

CONCLUSION

1. On the condition of Lake Baikal according to indicators observed in 2019.

Lake level. In 2019, generally favourable conditions developed for the regulation of the Lake Baikal water level by the useful inflow, and therefore the filling of the lake was high and sufficient to ensure domestic water supply. The level limit values, determined in resolution No. 1667 of the Government of the Russian Federation dated December 27, 2017 “On Maximum and Minimum Water Level of Lake Baikal in 2018-2020”, have not been reached.

As of 01/01/2019, the average water level in Lake Baikal was around 456.64 metres according to the Pacific Ocean system, i.e. 0.66 metres higher than on the corresponding date in 2018 (01/01/2018 - 455.98 m PO) and 0.21 m above the average long-term value of the level (456.43 m PO).

The drawdown of Lake Baikal was completed by May 08, 2019 at the level of 456.23 m PO.

Break-up of Lake Baikal from ice sheet occurred 2-4 days earlier than the standard schedule. The clearing from ice in the southern and middle parts of Lake Baikal occurred 3-8 days earlier than the average long-term period, of the northern part - 2-3 days later than the standard schedule and, as a result, an increase in the inflow into the lake occurred earlier than usual.

The filling of Lake Baikal began on May 9, 2019 and continued until September 18. The water level during the period of filling increased by 0.65 m to the mark of 456.88 m PO, which is 0.07 m lower than the maximum mark of 2018 (456.95 m PO).

The drawdown of the Lake Baikal water level began on September 19, 2019 and at the end of the year the level dropped to 456.48 m PO.

The observations of the surface layer and water layer in 2019 were carried out by the Irkutsk Centre of Hydrometeorology and Environmental Monitoring of Roshydromet (Federal Service for Hydrometeorology and Environmental Monitoring of Russia):

- In South Baikal — in the area of influence of waste waters of Baikalsk town KOS (wastewater treatment plant);
- in the area ports of Southern Baikal (Bolshoye Goloustnoye settlement, Kultuk settlement, Baikal settlement and Vydrino settlement);
- at the Angara River source;
- in the area of the Selenga Shallow Waters;
- in the area of Barguzin Bay;
- in North Baikal – in the area of the Baikal-Amur Mainline route influence;
- at baseline deep-sea stations of benchmark section, running along Lake Baikal in its central part;

At baseline stations of benchmark section of Lake Baikal in 2019, the results of hydrochemical observations showed that the average content of oxygen dissolved in the water, as well as mineral substances, nitrite nitrogen, nitrate nitrogen, ammonia nitrogen, phosphates, silicon, oil products, sulphates, chlorides, synthetic surface active substances, lead, manganese, nickel, cadmium, copper, zinc, cobalt, silver, aluminium, chromium and pH values were within the permissible limits. No organochlorine pesticides (p,p-DDT (dichlorodiphenyltrichloroethane), p,p-DDD (dichlorodiphenyldichloroethane), p,p-DDE (dichlorodiphenylethylene), α -HCH (alpha-hexachlorocyclohexane), γ -HCH (gamma-hexachlorocyclohexane) were detected in the water of Lake Baikal. At all reference section baseline stations (with the exception of Zavorotnaya Creek station), the average annual concentrations of phenols were recorded at the MPC level.

Compared to 2018, in 2019 the average content of nitrate and ammonium nitrogen increased by 4.0 and 1.7 times, respectively; suspended solids, silicon, total and organic phosphorus - 1.2 time, organic carbon - 1.1 time; manganese and zinc - 2.0 times, iron - 1.5 times, cadmium - 1.3 times, cobalt - 1.1 time. The average concentration of nitrite nitrogen decreased by 2.0 times, chlorides - 1.3 times; chromium - 2.0 times, aluminium - 1.8 times, lead - 1.3 times, beryllium - 1.1 time, mercury - down to zero values (from 0.001 $\mu\text{g} / \text{dm}^3$). The

average content of oxygen, minerals, oil products, sulphates, mineral phosphorus, nickel, copper and silver dissolved in water remained at the level of 2018.

According to assessment by specific combinatorial water pollution index the water quality was characterised as 1st class, “conditionally clean” at all monitoring stations of Baikal Lake. In comparison with 2018, the quality of the lake water remained at the same level.

In 2019, in the area of Lake Baikal, adjacent to the territory of the Baikal Pulp and Paper Mill, the average concentrations of non-sulphate sulphur increased by 2.0 times, iron - 1.5 times, zinc - 1.3 times, nickel - 1.1 time compared to baseline values. The average values of the concentrations of oxygen dissolved in water, mineral substances, oil products, organic carbon, sulphates, chlorides, total sulphur, manganese, cobalt, copper, chromium, mercury were at the baseline level. The average concentrations of suspended solids in the landfill water area were 1.5 times lower than the baseline level, silicon, lead and aluminium - 1.2 times, cadmium, silver and beryllium - 1.1 times.

