BIO-ORGANIC CATALYST
THE POWER IN NATURE®

CASE STUDY

The Results of Testing of Bio-Organic Catalyst Eco-Cat™ for Odor Removal in the Air Above Wastewater Treatment Sludge

Moscow Region, Russia

1. **Purpose of the testing:** Determination of the effectiveness of Bio-organic Catalyst Eco-Cat™ manufactured by Bio-Organic Catalyst Inc., USA, for biological wastewater treatment sludge odor removal in the air.
2. **Site A. Wastewater Treatment Plant "Akatovo", City of Balashikha, Moscow Region, Russia**
   Eco-Cat™ to water dilution ratio: 1 : 30
   Treatment method: Spraying
   Terms of measurements (meteorological factors):
   Barometric pressure, mm of mercury column: 742
   Temperature: 22 °C
   Humidity: 38%
   Air speed: 0.1 m/s
   Date of testing: November 12, 2015

Test results, Quantitative chemical analysis

Item No.	The name of chemicals	Units	Test Results				Maximum permissible concentration
			1	2	3	Measurement error, %	
Laboratory room, Sludge without treatment							
1	Ammonia	mg/m³	0.2	0.22	0.19	25	0.2
2	Nitrogen Dioxide	mg/m³	<0.02	<0.02	<0.02	25	0.2
3	Methane	mg/m³	<0.1	<0.1	<0.1	15	50
4	Nitric acid	mg/m³	<0.05	<0.05	<0.05	25	0.4
5	Mercaptans in terms of ethylmercaptan	mg/m³	$<1.5\text{-}10^{-5}$	$<1.5\text{-}10^{-5}$	$<1.5\text{-}10^{-5}$	24.2	$5\text{-}10^{-5}$
6	Hydrogen sulfide	mg/m³	<0.004	<0.004	<0.004	25	0.008
7	Saturated hydrocarbons C1-C5	mg/m³	<1	<1	<1	23	50
8	Phenol	mg/m³	<0.001	<0.001	<0.001	19.8	0>01
9	Formaldehyde	mg/m³	0.011	0.014	0.010	20	0.05

Item No.	The name of chemicals	Units	Test Results				Maximum permissible concentration
			1	2	3	Measurement error, %	
Laboratory room, Sludge treatment with EcoCatalyst®							
1	Ammonia	mg/m^3	0.041	0.040	0.037	25	0.2
2	Nitrogen Dioxide	mg/m^3	<0.02	<0.02	<0.02	25	0.2
3	Methane	mg/m^3	<0.1	<0.1	<0.1	15	50
4	Nitric acid	mg/m^3	<0.05	<0.05	<0.05	25	0.4/0.15
5	Mercaptans in terms of ethylmercaptan	mg/m^3	<1.5-10^{-5}	<1.5-10^{-5}	<1.5-10^{-5}	24.2	5-10^{-5}
6	Hydrogen sulfide	mg/m^3	<0.004	<0.004	<0.004	25	0.008
7	Saturated hydrocarbons C1-C5	mg/m^3	<1	<1	<1	23	50
8	Phenol	mg/m^3	<0.001	<0.001	<0.001	19.8	0.01
9	Formaldehyde	mg/m^3	0.011	0.012	0.010	20	0.05

Conclusion:

- Eco-Cat™ reduced the concentration of ammonia in the air above the wastewater sludge 5 times (from an average level of 0.203 mg/m3 to an average level of 0.039 mg/m3 and allowed to reliably meet the Maximum Permissible Concentration (MPC) ammonia in the air of 0.2 mg/m3.
- An average concentration of other eight chemicals tested in the air above the sludge was well below of appropriate MPC in the air for these chemicals.

3. Site B. City of Almetyevsk Wastewater Treatment Plant, Republic of Tatarstan, Russia

Test results Quantitative chemical analysis

Item No.	The name of chemicals	Maximum permissible concentration, mg/m^3	Date & time of testing	Test results, mg/m^3	Meteorological factors		
					Temperature, °C	Humidity, %	Speed & direction of the wind, m/c
Sludge without treatment							
1	Hydrogen sulfide	0.008	September 23, 2015 8:55 am	0.004 ± 0.001	+19	54	Calm
	Ammonia	0.2		0.015±0.004			
	Methanol	0.006		>0.007			
	Ethanethiol (ethylmercaptan)	5-10^{-5}		0.008			
5ludge treated with EcoCatalyst®							
2	Hydrogen sulfide	0.008	September 23, 2015 10:05 am	<0.002	+22	41	Calm
	Ammonia	0.2		<0.001			
	Methanol	0.006		>0.007			
	Ethanethiol (ethylmercaptan)	5-10^{-5}		0.007			

Conclusion:

- Eco-Cat™ reduced the concentration of hydrogen sulfide in the air above the wastewater sludge more than 2 times (from 0.004 mg/m3 to less than 0.002 mg/m3); ammonia concentration was reduced more than 15 times (from 0.015 mg/m3 to less than 0.001 mg/m3), and ethanethiol (ethylmercaptan) concentration was reduced on 15% (from 0.0008 mg/m3 to 0.0007 mg/m3).

Case Study Performed By:

East Coast Distribution, Inc. (USA) - the exclusive representative of Bio-Organic Catalyst, Inc. (USA), manufacturer of Eco-Cat™, in the territory of Southern Eastern and Eastern Europe, CIS and Republic of Georgia.