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THE INFLUENCE OF FOOD INDUSTRY ENTERPRISES ON THE EFFICIENCY OF CITY WASTEWATER TREATMENT

In the city of Kyiv there is a system of centralized sewage system, which includes sewage flow, pressure nets and collectors with diameters from 100 to 3100 mm, sewage pumping stations, Bortnytska aeration station. Bortnytska aeration station is today the only complex of engineering structures, equipment and communications intended for complete biological treatment of sewage of the city of Kyiv and certain regions of the Kyiv region (Vyshgorod, Irpin, Vyshneve, Gnodyn, Shchaslyve, Chabany, Kotsyubynske, Novosilky, Petropavlivskay Borschagivka, Gatne), where all domestic wastewater and industrial wastewater are treated. The design capacity of the plant is 1800 thousand m³ of sewage/day.

Over the past 5 years, there have been 8 major accidents in large-diameter sewage collectors in Kyiv, which has limited water supply to nearly a third of Ukraine's capital for up to three days. According to statistics for 2017, in less than 11 months in the city of Kyiv there were 86 emergencies on sewer networks. During this period more than 8.5 thousand contaminants were eliminated, and the average share of fat waste pumping in the year reached almost 9 tons [1, 2].

During the survey, it turned out that enterprises and organizations of various activities dump ammonia nitrogen, phosphates, fats, chlorides and suspended substances into the sewerage network, which are the main pollutants. In addition, wastewater, solid industrial waste, gypsum, metal and plastic shavings, garbage, soil, silt, etc. are also included in the sewerage systems [2].

The function of monitoring the compliance of enterprises with the rules of wastewater discharges into the sewage system should be performed by water utilities, which receive and treat these wastewater from all over the city. However, in the rating compiled by the State Agency for Water Resources of Ukraine, "TOP-100 largest pollutant enterprises", water utilities are in the first place, in particular topping the list [3].

The reason for such sad statistics maybe inactivity on the part of the state to assist water utilities in nature conservation activities. National rules for the acceptance of sewage into the system of centralized drainage were adopted only in December 2017, and the rules of reception for the city of Kiev have not yet been adopted.

According to Article III, Part III “Rules for the acceptance of wastewater into district drainage systems”, wastewater receiving into district drainage systems shall not:

1) contain combustible impurities and dissolved gaseous substances capable of forming explosive mixtures;

2) contain substances capable of clogging pipes, wells, grates or depositing on their surfaces (debris, soil, abrasive powders and other coarse suspensions, gypsum, lime, sand, metal and plastic shavings, fats, resins, fuel oil, beer crumbs, bread yeast, etc.);

3) contain only inorganic or non-biodegradable substances;

4) contain substances for which no maximum permissible concentrations have been established for the water of reservoirs or toxic substances that impede the biological treatment of wastewater, as well as substances for the determination of which analytical methods have not been developed;

5) contain dangerous bacterial, viral, toxic and radioactive contamination;

6) contain biologically rigid synthetic surfactants, the level of primary biodegradation of which is less than 80 %;

7) have a temperature above 40 °C;

8) have a pH below 6.5 or above 9.0;

9) have a chemical oxygen demand above biochemical oxygen consumption for 5 days (hereinafter – BOC₅) more than 2.5 times;

10) have a BOC that exceeds that specified in the draft sewage treatment plant of the respective settlement;

11) create conditions for causing harm to the health of the personnel servicing the systems of centralized drainage;

12) make it impossible to dispose of sewage sludge using methods that are safe for the environment;

13) contain contaminants exceeding the permissible concentrations established by these Regulations and local regulations [4].

Most often the rules are not followed by shopping and entertainment complexes, dairy enterprises, beer producers, large supermarkets.

Failure to comply with these rules will result in disruption of sewerage networks of residential districts and districts of the city, as well as treatment facilities for wastewater treatment plants receiving sewage data (eg Bortnytska Aeration Station).

In our opinion and the experts’ opinion, the following ways of solving these problems can be:

1. Adoption of wastewater acceptance rules for local wastewater treatment plants, which will be adapted to the economic and municipal activities of the city and will be adhered to by all enterprises of the city.

2. Prohibition of the use of phosphate-containing detergents (according to Regulation (EC) no. 648/2004 of the European Parliament and of the Council “On detergents” of 31.03.2004).

3. Installation of stationary grease traps in accordance with SBC.B. 2.5-64:2012 “Internal water supply and sewerage of structures” [5].

4. Conducting trainings and outreach to business executives.

5. Establishment of a register of enterprises that use toxic and chemical substances in their field of activity.

6. Approval of stricter discharge standards.

7. Improvement of the system of control over sources of discharges.

8. Creation of a single database that will contain relevant information on instrumental monitoring of stationary sources of pollution of surface and underground water bodies.

9. Carrying out periodic preventive cleaning of sewage and interior networks.

References

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4. Про затвердження Правил приймання стічних вод до систем централізованого водовідведення та Порядку визначення розміру плати, що справляється за понаднормативні скиди стічних вод до систем централізованого водовідведення: Наказ Міністерства регіонального розвитку, будівництва та житлово-комунального господарства України, 1 грудня 2017 р., № 316 [Електронний ресурс]. – Режим доступу: <https://zakon.rada.gov.ua/laws/card/z0056-18>. – Дата доступу: 04.01.2020.

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