

Disposal of storm sewage in the territory of Arkhangelsk

The disposal of crude storm sewage is one of the most considerable sources of pollution of reservoirs and water currents in Arkhangelsk, especially where the Northern Dvina river that flows into the White Sea.

Arkhangelsk sewerage networks are laid taking into account the city geographical arrangement features. Their extent is considerable and makes about 200 km, half of which is the main drainage-storm collectors ($\approx 98,5$ km), and the others – intraquarter networks.

The basic main collectors in the central part of the city were constructed in the period from 1931 to 1950 and are wooden. By now they have decayed and more than half of them is in an emergency condition.

Since the beginning of the 1960s in the XX-th century the packing of ferro-concrete, cast-iron and asbestcement pipelines was conducted, but they also have the high percent of deterioration and demand major repairs and replacement.

In the 1990s as a result of some enterprises liquidation and new enterprises establishment the departmental networks of the drainage-storm water drain, as a rule, being in a shabby condition, appeared completely neglected.

The tupe of the pipeline	The length of the main collectors, km	The length of the drainage storm system , km	Total
Ferro-concrete	55.68	68.0	
Cast-iron	2.5	3.15	
Wooden casings	29.2	29.5	
Asbestcement	9.1	6.0	
Ceramic	1.3	0.9	
Steel	0.014	0.014	
Plastic	0.018	0.022	
Total	98.13	107.8	205.93

The city drainage-storm waters arrive into the Northern Dvina river basin along the sewer collectors and drainage ditches. There are **no purification constructions** of these waters, as they were not planned at that time.

The situation is aggravated by the fact that domestic-faecal sewage from a part of the available housing of the city (380 houses) is connected to the system of the drainage-storm water drain through the septic tanks. In this connection, **there is the pollution of both the system of the drainage-storm water drain with the crude domestic-faecal sewage and of the water object itself – the Northern Dvina river.**

The city administration of Arkhangelsk repeatedly developed and corrected the programs directed to the termination of crude sewage dump into the reservoirs, such as:

- The division of the common water drains into domestic-faecal and drainage-storm;
- The switching of the unsewered available housing to the city water drain system.

So, from 1991 to 2006 about 200 houses were connected with the networks of the city water drain .

According to the preliminary data about 3 000 m³/day of crude and not disinfected domestic sewage is dumped into the Northern Dvina river through the storm water drain of the city.

The main drainage-storm collectors are the property of "The city of Arkhangelsk" municipality and represent gravity flowing collectors. The specialized organization

municipal unitary enterprise "Arkhkomhoz" provides service to only 20 outlets of the storm sewage out of them. In 2006 the inventory carried out by the Arkhangelsk City administration resulted in identifying 27 more ownerless collectors 8.4 km long.

Thus, in the city of Arkhangelsk there are about 60 outlets of storm sewage which is dumped into the water objects together with domestic-sewage of residential houses without any treatment. Besides, sewer pump stations of faecal city sewage have emergency connections to the main collectors of the storm drains.

It is necessary to note that according to the requirements of the Sanitary rules and norms (SanRaN 2.1.5.980-00) «Hygienic requirements to surface water protection» it is prohibited to dump the organized storm sewage in the settlements (item 4.1.2), and the disposal of the superficial runoff from the industrial platforms and residential zones through the rain water drain should exclude domestic and industrial sewage inflow into it. The same demands are made to the superficial runoff disposal into water objects, as to the sewage (item 4.7). However, the requirements of the given rules are not observed in the city of Arkhangelsk .

The laboratory control over the qualitative structure of the taken away storm sewage into the water objects through the main collectors of the serving organization is not carried out, as well as for many years the MUE "Arkhkomhoz" does not carry out the obligations to obtain permits to dump sewage into the water objects.

The control sampling to identify qualitative structure of storm sewage is carried out only when control-supervising measures are taken by the executive authority.

It is determined that water disposal of sewage along storm outlets is carried out with the excess of the maximum-permissible concentration established for fishery reservoirs. The concentration of various polluting substances fluctuates from 7 to 285 of maximum permissible concentration of a reservoir. The basic polluting substances are: solid substances, ammonium-ion, biochemical consumption of oxygen (BCO), chemical consumption of oxygen (CCO) and oil products.

The city administration of Arkhangelsk repeatedly developed and improved the programs to stop crude sewage discharge into reservoirs, such as:

- separating common water drains into domestic-faecal and drainage-storm;
- re-switching of the unsewered available housing to the city water drain system.

In December, 2004 the Coordination council of the Arkhangelsk region administration took place on the following question «The environmental contamination by the storm water runoff in Arkhangelsk» in the course of which it was decided:

• to develop and confirm service regulations of the city networks of the storm water drain. Deadline: 01.06.2005г.

However, **such rules haven't been developed or confirmed till now** by the local government - the City administration of Arkhangelsk. The enterprises and the organizations connected to system of the drainage-storm water drain, do not pay either for using the given systems, or for the environmental contamination

It is necessary to mention that in 2007 the City administration of Arkhangelsk at the expense of the city budget began works at the ecological-analytical estimation of the water disposal of the storm sewage.

«The ecological-analytical estimation of the condition of the Northern Dvina river in the place of the storm sewage dump» was conducted by the city administration within the frames of the city target program "Ecology of Arkhangelsk city (2007-2009)", approved by the decision of the Arkhangelsk city council of deputies dated 10/25/2006 №255. During the spring-autumn period of 2007 the first stage of works was realized.

The purpose of the first stage was the preliminary estimation of polluting substances weight arriving with a superficial drain into the Northern Dvina river.

It was also established that the existing system of collecting and disposal of the drainage-storm drain in Arkhangelsk:

- *separate* in the districts of Mayskaya Gorka and Varavino-Faktoriya;
- *common*– in the territory of Lomonosov district, drained through the outlet of the storm waters in Vyucheysky St.;
- *Combined*, with the disposal of the part of domestic-faecal sewage in the network of the storm water drain – on the rest territory of the city.

During the work there were chosen three datum outlets, each of which characterized this or that drain formed in the city territory – *outlets in K.Libkneht St., in Rusanova St. and in Loginova St.* On each of the outlets the flow rate of the dumped storm waters (for a certain day taking into account weather conditions) was measured. The qualitative characteristics of the sewage with a number of indicators were defined. The obtained data were generalized and analysed.

Taking into account the above-stated information, the Management of the federal service on supervision in wildlife management sphere of the Arkhangelsk region considers it necessary to offer the City administration of Arkhangelsk:

- to continue works on carrying out the ecological-analytical estimation of the condition of the water objects in the place of the outlets of the storm sewage;
- to execute stage-by-stage full inventory of the drainage-storm networks;
- to develop and approve the connection and operation rules of the storm water drain by the city networks;
- to consider possibilities to establish treatment of the city's storm waters dumped into the superficial water objects.

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22.11.2010