During 2019, in the control 100-meter section the average concentration of phenols corresponded to the MPC level. The average content of other observed substances (mineral and suspended substances, sulphates, chlorides) did not exceed the permissible limits. The maximum value of suspended solids exceeded the norm by 1.5 times (in March), phenols - 3 times (in June). In addition, the maximum concentration of phenols was exceeded up to double MPC in February, March, April and August. The range of pH values was within the permissible limits.

Compared to 2018, in the area affected by wastewater from the waste water treatment plant of the city of Baikalsk, the average content of chromium in the water of Lake Baikal increased by 1.7 times, manganese and cobalt - 1.6 times, silver - 1.4 times, non-sulphate sulphur, organic carbon and nickel - 1.3 times, silicon, lead and zinc - 1.2 times, beryllium - 1.1 times. The concentration of suspended solids decreased by 3.0 times, cadmium - 1.7 times, aluminium - 1.6 times, iron - 1.2 times, chlorides - 1.1 times, mercury - down to zero values (from 0.005 µg / dm³). The average content of minerals, oxygen dissolved in water, oil products, sulphates, total sulphur remained at the level of 2018. The range of pH values has not changed significantly.

In 2019, the average concentrations of regulated substances in the areas of South Baikal ports did not exceed the established water quality standards for water bodies of fishery significance, with the exception of phenols. The average annual content of phenols exceeded the MPC by 2.0 times in the port of Baikal settlement, was at the level of MPC in the ports of Vydrino settlement and Baikalsk city.

In comparison with 2018, the average content of nitrate nitrogen increased by 6.7 times, suspended solids by 1.5 times, organic carbon by 1.2 times, oil products - from zero values to 0.01 mg / dm³; the average content of chlorides and organic phosphorus decreased by 1.3 times, sulphates and total phosphorus by 1.1 times.

In the middle part of Lake Baikal in the area of the Barguzin Bay and the Selenginsky shallow water, the average and maximum concentrations of mineral substances, nitrite nitrogen, nitrate nitrogen, ammonia nitrogen, phosphates, silicon, oil products, sulphates, and chlorides did not exceed MPC limits. The content of oxygen dissolved in the water and the range of pH values were within permissible limits. Compared to 2018:

- in the area of the Selenga shallow water, there was an increase in the average values of the concentrations of nitrate nitrogen by 3.0 times, silicon and mineral phosphorus - 2.0 times, total phosphorus - 1.5 times, sulphates and organic carbon - 1.3 times, nitrogen ammonium - by 1.2 times, oil products - from zero values to 0.02 mg / dm³, nitrite nitrogen - from zero values to 0.001 mg / dm³; decrease - suspended solids by 1.3 times, chlorides - by 1.2 times, dissolved oxygen in water - by 1.1 times;

- in the area of the Barguzin Bay, the average content of nitrate nitrogen increased by 10.3 times, organic phosphorus - 2.2 times, silicon - 1.8 times, total phosphorus - 1.6 times, ammonium nitrogen - 1.4 times, suspended solids - 1.3 times. In 2019, there was a decrease in mineral phosphorus by 2.0 times, chlorides by 1.1 times.

In the north of Lake Baikal (Baikal-Amur Mainline), both average and maximum concentrations of mineral substances, nitrite nitrogen, nitrate nitrogen and ammonia nitrogen, phosphates, silicon, oil products, sulphates, chlorides, lead, manganese, nickel, cadmium, iron, zinc, cobalt, silver, aluminium, chromium and mercury didn't exceed MPC.

Compared to 2018, in 2019 the concentration of nitrate nitrogen increased by 4.2 times, ammonium nitrogen - 1.6 times, organic phosphorus - 1.2 times, total phosphorus and organic carbon - 1.1 times; manganese - 4.7 times, zinc - 2.5 times, cobalt - 1.6 times, cadmium - 1.4 times, nickel - 1.3 times, iron - 1.1 times. There was a decrease in the concentration of mineral phosphorus by 1.7 times, chloride - by 1.2 times; lead - 2.2 times, chromium - 1.8 times, aluminium - 1.6 times, mercury - down to zero values (from 0.005 $\mu\text{g} / \text{dm}^3$).

