LIMITED LIABILITY PARTNERSHIP "TITECO"
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AKTOGAY SULPHIDE CONCENTRATOR EXPANSION PROJECT

Company **LLP "KAZ Minerals Aktogay"**

Part **Environmental Impact Assessment (EIA)**
Environmental Impact Statement (EIS)

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LLP “KAZ Minerals Aktogay” is a legal entity registered and operating in accordance with the laws of the Republic of Kazakhstan, on whose behalf and in the interests of which operates a branch of KAZ Minerals Project B.V. in the Republic of Kazakhstan as an attorney in accordance with the assignment agreement No. AE1800500 of February 12, 2018.

Section “Environmental Impact Assessment” (EIA) for the “Aktogai Mine Expansion Project. Sulphide Concentrator” is made by TITECO Limited Liability Partnership (State license of the Ministry of Environmental Protection of the Republic of Kazakhstan No.01479P of July 09, 2012) in accordance with the regulatory and technical documentation in force in the Republic of Kazakhstan and international requirements for conducting EIA (ESIA).

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INTRODUCTION

The procedure of Environmental Impact Assessment for Aktogai Sulphide Concentrator Expansion Project located in the Ayagoz district of the East Kazakhstan region (hereinafter the EIA) is presented hereto.

The EIA procedure was carried out in accordance with the provisions of the Environmental Code of the Republic of Kazakhstan of January 9, 2007 [Chapter 6, Article 41] (as amended and supplemented by the Laws of the Republic of Kazakhstan as of October 5, 2018) and other applicable legal and regulatory documents of the Republic of Kazakhstan that regulate the environmental protection and environmental safety.

The content and structure of this environmental impact assessment are adopted in accordance with the requirements of the *"Instructions for Conducting Environmental Impact Assessment" approved by order of the Minister of Environmental Protection of the Republic of Kazakhstan No204-p dated June 28, 2007 (clause 5, subclause 26) as amended in accordance with the order of the Ministry of Energy of the Republic of Kazakhstan dated June 17, 2016 No.253.* The EIA materials are prepared in full compliance with the second phase of the EIA procedure.

EIA is based on:

– Aktogai Sulphide Concentrator Expansion Project.

– Stock materials of the current state of groundwater, soil, vegetation and wildlife of the project location area.

Qualitative and quantitative parameters (emissions, production and consumption wastes) obtained as a result of the development of the EIA Section for the designed project:

– can be used by the contractor as standards for environmental management at the construction phase of designed project;

– can be used as guide values at the operation phase of the designed project.

The Section "Environmental Impact Assessment" (EIA) was performed by TITECO Limited Liability Partnership (State license of the Ministry of Environmental Protection of the Republic of Kazakhstan No.01479R of 09/07/2012) with the registered address at:

Office 114, 36, Sarayshik Street, Esil district, 010000 Astana, Phone/fax: 8 (7172) 51-40-45, e-mail: titeco@bk.ru

The EIA Section is made for KAZ Minerals Aktogay LLP with a legal address:

8, Omarov Street, Almaty, 050000, Republic of Kazakhstan, Phone: 8-727-330-45-52, fax 8-727-244-71-96, www.kazminerals.com

Bank details: BIN 090840006023, IIC No.KZ1583201T0250320019 at JSC Citibank Kazakhstan, BIK CITIKZKA, KBE 17.

Project Director - Brian Tomlinson.

The aim of the project under consideration is the expansion of Aktogai Plant by construction of a second concentrator with a capacity of 25 million tons per year for concentration of the sulfide copper ore from the Aktogay deposit located in the Ayagoz district of the East Kazakhstan region of the Republic of Kazakhstan.

The project phases include: the project implementation phase, including design, procurement and construction/construction management; and startup and commissioning phase. The start-up and commissioning phase will begin in 2022.

The environmental impact assessment has been developed in accordance with the regulatory and instructional and methodological documents governing the implementation of environmental impact assessment activities in the territory of the Republic:

- Environmental Code of the Republic of Kazakhstan. Astana, Akorda, 09.01.2007 No. 212-III (as amended and supplemented as of 05.10.2018).

● Instruction for performance of an environmental impact assessment (approved by order of the Minister of Environmental Protection of the Republic of Kazakhstan dated June 28, 2007 No. 204-p as amended as of June 17, 2016).

● Methodological recommendations for performance of an environmental impact assessment (EIA) of the proposed economic activity on the biological resources (soil, vegetation, wildlife), Appendix 24 to the order of the Minister of Environmental Protection of November 29, 2010 No. 298;

● Sanitary and epidemiological requirements for the establishment of a sanitary protection zone of production facilities (approved by the Order of the Minister of National Economy of the Republic of Kazakhstan dated March 20, 2015 No. 237).

The purpose of the EIA Section is:

– determination of the level of possible negative impact of the concentration plant at the phase of construction and installation works and subsequent operation;

– development of measures to reduce the negative environmental impact up to the normative one.

The EIA *includes:*

– analysis of the operations' impact on all environmental components including the calculation of emissions of pollutants into the atmosphere, the volume of water consumption and wastewater, the formation of production and consumption waste.

It was developed:

– a set of measures to ensure the minimum environmental impact.

1 INFORMATION ON THE DEPOSIT

1.1 COMPANY OVERVIEW

On August 15, 2014, the shareholders of Kazakhmys PLC voted for the Group reorganization. All conditions regarding reorganization were met on October 31, 2014, and the economic separation took effect on August 1, 2014.

On October 31, 2014, after completion of the reorganization, the Group was renamed KAZ Minerals.

Mining and processing enterprises of the Eastern Division, the Bozymchak mining and processing complex in Kyrgyzstan, as well as three large growth projects (Bozshakol, Aktogai and Koksay) remained in the Group. As a result, the Group became compact, but with a clearer business profile and significant growth potential following the implementation of the production expansion projects.

The Company is a leading international natural resource development company with a core business in Kazakhstan and surrounding regions.

KAZ Minerals owns 4 underground mines in East Kazakhstan and one Bozymchak open-pit mine in Kyrgyzstan.

KAZ Minerals, is a leading copper producer in Kazakhstan, also produces and sells the significant volumes of by-product: zinc, silver and gold.

In 2014, the production of copper cathode of the enterprises belonging to the KAZ Minerals Group amounted to 84 thousand tons. The Group also produced 121 thousand tons of zinc in concentrate, 3,4 thousand ounces of silver and 34,6 thousand ounces of gold in 2014.

The Company mission is the timely development of large growth projects.

KAZ Minerals is entering a new level of development, and at the heart of its growth are the Bozshakol and Aktogay deposits - the two major projects where the opearations are started from scratch. Both projects have a long service life and low risks, which ensures astable growth and increases the value of our business.

Processing plants at the mine will produce both cathode copper from oxidized ore and copper in concentrate, which can then either be exported to consumers in China, or can be processed into cathode copper at existing copper smelting facilities in Kazakhstan.

Aktogay is the Group’s second major copper mining project located in eastern Kazakhstan. It was developed in a combined way (open pit and underground), the ore is also processed there- at the concentrator. The first production of cathode copper from oxidized ores was started in 2015, and the production of copper concentrate from sulphide ores in 2016.

1.2 PURPOSE AND JUSTIFICATION OF WORKS

The Aktogai field was discovered in 1974. In 1975–1980 the prospecting and evaluation works and detailed exploration were carried out. The ore body of the deposit is composed of sulphide ores in the majority, and the oxidized copper ore lies above the sulphide ore formation (5% of the total reserves of the deposit).

The Company owns copper smelters, which receive some of the necessary copper concentrate from copper mines and processing plants.

Some mines are close to the end of their economic life. There is a need for new sources of copper concentrate to replace the projected decline in supply from existing enterprises. In addition, there is a commercial opportunity to sell copper concentrate under the purchase agreements of future products to other mining companies for smelting.

The project implementation contributes to:

- development of the mineral resource complex of the country;
- increase of the potential of the mining industry of Kazakhstan through the introduction of new technologies that will be used in the ore mining and processing, as well as in the production of the final product.

The Aktogay field is operated by KAZ Minerals Aktogay LLP. The main strategic goal of the Aktogay project is to increase the Company's resourse base and increase the production of copper concentrate, which will allow KAZ Minerals Aktogay LLP to keep its place among the ten largest copper producers in the world.

The Aktogai plant expansion project plans to build a second sulphide factory to be located at a distance of 1,5 km from the existing one.

The capacity of the existing plant for processing sulfide copper-molybdenum ores is 25,0 million tons of ore per year. The project envisages to increase the processing capacity up to 50,0 million tons of ore per year.

Aktogay is one of the largest undeveloped copper deposits in the world; it contains about 3,5 million tons of recoverable copper. Around the current reserves limits it can be mined a significant amount of material in the sulfide poor horizons. KAZ Minerals Aktogay LLP also reevaluated the Aktogai Oksidny project resource.

The Company tends to a steady downward in copper production due to the depletion of the reserves of the Company's operating mines. In this regard, it was decided to construct the two largest concentrators - Bozshakol and Aktogai. The main strategic goal of the Aktogay Concentrator expansion project is to increase the company's resourse base and increase copper concentrate production, which will allow KAZ Minerals Aktogay LLP to keep its place among the ten largest copper producers in the world.

The implementation of the Aktogay Concentrator expansion project will allow the creation of an additional 2,500 jobs during the construction period and 600-700 jobs during the field operation. Phase.

The project “Aktogai Minne Expansion. Sulphide Concentrator” considers the process of construction of a concentrating plant, processing, enrichment, and operation of the auxiliary infrastructure of the enterprise.

The district belongs to the intensively developed one with a developed network of railways and highways, power lines and other communications.

1.3 DEPOSIT LOCATION

Administratively the Aktogay Concentrator is located in the area of the Ayagoz district of the East Kazakhstan region, 25 km east of the Aktogai village and Aktogai railway station of the Almaty railway, with which it is connected by a dirt road, and about 420 km from the city of Balkhash. Other settlements are located at a distance from the concentrating plant: at a distance of 26 km (Shynyrau village), 32 km (Kopa village), 38 km (Tarlauly village), 56 km (Karakol and Zhanama village). The district center - Ayagoz town is located northeast of the Aktogay village at a distance of about 110 km in a straight line. The regional center of Ust-Kamenogorsk is located northeast of the Aktogay village at a distance of about 400 km in a straight line. A layout map of the Aktogai Concentrator is given in Appendix 1.

Ayagoz district was formed in 1930. The area is 49588 square km. The administrative center - the city of Ayagoz received the status of a city in 1937. The city was built on the basis of the station settlement that emerged during the first five-year plan under the construction of the Turkestan-Siberian railway.

The district center - the city of Ayagoz, is a large railway station and is located on both sides of the railway. There are 2 locomotive, 2 wagon depots, the track maintenance, signalisation and communication departments. There are 8 secondary schools, a gymnasium, a lyceum, a sports school for children and a district house of culture there.

The Aktogay station via the II class asphalt road has an access (86 km) to the Almaty-Ust-Kamenogorsk road. The railway and the Aktogay-Sayak highway provide a direct connection with the BGOK Concentrator, the distance to the city of Balkhash along which is 420 km. The Aktogay station is a junction station of II class with the approaching Aktogay - Sayak trunk railway lines Almaty - Semipalatinsk, Aktogay - Dostyk. The higway with asphalt coating sapproaches to Aktogay village from the south-eastern side of Ucharal town.

Aktogai Concentrator is located in semi-desert terrain in salt marshes 100 km south-west of the

Tarbagatai mountain range, 70 km northeast of Lake Balkhash and 54 km north-west of Lake Sasykkol. This area is characterized by semi-desert vegetation and low hills. The upland reaches 350 m. There are the sands at 8 km south of the deposit. Approximately 10 km to the east of the quarry site there is a salt pond, near which there are insignificant sections of water and channels (drying out).

The overview map of the location of Aktogai Concentrator is shown in figure 1.3.1.

Figure 1.3.1. Overview map

Geographical points:

Land corners	Corner point coordinates	
	North latitude	East longitude
1	2	3
1	46˚ 57’ 06’’	79˚ 58’ 31’’
2	46˚ 57’ 53’’	79˚ 59’ 46’’
3	46˚ 58’ 40’’	79˚ 59’ 23’’
4	46˚ 58’ 42’’	79˚ 57’ 29’’
5	46˚ 57’ 46’’	79˚ 57’ 26’’

Table 1.3.1 shows the information on the population in areas adjacent to the field.

Table 1.3.1 - Population in the project area

Setllements	Total population
Ayagoz	38290
Districts	34713

Aktogai Concentrator is located in the steppe zone at the junction of the East Kazakhstan and Karaganda regions. Aktogay is a thousand kilometers away from the city of Zhezkazgan, and more than six hundred kilometers from Vostoktsvetmet enterprises. The nearest settlement - the railway station of the same name - is located 20 km from the field. The district center Ayagoz is one hundred and thirty

kilometers away. The area is economically poorly developed and poorly populated. The main source of electricity is the power transmission line LEP-500, which connects the Shulbinskaya and Kapchagai GEM. The household and drinking water supply can be provided from Zhuzagash and Zhanar deposits of groundwater.

The region has good transportation links (railways, roads, river) with other regions of Kazakhstan and other infrastructure (pipelines, power lines, etc.). East Kazakhstan is one of the most industrialized regions of Kazakhstan contributing to the national industrial production. Its advantage is the availability of local raw materials and energy production. The region has a developed banking sector, large and medium-sized industry, qualified personnel, modern communications infrastructure, foreign investment and national development programs. The main types of industry are mining and refining of nonprecious metals, mining of precious metals and coal, hydro and thermal power plants, non-ferrous metallurgy and mechanical engineering.

Agriculture plays a considerable role in the region. The main crop is wheat. Other crops are potatoes, vegetables and melons. Cattle breeding is very common in rural areas.

Aktogay settlement is located 25 km to the west and is a major railway junction connecting Almaty with southwestern regions; with the Balkhash region, where the Company owns a large industrial complex, including copper smelting and copper cleaning plants; with Karaganda in the west and north-west; with Ust-Kamenogorsk in the north, from where the railway runs to China.

Aktogay has a well-developed local transport infrastructure. The Aktogay section is connected by a service branch line built by Kazakhmys company with a railway junction in the Aktogai settlement. The main highways passing close to the site are: Aktogay-Ucharal, Aktogay-Kopa, Aktogai-Kazbek. In addition, a 15 km access road connects the site with a public road connecting the Aktogay settlement to the Almaty-Ayagoz-Ust-Kamenogorsk highway. The former military airstrip is located 7 km from the site.

1.3.1 Modern socio-economic living conditions of local population

The Ayagoz District (Kazakh: Ayagz Audany) is a district in the southwest of the East Kazakhstan region in Kazakhstan. The relief of the region is halfly mountaineous (Akshatau ridge, Tarbagatai ridge), and the southern and western parts are hilly-flat. The highest point is located on the Tarbagatay Ridge: Okpetti Mountain - 3608 m. From the east, the Ayagoz District borders to the Tarbagatai District, from the west to the Karaganda Region, in the north to the Abay and Zharma districts, from the south to the Urdzhar District and the Almaty Region.

Currently, the main areas of the district's economy are:

- railway transport and power industry;
- distribution of electricity and telecommunications;
- agricultural production.

1.3.2 Social and economic development of the Ayagoz district

Industry. As of July 1, 2017, the industrial enterprises of the district produced the products in current prices in the amount of 25797,4 million tenge, which is (11075,5 million tenge) 232,9% compared to the corresponding period of 2016. The volume index is 186,2%.

Agriculture. By results of the first half of 2017, the gross agricultural output amounted to 8330,5 million tenge, which is 118,6% compared to the corresponding period of 2016 (7021,4 million tenge). 9072,2 tons of meat (in live weight), 27645,0 tons of milk, 2124 thousand eggs were produced. In all categories of farms of the region, there are 89262 cattle, of which 42375 f cows, 337791 of sheep and goats, 36966 horses, 40123 birds.

Investment in fixed assets. As of March 1, 2017, investments in fixed assets amounted to 784,8 million tenge. In comparison with the corresponding period of the last year, it is more by 736,2 million tenge or makes 1,614.8%.

Goods turnover. The volume of retail turnover (without public catering industry) made 877,7 million tenge.

As compared with January-February of 2017 it is by by 266,1 million tenge more (143.5%).

Small business. As of March 1 of the current year, 113 small businesses have been registered: 74of these are operating, 60 are active.

Health care. Among newly diagnosed patients, the number of cases of tuberculosis was 9, or by last year made 69.2%.

Labor market. As of July 1, 2017, the district department of employment and social programs employed 744 people. The registered unemployed amount to 300 people. The unemployment rate is 0.9%.

Wage. As of July 1, 2017, the average monthly salary was 98,641 tenge or compared with the corresponding period of the last year increased by 5,9%. The highest level of wages is noted in organizations related to transportation and communication services, and the lowest level in social and public services.

Finance. As of March 1 of the current year, the district budget received 338,2 million tenge from the economic entities of the district, which is 166,5% of the forecasted amount.

At present, there are 40 public secondary schools in the district, of which: 34 secondary schools, 1 incomplete secondary school, 5 primary schools. In total, there are 14,100 students. All schools are equipped with computer equipment. There are also 10 kindergartens, 1 school of art, 1 station of young technicians, 25 educational mini-centers. Residents of the district are provided with medical care from various medical and preventive treatment institutions.There are 18 family medical ambulance stations, 27 medical centers, 2 rural hospitals, 1 dentist's, 1 city hospital, 1 district hospital. Also in the area there are 47 cultural institutions, including 20 clubs, 23 libraries, 1 museum and 3 community centers. The resource bases of these facilities were improved.

There are only 68 settlements in the Ayagoz district. There are 54 medical and preventive treatment institutions in total, including the following:

- Medical Association of Ayagoz district;
- Ayagoz District TB Dispensary;
- City Hospital (Kazygul);
- Medical ambulatories - 18;
- LLP "Dentist" - 2;
- Medical stations - 30;
- District bed capacity
- Central District Hospital
- Chubartau rural hospital
- Aktogay rural hospital.

In 2017, in total 1,361 children were born. The birth rate for the first half of 2017 is 8,7. The general mortality rate is 3,5. The positive natural increase is 5,5.

The population of Ayagoz district of the East Kazakhstan region as of January 1, 2018 is 73003 people. In the city - 38290 people, in the district - 34713 people.

The Department of Economics and Budget Planning of the Aagoz District developed the "Program for the development of the territory of the Aagoz District of the East Kazakhstan Region for 2016–2020". The strategic directions of the program are:

– accelerated development of the economy of the district based on the introduction of high-performance innovative technologies in the industry, agriculture, investment, small and medium-sized businesses, trade, tourism and the environment;

– development of the social sphere and human potential, improvement of the quality of life of the population, provision of all kinds of high-quality social services.

1.4 PROJECT DESCRIPTION

Sulfide copper-molybdenum ores from the Aktogay deposit are supplied to the Concentrator. The capacity of the designed Concentrator is 25.0 million tons of ore per year.

The capacity of the existing concentrating plant for processing sulfide copper-molybdenum ores is 25.0 million tons of ore per year. The project envisages an increase in processing up to 50.0 million tons of ore per year.

Copper-molybdenum concentrate will be shipped to the third-party consumers, while the possibility of its export is not excluded.

1.4.1 General information.

The main technological solutions for the expansion of the Aktogay Concentrating Plant are developed on the basis of the design assignment and in accordance with government regulations, rules and standards in force in the Republic of Kazakhstan.

The technology of flotation concentration of copper-molybdenum ores has not undergone significant changes in recent years: the bulk-differential flowsheet is mainly used with the discharge of a bulk concentrate and its subsequent selection. The main problem in the concentration (benefication) of copper-molybdenum ores is the separation of copper-molybdenum concentrates. It can be carried out by flotation of molybdenum minerals during the depression (suppression) of copper minerals and vice versa.

Practically, the following methods for separating the bulk copper-molybdenum concentrates are most common:

– flotation of copper sulfides and the suppression of molybdenite by organic colloids;

– extraction of molybdenite in case of depression of copper and pyrite sulfides by the “steam” flotation method;

– molybdenite flotation in the suppression of copper and pyrite sulfides after low-temperature oxidative (sweet) roasting of bulk concentrate at 260-330 ºC;

– suppression of copper and iron sulfides by sodium hydrosulfide, ammonium sulfide or ammonium hydrosulfide, which can be used independently or in a combination of sodium sulfide with sodium hydrosulfide and sodium hydrosulfide with ammonium sulfide.

At the concentrating plants of the CIS countries (Russia, Kazakhstan, Uzbekistan) and the Balkhash plant (Kazakhstan) the “steam” technology of selection of copper-molybdenum concentrates is used and has several disadvantages, the main of which are:

– reduction in the rate of molybdenite flotation in a strongly lime medium and its significant loss with the pyrite product;

– the impossibility of achieving effective depression of pyrite, especially of slime pyrite even with high alkalinity of the pulp;

– partial depression of precious metals;

– high energy costs for pulp heating;

– high consumption of sodium sulfide (from 5 to 20 kg/t);

– instability of the selective flotation process;

– increase in the risk of technological process when using the jet steam.

The foreign plants mostly use the method ofbulk separation of concentrates that excludes the steaming and as a copper sulfide depressor uses the sodium hydrosulfide or a mixture of sulfide and sodium hydrosulfide.

1.4.2 Structure of the designed concentrating plant

This project consideres the construction of a second concentrating plant.

The main buildings and structures envisaged by the Aktogai Expansion Project. Sulfide Concentrator:

- ore stockpile area (code 3200);

- storage area for mill liners;
- building for lime unloading and distribution (code 3820);
- the main switchyard (code 0420);
- the building of the main distribution substation (code 0400);
- main building, grinding and classification area (code 3300);
- main building, flotation area (code 3400);
- main building, molybdenum extraction, filtration and thickening area (code 3460);
- cooling tower and process water supply system (code 0500);
- drinking and fire water supply system (code 0500);
- main building, reagent area (code 3800);
- parking area 1;
- building for ore pebbles crusher (code 3340);
- parking area 2;
- offices of plant technical maintenance and changing rooms (code 0985);
- plant's maintenance shop (code 0984);
- primary crushing building (code 3100);
- tailings thickening building (code 3700);
- tailing thickeners;
- thickening and unloading of the concentrating plant (code 3500);
- technical water pumping station (code 0500);
- pond for technical water;
- storm water pond;
- discharge pumping station (code 3760);
- open container warehouse of reagents;
- complex for shipment of copper concentrate in Big-Bags (code 3600);
- Ground conveyor (3130).

For the protection and safety of industrial buildings and structures are designed the wire mesh fencing, gates and wickets.

The designed areas (buildings and structures) are placed on the master plan taking into account the existing rules and regulations, as well as:

- production technology;
- sanitary and fire regulations;
- the site terrain;
- prevailing wind direction;
- laying of transport and engineering communications.

The main indicators of the master plan are shown in Table 1.4.1.

Table 1.4.1- Key indicators of the master plan

№	Description	Unit of measurement	Quantity
1	Site territory (within the conditional borders of the site)	h	78,4726
2	Built-up area	m²	125733,03
3	Coverage area (driveways, sites, tracks)	m²	84775
4	Undeveloped area	m²	574217,97
5	Building percentage	%	16,02
6	Coverage percentage	%	10,80
7	Percentage of undeveloped area	%	73,18

Motor transportation of the concentrating plant is envisaged along the existing and designed roads.

The existing road with a crushed stone surface connects the Aktogay Station with the Aktogay mine site.

It is planned that the concentrating plant will have on its site the technological, inter-site and service roads are provided that will ensure transportation of technological, auxiliary, household cargoes, repair and fire fighting services. The projects plans to have the roads of the III-B and IV-in categories with pre-coated penetration macadam. The road parameters are made in accordance with the RK Building Codes 3.03-22-2013 Industrial transport, SP RK 3.03-122-2013 Industrial transport.

Freight traffic is carried out by newly putchased, rented or vehicles.

Prior to the start of construction of the designed facilities it is planned the cutting of the fertile layer of 0.15 m in average.

After completion of the work at the mine, it is necessary to carry out the reclamation work.

The reclamation objects are the territories occupied under industrial buildings and structures, the surface disturbed during the construction of roads, pipelines, electrical networks.

1.4.3 Master-plan main solutions

Placement of facilities of Aktogay Concentrator was developed taking into account the technological solutions for main and auxiliary, as well as ensuring the shortest transport-technological and communication links between them.

According to the functional use the site is divided into zones:

- production;
- warehouse and auxiliary;
- ancillary;
- administration and service.

All designed buildings and structures, depending on their degree of fire resistance and according to the requirements of the technical regulations “General requirements for fire safety” approved by Order of the Minister of Internal Affairs of the Republic of Kazakhstan dated 06.23.2017 No. 439, are located on the site with fire safety spacing and have free access for operational vehicles.

To extinguish a possible fire and rescue people, a complex of fire equipment is provided.

All buildings and structures on the site have an access for vehicles and fire equipment. The access for fire trucks in all cases is provided at least on one side of the 18 meters wide building and on both sides of a building of more than 18 meters width.

The expansion of Aktogai Concentrating Plant took into account the features specific for the design of industrial enterprises, which are characterized by:

- a variety of technological processes;
- existence of harmful emissions emitted during production;
- presence of a specific type of vehicles;
- existence of great number of engineering structures;
- presence of buildings and structures of various sizes and shapes.

The project used the modern layout concepts and color design of facades for the optimal formation of the aesthetic appearance of the building.

To ensure technological (engineering)interconnection between the site zones, a project of highways has been developed. Internal railway communications are represented by *a separate project*.

The production area is represented by the ore crushing complex (primary crusher) and the processing plant complex (sulphide concentrator).

The industrial site is based on the main building of the concentrating plant, located in its central part, with the main facade oriented to the north-west.

In the southeast direction from the main building there is an ore pebble crusher connected to the main building by conveyor galleryies.

The ore crusher is located in the northeast and the Aktogay open-pit mine in northeast of the main building.

The main production also includes the following facilities of the process flowsheet: ore stockpiles, tailings facilities.

Facilities of the storage area and auxiliary facilities are mainly located in the eastern and southern parts, on the leeward side of the industrial site.

The warehouse area houses the facilities for reception, intermediate storage, warehousing and shipment of concentrating products, spare parts and components of the maintenance and technical repair of mining equipment shops, maintenance workshops of the Company and other facilities. The mining equipment service area is a separate area located outside the plant actory,

The auxiliary area includes infrastructure and facilities for service purposes: facilities for maintenance services, a checkpoint, a complex of buildings, a blower-compressor station, power and water supply facilities, transport and communications facilities. These facilities are located in a way to ensure the shortest transport-technological and communication links required for the production process.

The administrative area includes the plant office, the maintenance office, and a dressing room. The plant office is located in the main building, where the enterprise management is implemented, as well as management is performed in the operator's room of the primary crusher. The maintenance offices and locker rooms don't have any control cabinets.

Specifications of buuildings and structures

Architectural and space-planning solutions of the buildings and structures are made taking into account the functional and technological, sanitary and hygienic, architectural and compositional, technical and economic conditions and meet the requirements of the current standards for fire-fighting, typification (type design), unification and standardization in construction.

All main buildings and structures have a metal frame, which made it possible to adopt the best option for the dimensions of buildings.

Some buildings due to the specific technological process carried out therein, are partially or fully to be constructed from monolithic reinforced concrete and concrete (the building for lime unloading and distribution, the underground tunnel between the large-grained ore storage and the grinding area of the main building, the primary crusher, technical and storm water ponds, etc.). The ponds have the clay base with membrane hydrodynamics. There is no concrete, only in the mouth area for a water intake.

The main column spacing in the buildings and structures is 6.0 m, however, given the installation of specific technological equipment, in some facilities the spacing is changed to 9.0 and 12.0 m.

The height of buildings and structures, the elevation of floors and floor slabs are taken on the basis of the main technological process and the dimensions of the equipment used.

All the main industrial buildings in plan view are of rectangular shape and are made mainly with the use of three-layer sandwich-type metal panels and profiled steel sheet in the building envelope.

The appearance of the buildings (facades) is determined by the material adopted for the building envelope (enclosing structures) of sandwich panels and profiled steel sheet with a factory-made polymer coating with vertical cutting. The color solution in the interiors of these buildings is caused by the factory-made polymer coating, the color of which is determined in the design taking into account the requirements of the relevant regulatory documents.

Some auxiliary facilities, such as the plant's office, a checkpoint, and some other small, single-story buildings are of modular type. The external lining of these buildings is made of profiled steel sheet, painted in factory conditions. The inner lining of the walls and partitions are made of fiber cement plates along a metal frame.

Sanitary service for workers of the second Aktogai Concentrator is envisaged in the shift camp (which is being designed as a separate project), in the public services building and partially on the main industrial site.

At the main industrial site, the following administrative buildings are foreseen: the plant office and the maintenance building.

Offices have sectional office space, rooms, walk-in closets for working clothes, meeting rooms, rest rooms, canteens, sanitary facilities and technical rooms.

Reagent warehouse and compressor station have their own domestic premises.

The industrial premises of the plant and at the auxiliary facilities have the lavatories and dressing rooms for outdoor workwear.

Due to the technological features of production and the industrial safety rules, some office and administrative premises are built into larger industrial buildings aa the independent buildings with enclosing structures.

There is a bathroom in the building of the primary crusher.

A medical center with a heated garage for an ambulance (existing) is provided for emergency medical care at the main industrial site.

Employees and vehicles enter to the site through the checkpoint equipped with security equipment. For the passage of people there is a corridor equipped with turnstiles. There are the viewing platforms for the inspection of vehicles.

Facilities of the Aktogai Concentrating Plant include:

- ore stockpile area (code 3200);
- storage area for mill liners;
- building for lime unloading and distribution (code 3820);
- the main switchyard (code 0420);
- the building of the main distribution substation (code 0400);
- main building, grinding and classification area (code 3300);
- main building, flotation area (code 3400);
- main building, molybdenum extraction, filtration and thickening area (code 3460);
- cooling tower and process water supply system (code 0500);
- drinking and fire water supply system (code 0500);
- main building, reagent area (code 3800);
- parking area 1;
- building for ore pebbles crusher (code 3340);
- parking area 2;
- offices of plant's maintenance shop and changing rooms (code 0985);
- plant's technical maintenance workshop (code 0984);
- primary crusher building (code 3100);
- tailings thickening building (code 3700);
- tailing thickeners;
- thickening and unloading of the concentrating plant (code 3500);
- technical water pumping station (code 0500);
- pond for technical water;
- pond for storm water;
- discharge pumping station (code 3760);
- open container warehouse of reagents;
- complex for shipment of copper concentrate in Big-Bags (code 3600);
- ground conveyor (3130).

The main production facilities of the concentrating plant include: ore stockpile area, storage area for mill liners, building for lime unloading and distribution, building of the main distribution substation, the main building (grinding and classification areas, flotation area, molybdenum extraction, filtration and thickening area, reagent area), building for ore pebbles crusher.

The facilities directly related to the operation of the concentrating plant: the main switchyard, tailings building, tailing thickeners, thickening and unloading of the concentrating plant, cooling tower and process water supply system, drinking and fire-fighting water supply system, industrial water pumping station, pond for technical water, pond for storm water, discharge pumping station, open container storage for reagents, ground conveyor.

Primary crusher building. Primary crushing is carried out in close proximity to the mine pit. The receiving hopper is loaded by the mine dump trucks. The dispatcher controls the loading of the bunker through a special panoramic window.

The crane is used for the crusher maintenance and repair. There is a repair and assembly platform and stands for storing the cones and eccentric shafts.

The crushed ore by a transfer conveyor is fed to the main conveyor for transportation to the concentrating plant.

Surface main conveyor of 1508 m length is intended for the delivery of coarse-ground ore to the concentrating plant's warehouse. The conveyor is equipped with automatic scales for weighing the ore delivered to the warehouse. By lifting the conveyor line, the discharge chute at the final feed point is set to the height required to form the bulk ore cone in the warehouse (storage).

Ore storage area is a floor warehouse, which is connected by a tunnel and a conveyor overpass with the grinding section of the main building. The coarse-ground ore enters the warehouse via the discharge chute of the main conveyor and is collected in the form of a conical embankment, from where by the dozed (batched) portions enter the conveyor tunnel located directly below the embankment. The *warehouse* supplies the balls for self-grinding mill to the ore conveyor. Auxiliary facilities are located in a separate building.

Building for ore pebble crushing is intended for additional crushing of the ore pebbles, which is finished during the transportation to the grinding unit of the main building. It is a separate building with dimensions in axes of 50 × 33 m, 27,0–45 m height, located to the east of the main building of the concentrating plant. Via the transfer conveyors, the ore pebbles are fed to the crushing plant, after crushing the fine fraction is returned to the main conveyor that transports the ore to the grinding unit (section). For emergency unloading there is a separate warehouse of ore pebbles on the site.

Building for lime unloading and distribution is a separate building with equipment for unloading from railway transport, slaking and distribution of lime. The building is located to the south-east of the underground conveyor tunnel. The warehouse is supposed to be loaded from railroad cars that delivere the crushed lime to the plant. From the reinforced concrete vertical bunkers the lime after grinding with semaltenious slaking enters the tank with a mixer to obtain milk of lime, which is then fed to the reagent area (building of reagents) of the main building.

Main building is a separate building consisting of several technological spans: grinding, flotation, molybdenum separation, HPRP building (high pressure roller press). The main purpose of the main building is to concentrate the mixture of copper-molybdenum ore by performing a sequential technological process of ore grinding, bulk-selective flotation (bulk-differential) and in the result to receive the copper and molybdenum concentrate. The layout of the building is performed on the basis of the most rational organization of the technological process and convenient interconnection with the auxiliary facilities of the plant.

Administrative building of the sulphide shop is located within the main building. It includes a lunch room for 60 people per shift, a first-aid post, IT server room, a technical library and documens keeping rrom, open workstations for 20 people, a meeting room, closed offices and service rooms. This building is designed as an operating protected location that could provide an emergency shelter in case of an accident in the main building.

Control room of the sulfide shop is located within the main building. There are opearintg stations for 10 people on the basement level. The ground floor of the PMC building houses the rooms for DCS offices, offices for operators, control rooms and DCS engineers' rooms. Access to the first floor is from two open staircases.

