Analysis of Legislative Changes in the Regulation of Surface Wastewater Discharges to Water Bodies

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Abstract. The paper considers the features of the transition to a new system of rationing of surface wastewater discharges. The basic legislative requirements are given, the required degree of purification is calculated, which ensures the achievement of technological standards. The possible lists of substances for goals calculating the specifications of permissible dump are given. The necessity of entering additional information into technical standards for the ensure system of rationing of surface wastewater discharges at the design and construction stage is substantiated.

1. Introduction

Currently, in the Russian Federation, in accordance with [1], the process of transition to technological rationing of objects that have a negative impact on the environment is being implemented. According to [1, Article 4.2], according to the degree of such impact, all objects are divided into four categories.

In relation to wastewater disposal systems [2], the criterion for assigning an object to a certain category is the daily volume of wastewater discharged (WD), while all objects for collecting and processing WD in terms of wastewater treatment of centralized wastewater disposal systems (WDS) belong to either category I or II:

- Category I – with a volume of 20 thousand m\(^3\)/day of discharged WD and more [2, p. 1, p. 15];
- Category II - with a volume of less than 20 thousand m\(^3\)/day of discharged SV [2, p. 2, p. 6].

According to [3, Article 107], one of the types of WDS is storm water systems (SWS). They are designed for the removal (reception, transportation) and leaning of surface WD. Thus, the above criteria are also applicable for the data of the WDS.

In relation to SV discharges, the following standards of permissible exposure are distinguished [1, Article 21, paragraph 1]

- Technological norms (TN);
- Standards of permissible discharges (SPD).
At the same time, compliance with the TN does not provide for compliance with environmental quality standards.

SPD is calculated for objects of categories I and II (for category III-only for highly toxic substances, substances of hazard class I, II) [1, Article 22].

2. Problem specification
The development of TN should be carried out in accordance with the current rules [10].

The calculation of TN is carried out for objects of category I [1, Article 23], which, according to [1], must receive a comprehensive environmental permit (CEP).

For objects of category II, TN can be established only in the case of receiving the CEP for them (allowed by the current legislation [1]) and provided that the WDS (SWDS) is the WDS of settlements or urban districts (SDS). Otherwise, technologically standardized substances are included in the list of pollutants (pollutants) for which SPD is established [9, p. 17].

In accordance with [5, p. 8], SWDS are subject to classification as SDS without assessing compliance with the set of criteria for referring provided for in [5].

Decree No. 1430 [4] approved the technological indicators for the treatment facilities of the SWDS in settlements or urban districts (see table 1).

| Category of water bodies | Technological indicators, mg/l |
|--------------------------|--------------------------------|
|                          | Suspended matter | Petroleum products | COD | BOD | Phosphorus phosphates |
| A                        | 5                | 0,3               | 30  | 5   | 0,5                     |
| B                        | 15               | 1                 | 50$^1$ | 10  | 1                        |
| C                        | 15               | 2                 | 60  | 12  | 1                        |
| D                        | 15               | 2                 | 60  | 12  | 5                        |

1 - When wastewater is discharged into the reservoirs specified in the list of reservoirs that are completely located on the territories of the corresponding constituent entities of the Russian Federation and the use of water resources of which is carried out to provide drinking and domestic water supply for 2 or more constituent entities of the Russian Federation, approved by the order of the Government of the Russian Federation dated December 31, 2008 No. 2054-r., the average annual COD concentration is 40 mg/l.

2 - The category of water bodies is established in accordance with [6].

For comparison, let us present the standard values of the runoff pollutant concentrations for different sections of the catchment surfaces of residential areas according to [7, tab. 15], as well as the required degree of purification to achieve technological indicators (see table 2).

The analysis of the given data shows that the list of technological indicators for the purification of surface WD is wider than the list given in [7] and contains such indicators as COD and phosphorus phosphates. Surface runoff from the roof of buildings and structures does not require cleaning from oil products and BOD, from lawns and green spaces, as well as residential buildings (individual construction sites) - from oil products (for water bodies, except for category A).

The standards for the composition of WD in relation to technologically standardized substances when discharging WD into the SWDS of settlements and urban districts are given in [3, Appendix 7]. The required degree of wastewater treatment received from subscribers, depending on the category of the water body, is given in see table. 3.

The required degree of purification according to technologically standardized indicators is achieved using the best available technologies (BAT), given in the reference book [11].
Table 2. Necessary degree of purification.

| Type of object | Concentration value in effluent, mg / l (required degree of purification, %) | Rain | Meltage |
|----------------|---------------------------------------------------------------------------------|------|--------|
|                |                                                                                | Suspended matter | BOD₅ | Petroleum products | Suspended matter | BOD₅ | Petroleum products |
| Residential areas with a high level of improvement and regular mechanized cleaning of road surfaces | 400 | 30 | 8 | 2000 | 50 | 20 |
| Modern residential development | 650 | 40 | 12 | 2500 | 70 | 20 |
| Thoroughfares with heavy traffic | 1000 | 60 | 20 | 3000 | 85 | 25 |
| Areas adjacent to industrial enterprises | 2000 | 65 | 18 | 4000 | 110 | 25 |
| Roofs of buildings and structures | <20 | <10 | 0,01-0,7 | <20 | <10 | 0,01-0,7 |
| Territories with a predominance of individual residential development; lawns and green spaces | 300 | 40 | <1 | 1500 | 70 | <1 |

1 - the required degree of purification is calculated for discharge into a water body of category B.