Bottom sediments. In 2019, in the area of municipal wastewater discharge in the city of Baikalsk, an increase in organic carbon and difficult to hydrolyse carbohydrates, organic nitrogen was noted in the bottom sediments, the value calculated as the ratio of difficult to hydrolyse carbohydrates + lignin-humus complex to total organic matter in 1.7; 1.2; 1.1 times, respectively. A decrease in easy to hydrolyse carbohydrates and lignin-humus complex by 1.2 times was noted. Compared to 2018, there was an increase in the average concentrations of lead and nickel by 1.3; 1.1 times, respectively, and a decrease in the concentrations of iron, cadmium, zinc, cobalt, copper, manganese by 23.8; 22.0; 2.5; 2.1; 1.5; 1.2 times, respectively. The state of bottom sediments improved in 2019 as noted based on the most representative indicator — sulphide sulphur content. The average sulphide sulphur content decreased by 5.3 times compared to 2018.

In bottom sediments at the forefront of the river Selenga, the average organic carbon content increased by 1.3 times; the content of sulphide sulphur decreased by 5.2 times, easy to hydrolyse carbohydrates - by 4.7 times, difficult to hydrolyse carbohydrates - by 1.7 times; for the lignin-humus complex - 1.5 times. The average organic nitrogen content and the value calculated as the ratio of difficult to hydrolyse carbohydrates + lignin-humus complex to total organic matter remained at the level of 2018.

In bottom sediments in the north of the lake, in the zone of influence of the BAM route, the average content of organic nitrogen and organic carbon increased by 1.7 and 1.2 times, respectively. There was noted a decrease in the content of easy to hydrolyse carbohydrates by 1.3 times, difficult to hydrolyse carbohydrates - by 1.2 times, the value calculated as the ratio of difficult to hydrolyse carbohydrates + lignin-humus complex to total organic matter - by 1.1 times. The average content of sulphide sulphur in bottom sediments decreased by 2.9 times.

Hydrobiological societies. Hydrobiological observations in the area of the Baikalsk waste water treatment plant in 2019 have shown that the data on the number of bacteria groups detected in surface waters and soils are comparable to the long-term ones. The area of contamination by the state of bacterioplankton in 2019 varied from 4.6 km^2 during the ice survey to 8.5 km^2 in August. In June it was 7.6 km^2 . The area of contamination based on the state of bottom sediment microflora varied from 2.2 km^2 during the ice survey to 3.3 km^2 in September.

The phytoplankton structure remained poly-dominant throughout the season. During the freeze-up period, the combined group of unidentified cocci (7.7-59.0%) was mainly leading. The second-third positions in the dominant structure were occupied by native algae of Lake Baikal: cryptophytic *Rhodomonas pusilla* (Bachmann) Javornicky (up to 40.0%) and small-celled golden *Chrysochromulina parva* (up to 38.7%).

Throughout the season, in hydrobiological samples, we found a charophyte of the genus *Spirogyra* Link, which is unusual for Lake Baikal. During the ice survey, filamentous was recorded in half of the zoobenthos samples. The largest amount was recorded in shallow waters at the place of release of conditionally clean waters (at the depth of 19-35 m).

In the area of Northern Baikal, the average of heterotrophic organisms, as compared with the 2018 data, increased: by 1.6 times in summer, by 1.3 times in autumn. During the season, the average of heterotrophic organisms slightly decreased from June to September (from 254 to 234 c / ml). In the surface layer of water, the total range of values of bacterioplankton groups was:

heterotrophs - 7-1 192 cells / ml, phenol-oxidizing bacteria - 0-113 cells / ml, hydrocarbon-oxidizing - 0-10² cells / ml.

The range of phytoplankton abundance in the northern part of Lake Baikal was within 362.382-7 368.597 thousand cells / l, biomass - 33.885-3 086.068 mg / m³. Compared to the data of 2018, in June, there was a decrease in the number by 1.6 times, with an increase in biomass by 1.4 times, in September, the average indicators decreased: the number - by 2.9 times, biomass - by 2.3 times.

Charophyte of the genus *Spirogyra Link* was found in zooplankton samples taken at most coastal stations. In June, filaments was found along the western coast at all stations from Cape Tolsty to the port of Severobaikalsk, along the northernmost end of the lake - at stations located 0.5 km from the mouths of the Kichera and Upper Angara rivers, along the eastern coast - 0.5 km from the mouth of the river Tompuda and 1 km from the coast opposite the Khakusy Cape. In September, the alga was again found at most stations along the west coast and northern tip.

The total average values of the zooplankton abundance and biomass for the studied area were 23.531 thousand ind./m³ and 391.93 mg / m³, which is 1.3 and 1.7 times lower than the corresponding values of 2018. By autumn, the average quantitative indicators slightly decreased (number - insignificantly, biomass - 1.3 times) and amounted to 22.775 thousand ind./m³ and 296.83 mg / m³, respectively.

Oligochaetes almost completely formed the macrozoobenthos community. In shallow waters, they accounted for 86.0% of the abundance and 90.1% of the biomass. In the deep-water zone, they accounted for 91.4 and 89.8%, respectively. The role of the rest of the zoobentonts in building the community is insignificant.

