

Russian Federation  
OPEN JOINT STOCK COMPANY  
“SURGUTNEFTEGAS”

APPROVED  
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“ ” \_\_\_\_\_ 2017

**Summary report**  
**on results of industrial environmental monitoring**  
**within license blocks of OJSC “Surgutneftegas”**  
**In the territory of Khanty-Mansiysky Autonomous Okrug – Yugra**  
**2016**

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Industrial environmental control (IEC) in OJSC “Surgutneftegas” is performed on the basis of GOST R 56059-2014 “Industrial environmental control. General Provisions” to provide information on environment condition and pollution level, required to perform activity on preservation and restoration of natural environment, rational use and reproduction of natural resources, prevention of negative impact of business and other activity on the environment and elimination of its consequences.

According to GOST R 56059-2014 environmental analytical measurement can be performed only by in-house or third-party laboratories that are accredited for required measuring in compliance with the current legislation of the Russian Federation and have license to operate in the sphere of hydrometeorology and related areas.

Surgutneftegas has license No. R/2013/2377/100/L dated 11.09.2013 to operate in the sphere of hydrometeorology and related areas, including determination of the pollution level of ambient air, water and soil.

In Khanty-Mansiysky Autonomous Okrug – Yugra industrial environmental monitoring within license blocks is performed in compliance with Decree of the Autonomous Okrug Government. No. 485-p “On environmental monitoring system within license blocks for subsoil use for the purpose of oil and gas production on the territory of Khanty-Mansiysky Autonomous Okrug – Yugra and annulment of some decrees of the Government of Khanty-Mansiysky Autonomous Okrug – Yugra” dated 23.12.2011.

The monitoring system is developed in compliance with projects of local environmental monitoring and projects for baseline pollution assessment of natural environment components within license blocks approved in the established order.

During the development of the monitoring system the regional features were taken into consideration, including: vast area of the territory, marshiness of the land, developed river net as well as the location of production facilities.

Monitoring points are installed at all major water bodies in the areas of the Company’s operations, at the prevailing types of soils as well as the areas where

the Company’s production facilities are placed that pose potential environmental risks.

In 2016, within license blocks of OJSC “Surgutneftegas” in KhMAO – Yugra the environmental monitoring was performed at 76 license blocks including local environmental monitoring at 54 blocks in 1027 sampling points, baseline pollution assessment at 22 blocks, in 390 sampling points. Monitoring points are fixed in the field by identification marks containing information about number, geographical coordinates and name of the license block.

Natural environment components under study: surface waters, bottom sediments, soils, ambient air and snow cover.

**The structure of observational network of environmental monitoring  
within license blocks of OJSC “Surgutneftegas” in Khanty-Mansiysky  
Autonomous Okrug – Yugra**

Natural environment components	Status of monitoring points	Number of points	Number of controlled parameters
Ambient air	Baseline pollution assessment points	27	7
	Local monitoring points	163	7
Snowfall	Baseline pollution assessment points	27	13
	Local monitoring points	156	13
Surface waters	Baseline pollution assessment points	133	22
	Local monitoring points	289	22
Bottom sediments	Baseline pollution assessment points	133	22
	Local monitoring points	265	14
Soils	Baseline pollution assessment points	70	24
	Local monitoring points	154	17

Laboratory sample analysis is carried out by seven in-house accredited laboratories by approved methodology in accordance with the current directives and guidelines. Lower range of pollutant detection techniques does not exceed established standards for the safe content level (maximum allowable concentrations (MAC), approximate permissible concentration (APC), safe reference levels of impact (SRLI), etc).

The results of research are submitted to the Department for Environmental, Wildlife and Forestry Affairs Control of Khanty-Mansiysky Autonomous Okrug – Yugra (Prirodnadzor of Yugra) by means of information exchange system “quantitative chemical analysis electronic protocols” during the established period as well as in electronic and paper form until the first day of April of the year following the reporting year.

#### Surface waters

In 2016, 848 samples of surface waters were taken from 54 license blocks where local environmental monitoring is performed and 227 samples of surface waters from 22 license blocks where baseline pollution assessment was performed.