Table 3. Necessary degree of wastewater treatment.

| Category of water bodies | Required cleaning efficiency, % |
|--------------------------|---------------------------------|
|                          | Suspended matter | Petroleum products | COD | BOD₅ | Phosphorus phosphates |
| A                        | 98,3              | 96,3               | 70,0 | 83,3 | 66,7               |
| B                        | 95,0              | 87,5               | 50,0 | 66,7 | 33,3               |
| C                        | 95,0              | 75,0               | 40,0 | 60,0 | 33,3               |
| D                        | 95,0              | 75,0               | 40,0 | 60,0 | 0,0                |

SPD calculation is carried out in accordance with the current methodology [9].

In order to determine the list of pollutants for which SPD is calculated, it is necessary to conduct an inventory of discharges in accordance with [8]. For SWDS, the list of pollutants [8, Appendix 1], in respect of which the inventory is carried out, includes: ammonium ion (ammonium nitrogen), sulphates, chloride anion (chlorides), phenol (hydroxybenzene), aluminium, iron, copper, zinc. In addition, according to [8, p. 7], if in the established procedure standards for the permissible impact (SPI) on a water body (water management section of a water body), into which water is discharged from the WSS facility, there are pollutants that are not specified in the list, the inventory is also carried out in addition to these pollutants (it should be noted that some of the pollutants included in the SPI are technologically standardized).

The approved SPI are posted on the Rosvodresursy website (https://voda.gov.ru/activities/list.php?part=35). For example, the SPI for the Volga River basin for chemical and suspended mineral substances contains the following list of indicators:
- Volga to Rybinsk reservoir, basin of Rybinsk reservoir, Volga from the confluence of the Oka to Kuibyshev reservoir, within water management areas (approved on August 14, 2015): suspended solids, COD, BOD, phosphates, oil products, total iron, ammonium nitrogen, nitrate nitrogen, zinc, copper, manganese;

- The Volga below the Rybinsk Reservoir, before the confluence of the Oka (approved on April 21, 2014): in addition to the above list, it contains dry residue, chlorides, sulphates, nitrites, ASPAS, phenols, nickel, chromium, aluminium, calcium, magnesium, lead, cadmium, arsenic, molybdenum, mercury.

At the same time, for example, the SPI for the Ikshinsky reservoir basin (approved on February 6, 2015) contains only four indicators: suspended matter, total phosphorus, COD, oil products.

When designing or constructing CWV facilities, for the purpose of determining the list of pollutants on the basis of which SPD is developed, all pollutants on the list according to [8, Appendix 1], as well as pollutants included in the SPI, may be included [8, clause 4]. Also, the list should include substances taken from the SPD from subscribers [9, p. 17].

3. Conclusion

Thus, at present, on the one hand, the list of pollutants for which the SPD is being developed has been streamlined, on the other hand, there is some uncertainty (mainly during design), given that the technical standards (literature) lack the characteristics of surface wastewater for all pollutants. Compliance with SPD in most cases requires the use of deep wastewater treatment methods.

4. References

[1] Federal Law "On Environmental Protection" dated January 10, 2002 No 7-FZ (as amended on December 30, 2020) (as amended on January 1, 2021) URL: http://docs.cntd.ru/document/901808297/

[2] Decree of the Government of the Russian Federation of December 31, 2020 No 2398 "On approval of criteria for classifying objects that have a negative impact on the environment to objects of I, II, III and IV categories" URL: http://docs.cntd.ru/document/573292854/ (date of treatment 01/18/2021)

[3] Decree of the Government of the Russian Federation of July 29, 2013 No 644 (as amended on May 22, 2020) "On approval of the Rules for cold water supply and wastewater disposal and on amendments to some acts of the Government of the Russian Federation" URL: http://www.consultant.ru/document/cons_doc_LAW_150474/27d00da0e783d70f88b9a5b430e05e87a2e165/

[4] Decree of the Government of the Russian Federation of September 15, 2020 No 1430 "On approval of technological indicators of the best available technologies in the field of wastewater treatment using centralized drainage systems of settlements or urban districts" URL: http://docs.cntd.ru/document/565798086/

[5] Decree of the Government of the Russian Federation of May 31, 2019 No 691 "On approval of the Rules for classifying centralized drainage systems (sewerage) to centralized drainage systems of settlements or urban districts and on amending the Resolution of the Government of the Russian Federation of September 5, 2013 N 782" ... URL: http://docs.cntd.ru/document/554769139/

[6] Decree of the Government of the Russian Federation of October 26, 2019 N 1379 "On approval of the Rules for classifying water bodies as water bodies for the purpose of establishing technological indicators of the best available technologies in the field of wastewater treatment using centralized drainage systems of settlements or urban districts" URL: http://docs.cntd.ru/document/563636255/

[7] SP 32.13330.2018 Sewerage External networks and facilities SNIiP 2.04.03-85 (with Amendment No 1) URL: http://docs.cntd.ru/document/554820821/
[8] Decree of the Government of the Russian Federation of 13.07.2019 No. 891 "On approval of the Rules for conducting an inventory of discharges of pollutants into the environment" URL: http://docs.cntd.ru/document/560704091/

[9] Order of the Ministry of Natural Resources and Environment of the Russian Federation of December 29, 2020 No. 1118 "On approval of the Methodology for the development of standards for permissible discharges of pollutants into water bodies for water users" URL: http://www.garant.ru/products/ipo/prime/doc/400065060/

[10] Rules for the development of technological standards (approved by Order of the Ministry of Natural Resources and Ecology of the Russian Federation No 89 of February 14, 2019) URL:http://docs.cntd.ru/document/542643374/

[11] ITS 10-2019 Wastewater treatment using centralized wastewater systems in settlements, urban districts (with Amendment) URL:http://docs.cntd.ru/document/564068889/