

Russian Federation
“SURGUTNEFTEGAS”
PUBLIC JOINT STOCK COMPANY

Summary report
on results of industrial environmental monitoring
within subsoil blocks of “Surgutneftegas” PJSC
in the territory of Khanty-Mansiysky Autonomous Okrug – Yugra
for 2018

Surgut – 2019

Industrial environmental monitoring (IEM) in “Surgutneftegas” PJSC is performed in accordance with GOST R 56059-2014 “Industrial environmental monitoring. 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” PJSC has license №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 Government of Khanty-Mansiysky Autonomous Okrug – Yugra 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 assessment of the initial contamination of natural environment components within subsoil blocks of “Surgutneftegas” PJSC.

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 2018, within subsoil blocks of “Surgutneftegas” PJSC in KhMAO – Yugra the monitoring was performed at 62 subsoil blocks including local environmental monitoring at 55 blocks (hereinafter – LEM) in 1047 sampling points, baseline pollution assessment at 6 blocks (hereinafter – BPA) in 121 sampling points. Monitoring points are fixed in the field by identification marks containing information about number, geographical coordinates and name of the subsoil 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 subsoil blocks of “Surgutneftegas” PJSC in Khanty-Mansiysky
Autonomous Okrug – Yugra**

Natural environment components	Type of monitoring	Number of points	Number of controlled parameters
Ambient air	BPA	6	7
	LEM	166	7
Snowfall	BPA	6	13
	LEM	159	13
Surface waters	BPA	41	22
	LEM	294	22
Bottom sediments	BPA	41	20
	LEM	271	14
Soils	BPA	16	23
	LEM	157	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 research results 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 form until the first day of April of the year following the reporting year.

Surface waters

In 2018, 850 samples of surface waters were taken from 55 subsoil blocks where LEM is performed and 82 samples of surface waters from 6 subsoil blocks where BPA was performed.

Evaluation of the results of BPA and LEM of surface waters at subsoil 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 2018**

Hydrochemical indicator	Unit	Average value of hydrochemical indicators		MAC	Ratio of average values to MAC	
		BPA	LEM		BPA	LEM
pH value	pH unit	6.3	6.7	6.5-8.5	-	-
BOD, ultimate	mgO ₂ /dm ³	2.4	2.5	3.0	0.80	0.83
Ammonium ion	mg/dm ³	0.79	0.62	0.5	1.58	1.24
Nitrate ion	mg/dm ³	0.7	0.6	40	0.017	0.015
Phosphate ion	mg/dm ³	0.12	0.07	0.2	0.6	0.35
Sulfate ion	mg/dm ³	1.7	1.85	100	0.017	0.019
Chloride ion	mg/dm ³	12.9	17.9	300	0.04	0.05
Anionic surfactant	mg/dm ³	<0.025	<0.025	0.1	<0.25	<0.25
Oil products	mg/dm ³	<0.02	<0.02	0.05	<0.4	<0.4
Phenol	mg/dm ³	0.00033	0.00032	0.001	0.33	0.32
Total iron	mg/dm ³	1.06	1.43	0.1	10.6	14.3
Lead	mg/dm ³	0.002	0.002	0.006	0.4	0.4
Zinc	mg/dm ³	0.036	0.036	0.01	3.6	3.6
Nickel	mg/dm ³	0.003	0.0026	0.01	0.3	0.26
Manganese	mg/dm ³	0.071	0.116	0.01	7.1	11.6
Hexavalent chrome	mg/dm ³	<0.01	<0.01	0.02	<0.5	<0.5
Copper	mg/dm ³	0.002	0.002	0.001	2	2
Mercury	mcg/dm ³	<0.01	<0.01	0.01	<1	<1

The landscape of the West Siberian taiga zone is featured by a large number of wetlands. The chemical composition of bog waters is characterized by high acidity which is confirmed by pH value measurement. Over 68% of surface waters samples showed the weak acid reaction.

The acidic media of aquifers, formed due to a high level of marshiness is beneficial for the migration of micro- and macroelements. This determines a high concentration of iron manganese, zinc and copper in the surface waters of the autonomous okrug.