Thickening and unloading of the concentrating plant with a plan size of 86 × 100 m, height from 20 to 30 m, is located south-west of the main building of the concentrating plant and is technologically connected with it. The building was designed to have a metal frame with walls and roof made of sandwich panels along the metal girders.

The purpose of the building is to filter and dehydrate the concentrates and their storage for subsequent loading and shipment to consumers. The copper concentrate is shipped by the railway carsm while molybdenum in big bags.

Facility for shipment of copper concentrate in big bags. It is a separate building connected to the thickening and unloading building.

Open container warehouse of reagents. Reagent building. The warehouse is located in the immediate vicinity of the plant's main building from the south-east side and has a railway and automobile access. The reagent building is intended for the warehousing and storage of reagents used

in production processes (pine oil-based frother, isobutyl sodium xanthate, molybdenum collector, flocculant for concentrate, etc.).

Tailings facilities. These facilities are located to the south of the main building of the concentrating plant and are intended for utilization of tail pulp from the flotation line. The tailings facilities include the building for separation of the tailings thickening, tailings thickeners, emergency pond for tailings discharge.

The maintenance shop of the plant is a separate building. The block of the maintenance shop with the training shop is a one-story building. The building is designed for the personnel of various operating stations. There is a rail-mounted travel crane with a carrying capacity of 25 ton and with a minimum frame height of 15 m. The building also houses the general purpose warehouses, lubricant and reagent warehouses, switchboard, gas-operated receiving station.

The plant's maintenance offices and the changing rooms consist of two blocks connected by a link building:

- block of the maintenance shop with the training shop;
- block of the maintenance offices and changing rooms.

1. Block of the maintenance shop with the training shop – is a single-storey modular building, pre-assembled from steel structures, with plan dimensions of 22 × 65 m, height 17 m, on a concrete foundation adjacent to the main building of the plant from the south-east side. The outer walls are designed to be combined from a trapezoid shaped flooring along a metal frame, with insulation and an inner lining of fiber cement plates. The inner walls and partitions are made of a metal frame with fiber cement plates on both sides. The roof is made from sandwich-type roofing panels on the metal girders. The building is designed for personnel of various operating stations. The block has a rail-mounted travel crane with a carrying capacity of 25 tons, with a minimum frame height of 15 m. The building also houses for general purpose warehouses, lubricant and reagent warehouses, switchboard, gas-operated receiving station.

2. The maintenance building is designed as a single-storey, modular type building with dimensions in plan of 52 × 12 m, height of 5 m. Walls, partitions and roofing are made similar to the block of the plant's maintenance shop with a training shop. The block includes male and female changing rooms equipped with bathrooms and showers, as well as office rooms, operating stations, a dining room, an electrical room, a technical room.

The blocks of the plant's maintenance offices and changing rooms and the maintenance shop for with the training shop are interconnected by a closed corridor.

The building of the main distribution substation. The main distribution substation is of block-modular type of full factory readiness. It is designed to receive, convert and distribute the electrical energy.

Storage area for mill liners. The storage area for mill liners is designed for the storage of waste liners.

Cooling tower and process water system. The cooling tower is designed to cool the water that removes heat from the heat-generating equipment.

Pump station of technical water. It is a separate building with plan dimensions of 30 × 25 m.

Parking areas 1, 2. There are two parking areas ta the site.

1.5 BRIEF DESCRIPTION OF CONCENTRATING PROCESS

1.5.1 Technology option

The main technological solutions for the construction of the Aktogay Concentrating Plant are developed on the basis of the design assignment and in accordance with state regulations, rules and standards in force in the Republic of Kazakhstan.

KAZ Minerals Aktogay LLP is planning to build a second concentrating plant to increase the volume of processing of sulfide copper-molybdenum ores from the Aktogay field. The field is located in the East Kazakhstan region of the Republic of Kazakhstan. The field contains the sulfide copper-molybdenum ores.

The main valuable components of the ore are copper, molybdenum, gold and silver.

The technology of flotation concentration of copper-molybdenum ores has not undergone significant changes in recent years: the bulk-differential flowsheet is mainly used with the discharge of a bulk concentrate and its subsequent selection. The main problem in the concentration of copper-molybdenum ores is the separation of copper-molybdenum concentrates. It can be carried out by flotation of molybdenum minerals during the depression (suppression) of copper minerals and vice versa.

Practically, the following methods for separating the bulk copper-molybdenum concentrates are most common:

– flotation of copper sulfides and the suppression of molybdenite by organic colloids;

– extraction of molybdenite in case of depression of copper and pyrite sulfides by the "steam" flotation method;

– molybdenite flotation in the suppression of copper and pyrite sulfides after low-temperature oxidative (sweet) roasting of bulk concentrate at 260-330 ºC;

– suppression of copper and iron sulfides by sodium hydrosulfide, ammonium sulfide or ammonium hydrosulfide, which can be used independently or in a combination of sodium sulfide with sodium hydrosulfide and sodium hydrosulfide with ammonium sulfide.

At the concentrating plants of the CIS countries (Russia, Kazakhstan, Uzbekistan) and the Balkhash plant (Kazakhstan) the "steam" technology of selection of copper-molybdenum concentrates is used and has several disadvantages, the main of which are:

– reduction in the rate of molybdenite flotation in a strongly lime medium and its significant loss with the pyrite product;

– the impossibility of achieving effective depression of pyrite, especially of slime pyrite even with high alkalinity of the pulp;

– partial depression of precious metals;

– high energy costs for pulp heating;

– high consumption of sodium sulfide (from 5 to 20 kg/t);

– instability of the selective flotation process;

– increase in the risk of technological process when using the jet steam.

The foreign plants mostly use the method of separation of collective (bulk) concentrates that excludes the steaming and as a copper sulfide depressor uses the sodium hydrosulfide or a mixture of sulfide and sodium hydrosulfide.

Taking into account the shortcomings of "steam" flotation and the positive results of researches on the separation of copper-molybdenum concentrates by sodium hydrosulfide mixed with sodium sulfide, the technology developer - Fluor Australia Pty Ltd recommended the bulk concentrate separation method for Aktogay deposit ores.

This project envisages a bulk-selective scheme (bulk-differential flowsheet) for the concentration of copper-molybdenum ores of the Aktogay deposit with the separation of collective concentrate using a method that eliminates steaming and uses copper sulphide mixed with sodium hydrosulfide as a depressant of copper minerals. Refuse to use the live steam helps to reduce energy intensity and increase the safety level of the process. In addition, the advantage of the adopted technology is the relatively low consumption of sodium sulfide, which improves sanitary working conditions, due to the toxicity of sodium sulfide.

1.5.2 Brief description of the selected technology

Sulfide copper-molybdenum ores from the Aktogay deposit are fed to the concentrating plant. The capacity of the concentrating plant is 25.0 million tons of ore per year.

The project provides for obtaining copper and molybdenum concentrates of the following brands:

- copper concentrate of KM4 brand, Standard (TU) 87 RK-00200928-145-97;
- molybdenum concentrate of KMF-4 brand, GOST 212-76.

Copper concentrate is to be processed at the metallurgical plant of KAZ Minerals Aktogay LLP, and molybdenum concentrate is to be shipped to third-party consumers or exported.

Ore processing technology includes the following operations:

- primary crushing of ore to a particle size of 300 mm;
- semi-autogenous grinding (SAG) of ore;
- screening of SAG product;
- two-stage crushing of ore pebbles;
- the 2nd stage of ore grinding in a closed cycle with hydrocyclones;
- the rougher, scavenger and three recleaner operations of bulk floatation;
- regrinding of the concentrate of the bulk rougher floatation in a closed cycle with hydrocyclones;
- regrinding of the concentrate of the 1st scavenger bulk floatation in a closed cycle with hydrocyclones;
- thickening of the bulk concentrate;
- two stages of slurry (pulp) agitation of the bulk concentrate;
- roughing and 4 recleaner operations of molybdenum floatation;
- thickening and filtration of molybdenum and copper concentrates;
- thickening of tailings.

The flow process involves the use of the following reagents:

- lime;
- Sodium isobutyl xanthate;
- methylisobutylcarbinol;
- sodium sulfide and sodium hydrosulfide;
- pine oil;
- molybden collector;
- flocculant.

The concentration under the said flowsheet of the original ore with a copper and molybdenum content of 0,361% and 0,009%, respectively, allows the following technological parameters to be achieved:

- copper content in copper concentrate 24,3%;
- content of molybdenum in molybdenum concentrate is 46,3%;
- extraction of copper into copper concentrate 83,8%;
- extraction of molybdenum into molybdenum concentrate 75,0%;
- content of copper in the tailings 0,059%;
- content of molybdenum in the tailings of 0,002%.

1.5.3 Process Description

Ore from the mine pit is transported by trucks into the coarse ore hopper. The crushed ore is fed by a plate feeder from the crusher to a conveyor belt, through which it enters the main conveyor.

The units for loading the ore into the crusher and overloading from the transfer conveyor to the main conveyor are equipped with shelters with dust removal by means of a bagdust collector (ASP-1

MODEL CE8-120-3 aspiration system (3120-DC-133 PRIMARY CRUSHER DUST COLLECTOR), with 99.9% cleaning efficiency .

A self-cleaning magnet located above the discharge chute of the transfer conveyor serves to remove metallic inclusions and then transfer them to the receiving hopperof metallic impurities.

The crane is used for the primary crusher maintenance and repair. For this purpose there is a repair and assembly platform to to accommodate the crusher body and the main shaft, as well as stands for storing cones and eccentric shafts.

The ore after coarse crushing by the main conveyor is fed from the ore crushing complex to the coarse-ore storage area, where it is stored as a stockpile. Aspiration suction pumps are installed on all dusting points of the overfilling - ASP, (aspiration system MODEL CE8-185-3 (3230-DC-101 RECLAIM DUST COLLECTOR), MODEL IN-V36 SHRL (3560-DC-134 MOLYBDENUM CONCENTRATE BAGGING STATION DUST COLLECTOR), cleaning efficiency of 99.9%.

The system of three belt feeders and a belt conveyor supplies the ore from the stockpile to the grinding area of the main building to the SAG (semi-autogenous grinding) mill.

The balls for SAG mill are also supplied to this belt conveyor. Balls with a diameter of 125 mm are transported by road to the ball hopper, from where they are unloaded using a ball feeder to the conveyor belt. To create sanitary conditions at workplaces, a system of aspiration of dusty air with the release of cleaned air into the atmosphere is provided in a conveyor tunnel under the stack.Aspiration suction pumps are installed on all dusting points of the overfilling - ASP-2, (aspiration system MODEL CE8-120-3 (3340-DC-103 PEBBLE CRUSHING DUST COLLECTOR), MODEL IN-V36 BFRL (3882-DC-113 SODIUM HYDROSULPHIDE DUST COLLECTOR)) with cleaning efficiency of 99.9%. Dust collected in the apparatus as it accumulates is discharged onto a belt conveyor and returns to the process.

After SAG mill, the ore is screened to remove the ore of critical size. The oversize product (the ore pebble) is conveyed by the conveyor system to the ore pebble crusher, where it undergoes two crushing stages on the cone and rolling crushers, then is conveyed back to the SAG mill. The undersize product is transported to the grinding stage II to two ball mills that operate in a closed cycle with a battery of hydrocyclones.

Balls with a diameter of 80 mm from the ball hopper are unloaded by the ball feeder to the conveyor and fed into the mill of the grinding stage II. Aspiration suction pumps are installed on all dusting points of the overfilling, ASP, (aspiration system MODEL CE8-185-3 (3340-DC-104 HPGR DUST COLLECTOR), MODEL IN-V36 BFRL (3831-DC-110 SIBX DUST COLLECTOR), cleaning efficiency 99 ,9%.

The hydrocyclone overflow of the grinding stage II enters the chambers of floatation machines of the rougher bulk floatation. The concentrate of the rougher bulk floatation enters the regrinding mill operating in a closed cycle with a battery of hydrocyclones. The hydrocyclone overflow goes through the 2nd recleaner.

The tailings of the bulk rougher flotation enter the chambers of flotation machines of the scavenger bulk floatation. The concentrate of the scavenger bulk floatation is re-grinded in a mill operating in a closed cycle with hydrocyclones. The hydrocyclone overflow enters the cells of flotation machines of the scavenger bulk flotation I, the concentrate of which is sent to recleaner III.

Tailings of the recleaner I are sent to the control recleaner flotation, the concentrate of which is returned to the cycle of the re-grinding cycle of the concentrate of control flotation.

Concentrate of the recleaners II and III, which is a bulk copper-molybdenum concentrate, is condensed in a thickener to remove the parts of the reagents with an overflow, which is returned to the process as recycled water.

The thickened bulk concentrate is agitated with sodium hydrosulfide in a mixture with sodium sulfide in two agitators and enters the flotation machine of the rougher molybdenum flotation. The concentrate of the rougher molybdenum flotation is subjected to recleaner I.The froth product of the sixth molybdenum recleaner enters the molybdenum regrinding mill, working in a closed cycle with a battery of hydrocyclones. The hydrocyclone overflow is sent to the II clean-up molybdenum flotation, the tailings of which are returned to the molybdenum recleaner- I. And the concentrate is subjected to two consecutive recleaners. The froth product of the fourth molybdenum recleaner is a finished

molybdenum concentrate. The flotation product of the rougher molybdenum flotation is a finished copper concentrate.

Molybdenum and copper concentrates are thickened in their respective thickeners, the overflows of which are returned to the process as recycled water. The thickened products are sent to the appropriate press filters of the filter area with a warehouse of concentrates.

Copper concentrate after filtration on two parallel operating filter presses is stored in stockpiles. The copper concentrate from the warehouse is shipped by the loader to the railway cars.

The molybdenum concentrate after filtration on a filter press is packed in big bags and sent to consumers.

Tailings of the scavenger bulk and recleaner flotations are the waste tailings, which by gravity are transported to the tailings sump and then pumped to the tailings thickeners. The thickened tailings are pumped to the tailings pond (under the project of the second phase of construction of he tailings storage).

Processing of ores is envisaged under the scheme of circulating water supply. Thickener drains are returned to the process as recycled water.

Reagent facilities

Concentration of the sulphide copper-molybdenum of Aktogay ores under the technological scheme involves the use of the following reagents: xanthate sodium isobutyl, methyl isobutyl, molybdenum collector, pine oil, sodium hydrosulfide in mixture with sodium sulfide, powder lime used in the flotation cycles, and flocculant used during thickening of flotation concentrates and tailings.

For the storage of reagents, a reagent warehouse and a hopper warehouse are provided. The reagent warehouse is designed to store a two-month supply of reagents. As required, reagents from the warehouse are delivered to the reagent section of the main building, as well as to the building of flocculant preparation for tailings.

Preparation of solutions of flotation reagents is carried out by appropriate systems in the reagent section of the main building. Solutions of reagents from the supply tanks are pumped to the reagent area of the main building. The reagents from the tanks of the reagent area are supplied to the process by the systems of dosing of reagents.

Preparation of the flocculant solution for concentrates is carried out in an appropriate system located in the reagent section of the main building. From the supply tank, the flocculant solution for the concentrate is fed by dosing pumps to thicken the copper and molybdenum concentrates.

The system for preparing the flocculant solution for tailings is located in the building of the same name. The finished flocculant solution is fed into the appropriate thickener by the dosing pumps.

The tankers for preparing reagent solutions have the local exhausts. The exhaust air without treatment is released into the atmosphere, due to the low content of harmful substances.

The empty container of reagents is stored at the designated site.

The powder lime is delivered by rail to the hopper warehouse of powder lime and is fed into two hoppers using a pneumatic transport system. The dusty air formed during the loading of the hoppers is cleaned in the aspiration system and then released into the air.

From the hoppers the lime is fed by an inclined screw conveyor system into a vertical mill, where occurs a wet grinding of lime to a particle 63 μm size with its simultaneous lime sliking. Balls of 25 mm in diameter are transported by vehicles to a hopper warehouse of powder lime. Balls are loaded into the mill by ball feeder. Lime milk to achieve the desired concentration is circulated between the vertical mill and the two tanks. The vertical mill and the tanks are equipped with an aspiration hood system. Dusty air containing water vapor is cleaned and released into the air.

The finished lime milk is pumped into the agitator tank. To prevent clogging of pipes with lime the circulation of lime solution by pumps is arranged. Lime milk from the tank is pumped to the reagent area of the main building and further to the corresponding operations.

1.5.4 Main process equipment

The main process equipment was selected taking into account the processing of 25,0 million tons of ore per year, equipment utilization ratio (0.78 for coarse crushing equipment, 0.92 for other equipment), and feed (supply) irregularity coefficient of 1.15.

The main process equipment of the designed concentrating plant includes: crushers, mills, hydrocyclones, flotation machines, a thickener and filter presses.

Equipment for coarse ore crushing

For coarse crushing of ore on the open-pit side wasdesigned a cone crusher of coarse crushing with a cone diameter of 2260 mm (89") and a receiving opening of 1600 mm (63″).

Manufacturers of semi-mobile crushing plants: ThyssenKrupp Polusisus, Germany; Tevona TAKRAF, Germany.

Equipment for crushing ore pebbles

For the crushing of ore pebbles, a cone crusher for stage I and a high pressure roller crusher (press) for for crushing stage II were designed.

Manufacturers of cone crushers: Sandvik, Sweden; Metso Minerals, Sweden; Thyssen Krupp Fordertechnik, Germany.

Manufacturers of high pressure roller crushers (presses): Mashinenfabrik Koppern GmbH & Co. KG, Germany; Humboldt Wedag, Germany.

Grinding equipment

For the grinding stage I, a semi-self-grinding mill with a drum diameter of 12,2 m and a drum of 7.6 m in length were designed. For the grinding stage II, the ball mills with a drum diameter of 8,5 m and a drum length of 13,6 m were designed. To regrind the concentrate of the rough (main) bulk flotation and concentrate of the scavenger (control) bulk flotation, the multi-chamber mills with a fixed drum are recommended. The ceramic balls are used as grinding units in grinding mills,.

Manufacturers: Metso minerals, Sweden; Outotes, Finland; Sandvik, Sweden; Thyssen Krupp Fordertechnik, Germany; NPO “Rivs”, St. Petersburg.

Equipment for the classification of products

Classification of concentrating products is recommended to perform in hydrocyclones of various sizes.

Manufacturers: NPO “Rivs”, St. Petersburg; Mekhanobr-Technika, St. Petersburg; Warman, Germany, Krebs, USA; Metso minerals, Sweden; Engineering Dobersek GmbH, Germany; ThyssenKrupp Fordertechnik, Germany.

Flotation Equipment

Flotation concentration of useful components is carried out in pneumomechanical flotation machines with a chamber capacity from 5 to 257 m³.

Manufacturers: NPO “Rivs”, St. Petersburg; Outotec, Finland; Metsominerals, Sweden; FLSmidth Minerals, Sweden.

Equipment for thickening

To thicken the concentration products, the high-speed thickeners are used to reduce the thickening area.

Thickener manufacturers: Outotec, Finland.

Filtration equipment

To filter the concentrates are recommended the filter presses that provide 8% product moisture.

Manufacturers: Hoesch, Germany; Larox, Germany; Demme, Italy.

1.5.5 Evaluation of the performance of the main production line, the possibility of products exporting

The construction of the concentrating plant is supposed to be in one section. The design capacity of ore is 25,0 million tons of ore per year.

Sulfide copper-molybdenum ores of the Aktogay deposit are fed for processing.

The mode of operation is determined based on the operation mode of the plant 365 days a year and the equipment utilization rate:

− for coarse crushing of equipment utilization ratio of 0,78 - 285 days a year, two shifts of 10 hours each;

− for the processes of grinding, flotation, regrinding, dehydration and tailing facility of equipment utilization ratio of 0,92 - 336 days a year, two shifts of 12 hours each.

The performance of mineral concentrating processes, taking into account the mode of operation and the power irregularity factor of 1.15, is:

- coarse ore crushing area 4386-5043,9 t/h;
- ore pebbles crushing area 682-792 t/h;
- grinding, bulk flotation and regrinding area 3100-3600 t/h;
- molybdenum flotation area 58,9-68,4 t/h;
- copper concentrate dehydration area 38,6-44,82 t/h;
- molybdenum concentrate concentrate dehydration area 0,465-0,54 t/h.

When calculating the balance of metals, the technological indicators of the concentration of Flour Australia Pty Ltd were taken as a basis, taking into account their adjustment for the processing of copper-molybdenum ores.

Commercial products of the concentrating production are the copper and molybdenum concentrates are produced in the amount of 311,233 and 3,655 thousand tons per year, respectively.

The copper concentrate is planned to be processed at the metallurgical facilities of KAZ Minerals Aktogay LLP. Produced molybdenum concentrate is intended for shipment to third-party consumers, while the possibility of its export is not excluded.

The balance of metals is calculated on the average metal content in the ore, with an annual productivity of 25,0 million tons of ore and is given in Table 1.5.1.

Table 1.5.1 – Balance of concentration of copper-molybdenum ores

Content of copper – molybdenum ore		Product			
		Ore	Copper concentrate	Molybdenum concentrate	Tailings
Output	%	100,0	1,245	0,015	98,740
	ths.ton	25000,0	311,233	3,645	24685,122
Content,%	Copper	0,361	24,300	2,000	0,059
	Molybdenum	0,009	0,004	46,300	0,002
	Gold, g / t	0,030	1,446	2,263	0,012
	Silver, g / t	1,200	48,195	72,428	0,597
Recovery, %	Copper	100,0	83,800	0,081	16,119
	Molybdenum	100,0	0,553	75,000	24,447
	Gold	100,0	60,000	1,100	38,900
	Silver	100,0	50,000	0,880	49,120
Metal, t	Copper	90250,0	75629,50	72,90	14547,60
	Molybdenum	2250,0	12,45	1687,50	550,05
	Gold, kg	750,00	450,00	8,25	291,75
	Silver, kg	30000,00	15000,00	264,00	14736,00

The designed concentration production *does not provide* for the separation of gold and silver contained in the original ore into independent commercial products. These precious metals are partially recovered into copper and molybdenum concentrates, from which they can be isolated at the stage of metallurgical processing.

The principal technological scheme for the concentration of copper-molybdenum ore is presented in Figure 1.5.1.

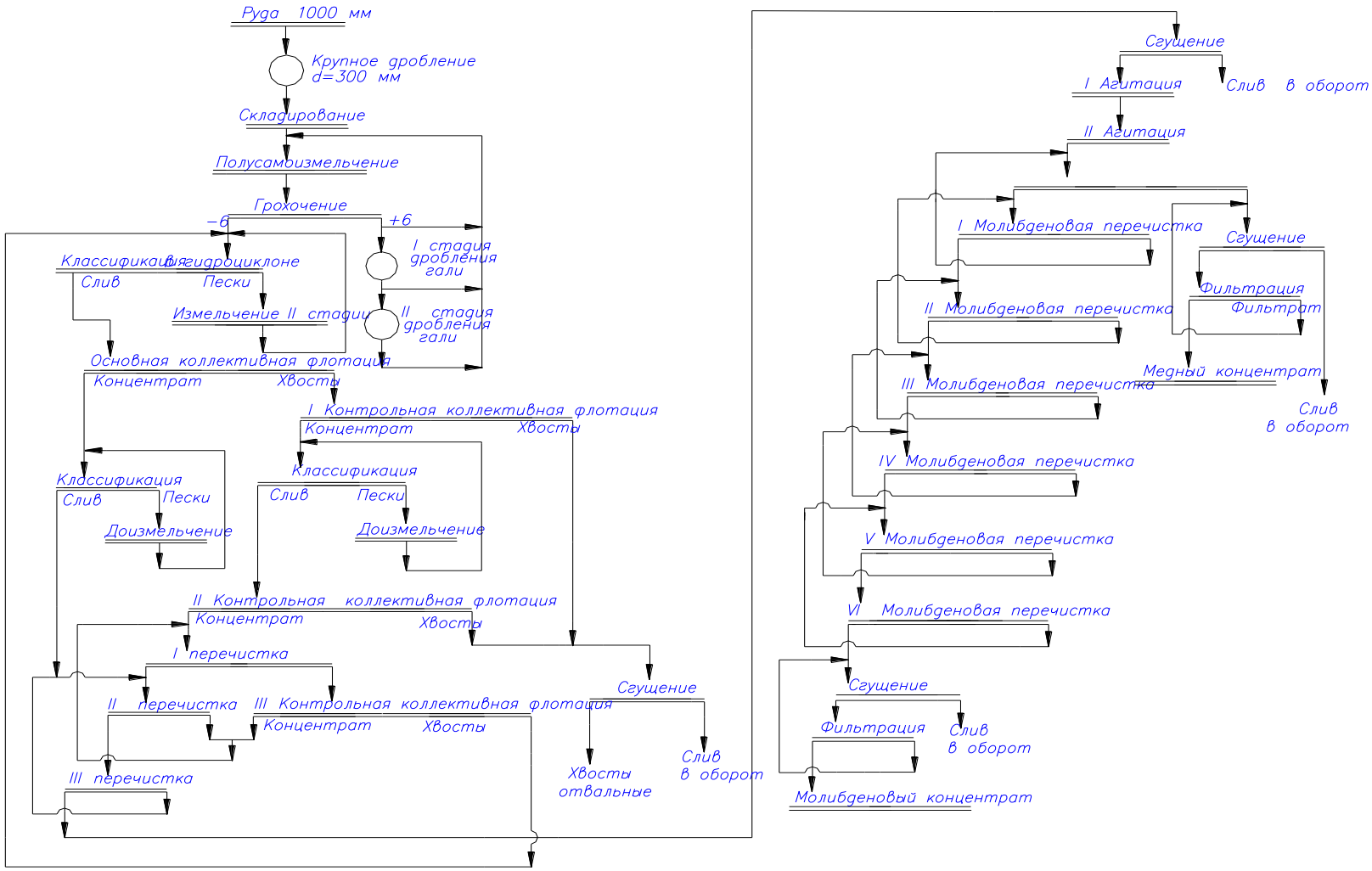

Figure 1.5.1. Concentration diagram

The designed concentrating plant doesn't have any by-products. Dump tailings are the tailings of the scavenger bulk flotation, which are stored in the tailings pond. To reduce the volumes of slurry tailings, it is required the tailings thickening in high-performance thickeners. Adding flocculant makes it possible to achieve a solid content in the pulp - 68%, as a result, the consumption of slurry tailings directed to the tailing dump is reduced.

Flotation tailings are technogenic raw materials. Their further processing is possible. Accepted design solutions provide safe storage of the process tailings (waste).

The tailings hydrotransport system of the concentrating plant consists of a pumping station for thickened tailings, main and distribution slurry pipelines, as well as a pulp pumping station operating during shutdown period of the main equipment for tailings thickening.

The tailings facilities consist of the following equipment:

- tailings pipeline ramps;
- tailings distribution systems;
- embankments and dikes;
- drainage systems;
- access road to the drain water system;
- weeper drain of natural flow;
- return water pumping station.

After thickening, the tailings are discharged into the receiving tank 3730-TK-164 (volume 215 m^3), before being removed to the tailing dump. Then by pumps 3730-PU-531 and 3730-PU-541 are pumped toward the tailing pond.

Pump characteristics: capacity - 3543 m^3/h; head - 39.2 m.

The tailings removal line is designed to have diameter of 650 mm (the pipe is made of carbon steel CS API 5L Gr B ERW lined with rubber). Two lines from the pumps are combined into one line inside the thickening building. The external line of the tailings pipeline is designed to be of 650 mm in diameter. The length of the tailing line is 400 m.

Under the thickening building, the overflow and drainage lines from the receiving tank 3730-TK-164 are laid, as well as the emergency line for the thickeners, with the line diameter of 1000 mm (pipe material HDPE PE100. PN10). These lines are laid underground in parallel with the main tailing line, with the length of 250 m to the distribution chamber, then the tailings merge into the tray system which leads to the tailing pond.

The tailings pipeline runs to the center point of the tailings discharge ramp. The discharge point is located at the top of the ramp. The ramp will gradually lengthen to the west, and in few years to the east, to higher elevations over the life of the mine.

The construction of embankments and dikes along the perimeter will be carried out in stages. The total amount of excavation work required for embankments, dikes and the pipeline ramp is approximately 3 million m^3 at start-up stage, and will increase to about 5,1 million m^3 at the end of the life of the mine.

The drain water return system includes a floating pontoon, which will be equipped with non-freezing devices for low temperatures in winter. Drain water will be transferred to a closed-type pumping station. At the pumping station, two working pumps with a capacity of 673 m^3/h and a pressure of 115 m are designed. Drain water is pumped to the concentrating plant through a 560 mm in diameter pipeline made of high-density polyethylene.

The drain water return system will not function during the cold season. Despite the maximum capacity of the pump system required to discharge collected water after the end of the cold season, the average amount of return water will be approximately 50% of the pump capacity.

Access to the drain water return supply and pumping station is performed through the service road on the east side of the tailings storage facility.

See drawings: 3207-3700-M-1004
3207-3700-M-1005
3207-3700-M-1006
3207-3700-P-1012
3207-3700-P-1012

The drawings are presented as part of the detailed design 3207.

Table 1.5.2 - Basic design parameters

Parameters	UOM	Value
Ore Characteristic		
Specific density	t/m	2,77
Bulk density (bulk weight)	t/m^3	1,6
Average moisture of common ore	%	3
Work schedule		
Number of days	day	365
Working hours per day	hour	24
Utilization rate	%	92,0
Total working hours per year	hour	8059
Mine life	years	79
Productivity during ore processing		
Current (hourly) max	сухая-т/ч	3457
Annual value	сухая-т/год	25000000
Technical water of the whole plant		
Current (hourly, without recycling)	m^3/h	1957,75
Annual value	$m^3/year$	17112985,7
Recycling water		
Current (hourly)	m^3/h	8331,81
Annual value	$m^3/year$	72794263,5
Reagent consumption		
Lime	kg/t of ore	0,701
Collector 1 (SIPX)	kg/t of ore	0,025
Molybdenum collector	kg/t of ore	0,005
Isobutyl sodium xanthate	kg/t of ore	0,025
Frother (pine oil)	kg/t of ore	0,01
Sodium sulfide mixed with sodium hydrosulfide	kg/t of ore	0,001
Flocculant of concentrate thickener (Magnaflok)	kg/t of ore	0,001
Methylisobutylcarbinol (MIBK)	kg/t of ore	0,025
Electricity		
Electricity consumption for industrial purposes	MW per year	827514
Electricity consumption for household needs	MW per year	75862
Unground ore processing cycle		
Days a year	day	365
Working hours per day	hour	24
The estimated duration of the production cycle for the year	%	90
Estimated number of working hours per year	hour	7920
Extraction of		
Copper from sulfide ore	%	82
Molybdenum from sulfide ore	%	50
Product specification		
Copper content in copper concentrate	%	16-20
Molybdenum content in molybdenum concentrate	%	50

During the operation the most significant objects of environmental impact will be the following:

- ore crushing and its transportation;
- a warehouse of coarse ore;
- stock of unground ore;
- concentrating plant.

The raw materials for the concentrating plant are sulfide and copper-molybdenum ores of the Aktogay deposit.

The capacity of the concentrating plant is 25,0 million tons per year.

Table 1.5.3 shows the main physical-mechanical properties of the processed raw materials. The coefficient of hardness of rocks and ores by M.M. Protodyakonov is within 8–16. For weakened zones and near-surface weathered rocks, it will be 4-6. Fragmentation index is 1.5

Table 1.5.3 – Physical-mechanical properties of the raw materials

Parameter	UOM	Values
Specific gravity	t/m^3	2,77
Bulk weight	t/m^3	1,6
Natural angle of repose	degree	38
Moisture	%	2 - 4
Coarseness	mm	1000

Table 1.5.4 shows the chemical composition of ores according to the analysis of technological samples taken and studied during the exploration period of the field.

The flowsheet of concentrating of copper-molybdenum ore is presented in Figure 1.5.2.

Workers will work on a 15-days work / 15-days rest schedule. The staff number is 691 people, of which 595 are workers, 96 are engineers and technicians.

The development of reserves of the Aktogay deposit is planned within 28 years after the implementation of the project to expand the Aktogai Concentrator. The expansion project will double the sulphide ore processing capacity from 25 to 50 million tons per year.

The balance of the products of the concentration of copper-molybdenum ore is shown in table 1.5.4.