Measurement of baseline pollution and local monitoring of surface waters at license blocks is performed in compliance with the current specified parameters (MAC), established by Order No. 552 of Ministry of Agriculture of the Russian Federation dated 13.12.2016.

### Average concentration of hydrochemical indicators determined in surface waters in 2016

Hydrochemical indicator	Unit of measure	Average value of determined indicators		MAC	Ratio of average values to MAC	
		Baseline pollution assessment	Local environmental monitoring results		Baseline pollution assessment	Local environmental monitoring analysis
1	2	3	4	5	6	7
pH value	pH unit	6.1	6.2	6.5-8.5	-	-
BOD, ultimate	mgO <sub>2</sub> /dm <sup>3</sup>	2.8	2.8	3.0	0.93	0.93
Ammonium ion	mg/dm <sup>3</sup>	0.7	0.5	0.5	1.4	1
Nitrate ion	mg/dm <sup>3</sup>	0.5	0.7	40	0.01	0.02
Phosphate ion	mg/dm <sup>3</sup>	0.1	0.1	0.2	0.5	0.5
Sulfate ion	mg/dm <sup>3</sup>	0.8	1.3	100	0.008	0.013
Chloride ion	mg/dm <sup>3</sup>	2.2	8.3	300	0.01	0.03
Anionic surfactant	mg/dm <sup>3</sup>	<0.025	<0.025	0.1	<0.25	<0.25
Oil products	mg/dm <sup>3</sup>	<0.02	<0.02	0.05	<0.4	<0.4
Phenol	mg/dm <sup>3</sup>	0.0007	0.0008	0.001	0.7	0.8
Total iron	mg/dm <sup>3</sup>	1.6	1.5	0.1	16	15
Lead	mg/dm <sup>3</sup>	0.001	0.002	0.006	0.2	0.3
Zinc	mg/dm <sup>3</sup>	0.07	0.07	0.01	7	7
Nickel	mg/dm <sup>3</sup>	0.003	0.002	0.01	0.3	0.2
Manganese	mg/dm <sup>3</sup>	0.049	0.064	0.01	4.9	6.4
Total chrome	mg/dm <sup>3</sup>	0.0014	0.002	0.02	0.07	0.1
Copper	mg/dm <sup>3</sup>	0.0028	0.0022	0.001	2.8	2.2
Mercury	mcg/dm <sup>3</sup>	<0.01	<0.01	0.01	<1	<1

Landscape of the West Siberian taiga zone is featured by a large number of wetlands. Chemical composition of bog waters is characterized by high acidity which is confirmed by measurement of pH value. Over 60% of surface waters samples showed weak acid reaction.

Also, bogs contribute to formation of acidic media in ground-water reservoirs which is favorable for migration of micro- and macro elements. This conditions high concentration of iron, manganese, zinc and copper in surface waters of KhMAO.

Natural landscape-geochemical conditions cause almost widespread exceedance of the approved standards related to iron (in 99% of samples taken at sites of baseline pollution assessment and 97% of samples taken at sites of local environmental monitoring), manganese (83% of samples taken at sites of baseline pollution assessment and 87% of samples taken at sites of local environmental monitoring), zinc (99% of samples taken at sites of baseline pollution assessment and 95% of samples taken at sites of local environmental monitoring) and copper (92% of samples taken at sites of baseline pollution assessment and 67% of samples taken at sites of local environmental monitoring).

Usually, flooding of large Siberian rivers takes long time – from two to four months depending on dryness of year. Long hydroperiod of extensive bottomlands intensifies influence of biology-and-soil formation factors of surface water chemical composition. This results in higher concentration of nitrogen and phenolic compounds occurring due to decay of vegetation remains.

In 2016, standards exceedance of ammonium ion concentration was observed in 40% of samples taken at sites of baseline pollution assessment and in 34% of samples taken at sites of local environmental monitoring. Phenol concentration exceeded MAC in 15% of samples taken at sites of baseline pollution assessment and 20% of samples taken at sites of local environmental monitoring.

In 2016, the chronic toxicity testing conducted on all surface waters samples showed that 40% of samples taken at sites of baseline pollution assessment and 38% of samples taken at sites of local environmental monitoring had chronic toxicity effect.