In the area of the Selenga Shallow Waters, the abundance of heterotrophic bacteria in the surface water layer (0.5 m) in 2019 varied from 131 to 1120 c/ml. The average number (412 cells / ml) is 7.6 times higher than last year.

In the area of the Selenga shallow water in September 2019, the amplitude of phytoplankton abundance varied from 1,053.694 to 2,254.022 thousand cells / l, and biomass - from 140.083 to 391.463 mg / m³. Compared to the results of 2018, the average phytoplankton indicators in the studied water area increased: the abundance - by 1.8 times (up to 1,737.455 thousand cells / l), biomass - by 2.6 times (up to 220.782 mg / m³).

Charophyte of the genus *Spirogyra Link* was recorded in small quantities in zooplankton samples taken at half of the stations, mainly in the southwestern part of the Selenga shallow water. The most massive accumulation was observed opposite the Prorva Strait.

The average values of the zooplankton abundance and biomass were 24.332 thousand ind./m³ and 215.15 mg/m³, which is 1.3 and 3.1 times respectively lower than in 2018.

Compared to 2018, the average number of zoobenthos (27,297 ind./m²) increased by 1.6 times, biomass (31.35 g / m²) - 2.5 times. The majority of benthocenosis was distributed among three groups of organisms. In general, oligochaetes accounted for - 76.5%, nematodes - 12.7%, amphipods - 7.2%. The core of the biomass consisted of oligochaetes - 85.7% and amphipods - 13.2%.

In the Maloe More area, the number of heterotrophic bacteria varied in the range from 70 to 274 cells / ml. The average value was 183 cells / ml. No hydrocarbon-oxidizing bacteria were found in the samples. In soil samples, the number of heterotrophs varied from 3.10 to 12.70 thousand cells / g of wet mud. In the Maloe More area on Lake Baikal in September 2019, the number of phytoplankton varied within 1,260.306-1,437.041 thousand cells / l, the biomass - 169.368-197.908 mg / m³.

The fish fauna and population of Baikal seal (nerpa). In 2019, the total number of breeding stock of Baikal omul coming into spawning streams amounted to 1.8 million ind., i.e. the same as the 2018 level (1.75 million ind.), but significantly lower than the long-term annual average (4.3 million ind.). In the Upper Angara River, the number of spawning population (0.93 million ind.) was 2.4 times lower than the long-time annual average. 0.088 million individuals of omul breeding stock were caught in the rivers of the Posolsky Sor (the

Bolshaya River and the Kultuchnaya River) for the purposes of reproduction. In 2017-2019, omul biomass was estimated at the level of 7.4-7.7 thousand tons. The total allowable catch of omul for 2020 is approved at the level of 2019 - in the amount of 150 tons.

The reserves of other wild-caught fish remain fairly stable. The total allowable catch of whitefish and grayling for 2020 is set at 30 tons for each species. The recommended catch of less valuable ordinary fish (common roach, common dace, perch and crucian carps) amounted to 1,170 tons (2018 - 1,200 tons) in 2019, for 2020 it was approved in the amount of 975 tons.

The total Baikal seal population in 2019 amounted to 129.8 thousand individuals. The allowable annual seal harvesting amounts to 5 to 6 thousand individuals. Taking into account the ban on industrial hunting, the allowable harvest was approved in the amount of 3,000 individuals for 2019-2020.

Rivers flowing into Baikal. Observations in the Lake Baikal basin on the territory of the Republic of Buryatia were carried out on 25 rivers; water samples were taken at 42 sections. The excess of MPC in the waters of the rivers of Lake Baikal basin was registered for 12 (in 2018 - 12) ingredients of the chemical composition out of 17 recorded.

Compared to 2018, in 2019 there was an increase in the average concentrations of organic substances (COD), nitrites, nitrates, phosphorus phosphates, total iron, copper, zinc, manganese, aluminium, oil products and fluorides. A slight decrease in concentrations was noted for the content of organic substances (according to BOD₅), volatile phenols, sulphates and nickel.

The pollution of the waters of the Baikal basin with manganese, copper and zinc was determined to be typical. At the same time, the level of pollution with manganese is high, copper - medium, nickel - low. According to the content of total iron and volatile phenols, persistent pollution was noted; for organic substances (COD, BOD₅), aluminium, oil products and fluorides - unstable pollution; for sulphates, nitrite nitrogen - sporadic average level pollution.

In 2019, the quality of Lake Baikal surface water hydro-chemical indicators was mainly affected by hydrological and climatic conditions, as well as the anthropogenic factor.

Groundwater. In general, no significant changes in the state of the underground hydrosphere were noted within the BNT in 2019.