Table 1.5.4 - Chemical composition of sulfide ores according to technological samples

Components	Medium ore (copper content 0,40-0,43 %)						Relatively rich ores (copper content 0,50-0,66 %)			Poor ore (copper content 0,20-0,31 %)	
	Granitoids			Volcanics			Granitoids		Volcanics	Granitoids	
	№ 1	Semi-industrial № 359	Large-sized № 390	№ 30	Large-sized № 35	Semi-industrial №39	№ 4	№ 8	№ 12	№ 189	Coarse № 358
1	2	3	4	5	6	7	8	9	10	11	12
I. Ore components											
Copper	0,45	0,40	0,48	0,42	0,41	0,41	0,56	0,50	0,58	0,25	0,31
Molybdenum	0,007	0,0082	0,010	0,017	0,015	0,015	0,009	0,012	0,014	0,006	0,005
Sulfur total	0,48	1,07	1,09	0,90	0,70	0,70	not identified	1,08	not identified	not identified	0,82
Sulfur sulphide	not identified	not identified	not identified	not identified	not identified	not identified	0,40	not identified	0,88	0,50	not identified
Gold, g/t	traces	0,100	not found	not found	0,200	0,028	0,040	not found	not found	0,050	not found
Silver g/t	0,50	1,50	1,20	1,20	1,40	2,13	2,40	1,20	<0,001*	0,60	0,0002*
Selenium	0,0001	not identified	not identified	not identified	0,0001	0,0003	0,0003	not identified	0,0006	<0,0001	0,00028
Rhenium	0,000013	not identified	not identified	not identified	0,000023	0,000025	0,000008	not identified	Не/обн.	0,00000091	0,000013
Tellurium	Not foud	not identified	not identified	not identified	not identified	0,0001	0,0001	not identified	<0,0001	<0,0001	0,0001
Lead	0,001	0,004	0,05	0,01	not identified	0,03	0,005	0,05	0,015	not identified	0,052
Zinc	0,005	0,008	0,31	0,01	0,02	0,02	0,01	0,31	0,06	not identified	0,05
Cobalt	0,001*	not identified	not identified	not found	0,0027	0,0011	0,0008*	н/о	0,015	not identified	not found
Cadmium	not found	not identified	traces	not found	0,0064	not found	0,0002	0,035	<0,00025	0,004	not found
Tungsten	0,0005*	not identified	not identified	not found	not identified	0,02*	0,0001*	0,02*	не обн	not identified	not found
II. Slag-forming and other											
Silicon oxide	63,75	62,64	54,40	66,00	64,53	65,75	63,07	62,24	66,0	60,32	65,22
Aluminium oxide	15,115	8,0	16,08	15,40	13,88	14,43	16,20	16,24	14,59	15,33	14,66
Calcium oxide	3,70	2,38	5,61	5,25	5,15	3,45	2,33	4,62	2,42	4,62	4,20
Iron oxide	5,19	not identified	6,24	0,08	not identified	not identified	3,96	2,48	0,09	3,71	not identified
Ferrous oxide	not identified	not identified	not identified	1,00	1,75	not identified	not identified	1,15	1,91	2,66	not identified.
Magnesium oxide	2,13	not identified	4,0	2,60	1,50	1,63	1,59	1,30	1,33	2,95	1,40
Potassium oxide	not identified	not identified	not identified	not identified	not identified	not identified	3,43	not identified	2,94	2,60	not identified
Sodium oxide	not identified	not identified	not identified	not identified	not identified	not identified	4,61	not identified	4,39	3,20	not identified
Titanium dioxide	not identified	not identified	not identified	not identified	not identified	not identified	not identified	not identified	0,70	0,53	not identified
Ppp	not identified	not identified	not identified	not identified	not identified	not identified	1,81	not identified	2,90	1,78	not identified
III. Harmful impurity											
Arsenic	not found	not identified	not identified	not found	not identified	not found	not found	not found	not found	0,0001	not found
Bismuth	0,00005*	<0,006	not identified	not found	not identified	0,0001*	0,0001	not found	not found	not identified	not found
Fluorine	not identified	not identified	not identified	not found	not identified	0,03	not identified	not identified	not identified	not identified	not identified
Uranus	not found	not identified	not identified	not found	not identified	not identified	not found	not identified	not identified	not identified	not identified
Note - * according to spectral analysis											

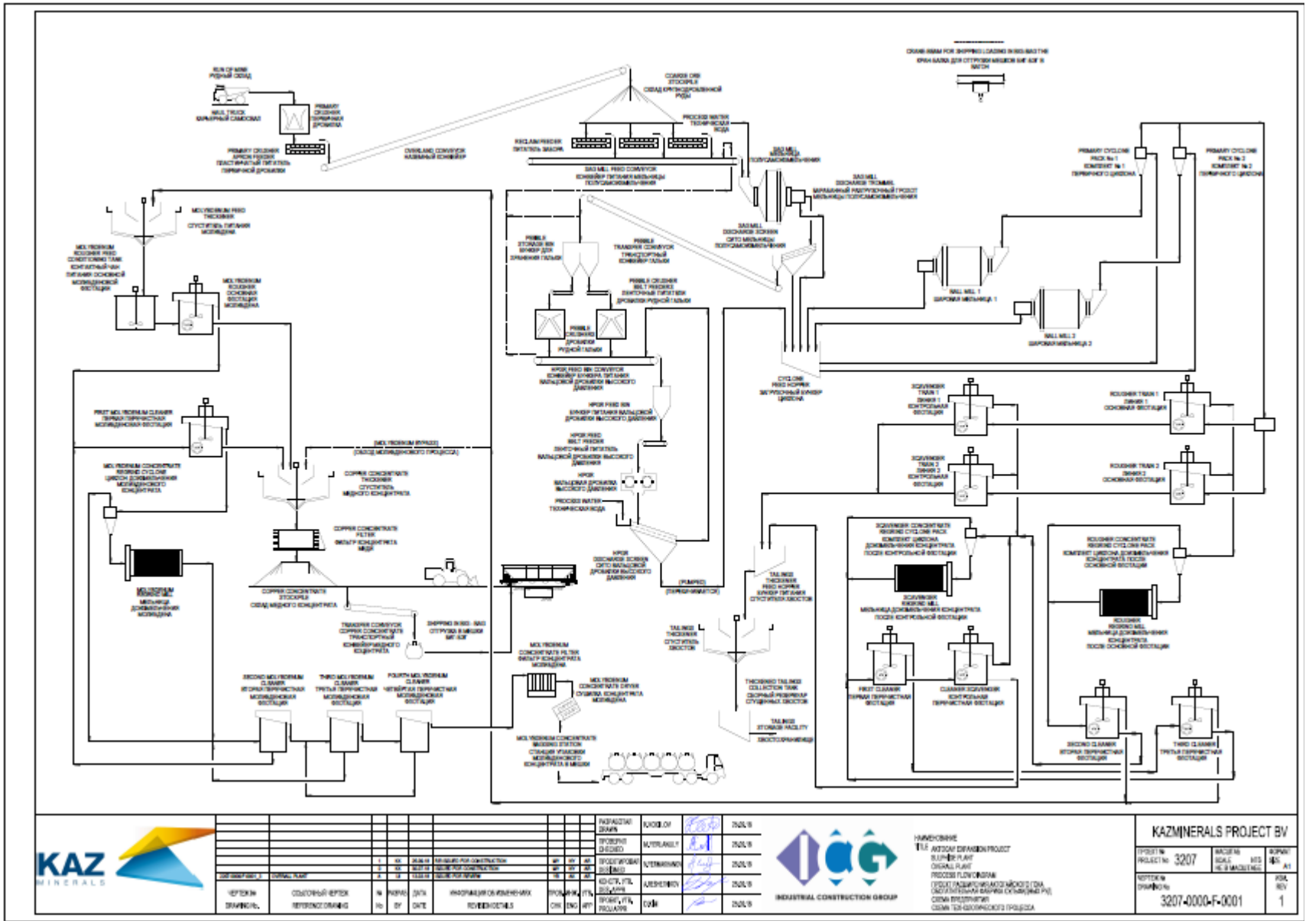

Figure 1.5.2. Sulphide ore concentration flowsheet

Table 1.5.5 - Chemical composition of concentrated products according to test data

№ №	Elements and compounds	Sample 39								Sample 359							
		Copper concentrate, output -2,25%		Molybdenum product, output - 0,05%		Bulk concentrate , output – 2,30%		Tailings, output -97,70%		Copper concentrate, output -2,81%		Molybdenum product, output - 0,04%		Bulk concentrate , output – 2,85%		Tailings, output -97,15%	
		Content %	Distribution,%	Content, %	Distribution,%	Content %	Distribution,%	Content, %	Recovery, %	Content %	Distribution,%	Content ,%	Distribution,%	Content %	Distribution,%	Content, %	Distribution,%
1	Copper	15,51	89,39	1,86	0,21	15,21	89,60	0,041	10,4	15,65	89,90	2,00	0,15	15,46	90,05	0,05	9,96
2	Molybdenum	0,013	1,73	23,78	71,20	0,53	72,93	0,0046	27,07	0,021	4,85	21,67	71,24	0,325	76,09	0,002	23,91
3	Iron, common	-	-	-	-	-	-	-	-	34,31	11,06	24,25	0,11	34,27	11,17	7,97	88,83
4	Sulfur	22,74	71,20	23,64	71,20	22,76	72,3	0,20	27,7	22,75	60,56	20,65	0,79	29,72	61,35	0,42	38,65
5	Lead	0,03	14,5	0,49	6,4	0,04	23,9	0,003	76,1	0,08	1,89	1,20	0,32	0,11	2,21	0,12	97,79
6	Zinc	0,04	5,3	0,04	0,2	0,04	5,5	0,02	94,5	1,92	42,90	1,10	0,40	1,91	43,30	0,05	56,70
7	Selenium	0,0059	37,8	0,046	6,6	0,0068	44,4	0,0002	55,6	0,0073	59,86	0,0039	0,46	0,0073	60,32	0,00014	39,58
8	Tellurium	0,0002	0,5	0,0083	4,1	0,0002	4,6	0,0001	95,4	0,00015	5,96	0,00024	0,14	0,00001	6,10	0,000067	93,90
9	Rhenium	0,000078		0,023622	55,1	0,00067	62,2	0,000009	37,8	0,000095	13,90	0,021300	44,2	0,000390	58,10	0,000008	41,90
10	Cobalt	0,0012	2,25	0,05	0,05	0,0012	2,3	0,0011	97,7	0,013	19,00	0,005	0,11	0,013	18,11	0,0016	80,89
11	Cadmium	0,002	0,0	0,002	0,0	0,0	0,0	0,0	0,0	0,0015	6,73	0,0034	0,24	0,0015	6,95	0,0006	93,05
12	Bismuth	0,009	9,3	0,0055	1,2	0,001	10,5	0,0002	89,5	0,005	14,00	0,004	0,07	0,0089	14,7	0,0016	85,90
13	Silicon oxide	23,04	0,79	20,01	0,79	22,97	0,8	66,76	99,2	7,42	0,37	17,93	0,13	9,83	0,50	57,47	99,50
14	Aluminium oxide	6,05	0,97	6,70	0,03	6,34	2,0	14,57	99,0	2,54	0,55	3,25	0,10	2,93	0,65	13,22	99,35
15	Iron oxide	32,17	20,0	16,44	2,5	35,42	22,5	2,87	7,5	-	-	-	-	-	-	-	-
16	Titanium oxide	0,70	2,2	1,80	0,1	0,72	2,3	0,72	97,7	-	-	-	-	-	-	-	-
17	Magnesium oxide	1,06	1,7	6,82	0,3	1,20	2,7	1,44	97,3	4,32	3,04	21,25	0,21	4,56	3,25	3,98	96,75
18	Manganese oxide	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-	-	-	-	-	-	-	-
19	Calcium oxide									4,37	2,19	12,25	0,09	4,48	2,28	5,64	97,72
20	Gold, g/t	0,70	51,0	0,80	1,3	0,70	52,3	0,012	47,7	0,8	63,63	0,6	0,77	0,8	64,30	0,013	35,70
21	Silver, g /t	46,0	48,5	46,0	1,1	46	49,6	1,1	50,4	21,1	42,96	25,4	0,73	21,16	43,69	0,8	56,31

1.6 PROCESS SOLUTION BY INFRASTRUCTURE FACILITIES

KAZ Minerals Aktogay LLP plans the specialization and centralization of repair work with a clear distribution of functions for maintenance and routine repair of equipment.

The overhaul and complex maintenance of the equipment is planned to be performed by and with the means of the involved specialized repair and installation entities, repair factories in the region, while the other (non-complicated) current repairs - by integrated repair teams of the mechanical repair service of Aktogai Concentrator. Technical inspection and maintenance of the equipment is envisaged by the operational and duty personnel of the relevant departments of the repair service.

To improve the efficiency of repair work, it is planned to use the methods of repair by modules and units (assemblies) based on maximum centralization.

Repairs are carried out using components and spare parts received from equipment manufacturers on a contract basis and partly manufactured at the production sites of the repair center of the concentrating plant.

Repair and preventive maintenance of heating and ventilation equipment, water supply and sewage, power supply is to be performed by specialized teams of the Concentrator's repair service using special tools, standard spare parts and units (assemblies).

The basis for preparing and carrying out repair work are the repair and assembly areas, repair stations located in the corresponding buildings, as well as the central repair station of the concentrating plant and the repair department of the building for mining equipment maintenance (existing).

Capital and current repairs of buildings and structures, as well as their provision with repair and construction products, are to be carried out with workforce and means of repair-construction and installation contractors of the region on a contract basis.

Material and technical support of the production units of Aktogai Concentrator is performed through a system of warehouses.

To ensure the adopted system of organization of repair work and the logistics support of Aktogai Concentrator, the construction of the following auxiliary facilities is within the design basis.

1.6.1 Technical control service and warehousing facility of the Concentrating plant

The auxiliary facilities of the concentrating plant include:

- technical control point (expansion of the existing one);
- open warehouse for equipment and balls.

Technical control point (expansion of the existing one)

Technical control point (TCP) is designed to control the technical condition of heavy dump trucks and mobile pit equipment before going to journey. The technical control point is made as a canopy equipped with an inspection ditch and an automatic barrier. There are heated rooms for mechanics, drivers, and rooms for mobile compressors in the closed part of TCP. The expansion of the existing building for the maintenance of freight transport is within the design basis.

The building of a warehouse of materials is referred to B1category of fire hazard.

Open warehouse for equipment and balls

Открытый склад оборудования и шаров предназначен для приема и хранения оборудования, длинномеров, шаров и отправки этих грузов потребителю. Склад оснащен двумя кранами грузоподъемностью 32/5 и 10/5 тонн, пролетами 32 метра.

An open warehouse for equipment and balls is designed to receive and store equipment, long vehicles, balls and deliver these goods to the consumer. The warehouse is equipped with two cranes with a lifting capacity of 32/5 and 10/5 tons, spans of 32 meters.

The 32/5 tons lifting capacity crane with is used to accept bulky goods (equipment) for both the Concentrator and the mine, as well as packages with long rolled steel.

Unloading of railway platforms with heavy equipment (over 32 tons) is carried out using a 50 tons lifting capacity truck crane envisaged under the master plan.

The 10/5 tons lifting capacity crane is used for loading and unloading operations for lightweight cargoes, including warehousing operations using lifting electromagnets when receiving and shipping balls.

The unheated warehouse is designed for storage of equipment and materials that require full protection from precipitation, but do not require positive temperatures during storage.

The warehouse is located in the mining equipment maintenance building with a height of 9,5 meters to the bottom of building structures. For cargo reception from the vehicles, the warehouse is equipped with a ramp. Handling and storage operations at the warehouse are made using a top-running bridge crane.

Concrete bases are provided in all warehouses to protect the environment from pollution.

1.6.2 Organization of technical quality control of products

The technical control department of Aktogay Concentrator ensures a systematic inspection of compliance with the requirements for product quality at all stages of the core production, as well as the conditions that ensure the required quality in accordance with the standards.

The most important task of technical control is the timely detection of defect and the elimination of its causes.

The functions of the technical control department include:

- quality control of raw materials, as well as basic and auxiliary materials entering the Aktogai Concentrator;
- intra shop operational control of compliance with the established technological regime;
- control of finished products;
- execution of documents certifying the quality of products in accordance with the technical specifications and standards of the enterprise;
- constant monitoring of the state of equipment, machinery, instrumentation and weighing equipment;
- daily systematic actions for prevention and detection of defect taking into account reclaimable and definitive defect and the reasons of its causing, participation in the development of preventive measures to control defects;

development of control methods in accordance with state standards that ensure the comparability of the results of quality control at the level of world standards;

- making proposals on the improvement and development of new technological regimes that contribute to the improvement of product quality and resulting from the observation of technological processes and production control.

Organization of quality control of products of the core operations is based on testing and samples processing.

To ensure the process conditions it is planned to control the parameters of processes at all stages: from the receipt of raw materials to the finished products.

The control of process parameters is entrusted to the existing quality control laboratories, analytical and metallurgical laboratories.

For the timely receipt of the necessary analytical information, operational management of processes it is planned:

- manual sampling and delivery of samples to the quality control laboratory (the laboratory of the current Concentrator will be used to ensure control,);
- mechanized sample preparation for analysis;
- transfer of samples to the analytical laboratory;
- express analysis of samples on modern equipment;
- in-depth analysis based on chemical, physicochemical and physical methods;
- processing and registration of the received analytical information and its transfer to a higher level.

These conditions will be performed by the existing free-standing laboratory.

Weighing station (railway)

The weighing station is intended to control the goods arriving at the Aktogai Concentrator by rail and delivered from the plant, including the finished products. In terms of fire hazard, the weighing station refers to category B4.

Weighing station (for motor transport)

This weighing station is intended to control the cargo arriving at the Aktogai Concentrator by road and to control the cargo when it is delivered to the consumer.

1.6.3 Auxiliary facilities of the energy service and other facilities

Compressor station

The need in compressed air with a pressure of 0,5-0,7 MPa for the expansion facilities of Aktogai Concentrator is determined in the following volumes:

- Concentrating plant - 72 Nm3 / min;
- unaccounted facilities (10%) – 8,4 Nm^3 / min.

Total – 80,4 Nm^3 / min.

The Concentrator's needs in compressed air is to be covered by the compressor station.

Three compressors (one in reserve) with a capacity of 47.1 Nm^3/min each are to be installed.

To provide facilities with compressed dry air, the compressor station will be equipped by the air dryers.

Under-running bridge crane is provided for maintenance and repair in the compressor station.

The compressor equipment operates in the automatic mode. The compressor station is blocked with a blower station.

Intersection pipelines of compressed air are designed on racks.

1.6.4 Mechanization of operations on the existing and designed facilities for auxiliary purposes

The reduction of labor-intensive and heavy work in the repair service is carried out by using more modern technology and the organization of repair work, a variety of lift-and-carry and loading-unloading machines and mechanisms, labour saving devices, mechanical and electric hand tools, stands and devices that maximize the cost of manual labor.

The basis of mechanization is the location in the shops of all stationary equipment in the operational areas of load-lifting mechanisms and the centralization of repairs.

Equipment repair at the production sites of the mining equipment maintenance complex, the plant's maintenance shop is to be carried out using the various stands and devices. The top-running bridge and suspended electric cranes installed in the above-mentioned subdivisions ensure the mechanization of lifting and lowering loads during the repair of equipment, fully provide mechanization of transporting the heavy units and products and other goods to the repair sections.

The mechanization of labor-intensive and heavy work, the efficiency of loading, unloading, transport and storage operations is within the project both in the warehouse design and in the accepted technological process and equipment.

Reception and delivery of diesel fuel in the emergency fuel storage is carried out by pumping units.

Mechanization of lift-carry and warehousing operations in closed warehouses for equipment and materials, oxygen cylinders and calcium carbide, as well as in an open warehouse for equipment and balls, equipped with two gantry cranes (one of them with a lifting electromagnet) is carried out using appropriate lifting cranes.

In the compressor station an overhead crane of the appropriate capacity is provided for the equipment repair.

1.7 WATER SUPPLY AND SEWERAGE

The source of water supply is the Zhuzagash groundwater field located 30 km west of the Aktogay field in the valley of the Ayagoz river. The raw water is supplied from the raw water reservoir by the raw water pumping station located in the territory of the concentrating plant.

Wastewater in the amount of 297,57 m^3/day, 108613,05 m^3/year is discharged through a gravity sewer network with subsequent drainage to the existing wastewater treatment plants of complete biological treatment located on the territory of the existing concentrating plant.

Domestic sewage from stand-alone consumers of remote sites is discharged into sewage sludge with subsequent removal by a sewage disposal machine to the existing sewage treatment plant. Removal of effluent will be carried out regularly as it accumulates to the existing sewage treatment of modular type of the existing concentrating plant.

Rain and melt water from the roofs of buildings and the expansion territory of the concentrating plant, the mining equipment maintenance complex and warehouses should be collected by a system of storm water basins and pipelines and discharged through the oil catcher into the rainwater settling pond provided near the concentrating plant.

In the 2015 EIA facility to the existing Concentrating Plant, the volume of household and similar industrial effluents of the Plant was 400 m^3/day.

According to the passport of the existing sewage treatment plants and the conclusion of the State Environmental Expertize the maximum design capacity is 540 m^3/day (Certificate and the conclusion of the SEE are presented in Appendix 18, 19).

A separate project is planned to expand the existing sewage treatment facilities by 390 m^3/day, therefore, the capacity of the existing KOS KHAANZA will increase to 930 m^3/day, this will be sufficient for the operation of existing and planned concentrating plants. The start of the project for expansion of sewage treatment facilities of the rotational camp is April 2019, ending in February 2020.

Permanent existing sewage treatment plants of the company HAANZAA are the block-modular complete unit consisting of a full complex of systems and equipment for complete cleaning of all sewage drains. The process of cleaning of the permanent sewage treatment plants and accounting for water volumes is controlled by an industrial computer, where the flow of treated water is recorded and displayed. A special officer keeps a log of water supply and disposal.

Permanent sewage treatment plants are designed for the treatment of household waste and industrial waste from laundries.

Wastewater treatment at the station is carried out up to the quality standards suitable for discharge into fishery reservoirs.

Dry pressed excess sludge from the station is removed by the contracting organization under the contract to the solid waste storage sites.

The treated household sewage is discharged into the industrial water pond to feed the factory's recycling system.

The need for raw water for the production needs of the Plant is: 73512,92 m^3/day, including the raw water - 61528,89 m^3/day.

Water will be supplied via a pipeline from the Zhuzagash groundwater field located approximately 30 km from the Company site.

Water from the pumping station to the designed Concentrating plant will be supplied through a pipeline with a diameter of 700 mm and a length of 30 km laid below the freezing depth at a 2,8 m depth. The pipeline design includes an algaecid dosing system. This pipeline will supply water to the process pond and raw water reservoir at the mine site. The water intake structure at the Zhuzagash field, the laying of the water main and the pumping station of the second lift are within the a separate project.

A complete water circulation and a local circulating cooling system for a gearless drive of the mill are provided at the Concentrating plant for production needs. The flowchart of complete water circulation is as follows: after the tailings thickening, the treated water is drained by gravity into the process water pond, and then by the pumps (2 operational, 1 reserve) of the process water pumping

house are supplied for the processing needs of the Concentrating plant. This system is fed from the reservoir of raw water and by treated wastewater from the wastewater treatment plant.

The desalinated water is used to feed the circulating cooling system of the gearless drive of the mill of the Concentrating plant. There is a reverse osmosis installation to receive the desalinated water.

There is also a local circulating system of the compressor station.

1.8 HEATING AND VENTILATION

The parameters of the air environment of the industrial premises of the Concentrating plant are provided in accordance with the requirements of the "Hygienic standard for physical factors affecting humans" No.169 of 28.02.2018. Information is reflected in the in section 11 "Heating, ventilation and air conditioning."

Heating. The electric heat supply is adopted for "Aktogai Expansion. Sulfide ore Concentrating Plant"

In the process of copper-molybdenum flotation the emission from tank equipment practically does not occur, only a small release of pollutants is possible. Since emissions are low with molybdenum flotation the cleaning is not foreseen.

In the industrial and auxiliary premises of the equipment servicing complex is installed the supply and exhaust ventilation with mechanical and natural stimulation. The intake air is cleaned, warmed up in the cold season and fed to the work area through duct systems. Air is removed by exhaust ventilation systems.

The performance of air supply units is estimated taking into account the assimilation of heat and moisture excess, replenishment of air volumes carried away by exhaust ventilation systems of general ventilation, local suction systems and to maintain the specified air parameters in the working area. To accommodate the inlet installations, the ventilation chambers are provided, which are attached to the main production premises.

The ore loading unit into the crusher and the overloading from the transfer conveyor to the main line are equipped with shelters to remove dust by means of a bag-type dust collector.

Powder lime is delivered by rail to the hopper storage of powder lime and supplied by means of a pneumatic transport system to two 800-ton storage hoppers. An aspiration system and a bag filter are installed at the receiving silo of powder lime. Lime dust is emitted into the atmosphere with a concentration of 5 mg/m^3.

From hoppers, lime is fed by an inclined screw conveyor system into a vertical mill of 10 t/h capacity, where wet grinding of lime to a particle size of 63 μm occurs whith its simultaneous slaking. Lime milk to achieve the desired concentration is circulated between the vertical mill and the two tanks. At the lime slaking area, an aspiration system is performed with the installation of a scrubber to clean the dust generated during the grinding and slaking of lime.

The offices have with air conditioning system by local split-systems to be used in warm seasons.

To prevent dusting when working in dry, windy weather, the wetting of the surface of dumps and ore stores is provided.

Ventilation

The project provides for ventilation systems in industrial premises according to Sanitary Rules No. 236 "Sanitary and epidemiological requirements for industrial facilities", approved by Order of the Minister of National Economy of the Republic of Kazakhstan dated March 20, 2015 No. 236.

For air conditioning during the warm period of the year the offices and domestic buildings have the local split systems.

There is a supply and exhaust ventilation with mechanical and natural stimulation in the production, auxiliary and domestic buildings. The intake air is cleaned, warmed up in the cold period of the year and fed to the work area through duct systems. Air is removed by exhaust ventilation systems and local suction from technological equipment.

The repair shops have the local suction from equipment. The premises are equipped with ventilation lantern openings in the roof.

The performance of air handling units is calculated from the condition of assimilation of heat and moisture excess, replenishment of air volumes carried away by exhaust ventilation systems of general ventilation, local suction systems, as well as to maintain the specified parameters of air in the working area. To accommodate the air handling units, ventilation chambers are provided, which are attached to the main production premises.

1.9 HOUSEHOLD AND MEDICAL SERVICE

To provide all people on the site with housing, there is an existing temporary camp ICG, intended only for personnel during the construction period, which includes:

- housing for permanent staff and builders with showers and toilets;
- central laundry;
- heating and air conditioning;
- drinking water quality for drinking, washing and cooking;
- storage and freezing of products and other stocks:
- dining rooms and canteens for employees and builders, including ready meals for lunches and shift work;
- first-aid post and first-aid stations;
- leisure facilities, including sports in the open air, such as football and tennis, and facilities for the gym, watching TV, video films and Internet access.

All residential areas are well insulated with full air conditioning with reversible cycle and electric heating with the temperature range from 22^{o}C to 28^{o}C.

Under a separate project is planned the expansion of the existing permanent shift camp for the service personnel of the second plant.

On the territory of the designed Concentrating plant in the 0981 Office building of the sulphide shop there is a premise 002 - Room for lunch, where the workers could have a rest during working hours.

It is not allowed to store and eat food in industrial premises. See drawing 3207-0981-A-1001_A presented in the drawings of the detailed design No.3207.

To ensure the life activities of workers, including conditions of food, accommodation in the period of their work at the facility for the production of works, the sanitary and living conditions are provided for in the complex of residential, domestic, sanitary and household buildings. These include residential buildings, dining rooms for 800 people, a laundry room, a medical unit (a separate building in a new shift camp), and dressing rooms that are part of the premises of the production building.

3. ENVIRONMENTAL IMPACT ASSESSMENT FOR AKTOGAY SULPHIDE CONCENTRATOR EXPANSION

The environmental impact assessment was carried out on the basis of the analysis of the current situation in the territory, organizational, technical and technological decisions made, as well as in accordance with the Environmental Code of the Republic of Kazakhstan and current regulatory and procedural guidelines.

The main factor of adverse environmental impact can be emissions of various pollutants that may directly or indirectly affect virtually all environmental components - soil, atmosphere, hydrosphere, biota, social conditions. In addition to emissions of pollutants into the atmosphere, the sewage, production and consumption waste, and economic infrastructure activities can have a certain impact on individual components of the natural environment.

Environmental impacts arising during the construction and installation works and subsequent operation of the second processing plant/facility relate to:

- contamination of atmosphere by harmful emissions from transport, machinery and equipment arising during Aktogay Sulphide Concentrator extension, as well as in the process of its further operation;
- utilization of water and acquisition of land resources;
- terrain disturbance, including mechanical disturbances, as well as possible and chemical affects on the underlying surface;
- possible emergencies due to petroleum products spills on the territory during the construction and installation works, as well as air emissions.

Based on the analysis of engineering solutions and archive materials, the necessary calculations and justifications were prepared for the Environmental Impact Assessment of the planned works during normal operation. Including determination of the main sources that may adversely affect the environment.

Table 3.1 – Probable factors of negative impact from facilities of the Aktogay Sulphide Concentrator expansion.

№	Components of the environment	Environmental шmpact factors	Estimation method
1	Atmosphere	Pollutant emissions from stationary and mobile sources	Theoretical prediction under the current Republic of Kazakhstan regulatory and procedural guidelines.
2	Surface and subterranean waters	Use of water for industrial and domestic purposes	Current Republic of Kazakhstan regulatory and procedural guidelines, analysis of technical solutions for conducting surveys. Expert assessment of the impact of exploration.
3	Landscapes and soils	Mechanical violations, possible chemical contamination of soil	Analysis of archive materials, analysis of technical (engineering) solutions for conducting surveys. Expert assessment of the impact of exploration.
4	Vegetation	Mechanical violations, possible chemical contamination	Analysis of archive materials. Expert assessment of the degree of influence of exploration.
5	Wild animals	Disturbance of wildlife habitats. Noise from operating units. Presence of people	Analysis of archive materials. Expert assessment of the degree of influence of exploration
6	Atmosphere, groundwater, soil, vegetation, wildlife	Generation, storage, disposal of sewage and waste.	Theoretical prediction under the current Republic of Kazakhstan regulatory and procedural guidelines. Expert assessment of the degree of influence of exploration

3.1 ASSESSMENT OF ATMOSPHERIC AIR IMPACT

3.1.1 Criteria for assessing the level of air pollution

The state of the air basin has a special place in the modern concept of environmental protection. Any anthropogenic impact can lead to unacceptable levels of pollution of environmental components, reduction of fauna and flora biodiversity, degradation of land and vegetation cover, changes in wildlife habitats, extinction and reduction of populations, and most importantly - a threat to public health.

The level of impact of the designed Aktogay Sulphide Concentrator extension on the quality of the atmospheric air is characterized by the component composition and amounts of pollutant emissions. This section provides information on the number and types of emission sources during construction and operation.

The basic principles of air protection in accordance with the Environmental Code of the Republic of Kazakhstan are:

– protection of human life and health of present and future generations;

– to prevent the irreversible effects of air pollution on the environment.

The criteria for the quality of the air condition are the values of maximum permissible concentrations (MPC) of pollutants from populated areas, adopted in Kazakhstan (Hygienic standards for atmospheric air in urban and rural areas. Order No. 168 of the Minister of National Economy of the Republic of Kazakhstan dated February 28, 2015).

The following criteria are used to assess the level of air pollution and establish the standards for MPE from sources of air pollution:

– highest non-recurrent MPC, according to the list "Maximum permissible concentration (MPC) of pollutants in the atmospheric air of populated areas";

– sanitary-epidemiological rules and regulations "Sanitary-epidemiological requirements for atmospheric air" (approved by the Resolution No. 237 of the Government of the Republic of Kazakhstan dated March 20, 2015), Appendix 1.

For a group of substances that have a summing effect in the joint presence, a dimensionless concentration is determined as q

$q = C1/MPC1 + C2/MPC2,$

According to the sanitary standards of the Republic of Kazakhstan, on the border of the sanitary protection zone and in residential areas the surface concentration of pollutants shall not exceed 1 MPC.

The Section considers the impact of the Aktogay field facilities, taking into account the commissioning of the mining and processing plant, infrastructure facilities, as well as the impact associated with the construction and installation of the above works.

3.1.2 Work characteristics as a source of air pollution

Air quality is characterized by the content of pollutants emitted by construction facilities. The degree of impact of the facilities under consideration on the atmosphere is characterized by both the volume and the component composition of pollutant emissions.

3.1.3 Impact during the construction of the Sulphide Concentrator

It should noted that construction and installation works are short-term and periodic, therefore, upon their completion, their impact on the atmospheric air is not expected.

The following areas that have emissions of pollutants into the atmospheric air have been determined during the construction process on the implementation of design decisions:

Mobile:

- the work of vehicles on the site;

Stationary:

- welding operations;

- works with metal structures;
- waterproofing;
- work with paint materials;
- special equipment refueling;
- work on excavation and movement of soil and the use of inert materials;
- operation of the ready-mix station.

According to the calculations made in the framework of this project (Appendix 4), during the construction of the facility of the planned activity, the types of work that conditionally related to fugitive emission sources have been defined.

The main sources of air pollution during construction work are mobile and fugitive sources of air pollution; earthworks, construction and installation and transport equipment; dust emissions from areas of disturbed land, bulk materials warehouses; welding and paint work.

The total duration of the construction work is determined - April 2019 - September 2022.

Table 3.1.1 shows the estimated volume of earthworks during construction work. Consumption of basic building materials is presented in Table 3.1.2. The list, the number of used equipment and the estimated fuel consumption for the construction period for various operations can be found in Table 3.1.3.

