SURHAN GAS CHEMICAL
OPERATING COMPANY

Results of environmental monitoring at "Uzbekiston Mustakilligi" investment block in 2021

Contents

1. Introduction

According to the approved environmental monitoring program agreed with the State Committee for Ecology of Ruz, in 2021 survey was carried out to assess the environmental impact of the following oil and gas operations:

- drilling and testing of wells at Mustakillikning 25 yilligi field;
- construction of a gas processing plant (GPP).

The objects of environmental monitoring are:

- ✓ atmospheric air;
- ✓ surface water bodies and streams;
- ✓ soils, subsoils and terrain;
- ✓ radiation situation;
- ✓ production and consumption waste;
- ✓ flora and fauna.

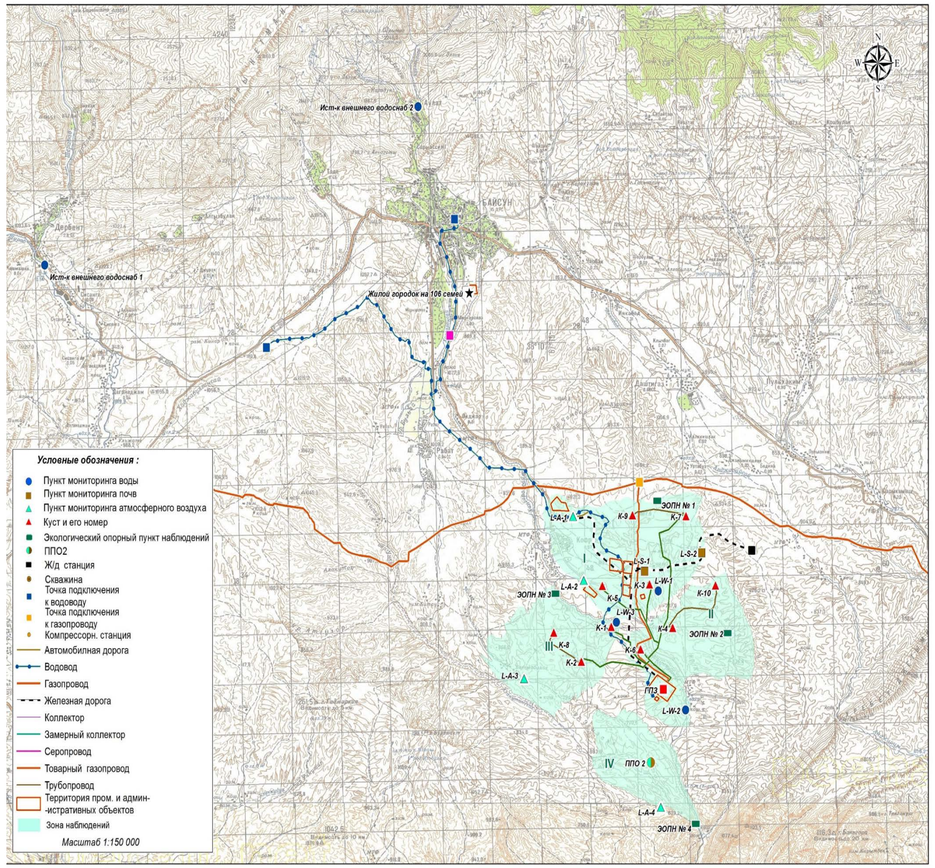
2. Purposes and objectives of survey

The purpose of environmental monitoring is to assess the impacts carried out by SURHAN GAS CHEMICAL OPERATING COMPANY FC LLC (hereinafter referred to as Operator) by its production activities on the environment in order to take timely measures to prevent violations.

The tasks are :

- ✓ assessment of actual state of natural environment;
- ✓ comparison of the obtained information with the data of Environmental Audit (2017-2018) conducted before the start of oil and gas operations;
- ✓ monitoring the state of natural environment and ongoing changes in the contract area;
- ✓ predictive assessment of the impact of man-made processes on the state of environment on the Contract area.