In the Republic of Buryatia in 2019, the position of the average annual groundwater levels of the quaternary deposits of the intermontane artesian basin was higher than last year, which led to an increase in average long-term values. The maximum technogenic load on groundwater is concentrated in the territories of industrial centers, where mining enterprises, operating plants, large oil depots, warehouses of fuels and lubricants, etc. are located. The groundwater of unprotected aquifers is polluted by a wide range of components, mainly II and III hazard class; in relation to 2018, there is an increased content of phenols, heavy metals, nitrogen-containing compounds, less often oil products.

On the territory of the Irkutsk region within the BNT Central Ecological Zone, the baseline groundwater condition in 2019 was at the level of previous years and was in its natural state. As in 2018, the contamination was observed only in local areas — within the territories of fuel filling stations, within the area of influence of the Baikal Pulp and Paper Mill facilities (industrial site, deposits of sludge lignin and ash-disposal areas of thermal power plant), where an excess of manganese, ammonium, iron and magnesium was noted.

The Trans-Baikal Krai groundwater conditions were not monitored within the BNT in 2019. According to the analysis results of the characteristics of the main deposits of groundwater, basic patterns of groundwater formation remain.

Endogenous geological processes. The 2019 level of seismic activity was below the level of 2018. During 2019, the intensity of earthquake shocks did not exceed 5 points. In 2019, 56 earthquakes with an energy class $K = 9.6-12.8$ were registered within the BNT, 38% of them, or 21 events with $K = 9.6-12.5$ occurred within the boundaries of the BNT CEZ.

Exogenous geological processes. In 2019, no catastrophic EGP manifestations were observed. In 2019, a low degree of the talus phenomena was observed. The processes of ravine formation proceed with varying degrees of intensity — in Irkutsk region the

amplitude of this phenomenon in 2019 was characterized as low, while in the Republic of Buryatia the activity was average. The landslide activity was low despite the large amount of precipitation. In 2019, the manifestation of stream bank erosion processes of the Selenga River was characterized by low activity. The activity of stream bank erosion of the Irkut River was low and was observed during the summer river flooding. The abrasion of the shores of Lake Baikal in 2019 manifested itself with a low degree of activity. The degree of the process of aeolian accumulation in 2019 was below the average long-term value staying at an average level. Flooding in 2019 was characterized by low activity; the process manifested itself during the period of seasonal rise in the level of groundwater.

Mineral resources and subsoil use. The scale of subsoil use within the Baikal Natural Territory in 2019 increased compared to 2018. In the Irkutsk region, the number of explored and discovered deposits within the BNT CEZ has increased, as well as the number of valid licenses. In the Republic of Buryatia, the number of recorded deposits has increased both on the territory of the CEZ and within the BNT BEZ. In the Trans-Baikal Territory, data on the number of explored deposits in the BNT BEZ also increased.

Lands. In the course of 2019 some insignificant redistribution of land between categories took place. The changes affected the following categories of lands: residential lands increased by 1.78%; industrial lands increased by 0.54%; reserve lands decreased by 0.15%; agricultural lands decreased by 0.13%; forest reserve lands decreased by 0.002%; lands of specially protected areas increased by 0.001%.

Forests. In 2019, the BNT area covered with forest vegetation decreased in total by 5.49 thousand hectares (0.02 %) down to 25,157.06 thousand hectares. In the Republic of Buryatia and the Trans-Baikal Krai, the area increased by 0.71 thousand ha and 7.21 thousand ha, respectively. In Irkutsk Region the area decreased by 13.41 thousand ha.

In 2019 compared to 2018, the calculated felling rate of mature and over-mature forest stands in BNT decreased by 8% compared to 2018 and amounted to 15,842.8 thousand m³ (in 2018 – 17,269.5 thousand m³). In 2019, the felling volume of mature, over-mature forest stands in BNT decreased by 2.8% and amounted to 4,579.2 thousand m³ (in 2018 - 4,710.6 thousand m³). In the Irkutsk region, the felling volume increased by 7.8%, in the Republic of Buryatia it decreased by 6.7%, in the Trans-Baikal Krai it decreased by 43.9%.

The improvement felling volume has decreased compared to 2019 by 27% and amounted to 24.97 thousand ha (in 2018 - 34.28 thousand ha). In the Republic of Buryatia, the felling volume decreased by 27%, in the Trans-Baikal Krai by 50%, in the Irkutsk region - by 16%. In 2019, sanitary felling was carried out on an area of 5.43 thousand hectares (in 2018 - 11.18 thousand hectares).

In 2019, the number of fires increased by 51% compared to 2018 and amounted to 889 fires (in 2018 - 589 fires). The total area affected by fires increased by more than 10 times compared to 2018 and amounted to 311.23 thousand hectares (in 2018 - 28.38 thousand hectares).

