

## Upgrading wastewater treatment plants as a method of improving the quality of the environment

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*Abstract:* The City of Lipetsk is referred to as a single-industry town with a developed metallurgical industry. There are more than 500,000 people. The city is on the river Voronezh, referring to the Atlantic basin. By the end of the second millennium, the city was in a dire problem with pollution of river water by products of metallurgical production. The performed modernization of metallurgical production and subsequent upgrading of sewage treatment plants has allowed to reduce discharges into the river Voronezh and thereby improving the environment, not only the city of Lipetsk, but also the territories at the bottom of the river.

*Keywords:* city, sewage, metallurgical plant, treatment facilities, Voronezh river.

The quality of the habitat is generally regarded as the matching parameters of the environment to the needs of people and other living organisms. Water is the basis of life on Earth. But intense human impact on the environment results in the contamination of water resources of the planet. This is a global problem that requires the introduction of new technology and material costs. The sewage treatment plant of the city of Lipetsk is the main water conservation enterprise. Located on the left bank of the Voronezh River. It covers an area of 62 hectares. The first complex of buildings with a mechanical sewage treatment capacity of 80 thousand cubic meters per day was set into operation in 1967. The first set of the biological treatment plant was put into operation in 1975. Population growth and development of industry have resulted in an increase in the hydraulic load as well as an increase in the concentration of pollutants in the incoming waste water. To provide quality wastewater treatment, it was decided to introduce new technologies. The project is financed by the municipality. The ultraviolet disinfection station was built in 2008-2009. The project cost was 100 million rubles. In 2010, the reconstruction of the three primary clarifiers in aerotenknitri-denitrifier. The funding from the budget of the city amounted to 50 million rubles. In 2011, the reconstruction of the three primary clarifiers was held. The budget amounted to 25.1 million rubles. In 2012, the pumping station was reconstructed with activated sludge. The project cost 30.7 million rubles. In 2013-2014, the biological treatment plants were reconstructed: two aeration tanks, four secondary settling tanks with a diameter of 40 meters and construction of a new blast station. All the mechanisms and sites of devices made of aluminum, plastic and stainless steel. These materials are resistant to the corrosive environment drains and are not subjected to corrosion. Under this project the municipality took a loan of 311 million rubles. In January 2015 it was put into

operation a new blower station. The largest electricity consumption for wastewater treatment plants fall on the blower units. With this in mind, it was decided to build a new blowing station with the installation of energy-saving equipment. According to preliminary calculations of energy savings due to the introduction on the new stations energy-saving equipment for the year will be about 876 thousand kW or 4.4 mln. Cost blower units was 52 million rubles. The building blast station at a cost of 50 million rubles.

The received drains (200,000 m<sup>3</sup> / day.) undergo a full biological treatment cycle, disinfected and released into the river Voronezh. Wastewater entering the production lines are processed with a drug known as "PUROLAT-BINGSTI". to minimize the risk of infection by pathogens. The effectiveness of wastewater treatment is not less than 95%. Every 10 days, the company carries out studies of river water. Production control for the wastewater treatment quality by cleaning the steps, as well as the quality of surface waters in the river Voronezh 500 m from the point of discharge and after the treatment, the plant laboratory carries out chemical and bacteriological control. Test results show that the quality of the wastewater and confirms that their discharge does not significantly alter the properties of water in a river.

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