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ASSESSMENT OF SEASONAL FACTORS IMPACT ON QUALITY OF DRINKING WATER IN AREAS ADJACENT TO THE LANDFILL IN ZHITOMIR

One of the most urgent problems of industrialized nations is the disposal of solid and hazardous wastes, which increase each year. Hazardous wastes are solids, liquids and gases that pose a real or potential threat to the environment or to human health.

Municipal solid waste (MSW), or trash, is solid waste, that is generated primarily in homes, although it also includes the waste from commercial and institutional facilities. MSW is a heterogeneous mixture composed primarily of paper and paperboard, yard waste, glass, metals, plastics, food waste and other materials (rubber, leather and textiles), that are no longer useful and that should be disposed of.

About 4% of waste is toxic and contain more than 100 kinds of toxic compounds, such as dyes, pesticides, mercury and its compounds, solvents, lead and its salts, medicines, cadmium, arsenic compounds, formaldehyde, salts of thallium and others. Hazardous waste should be treated to eliminate or reduce its toxicity, and the small amount of hazardous waste that remains should be disposed of in sanitary landfills that are designed to protect the environmental from contamination. Nowadays landfills have the potential to contaminate soil, surface water and groundwater.

Residential areas located close to Zhitomir municipal solid waste landfill (ZMSWL) do not have a centralized water supply system, so residents have to use well water. That is why our study of well water quality in ZMSWL vicinity is a key issue.

The purpose of this study was to examine indicators of well water quality in the laboratory and to find out if they meet current legal standards in Ukraine.

Monitoring of well water quality was held regularly during four months from September to December 2016. The analysis of the data was performed with considering the season and the distance from ZMSWL. Three sample points were selected to study at the first phase; there were three wells in the residential area at the distanced of (five hundred, seven hundred fifty, one thousand meters from the boundary of the landfill). Water sampling was conducted every month at the same time:

- in September, when the weather was sunny and there was no precipitation;
- in October, when heavy autumn rains began;
- in November, when there was the first heavy snowfall followed by rapid thawing;
- in December, when there was a heavy snowfall followed by thawing.

We examined well water quality in three wells, located at the distance of 500, 750 and 1000 meters from ZMSWL. In the course of the study the following parameters were determined: pH value (pH), alkalinity, total hardness, and nitrate concentration.

The data obtained show that pH of the studied samples ranges from 6.52 to 7.5 which does not exceed the admissible sanitary standards. The climatic conditions have little effect on pH level. In fact, pH levels depend on the distance from the source of contamination. The analysis shows that the alkalinity of samples is normal while the total hardness is more than 10 mg eq/dm³ and exceeds the sanitary standards.

The study also revealed a significant excess of nitrate concentration which can be an indicator of water contamination by organic substances. The data obtained showed an abnormally high nitrate content in certain climatic periods.

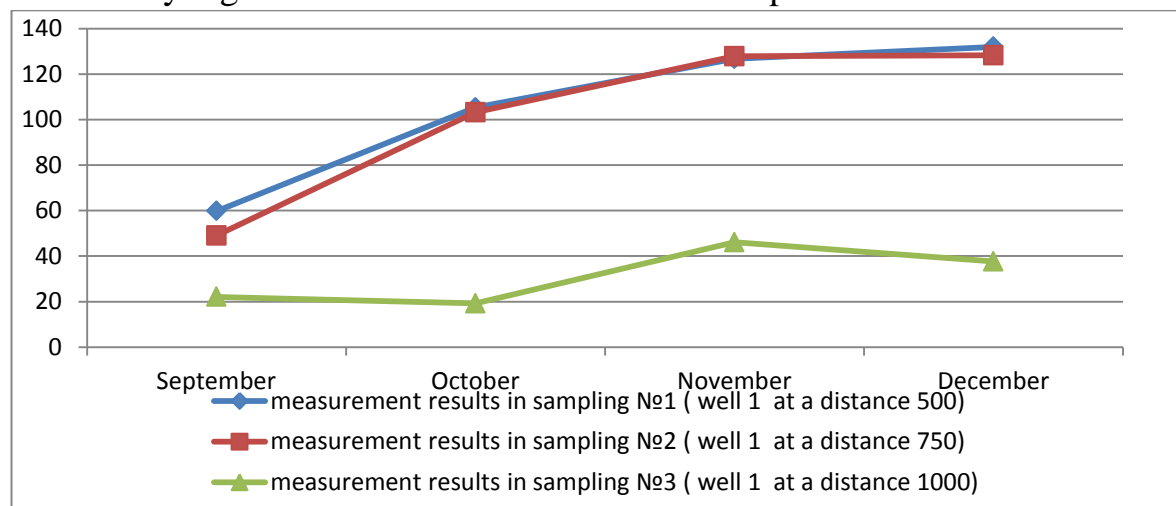


Figure. 1 Dynamics of nitrate content in well water.

The figure shows seasonal changes in nitrate content as well as its dependence on the distances from ZMSWL.

The highest nitrate content in well water is observed in November and December due to seasonal dynamics of climatic conditions and water exchange in the wells. The smallest nitrate concentration is in well 3 at a distance of 1000 meters from ZMSWL.

The results of our research show that Zhitomir solid waste landfill deteriorate the quality of well water, and threatens people's health.

We can also conclude that both ZMSWL and nearby groundwater should be continually monitored for possible pollution and precipitation runoff from ZMSWL should be collected and treated to remove any possible contaminants.

REFERENCES

1. Бондарь И.Л. Исследование морфологического состава твердых бытовых отходов, образующихся в жилой застройке и на предприятиях г. Харькова/И.Л. Бондарь // Коммунальное хозяйство городов: науч.-техн. сб. – К.: Техніка, 2001. – Вып. 29. – С. 102–105.

2. Перелік методик виконання вимірювань (визначень) складу та властивостей проб об'єктів довкілля, викидів, відходів, скидів, тимчасово допущених до використання. [Чинний від 02-01-08 до 31-12-12]/Мінекоресурсів України. – К., – 2007. – 69 с.

3. Бондар І.Л. Екологічні аспекти впливу твердих побутових відходів різного морфологічного складу на довкілля/І.Л. Бонда //Коммунальное хозяйство городов: науч. – техн. сб. – К.: Техніка, 2002. – Вып. 36. – С. 222–226. – (Серия «Архитектура и технические науки»).