Ambient air. In 2019, the level of air pollution in the city of Baikalsk decreased in comparison with 2018 from “high” to “elevated”, in other settlements of the BNT CEZ - did not change and was assessed as “low”.

The quality of atmospheric air within the BNT Buffer Ecological Zone in 2019, compared to 2018, did not change. In 2019, the level of pollution in Ulan-Ude and Petrovsk-Zabaikalsky, as well as in the village of Selenginsk, was characterized as “very high”. The city of Ulan-Ude and the village of Selenginsk are included in the Priority list of cities in Russia with the highest level of air pollution. The air quality indicators in Gusinoozyorsk also did not change and were characterized by a “high” level of pollution.

The level of atmospheric air pollution, as in 2018, remained at a “very high” level in the BNT’s ecological zone of atmospheric influence in the cities of Irkutsk, Shelekhov, Usolye-Sibirskoye and Cheremkhovo. In Svirsk, the level of pollution was also assessed as “very high”.

In Angarsk, the level of atmospheric air pollution dropped from "very high" to "high". The pollution level in the village of Meget was rated "provisionally low."

Climatic conditions. In 2019, the average annual air temperature within BNT exceeded the multiyear values by 1.0-2.7°C due to the significant positive temperature anomalies observed for the majority of the year. The largest positive anomalies were observed in March (4-7 °C), June - August (1-4 °C), September (2-3 °C). In the Republic of Buryatia, in some seasons of the year, abnormally warm weather was observed with average daily temperatures above the climatic norm by 10-12 °C. In Ulan-Ude on January 23, March 16-17, September 1, September 25, November 7-8, the daily maximum levels were exceeded; on October 29, the daily maximum of 2006 was repeated. During the remaining period, the average monthly air temperature in the BNT was close to the long-time annual averages. During the warm season, the combination of high temperatures, dry air and strong winds created favourable conditions for the spread of forest fires. In a number of areas of the Trans-Baikal Krai in the summer of 2019, an extreme fire hazard was observed.

2. Anthropogenic impact. In 2019, 429.1 thousand tons of pollutants were released into the atmosphere on the Baikal Natural Territory.

The volume of wastewater discharges in 2019 decreased by 11.7% and amounted to 469.44 million m³ (in 2018 - 531.61 million m³). In the Republic of Buryatia, the volume of wastewater discharges decreased by 63.4 million m³ and amounted to 448.3 million m³.

In the Irkutsk region, Lake Baikal is contaminated by municipal unitary enterprise "Sewer Treatment Facilities of the Baikal Municipality". In 2019, 1.56 million m³ of contaminated sewage was discharged into Lake Baikal (1.32 million m³ in 2018).

In the Trans-Baikal Krai, the volume of wastewater discharges increased by 1.6 million m³ and amounted to 19.1 million m³ (in 2018 - 17.5 million m³).

The total mass of pollutants entering Lake Baikal amounted to 228.233 tons (in 2018 - 238.136 tons), which is 9.903 tons or 4.16% less than in 2018. In 2019, such pollutants as BOD_{full} entered Lake Baikal with wastewater - 7.272 tons (in 2018 - 9.164 tons), sulphate anion - 63.354 tons (in 2018 - 82.565 tons), chlorides - 37.776 tons (in 2018 - 33.573 tons), suspended solids - 11.912 tons (in 2018 - 14.522 tons), nitrate anion - 66.144 tons (in 2018 - 69.939 tons), nitrite anion - 0.23 tons (in 2018 - 0.22 tons), phosphates - 0.508 tons (in 2018 - 1.06 tons), nonionic synthetic surface active agents - 0.091 tons (in 2018, synthetic surface active agents - 0.155 tons), ammonium ion - 0.36 tons (in 2018 ammonium nitrogen - 0.164 tons), aluminium - 1.624 tons (in 2018 - 0.412 tons), oil products (oil) - 0.025 tons (in 2018 - 0.025 tons), COD - 38.937 tons (in 2018 - 26.337 tons).

The volume of waste generation in 2019 amounted to 190,819.3 thousand tons.

The area of the Baikal Pulp and Paper Mill. In 2013 the Government of the Russian Federation adopted a resolution on the closure of OAO Baikal Pulp and Paper Mill. On September 14, 2013 the main production activities, associated with the production of sulphate viscose pulp, were discontinued. After the closure of the Baikal Pulp and Paper Mill the main remaining environmental problem is waste disposal, remediation of sludge deposit areas, rehabilitation of the industrial site and elimination of contaminated groundwater mount.

The volume of water withdrawal from Lake Baikal by OAO Baikal Pulp and Paper Mill in 2019 amounted to 1,315.03 thousand m³ (in 2018 - 1,211.43 thousand m³). The increase in water withdrawal from Lake Baikal is associated with an increase in water transfer for the needs of utilities and heat power industry. In general, the volume of water use in the area of the Baikal Pulp and Paper Mill, as compared with 2018, increased: water intake increased by 103.6 thousand m³ (8.6%); wastewater discharge increased by 239.3 thousand m³ (81.1%).

