In the area adjacent to the pond, were found unequipped, unauthorized garbage dumps, the size of which increased with each passing month. In August 2018, felling works were carried out near station 3, after which a large number of roots and dry grass (deadwood) remained uncollected.

The assessment of the ecological state of the reservoir was carried out on the basis of monthly monitoring of a number of hydrochemical indicators (dissolved oxygen, permanganate oxidability, biogenic substances) at three coastal stations. Water sampling was carried out in the morning, the analysis was carried out in the hydrochemical laboratory of KSTU.

Thus, despite the significant anthropogenic load, identified unauthorized discharges into the reservoir and observed cases of pollution, the water quality in the pond Shenfliz in the warm months of 2018 remained quite high. According to GOST 17.1.2.04-77 [11] the pond waters are assessed as oligosaprobe according to the majority of the studied parameters, which corresponds to the category "sufficiently clean waters". At the same time, the extremely low oxygen saturation allows us to speak about the increased pollution of the reservoir at the end of the growing season, according to this indicator, the water in Shenfleeze is contaminated (betamezosaprobnye).

Concentrations of ammonium nitrogen are high, at the maximum permissible level, sometimes exceeding the MPC. The violation of the correct seasonal changes in the content of dissolved oxygen, permanganate oxidability, nitrite ions was revealed, which apparently occurs due to the intensification of anthropogenic activity and the growing impact on the reservoir, including its pollution. The increased content of organic and biogenic substances can accelerate the process of eutrophication of the pond and lead to negative changes in its trophic status and sanitary condition.

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ENGINEERING OF A GENETIC CONSTRUCTION CONTAINING A KERATINASE GENE FROM BACILLUS LICHENIFORMIS

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The annual global volume of waste chicken feathers is 8.5 million tons. The feathers are composed of 95–98 % protein, mainly β-keratin. Keratins are insoluble in water and exhibit high resistance to physical and chemical treatments, as well as to typical proteolytic enzymes. The degradation of these proteins involves the action of specific microbial proteolytic enzymes such as keratinases. Compared with the common proteases like papain or trypsin, keratinases have many competitive advantages promoting hydrolysis of highly hydrophobic keratinous substrates Therefore, today the safe and energy-efficient disposal of animal waste is one of the most important challenges.

Keywords: keratin, keratinase, keratinolytic microorganisms, keratin waste, Bacillus licheniformis.

Taking it into account, the aim of this work was to create a genetic construction containing the gene encoding keratinase from Bacillus licheniformis.

The keratinase gene kerA was isolated by polymerase chain reaction (PCR) from the genomic DNA of the bacterium B. licheniformis and inserted into the plasmid pET42a (Invitrogen, USA) using the method of ligation independent cloning [3], also known as the method of continuous extension PCR (CE-PCR).

The plasmid and gene kerA were amplified by PCR and recovered using a commercial PCR Purification Kit (Jena Bioscience, Germany). The resulting PCR amplification products were annealed on each other, and amplification was performed using the CE-PCR method.

Since complementary regions to the pET42a plasmid were inserted into the gene kerA, it has enabled to create a genetic construction represented by a pET42a plasmid containing the nucleotide sequence encoding keratinase from B. licheniformis. The obtained plasmid was checked by restriction analysis and sequencing to verify the correct nucleotide sequence of the target gene.

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CALCULATION AND EXPERIMENTAL STUDY OF BORIC ACID SOLUBILITY IN STEAM AT BOILING

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The droplet ablation processes of soluble materials by steam during the operation of nuclear power plants have a great impact on the ecological situation. This effect can be expressed in growth of the moisture of the surrounding air by using evaporative cooling towers or affecting the possibility of cooling the reactor core in the accident event. To study these processes in Institute for Physics and Power Engineering, a calculation and experimental study of the solubility of boric acid in steam was carried out. The main results of research are presented in this paper.

Keywords: boric acid, solubility, steam, reactor, accident, calculation, environment.

Ensuring the safety of modern NPP projects in order to prevent accidents that can have a negative ecological impact on the environment is one of the most urgent tasks facing modern nuclear engineering. In Russian Federation the advanced project of nuclear power plant WWER-TOI (Water-Water Energetic Reactor Typical Optimized Informatized) has been developed. This project of NPP with WWER-1200 water pressurized reactors was created according to the international nuclear and radiation safety requirements. Construction of reactor units under the WWER-1200 project are currently underway in many countries of the world: the Republic of Belarus, Hungary, Finland, Egypt, Bangladesh, etc.

WWER-TOI project is developed on the basis of the design documents worked-out for AES-2006 project, considering in maximum experience gained by industry organizations while development of the recent NPP projects based on WWER technology (Novovoronezh NPP-2). WWER-TOI project takes into account experience in construction and operation of NPP with WWER both in Russia and abroad.

Within the framework of the WWER-TOI project, special attention is paid to ensuring reactor safety in case of beyond-design accidents with a rupture in the main circulation line and loss of all AC sources within 72 hours. This task is solved by the functioning of passive safety systems that provide core cooling for a consecutive feed to the reactor solution of boric acid with a concentration of 16 g / kg from the system of hydraulic capacities. As is known, the core is at this time in a boiling state, correspondingly, taking into account the low acid concentration in the vapor phase, it is possible to increase the amount of boric acid in the core coolant and to achieve the conditions for its crystallization on the outer surface of the fuel rods, which can lead to deterioration of the heat sink. Removal of boric acid from the reactor with steam or as a result of drip entrainment can significantly reduce the risk of its crystallization. Consequently, the study of the processes of entrainment of boric acid from the core