Natural landscape-geochemical conditions cause almost widespread exceedance of the approved standards related to iron (in 100% of samples taken at sites of BPA and 94% of samples taken at sites of LEM), manganese (97% of samples taken at sites of BPA and 79% of samples taken at sites of LEM), zinc (91% of samples taken at sites of BPA and 80% of samples taken at sites of LEM) and copper (38% of samples taken at sites of BPA and 48% of samples taken at sites of LEM).

Usually, high water of large Siberian rivers takes long time from two to four months depending on dryness of the year. A long period of flooding of vast bottomland areas increases the impact of biology-and-soil factors on formation of the chemical compound of surface waters. This translates into increasing concentration of nitrogen, phenol compounds generated by decomposition of plant remains.

In 2018, standards exceedance of ammonium ion concentration was observed in 60% of samples taken at sites of BPA and in 56% of samples taken at

sites of LEM. Phenol concentration exceeded the level of MAC in 12% of samples taken at sites of BPA and in 13% of samples taken at sites of LEM.

Concentration of oil products and chlorides in surface waters which characterizes the technological pollutant flux in oil production regions has special urgency when assessing the ecological situation. In compliance with Decree of the Government of Khanty-Mansiysky Autonomous Okrug – Yugra 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 points of LEM on a monthly basis during free channel period with due account for hydrographic features of water bodies.

In 2018, MAC exceedance of chlorides and oil products in surface waters was not identified.

Bottom sediments

In 2018, 271 samples of bottom sediments were taken and analyzed at 55 subsoil blocks where LEM was conducted and 41 samples of bottom sediments were taken and analyzed at 6 subsoil blocks where BPA was performed. The samples were taken once per year in sampling points of the surface water.

Average values of determined indicators in bottom sediments in 2018

Indicator	Unit of measure	Average values of determined indicators	
		BPA	LEM
pH value	pH unit	5.3	5.8
Organic substance	%	58	28
Chloride ion	mg/kg	88	38
Sulfate ion	mg/kg	25	34
Oil products	mg/kg	22	14
Iron (active form)	mg/kg	636	170
Lead (active form)	mg/kg	0.54	0.41
Zink (active form)	mg/kg	6.91	4.5
Manganese (active form)	mg/kg	36	10
Copper (active form)	mg/kg	0.20	0.20
Nickel (active form)	mg/kg	0.35	0.24
Hexavalent chrome	mg/kg	10	0.68
Mercury	mg/kg	0.025	0.0022

There are no federal pollution standards set for bottom sediments. Current condition of bottom sediments was assessed against results of BPA measurement performed in 2018.

The average values of all determined indicators of bottom sediments samples taken as part of LEM do not exceed or below the average values of indicators of samples taken at subsoil blocks where, in 2018, BPA was performed.

Oil products concentration in bottom sediments with LEM was 14 mg/kg on average which meet the criteria where there are no substantial change of the species diversity and level of indicators that characterize the structure and condition

of biotic (benthic) communities of the bottom system 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 with Decree of the Government of Khanty-Mansiysky Autonomous Okrug – Yugra No. 441-P dated 10.11.2004).

Soils

In 2018, as part of environmental monitoring, 157 samples taken at 55 subsoil blocks where LEM is performed and 16 soil samples were taken at 6 subsoil blocks where BPA was performed.

Average values of indicators determined in soils in 2018

indicator	Unit of measure	Average values of determined indicators		MAC	Ratio of average values to MAC	
		BPA	LEM		BPA	LEM
pH of salt extract	pH unit	3.7	4.0	-	-	-
Organic substance	%	54	37	-	-	-
Exchangeable ammonium	mg/kg	28	8.3	-	-	-
Phosphate ion	mg/kg	75	13.8	-	-	-
Nitrate ion	mg/kg	1.44	1.6	130	0.011	0.012
Sulfate ion	mg/kg	30	33	-	-	-
Chloride ion	mg/kg	77	77	-	-	-
Oil products	mg/kg	17	19	-	-	-
Benz(o)pyrene	mg/kg	0.0004	0.00044	0.02	0.02	0.022
Iron (active form)	mg/kg	200	268	-	-	-
Lead (active form)	mg/kg	0.25	0.37	6.0	0.04	0.06
Zink (active form)	mg/kg	5.49	5.9	23	0.24	0.26
Manganese (active form)	mg/kg	23	18	100	0.23	0.18
Copper (active form)	mg/kg	0.20	0.21	3.0	0.07	0.07
Nickel (active form)	mg/kg	0.20	1.5	4.0	0.05	0.37
Hexavalent chrome	mg/kg	6.59	2.3	-	-	-