3. General principles of environmental monitoring



In 2021, within the scope of Environmental Monitoring, Operator continued survey to assess the impact of oil and gas operations (OGO) on environmental objects at "Uzbekiston Mustakilligi" Investment Block. The survey was carried out by the Center for Specialized Analytical Control of the State Committee for Ecology of RUz within the scope of concluded contract in accordance with **"Program for industrial environmental monitoring of environment condition during oil and gas operations at "Uzbekiston Mustakilligi" investment block carried out by Operator in 2021"** approved at the meeting of the subcommittee for industrial safety, labor protection and environmental protection and agreed with the State Committee for Ecology of the Republic of Uzbekistan.

The complex of environmental studies included a field survey of the terrain, flora and fauna, sampling of soil and subsoil, surface and ground water, atmospheric air, with appropriate laboratory analyses, processing of results and issuance of conclusions.

The map shows the regime stations of the Ecoaudit 2017-2018 (EA 2017) of Ecomonitoring 2021 point.

At each local and background observation point, in accordance with the calendar schedule, samples of atmospheric air, surface water, soils were taken, and radiation measurements were carried out as well.

4. RESULTS OF ENVIRONMENTAL MONITORING.
4.1 Monitoring of atmospheric air condition

The studies were carried out at 4 environmental observation points (No. 1, 2, 3, 4) and 4 local observation points (L-A-1, L-A-2, L-A-3 and L-A-4) and 10 well pads (K-1, K-2 ... K-10).

The level of atmospheric air pollution was assessed in relation to the sanitary and hygienic standards developed and approved by the Ministry of Health of the Republic of Uzbekistan - SanPiN No. 0293-11 "List of maximum permissible concentrations (MPC) of pollutants in the atmospheric air of populated areas on the territory of the Republic of Uzbekistan".

The results of testing of atmospheric air composition have shown the following.

- The content of such pollutants as carbon oxide, sulfur dioxide and nitrogen dioxide has not been detected in the atmospheric air of the entire surveyed area, except for some cases when the content was at a level of up to 0.4 MPC one-time;
- The content of carbon oxide in the atmospheric air of the entire surveyed area, both at stages I and II of observations, has not exceeded the established MPC level at the second stage of observations, its concentration has decreased compared to the previous stage and for the entire period has been within 0.01 - 0.4 MPC one-time;

In general, the above values of carbon oxide, sulfur dioxide, nitrogen dioxide are below the established standard values, and these data correspond to the values recorded in the given area during the environmental audit of 2017 and the values of environmental monitoring of previous years.

- The content of inorganic dust has ranged from 0.05 to 0.9 MPC one-time, its concentration increased depending on strengthening of wind gusts in the area at the time of the test. Fig. 2.4.

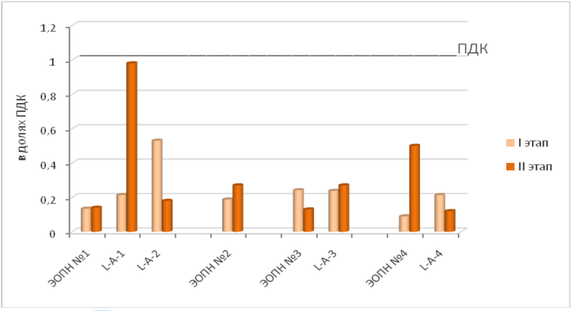
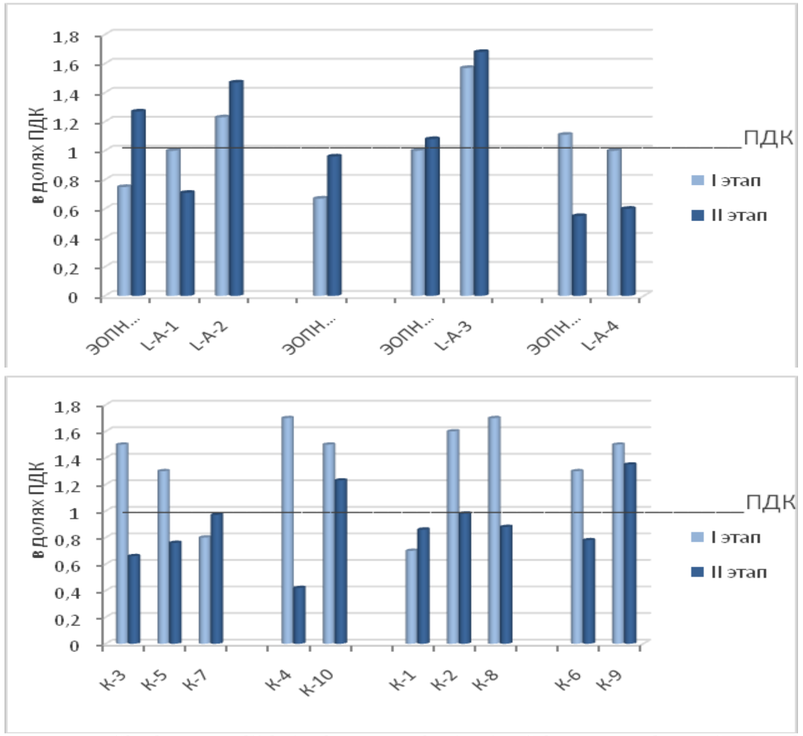


