Environmental Engineering and Management Journal

March 2017, Vol. 16, No. 3, 633-641
http://omicron.ch.tuiasi.ro/EEMJ/

"Gheorghe Asachi" Technical University of Iasi, Romania

ASSESSMENT OF GROUNDWATER AND SURFACE WATER CONTAMINATION BY LANDFILL LEACHATE: A CASE STUDY IN NEAMT COUNTY, ROMANIA

Lăcrămioara Rusu[1]*, Mirela Suceveanu[1]*, Daniela Şuteu[2], Lidia Favier[3], Maria Harja[2]

[1]*"Vasile Alecsandri" University of Bacau, Faculty of Engineering, Calea Marasesti 157, 600115 Bacau, Romania*
[2]*„Gheorghe Asachi" Technical University of Iasi, Faculty of Chemical Engineering and Environmental Protection, 73 Dimitrie Mangeron Street, Iasi 700050, Romania*
[3]*Ecole Nationale Supérieure de Chimie de Rennes, CNRS, UMR 6226, Avenue du Général Leclerc, CS 50837, 35708 Rennes Cedex 7, France*

Abstract

The aim of this study was to determine the actual impact of the uncontrolled landfill site in Roman town, Romania on the water resource quality. The surface water and groundwater samples were collected quarterly in two time periods: January 2012 - June 2013, when the landfill was operational and July 2013 - December 2014, after the landfill was closed. The parameters analyzed in this study include: pH, biological oxygen demand (BOD_5), chemical oxygen demand (COD), NH_4^+ Cl^-, NO_2^-, NO_3^-, SO_4^{2-}, heavy metals (Cd, Pb, Hg, Cr, Cu, Ni). In the case of surface water, for both investigated periods, the only parameter that exceeds the maximum allowable limit is the chemical oxygen demand with a maximum value of 235 mg O_2/L. The high values of the COD indicator may be attributed to the contamination of the surface water with persistent organic pollutants from landfill leachate. The results recorded in the case of groundwater show that the maximum allowable limits for parameters BOD_5, COD, NH_4^+, Cl^-, NO_2^- are exceeded for both investigated periods. All the mean concentrations of heavy metals for the two periods investigated showed values that exceed the maximum allowable limits, except Pb (3.5-6.67 μg/L) and Hg (n.d.) which were below the limits.
Analyzing the results, it can be noticed that the landfill affected the groundwater and the surface water quality, both during the period when it was in use, and after its closure. It represents a risk to human health due to the contaminants that seep into the groundwater, given the proximity of the landfill to the inhabited area (about 200 m). Since this landfill is a source of contamination even after being closed, it is necessary to neutralize it and to monitor the surface and groundwater quality indicators periodically.

Key words: environmental impact, groundwater contamination, heavy metals, landfill leachate, municipal solid waste

Received: February, 2016; Revised final: January, 2017; Accepted: February, 2017

*Author to whom all correspondence should be addressed: e-mail: lacraistrati04@yahoo.com; mirela.suceveanu@ub.ro; Phone: +40234542411; Fax: +40234580170