In 2019, as a result of the activities of the Baikal Pulp and Paper Mill, solid municipal waste was generated in the amount of 8,460 tons to be transferred to the regional operator.

Baikal-Amur Mainline Route Zone. In 2019, discharge of harmful substances into the atmosphere from stationary sources amounted to 0.416 thousand tons, including 0.314

thousand tons in the city of Severobaikalsk. The main contribution to atmospheric air pollution from stationary sources is made by land transport enterprises and enterprises for the production, transmission and distribution of electricity, gas, steam and hot water.

Wastewater discharge into the rivers of the BAM zone in 2019 was: in the city of Severobaikalsk to the river Tyya - 1.0 million m³; in the village of Kichera to the river Kichera - 0.04 million m³; in the village of Angoya to the river Upper Angara - 0.004 million m³; in the village of Novy Uoyan to the river Upper Angara - 0.03 million m³; in the village of Yanchukan to the river Upper Angara - 0.003 million m³; in the village of Tonnelny to the river Itykit - 42.95 million m³.

In 2019, 369.76 thousand tons of waste were generated in the Severobaikalsk region, including 0.374 thousand tons in the city of Severobaikalsk.

3. Measures aimed at conservation of Lake Baikal taken in 2019 were as follows.

Statutory regulation and coordination of Lake Baikal conservation. The 14th session of the Interdepartmental Commission on Conservation of Lake Baikal was held on August 8, 2019 in Moscow. At the meeting, the following issues were considered: on the course of implementation of measures within the framework of the Federal Target Program "Protection of Lake Baikal and the Socio-Economic Development of the Baikal Natural Territory for 2012-2020" and the Federal Project "Conservation of Lake Baikal" of the National Project "Ecology; on the preparation of the draft order of the Ministry of Natural Resources of Russia "On Amendments to the Order of the Ministry of Natural Resources and Ecology of the Russian Federation dated 05/03/2010 No. 63 "On the approval of the standards for maximum permissible impacts on the unique ecological system of Lake Baikal and the list of hazardous substances, including substances related to categories of especially hazardous, highly hazardous, hazardous and moderately hazardous for the unique ecological system of Lake Baikal"; on the implementation of measures within the framework of the fulfilment by the Russian Federation of obligations in the field of protection of Lake Baikal as a UNESCO World Natural Heritage Site; on conducting inspections of objects of accumulated environmental damage as a result of the activities of the Baikal Pulp and Paper Mill.

Federal Law No. 194-FZ of July 18, 2019 "On Amendments to the Federal Law "On the specific features of providing to citizens land plots in state or municipal ownership and located in the territories of subjects of the Russian Federation that are part of the Far Eastern Federal District and on amending certain legislative acts of the Russian Federation" and certain legislative acts of the Russian Federation in connection with the inclusion of the Republic of Buryatia and the Trans-Baikal Territory in the Far Eastern Federal District" amendments have been made to paragraph 1 of Article 3 of the Federal Law of 01/05/1999 No. 94-FZ "On the protection of Lake Baikal".

Measures for conservation of Lake Baikal. Protective activities for Lake Baikal were funded from the Federal budget in 2019 in the amount of 2,406.18 million Rubles (in 2018 – 2,903.39 million Rubles), of which 2,329.14 million Rubles was allocated under the federal project "Preservation of Lake Baikal" within the framework of the Federal Target Program "Conservation of Lake Baikal and Socio-economic Development of the Baikal Natural Territory for 2012-2020" and 77.04 million Rubles — from other sources. The distribution of funds by type of expenditure was as follows: the capital investments amounted to 1,724.65 million Rubles while R&D amounted to 16.27 million Rubles and 665.26 million Rubles were allocated for other purposes. The budgets of the constituent entities of the Russian Federation spent 446.71 million Rubles on the projects and activities associated with Lake Baikal conservation, Funds raised from extrabudgetary sources amounted to 418.7 million Rubles.

The environmental monitoring in 2019 was carried out by the organisations of Roshydromet (Federal Service for Hydrometeorology and Environmental Monitoring of Russia), Rosprirodnadzor (Russian Federal Service for Supervision of Natural Resource Management), Rosvodresursy (Russian Federal Water Resources Agency), Rosnedra (Russian Federal Subsoil

Resources Management Agency), Rosrybolovstvo (Russian Federal Agency for Fishery), Rosreestr (Russian Federal Service for State Registration, Cadastre and Cartography) as well as by the competent authorities of federal constituent entities — the Republic of Buryatia, Irkutsk region and Trans-Baikal Krai. In addition, some accounting and control records acquired by Rostekhnadzor (Russian Federal Service for Ecological, Technological and Nuclear Supervision), Rospotrebnadzor (Russian Federal Service for Supervision of Consumer Rights Protection and Human Well-Being), Rostransnadzor (Russian Federal Service for Supervision of Transport), Rosstat (Russian Federal State Statistics Service) and the Russian Ministry of Emergency Situations were used for the purpose of BNT monitoring.