Fig. 2.4. The content of inorganic dust in the atmospheric air of surveyed area for I and II stages of 2021.

SURHAN GAS CHEMICAL OPERATING COMPANY

- An increased content of hydrogen sulfide in the atmospheric air of the surveyed area was recorded only at two local observation points and one environmental observation point, on the area of well pads, an increased content of hydrogen sulfide was recorded only on the area of K-10 and K-9, in the rest of the surveyed area its concentration decreased compared to the first stage observations and was fixed below the established standard value. The data obtained during monitoring of the atmospheric air for the content of hydrogen sulfide in it in the current year is slightly higher than the indicators of the environmental audit of 2017 and environmental monitoring conducted in 2020, when its maximum concentration was recorded at the level of 0.6 MPC one-time, however, they are lower than the recorded concentrations of hydrogen sulfide during environmental monitoring in 2019, when its maximum concentration was at the level of 2.0 MPC one-time. It should be noted that these deviations are temporary and the level of hydrogen sulfide in the atmospheric air decreases (disperses) upon completion of work and well suspension.



The content of hydrogen sulfide in the atmospheric air of the surveyed area for I and II stages of 2021.

- Of the hydrocarbons, as in the previous years (2017-2020), only methane was found in the atmospheric air, however, its concentration does not exceed the safe reference levels of impact-SRLI.
- According to the results of field and laboratory studies in the summer and autumn periods, there was no significant impact on the atmospheric air during oil and gas operations at "Uzbekiston Mustakilligi" investment block.

In general, the results of survey showed that the level of atmospheric air pollution with inorganic dust, carbon oxide, nitrogen dioxide and hydrocarbons in the contract area does not exceed the MPC and the background indicators of the EA in 2017.

Conclusion: The atmospheric air does not experience any increased anthropogenic and technogenic burden.

4. RESULTS OF ENVIRONMENTAL MONITORING
4.2 Surface water condition

Fig.4 Dynamics of the content of pollutants in the surface water of Khongaransai within the Contract area

Surface watercourses at the site of oil and gas operations are represented by one watercourse - Khongaronsai, the channel of which passes through Boysun town and Kofrun village and then, cutting through mountain uplifts, enters the valley of the Surkhandarya River.

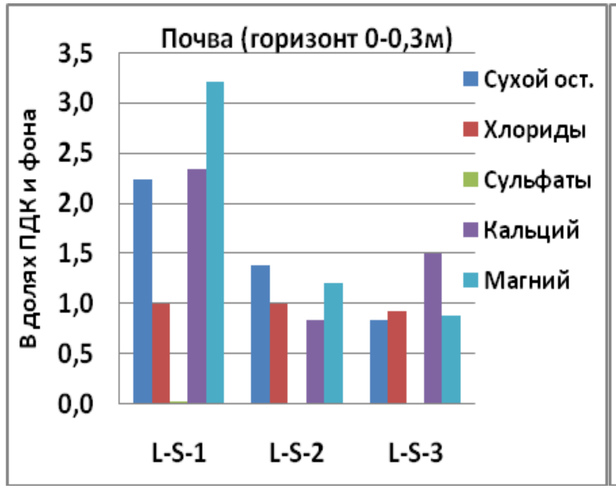
In the surface water of Khongaransai within the Contract area, mineralization is up to 6.3-9.38 g/dm3 (stage I) and up to 6.2-8.99 g/dm3 (stage II), a high content of suspended solids, nitrite nitrogen, COD, chlorides, petroleum products, phenol, sulfates, manganese and iron. The increase in the amount of salts in water is associated with the inflow of saline groundwater through the channel and the absence of precipitation. Fig. 4 shows the dynamics of the content of pollutants in the surface water of Khongaransai within the Contract area.