Table 3.1.1 – Scope of earthwork

Name	**Quantity, m^3.**	**Range of application**
Sulphide Concentrator and infrastructure		
Top-soil stripping	54740	Clearing, uprooting and cutting
Excavation in general, including loading, transportation, stockpiling, work of excavators, bulldozer, dump truck	1643202	Removal of soil layer to dump
The main backfill of the materials, the material comes from waste rock	1551764	Backfilling of materials for the configuration of the ground

Table 3.1.2 – Materials consumption

Name of materials	Consumption	Unit of measurement
1	2	3
Constructional materials consumption		
Cement	2000	t
Bitumen	10	t
Sand and gravel mix	10000	t
Broken stone (rubble)	20000	t
Sand	4000	t
Paint materials		
Base coating FL-03K	3.0	t
Base coating XC-059	3.0	t
Base coating GF-021	4.0	t
Dissolvent P-4	5.0	t
Enamel XC-759	5.0	t
Welding operations		
Electrodes UONI 13/55	4000	kg
Electrodes MR-3	2650	kg
Liquified petroleum gas	1200	kg
Metal-working machine:	See the quantity, consumtion, hours of operation in Appendix 4 (calculation of emissions).	
Handheld power tools (angle grinder)		
Cutting-off machine		
Drilling unit		
Lathe tool		
Grinding machine		
Diesel power plant		
Diesel fuel capacity of 10 m^3		
Battery Charging		

Table 3.1.3 – Machinery to be used during construction

№	Name of machines and mechanisms
1	Doosan Solar Excavator 210 W-V, № 360 AC (wheel type) bucket capacity 0.5m3
2	Concrete mixing machine CARMIX 5.5 XL, pre-owned
3	Self-propelled concrete mixing machine DIECI F7000
4	Concrete mixer truck SB 58146Z (581460-000003262/7), VIN X6S58146ZE0002405
5	Concrete mixer truck SB 58146Z /KAMAZ 65115 , VIN X6S58146ZE0002403
6	Pumpcrete machine Scorpion CP-40.318 P
7	Pumpcrete machine Scorpion CP-40.318 P
8	Dump truck SHACMAN Sx3255dr384, №H510702
9	Dump truck SHACMAN Sx3255dr384, №H496402
10	Dump truck SHACMAN Sx3255dr384, №H496402
11	Truck-tractor bolster - type MAN TGS 33.440 6X4bbs-Ww (000000130)
12	Truck-tractor bolster - type MAZ
13	Truck-tractor bolster - type MAZ
14	Truck-tractor bolster - type MAZ
15	Truck-tractor bolster - type MAZ
16	Truck crane KC-55732b, boom length 32.7 m., load capacity 25 t, KAMAZ-43118 on the chassis, 6x6, №324/327 + 4СК *3*10m
17	Truck crane KC-55732 boom length 32.7 m., load capacity 25 t, KAMAZ-43118 on the chassis, 6x6, №324/327 + 4СК *3*10m м
18	Diesel power plant AKSA
19	UAZ390945-440
20	Toyota HiluxToyota Hilux, number plate H3924/02, white
21	Toyota HiluxToyota Hilux number plate 823AT 05, white
22	Hydraulic loader excavator Gidromech
23	Hydraulic loader excavator Gidromech
24	FARESIN 17.40 telescopic wheel loader
25	FARESIN 17.40 telescopic wheel loader
26	FARESIN 17.40 telescopic wheel loader
27	FARESIN 17.40 telescopic wheel loader
28	FN 14.35 FARESIN telescopic wheel loader
29	MANITOU 1740 telescopic forklift, pre-owned
30	MANITOU 1740 telescopic forklift, pre-owned
31	SNORKEL A46JRT articulating boom lift
32	SHACMAN Sx3255dr384 dump truck, №H510802
33	SHACMAN Sx3255dr384 dump truck, №H510802
34	Truck crane Sany QY25C
35	Truck crane Sany QY25C
36	Truck crane Sany QY25C
37	Truck crane Sany QY25C
38	Jib crane KC-99713 on a special chassis WFN5RUER1D2035470
39	Fully mobile crane, diesel electric -DEC 251, load capacity 25 t. boom length 14 (000000089)
40	Fully mobile crane, diesel electric -DEC 251, load capacity 25 t. boom length 14 (000000089)
41	Truck crane KC-55732b, boom length 32.7 m., load capacity 25 t, KAMAZ-43118 on the chassis, 6x6, №324/327 + 4СК *3*10m
42	Manipulator Chzhonlyan Zlj5166jsq3e,reg.№H492802
43	Wheel loader DoosanSD300N, №361AAC (000000616)
44	Hydraulic excavator Doosan Solar 255 LC-V ALD503A tracked body DHKHEMYOSC0001950
45	Doosan Solar Excavator 210 W-V, № 360 AC (wheel type) bucket capacity 0.5m3
46	Excavator-loader Cukurova 888, №345AAC (колесный трактор) bucket capacity 0.25 m3
47	Toyota HiluxToyota Hilux reg.# H378602 engine MROFX22G6D1372987 white
48	Push-loading tractor reg.# 193AAC body KMTODO61C02076367
49	Dump carrier, TSY8250, VIN:L1XXH8006CY000100, cert..XD6382012100008
50	Dump carrier, TSY8250, VIN:L1XXH8008CY000096, cert..XD6322012100004
51	Drop-side trailer Nefaz 9334-20-10, reg.№76RBA02

№	Name of machines and mechanisms
52	Drop-side trailer 9327, reg.№92RBA02
53	3-х осный прицеп бочка-цементовоз, год выпуска 2014 (000000796)
54	Vacuum truck KO-505A (428311-000007162/7)
55	KAMAZ 44108-91910-10 truck tractor
56	KAMAZ 44108-91910-10 truck tractor
57	KAMAZ 53215 ATS-66064 water carrier
58	Vibrating roller ATLAS AW260
59	Ural 375 reg. # H448402, chassis 315121 green (refueling truck)
60	Front loader Hyundai HL-707-7
61	VOLVO KC-65721-60 t.
62	GAZ 33081-91 «bus»
63	Bus ISUZU SAZ HC-40
64	Mitsibishi L200
65	Mitsibishi L200
66	Mitsibishi L200
67	UAZ 390945-440
68	UAZ-220695-330 «bus»
69	UAZ-390994 «farmer»

Preliminary calculations of the volumes of fuel used by construction and transport equipment, as well as the estimated areas of disturbed land define emissions to the atmosphere during the construction and installation works. During the construction period, the types and amount of emissions to the atmosphere can vary greatly. Usually a significant part of air pollutants falls at the time of equipment installation, when the greatest number of construction equipment and builders is involved. However, emissions into the atmosphere in the form of dust from disturbed land may be maximized during initial preparation and profiling of the site. In the period of construction and installation work, the pollution of air can be due to 12 temporary fugitive sources of pollution, of which 7001 (005) and 7006 are mobile. Emissions of pollutants contain 26 components.

In this case the total emission of pollutants will be: 112.30880366 tons, including solid - 37.82764494 tons, liquid and gaseous - 74.48115872 tons. Since, according to EC of RoK, emissions from mobile sources are not standardized, allowable emissions are: 108, 9430025 tons, including solid - 37.62985 tons, liquid and gaseous - 71.31315252 tons.

A general layout shows the location of the designed industrial sites and processing facilities of the Aktogai Sulphide Concentrator. Emission sources during construction works are not stationary, episodic, the location is not indicated specifically.

Calculation of emissions during construction and installation works is given in Appendix 4.

The list and amount of contaminants during construction and installation work at the construction site is presented in Table 3.1 (excluding and including emissions from vehicles).

The parameters of the sources of emissions of pollutants during construction are given in Table 3.3.

The emission standards for pollutants during the construction period are given in Table 3.6.

ЭРА v2.5 ТОО «TITECO» Таблица 3.1

List of pollutants emitted into the atmosphere
Current sitiation

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства)- с учетом автотранспорта

Код загр. веще-ства	Наименование Вещества	ПДК максим. разовая, мг/м3	ПДК Средне-суточная, мг/м3	ОБУВ ориентир. безопасн. УВ,мг/м3	Класс Опас-Ности	Выброс вещества г/с	Выброс вещества, т/год	Значение КОВ (М/ПДК)**а	Выброс вещества, усл.т/год
1	2	3	4	5	6	7	8	9	10
0123	Железо (II, III) оксиды (диЖелезо триоксид, Железа оксид) /в пересчете на железо/ (274)		0.04		3	0.03204	0.09608	2.402	2.402
0143	Марганец и его соединения /в пересчете на марганца (IV) оксид/ (327)	0.01	0.001		2	0.0016326	0.00916	17.8018	9.16
0301	Азота (IV) диоксид (Азота диоксид) (4)	0.2	0.04		2	0.5764359	18.5028775	2915.6344	462.571938
0304	Азот (II) оксид (Азота оксид) (6)	0.4	0.06		3	0.55412693	15.4393655	257.3228	257.322758
0328	Углерод (Сажа, Углерод черный) (583)	0.15	0.05		3	0.1203415	1.94779122	38.9558	38.9558244
0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)	0.5	0.05		3	0.2618276	4.0634083	81.2682	81.268166
0333	Сероводород (Дигидросульфид) (518)	0.008			2	0.00002316	0.00001252	0	0.001565
0337	Углерод оксид (Окись углерода, Угарный газ) (584)	5	3		4	0.9360916	17.88787	4.9876	5.96262333
0342	Фтористые газообразные соединения /в пересчете на фтор/ (617)	0.02	0.005		2	0.0006837	0.00478	0	0.956
0344	Фториды неорганические плохо растворимые - (алюминия фторид, кальция фторид, натрия гексафторалюминат) (Фториды неорганические плохо растворимые /в пересчете на фтор/) (615)	0.2	0.03		2	0.000556	0.004	0	0.13333333
0616	Диметилбензол (смесь о-, м-, п-изомеров) (203)	0.2			3	0.4208	2.25	11.25	11.25
0621	Метилбензол (349)	0.6			3	1.0472	5.56	9.2667	9.26666667
0703	Бенз/а/пирен (3,4-Бензпирен) (54)		0.000001		1	0.000001034	0.00000372	9.3309	3.72
1210	Бутилацетат (Уксусной кислоты бутиловый эфир) (110)	0.1			4	0.2346	1.2467	9.6869	12.467

ЭРА v2.5 ТОО «TITECO» Таблица 3.1

List of pollutants emitted into the atmosphere
на существующее положение

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай) (период строительства)

Код загр. веще-ства	Н а и м е н о в а н и е Вещества	ПДК максим. разовая, мг/м3	ПДК Средне-суточная, мг/м3	ОБУВ ориентир. безопасн. УВ,мг/м3	Класс Опас-Ности	Выброс вещества г/с	Выброс вещества, т/год	Значение КОВ (М/ПДК)**а	Выброс вещества, усл.т/год
1	2	3	4	5	6	7	8	9	10
1301	Проп-2-ен-1-аль (Акролеин, Акрилальдегид) (474)	0.03	0.01		2	0.01621673	0.42	128.8914	42
1325	Формальдегид (Метаналь) (609)	0.05	0.01		2	0.01621673	0.42	128.8914	42
1401	Пропан-2-он (Ацетон) (470)	0.35			4	0.5233	2.781	6.4583	7.94571429
1411	Циклогексанон (654)	0.04			3	0.1468	0.783	19.575	19.575
2704	Бензин (нефтяной, малосернистый) /в пересчете на углерод/ (60)	5	1.5		4	0.003947	0.02127	0	0.01418
2732	Керосин (654*)			1.2		0.11457	0.4364149	0	0.36367908
2752	Уайт-спирит (1294*)			1		0.0833	0.45	0	0.45
2754	Алканы С12-19 /в пересчете на С/ (Углеводороды предельные С12-С19 (в пересчете на С); Растворитель РПК-265П) (10)	1			4	0.1723203	4.21446	3.6498	4.21446
2902	Взвешенные частицы (116)	0.5	0.15		3	0.05292	1.008	6.72	6.72
2904	Мазутная зола теплоэлектростанций /в пересчете на ванадий/ (326)		0.002		2	0.002007	0.01055	8.6874	5.275
2908	Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент, пыль цементного производства - глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494)	0.3	0.1		3	4.622426	34.6869	346.869	346.869
2930	Пыль абразивная (Корунд белый, Монокорунд) (1027*)			0.04		0.0056	0.06516	1.629	1.629
	В С Е Г О:					9.945983784	112.30880366	4009.3	1372.49391

Примечания: 1. В колонке 9: «М» - выброс ЗВ,т/год; «ПДК» - ПДКс.с. или (при отсутствии ПДКс.с.) ПДКм.р. или (при отсутствии ПДКм.р.) ОБУВ;»а» - константа, зависящая от класса опасности ЗВ
2. Способ сортировки: по возрастанию кода ЗВ (колонка 1)

ЭРА v2.5 ТОО «TITECO» Таблица 3.1

Перечень загрязняющих веществ, выбрасываемых в атмосферу
на существующее положение

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства) – без учета а/тр

Код загр. веще-ства	Наименование Вещества	ПДК максим. разовая, мг/м3	ПДК Средне-суточная, мг/м3	ОБУВ ориентир. безопасн. УВ,мг/м3	Класс Опас-Ности	Выброс вещества г/с	Выброс вещества, т/год	Значение КОВ (М/ПДК)**а	Выброс вещества, усл.т/год
1	2	3	4	5	6	7	8	9	10
0123	Железо (II, III) оксиды (диЖелезо триоксид, Железа оксид) /в пересчете на железо/ (274)		0.04		3	0.03204	0.09608	2.402	2.402
0143	Марганец и его соединения /в пересчете на марганца (IV) оксид/ (327)	0.01	0.001		2	0.0016326	0.00916	17.8018	9.16
0301	Азота (IV) диоксид (Азота диоксид) (4)	0.2	0.04		2	0.4431233	17.9471	2802.2997	448.6775
0304	Азот (II) оксид (Азота оксид) (6)	0.4	0.06		3	0.532465	15.349	255.8167	255.816667
0328	Углерод (Сажа, Углерод черный) (583)	0.15	0.05		3	0.0676023	1.75	35	35
0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)	0.5	0.05		3	0.1910064	3.794	75.88	75.88
0333	Сероводород (Дигидросульфид) (518)	0.008			2	0.00002316	0.00001252	0	0.001565
0337	Углерод оксид (Окись углерода, Угарный газ) (584)	5	3		4	0.4943216	16.0931	4.5349	5.36436667
0342	Фтористые газообразные соединения /в пересчете на фтор/ (617)	0.02	0.005		2	0.0006837	0.00478	0	0.956
0344	Фториды неорганические плохо растворимые – (алюминия фторид, кальция фторид, натрия гексафторалюминат) (Фториды неорганические плохо растворимые /в пересчете на фтор/) (615)	0.2	0.03		2	0.000556	0.004	0	0.13333333
0616	Диметилбензол (смесь о-, м-, п-изомеров) (203)	0.2			3	0.4208	2.25	11.25	11.25
0621	Метилбензол (349)	0.6			3	1.0472	5.56	9.2667	9.26666667
1210	Бутилацетат (Уксусной кислоты бутиловый эфир) (110)	0.1			4	0.2346	1.2467	9.6869	12.467
1301	Проп-2-ен-1-аль (Акролеин,	0.03	0.01		2	0.01621673	0.42	128.8914	42

ЭРА v2.5 ТОО «TITECO» Таблица 3.1

Перечень загрязняющих веществ, выбрасываемых в атмосферу
на существующее положение

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства) – без учета а/тр

Код загр. веще-ства	Н а и м е н о в а н и е Вещества	ПДК максим. разовая, мг/м3	ПДК Средне-суточная, мг/м3	ОБУВ ориентир. безопасн. УВ,мг/м3	Класс Опас-Ности	Выброс вещества г/с	Выброс вещества, т/год	Значение КОВ (М/ПДК)**а	Выброс вещества, усл.т/год
1	2	3	4	5	6	7	8	9	10
	Акрилальдегид) (474)								
1325	Формальдегид (Метаналь) (609)	0.05	0.01		2	0.01621673	0.42	128.8914	42
1401	Пропан-2-он (Ацетон) (470)	0.35			4	0.5233	2.781	6.4583	7.94571429
1411	Циклогексанон (654)	0.04			3	0.1468	0.783	19.575	19.575
2752	Уайт-спирит (1294*)			1		0.0833	0.45	0	0.45
2754	Алканы С12-19 /в пересчете на С/ (Углеводороды предельные С12-С19 (в пересчете на С); Растворитель РПК-265П) (10)	1			4	0.1723203	4.21446	3.6498	4.21446
2902	Взвешенные частицы (116)	0.5	0.15		3	0.05292	1.008	6.72	6.72
2904	Мазутная зола теплоэлектростанций /в пересчете на ванадий/ (326)		0.002		2	0.002007	0.01055	8.6874	5.275
2908	Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент, пыль цементного производства – глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494)	0.3	0.1		3	4.622426	34.6869	346.869	346.869
2930	Пыль абразивная (Корунд белый, Монокорунд) (1027*)			0.04		0.0056	0.06516	1.629	1.629
	В С Е Г О:					9.10716082	108.94300252	3875.3	1343.05327

Примечания: 1. В колонке 9: «М» – выброс ЗВ,т/год; «ПДК» – ПДКс.с. или (при отсутствии ПДКс.с.) ПДКм.р. или (при отсутствии ПДКм.р.) ОБУВ;»а» – константа, зависящая от класса опасности ЗВ
2. Способ сортировки: по возрастанию кода ЗВ (колонка 1)

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2018 год

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площадного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
001		Снятие почвенного слоя	1	4380	неорганизованный источник	1	7001	3					3000	1000	1	1
		Вывоз почвенного слоя на отвал	1	4380												
		Засыпка материала для конфигурации основания	1	4380												
		Карьерная техника	1	4380												
		Автотранспорт (пыление)	1	4380												
004		Газосварка	1	1460	неорганизованный источник	1	7002	3					1300	700	1	1
		Газорезка	1	200												

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2018 год

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код ве-ще-ства	Наименование вещества	Выбросы загрязняющих веществ			Год дос-тиже-ния ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
7001				0301	Азота (IV) диоксид (Азота диоксид) (4)	0.1034		0.372	
				0304	Азот (II) оксид (Азота оксид) (6)	0.0168		0.0605	
				0328	Углерод (Сажа, Углерод черный) (583)	0.0501		0.1803	
				0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)	0.0646		0.2327	
				0337	Углерод оксид (Окись углерода, Угарный газ) (584)	0.323		1.163	
				0703	Бенз/а/пирен (3,4-Бензпирен) (54)	0.000001034		0.00000372	
				2732	Керосин (654*)	0.097		0.349	
				2908	Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент, пыль цементного производства - глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494)	1.22345		13.768	
7002				0123	Железо (II, III) оксиды (диЖелезо	0.03204		0.09608	

ЭРА v2.5 ТОО «TITECO»

Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2018 год

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число источников выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площадного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		Сварочные работы	1	1770												
		Сварочные работы	1	2000												

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2018 год

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код ве-ще-ства	Наименование вещества	Выбросы загрязняющих веществ			Год дос-тиже-ния ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
					триоксид, Железа оксид) /в пересчете на железо/ (274)				
				0143	Марганец и его соединения /в пересчете на марганца (IV) оксид/ (327)	0.0016326		0.00916	
				0301	Азота (IV) диоксид (Азота диоксид) (4)	0.014413		0.0366	
				0337	Углерод оксид (Окись углерода, Угарный газ) (584)	0.02114		0.0631	
				0342	Фтористые газообразные соединения /в пересчете на фтор/ (617)	0.0006837		0.00478	
				0344	Фториды неорганические плохо растворимые - (алюминия фторид, кальция фторид, натрия гексафторалюминат) (Фториды неорганические плохо растворимые /в пересчете на фтор/) (615)	0.000556		0.004	
				2908	Пыль неорганическая, содержащая двуокись	0.000556		0.004	

ЭРА v2.5 ТОО «TITECO»

Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2018 год

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площадного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
004		Покрасочные работы	1	1460	неорганизованный источник	1	7003	2					2000	1200	1	1
		Покрасочные работы	1	1460												
		Покрасочные работы	1	1460												
		Покрасочные работы	1	1460												
		Покрасочные работы	1	1460												
004		Битумоплавильная установка	1	1460	неорганизованный источник	1	7004	2					3200	1500	1	1

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2018 год

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код ве-ще-ства	Наименование вещества	Выбросы загрязняющих веществ			Год дос-тиже ния ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
					кремния в %: 70-20 (шамот, цемент, пыль цементного производства - глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494)				
7003				0616	Диметилбензол (смесь о-, м-, п- изомеров) (203)	0.4208		2.25	
				0621	Метилбензол (349)	1.0472		5.56	
				1210	Бутилацетат (Уксусной кислоты бутиловый эфир) (110)	0.2346		1.2467	
				1401	Пропан-2-он (Ацетон) (470)	0.5233		2.781	
				1411	Циклогексанон (654)	0.1468		0.783	
				2752	Уайт-спирит (1294*)	0.0833		0.45	
7004				0301	Азота (IV) диоксид (Азота диоксид) (4)	0.01912		0.1005	
				0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)	0.0559		0.294	
				0337	Углерод оксид (Окись углерода, Угарный газ) (584)	0.1322		0.695	

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2018 год

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площадного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
004		Работы с инертными материалами (щебень)	1	1460	неорганизованный источник	1	7005	2					2000	1500	1	1
		Работы с инертными материалами (ПГС)	1	1460												
		Работы с инертными материалами (цемент)	1	1460												
		Работы с инертными материалами (песок)	1	1460												
004		Автотранспорт	1	1460	неорганизованный Источник	1	7006	2					3500	2000	1	1

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2018 год

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код ве-ще-ства	Наименование вещества	Выбросы загрязняющих веществ			Год дос-тиже ния ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
				2754	Алканы С12-19 /в пересчете на С/ (Углеводороды предельные С12-С19 (в пересчете на С); Растворитель РПК-265П) (10)	0.001903		0.01	
				2904	Мазутная зола теплоэлектростанций /в пересчете на ванадий/ (326)	0.002007		0.01055	
7005				2908	Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент, пыль цементного производства - глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494)	2.54102		9.4206	
7006				0301	Азота (IV) диоксид (Азота диоксид) (4)	0.0299126		0.1837775	
				0304	Азот (II) оксид (Азота оксид) (6)	0.00486193		0.0298655	
				0328	Углерод (Сажа,	0.0026392		0.01749122	

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2018 год

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площадного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
004		Ручной электроинструмент	1	1460	неорганизованный источник	1	7007	2					500	1600	1	1
		Отрезные станки	1	1460												
		Токарные станки	1	1460												
		Сверлильный станок	1	1460												
		Заточной станок	1	1460												
005		Место разгрузки и складирования щебня	1	8760	неорганизованный источник	1	7008	2					3200	1700	1	1
		Место разгрузки и складирования ПГС	1	8760												

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2018 год

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код ве-ще-ства	Наименование вещества	Выбросы загрязняющих веществ			Год дос-тиже ния ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
					Углерод черный) (583)				
				0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)	0.0062212		0.0367083	
				0337	Углерод оксид (Окись углерода, Угарный газ) (584)	0.11877		0.63177	
				2704	Бензин (нефтяной, малосернистый) /в пересчете на углерод/ (60)	0.003947		0.02127	
				2732	Керосин (654*)	0.01757		0.0874149	
7007				2902	Взвешенные частицы (116)	0.05292		1.008	
				2930	Пыль абразивная (Корунд белый, Монокорунд) (1027*)	0.0056		0.06516	
7008				2908	Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент, пыль цементного производства - глина, глинистый сланец, доменный шлак, песок, клинкер, зола,	0.83723		4.7683	

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2018 год

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число источника выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площад-Ного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
006		Резервуар дизельного топлива	1	1460	неорганизованный источник	1	7009	2					3400	2000	1	1
007		Буровые работы Взрывные работы	1 1	1460 1460	неорганизованный источник	1	7010	2					3500	1800	1	1

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2018 год

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код ве-ще-ства	Наименование вещества	Выбросы загрязняющих веществ			Год дос-тиже ния ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
					кремнезем, зола углей казахстанских месторождений) (494)				
7009				0333	Сероводород (Дигидросульфид) (518)	0.00002316		0.00001252	
				2754	Алканы С12-19 /в пересчете на С/ (Углеводороды предельные С12-С19 (в пересчете на С); Растворитель РПК-265П) (10)	0.00825		0.00446	
7010				0301	Азота (IV) диоксид (Азота диоксид) (4)			6.86	
				0304	Азот (II) оксид (Азота оксид) (6)			1.114	
				0337	Углерод оксид (Окись углерода, Угарный газ) (584)			6.21	
				2908	Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент, пыль цементного производства - глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских	0.02017		6.726	

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2018 год

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площадного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
004		Резервная ДЭС	1	2920	неорганизованный источник	1	7011	2					1500	800	1	1
002		Генераторы	15	2700	неорганизованный источник	1	7012	2					2200	1200	1	1
		Воздушные компрессоры	3	540												
		Вибрационный аппарат (	2	360												

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2018 год

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код ве-ще-ства	Наименование вещества	Выбросы загрязняющих веществ			Год дос-тиже ния ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
					месторождений) (494)				
7011				0301	Азота (IV) диоксид (Азота диоксид) (4)	0.4		4.2	
				0304	Азот (II) оксид (Азота оксид) (6)	0.52		5.46	
				0328	Углерод (Сажа, Углерод черный) (583)	0.0667		0.7	
				0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)	0.1333		1.4	
				0337	Углерод оксид (Окись углерода, Угарный газ) (584)	0.333		3.5	
				1301	Проп-2-ен-1-аль (Акролеин, Акрилальдегид) (474)	0.016		0.168	
				1325	Формальдегид (Метаналь) (609)	0.016		0.168	
				2754	Алканы С12-19 /в пересчете на С/ (Углеводороды предельные С12-С19 (в пересчете на С); Растворитель РПК-265П) (10)	0.16		1.68	
7012				0301	Азота (IV) диоксид (Азота диоксид) (4)	0.0095903		6.75	
				0304	Азот (II) оксид (Азота оксид) (6)	0.012465		8.775	
				0328	Углерод (Сажа,	0.0009023		1.05	

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2018 год

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площадного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		дизель) Вибрационный аппарат (бензин)	3	540												

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2018 год

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код ве-ще-ства	Наименование вещества	Выбросы загрязняющих веществ			Год дос-тиже ния ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
					Углерод черный) (583)				
				0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)	0.0018064		2.1	
				0337	Углерод оксид (Окись углерода, Угарный газ) (584)	0.0079816		5.625	
				1301	Проп-2-ен-1-аль (Акролеин, Акрилальдегид) (474)	0.00021673		0.252	
				1325	Формальдегид (Метаналь) (609)	0.00021673		0.252	
				2754	Алканы С12-19 /в пересчете на С/ (Углеводороды предельные С12-С19 (в пересчете на С); Растворитель РПК-265П) (10)	0.0021673		2.52	

ЭРА v2.5 ТОО «TITECO» Таблица 3.6

Нормативы выбросов загрязняющих веществ в атмосферу по предприятию

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства) – без учета автотранспорта

Производство цех, участок	Номер источника выброса	Нормативы выбросов загрязняющих веществ								год достижения ПДВ
		существующее положение на 2018 год		на 2019 год		на 2020-2022 года		П Д В		
Код и наименование загрязняющего вещества		г/с	т/год	г/с	т/год	г/с	т/год	г/с	т/год	
1	2	3	4	5	6	7	8	9	10	11
Н е о р г а н и з о в а н н ы е и с т о ч н и к и										
(0123) Железо (II, III) оксиды (диЖелезо триоксид, Железа оксид) /в пересчете на(274)										
Строительная площадка	7002			0.03204	0.09608	0.03204	0.09608	0.03204	0.09608	2019
(0143) Марганец и его соединения /в пересчете на марганца (IV) оксид/ (327)										
Строительная площадка	7002			0.0016326	0.00916	0.0016326	0.00916	0.0016326	0.00916	2019
(0301) Азота (IV) диоксид (Азота диоксид) (4)										
Оборудование работающее на дизельном топливе	7012			0.0095903	6.75	0.0095903	6.75	0.0095903	6.75	2019
Строительная площадка	7002			0.014413	0.0366	0.014413	0.0366	0.014413	0.0366	2019
	7004			0.01912	0.1005	0.01912	0.1005	0.01912	0.1005	2019
	7011			0.4	4.2	0.4	4.2	0.4	4.2	2019
Буровые и взрывные работы	7010				6.86		6.86		6.86	2019
(0304) Азот (II) оксид (Азота оксид) (6)										
Оборудование работающее на дизельном топливе	7012			0.012465	8.775	0.012465	8.775	0.012465	8.775	2019
Строительная площадка	7011			0.52	5.46	0.52	5.46	0.52	5.46	2019
Буровые и взрывные работы	7010				1.114		1.114		1.114	2019

ЭРА v2.5 ТОО «TITECO» Таблица 3.6

Нормативы выбросов загрязняющих веществ в атмосферу по предприятию

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства) – без учета автотранспорта

Производство цех, участок	Номер источника выброса	Нормативы выбросов загрязняющих веществ								год достижения ПДВ
		существующее положение на 2018 год		на 2019 год		на 2020-2022 года		П Д В		
Код и наименование загрязняющего вещества		г/с	т/год	г/с	т/год	г/с	т/год	г/с	т/год	
1	2	3	4	5	6	7	8	9	10	11
Н е о р г а н и з о в а н н ы е и с т о ч н и к и										
(0123) Железо (II, III) оксиды (диЖелезо триоксид, Железа оксид) /в пересчете на(274)										
Строительная площадка	7002			0.03204	0.09608	0.03204	0.09608	0.03204	0.09608	2019
(0143) Марганец и его соединения /в пересчете на марганца (IV) оксид/ (327)										
Строительная площадка	7002			0.0016326	0.00916	0.0016326	0.00916	0.0016326	0.00916	2019
(0301) Азота (IV) диоксид (Азота диоксид) (4)										
Оборудование работающее на дизельном топливе	7012			0.0095903	6.75	0.0095903	6.75	0.0095903	6.75	2019
Строительная площадка	7002			0.014413	0.0366	0.014413	0.0366	0.014413	0.0366	2019
	7004			0.01912	0.1005	0.01912	0.1005	0.01912	0.1005	2019
	7011			0.4	4.2	0.4	4.2	0.4	4.2	2019
Буровые и взрывные работы	7010				6.86		6.86		6.86	2019
(0304) Азот (II) оксид (Азота оксид) (6)										
Оборудование работающее на дизельном топливе	7012			0.012465	8.775	0.012465	8.775	0.012465	8.775	2019
Строительная площадка	7011			0.52	5.46	0.52	5.46	0.52	5.46	2019
Буровые и взрывные работы	7010				1.114		1.114		1.114	2019

ЭРА v2.5 ТОО «TITECO» Таблица 3.6

Нормативы выбросов загрязняющих веществ в атмосферу по предприятию

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства) – без учета автотранспорта

Производство цех, участок	Номер источника выброса	Нормативы выбросов загрязняющих веществ								год достижения ПДВ
		существующее положение на 2018 год		на 2019 год		на 2020-2022 года		П Д В		
Код и наименование загрязняющего вещества		г/с	т/год	г/с	т/год	г/с	т/год	г/с	т/год	
1	2	3	4	5	6	7	8	9	10	11
(0342) Фтористые газообразные соединения /в пересчете на фтор/ (617)										
Строительная площадка	7002			0.0006837	0.00478	0.0006837	0.00478	0.0006837	0.00478	2019
(0344) Фториды неорганические плохо растворимые – (алюминия фторид, кальция фторид,(615)										
Строительная площадка	7002			0.000556	0.004	0.000556	0.004	0.000556	0.004	2019
(0616) Диметилбензол (смесь о-, м-, п- изомеров) (203)										
Строительная площадка	7003			0.4208	2.25	0.4208	2.25	0.4208	2.25	2019
(0621) Метилбензол (349)										
Строительная площадка	7003			1.0472	5.56	1.0472	5.56	1.0472	5.56	2019
(1210) Бутилацетат (Уксусной кислоты бутиловый эфир) (110)										
Строительная площадка	7003			0.2346	1.2467	0.2346	1.2467	0.2346	1.2467	2019
(1301) Проп-2-ен-1-аль (Акролеин, Акрилальдегид) (474)										
Оборудование работающее на дизельном топливе	7012			0.00021673	0.252	0.00021673	0.252	0.00021673	0.252	2019
Строительная площадка	7011			0.016	0.168	0.016	0.168	0.016	0.168	2019
(1325) Формальдегид (Метаналь) (609)										
Оборудование работающее на дизельном топливе	7012			0.00021673	0.252	0.00021673	0.252	0.00021673	0.252	2019
Строительная площадка	7011			0.016	0.168	0.016	0.168	0.016	0.168	2019

ЭРА v2.5 ТОО «TITECO» Таблица 3.6

Нормативы выбросов загрязняющих веществ в атмосферу по предприятию

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства) – без учета автотранспорта

Производство цех, участок	Номер источника выброса	Нормативы выбросов загрязняющих веществ								год достижения ПДВ
		существующее положение на 2018 год		на 2019 год		на 2020-2022 года		П Д В		
Код и наименование загрязняющего вещества		г/с	т/год	г/с	т/год	г/с	т/год	г/с	т/год	
1	2	3	4	5	6	7	8	9	10	11
(1401) Пропан-2-он (Ацетон) (470)										
Строительная площадка	7003			0.5233	2.781	0.5233	2.781	0.5233	2.781	2019
(1411) Циклогексанон (654)										
Строительная площадка	7003			0.1468	0.783	0.1468	0.783	0.1468	0.783	2019
(2752) Уайт-спирит (1294*)										
Строительная площадка	7003			0.0833	0.45	0.0833	0.45	0.0833	0.45	2019
(2754) Алканы С12-19 /в пересчете на С/ (Углеводороды предельные С12-С19 (в пересчете(10)										
Оборудование работающее на дизельном топливе	7012			0.0021673	2.52	0.0021673	2.52	0.0021673	2.52	2019
Строительная площадка	7004			0.001903	0.01	0.001903	0.01	0.001903	0.01	2019
	7011			0.16	1.68	0.16	1.68	0.16	1.68	2019
Заправка техники	7009			0.00825	0.00446	0.00825	0.00446	0.00825	0.00446	2019
(2902) Взвешенные частицы (116)										
Строительная площадка	7007			0.05292	1.008	0.05292	1.008	0.05292	1.008	2019
(2904) Мазутная зола теплоэлектростанций /в пересчете на ванадий/ (326)										
Строительная площадка	7004			0.002007	0.01055	0.002007	0.01055	0.002007	0.01055	2019
(2908) Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент,(494)										
Строительство сульфидного завода с инфраструктурой	7001			1.22345	13.768	1.22345	13.768	1.22345	13.768	2019

ЭРА v2.5 ТОО «TITECO» Таблица 3.6

Нормативы выбросов загрязняющих веществ в атмосферу по предприятию

Аягозский район, п. Актогай, ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай)(период строительства) – без учета автотранспорта

Производство цех, участок	Номер источника выброса	Нормативы выбросов загрязняющих веществ								год достижения ПДВ
		существующее положение на 2018 год		на 2019 год		на 2020-2022 года		П Д В		
Код и наименование загрязняющего вещества		г/с	т/год	г/с	т/год	г/с	т/год	г/с	т/год	
1	2	3	4	5	6	7	8	9	10	11
Строительная площадка	7002			0.000556	0.004	0.000556	0.004	0.000556	0.004	2019
	7005			2.54102	9.4206	2.54102	9.4206	2.54102	9.4206	2019
Места разгрузки строительных материалов	7008			0.83723	4.7683	0.83723	4.7683	0.83723	4.7683	2019
Буровые и взрывные работы	7010			0.02017	6.726	0.02017	6.726	0.02017	6.726	2019
(2930) Пыль абразивная (Корунд белый, Монокорунд) (1027*)										
Строительная площадка	7007			0.0056	0.06516	0.0056	0.06516	0.0056	0.06516	2019
Итого по неорганизованным источникам:				9.10716082	108.94300252	9.10716082	108.94300252	9.10716082	108.94300252	
Т в е р д ы е:				4.7847839	37.62985	4.7847839	37.62985	4.7847839	37.62985	
Газообразные, ж и д к и е:				4.32237692	71.31315252	4.32237692	71.31315252	4.32237692	71.31315252	
Всего по предприятию:				9.10716082	108.94300252	9.10716082	108.94300252	9.10716082	108.94300252	
Т в е р д ы е:				4.7847839	37.62985	4.7847839	37.62985	4.7847839	37.62985	
Газообразные, ж и д к и е:				4.32237692	71.31315252	4.32237692	71.31315252	4.32237692	71.31315252	

3.1.4 Impact during operation of the Sulphide Concentrator

The production capacity of the Sulphide Concentrator for the processing of ore is 25.0 million tons per year.