The existing system of monitoring of the unique environmental system of Lake Baikal and Baikal Natural Territory is in need of the reconstruction of the monitoring network of Roshydromet (Federal Service for Hydrometeorology and Environmental Monitoring of Russia), restoration of the full scheme of hydro-chemical and hydro-biological monitoring, improvement and replenishment of laboratory facilities with up-to-date devices, rehabilitation of Lake Baikal research fleet, further development of aerospace monitoring, optimisation of statistical reporting and improvement of interaction of competent authorities in the sphere of state environmental monitoring.

The 2019 data on water quality of the surface layer indicate that there are areas with a stable negative impact of economic activities on the ecosystem. They suffer anomalies in the composition of the aquatic environment; the anomalies are caused by the unsatisfactory condition of water treatment facilities of the settlements of Kultuk, Babushkin, Listvyanka, Slyudyanka, etc. and, accordingly, the discharge of insufficiently treated wastewater into the lake, expressed as increased concentrations of nitrogenous substances.

E n v i r o n m e n t a l s u p e r v i s i o n . In 2019, federal supervision authorities carried out 483 environmental control measures in the Baikal natural territory. The total number of inspections compared to 2018 increased by 5.5% and amounted to 154 inspections (in 2018 - 146 inspections). The number of detected violations increased by 40.6% compared to 2018 and amounted to 246 offenses (in 2018 - 175 offenses).

Based on the results of regional supervision in the Baikal Natural Territory in 2019, compared with 2018, the number of inspections (by type of supervision) increased by 6.6 times and amounted to 4,425 inspections (in 2017 - 667 inspections). A significant increase in inspections is associated with an increase in control measures in the field of protection and use of objects of the animal world and their habitat. The number of detected violations increased by 2.7 times and amounted to 1,542 offenses (in 2018 - 563 violations).

In 2019, the number of inspections against legal entities operating on Lake Baikal decreased by 16.3%, including those related to the operation of hydraulic structures — 36 inspections, the number of violations of mandatory legal requirements in the field of inland waterway transport decreased more than twice compared to 2018 — 215 violations.

E n v i r o n m e n t a l v i o l a t i o n s . In 2019, the number of administrative violations recorded at the BNT in the field of environmental protection and nature management increased by 24.9% compared with 2018 and amounted to 2,952 violations. The main violations recorded within the BNT in 2019 were:

- violation of fire safety rules in forests (59% of the total number of detected violations);
- violation of rules on hunting, fishing and other uses of wildlife (6%);
- non-observance of environmental and sanitary and epidemiological requirements when handling production and consumption waste, substances that deplete the ozone layer, or other hazardous substances (4.4%).

In 2019, the number of environmental crimes recorded at BNT, compared with 2018, decreased by 9.6% and amounted to 3,196 crimes. The main environmental crimes in 2019 were related to illegal woodland felling (84.2% of the total number of detected crimes). The largest number of crimes was recorded on the territory of the Republic of Buryatia - 47.5%.

I n t e r n a t i o n a l c o o p e r a t i o n . In 2019, as part of the Agreement between the Government of the Russian Federation and the Government of Mongolia on the protection and use of transboundary waters, the following events took place:

-in the period from 24 to 25 June 2019, the city of Krasnoyarsk hosted a meeting of the joint working group on the fulfilment of the Agreement between the Government of the Russian Federation and the Government of Mongolia on the protection and use of transboundary waters. During the meeting, the parties considered issues related to the water situation in the basins of the transboundary rivers Selenga and Onon prevailing in the winter period 2018-2019 and the spring flood of the current year, as well as the results of monitoring the quality of transboundary waters, the implementation of water protection and water management measures in the basins of the transboundary rivers Selenga and Onon.

- in the period from 6 to 8 August 2019, the 15th Meeting of the Plenipotentiaries of the Government of the Russian Federation and the Government of Mongolia on implementation of the Agreement on Protection and Use of Transboundary Waters between the Government of the Russian Federation and the Government of Mongolia was held in Yekaterinburg. During the meeting, the Parties heard information on the water situation in the basins of transboundary rivers, considered the results of observations of the state of surface waters of transboundary water bodies in the border sections for the reporting period, agreed on the main directions of the “Unified Basin Concept for the Protection and Use of Transboundary Waters”.