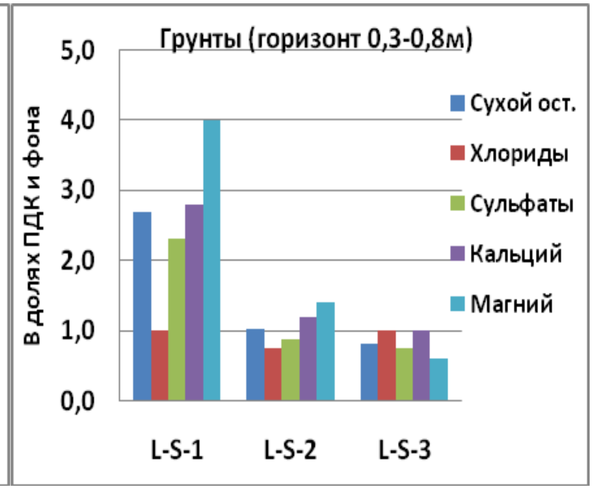
It should be noted that the discharge of wastewater into the surface water of Khongaransai from production activities of Operator is not stipulated and is not allowed, therefore, Khongaransai watercourses do not experience any anthropogenic impacts from the facilities under construction at the Mustakillikning 25 Yiligi field.

4.3. Monitoring of soil and subsoil condition.

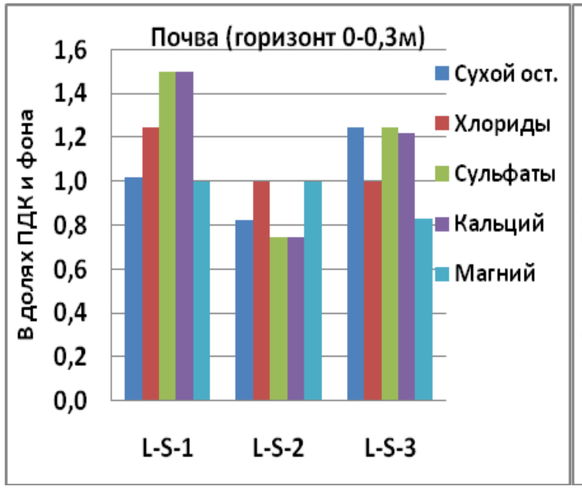
- the content of dry residue of water extract from soils ranges from 0.044% to 0.864%, from soils from 0.042% to 0.890%, which indicates low and medium salinity of soils and subsoils;
- the content in the soil of local points (near the wellhead, the drilling waste pit and the location of fuel and lubricants) of sulfates is up to 16.8 times higher than the MPC, chlorides, calcium, magnesium are higher than the background up to 24.7 times, 24.7 times and 15.2 times, respectively;
- the content of sulfates in the soils of local points is 17.6 times higher than the MPC, calcium and magnesium chlorides are higher than the background up to 78.2 times, 33.2 times and 14.0 times, respectively;
- oil pollution of local points of well pads in the humus horizon ranged from 0.025 mg/kg to 3.540 mg/kg, in soils from 0.010 mg/kg to 26.440 mg/kg.