The raw materials for the processing plant are sulphide copper-molybdenum ores from the Aktogay deposit.

S*ulphide ore processing at the Sulphide Concentrator will start in 2022*.

During the operation of the main technological equipment, significant emissions occur from the aspirating technological installations of the coarse crushing section and the ore-pebble crusher building, from fugitive sources - raw material transfer units, conveyor racks, waste dumps, ore stockpiles, trucks and tractors.

Atmosphere and air pollution.

Meteorological conditions leading to the accumulation of impurities determine a high potential and, conversely, conditions favorable for dispersion determine a low potential of the atmospheric pollution index. Potential atmospheric pollution is a combination of weather conditions that determine the ability of the atmosphere to disperse emissions of harmful substances and form a certain level of concentration of impurities in the surface layer.

Investigated area is located at a considerable distance from settlements and industrial sites.

The Aktogay field is located in a sparsely populated area. The settlements in the deposit area are mainly located along the railway line. The nearest villages located in close proximity to the facility are:

- Aktogay village 25 km west of the field;
- Shynyrau village 26 km east of the facility;
- Kopa village 32 km west of the facility.

Other settlements are located at a distance of: 38 km (settlement of Tarlauly), 56 km (settlement of Karakol and Zhanama) from the field. The regional center Ayagoz is located northeast of the village Aktogay at a distance of about 110 km in a straight line. The regional center Ust-Kamenogorsk is located north - east of the village Aktogay at a distance of about 400 km in a straight line.

There are no permanent stationary monitoring stations for the atmospheric air quality in the Aktogay deposit area (Appendix 5).

The most significant sources of exposure to the atmosphere during the extension of Aktogay Sulphide Concentrator will be:

- coarse ore stockpile;
- crushing and transportation of ore to a stockpile of crushed ore;
- transportation of ore for grinding;
- Concentrator.

The calculation of the expected emissions of pollutants at the planned performance of the Aktogay Sulphide Concentrator according to the project, for the first 10 years of the deposit development is given in *Appendix 3.*

The list and amount of pollutants during operation are shown in Table 3.1.

Atmospheric air pollution will be due to **25** sources of pollution, including **10** - *fugitive*. According to calculations, 24 items of pollutants are emitted into the atmosphere.

Dust exhausting plants from the crushing site reduce dust emissions into the atmosphere from the ore transfer station. Also dust suppression is provided in ore stockpiles and technological roads.

There are no industrial enterprises and settlements within a radius of 25 km from the area of the deposit. Due to the remoteness of the nearest settlement from the facilities of the designed Sulphide Concentrator (not less than 25 km), dispersion calculation in the residential area is not carried out, the negative impact of pollutant emissions into the atmosphere on the population is excluded.

Since a vehicle is a mobile source of emissions, the amount of emissions from its operation is calculated to determine the overall environmental situation. These emissions are included in the calculation of dispersion of surface concentrations. However, they are not included in the list of allowable emissions, since emissions from mobile sources are not standardized and payment for them

is made by consumed fuel. The mobile sources include the following sources: 6019 (002), 6020 (004), 6021 (004), 6026 (004), 6027 (004), 6022, 6023, 6024, 6025.

The calculation of emissions from the operation of the Sulpide Concentrator is given in Appendix 3.

The list and amount of pollutants during the operation of the Sulpide Concentrator are shown in Tables 3.1 (excluding and including emissions from vehicles).

The parameters of the emission sources of pollutants during the operation of the Sulpide Concentrator are given in Table 3.3.

ЭРА v2.5 ТОО «TITECO» Таблица 3.1

Перечень загрязняющих веществ, выбрасываемых в атмосферу
на 2022 год.

С учетом автотранспорта

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Код загр. веще-ства	Наименование Вещества	ПДК максим. разовая, мг/м3	ПДК Средне-суточная, мг/м3	ОБУВ ориентир. безопасн. УВ,мг/м3	Класс Опас-Ности	Выброс вещества г/с	Выброс вещества, т/год	Значение КОВ (М/ПДК)**а	Выброс вещества, усл.т/год
1	2	3	4	5	6	7	8	9	10
0101	Алюминий оксид (диАлюминий триоксид) /в пересчете на алюминий/ (20)		0.01		2	0.167000926	3.186017753	1795.654	318.601775
0123	Железо (II, III) оксиды (диЖелезо триоксид, Железа оксид) /в пересчете на железо/ (274)		0.04		3	0.12223578	1.93202809	48.3007	48.3007022
0128	Кальций оксид (Негашеная известь) (635*)			0.3		0.068771846	1.344606163	4.482	4.48202054
0143	Марганец и его соединения /в пересчете на марганца (IV) оксид/ (327)	0.01	0.001		2	0.003	0.0036	5.2868	3.6
0155	диНатрий карбонат (Сода кальцинированная, Натрий карбонат) (408)	0.15	0.05		3	0.0065	0.0477	0	0.954
0301	Азота (IV) диоксид (Азота диоксид) (4)	0.2	0.04		2	0.6483	2.1329	175.7857	53.3225
0304	Азот (II) оксид (Азота оксид) (6)	0.4	0.06		3	0.1038	0.3415	5.6917	5.69166667
0328	Углерод (Сажа, Углерод черный) (583)	0.15	0.05		3	0.1053	0.3372	6.744	6.744
0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)	0.5	0.05		3	0.0905	0.2468	4.936	4.936
0333	Сероводород (Дигидросульфид) (518)	0.008			2	0.005012	0.13809	40.569	17.26125
0334	Сероуглерод (519)	0.03	0.005		2	0.003102	0.08865	42.007	17.73
0337	Углерод оксид (Окись углерода, Угарный газ) (584)	5	3		4	7.0738	4.4	1.4116	1.46666667
0342	Фтористые газообразные соединения /в пересчете на фтор/ (617)	0.02	0.005		2	0.0014	0.006	1.2675	1.2
0344	Фториды неорганические плохо растворимые – (алюминия фторид, кальция фторид, натрия	0.2	0.03		2	0.001	0.0002	0	0.00666667

ЭРА v2.5 ТОО «TITECO» Таблица 3.1

Перечень загрязняющих веществ, выбрасываемых в атмосферу
на 2022 год.

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Код загр. веще-ства	Наименование Вещества	ПДК максим. разовая, мг/м3	ПДК Средне-суточная, мг/м3	ОБУВ ориентир. безопасн. УВ,мг/м3	Класс Опас-Ности	Выброс вещества г/с	Выброс вещества, т/год	Значение КОВ (М/ПДК)**а	Выброс вещества, усл.т/год
1	2	3	4	5	6	7	8	9	10
	гексафторалюминат) (Фториды неорганические плохо растворимые /в пересчете на фтор/) (615)								
1048	2-Метилпропан-1-ол (Изобутиловый спирт) (383)	0.1			4	0.0053	0.1307	1.2725	1.307
1051	Пропан-2-ол (Изопропиловый спирт) (469)	0.6			3	0.0043	0.1021	0	0.17016667
2704	Бензин (нефтяной, малосернистый) /в пересчете на углерод/ (60)	5	1.5		4	0.9484	0.3808	0	0.25386667
2732	Керосин (654*)			1.2		1.5417	1.9793	1.6494	1.64941667
2735	Масло минеральное нефтяное (веретенное, машинное, цилиндровое и др.) (716*)			0.05		0.168	0.0302	0	0.604
2736	Масло сосновое флотационное (МСФ) (717*)			1		0.004	0.1152	0	0.1152
2902	Взвешенные частицы (116)	0.5	0.15		3	0.0104	0.0179	0	0.11933333
2908	Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент, пыль цементного производства – глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494)	0.3	0.1		3	1.050256448	18.194945394	181.9495	181.949454
2930	Пыль абразивная (Корунд белый, Монокорунд) (1027*)			0.04		0.0064	0.011	0	0.275
2985	Полиакриламид анионный АК-618 (АК-618) (964*)			0.25		0.0007	0.0201	0	0.0804
	В С Е Г О:					12.139179	35.1875374	2317	670.821085

ЭРА v2.5 ТОО «TITECO» Таблица 3.1

Перечень загрязняющих веществ, выбрасываемых в атмосферу
на 2022 год.

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Код загр. веще-ства	Наименование Вещества	ПДК максим. разовая, мг/м3	ПДК Средне-суточная, мг/м3	ОБУВ ориентир. безопасн. УВ,мг/м3	Класс Опас-Ности	Выброс вещества г/с	Выброс вещества, т/год	Значение КОВ (М/ПДК)**а	Выброс вещества, усл.т/год
1	2	3	4	5	6	7	8	9	10
Примечания: 1. В колонке 9: «М» – выброс ЗВ,т/год; «ПДК» – ПДКс.с. или (при отсутствии ПДКс.с.) ПДКм.р. или (при отсутствии ПДКм.р.) ОБУВ;»а» – константа, зависящая от класса опасности ЗВ 2. Способ сортировки: по возрастанию кода ЗВ (колонка 1)									

ЭРА v2.5 ТОО «TITECO» Таблица 3.1

Перечень загрязняющих веществ, выбрасываемых в атмосферу
на 2022 год.

Без учета автотранспорта

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – нормативы)

Код загр. веще-ства	Наименование Вещества	ПДК максим. разовая, мг/м3	ПДК Средне-суточная, мг/м3	ОБУВ ориентир. безопасн. УВ,мг/м3	Класс Опас-Ности	Выброс вещества г/с	Выброс вещества, т/год	Значение КОВ (М/ПДК)**а	Выброс вещества, усл.т/год
1	2	3	4	5	6	7	8	9	10
0101	Алюминий оксид (диАлюминий триоксид) /в пересчете на алюминий/ (20)		0.01		2	0.134955926	2.929912753	1610.3159	292.991275
0123	Железо (II, III) оксиды (диЖелезо триоксид, Железа оксид) /в пересчете на железо/ (274)		0.04		3	0.10338578	1.78137809	44.5345	44.5344522
0128	Кальций оксид (Негашеная известь) (635*)			0.3		0.055576846	1.206510163	4.0217	4.02170054
0143	Марганец и его соединения /в пересчете на марганца (IV) оксид/ (327)	0.01	0.001		2	0.003	0.0036	5.2868	3.6
0155	диНатрий карбонат (Сода кальцинированная, Натрий карбонат) (408)	0.15	0.05		3	0.0065	0.0477	0	0.954
0301	Азота (IV) диоксид (Азота диоксид) (4)	0.2	0.04		2	0.0103	0.0313	0	0.7825
0333	Сероводород (Дигидросульфид) (518)	0.008			2	0.005012	0.13809	40.569	17.26125
0334	Сероуглерод (519)	0.03	0.005		2	0.003102	0.08865	42.007	17.73
0337	Углерод оксид (Окись углерода, Угарный газ) (584)	5	3		4	0.015	0.0123	0	0.0041
0342	Фтористые газообразные соединения /в пересчете на фтор/ (617)	0.02	0.005		2	0.0014	0.006	1.2675	1.2
0344	Фториды неорганические плохо растворимые – (алюминия фторид, кальция фторид, натрия гексафторалюминат) (Фториды неорганические плохо растворимые /в пересчете на фтор/) (615)	0.2	0.03		2	0.001	0.0002	0	0.00666667
1048	2-Метилпропан-1-ол (Изобутиловый спирт) (383)	0.1			4	0.0053	0.1307	1.2725	1.307
1051	Пропан-2-ол (Изопропиловый спирт)	0.6			3	0.0043	0.1021	0	0.17016667

ЭРА v2.5 ТОО «TITECO» Таблица 3.1

Перечень загрязняющих веществ, выбрасываемых в атмосферу
на 2022 год.

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – нормативы)

Код загр. веще-ства	Наименование Вещества	ПДК максим. разовая, мг/м3	ПДК Средне-суточная, мг/м3	ОБУВ ориентир. безопасн. УВ,мг/м3	Класс Опас-Ности	Выброс вещества г/с	Выброс вещества, т/год	Значение КОВ (М/ПДК)**а	Выброс вещества, усл.т/год
1	2	3	4	5	6	7	8	9	10
	(469)								
2732	Керосин (654*)			1.2		0.3982	1.3456	1.1213	1.12133333
2735	Масло минеральное нефтяное (веретенное, машинное, цилиндровое и др.) (716*)			0.05		0.168	0.0302	0	0.604
2736	Масло сосновое флотационное (МСФ) (717*)			1		0.004	0.1152	0	0.1152
2902	Взвешенные частицы (116)	0.5	0.15		3	0.0104	0.0179	0	0.11933333
2908	Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент, пыль цементного производства – глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494)	0.3	0.1		3	0.925846448	17.200655394	172.0066	172.006554
2930	Пыль абразивная (Корунд белый, Монокорунд) (1027*)			0.04		0.0064	0.011	0	0.275
2985	Полиакриламид анионный АК-618 (АК-618) (964*)			0.25		0.0007	0.0201	0	0.0804
	В С Е Г О:					1.862379	25.2190964	1922.4	558.884932

Примечания: 1. В колонке 9: «М» – выброс ЗВ,т/год; «ПДК» – ПДКс.с. или (при отсутствии ПДКс.с.) ПДКм.р. или (при отсутствии ПДКм.р.) ОБУВ;»а» – константа, зависящая от класса опасности ЗВ
2. Способ сортировки: по возрастанию кода ЗВ (колонка 1)

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площадного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
002		Передаточный транспортер	1	6833	труба	1	0058	12	1.2	12.2	13.7979072	15	3700	1700		
		Магистральный транспортер	1	6833												
		Полустационарная дробилка	1	6833												
003		Подача крупнодробленной руды на мельницу	1	6833	труба	1	0059	12	1.2	12.2	13.7979072	15	2000	1180		
		Погрузка руды на транспортер	1	6833												

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код ве-ще-ства	Наименование вещества	Выбросы загрязняющих веществ			Год дос-тиже-ния ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
0058	Аспирационная система;	0101/100 0123/100 0128/100 2908/100	99.90/99.90 99.90/99.90 99.90/99.90 99.90/99.90	0101	Алюминий оксид (диАлюминий триоксид) /в пересчете на алюминий/ (20)	0.000306085	0.022	0.007529232	2022
				0123	Железо (II, III) оксиды (диЖелезо триоксид, Железа оксид) /в пересчете на железо/ (274)	0.00018005	0.013	0.00442896	2022
				0128	Кальций оксид (Негашеная известь) (635*)	0.000126035	0.009	0.003100272	2022
				2908	Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент, пыль цементного производства - глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494)	0.00118833	0.086	0.029231136	2022
0059	Аспирационная система;	0101/100 0123/100 0128/100 2908/100	99.90/99.90 99.90/99.90 99.90/99.90 99.90/99.90	0101	Алюминий оксид (диАлюминий триоксид) /в пересчете на алюминий/ (20)	0.000015249	0.001	0.000326145	2022
				0123	Железо (II, III) оксиды (диЖелезо триоксид, Железа	0.00000897	0.0007	0.00019185	2022

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площадного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
004		Конусная дробилка	1	4080	аэрационный фонарь	1	0060	36	1	19.63	15.417402	20	2060	1280		
		Валковая дробилка	1	4080												
		Мельницы, флотомашины, сгуститель	1	4080												

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код вещества	Наименование вещества	Выбросы загрязняющих веществ			Год достижения ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
					оксид) /в пересчете на железо/ (274)				
				0128	Кальций оксид (Негашеная известь) (635*)	0.000006279	0.0005	0.000134295	2022
				2908	Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент, пыль цементного производства - глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494)	0.000059202	0.004	0.00126621	2022
0060	Аспирационная система;	0101/100 0123/100 0128/100 2908/100	99.90/99.90 99.90/99.90 99.90/99.90 99.90/99.90	0101	Алюминий оксид (диАлюминий триоксид) /в пересчете на алюминий/ (20)	0.000147592	0.010	0.011810376	2022
				0123	Железо (II, III) оксиды (диЖелезо триоксид, Железа оксид) /в пересчете на железо/ (274)	0.00008676	0.006	0.00694728	2022
				0128	Кальций оксид (Негашеная известь) (635*)	0.000060732	0.004	0.004863096	2022
				0333	Сероводород (Дигидросульфид) (	0.005	0.324	0.138	2022

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площадного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
005		Бункерный склад извести-пушонки	1	4080	труба	1	0061	23.2	0.32	11.81	0.9498188	20	1500	800		
005		Узел загрузки	1	4080	труба	1	0062	18	0.32	4.75	0.3820186	20	1545	865		

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код вещества	Наименование вещества	Выбросы загрязняющих веществ			Год достижения ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
					518)				
				0334	Сероуглерод (519)	0.003	0.195	0.0864	2022
				1048	2-Метилпропан-1-ол (Изобутиловый спирт) (383)	0.002	0.130	0.0576	2022
				1051	Пропан-2-ол (Изопропиловый спирт) (469)	0.002	0.130	0.0576	2022
				2732	Керосин (654*)	0.1667	10.812	1.224	2022
				2736	Масло сосновое флотационное (МСФ) (717*)	0.004	0.259	0.1152	2022
				2908	Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент, пыль цементного производства - глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494)	0.000572916	0.037	0.045852048	2022
				2985	Полиакриламид анионный АК-618 (АК-618) (964*)	0.0007	0.045	0.0201	2022
0061	Аспирационная система;	0128/100	99.90/99.90	0128	Кальций оксид (Негашеная известь) (635*)	0.0000038	0.004	0.0000412	2022
0062	Аспирационная	0128/100	99.90/99.90	0128	Кальций оксид (	0.000003	0.008	0.0000343	2022

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площадного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		извести														
007		Чан контактный	1	2040	труба	1	0063	15	0.35	10	0.962115	24	1700	745		
007		Чан расходный	1	2040	труба	1	0064	15	0.35	10	0.962115	24	1800	810		
007		Чан контактный	1	8000	труба	1	0065	15	0.53	10	2.2061886	24	1880	730		
		Емкость расходная	1	8000												
007		Емкость для обезвреживания тары	1	2040	труба	1	0066	15	0.27	10	0.5725566	24	1910	890		
007		Эмульгатор	1	520	труба	1	0067	10	0.33	9.76	0.8347734	24	1980	865		
010		Сварочный участок	1	1140	крышной вентилятор	1	0068	19.2	0.4	2.85	0.1068144	20	3658	1580		
		Точильно-	1	250												

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код вещества	Наименование вещества	Выбросы загрязняющих веществ			Год достижения ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
	система;				Негашеная известь) (635*)				
0063				0334	Сероуглерод (519)	0.000035	0.036	0.00025	2022
				1048	2-Метилпропан-1-ол (Изобутиловый спирт) (383)	0.001	1.039	0.0073	2022
				1051	Пропан-2-ол (Изопропиловый спирт) (469)	0.001	1.039	0.0073	2022
0064				0334	Сероуглерод (519)	0.0000335	0.035	0.001	2022
				1048	2-Метилпропан-1-ол (Изобутиловый спирт) (383)	0.0013	1.351	0.0372	2022
				1051	Пропан-2-ол (Изопропиловый спирт) (469)	0.0013	1.351	0.0372	2022
0065				0333	Сероводород (Дигидросульфид) (518)	0.000012	0.005	0.00009	2022
				0334	Сероуглерод (519)	0.0000335	0.015	0.001	2022
				1048	2-Метилпропан-1-ол (Изобутиловый спирт) (383)	0.001	0.453	0.0286	2022
0066				0155	диНатрий карбонат (Сода кальцинированная, Натрий карбонат) (408)	0.0065	11.353	0.0477	2022
0067				2732	Керосин (654*)	0.015	17.969	0.0281	2022
0068				0123	Железо (II, III) оксиды (диЖелезо триоксид, Железа	0.005	46.810	0.036	2022

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площадного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		шлифовальные станки (2 шт.)														
		Ванна для мойки деталей	1	120												
010		Стол сварщика	1	2080	крышной	1	0069	19.2	0.4	2.85	0.3581424	20	3658	1580		
		Металлобрабатывающие станки	1	250	вентилятор											
		Ванна для мойки деталей	1	120												

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код ве-ще-ства	Наименование вещества	Выбросы загрязняющих веществ			Год дос-тиже-ния ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
					оксид) /в пересчете на железо/ (274)				
				0143	Марганец и его соединения /в пересчете на марганца (IV) оксид/ (327)	0.0006	5.617	0.0011	2022
				0301	Азота (IV) диоксид (Азота диоксид) (4)	0.0075	70.215	0.0309	2022
				0337	Углерод оксид (Окись углерода, Угарный газ) (584)	0.0016	14.979	0.0103	2022
				0342	Фтористые газообразные соединения /в пересчете на фтор/ (617)	0.0002	1.872	0.0002	2022
				2732	Керосин (654*)	0.2165	2026.880	0.0935	2022
				2902	Взвешенные частицы (116)	0.0052	48.683	0.0094	2022
				2930	Пыль абразивная (Корунд белый, Монокорунд) (1027*)	0.0032	29.959	0.0058	2022
0069				0123	Железо (II, III) оксиды (диЖелезо триоксид, Железа оксид) /в пересчете на железо/ (274)	0.007	19.545	0.006	2022
				0143	Марганец и его соединения /в пересчете на марганца (IV) оксид/	0.0009	2.513	0.0007	2022

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площадного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код вещества	Наименование вещества	Выбросы загрязняющих веществ			Год достижения ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
					(327)				
				0301	Азота (IV) диоксид (Азота диоксид) (4)	0.0014	3.909	0.0002	2022
				0337	Углерод оксид (Окись углерода, Угарный газ) (584)	0.0067	18.708	0.001	2022
				0342	Фтористые газообразные соединения /в пересчете на фтор/ (617)	0.0005	1.396	0.0027	2022
				0344	Фториды неорганические плохо растворимые - (алюминия фторид, кальция фторид, натрия гексафторалюминат) (Фториды неорганические плохо растворимые /в пересчете на фтор/) (615)	0.0005	1.396	0.0001	2022
				2735	Масло минеральное нефтяное (веретенное, машинное, цилиндровое и др.) (716*)	0.084	234.544	0.0151	2022
				2902	Взвешенные частицы (116)	0.0052	14.519	0.0085	2022
				2908	Пыль неорганическая,	0.0005	1.396	0.0001	2022

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площадного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
010		Стол для электросварки	1	1020	труба	1	0070	14	0.225	10.6	0.4214653	20	1350	810		
010		Ванна для мойки деталей	1	4200	труба	1	0071	14	0.225	11.83	0.47	20	2415	2520		

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код вещества	Наименование вещества	Выбросы загрязняющих веществ			Год достижения ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
					содержащая двуокись кремния в %: 70-20 (шамот, цемент, пыль цементного производства - глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494)				
				2930	Пыль абразивная (Корунд белый, Монокорунд) (1027*)	0.0032	8.935	0.0052	2022
0070				0123	Железо (II, III) оксиды (диЖелезо триоксид, Железа оксид) /в пересчете на железо/ (274)	0.005	11.863	0.0099	2022
				0143	Марганец и его соединения /в пересчете на марганца (IV) оксид/ (327)	0.0006	1.424	0.0011	2022
				0342	Фтористые газообразные соединения /в пересчете на фтор/ (617)	0.0002	0.475	0.0004	2022
0071				2735	Масло минеральное нефтяное (	0.084	178.723	0.0151	2022

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площадного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
010		Стол для электросварочных работ	1	1024	труба	1	0072	14	0.225	10.57	0.4202724	20	2370	2650		

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код ве-ще-ства	Наименование вещества	Выбросы загрязняющих веществ			Год дос-тиже-ния ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
					веретенное, машинное, цилиндровое и др.) (716*)				
0072				0123	Железо (II, III) оксиды (диЖелезо триоксид, Железа оксид) /в пересчете на железо/ (274)	0.007	16.656	0.006	2022
				0143	Марганец и его соединения /в пересчете на марганца (IV) оксид/ (327)	0.0009	2.141	0.0007	2022
				0301	Азота (IV) диоксид (Азота диоксид) (4)	0.0014	3.331	0.0002	2022
				0337	Углерод оксид (Окись углерода, Угарный газ) (584)	0.0067	15.942	0.001	2022
				0342	Фтористые газообразные соединения /в пересчете на фтор/ (617)	0.0005	1.190	0.0027	2022
				0344	Фториды неорганические плохо растворимые - (алюминия фторид, кальция фторид, натрия гексафторалюминат) (Фториды	0.0005	1.190	0.0001	2022

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площадного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
002		Передача руды в бункер, пересыпка с карьерного самосвала	1	6833	неорганизованный источник	1	6017	5					4930	1690	1	1
		Загрузка руды в бункер, узлы пересыпок	1	6833												

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код ве-ще-ства	Наименование вещества	Выбросы загрязняющих веществ			Год дос-тиже-ния ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
					неорганические плохо растворимые /в пересчете на фтор/) (615)				
				2908	Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент, пыль цементного производства - глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494)	0.0005	1.190	0.0001	2022
6017				0101	Алюминий оксид (диАлюминий триоксид) /в пересчете на алюминий/ (20)	0.099263		2.134095	2022
				0123	Железо (II, III) оксиды (диЖелезо триоксид, Железа оксид) /в пересчете на железо/ (274)	0.05839		1.25535	2022
				0128	Кальций оксид (Негашеная известь) (635*)	0.040873		0.878745	2022
				2908	Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (	0.385374		8.28531	2022

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площад-Ного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
003		Склад крупнодробленной руды	1	6833	неорганизованный источник	1	6019	5					1270	1300	1	1
		Автотранспорт	1	6833												

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код ве-ще-ства	Наименование вещества	Выбросы загрязняющих веществ			Год дос-тиже-ния ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
					шамот, цемент, пыль цементного производства - глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494)				
6019				0101	Алюминий оксид (диАлюминий триоксид) /в пересчете на алюминий/ (20)	0.035224		0.776152	2022
				0123	Железо (II, III) оксиды (диЖелезо триоксид, Железа оксид) /в пересчете на железо/ (274)	0.02072		0.45656	2022
				0128	Кальций оксид (Негашеная известь) (635*)	0.014504		0.319592	2022
				0301	Азота (IV) диоксид (Азота диоксид) (4)	0.1549		1.5504	2022
				0304	Азот (II) оксид (Азота оксид) (6)	0.0252		0.252	2022
				0328	Углерод (Сажа, Углерод черный) (583)	0.0321		0.262	2022
				0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера	0.0191		0.1717	2022

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площадного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
008		Отвал ПСП №1 (разгрузка самосвалов)	1	2040	неорганизованный источник	1	6020	2					6382	824	1050	470
		Отвал ПСП №1 (формирование бульдозером)	1	2040												
		Отвал ПСП №1 (хранение)	1	8760												
		Бульдозер Caterpillar D8 1	1	2040												

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код вещества	Наименование вещества	Выбросы загрязняющих веществ			Год достижения ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
					(IV) оксид) (516)				
				0337	Углерод оксид (Окись углерода, Угарный газ) (584)	0.1516		1.4403	2022
				2732	Керосин (654*)	0.307		0.1893	2022
				2908	Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент, пыль цементного производства - глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494)	0.136752		3.013296	2022
6020				0301	Азота (IV) диоксид (Азота диоксид) (4)	0.0516		0.1477	2022
				0304	Азот (II) оксид (Азота оксид) (6)	0.0084		0.024	2022
				0328	Углерод (Сажа, Углерод черный) (583)	0.0107		0.0228	2022
				0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)	0.0064		0.0157	2022
				0337	Углерод оксид (Окись углерода, Угарный газ) (584)	0.0505		0.133	2022

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площадного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
008		Отвал ПСП №2 (разгрузка самосвалов)	1	8760	неорганизованный источник	1	6021	2					3880	435	470	235
		Отвал ПСП №2 (формирование бульдозером)	1	8760												
		Отвал ПСП №2 (хранение)	1	8760												
		Бульдозер Caterpillar D8 1	1	2040												

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код ве-ще-ства	Наименование вещества	Выбросы загрязняющих веществ			Год дос-тиже-ния ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
				2732	Керосин (654*)	0.1023		0.027	2022
				2908	Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент, пыль цементного производства - глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494)	0.1484		2.3794	2022
6021				0301	Азота (IV) диоксид (Азота диоксид) (4)	0.0516		0.0861	2022
				0304	Азот (II) оксид (Азота оксид) (6)	0.0084		0.014	2022
				0328	Углерод (Сажа, Углерод черный) (583)	0.0107		0.0131	2022
				0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)	0.0064		0.0091	2022
				0337	Углерод оксид (Окись углерода, Угарный газ) (584)	0.0505		0.0771	2022
				2732	Керосин (654*)	0.1023		0.0158	2022
				2908	Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (	0.0565		0.6338	2022

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площадного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
009		Открытая стоянка перед главными воротами	1	8760	неорганизованный источник	1	6022	5					-470	1410	1	1
009		Открытая автостоянка на 10 автомашин	1	8760	неорганизованный источник	1	6023	5					680	2350	1	1

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ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код вещества	Наименование вещества	Выбросы загрязняющих веществ			Год достижения ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
					шамот, цемент, пыль цементного производства - глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494)				
6022				0301	Азота (IV) диоксид (Азота диоксид) (4)	0.0518		0.0197	2022
				0304	Азот (II) оксид (Азота оксид) (6)	0.0084		0.0032	2022
				0328	Углерод (Сажа, Углерод черный) (583)	0.0042		0.0015	2022
				0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)	0.005		0.0022	2022
				0337	Углерод оксид (Окись углерода, Угарный газ) (584)	1.4457		0.5478	2022
				2704	Бензин (нефтяной, малосернистый) /в пересчете на углерод/ (60)	0.1539		0.0584	2022
				2732	Керосин (654*)	0.1539		0.0584	2022
6023				0301	Азота (IV) диоксид (Азота диоксид) (4)	0.0582		0.0224	2022
				0304	Азот (II) оксид (	0.0095		0.0036	2022

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площад-Ного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
009		Открытая автостоянка на 40 автомашин	1	8760	неорганизованный источник	1	6024	5					690	1880	1	1

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код ве-ще-ства	Наименование вещества	Выбросы загрязняющих веществ			Год дос-тиже-ния ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
					Азота оксид) (6)				
				0328	Углерод (Сажа, Углерод черный) (583)	0.0042		0.0016	2022
				0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)	0.0056		0.0026	2022
				0337	Углерод оксид (Окись углерода, Угарный газ) (584)	2.1906		0.8308	2022
				2704	Бензин (нефтяной, малосернистый) /в пересчете на углерод/ (60)	0.2548		0.0965	2022
				2732	Керосин (654*)	0.0292		0.0109	2022
6024				0301	Азота (IV) диоксид (Азота диоксид) (4)	0.1602		0.0701	2022
				0304	Азот (II) оксид (Азота оксид) (6)	0.0261		0.0114	2022
				0328	Углерод (Сажа, Углерод черный) (583)	0.0261		0.0101	2022
				0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)	0.0281		0.0139	2022
				0337	Углерод оксид (Окись углерода, Угарный газ) (584)	3.0613		1.1645	2022
				2704	Бензин (нефтяной, малосернистый) /в	0.5185		0.1895	2022

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площадного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
009		Автотранспорт	1	1200	неорганизованный источник	1	6025	2					4880	1915	1	1

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код вещества	Наименование вещества	Выбросы загрязняющих веществ			Год достижения ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
					пересчете на углерод/ (60)				
				2732	Керосин (654*)	0.1872		0.0733	2022
6025				0101	Алюминий оксид (диАлюминий триоксид) /в пересчете на алюминий/ (20)	0.032045		0.256105	
				0123	Железо (II, III) оксиды (диЖелезо триоксид, Железа оксид) /в пересчете на железо/ (274)	0.01885		0.15065	2022
				0128	Кальций оксид (Негашеная известь) (635*)	0.013195		0.138096	2022
				0301	Азота (IV) диоксид (Азота диоксид) (4)	0.0581		0.1029	2022
				0304	Азот (II) оксид (Азота оксид) (6)	0.0094		0.0167	2022
				0328	Углерод (Сажа, Углерод черный) (583)	0.0066		0.0107	2022
				0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)	0.0135		0.0208	2022
				0337	Углерод оксид (Окись углерода, Угарный газ) (584)	0.0581		0.1029	2022
				2704	Бензин (нефтяной, малосернистый) /в пересчете на	0.0212		0.0364	2022

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площадного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
008		Отвал ПСП №3 (разгрузка самосвалов)	1	2040	неорганизованный источник	1	6026	2					3778	1351	352	235
		Отвал ПСП №3 (формирование бульдозером)	1	2040												
		Отвал ПСП №3 (хранение)	1	8760												
		Бульдозер Caterpillar D8 1	1	2040												

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код ве-ще-ства	Наименование вещества	Выбросы загрязняющих веществ			Год дос-тиже-ния ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
					углерод/ (60)				
				2732	Керосин (654*)	0.1593		0.2393	2022
				2908	Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент, пыль цементного производства - глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494)	0.12441		0.99429	2022
6026				0301	Азота (IV) диоксид (Азота диоксид) (4)	0.0516		0.1023	2022
				0304	Азот (II) оксид (Азота оксид) (6)	0.0084		0.0166	2022
				0328	Углерод (Сажа, Углерод черный) (583)	0.0107		0.0154	2022
				0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)	0.0064		0.0108	2022
				0337	Углерод оксид (Окись углерода, Угарный газ) (584)	0.0505		0.0913	2022
				2732	Керосин (654*)	0.1023		0.0197	2022
				2908	Пыль неорганическая, содержащая двуокись	0.0476		0.4746	2022

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Производство	Цех	Источники выделения загрязняющих веществ		Число часов работы в год	Наименование источника выброса вредных веществ	Число ист выброса	Номер ист. выброса	Высота Источника выброса,м	Диаметр устья трубы м	Параметры газовозд.смеси на выходе из ист.выброса			Координаты источника на карте-схеме, м			
		Наименование	Количество ист.							скорость м/с	объем на 1 трубу, м3/с	темпер. оС	точечного источ. /1-го конца лин. /центра площад-Ного источника		2-го конца лин. /длина, ширина площадного источника	
													X1	Y1	X2	Y2
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
008		Отвал ПСП №4 (разгрузка самосвалов)	1	2040	неорганизованный источник	1	6027	2					1149	314	235	352
		Отвал ПСП №4 (формирование бульдозером)	1	2040												
		Отвал ПСП №4 (хранение)	1	8760												
		Бульдозер Caterpillar D8 1	1	2040												

ЭРА v2.5 ТОО «TITECO» Таблица 3.3

Параметры выбросов загрязняющих веществ в атмосферу для расчета ПДВ на 2022 год

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации)

Номер ист. выброса	Наименование газоочистных Установок и мероприятий по сокращению выбросов	Вещества по котор. производ. г-очистка к-т обесп газоо-й %	Средняя Эксплуат Степень очистки/ max.степ очистки%	Код ве-ще-ства	Наименование вещества	Выбросы загрязняющих веществ			Год дос-тиже-ния ПДВ
						г/с	мг/м3	т/год	
8	18	19	20	21	22	23	24	25	26
6027				2908	кремния в %: 70-20 (шамот, цемент, пыль цементного производства - глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494) Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент, пыль цементного производства - глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494)	0.1484		2.3377	2022

3.1.4.1. Calculations and analysis of the level of air pollution when implementing design solutions

The calculation of concentrations of harmful substances in the surface layer of the atmosphere was carried out on the sowtware "Era - 2.5" on a PC. At the same time, the highest concentrations of harmful substances in the reference points on the ground and the contributions of individual sources to the maximum concentration of harmful substances contained in the emissions of the company were determined.