Concentration of oil products and chlorides in surface waters which characterizes technological pollutant flux in oil production regions has special urgency when assessing ecological situation. In compliance with the Decree of the Autonomous Okrug Government No. 485-p dated 23.12.2011 surface waters sampling for concentration determination of oil products and chlorides as priority pollutants shall be performed at local monitoring points on a monthly basis during free channel period with due account for hydrographic features water bodies.

In 2016, MAC exceedance of chlorides and oil products in surface waters was not identified.

### Bottom sediments

In 2016, 265 samples of bottom sediments were taken and analyzed at 54 license blocks where local environmental monitoring was conducted and 133 samples of bottom sediments – at 22 license blocks where baseline pollution was assessed. The samples were taken once in sampling points of the surface waters.

### **Average values of indicators determined in bottom sediments in 2016**

Indicator	Unit of measure	Average values of determined indicators	
		Baseline pollution assessment	Local environmental monitoring results
pH value	pH unit	5.6	5.9
Organic substance	%	19	6
Chloride ion	mg/kg	62	21
Sulfate ion	mg/kg	36	18
Oil products	mg/kg	23	21
Iron (active form)	mg/kg	286	113
Lead (active form)	mg/kg	0.5	0.8
Zinc (active form)	mg/kg	3.4	1.9
Manganese (active form)	mg/kg	29	13
Chrome (active form)	mg/kg	0.13	0.13
Copper (active form)	mg/kg	3.8	1.7
Nickel (active form)	mg/kg	0.33	0.25
Mercury	mg/kg	0.03	0.025

There are no federal pollution standards set for bottom sediments. Current condition of bottom sediments was assessed against the results of baseline pollution measurement performed in 2016.

Average values of all determined indicators of bottom sediments samples taken as part of local environmental monitoring (except for lead) did not exceed

indicators values of samples taken at license blocks where in 2016 baseline pollution was assessed.

In 2016, all bottom sediments samples underwent acute toxicity testing. Tolerable toxicity rate was specified for 54% of samples taken at sites of baseline pollution assessment and 22% of samples taken at sites of local environmental monitoring.

Oil products concentration in bottom sediments was 21 mg/kg on average (23 mg/kg – baseline pollution) that is described as “cumulative changes area in bottom ecosystem which weaken its biotic (benthic) communities” according to regional standard “Maximum permissible limit (MPL) of oil and oil products concentration in bottom sediments of surface water bodies within Khanty-Mansiysky Autonomous Okrug – Yugra” (approved by Decree of the Autonomous Okrug Government No. 441-P dated 10.11.2004).

### Soils

In 2016, as part of environmental monitoring, the analysis was carried out towards 154 samples taken at 54 license blocks where local environmental monitoring was conducted and 70 soil samples taken at 22 license blocks where baseline pollution was assessed.

#### **Average values of indicators determined in soils in 2016**

indicator	Unit of measure	Average values of determined indicators		MAC	Ratio of average values to MAC	
		Baseline pollution assessment	Local environmental monitoring analysis		Baseline pollution assessment	Local environmental monitoring analysis
1	2	3	4	5	6	7
pH of salt extract	pH unit	3.5	3.7	-	-	-
Organic substance	%	24	15	-	-	-
Exchangeable ammonium	mg/kg	12.6	8.1	-	-	-
Phosphate ion	mg/kg	5.8	7.3	-	-	-
Nitrate ion	mg/kg	6.7	4.1	130	0.05	0.03
Sulfate ion	mg/kg	28	16	-	-	-
Chloride ion	mg/kg	79	31	-	-	-
Oil products	mg/kg	15	31	-	-	-
Benz(o)pyrene	mg/kg	0.00042	0.00046	0.02	0.02	0.02
Iron (active form)	mg/kg	166	27	-	-	-
Lead (active form)	mg/kg	0.73	0.35	6.0	0.13	0.06
Zink (active form)	mg/kg	2.8	1.4	23	0.12	0.06
Manganese (active form)	mg/kg	25	6	100	0.25	0.06
Chrome (active form)	mg/kg	0.24	0.1	-	-	-
Copper (active form)	mg/kg	0.21	0.23	3.0	0.07	0.07
Nickel (active form)	mg/kg	0.36	0.21	4.0	0.09	0.05

Average values of the determined indicators of soils samples taken under local environmental monitoring are at and below the level of average values of soils indicators taken at the license blocks at which baseline pollution research was organized in 2016 and make tenth and hundredth of the approved environmental standards.

