



## Report on the laboratory testing of EcoSystem Plus® at the Pulp & Paper Plant in Vologda Region of Russia

1. EcoSystem Plus® is a bioorganic catalyst and an accelerator of biological processes.
2. EcoSystem Plus® is designed to break down organic wastes and passage of natural biological processes in an expedited manner.
3. The manufacturer of the product: Bio-Organic, Catalyst, Inc., USA.
4. Duration of the study: December 13, 2016 – January 9, 2017.
5. To conduct the study, the product was diluted with distilled water in 1:30 ratio.
6. The tests were conducted according to the recommendations of the manufacturer.
7. All tests were carried out on the white water and the mass suspension without the addition of biocides.

**Test 1.** A sample of the circulating water (“white water”) was collected from a wire box and poured into two glass chemical cylinders (beakers). A metal plate (Control plate – X) was placed into Cylinder 1. A diluted solution of EcoSystem Plus® (1 cm<sup>3</sup> per 100 cm<sup>3</sup> of the white water) was added into Cylinder 2, and a metal plate (Plate B), identical to the plate in the Cylinder 1, was placed into Cylinder 2. An exterior appearance of the plates had been controlled during the following days of the study. Below, on Picture 1 are shown the plates before testing, and on Picture 2, the same plates after 20 days of the testing.

PICTURE 1



PICTURE 2



**Test 2.** At the same time, we conducted a test to control biological contamination on a heat exchanger of a distiller. We completely filled the distiller’s heat exchanger with diluted solution of EcoSystem Plus® in the ratio as described above. An exterior of the heat exchanger had been controlled during the following days. Below, on Picture 3 is shown the appearance of the heat exchanger before the test, and on Picture 4, the same heat exchanger after 20 days of the testing.

PICTURE 3



PICTURE 4



**Test 3.** Samples of the water were collected from different locations of the headbox and microbiological examination of the samples was conducted by "Orion Diagnostics" test. The results of the testing are listed in the table below.

Point of a sample collection	Addition of EcoSystem Plus®	Results of the tests		
		Bacteria	Yeast	Mildew
Headbox of the upper wire table	0	$10^5$	$10^3$	++
	1 cm <sup>3</sup> /100 cm <sup>3</sup>	$10^5$	$10^3$	+
Headbox of the lower wire table	0	$10^6$	$10^4$	++
	1 cm <sup>3</sup> /100 cm <sup>3</sup>	$10^5$	$10^4$	++
Recirculating water	0	$10^5$	$10^2$	+
	1 cm <sup>3</sup> /100 cm <sup>3</sup>	$10^5$	-	+

*Footnote: The product was diluted before the testing, as described above.*

**Conclusion:**

The results of the testing demonstrate that the application of EcoSystem Plus® provides more effective decomposition of biological contaminations.

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