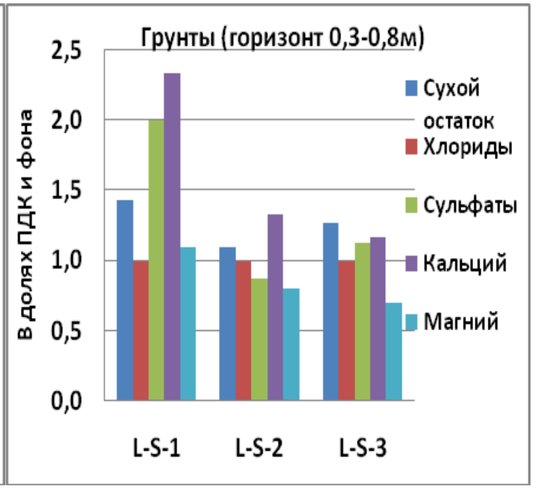
At the GPP construction site, no abnormal excesses of the analyzed components in soils and subsoils have been detected.





The content of ingredients in soils and subsoils at local observation stations (in fractions of MPC for sulfates, in fractions of background for dry residue, chlorides, calcium, magnesium) at the I stage of observations in 2021.

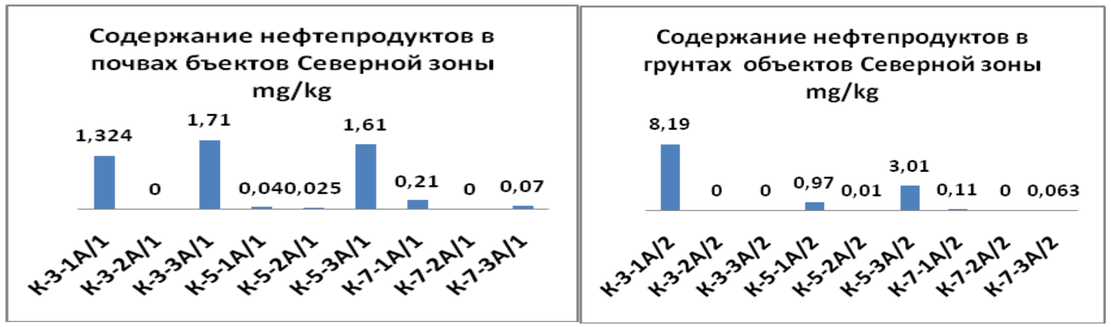




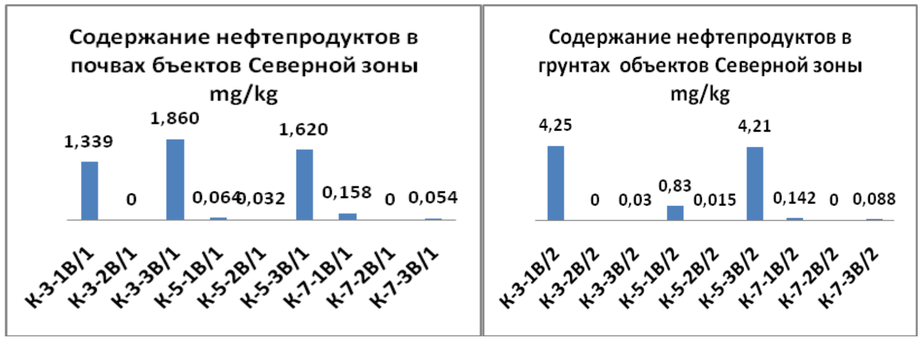
The content of ingredients in soils and subsoils at local observation stations (in fractions of MPC for sulfates, in fractions of background for dry residue, chlorides, calcium, magnesium) at the II stage of observations in 2021.

Between the results of the content of these ingredients, there are differences in some local stations towards increase. The increased content of sulfates, calcium chlorides, magnesium in soils and subsoils of observation stations is caused by the use of man-made land with a significant salt content in the preparation of sites.

Relative to the data of 2019-2020, the salt composition of soils has also changed upwards. These changes in the contents are also associated with seasonal fluctuations of the components, their redistribution between the humus layer and soils.



The content of oil products in soil and subsoil at local observation points of the Northern zone (mg/kg) at the I stage of observations in 2021.



The content of oil products in soil and subsoil at local observation points of the Northern zone (mg/kg) at the II stage of observations in 2021.

A slight increase in the content of oil products in soils and subsoils of well pads in 2021 is associated with ongoing operational work, storage of drill cuttings, placement and use of fuels and lubricants and is defined as technogenic.