Oil products content in soil samples taken at license blocks under development was 31.7 mg/kg on an average which coincides with a baseline concentration of oil products in soil based on Pikovsky's measurement scale (1993).

### Ambient air

In 2016, 163 samples of ambient air were examined at 54 license blocks. The samples were taken at 50 conditional baseline monitoring points (least affected by technological impact and transboundary masses from technological facilities at the blocks) and 113 control points (affected by technological infrastructure facilities).

The determined components list and frequency are regulated by projects of local monitoring of the Company's license blocks located in KhMAO-Yugra. Seven components were under research: methane, carbon monoxide, sulphur dioxide, nitrogen oxide and dioxide, suspended materials and carbon black.

In accordance with environmental monitoring projects ambient air quality assessment was carried out on the basis of comparison of the results of quantitative chemical analysis with MAC and SRLI standards. Levels exceeding hygienic standards were not found.

Local monitoring results prove that in 2016 ambient air condition was satisfactory.

### Snow cover (snow melt)

In 2016, 156 samples of snow cover were examined at 54 license blocks. The samples were taken during the period of maximum stored moisture (March-April) at 51 conditional baseline (not affected by technological impact) and 105 control points.

### **Average value of determined indicators in snow cover (snow melt) in 2016**

Determined indicator	Unit of measure	Average values of determined indicators		Average regional values (ARV)
		Baseline points	Control points	
1	2	3	4	5
pH value	pH unit	5.0	5.1	5.6
Ammonium ion	mg/dm <sup>3</sup>	<0.1	<0.1	0.22
Nitrate ion	mg/dm <sup>3</sup>	1.52	1.42	0.19
Sulfate ion	mg/dm <sup>3</sup>	0.60	0.54	1.18
Chloride ion	mg/dm <sup>3</sup>	0.44	0.65	4.53
Oil products	mg/dm <sup>3</sup>	<0.02	<0.02	0.045
Phenol	mg/dm <sup>3</sup>	0.0012	0.0009	0.001
Total iron	mg/dm <sup>3</sup>	0.31	<0.05	0.029
Lead	mg/dm <sup>3</sup>	<0.001	<0.001	0.002
Zinc	mg/dm <sup>3</sup>	0.057	0.064	0.007
Manganese	mg/dm <sup>3</sup>	0.005	0.003	0.005
Nickel	mg/dm <sup>3</sup>	<0.001	<0.001	0.002

Determined indicator	Unit of measure	Average values of determined indicators		Average regional values (ARV)
		Baseline points	Control points	
1	2	3	4	5
Chrome (VI)	mg/dm <sup>3</sup>	<0.01	<0.01	0.002

There are no approved environmental standards of snow cover pollutants. Snow cover quality assessment was carried out on the basis of comparison of average values of the results of quantitative chemical analysis of samples taken at monitoring points not affected by technological impact (baseline points) and control monitoring points with average regional values (ARV) determined by snow cover monitoring within the Autonomous Okrug in 2007-2010. High concentration of nitrate ions and zink is present at baseline and control monitoring points in relation to the indicated values. Concentration of phenol and total iron in baseline monitoring points exceeds average regional values.

Average values of chlorides and zinc exceeded baseline level of 2016 by 1.5 and 1.1 times respectively. Concentration of other indicators under control is at and below the level of the values determined at the baseline points.

As can be seen from the above, complex analyses of the results of 2016 local environmental monitoring proves that the Company's oil production facilities located within Khanty-Mansiysky Autonomous Okrug – Yugra do not have significant impact on the environment. General environmental situation in the area where the Company operates is satisfactory. The environmental impact of the Company's industrial facilities is described as acceptable, i.e. it maintains the quality of the environment.