The dispersion calculations were made for the existing situation in 2018 (emissions from the existing factory), as well as for the future in 2022, taking into account the designed factory. The calculation of the maximum possible concentrations in the surface layer of the atmosphere is made for all pollutants, taking into account the summing effect with the joint presence of a number of substances - summation groups. The dimensions of the calculated rectangle for the industrial site were 10,000 x 10,000 m, based on the space occupied by the facilities of the production site and the nature of the placement of the isolines, the grid step was taken 500 m.

Adverse wind directions (hail) and wind speeds (m/s) are determined at each search node.

Meteorological characteristics and coefficients, that determine the conditions for dispersion of pollutants in the atmosphere: the sedimentation coefficient of the impurity for solids, the coefficient of stratification of the atmosphere, terrain relief coefficient.

The results of the calculations were carried out at dangerous average weighted wind speeds with a step of searching directions of 10 degrees.

The calculation of dispersion includes substances for which the the following inequality is satisfied [6]:

$$\mathbf{M / MPC\ one\ time\ concentration > F}$$
$$\mathbf{F = 0.01xH \quad at\ H > 10\ m}$$
$$\mathbf{F = 0.1 \quad at\ H < 10m}$$

where M – the total value of the emissions from all sources of the company, corresponding to the most unfavorable of the established conditions of release, g/c;

MPC one time concentration – max. permissible one time concentration, mg/m^3;

H(m) – company average weighted height of emission sources [6, p.7.8] is defined by formula:

$$\mathbf{H\ (m) = (5*M_{(0\text{-}10)} + 15*M_{(11\text{-}20)} + 25*M_{(21\text{-}30)} + \ldots.) / M_i\ ,\ m}$$
$$\mathbf{Mi = M_{(0\text{-}10)} + M_{(11\text{-}20)} + M_{(21\text{-}30)} + \ldots..}$$

Mi – total emissions of the i- substance in the ranges of sources heights up to 10 meters inclusive, 11-20m, 21-30m, etc.

The calculation results are summarized in the Table “The necessity of surface concentrations calculations”.

The calculation of surface concentrations of pollutants was carried out without taking into account background concentrations, due to the fact that there is no monitoring of the state of air pollution in the Aktogay deposit area.

Due to the large remoteness of the nearest settlements from the designed plant the calculation of dispersion in the residential area was not carried out.

Analysis of the results of calculations of the dispersion of pollutants in the atmosphere in the zone of influence of the designed and existing concentrtator showed that exceedances of maximum permissible one time concentration on the border of the SPZ for all considered ingredients and groups of summations is not available.

A certificate confirming the absence of observation posts was issued by Republican State Enterprise on the Right of Economic Use Kazhidromet (Appendix 5). In addition, according to the letter of the Committee for Environmental Regulation and Control of the Ministry of Environmental Protection of the Republic of Kazakhstan, in case of absence of observation posts in thy settlement, background concentrations are accepted according to RD 52.04.186-89 for the following substances: dust, sulfur dioxide, nitrogen dioxide, carbon monoxide. With a population of less than 10 thousand people, background concentration is equal to 0.

The calculation of the level of air pollution was made in accordance with the methodology for calculating concentrations of harmful substances in the atmospheric air from emissions of enterprises (approved by Order of the Minister of Environmental Protection of RK dated April 18, 2008 No. 100-P.). The distribution of contaminants at the site is shown in Appendix 14 as maps of isolines of pollutants concentrations.

The results of calculations of surface concentrations at the SPZ boundary are given in table 3.5.

Emission standards for a Sulphide Concentrator operation are proposed to be set for the next 6.5 years of work for the period 2022–2028. The standards are set excluding emissions from motor-and-tractor equipment, since, according to Article 28 of the Environmental Code of the Republic of Kazakhstan, emissions from mobile sources of pollution are not taken into account in standardization works. Payment for pollutant emissions from vehicles is made on actual fuel consumption.

Table 3.6. shows emission standards for pollutants from designed extension of Aktogay Sulphide Concentrator.

3.1.4.2 Justification for the size of the sanitary protection zone

"Sanitary-epidemiological requirements for the establishment of a sanitary protection zone for production facilities", approved by Decree No. 237 of the Government of the Republic of Kazakhstan on March 20, 2015.

The criterion for determining the size of the SPZ is correspondence at its outer boundary and outside SPZ of pollutant concentrations, the MPC and /or the maximum permissible level of physical exposure to atmospheric air in populated areas.

The construction period on the territory of the second concentration plant is short, emission sources are not stationary, episodic. In this regard, for the period of construction work according to the rules "Sanitary and epidemiological requirements for the establishment of a sanitary protection zone for industrial facilities" No. 237 dated March 22, 2015, the class of facilities as per to sanitary classification is not classified, the size of the sanitary protection zone is not set.

During the operation period,for the facilities which have negative impact on the environment and human health, the following dimensions of the SPZ are established depending on the hazard class of the company:

1) hazard class I facilities with a SPZ of 1000 m and more;
2) hazard class II facilities with a SPZ from 500 m to 999 m;
3) hazard class III facilities with a SPZ from 300 m to 499 m;
4) hazard class IV facilities with a SPZ from 100 m to 299 m;
5) hazard class V facilities with a SPZ from 50 m to 99 m.

According to sanitary regulations and standards "Sanitary and epidemiological requirements for the establishment of a sanitary protection zone for industrial facilities" (approved by the Decree No. 237 of the Government of the Republic of Kazakhstan on March 20, 2015, paragraph 3, subparagraph 13.1) the facilities of the designed second Concentrator are:

- ore stockpiles – not less than 500 m (hazard class II);
- concentrators that use jigging - not less than 500 m (hazard class II);
- facilities for maintenance of equipment – not less than 300 m (hazard class III).

The performed dispersion calculations showed that surface concentrations for all pollutants and groups of summations at the SPZ border (500 m from sources of pollution) will not exceed the sanitary norms.

According to the "Sanitary and Epidemiological Requirements for the Establishment of the Sanitary Protection Zone for Production Facilities" approved by Decree No. 237 of the Government of the Republic of Kazakhstan dated March 20, 2015, the facilities for expansion of Aktogay Sulphide Concentrator are classified as hazard class II with the SPZ of 500 m.

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Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay»

Код загр. веще-ства	Наименование Вещества	ПДК максим. разовая, мг/м3	ПДК Средне-суточная, мг/м3	ОБУВ ориентир. безопасн. УВ,мг/м3	Выброс Вещества г/с	Средневзве-шенная высота, м	М/(ПДК*Н) для Н>10 М/ПДК для Н<10	Примечание
1	2	3	4	5	6	7	8	9
0008	Взвешенные частицы PM10 (117)	0.3	0.06		0.0052	12.0000	0.0014	-
0123	Железо (II, III) оксиды (диЖелезо триоксид, Железа оксид) /в пересчете на железо/ (274)		0.04		0.031	17.3677	0.0045	-
0128	Кальций оксид (Негашеная известь) (635*)			0.3	0.0068	20.9059	0.0011	-
0143	Марганец и его соединения /в пересчете на марганца (IV) оксид/ (327)	0.01	0.001		0.0039	17.3846	0.0224	Расчет
0150	Натрий гидроксид (Натр едкий, Сода каустическая) (876*)			0.01	0.000396	6.5000	0.0396	-
0155	диНатрий карбонат (Сода кальцинированная, Натрий карбонат) (408)	0.15	0.05		0.006518	14.9765	0.0029	-
0203	Хром /в пересчете на хром (VI) оксид/ (Хром шестивалентный) (647)		0.0015		0.000006	6.5000	0.0004	-
0304	Азот (II) оксид (Азота оксид) (6)	0.4	0.06		5.7061	7.9536	14.2653	Расчет
0328	Углерод (Сажа, Углерод черный) (583)	0.15	0.05		1.6113	5.5956	10.742	Расчет
0334	Сероуглерод (519)	0.03	0.005		0.0031005	35.3193	0.0029	-
0337	Углерод оксид (Окись углерода, Угарный газ) (584)	5	3		20.3663003	6.6788	4.0733	Расчет
0415	Смесь углеводородов предельных С1-С5 (1502*)			50	34.91359	2.9687	0.6983	Расчет
0416	Смесь углеводородов предельных С6-С10 (1503*)			30	12.90365	2.9687	0.4301	Расчет
0501	Пентилены (амилены - смесь изомеров) (460)	1.5			1.28988	2.9687	0.8599	Расчет
0602	Бензол (64)	0.3	0.1		1.18669	2.9687	3.9556	Расчет
0616	Диметилбензол (смесь о-, м-, п- изомеров) (203)	0.2			0.14964	2.9687	0.7482	Расчет
0621	Метилбензол (349)	0.6			1.11955	2.9687	1.8659	Расчет
0627	Этилбензол (675)	0.02			0.04893	2.4289	2.4465	Расчет
0703	Бенз/а/пирен (3,4-Бензпирен) (54)		0.000001		0.000016	3.1250	1.6	Расчет

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Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay»

Код загр. веще-ства	Наименование Вещества	ПДК максим. разовая, мг/м3	ПДК Средне-суточная, мг/м3	ОБУВ ориентир. безопасн. УВ,мг/м3	Выброс Вещества г/с	Средневзве-шенная высота, м	М/(ПДК*Н) для Н>10 М/ПДК для Н<10	Примечание
1	2	3	4	5	6	7	8	9
1048	2-Метилпропан-1-ол (Изобутиловый спирт) (383)	0.1			0.0053	22.9245	0.0023	-
1051	Пропан-2-ол (Изопропиловый спирт) (469)	0.6			0.0043	24.7674	0.0003	-
2704	Бензин (нефтяной, малосернистый) /в пересчете на углерод/ (60)	5	1.5		1.7258	7.3746	0.3452	Расчет
2732	Керосин (654*)			1.2	3.1251	8.4394	2.6043	Расчет
2735	Масло минеральное нефтяное (веретенное, машинное, цилиндровое и др.) (716*)			0.05	0.53274	16.2059	0.6575	Расчет
2736	Масло сосновое флотационное (МСФ) (717*)			1	0.004	36.0000	0.0001	-
2754	Алканы С12-19 /в пересчете на С/ (Углеводороды предельные С12-С19 (в пересчете на С); Растворитель РПК-265П) (10)	1			0.83023	13.1075	0.0633	Расчет
2902	Взвешенные частицы (116)	0.5	0.15		0.0198	17.8828	0.0022	-
2908	Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент, пыль цементного производства – глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494)	0.3	0.1		3.74746	5.9799	12.4915	Расчет
2909	Пыль неорганическая, содержащая двуокись кремния в %: менее 20 (доломит, пыль цементного производства – известняк, мел, огарки, сырьевая смесь, пыль вращающихся печей, боксит) (495*)	0.5	0.15		0.000002	2.0000	0.000004	-
2930	Пыль абразивная (Корунд белый, Монокорунд) (1027*)			0.04	0.0156	16.6974	0.0234	Расчет
2936	Пыль древесная (1039*)			0.1	1.989	12.5000	1.5912	Расчет
2978	Пыль тонко измельченного резинового вулканизата из отходов подошвенных резин (1090*)			0.1	0.0678	15.0000	0.0452	Расчет

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Код загр. веще-ства	Наименование Вещества	ПДК максим. разовая, мг/м3	ПДК Средне-суточная, мг/м3	ОБУВ ориентир. безопасн. УВ,мг/м3	Выброс Вещества г/с	Средневзве-шенная высота, м	М/(ПДК*Н) для Н>10 М/ПДК для Н<10	Примечание
1	2	3	4	5	6	7	8	9
2985	Полиакриламид анионный АК-618 (АК-618) (964*)			0.25	0.0007	36.0000	0.000077778	-
	Вещества, обладающие эффектом суммарного вредного воздействия							
0301	Азота (IV) диоксид (Азота диоксид) (4)	0.2	0.04		5.2214	7.7373	26.107	Расчет
0302	Азотная кислота (5)	0.4	0.15		0.0035	6.5000	0.0087	-
0303	Аммиак (32)	0.2	0.04		0.0012	6.5000	0.006	-
0316	Гидрохлорид (Соляная кислота, Водород хлорид) (163)	0.2	0.1		0.000732	6.5000	0.0037	-
0322	Серная кислота (517)	0.3	0.1		6.000037	5.0001	20.0001	Расчет
0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)	0.5	0.05		2.66870009	6.3285	5.3374	Расчет
0333	Сероводород (Дигидросульфид) (518)	0.008			0.005582	32.6353	0.0214	Расчет
0342	Фтористые газообразные соединения /в пересчете на фтор/ (617)	0.02	0.005		0.0019	17.4947	0.0054	-
0344	Фториды неорганические плохо растворимые - (алюминия фторид, кальция фторид, натрия гексафторалюминат) (Фториды неорганические плохо растворимые /в пересчете на фтор/) (615)	0.2	0.03		0.0015	17.7333	0.0004	-

Примечание. 1. Необходимость расчетов концентраций определяется согласно п.5.21 ОНД-86.Средневзвешенная высота ИЗА определяется по стандартной формуле: Сумма(Hi*Mi)/Сумма(Mi), где Hi – фактическая высота ИЗА, Mi – выброс ЗВ, г/с
2. При отсутствии ПДКм.р. берется ОБУВ, при отсутствии ОБУВ – 10*ПДКс.с.

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Код загр. веще-ства	Наименование Вещества	ПДК максим. разовая, мг/м3	ПДК Средне-суточная, мг/м3	ОБУВ ориентир. безопасн. УВ,мг/м3	Выброс Вещества г/с	Средневзве-шенная высота, м	М/(ПДК*Н) для Н>10 М/ПДК для Н<10	Примечание
1	2	3	4	5	6	7	8	9
0008	Взвешенные частицы PM10 (117)	0.3	0.06		0.0052	12.0000	0.0014	-
0101	Алюминий оксид (диАлюминий триоксид) /в пересчете на алюминий/ (20)		0.01		0.167000926	4.4652	1.67	Расчет
0123	Железо (II, III) оксиды (диЖелезо триоксид, Железа оксид) /в пересчете на железо/ (274)		0.04		0.15323578	8.9760	0.3831	Расчет
0128	Кальций оксид (Негашеная известь) (635*)			0.3	0.075571846	5.9460	0.2519	Расчет
0143	Марганец и его соединения /в пересчете на марганца (IV) оксид/ (327)	0.01	0.001		0.0069	17.0435	0.0405	Расчет
0150	Натрий гидроксид (Натр едкий, Сода каустическая) (876*)			0.01	0.000396	6.5000	0.0396	-
0155	диНатрий карбонат (Сода кальцинированная, Натрий карбонат) (408)	0.15	0.05		0.013018	14.9882	0.0058	-
0203	Хром /в пересчете на хром (VI) оксид/ (Хром шестивалентный) (647)		0.0015		0.000006	6.5000	0.0004	-
0304	Азот (II) оксид (Азота оксид) (6)	0.4	0.06		5.8099	7.8829	14.5248	Расчет
0328	Углерод (Сажа, Углерод черный) (583)	0.15	0.05		1.7166	5.4914	11.444	Расчет
0334	Сероуглерод (519)	0.03	0.005		0.0062025	35.3144	0.0059	-
0337	Углерод оксид (Окись углерода, Угарный газ) (584)	5	3		27.4401003	6.2296	5.488	Расчет
0415	Смесь углеводородов предельных С1-С5 (1502*)			50	34.91359	2.9687	0.6983	Расчет
0416	Смесь углеводородов предельных С6-С10 (1503*)			30	12.90365	2.9687	0.4301	Расчет
0501	Пентилены (амилены - смесь изомеров) (460)	1.5			1.28988	2.9687	0.8599	Расчет
0602	Бензол (64)	0.3	0.1		1.18669	2.9687	3.9556	Расчет
0616	Диметилбензол (смесь о-, м-, п- изомеров) (203)	0.2			0.14964	2.9687	0.7482	Расчет
0621	Метилбензол (349)	0.6			1.11955	2.9687	1.8659	Расчет

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1	2	3	4	5	6	7	8	9
0627	Этилбензол (675)	0.02			0.04893	2.4289	2.4465	Расчет
0703	Бенз/а/пирен (3,4-Бензпирен) (54)		0.000001		0.000016	3.1250	1.6	Расчет
1048	2-Метилпропан-1-ол (Изобутиловый спирт) (383)	0.1			0.0106	22.9245	0.0046	-
1051	Пропан-2-ол (Изопропиловый спирт) (469)	0.6			0.0086	24.7674	0.0006	-
2704	Бензин (нефтяной, малосернистый) /в пересчете на углерод/ (60)	5	1.5		2.6742	6.5086	0.5348	Расчет
2732	Керосин (654*)			1.2	4.6668	8.7856	3.889	Расчет
2735	Масло минеральное нефтяное (веретенное, машинное, цилиндровое и др.) (716*)			0.05	0.70074	16.3004	0.8598	Расчет
2736	Масло сосновое флотационное (МСФ) (717*)			1	0.008	36.0000	0.0002	-
2754	Алканы С12-19 /в пересчете на С/ (Углеводороды предельные С12-С19 (в пересчете на С); Растворитель РПК-265П) (10)	1			0.83023	13.1075	0.0633	Расчет
2902	Взвешенные частицы (116)	0.5	0.15		0.0302	18.3364	0.0033	-
2908	Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент, пыль цементного производства - глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494)	0.3	0.1		4.797716448	5.4448	15.9924	Расчет
2909	Пыль неорганическая, содержащая двуокись кремния в %: менее 20 (доломит, пыль цементного производства - известняк, мел, огарки, сырьевая смесь, пыль вращающихся печей, боксит) (495*)	0.5	0.15		0.000002	2.0000	0.000004	-
2930	Пыль абразивная (Корунд белый, Монокорунд) (1027*)			0.04	0.022	17.4255	0.0316	Расчет
2936	Пыль древесная (1039*)			0.1	1.989	12.5000	1.5912	Расчет
2978	Пыль тонко измельченного резинового			0.1	0.0678	15.0000	0.0452	Расчет

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1	2	3	4	5	6	7	8	9
	вулканизата из отходов подошвенных резин (1090*)							
2985	Полиакриламид анионный АК-618 (АК-618) (964*)			0.25	0.0014	36.0000	0.0002	-
	Вещества, обладающие эффектом суммарного вредного воздействия							
0301	Азота (IV) диоксид (Азота диоксид) (4)	0.2	0.04		5.8697	7.3499	29.3485	Расчет
0302	Азотная кислота (5)	0.4	0.15		0.0035	6.5000	0.0087	-
0303	Аммиак (32)	0.2	0.04		0.0012	6.5000	0.006	-
0316	Гидрохлорид (Соляная кислота, Водород хлорид) (163)	0.2	0.1		0.000732	6.5000	0.0037	-
0322	Серная кислота (517)	0.3	0.1		6.000037	5.0001	20.0001	Расчет
0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)	0.5	0.05		2.75920009	6.2494	5.5184	Расчет
0333	Сероводород (Дигидросульфид) (518)	0.008			0.010594	34.2033	0.0387	Расчет
0342	Фтористые газообразные соединения /в пересчете на фтор/ (617)	0.02	0.005		0.0033	17.1152	0.0096	-
0344	Фториды неорганические плохо растворимые - (алюминия фторид, кальция фторид, натрия гексафторалюминат) (Фториды неорганические плохо растворимые /в пересчете на фтор/) (615)	0.2	0.03		0.0025	17.2800	0.0007	-

Примечание. 1. Необходимость расчетов концентраций определяется согласно п.5.21 ОНД-86.Средневзвешенная высота ИЗА определяется по стандартной формуле: Сумма(Hi*Mi)/Сумма(Mi), где Hi – фактическая высота ИЗА, Mi – выброс ЗВ, г/с
2. При отсутствии ПДКм.р. берется ОБУВ, при отсутствии ОБУВ – 10*ПДКс.с.

ЭРА v2.5 ТОО «TITECO» Таблица 3.5

Перечень источников, дающих наибольшие вклады в уровень загрязнения

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – расчет рассеивания)

Код вещества / группы суммации	Наименование вещества	Расчетная максимальная приземная концентрация (общая и без учета фона) доля ПДК / мг/м3		Координаты точек с максимальной приземной конц.		Источники, дающие наибольший вклад в Макс. Концентрацию			Принадлежность источника (производство, цех, участок)
		в жилой зоне	на границе санитарно - Защитной зоны	в жилой зоне X/Y	на границе СЗЗ X/Y	N ист.	% вклада ЖЗ	% вклада СЗЗ	
1	2	3	4	5	6	7	8	9	10
1. Существующее положение З а г р я з н я ю щ и е в е щ е с т в а :									
0123	Железо (II, III) оксиды (диЖелезо триоксид, Железа оксид) /в пересчете на железо/ (274)		0.00107/0.00043		1189/ 3437	0056		64.7	Существующая ОФ
						0021		13.1	Существующая ОФ
0128	Кальций оксид (Негашеная известь) (635*)		0.010815/0.0032445		*/*	0005		58.8	Существующая ОФ
						0004		41.1	Существующая ОФ
0143	Марганец и его соединения /в пересчете на марганца (IV) оксид/ (327)		0.00545/0.00005		1189/ 3437	0056		65.1	Существующая ОФ
						0021		13.2	Существующая ОФ
0301	Азота (IV) диоксид (Азота диоксид) (4)		0.56616/0.11323		238/2360	6014		31.7	Существующая ОФ
						0034		22.1	Существующая ОФ
0304	Азот (II) оксид (Азота оксид) (6)		0.28468/0.11387		-396/ 1642	0034		33.5	Существующая ОФ
						0033		33.4	Существующая ОФ
0322	Серная кислота (517)		0.58682/0.17605		7637/ 1191	6001		100	Существующая ОФ
0328	Углерод (Сажа, Углерод черный) (583)		0.36398/0.0546		-79/2001	6014		98.6	Существующая ОФ

ЭРА v2.5 ТОО «TITECO» Таблица 3.5

Перечень источников, дающих наибольшие вклады в уровень загрязнения

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – расчет рассеивания)

Код вещества / группы суммации	Наименование вещества	Расчетная максимальная приземная концентрация (общая и без учета фона) доля ПДК / мг/м3		Координаты точек с максимальной приземной конц.		Источники, дающие наибольший вклад в Макс. Концентрацию			Принадлежность источника (производство, цех, участок)
		в жилой зоне	на границе санитарно - Защитной зоны	в жилой зоне X/Y	на границе СЗЗ X/Y	N ист.	% вклада ЖЗ	% вклада СЗЗ	
1	2	3	4	5	6	7	8	9	10
0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)		0.27614/0.13807		-79/2001	6014		89	Существующая ОФ
						6004		6.1	Существующая ОФ
0333	Сероводород (Дигидросульфид) (518)		0.00613/0.00005		238/2360	0003		66.8	Существующая ОФ
						0049		10	Существующая ОФ
0334	Сероуглерод (519)		0.003661/0.00010983		*/*	0003		70.2	Существующая ОФ
						0006		9.8	Существующая ОФ
0337	Углерод оксид (Окись углерода, Угарный газ) (584)		0.1573/0.78649		-79/2001	6014		76.9	Существующая ОФ
						6009		10.3	Существующая ОФ
0415	Смесь углеводородов предельных С1-С5 (1502*)		0.02607/1.30335		238/2360	0050		25.6	Существующая ОФ
						0048		21.6	Существующая ОФ
0416	Смесь углеводородов предельных С6-С10 (1503*)		0.01606/0.4817		238/2360	0050		25.6	Существующая ОФ
						0048		21.6	Существующая ОФ
0501	Пентилены (амилены - смесь изомеров) (460)		0.0321/0.04815		238/2360	0050		25.6	Существующая ОФ
						0048		21.6	Существующая ОФ
0602	Бензол (64)		0.14767/0.0443		238/2360	0050		25.6	Существующая ОФ

ЭРА v2.5 ТОО «TITECO» Таблица 3.5

Перечень источников, дающих наибольшие вклады в уровень загрязнения

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – расчет рассеивания)

Код вещества / группы суммации	Наименование вещества	Расчетная максимальная приземная концентрация (общая и без учета фона) доля ПДК / мг/м3		Координаты точек с максимальной приземной конц.		Источники, дающие наибольший вклад в Макс. Концентрацию			Принадлежность источника (производство, цех, участок)
		в жилой зоне	на границе санитарно - Защитной зоны	в жилой зоне X/Y	на границе СЗЗ X/Y	N ист.	% вклада ЖЗ	% вклада СЗЗ	
1	2	3	4	5	6	7	8	9	10
0616	Диметилбензол (смесь о-, м-, п- изомеров) (203)		0.02793/0.00559		238/2360	0048 0050		21.6 25.6	Существующая ОФ Существующая ОФ
0621	Метилбензол (349)		0.06966/0.04179		238/2360	0048 0050		21.6 25.6	Существующая ОФ Существующая ОФ
0627	Этилбензол (675)		0.15206/0.00304		238/2360	0048 0044		21.6 70.3	Существующая ОФ Существующая ОФ
0703	Бенз/а/пирен (3,4-Бензпирен) (54)		0.10695/1.0695e-6		-79/2001	0050 6014		9.8 99.1	Существующая ОФ Существующая ОФ
2704	Бензин (нефтяной, малосернистый) /в пересчете на углерод/ (60)		0.01508/0.07538		238/2360	6011		100	Существующая ОФ
2732	Керосин (654*)		0.17449/0.20938		-79/2001	6014		87.7	Существующая ОФ
2735	Масло минеральное нефтяное (веретенное, машинное, цилиндровое и др.) (716*)		0.12522/0.00626		1189/ 3437	6004 0053		6.4 50.5	Существующая ОФ Существующая ОФ
2754	Алканы С12-19 /в пересчете на С/ (Углеводороды		0.01424/0.01424		1189/ 3437	0025 0053		18.5 83.2	Существующая ОФ Существующая ОФ

ЭРА v2.5 ТОО «TITECO» Таблица 3.5

Перечень источников, дающих наибольшие вклады в уровень загрязнения

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – расчет рассеивания)

Код вещества / группы суммации	Наименование вещества	Расчетная максимальная приземная концентрация (общая и без учета фона) доля ПДК / мг/м3		Координаты точек с максимальной приземной конц.		Источники, дающие наибольший вклад в Макс. Концентрацию			Принадлежность источника (производство, цех, участок)
		в жилой зоне	на границе санитарно - Защитной зоны	в жилой зоне X/Y	на границе СЗЗ X/Y	N ист.	% вклада		
							ЖЗ	СЗЗ	
1	2	3	4	5	6	7	8	9	10
	предельные С12-С19 (в пересчете на С); Растворитель РПК-265П) (10)								
						0025		8.3	Существующая ОФ
2908	Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент, пыль цементного производства – глина, глинистый сланец, доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494)		0.21898/0.06569		238/2360	6002		94.7	Существующая ОФ
						6003		2.9	Существующая ОФ
2930	Пыль абразивная (Корунд белый, Монокорунд) (1027*)		0.0035/0.00014		-396/ 1642	0030		55.5	Существующая ОФ
						0031		44.5	Существующая ОФ
2936	Пыль древесная (1039*)		0.51469/0.05147		872/3078	0057		100	Существующая ОФ
2978	Пыль тонко измельченного резинового вулканизата из отходов подошвенных		0.01239/0.00124		872/3078	6012		66.3	Существующая ОФ

ЭРА v2.5 ТОО «TITECO» Таблица 3.5

Перечень источников, дающих наибольшие вклады в уровень загрязнения

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – расчет рассеивания)

Код вещества / группы суммации	Наименование вещества	Расчетная максимальная приземная концентрация (общая и без учета фона) доля ПДК / мг/м3		Координаты точек с максимальной приземной конц.		Источники, дающие наибольший вклад в Макс. Концентрацию			Принадлежность источника (производство, цех, участок)
		в жилой зоне	на границе санитарно - Защитной зоны	в жилой зоне X/Y	на границе СЗЗ X/Y	N ист.	% вклада		
							ЖЗ	СЗЗ	
1	2	3	4	5	6	7	8	9	10
	резин (1090*)					0021		16.9	Существующая ОФ
	Группы веществ, обладающих эффектом комбинированного вредного действия								
03 0303	Аммиак (32)		0.00616		238/2360	0003		66.4	Существующая ОФ
0333	Сероводород (Дигидросульфид) (518)					0049		10	Существующая ОФ
28 0322	Серная кислота (517)		0.59323		7637/ 1191	6001		98.9	Существующая ОФ
0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)								
30 0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)		0.27982		-79/2001	6014		87.8	Существующая ОФ
0333	Сероводород (Дигидросульфид) (518)					6004		6	Существующая ОФ
31 0301	Азота (IV) диоксид (Азота диоксид) (4)		0.7975		238/2360	6014		45.3	Существующая ОФ
0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)					0034		17.7	Существующая ОФ
35 0330	Сера диоксид (Ангидрид		0.27622		-79/2001	6014		89	Существующая ОФ

ЭРА v2.5 ТОО «TITECO» Таблица 3.5

Перечень источников, дающих наибольшие вклады в уровень загрязнения

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – расчет рассеивания)

Код вещества / группы суммации	Наименование вещества	Расчетная максимальная приземная концентрация (общая и без учета фона) доля ПДК / мг/м3		Координаты точек с максимальной приземной конц.		Источники, дающие наибольший вклад в Макс. Концентрацию			Принадлежность источника (производство, цех, участок)
		в жилой зоне	на границе санитарно - Защитной зоны	в жилой зоне X/Y	на границе СЗЗ X/Y	N ист.	% вклада		
							ЖЗ	СЗЗ	
1	2	3	4	5	6	7	8	9	10
	сернистый, Сернистый газ, Сера (IV) оксид) (516)								
0342	Фтористые газообразные соединения /в пересчете на фтор/ (617)					6004		6.1	Существующая ОФ
40 0302	Азотная кислота (5)		0.58684		7637/ 1191	6001		100	Существующая ОФ
0316	Гидрохлорид (Соляная кислота, Водород хлорид) (163)								
0322	Серная кислота (517)								
	2. Перспектива (начало 2022 года)								
	З а г р я з н я ю щ и е в е щ е с т в а :								
0008	Взвешенные частицы PM10 (117)		0.028391/0.0085173		*/*	0030		100	Существующая ОФ
0101	Алюминий оксид (диАлюминий триоксид) / в пересчете на алюминий/ (20)		0.02111/0.00211		5097/ 3049	6017		97.9	Комплекс дробления руды
0123	Железо (II, III) оксиды (диЖелезо триоксид, Железа оксид) /в пересчете на железо/ (274)		0.00315/0.00126		5097/ 3049	6017		96.5	Комплекс дробления руды
0128	Кальций оксид (		0.0029/0.00087		5097/	6017		97.9	Комплекс

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Перечень источников, дающих наибольшие вклады в уровень загрязнения

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Код вещества / группы суммации	Наименование вещества	Расчетная максимальная приземная концентрация (общая и без учета фона) доля ПДК / мг/м3		Координаты точек с максимальной приземной конц.		Источники, дающие наибольший вклад в Макс. Концентрацию			Принадлежность источника (производство, цех, участок)
		в жилой зоне	на границе санитарно - Защитной зоны	в жилой зоне X/Y	на границе СЗЗ X/Y	N ист.	% вклада		
							ЖЗ	СЗЗ	
1	2	3	4	5	6	7	8	9	10
	Негашеная известь) (635*)				3049				дробления руды
0143	Марганец и его соединения /в пересчете на марганца (IV) оксид/ (327)		0.0055/0.00006		1189/ 3437	0056		64.5	Существующая ОФ
						0021		13	Существующая ОФ
0150	Натрий гидроксид (Натр едкий, Сода каустическая) (876*)		0.00084/8.383e-6		-79/2001	0015		33.7	Существующая ОФ
						0014		33.6	Существующая ОФ
0155	диНатрий карбонат (Сода кальцинированная, Натрий карбонат) (408)		0.0006/0.00009		-79/2001	0009		99.8	Существующая ОФ
0203	Хром /в пересчете на хром (VI) оксид/ (Хром шестивалентный) (647)		0.002739/0.00004109		*/*	0016		50	Существующая ОФ
						0017		50	Существующая ОФ
0301	Азота (IV) диоксид (Азота диоксид) (4)		0.56619/0.11324		238/2360	6014		31.7	Существующая ОФ
						0034		22.1	Существующая ОФ
0302	Азотная кислота (5)		0.019975/0.00799		*/*	0011		14.3	Существующая ОФ
						0012		14.3	Существующая ОФ
0303	Аммиак (32)		0.013697/0.0027394		*/*	0011		33.3	Существующая ОФ
						0016		33.3	Существующая ОФ
0304	Азот (II) оксид (Азота		0.28484/0.11394		-396/	0034		33.4	Существующая ОФ