It should be noted that the above-mentioned anthropogenic factors will be eliminated as part of reclamation of drilling site after completion of drilling operations, in accordance with the design requirements/decisions for construction of wells, Regulations for neutralization/disposal of drilling waste at completion stage (dismantling, well suspension, reclamation of site).

Conclusion: According to the results of laboratory tests, no significant impact on the condition of soils and subsoils during oil and gas operations at "Uzbekiston Mustakilligi" Investment Block has been noted at stages I and II of observations.

4.4 Environmental radiation monitoring

Environmental monitoring was carried out: at four environmental observation points (No. 1, 2, 3, 4) and three local observation points (L-S-1, L-S-2 and L-S-3).

During the period of industrial environmental monitoring during the construction of wells, to study the radiation situation on the territory of the site, measurements of exposure rate of external gamma radiation were carried out at 10 stations, and soil and subsoil samples were taken from two horizons (from a depth of 0-30 cm and 30-80 cm) to determine the "Total specific alpha activity", as well as at 7 stations (at stage I) and at 6 stations (at stage II) of monitoring, water samples were taken to determine the content of natural radionuclides 226Ra, 222Rn and 238U. The exposure rate values of external gamma radiation and total specific alpha activity at the site do not exceed the background values and permissible sanitary standards.

On the territory of the Contract area, at 7 observation points (stage I) and at 6 observation points (stage II), wastewater samples were taken and gamma spectrometric studies of the selected water samples were carried out to determine natural radionuclides: gross content of uranium-238, radium-226 and radon-222 (226Ra, 222Rn and 238U). The exposure rate values for external gamma radiation from soils and the content of natural radionuclides in water samples comply with the requirements of SanPiN No. 0193-06 (NRB-2006).

Conclusion: Based on the results of conducted radiation monitoring, none of the monitoring stations exceeded the established standards for radiation and environmental indicators, all radiation parameters in water and soil are much lower than the standards. No radionuclide contamination of water resources and soils has been recorded in the territory of "Uzbekiston Mustakilligi" investment block.

4.5. MONITORING OF AREAS OF TEMPORARY COLLECTION OF PRODUCTION AND CONSUMPTION WASTE

Wastes are generally associated with performance of such work as: drilling, well casing accompanied with drill cuttings. All generated drilling wastes are directed to a waterproof mud pit, neutralized by reagents, by solidification method with subsequent burial in the mud pit. Production waste generation is temporary – only during well construction.

The results of visual inspection of production and consumption waste storage at "Uzbekiston Mustakilligi" Investment Block have shown completion of planned nature protection activities in terms of waste.

The condition of storage places during oil and gas operations in wells is satisfactory as of the moment of departmental environmental monitoring.

RESULTS OF BIOLOGICAL MONITORING

Conducted at representative sites of each of the 4 environmental zones characterized by homogenous natural conditions, landscape, sources and contamination degree.

6 representative sites for the Northern zone, 2 for the Eastern zone, 3 for the Western zone, 3 for the Southern zone were taken for environmental monitoring of flora and fauna.

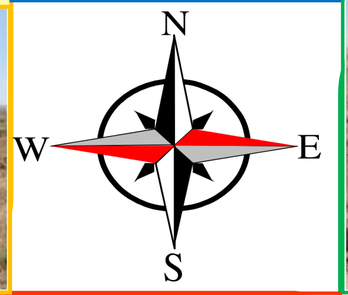
III-zone – Western

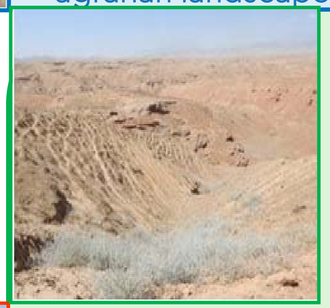
Environmental observation point №3 is located along the left side from Khongaronsai to K-2.

