away from the landfill, groundwater turns to its background values indicating its quality. The landfill discharges oil, phenols, formaldehyde, benzol, toluene, xylene, ethylbenzene, and iron and, to a lesser extent, sulfates, chlorides and barium into the underground hydrosphere. The overlimiting concentrations of other components are caused by intensive leaching from the rocks by aggressive carbonic acid water. The concentrations of hydrocarbonates can reach 8 g/l in the groundwater within the landfill and its nearest area, however, under natural conditions, they do not exceed 0.4 g/l. This is only possible in a case of partial activity of carbon dioxide associated with destruction of organic matter disposed in the landfill. One of the processes that play an important role in groundwater quality recovery is mixing of contaminated groundwater with infiltrating precipitation.

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