ЭРА v2.5 ТОО «TITECO» Таблица 3.5

Перечень источников, дающих наибольшие вклады в уровень загрязнения

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – расчет рассеивания)

Код вещества / группы суммации	Наименование вещества	Расчетная максимальная приземная концентрация (общая и без учета фона) доля ПДК / мг/м3		Координаты точек с максимальной приземной конц.		Источники, дающие наибольший вклад в Макс. Концентрацию			Принадлежность источника (производство, цех, участок)
		в жилой зоне	на границе санитарно - Защитной зоны	в жилой зоне X/Y	на границе СЗЗ X/Y	N ист.	% вклада		
							ЖЗ	СЗЗ	
1	2	3	4	5	6	7	8	9	10
	оксид) (6)				1642				
						0033		33.4	Существующая ОФ
0316	Гидрохлорид (Соляная кислота, Водород хлорид) (163)		0.008355/0.001671		*/*	0011		18	Существующая ОФ
						0012		18	Существующая ОФ
0322	Серная кислота (517)		0.58682/0.17605		7637/ 1191	6001		100	Существующая ОФ
0328	Углерод (Сажа, Углерод черный) (583)		0.36422/0.05463		-79/2001	6014		98.6	Существующая ОФ
0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)		0.27628/0.13814		-79/2001	6014		88.9	Существующая ОФ
						6004		6.1	Существующая ОФ
0333	Сероводород (Дигидросульфид) (518)		0.00628/0.00005		238/2360	0003		63.2	Существующая ОФ
						0049		10.1	Существующая ОФ
0334	Сероуглерод (519)		0.007339/0.00022017		*/*	0003		35	Существующая ОФ
						0060		35	Участок дробления рудной гали
0337	Углерод оксид (Окись углерода, Угарный газ) (584)		0.15809/0.79045		-79/2001	6014		76.5	Существующая ОФ
						6009		10.2	Существующая ОФ
0342	Фтористые газообразные		0.043582/0.00087164		*/*	0072		21.8	Блок

ЭРА v2.5 ТОО «TITECO» Таблица 3.5

Перечень источников, дающих наибольшие вклады в уровень загрязнения

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – расчет рассеивания)

Код вещества / группы суммации	Наименование вещества	Расчетная максимальная приземная концентрация (общая и без учета фона) доля ПДК / мг/м3		Координаты точек с максимальной приземной конц.		Источники, дающие наибольший вклад в Макс. Концентрацию			Принадлежность источника (производство, цех, участок)
		в жилой зоне	на границе санитарно - Защитной зоны	в жилой зоне X/Y	на границе СЗЗ X/Y	N ист.	% вклада		
							ЖЗ	СЗЗ	
1	2	3	4	5	6	7	8	9	10
	соединения /в пересчете на фтор/ (617)								центрального ремонта
						0056		21.8	Существующая ОФ
0344	Фториды неорганические плохо растворимые – (алюминия фторид, кальция фторид, натрия гексафторалюминат) (Фториды неорганические плохо растворимые /в пересчете на фтор/) (615)		0.009694/0.0019388		*/*	0072		29.4	Блок центрального ремонта
						0056		29.4	Существующая ОФ
0415	Смесь углеводородов предельных С1-С5 (1502*)		0.02607/1.30335		238/2360	0050		25.6	Существующая ОФ
						0048		21.6	Существующая ОФ
0416	Смесь углеводородов предельных С6-С10 (1503*)		0.01606/0.4817		238/2360	0050		25.6	Существующая ОФ
						0048		21.6	Существующая ОФ
0501	Пентилены (амилены - смесь изомеров) (460)		0.0321/0.04815		238/2360	0050		25.6	Существующая ОФ
						0048		21.6	Существующая ОФ
0602	Бензол (64)		0.14767/0.0443		238/2360	0050		25.6	Существующая ОФ
						0048		21.6	Существующая ОФ

ЭРА v2.5 ТОО «TITECO» Таблица 3.5

Перечень источников, дающих наибольшие вклады в уровень загрязнения

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – расчет рассеивания)

Код вещества / группы суммации	Наименование вещества	Расчетная максимальная приземная концентрация (общая и без учета фона) доля ПДК / мг/м3		Координаты точек с максимальной приземной конц.		Источники, дающие наибольший вклад в Макс. Концентрацию			Принадлежность источника (производство, цех, участок)
		в жилой зоне	на границе санитарно - Защитной зоны	в жилой зоне X/Y	на границе СЗЗ X/Y	N ист.	% вклада		
							ЖЗ	СЗЗ	
1	2	3	4	5	6	7	8	9	10
0616	Диметилбензол (смесь о-, м-, п- изомеров) (203)		0.02793/0.00559		238/2360	0050		25.6	Существующая ОФ
						0048		21.6	Существующая ОФ
0621	Метилбензол (349)		0.06966/0.04179		238/2360	0050		25.6	Существующая ОФ
						0048		21.6	Существующая ОФ
0627	Этилбензол (675)		0.15206/0.00304		238/2360	0044		70.3	Существующая ОФ
						0050		9.8	Существующая ОФ
0703	Бенз/а/пирен (3,4-Бензпирен) (54)		0.10695/1.0695e-6		-79/2001	6014		99.1	Существующая ОФ
1048	2-Метилпропан-1-ол (Изобутиловый спирт) (383)		0.022439/0.0022439		*/*	0064		18.8	Главный корпус
						0007		18.8	Существующая ОФ
1051	Пропан-2-ол (Изопропиловый спирт) (469)		0.002659/0.0015954		*/*	0007		26.3	Существующая ОФ
						0064		26.3	Главный корпус
2704	Бензин (нефтяной, малосернистый) /в пересчете на углерод/ (60)		0.01508/0.07538		238/2360	6011		100	Существующая ОФ
2732	Керосин (654*)		0.1758/0.21096		-79/2001	6014		87	Существующая ОФ
						6004		6.4	Существующая ОФ
2735	Масло минеральное		0.12522/0.00626		1189/	0053		50.5	Существующая ОФ

ЭРА v2.5 ТОО «TITECO» Таблица 3.5

Перечень источников, дающих наибольшие вклады в уровень загрязнения

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – расчет рассеивания)

Код вещества / группы суммации	Наименование вещества	Расчетная максимальная приземная концентрация (общая и без учета фона) доля ПДК / мг/м3		Координаты точек с максимальной приземной конц.		Источники, дающие наибольший вклад в Макс. Концентрацию			Принадлежность источника (производство, цех, участок)
		в жилой зоне	на границе санитарно - Защитной зоны	в жилой зоне X/Y	на границе СЗЗ X/Y	N ист.	% вклада		
							ЖЗ	СЗЗ	
1	2	3	4	5	6	7	8	9	10
	нефтяное (веретенное, машинное, цилиндровое и др.) (716*)				3437				
						0025		18.5	Существующая ОФ
2736	Масло сосновое флотационное (МСФ) (717*)		0.000206/0.000206		*/*	0003		48.5	Существующая ОФ
						0060		48.5	Участок дробления рудной гали
2754	Алканы С12-19 /в пересчете на С/ (Углеводороды предельные С12-С19 (в пересчете на С); Растворитель РПК-265П) (10)		0.01424/0.01424		1189/ 3437	0053		83.2	Существующая ОФ
						0025		8.3	Существующая ОФ
2902	Взвешенные частицы (116)		0.041688/0.020844		*/*	0031		33	Существующая ОФ
						0019		13.6	Существующая ОФ
2908	Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент, пыль цементного производства – глина, глинистый сланец,		0.22305/0.06692		238/2360	6002		93	Существующая ОФ

ЭРА v2.5 ТОО «TITECO» Таблица 3.5

Перечень источников, дающих наибольшие вклады в уровень загрязнения

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – расчет рассеивания)

Код вещества / группы суммации	Наименование вещества	Расчетная максимальная приземная концентрация (общая и без учета фона) доля ПДК / мг/м3		Координаты точек с максимальной приземной конц.		Источники, дающие наибольший вклад в Макс. Концентрацию			Принадлежность источника (производство, цех, участок)
		в жилой зоне	на границе санитарно - Защитной зоны	в жилой зоне X/Y	на границе СЗЗ X/Y	N ист.	% вклада		
							ЖЗ	СЗЗ	
1	2	3	4	5	6	7	8	9	10
	доменный шлак, песок, клинкер, зола, кремнезем, зола углей казахстанских месторождений) (494)					6003		2.8	Существующая ОФ
2909	Пыль неорганическая, содержащая двуокись кремния в %: менее 20 (доломит, пыль цементного производства - известняк, мел, огарки, сырьевая смесь, пыль вращающихся печей, боксит) (495*)		0.000429/0.0002145		*/*	6005		49	Существующая ОФ
						6013		49	Существующая ОФ
2930	Пыль абразивная (Корунд белый, Монокорунд) (1027*)		0.0035/0.00014		-396/ 1642	0030		55.5	Существующая ОФ
						0031		44.5	Существующая ОФ
2936	Пыль древесная (1039*)		0.51469/0.05147		872/3078	0057		100	Существующая ОФ
2978	Пыль тонко измельченного резинового вулканизата из отходов подошвенных резин (1090*)		0.01239/0.00124		872/3078	6012		66.3	Существующая ОФ

ЭРА v2.5 ТОО «TITECO» Таблица 3.5

Перечень источников, дающих наибольшие вклады в уровень загрязнения

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – расчет рассеивания)

Код вещества / группы суммации	Наименование вещества	Расчетная максимальная приземная концентрация (общая и без учета фона) доля ПДК / мг/м3		Координаты точек с максимальной приземной конц.		Источники, дающие наибольший вклад в Макс. Концентрацию			Принадлежность источника (производство, цех, участок)
		в жилой зоне	на границе санитарно - Защитной зоны	в жилой зоне X/Y	на границе СЗЗ X/Y	N ист.	% вклада ЖЗ	% вклада СЗЗ	
1	2	3	4	5	6	7	8	9	10
						0021		16.9	Существующая ОФ
2985	Полиакриламид анионный АК-618 (АК-618) (964*)		0.000433/0.00010825		*/*	0003		48.5	Существующая ОФ
						0060		48.5	Участок дробления рудной гали
Группы веществ, обладающих эффектом комбинированного вредного действия									
03 0303	Аммиак (32)		0.00631		238/2360	0003		62.8	Существующая ОФ
0333	Сероводород (Дигидросульфид) (518)					0049		10	Существующая ОФ
28 0322	Серная кислота (517)		0.59453		7637/ 1191	6001		98.7	Существующая ОФ
0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)								
30 0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)		0.28004		-79/2001	6014		87.7	Существующая ОФ
0333	Сероводород (Дигидросульфид) (518)					6004		6	Существующая ОФ
31 0301	Азота (IV) диоксид (Азота диоксид) (4)		0.79753		238/2360	6014		45.3	Существующая ОФ
0330	Сера диоксид (Ангидрид					0034		17.7	Существующая ОФ

ЭРА v2.5 ТОО «TITECO» Таблица 3.5

Перечень источников, дающих наибольшие вклады в уровень загрязнения

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – расчет рассеивания)

Код вещества / группы суммации	Наименование вещества	Расчетная максимальная приземная концентрация (общая и без учета фона) доля ПДК / мг/м3		Координаты точек с максимальной приземной конц.		Источники, дающие наибольший вклад в Макс. Концентрацию			Принадлежность источника (производство, цех, участок)
		в жилой зоне	на границе санитарно - Защитной зоны	в жилой зоне X/Y	на границе СЗЗ X/Y	N ист.	% вклада		
							ЖЗ	СЗЗ	
1	2	3	4	5	6	7	8	9	10
	сернистый, Сернистый газ, Сера (IV) оксид) (516)								
35 0330	Сера диоксид (Ангидрид сернистый, Сернистый газ, Сера (IV) оксид) (516)		0.27638		-79/2001	6014		88.9	Существующая ОФ
0342	Фтористые газообразные соединения /в пересчете на фтор/ (617)					6004		6.1	Существующая ОФ
40 0302	Азотная кислота (5)		0.58684		7637/ 1191	6001		100	Существующая ОФ
0316	Гидрохлорид (Соляная кислота, Водород хлорид) (163)								
0322	Серная кислота (517)								
71 0342	Фтористые газообразные соединения /в пересчете на фтор/ (617)		0.00135		1189/ 3437	0056		62.9	Существующая ОФ
0344	Фториды неорганические плохо растворимые – (алюминия фторид, кальция фторид, натрия гексафторалюминат) (Фториды неорганические плохо растворимые /в					0021		16	Существующая ОФ

ЭРА v2.5 ТОО «TITECO» Таблица 3.5

Перечень источников, дающих наибольшие вклады в уровень загрязнения

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – расчет рассеивания)

Код вещества / группы суммации	Наименование вещества	Расчетная максимальная приземная концентрация (общая и без учета фона) доля ПДК / мг/м3		Координаты точек с максимальной приземной конц.		Источники, дающие наибольший вклад в Макс. Концентрацию			Принадлежность источника (производство, цех, участок)
		в жилой зоне	на границе санитарно - Защитной зоны	в жилой зоне X/Y	на границе СЗЗ X/Y	N ист.	% вклада		
							ЖЗ	СЗЗ	
1	2	3	4	5	6	7	8	9	10
	пересчете на фтор/) (615)								
Примечание: X/Y=* * - Расчеты не проводились. Расчетная концентрация принята на уровне максимально возможной (теоретически)									

ЭРА v2.5 ТОО «TITECO» Таблица 3.6

Нормативы выбросов загрязняющих веществ в атмосферу по предприятию

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – нормативы)

Производство цех, участок	Номер источника выброса	Нормативы выбросов загрязняющих веществ						год достижения ПДВ
		существующее положение на 2018 год		на 2022-2028 год		П Д В		
Код и наименование загрязняющего вещества		г/с	т/год	г/с	т/год	г/с	т/год	
1	2	3	4	5	6	7	8	9
О р г а н и з о в а н н ы е и с т о ч н и к и								
(0101) Алюминий оксид (диАлюминий триоксид) /в пересчете на алюминий/ (20)								
Комплекс дробления руды	0058			0.000306085	0.007529232	0.000306085	0.007529232	2022
Участок складирования крупнодробленной руды	0059			0.000015249	0.000326145	0.000015249	0.000326145	2022
Участок дробления рудной гали	0060			0.000147592	0.011810376	0.000147592	0.011810376	2022
Итого				0.000468926	0.019665753	0.000468926	0.019665753	
(0123) Железо (II, III) оксиды (диЖелезо триоксид, Железа оксид) /в пересчете на(274)								
Комплекс дробления руды	0058			0.00018005	0.00442896	0.00018005	0.00442896	2022
Участок складирования крупнодробленной руды	0059			0.00000897	0.00019185	0.00000897	0.00019185	2022
Участок дробления рудной гали	0060			0.00008676	0.00694728	0.00008676	0.00694728	2022
Блок центрального ремонта	0068			0.005	0.036	0.005	0.036	2022
	0069			0.007	0.006	0.007	0.006	2022
	0070			0.005	0.0099	0.005	0.0099	2022
	0072			0.007	0.006	0.007	0.006	2022

ЭРА v2.5 ТОО «TITECO» Таблица 3.6

Нормативы выбросов загрязняющих веществ в атмосферу по предприятию

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – нормативы)

Производство цех, участок	Номер источника выброса	Нормативы выбросов загрязняющих веществ						год достижения ПДВ
		существующее положение на 2018 год		на 2022-2028 года		П Д В		
Код и наименование загрязняющего вещества		г/с	т/год	г/с	т/год	г/с	т/год	
1	2	3	4	5	6	7	8	9
Итого				0.02427578	0.06946809	0.02427578	0.06946809	
(0128) Кальций оксид (Негашеная известь) (635*)								
Комплекс дробления руды	0058			0.000126035	0.003100272	0.000126035	0.003100272	2022
Участок складирования крупнодробленной руды	0059			0.000006279	0.000134295	0.000006279	0.000134295	2022
Участок дробления рудной гали	0060			0.000060732	0.004863096	0.000060732	0.004863096	2022
Бункерный склад извести-пушонки	0061			0.0000038	0.0000412	0.0000038	0.0000412	2022
	0062			0.000003	0.0000343	0.000003	0.0000343	2022
Итого				0.000199846	0.008173163	0.000199846	0.008173163	
(0143) Марганец и его соединения /в пересчете на марганца (IV) оксид/ (327)								
Блок центрального ремонта	0068			0.0006	0.0011	0.0006	0.0011	2022
	0069			0.0009	0.0007	0.0009	0.0007	2022
	0070			0.0006	0.0011	0.0006	0.0011	2022
	0072			0.0009	0.0007	0.0009	0.0007	2022
Итого				0.003	0.0036	0.003	0.0036	
(0155) диНатрий карбонат (Сода кальцинированная, Натрий карбонат) (408)								
Главный корпус	0066			0.0065	0.0477	0.0065	0.0477	2022

ЭРА v2.5 ТОО «TITECO» Таблица 3.6

Нормативы выбросов загрязняющих веществ в атмосферу по предприятию

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – нормативы)

Производство цех, участок	Номер источника выброса	Нормативы выбросов загрязняющих веществ						
		существующее положение на 2018 год		на 2022-2028 года		П Д В		год достижения ПДВ
Код и наименование загрязняющего вещества		г/с	т/год	г/с	т/год	г/с	т/год	
1	2	3	4	5	6	7	8	9
(0301) Азота (IV) диоксид (Азота диоксид) (4)								
Блок центрального ремонта	0068			0.0075	0.0309	0.0075	0.0309	2022
	0069			0.0014	0.0002	0.0014	0.0002	2022
	0072			0.0014	0.0002	0.0014	0.0002	2022
Итого				0.0103	0.0313	0.0103	0.0313	
(0333) Сероводород (Дигидросульфид) (518)								
Участок дробления рудной гали	0060			0.005	0.138	0.005	0.138	2022
Главный корпус	0065			0.000012	0.00009	0.000012	0.00009	2022
Итого				0.005012	0.13809	0.005012	0.13809	
(0334) Сероуглерод (519)								
Участок дробления рудной гали	0060			0.003	0.0864	0.003	0.0864	2022
Главный корпус	0063			0.000035	0.00025	0.000035	0.00025	2022
	0064			0.0000335	0.001	0.0000335	0.001	2022
	0065			0.0000335	0.001	0.0000335	0.001	2022
Итого				0.003102	0.08865	0.003102	0.08865	
(0337) Углерод оксид (Окись углерода, Угарный газ) (584)								
Блок центрального ремонта	0068			0.0016	0.0103	0.0016	0.0103	2022

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Нормативы выбросов загрязняющих веществ в атмосферу по предприятию

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – нормативы)

Производство цех, участок	Номер источника выброса	Нормативы выбросов загрязняющих веществ						год достижения ПДВ
		существующее положение на 2018 год		на 2022-2028 года		П Д В		
Код и наименование загрязняющего вещества		г/с	т/год	г/с	т/год	г/с	т/год	
1	2	3	4	5	6	7	8	9
	0069			0.0067	0.001	0.0067	0.001	2022
	0072			0.0067	0.001	0.0067	0.001	2022
Итого				0.015	0.0123	0.015	0.0123	
(0342) Фтористые газообразные соединения /в пересчете на фтор/ (617)								
Блок центрального ремонта	0068			0.0002	0.0002	0.0002	0.0002	2022
	0069			0.0005	0.0027	0.0005	0.0027	2022
	0070			0.0002	0.0004	0.0002	0.0004	2022
	0072			0.0005	0.0027	0.0005	0.0027	2022
Итого				0.0014	0.006	0.0014	0.006	
(0344) Фториды неорганические плохо растворимые – (алюминия фторид, кальция фторид,(615)								
Блок центрального ремонта	0069			0.0005	0.0001	0.0005	0.0001	2022
	0072			0.0005	0.0001	0.0005	0.0001	2022
Итого				0.001	0.0002	0.001	0.0002	
(1048) 2-Метилпропан-1-ол (Изобутиловый спирт) (383)								
Участок дробления рудной гали	0060			0.002	0.0576	0.002	0.0576	2022
Главный корпус	0063			0.001	0.0073	0.001	0.0073	2022
	0064			0.0013	0.0372	0.0013	0.0372	2022
	0065			0.001	0.0286	0.001	0.0286	2022

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Нормативы выбросов загрязняющих веществ в атмосферу по предприятию

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – нормативы)

Производство цех, участок	Номер источника выброса	Нормативы выбросов загрязняющих веществ						год достижения ПДВ
		существующее положение на 2018 год		на 2022-2028 года		П Д В		
Код и наименование загрязняющего вещества		г/с	т/год	г/с	т/год	г/с	т/год	
1	2	3	4	5	6	7	8	9
Итого				0.0053	0.1307	0.0053	0.1307	
(1051) Пропан-2-ол (Изопропиловый спирт) (469)								
Участок дробления рудной гали	0060			0.002	0.0576	0.002	0.0576	2022
Главный корпус	0063			0.001	0.0073	0.001	0.0073	2022
	0064			0.0013	0.0372	0.0013	0.0372	2022
Итого				0.0043	0.1021	0.0043	0.1021	
(2732) Керосин (654*)								
Участок дробления рудной гали	0060			0.1667	1.224	0.1667	1.224	2022
Главный корпус	0067			0.015	0.0281	0.015	0.0281	2022
Блок центрального ремонта	0068			0.2165	0.0935	0.2165	0.0935	2022
Итого				0.3982	1.3456	0.3982	1.3456	
(2735) Масло минеральное нефтяное (веретенное, машинное, цилиндровое и др.) (716*)								
Блок центрального ремонта	0069			0.084	0.0151	0.084	0.0151	2022
	0071			0.084	0.0151	0.084	0.0151	2022
Итого				0.168	0.0302	0.168	0.0302	

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Нормативы выбросов загрязняющих веществ в атмосферу по предприятию

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – нормативы)

Производство цех, участок	Номер источника выброса	Нормативы выбросов загрязняющих веществ						год достижения ПДВ
		существующее положение на 2018 год		на 2022-2028 года		П Д В		
Код и наименование загрязняющего вещества		г/с	т/год	г/с	т/год	г/с	т/год	
1	2	3	4	5	6	7	8	9
(2736) Масло сосновое флотационное (МСФ) (717*)								
Участок дробления рудной гали	0060			0.004	0.1152	0.004	0.1152	2022
(2902) Взвешенные частицы (116)								
Блок центрального ремонта	0068			0.0052	0.0094	0.0052	0.0094	2022
	0069			0.0052	0.0085	0.0052	0.0085	2022
Итого				0.0104	0.0179	0.0104	0.0179	
(2908) Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент,(494)								
Комплекс дробления руды	0058			0.00118833	0.029231136	0.00118833	0.029231136	2022
Участок складирования крупнодробленной руды	0059			0.000059202	0.00126621	0.000059202	0.00126621	2022
Участок дробления рудной гали	0060			0.000572916	0.045852048	0.000572916	0.045852048	2022
Блок центрального ремонта	0069			0.0005	0.0001	0.0005	0.0001	2022
	0072			0.0005	0.0001	0.0005	0.0001	2022
Итого				0.002820448	0.076549394	0.002820448	0.076549394	
(2930) Пыль абразивная (Корунд белый, Монокорунд) (1027*)								
Блок центрального	0068			0.0032	0.0058	0.0032	0.0058	2022

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Нормативы выбросов загрязняющих веществ в атмосферу по предприятию

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – нормативы)

Производство цех, участок	Номер источника выброса	Нормативы выбросов загрязняющих веществ						год достижения ПДВ
		существующее положение на 2018 год		на 2022-2028 года		П Д В		
Код и наименование загрязняющего вещества		г/с	т/год	г/с	т/год	г/с	т/год	
1	2	3	4	5	6	7	8	9
ремонта	0069			0.0032	0.0052	0.0032	0.0052	2022
Итого				0.0064	0.011	0.0064	0.011	
(2985) Полиакриламид анионный АК-618 (АК-618) (964*)								
Участок дробления рудной гали	0060			0.0007	0.0201	0.0007	0.0201	2022
Итого по организованным источникам:				0.670379	2.2744964	0.670379	2.2744964	
Т в е р д ы е:				0.055765	0.2743564	0.055765	0.2743564	
Газообразные, ж и д к и е:				0.614614	2.00014	0.614614	2.00014	
Н е о р г а н и з о в а н н ы е и с т о ч н и к и								
(0101) Алюминий оксид (диАлюминий триоксид) /в пересчете на алюминий/ (20)								
Комплекс дробления руды	6017			0.099263	2.134095	0.099263	2.134095	2022
Участок складирования крупнодробленной руды	6019			0.035224	0.776152	0.035224	0.776152	2022
Итого				0.134487	2.910247	0.134487	2.910247	
(0123) Железо (II, III) оксиды (диЖелезо триоксид, Железа оксид) /в пересчете на(274)								
Комплекс дробления	6017			0.05839	1.25535	0.05839	1.25535	2022

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Нормативы выбросов загрязняющих веществ в атмосферу по предприятию

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – нормативы)

Производство цех, участок	Номер источника выброса	Нормативы выбросов загрязняющих веществ						год достижения ПДВ
		существующее положение на 2018 год		на 2022-2028 года		П Д В		
Код и наименование загрязняющего вещества		г/с	т/год	г/с	т/год	г/с	т/год	
1	2	3	4	5	6	7	8	9
руды								
Участок складирования крупнодробленной руды	6019			0.02072	0.45656	0.02072	0.45656	2022
Итого				0.07911	1.71191	0.07911	1.71191	
(0128) Кальций оксид (Негашеная известь) (635*)								
Комплекс дробления руды	6017			0.040873	0.878745	0.040873	0.878745	2022
Участок складирования крупнодробленной руды	6019			0.014504	0.319592	0.014504	0.319592	2022
Итого				0.055377	1.198337	0.055377	1.198337	
(2908) Пыль неорганическая, содержащая двуокись кремния в %: 70-20 (шамот, цемент,(494)								
Комплекс дробления руды	6017			0.385374	8.28531	0.385374	8.28531	2022
Участок складирования крупнодробленной руды	6019			0.136752	3.013296	0.136752	3.013296	2022
Отвалы ПСП	6020			0.1484	2.3794	0.1484	2.3794	2022
	6021			0.0565	0.6338	0.0565	0.6338	2022
	6026			0.0476	0.4746	0.0476	0.4746	2022
	6027			0.1484	2.3377	0.1484	2.3377	2022
Итого				0.923026	17.124106	0.923026	17.124106	

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Нормативы выбросов загрязняющих веществ в атмосферу по предприятию

Аягозский район, п. Актогай, ТОО «KAZMinerals Aktogay» (период эксплуатации – нормативы)

Производство цех, участок	Номер источника выброса	Нормативы выбросов загрязняющих веществ						год достижения ПДВ
		существующее положение на 2018 год		на 2022-2028 года		П Д В		
Код и наименование загрязняющего вещества		г/с	т/год	г/с	т/год	г/с	т/год	
1	2	3	4	5	6	7	8	9
Итого по неорганизованным источникам:				1.192	22.9446	1.192	22.9446	
Т в е р д ы е:				1.192	22.9446	1.192	22.9446	
Газообразные, ж и д к и е:								
Всего по предприятию:				1.862379	25.2190964	1.862379	25.2190964	
Т в е р д ы е:				1.247765	23.2189564	1.247765	23.2189564	
Газообразные, ж и д к и е:				0.614614	2.00014	0.614614	2.00014	

3.1.5 Atmosphere monitoring

The air monitoring system includes:

- observations of sources of emission and emission of pollutants;
- monitoring air pollution at the border of the SPZ.

The first type of observation is carried out to monitor the compliance with the MPE standards and is performed at the sources of vent emission from the factory facilities. A set of works on the assessment of the value of gas emissions during operation of diesel mining-and-transport equipment is related to the same type of observations . Monitoring of compliance with the MPE standards at emission sources should be carried out by specialized and accredited third-party laboratories under the contract, in accordance with the developed program of environmental contro(PEC).

The second type of observations will effectively control air pollution from fugitive emission sources. The observation points will be located on the border of the estimated SPZ at 8 points (Appendix 2). Additional observation points should be arranged in the direction of the prevailing winds outside the boundaries of the estimated SPZ, in the direction of environmental protection facilities, as well as in the direction of solid waste storage pits (within or outside the SPZ boundary). The observed parameters will be air temperature, wind direction and speed, the content of dust, nitrogen dioxide, carbon monoxide, sulfur dioxide in the air. The location of the monitoring observation points and the SPZ shall be adjusted as information on actual areas of pollutants influence is obtained and accumulated.

3.1.6 Air protection measures

Special measures to reduce emissions of pollutants into the atmosphere during the standardizing period are not foreseen, since for all production sites at the borders of sanitary protection zones surface concentrations concidering the background for all pollutants do not exceed the maximum permissible values (MPC) set by sanitary standards.

The company annually develops a complex of planning and technological measures to reduce the impact of operating technological equipment of the company on the quality of atmospheric air, reduce their surface concentrations and prevent excessive and emergency emissions of harmful substances into the atmosphere.

Technological activities (measures) include:

- careful technological regulation of work;
- ensuring production safety in the most hazardous areas and systems by the means of control and measuring instruments, automatic emergency shutdown devices, triggered by a sudden drop in pressure in the pipeline;
- staff training in safety, fire safety and compliance with the rules of operation when performing work;
- regular technical inspections of equipment, replacement of broken materials and equipment;
- the use of materials, equipment and fittings, which ensures operating reliability;
- testing of newly installed systems and equipment for for leaks;
- make a cover of ore (small layer) to reduce evaporation of acid mist from the heap leaching site over the irrigation system;
- vehicle inspection and maintenance of vehicles and special equipment, as well as emission control, provided by routine inspections of equipment.

Implementation of these measures (activities) and good organization of the production process and production control over the state of the environment shall ensure compliance with the standards for maximum permissible emissions (MPE) and reduce the negative load on the air basin during operation of the company.

Construction period:

Considering the fact that construction work on the implementation of design solutions is accompanied by significant dust emissions into the atmospheric air certain measures are provided to reduce dusting in the area of the company’s location.

The following measures to reduce the amount of dust emitted into the atmosphere are provided in fugitive sources of air pollution:

- the use of technically serviceable vehicles and machines;

- Dust suppression is used to prevent the pollution of the atmosphere by dust resulting from the use of crushed stone roads. The dust suppression is the reduction of dust suppression and the reduction of dust directly at the places of its formation. Dust suppression is carried out by watering the road with water using SAMS water carriers and observing the speed limit;

- covering the soil and bulk materials during transportation by road.

Measures to reduce emissions of pollutants for the period of adverse meteorological conditions (AMC).

The pollution of the surface layer of atmospheric air caused by the emissions of companies depends to a large extent on meteorological conditions. In certain periods of the year, when meteorological conditions contribute to the accumulation of pollutants in the surface layer of the atmosphere, the concentration of impurities in the air can increase dramatically. In order to prevent the occurrence of a high level of pollution during these periods, it is necessary to forecast such conditions in advance and timely reduce emissions of harmful substances into the atmosphere from the company. The RSE "KAZHYDROMET" carries out the forecasting of periods of adverse meteorological conditions (AMC) on the territory of the Republic of Kazakhstan. The regulation of emissions is carried out concidering the forecast of AMC on the basis of warnings about a possible increase in the concentration of impurities.

Activities to reduce emissions in the period of AMC are conducted in places where they are predicted. In the region under consideration there are no stationary observation posts, the AMC forecast on the synoptic situation is also not carried out. In this regard, the activities for the period of AMC were not developed.

3.1.7 Conclusions on the assessment of exposure to atmospheric air

Production capacity of the Sulphide Concentrator is 25.0 million tons per year.

Ore processing at the Sulphide Concentrator will start in 2022.

The total number of sources of emissions of pollutants will be:

- stationary - 15

- fugitive – 10.

Calculations of emissions of pollutants into the atmosphere are made on the basis of the main technological solutions developed as part of this project.

If to work in compliance with the parameters established by this project, the total emissions from production sources (including mobile - motor-and-tractor equipment) will be **35.1875374 tons**.

Standardized emissions (excluding emissions from mobile sources - motor-and-tractor equipment) will be **25.0952974 tons.**

The performed dispersion calculations showed that the surface concentrations for all pollutants and summation groups on the border of the sanitary protection zone (500 m) will not exceed the sanitary norms. The maximum size of the SPZ is 500 m. At the same time, calculations of dispersion of pollutants confirm the adequacy of the the sanitary protection zone of 500 m. for the rest of the sites.

According to the "Sanitary and epidemiological requirements for the establishment of a sanitary protection zone for industrial facilities", approved by the Decree No. 237of the Government of the Republic of Kazakhstan on March 20, 2015, the industrial site of the Aktogay Sulphide Concentrator belongs to hazard class II facilities with a SPZ from 500 m to 999 m.

In connection with the foregoing, it can be concluded that during operation of the Sulphide Concentrator a permissible impact on the atmospheric air in the area of its location is expected.

3.2 IMPACT ASSESSMENT ON WATER BODIES

3.2.1 Water supply and wastewater disposal

The source of water supply is the Zhuzagash groundwater field, located 30 km west of the Aktogay field in the valley of the Ayagoz River.

The water supply from the pumping station to the Aktogay site will be carried out through a pipeline with a diameter of 900 mm and a length of 30 km, laid below the freezing depth at a depth of 2.8 m. This pipeline will supply water to the process water pond and raw water tank at the mine site.