The average values of determined indicators of soil samples taken as part of LEM (except for lead) do not exceed or below the indicators values of samples taken at subsoil blocks where, in 2018, BPA was performed make up tenths and hundredths of established environmental standards.

Oil products concentration in soil samples taken at blocks under development was 19 mg/kg on an average which coincides with a background content of oil products in the soil based on Pikovsky’s measurement scale (1993).

Ambient air

In 2018, 322 samples of ambient air from 55 subsoil blocks were examined. These samples were taken at the subsoil blocks where LEM is performed. The samples were taken at 55 baseline monitoring points (least affected by technological impact and transboundary masses from technological facilities at the blocks) and 267 control points (affected by technological infrastructure facilities). Also, 12 samples of air were taken and analyzed at 6 subsoil blocks where BPA was performed.

Seven components were under research: methane, carbon monoxide, sulphur dioxide, nitrogen oxide and dioxide, suspended materials, carbon black.

In accordance with LEM 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.

Monitoring results prove that in 2018 ambient air condition was satisfactory.

Snow cover (snow melt)

In 2018, 159 samples of snow cover from 55 subsoil blocks were examined. These samples were taken at the subsoil blocks where LEM is performed. The samples were taken during the period of maximum stored moisture (March-April) at 55 baseline monitoring points (not affected by technological impact) and 104 control points. Also, 6 samples of snow were taken and analyzed at 6 subsoil blocks where BPA was performed.

Average values of determined indicators In the snow cover (melted snow) in 2018

Determined indicator	Unit of measure	Average values of determined indicators		Average regional values (ARV)
		Baseline points	Control points	
pH value	pH units	5.1	5.2	5.6
Ammonium ion	mg/dm ³	0.51	0.42	0.22
Nitrate ion	mg/dm ³	1.16	1.26	0.19
Sulfate ion	mg/dm ³	1.9	1.77	1.18
Chloride ion	mg/dm ³	0.84	0.75	4.53
Oil products	mg/dm ³	<0.02	<0.02	0.045
Phenol	mg/dm ³	0.0008	0.0008	0.001
Total iron	mg/dm ³	<0.05	<0.05	0.029
Lead	mg/dm ³	0.0016	0.002	0.002
Zink	mg/dm ³	0.038	0.035	0.007
Manganese	mg/dm ³	0.0026	0.0029	0.005
Nickel	mg/dm ³	0.0012	0.0011	0.002
Chrome	mg/dm ³	<0.01	<0.01	0.002

There are no environmental standards set for snow cover. Snow cover quality appraisal was carried out on the basis of comparison of the average values of the results of quantitative chemical analysis of samples taken at monitoring checkpoints

and points that are not affected by the technological impact (baseline) as well as of the average regional values obtained through the monitoring of snow cover in the territory of the autonomous okrug in the period of 2007-2010. The average concentration of all controlled indicators in the snow samples taken at the control points do not exceed values determined at baseline points. High concentration of ammonium ion, nitrate ion, sulphate ion, zinc is present in background points and checkpoints of monitoring against the ARV of controlled indicators.

Thus, the comprehensive analysis of the results of LEM within subsoil blocks of "Surgutneftegas" PJSC for 2018 shows that the Company's oil production facilities located within Khanty-Mansiysky Autonomous Okrug – Yugra, do not have a significant negative environmental impact on the environment. Overall characteristic of the environmental situation in the area where the Company operates is favorable. The impact of the Company's production facilities is described as acceptable, i.e. it maintains the quality of the environment.