The landscape is represented by rainfed fields and piedmont plain dissected by gullies with sandstone outcrops and sandy loamy soil

I-zone – Northern

Environmental observation point №1 is located on the left side of the Khongaronsai river (Tashkupriksai) between the Kofrun village and K-7 and K-3. Represented by the territory of active agrarian landscape





II-zone – Eastern

Environmental observation point №2 is located in the middle course of Khongaronsai on the right side between K-4 and K-7. The channel of the sai, the dry dissected slopes of foothills and gullies are with sandstone outcrops, sandy loamy soil

IV-zone – Southern

Environmental observation point №4 is located in the valley of the lower course of Alankutansai. The landscape is represented by low mountains

RESULTS OF BIOLOGICAL MONITORING

4.6. Flora

In the vegetation cover of the surveyed area, the composition of natural dominants and subdominants was mainly preserved. The total projective cover is more often than 25% (it fluctuates between 15–45%), which is explained by both heavy grazing and arid conditions of the territory. Everywhere in the composition of plant communities there is a significant abundance of xerophytic species, ephemera and weeds.

Bush 2
Climacoptera crassa
(flowering stage, October 9, 2021)

Bush 8
Tamarix ramosissima

- As a result of survey, 97 plant species have been identified. No Red Book plant species have been found on the routes during the field surveys.
- It has been established that more than 50% of the species composition of the flora of the territory is associated with specific and limited habitats of river valleys, canyons and dry gullies with sandstone outcrops.

Conclusion: In general, the vegetation cover of the surveyed area has an average degree of disturbance and retains the ability to self-restoration.

RESULTS OF BIOLOGICAL MONITORING
4.7. Fauna

Based on the results of environmental monitoring and industrial environmental control over the state of fauna in the territory of the Investment Block, 33 species have been identified.

33 including:

- 18 species of birds
- 11 species of reptiles
- 3 species of mammals
- 1 species of amphibia

Galerida cristata

Ardea cinerea

Ellobiustancrei

Bufotes viridis

Coluber karelini

Coluber ravergieri

RESULTS OF BIOLOGICAL MONITORING

4.7. Fauna

Among them, there are 8 species included in the Red Book of the Republic of Uzbekistan (2019) and the lists of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES): Central Asian tortoise (Testudo horsfieldi), desert monitor (Varanusgriseus), RDBUz, VU, IUCN:[VU], CITES I, Turkestan agama (Paralaudakia lehmanni), CITES, steppe agama (Trapelus sanguinolentus), CITES, carrion vulture (Neophron percnopterus), RDB Uz, EN, IUCN:[EN], CITES II, bearded vulture (Gypaetus barbatus), RDB Uz, NT, IUCN:[NT], CITES II, griffon vulture (Gyps fulvus) RDB Uz, NT, IUCN:[NT], CITES II, long-legged buzzard (Buteo rufinus), CITES.

long-legged buzzard

griffon vulture

Central Asian tortoise

desert monitor

Turkestan agama

RESULTS OF BIOLOGICAL MONITORING

The summer period of 2021 was characterized by abnormally high temperature and low water level of sais and streams, which led to the drying up of all surveyed channels in all environmental monitoring zones. This situation adversely affected the state of representatives of fauna. As a result, a significantly lower number of species were noted in the first and the second stages compared to the 2020 final report data.

An equally important factor determining the well-being of populations and the abundance of species is the anthropogenic and technogenic impact on the environment. At this period, drilling and construction work is being carried out on the territory of "Uzbekiston Mustakilligi" Investment Block for construction of gas processing plant, shift camp and other related infrastructure facilities. As a result, animals lose their usual habitats and begin to move in search of the most suitable place.

To organize continuous departmental monitoring of the state of fauna on the territory of "Uzbekiston Mustakilligi" Investment Block, Operator's Department of Safety, Health and Environmental Protection has established a system for maintaining observation sheets for the wildlife objects.

5. Conclusions

Owing to implementation of environmental measures, as well as regular industrial environmental control and monitoring of technological processes and objects of the state of atmospheric air, surface and ground water, soils and subsoils, in 2021 we can note the absence of a direct and material impact on the environment from the activities of SURHAN GAS CHEMICAL OPERATING COMPANY FC LLC.

The results of the environmental monitoring in 2021 have shown that the state of flora and fauna outside the areas allocated for construction work remains stable, no significant anthropogenic and technogenic impacts on the atmospheric air, water environment, soil, flora and fauna of the contract areas have been identified.

THANK YOU FOR YOUR ATTENTION!