Water intake facility at the Zhuzagash field, laying of a water conduit, pumping station of the second elevation is a separate project.

According to the data of water consumption and water disposal the following water supply systems are established:

- crude water (B9);
- drinking water (B1);
- demineralized (desalinized) water (B6);
- recycling water (B4, B5);
- fire extinguishing (B2).

The supply of crude (raw) water to consumers for the period of operation is as follows: from the Zhuzagash groundwater field, crude (raw) water is pumped through a pressure conduit with a diameter of 900 mm to the industrial site of the Sulpide Concentrator to a crude (raw) water tank with a capacity of 1500 m3.

Overflow of water from the crude (raw) water tank is delieverd into the pond of technical water with a lining of high density polyethylene with a volume of 56,000 m3, which serves as a reservoir of the circulating water of the Sulphide Concentrator, to compensate for the loss of water absorbed by the tailings pulp (feeding of the processing system of the concentrator).

The rest of the water from the crude (raw) water tank is delievered by pumps (1 operating, 1 reserve) of the raw water pumping station to the processing needs of the Sulphide Concentrator, to prepare reagents and milk of lime, to the reverse osmosis plant, to the fire extinguishing system, to feed the circulating system of the compressor station, to dust suppression, to the chlorination unit.

A complete water circulation and a local circulating cooling system of a gearless drive of the mill are provided at the concentratort for production needs.

The scheme of complete water circulation is as follows: after the thickening of the tailings the clarified water is drained by gravity into the process water pond, and then is delievered by pumps (2 operating, 1 reserve) of the processing water pump station to the processing needs of the concentrator. The feed of this system is provided from the reservoir of raw water and treated wastewater from the domestic wastewater treatment plant.

The scheme of the local circulating system is as follows: the heated water after cooling of the gearless mill drive under residual pressure is discharged to the cooling towers with chilled water chambers, and then by gravity flows into the 400 m3 tank of cooled water and then by pumps (1 operating, 1 reserve) of the cooling water pumping station is delieverd to cool the gearless drive mill.

Demineralized water is used to feed the circulating cooling system of the gearless mill drive of the Concentrator. Installation of reverse osmosis is provided to obtain demineralized (desalinized) water.

There is a local circulating system of the compressor station. The feed of these circulating systems is provided from the raw water reservoir.

Drinking water is supplied to the Sulphide Concentrator.

The need for crude (raw) water for the production needs of the factory is: 73512.92 m3 / day, including raw water - 61528,89 m3 / day.

It is supplied by the projected intake of Zhuzagash field of underground water of the drinking quality. The water intake is located 30 km west of the Aktogay field in the valley of the Ayagoz river (Zhuzagash field of groundwater).

A complete water circulation and a local circulating cooling system for a gearless mill drive are provided at the Sulphide Concentrator for production needs. In this regard, the standards for discharges

of pollutants are not established.

Preparation of drinking water for the Sulphide Concentrator is carried out on the territory of the Concentrator. The drinking water treatment scheme is as follows: water from the pumping station of raw water is supplied to the chlorination unit at the rotation camp with a capacity of 2.0 kg / day for liquid chlorine based on the chlorine dose of 1.9 mg /l followed by drainage to two drinking water reservoir with a capacity of 100 m. each. From tanks by pumps (2 operating, 1 reserve) of a drinking water pump station, the drinking water is supplied for domestic needs. Drinking-quality water after the chlorination plant, located in the territory of the Sulphide Concentrator, is delieverd to sanitary devices for washing the reagent solutions that accidentally get into the eyes or open areas of the body. For this purpose, eyewash fountains and emergency showers are provided.

Wastewater disposal

Polluted water flows (domestic, industrial, rainwater) are generated at the designed sites of the Sulphide Concentrator.

Sewage handling of sites is provided with separate sewage systems:

- domestic (K1);
- rain (K2).

Discharge of wastewater in the amount of 297.57 m3 / day, 108613.05 m3 / year is sewered through a gravity sewage network with subsequent diversion to the existing wastewater treatment plants of complete biological treatment, located on the territory of the existing Concentrator.

Domestic sewage from separate consumers of remote sites is discharged into sewage cesspit with subsequent removal by a sewage disposal machine to the existing sewage treatment plant. Removal of effluent will be carried out regularly as domestic wastewater accumulates into the existing modular treatment plant in the territory of the existing Concentrator.

According to the calculated volumes of water consumption and water disposal, given in Table 3.2.2 - "Water consumption and water disposal in the sulphide ore factory", the total volume of domestic and similar industrial effluent from the facilities of the Sulphide Concentrator under construction delievered to the treatment plant is 297.57 m3/day, 108613.05 m3/year.

The effluent from the administrative complex containing fat products are treated in a grease trap before being discharged into the external sewage network.

The envisaged treatment plants for complete biological treatment are units of a modular factory-made container type with a capacity of 540 m3/day. Manufacturer is KHAANZA. The container unit is placed on the ground. It consists of container modules - tanks and technical premises. The cleaning process includes pre-treatment of wastewater from coarse mechanical impurities and equalization, two-stage aerobic treatment of wastewater, followed by the separation of treated wastewater in the secondary final sedimentation tanks and its fine purification by filters.

The excess sludge generated in the process of sewage treatment is collected in a sludge tank, it is aerobically stabilized and by the sludge supply pump is delievered through a pipeline into a mechanical sludge dewatering unit. After a period of decontamination, the sludge can be used as a fertilizer. The compressor carries out aeration. The unit works steadily when changing hydraulic loads, flow concentrations. During long breaks in the flow of the feed, within a few days the installation (unit) enters independetly the optimum mode of operation.

Purified domestic sewage is chlorinated and discharged into the industrial water pond to feed the factory's recycling system.

Rain and melt water from the roofs of buildings and the territory of the extension of the Sulphide Concentrator, the complex of production units for maintenance of mining equipment and warehouses shall be collected by a system of storm water inlets and pipelines and discharged through the oil catcher into the rainwater settling pond located near the Concentrator. The volume of rain and melt water according to the project is 27 m3/h, 162 m3/day, 10,700 m3/year.

It is planned to buils mud and oil catcher from monolithic concrete with opening metal covers for maintenance.

Calculation of the amount of pollution retained at the treatment plant

Pollution in wastewater, according to VSN-01-89 is:

- suspended substances – 300 mg/l

The effect of water purification at wastewater treatment plants is:

- suspended substances – 90%

The concentration of pollutants ot the outlet of the sedimentation tank will be:

- suspended substances – 300 mg/l * (1-(90/100)) = 30 mg/l

The surface sewage in the amount of 162 m3/day and 10,700 m3/year is delivered to the treatment facilities.

Then the amount of pollutants captured will be:

daily:

- suspended substances = 162.0 * 1000 * 300 * 0.9 * 10^{-9} = 0.044 t/day

annual:

- suspended substances – 10700 * 1000 * 300 * 0.9 * 10^{-9} = 2.9 t/year

The results of the calculation of screenings are summarized in Table 3.2.1.

Table 3.2.1.– The results of the calculation of screenings

Source name	Units of measurement	The volume of wastewater entering the treatment plant, m3/year	The amunt of trapped suspended substances
1	2	3	4
Surface run-off	t/day	162.0	0.044
	t/year	10700	2.9

The water consumption and wastewater disposal scheme is presented below in Figure 3.2.1.

The balance of water consumption and water disposal of the projected facilities is presented in Table 3.2.2.

Fire Safety Activities

Fire water supply and automatic fire extinguishing

Water consumption for fire extinguishing shall be:

- external, according to Construction Rules and Regulations of RoK 4.01-02-2009 “Water supply. External networks and facilities", Technical Regulations "General requirements for fire safety";

- internal, according to Construction Rules and Regulations of RoK 4.01-41-2006* «Internal water supply and sewerage of buildings»;

- automatic, according to Construction Rules and Regulations of RoK 2.02-15-2003 «Automatic fire fighting equipment of buildings and structures»;

on an automatic foam fire-extinguishing unit, in accordance with SNiP 2.11.03-93 "Fire protection regulations for fuel depots".

The master water consumption for the fire extinguishing of the concentration plant is the water consumption for the fire extinguishing of the chemical depot (building area 37397 m3, building fire hazard category is “B1”, Sha fire resistance level): 20 l/s - for external fire extinguishing, 15 l/s - for internal fire extinguishing and 28.8 l/s - for automatic water fire suppression.

A fire extinguishing system is provided to ensure estimated flow and pressure at the site of the Sulphide Concentrator. It consists of two fire tanks with a capacity of 300 m each and a fire extinguishing pump station. For fire safety needs, a looped fire network with an arrangement of fire hydrants for external fire suppression is provided.

Water from the tanks is supplied by pumps (1 operating, 1 reserve) of a fire pumping pumping station to fire hydrants, fire hydrants and automatic firefighting systems.

Fire pumps are activated by local and remote buttons installed in the cabinets of fire hydrants and by fire alarm sensors. Fire hydrants are equipped with fire hoses and fire-hose nozzles installed in special cabinets. Each cabinet contains two hand extinguishers.

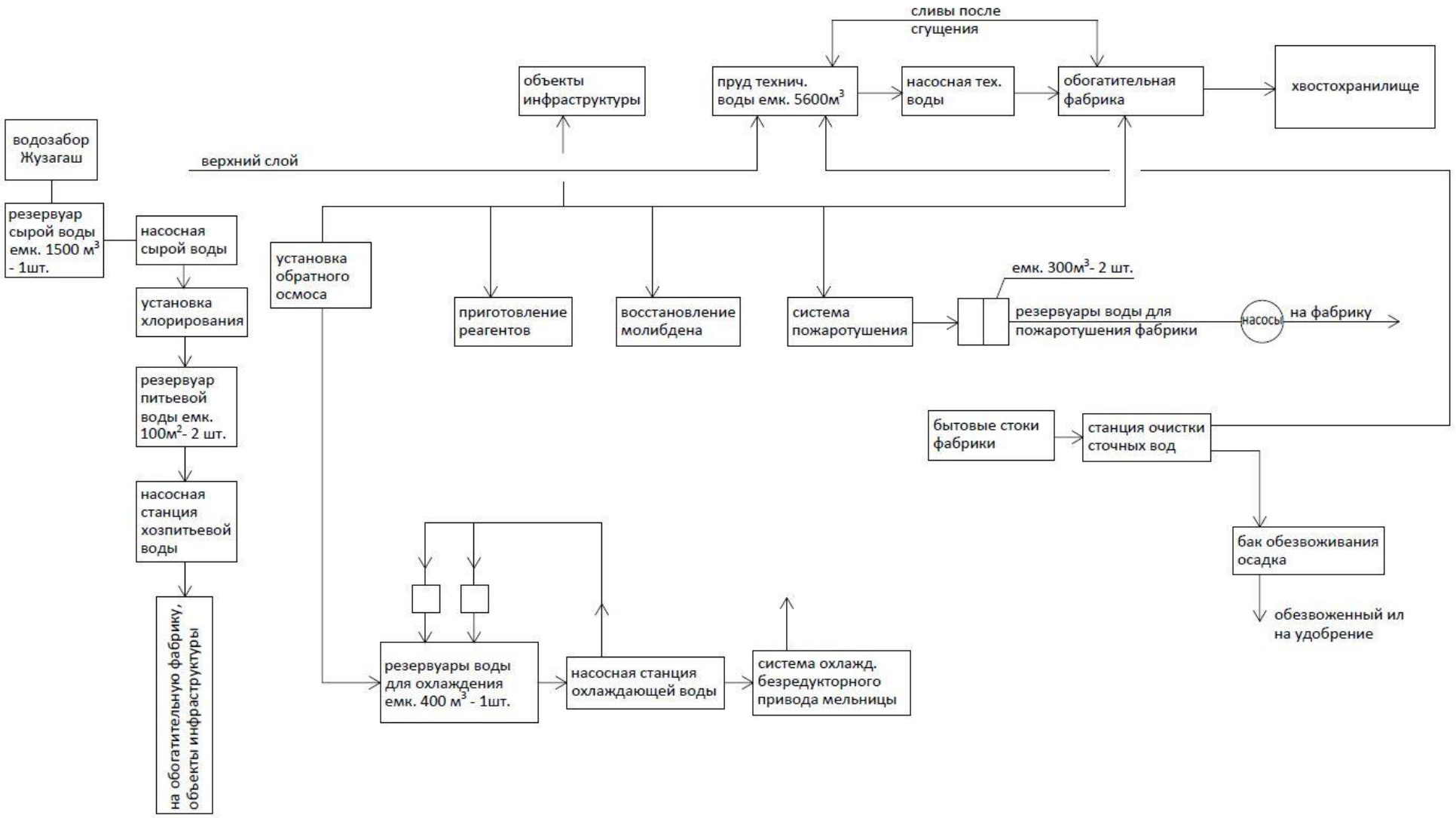

Рисунок 3.2.1 Схема водопотребления и водоотведения

Table 3.2.2. – Water consumption and wastewater disposal in a sulphide ore factory

№	Consumer name	Water consumption, m^3/day								Wastewater disposal , m^3/day						
		For production needs						For safety shower		Total	Recycling water	Domestic wastewater	In tailings storage facility	Non-recoverable losses	To evaporation pond	Comments
		Total	Water for cooling	Process water	Crude (raw) water	Drinking water	Demineralized water	Cold water	Hot water							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Ore stockpile area (3200)	1265.67		1247.4		5.14		13.13	5.63	238.0		23.89		214.12		
6	Main building. Grinding and classification section (3300)	4671.54			4629.6	9.12		32.82	14.07	550.26		70.26			480.0	
7	Main building, flotation section (3400)	909.87		891.6		5.14		13.13	5.63	238.0		23.89		214.12		
8	Main building, extraction, filtration and thickening of molybdenum section(3460)	362.43			344.16	5.14		13.13	5.63	503.89		23.89	480.0			
11	Main building. Reagent area (3800)	3282.27			3264.0	5.14		13.13	5.63	666.2		23.89			642.31	
13	Ore pebble crusher building (3340)	1208.27		1190		5.14		13.13	5.63	611.89		23.89		588.0		
15	Service offices (0985)	25.2				25.2				4.5		4.5				
16	Maintenance workshop (0984)	1.35				1.35				1.35		1.35				
17	Coarse crushing section (3100)	1800.03			1750.4	23.38		26.25	11.25	307.36		51.76			255.6	
18	Building for tailing thickening (3700)	46368.78			46368.68	3.20		1.9	1.3	46262.48		3.2	46259.28			
20	Thickening and unloading of the Concentrator (3500)	1821.47			1803.2	5.14		13.13	5.63	2649.52		23.89			2625.63	
21	Process water pumping station (0500)	3324.73			3309.05	9.12		6.56	2.81	253.89		18,.9			235.4	
	Factory office (0981)	**1.41**				**1.41**				**1.41**		**1.41**				
	Main flyover (overpass) of the Company (3900)	**8469.9**	**8400.0**		**64.8**	**3.2**		**1.9**	**1.3**	**63.5**		**3.2**			**60.3**	
	TOTAL:	**73512.92**	**8400**	**3329**	**61528.89**	**106.82**		**148.21**	**64.51**	**52352.25**		**297.57**	**46739.28**	**1016.24**	**4299.24**	

For the period of construction water from the existing water supply system of the Company will be used for production purposes,. For the period of construction KAZ Minerals Aktogay LLP (KAZ Minerals Aktogay) will provide a connection point to the water supply.

The sewerage system of sanitary-domestic premises at construction sites is carried out by connecting them to the existing sewerage system according to a temporary scheme or organizing an outdoor toilet with a waterproof cesspool, or "Biotoilet" mobile toilet cabins.

The cesspool is cleared when it is two-thirds of the volume full. Upon completion of the construction of the facility, after dismantling the outdoor toilets, disinfection measures are taken.

Table 3.2.3 presents the volumes of water consumption and wastewater disposal for the period of construction works.

Table 3.2.3 – Water consumption and wastewater disposal for the period of construction works

№	Consumer name	Unit of measurement	Quantity	Water consumption rate	Water consumption		Wastewater disposal		Losses	
					m^3/day	m^3/year	m^3/day	m^3/year	m^3/day	m^3/year
1	2	3	4	5	6	7	8	9	10	11
1.	The water supply of working on the site	workers	2500	0.007 m^3/day	17.5	4375.0	17.5	4375.0	-	-
2.	Dust suppression on the roads	m^2	5000	1 l/m^2	5.0	50.0	-	-	5.0	50.0
	TOTAL:				**22.5**	**4425.0**	**17.5**	**4375.0**	**5.0**	**50.0**

3.2.2 The assessment of impacts on surface water and groundwater

The hydrographic network of the Aktogay field area is represented by the Ayagoz, Bakanas and Tansyk rivers, the Balkhash, Koldar, Koshkar lakes.

The nearest Ayagoz river flows 30 km west of the deposit. In this area, it does not have a permanent flow; it falls apart into separate stretches in the summer period. Smaller rivers - Ai, Bakanas and Tansyk are also variable and shallow.

8 km to the northeast of the field there is the salt lake Koldar, which is fed by the flood waters of the Tansyk River. There are no other surface streams. The remaining lakes are located at considerable distances from the deposit.

The Aktogay field is located in the central deviding part of the Koldar granitoid massif with absolute surface marks of 420-455 m. In geomorphological terms, the area of the field is a watershed denudation plain on an hillocky area. In the north and south, the hillocky area goes into depositional plains, made, respectively, of the Middle Quaternary - Upper Quaternary alluvial-proluvial deposits of the Akogai basin and Kila salt lake deposits. The surface slopes are: to the north 0.133 to the south - 0.024. The relative excess of watersheds over the local basis of erosion reaches 60-70 m.

Groundwater pollution may occur due to the leakage of fuel and lubricants and fuel from automotive and transporting equipment.

According to the organization of work, the impact on groundwater shall be excluded, since work in case of fault detection is not allowed. Refueling will be carried out by a refuelling tanker at a special site with additional protection measures for soil pollution and, as a consequence, groundwater (oil and fuel catch pallets and other devices that prevent leakage of petroleum products).

Toilets with a waterproof cesspool are provided to collect domestic wastewater on sites . When domestic waste accumulates, it will be pumped out of the cesspit and transported by special vehicles to the existing wastewater treatment plants of complete biological treatment located on the territory of the company.

When implementing the project under consideration, additional impact on surface water bodies, due to their remoteness, will not occur, impact on groundwater is assessed as permissible.

Due to the fact that there is no ground and surface water intake in the UF area, there are no changes in the natural landscape of the site of the work area (for example, flooding of the surface of the earth due to secondary compression of sandy-clay rocks after drying and lowering the reservoir

pressure) and vegetation (for example, dewatering).

The impact of a possible lowering of the groundwater level affecting nearby users, such as residential villages and farmers, does not occur.

The amount and degree of possibility of accidental leakage of fuel is extremely small and the degree of their natural "washing" by infiltration of precipitation will be insignificant. However, due to the small depth of aquifers, their vulnerability increases and even a slight leakage of fuel can lead to groundwater contamination, Therefore, accidental leakage of diesel fuel shall be marked as a significant.

Groundwater contamination from domestic wastewater will not occur. Domestic wastewater from offices and workshops will flow by gravity through the pipeline into pump wells, from where they will be pumped through the discharge pipeline (through the pump well at the Sulphide Concentrator) to the wastewater treatment plant.

Wastewater will be collected in waterproof tanks and pumped to the wastewater treatment plant. It is possible to use a septic pumper truck for small isolated areas of sewage. The impact will be determined as acceptable.

Circulating water is continuously involved in the treatment process and requires replenishment, mainly due to evaporation from the surface of the tailings pond and due to the filling of pores between the particles of the rock mass.

Water is supplied from the projected underground intake of the drinking quality water from the Zhuzagash field. The water intake is located 30 km west of the Aktogay field in the valley of the Ayagoz river (Zhuzagash field of groundwater).

Rain and melt water from the roofs of buildings and the territory of the extension of the Sulpide Concentrator, the complex of production units for maintenance of mining equipment and warehouses shall be collected by a system of storm water inlets and pipelines and discharged through the oil catcher into the rainwater settling pond located near the Concentrator

Some structures, due to the specific technological process carried out in them, are partially or completely constructed of monolithic reinforced concrete (the building for lime unloading and distribution, the underground tunnel between the large-grained ore storage and the grinding section of the main building, tthe Primary Sizer, process and stormwater ponds, etc.).

The groundwater at the project site is circulating in the Lower Cambrian deposits and in tectonic fractures. The depth of groundwater in the central and western parts of the field is from 6 to 10 m and about 30 m in the easternmost part. Due to high salinity, groundwater at the site is unsuitable for drinking and limited in use for domestic needs.

During the operation of the factory no actions degrade the quality of groundwater.

3.2.3 Measures for water resources protection

During the work, the following measures will be taken to ensure minimal impact on the catchment basin and rational use of water resources:

- compliance with environmental requirements of legislative and regulatory acts of the Republic of Kazakhstan (Water Code, 2009; RND 1.01.03-94, 1994 Rules for the Protection of Surface Waters of the Republic of Kazakhstan), internal documents and standards of the company;
- control over water consumption and wastewater disposal;
- collection and environmentally safe disposal of all categories of wastewater and waste products;
- timely elimination of droplets and spillages (emergency situation) of fuel and lubricants during transport operation;
- transportation of liquid and solid waste, as well as fuel and lubricants in sealed special containers, excluding the possibility of environmental pollution during their transportation or at a trafic accident.

Also, it is required to take measures to provide personnel with drinking water, in accordance with sanitary standards (norms), and GOST 2874-82.

3.2.4 Control over water bassins

There are no surface watercourses within the field influence. Wastewater discharge is not performed.

The control over the water basin is not performed due to the lack of wastewater discharge and the lack of surface water.

During operation of the facilities of the designed Sulphide Concentrator, existing observation wells are provided for monitoring groundwater.

3.2.5 Conclusions on the water resources impact assessment

Due to the measures for the protection of groundwater from pollution, the projected (designed) facilities will have a permissible impact on the water basin.

3.3 IMPACT ASSESSMENT ON SOIL AND GROUND

The impact on the soil and the earth's surface is assessed as high. The required land area allotment for the Concentrating plant under the project will be 78,4726 ha.

The removed fertile soil is stored in the designed PSP dumps near the mine pit, waste dump and designed industrial sites and facilities.

The territory of Aktogai Plant is located in a semi-desert zone.

The soils in the deposit area are the desert-steppe with low content of organic matter and high level of detritus due to strong winds. The soils within the salt substratum are loamy with a high content of natural salts.

The area is a waterless semi-desert with scanty, dune and pseudosteppe vegetation.

The soil of the ktogai Plant area is generally unsuitable for agriculture and livestock farming.

The following soil types have been identified on the Aktogai Plant area:

- brown, usual light-loamy soils with low and medium content of gravel;
- brown weekly developed light loamy soils with low and medium content of gravel;
- brown weekly developed middle and light loamy soils with low and medium content of gravel;
- brown weekly developed middle and light loamy soils with high content of gravel;
- meadow brown solonchak light loamy soils;
- sodium automorphous saline, sandy, hard and light loamy;
- alkaline meadow light loamy soils.

The thickness of the fertile layer recommended for removal in these soils is from 0 to 15 cm. A characteristic feature of brown soils is the low humus content of humus horizons (the humus content in the upper horizon is from от 0,5 to 1,2 0%).

Engineering and geological surveys carried out in the Aktogay deposit area during the period of geological exploration have identified that:

- it is not possible to isolate the alluvial cover into an independent engineering-geological complex due to its low strength (from several centimeters up to 2 m) on a large area of the deposit (80%);
- the soil within the boundaries of the future mining allotment is unproductive, stony with a very low amount of humus, characterized by significant salinity, increasing from a depth of 1,33% to 3,32% per 100 g of absolutely dry sample (salinity of sulphate-calcium composition with chlorine to 7,1%), therefore, the soil is unsuitable for agricultural use.

Gray-brown soils are the zonal soil type of the desert zone. The surface layer is covered with a porous crust with a thickness of 3–5 cm, under it there is a layer of 5–7 cm thick, followed by a compacted layer with carbonate patches. Precipitation of gypsum and easily soluble salts occur at a depth of 40-50 cm. In contrast to brown soils, the maximum amount of carbonates falls on the uppermost layer. Gray-brown soil is experiencing a severe lack of moisture.

To the west, south-west and south of Koshkar Lake, the surface is represented by loose deluvial – proluvial sediments (loams, sands, pebbles, gravel, rubble) on which low-productive and saline soils (meadow-brown and meadow brown soils occupying low places) are developed. Unlike the zonal brown soils, they are much less common, but slightly better humous (1.5–2.5%) and in most cases are saline throughout the profile with water-soluble salts.

Thus, the soil cover of the Aktogai Plant area is very poor. The lands are mostly difficult to develop and are untillable, a limited number of which (~ 270 hectares) within the land allotment, could be used as low-productive pastures. The environs of the Alakol depression are occupied by sands, alkali soils and salt marshes (solonchak) and represent the desert.

The danger of soil contamination is usually caused by machines operating on the site. They are dangerous due to unacceptable spreading of lubricants and flammable materials. Therefore, it should be allowed to work only the machines in good condition, preventing leakage of lubricants and combustible substances and their entry into the soil.

All waste generated during the operation is planned to be stored in specially equipped places, in special containers and tanks, and to be disposed under the agreements with qualified entities

To prevent contaminating effects from household and similar industrial effluents from the facilities of the concentration plant, it is planned to construct a household sewage piping system to drain polluted effluents.

Implementation of the work is planned within the boundaries of the land allotment. The movement of vehicles and equipment will be carried out on the roads.

In connection with the above, the impact on soil cover is estimated as *acceptable*.

The impact of land acquisition for construction is predominantly local. For the construction will be used the land plot that does not have a high agricultural value.

Mechanical disturbances of soil cover and soil

Mechanical disturbances of the soil cover and soils in the conduct of construction works are the most significant in terms of area and are often irreversible.

The disturbed lands are the lands with the humus horizon removed, blocked or dug out and unsuitable for use without prior restoration of fertility, i.e. lands that have lost their original value due to their disturbance.

Performance of construction work on construction sites will lead to the complete destruction or transformation of the natural land cover. At a number of sites during the earthworks will be removed a fertile layer of soil of various thickness. The fertile soil layer is a valuable, slowly renewable natural resource, therefore, when conducting work that leads to a disturbance or reduction of the properties of the soil layer, the latter is subject to removal and moving to the reserve and subsequent use.

Operations on the site, even with strict observance of the boundaries of land allotment and operation technology, will be accompanied by less severe disturbances in the surrounding areas. The cut soil layer will be moved to the shoulders on the border of the site. Along the perimeter of the construction sites and in the adjacent territory will be the movement of vehicles and tractors, which will lead to the soil disturbance.

Significant mechanical disturbances of the soil can occur in the area of parking of construction machinery where the soil and vegetation cover experiences strong mechanical effects associated with the movement of people and equipment. They are destruction and dispersion and sometimes the significant compaction of the surface soil horizons.

In order to prevent the spreading of petroleum products during normal site pollution, as well as in the event of an accident, it will be arranged the 0,15 m high curbstone to fence a fuel storage facility, a hard ground covering (asphalting), and a sewage treatment plant.

Soil-plant ecosystems and their components in different seasons of the year are in a different state, so their response to anthropogenic influences will be ambiguous.

3.3.1 Measures for the soil and vegetation protection

Realization of the environmental protection measures should reduce the negative impact of all work, ensure the preservation of the resource potential of land and soil fertility, the ecological situation in general.

During the construction and operation of the concentrating plant, the territory will be disturbed by the industrial site, roads and railways.

To save the soil layer it is removed. The removed soil layer will be stockpiled into temporary dumps, and used for the improvement of industrial sites of the mine, improvement of unproductive land and subsequent reclamation of disturbed land at the stage of mine abandonment. To strengthen the dumps of fertile layer and preserve them for a long time, perennial grasses, such as wheat grass will be sown throughout their area.

The project plans the dumps to save the fertile layer

№№	Description	UOM	Dump №1	Dump №2	Dump №3	Dump №4
1	Area covered by the dumps	m^2	546286	97416	70511	97907
		h	54,6286	9,7416	7,0511	9,7907

2	Volume of fertile layer in the dump	m^3	267366	51622	88483	155064

The soil and vegetation layer in the desert-steppe area has low organic content and high levels of detritus due to strong winds. The soils within the salt substratum are loamy with a high content of natural salts.

The area is a waterless semi-desert with scanty, dune and pseudosteppe vegetation.

The soil of the deposit territory is generally not suitable for agriculture and livestock farming.

To reduce the negative impact of mechanical disturbances on soil and plant ecosystems, it is necessary to:

- application of modern technologies of operations;
- use of environmentally friendly equipment and fuels and lubricants;
- timely maintenance and inspection of vehicles and equipment, repairs;
- timely performance of land reclamation;
- conducting the production monitoring of soil and vegetation.

In places of abnormal operation, all violations should be promptly eliminated. Technical reclamation should be carried out at the contaminated sites.

Table 3.3.1 - Soil protection measures at the facility operation stage

№ п/п	Impact Factor	Environmental measures
1	Spills and leaks of petroleum products	Measures to prevent and promptly eliminate the consequences of leaks and spills.
2	Pollution from household and industrial waste	The program of measures to ensure the sanitary and hygienic state (removal of domestic solid wastes, cleaning the site, etc.)
3	Engineering solutions to ensure safety	- Ensuring long-term safety during the facility operation; - Prevent corrosion processes; - Ensure the possibility of monitoring the technical condition

3.3.2 Reclamation

As a result of the construction of the Concentrating plant, the soil vegetation layer will be removed. The soil will be stored and subsequently used for the restoration and reclamation of work sites. In the Republic of Kazakhstan there are special guidelines and regulations relating to the recultivation of disturbed lands. The reclamation of disturbed lands, the increase of their fertility, the removal and preservation of the fertile soil layer is an environmental protection measure. Restoration of disturbed lands and their subsequent development is aimed at elimination of the adverse impact on the environment, improving the sanitary and hygienic living conditions of the population, and increasing the aesthetic value of landscapes.

3.4 PRODUCTION AND CONSUMPTION WASTE

3.4.1 General information

This section is developed on the basis of paragraph I of Article 60 of the Environmental Code of the Republic of Kazakhstan "Environmental Requirements for Production and Consumption Waste Management" and on the basis of the "Methodology for Determining the Environment Emission Standards" approved by order of the Minister of Environmental Protection of the Republic of Kazakhstan No.110-P of April 16, 2012 [19].

3.4.2 Main waste sources

Construction period.

Solid and liquid industrial wastes **during the construction** of the facility are the following:

Waste lead acid batteries. Waste is the used batteries containing such pollutants as lead and sulfuric acid. The process when the waste formation occurs is the exhaustion of its resource during the operation of batteries. As accumulated the waste batteries are sent under the agreement for recycling.

Waste fluorescent lamps. Waste is the used fluorescent lamps, which are used to illuminate the premises, camp, etc.

Oily waste (filters, rags). Dangerous component are the petroleum products. The process when the waste formation occurs are the various auxiliary works, operation and repair of machines, equipment, machinery and vehicles. The waste is gathered in special containers.

Waste motor oils. The contaminating component is petroleum products. The process of waste formation is the operation of vehicles, process equipment. The waste is collected in containers (barrels), which are installed on a specially equipped area.

Oil sludge (bottom sediment). Waste is the sediment in the process tanks for fuel storage.

Scrap metal, including the damaged equipment, as well as remnants of metal structures, empty metal barrels and packages; scraps of cables and wire ropes;

The processes when waste is generated: various construction work, maintenance and repair of process equipment.

Stubs of welding electrodes. Waste is generated during the welding.

Scrap metal, including stubs of welding electrodes are transferred to third parties for recycling.

Construction waste - silicon-containing remnants of building materials, broken brick, remnants of cement, mortar, concrete, etc. The waste is generated during the construction and installation work. Construction waste is directly transported by special companies for disposal.

Used tires. The process when the waste formation occurs is the operation of vehicles. Contaminating component: rubber of tires.

Food waste. It is collected in the sealed labeled containers installed on specially equipped sites of the enterprise. By the time of project development for the transfer of this type of waste the contractor is still being determined.

Domestic waste. This type of waste is generated in the process of human life, the functioning of the camp. Waste consists of cardboard, paper, glass, plastic and other items.

Solid sediment from sewage treatment plants. It is formed during the treatment of wastewater (surface water) polluted with petroleum products.

Operation period

Solid and liquid industrial wastes during **production operation** are the following:

Concentration tailings. Waste are flotation tailings generated during the concentration of ores and the production of copper and molybdenum concentrates. The waste by the slurry pipelines is sent to the tailing pond.

Used lead acid batteries. Waste is the used batteries containing pollutants such as lead and sulfuric acid. The process when the waste formation occurs is the exhaustion of its resource during the operation of batteries. As accumulated the waste batteries are sent under the agreement for recycling.

Waste fluorescent lamps. Waste is the used fluorescent lamps, which are used to illuminate the premises, camp, etc. As accumulated the waste is transferred to a specialized enterprise under a demercurization contract.

Oily waste (filters, rags). Dangerous component are the petroleum products. The process when the waste formation occurs are the various auxiliary works, operation and repair of machines, equipment, machinery and vehicles. The waste is collected in special containers. As accumulated the waste is transferred to a specialized enterprise under the agreement.

Waste motor oils. The contaminating component is petroleum products. The process when the waste formation occurs is the operation of vehicles, process equipment. The waste is collected in containers (barrels), which are installed on a specially equipped area. As accumulated the waste is transferred to a specialized enterprise under the agreement.

Oil sludge (bottom sediment). Waste is the sediment in the process tanks for fuel storage. As accumulated the waste is transferred to a specialized enterprise under the agreement.

Scrap metal, including the damaged equipment, as well as remnants of metal structures, empty metal barrels and packages; scraps of cables and wire ropes;

The processes when waste is generated: various construction work, maintenance and repair of process equipment.

Stubs of welding electrodes. The process when the waste formation occurs is the welding.

Scrap metal, including stubs of welding electrodes are transferred to third parties for recycling. As accumulated the waste is transferred to a specialized enterprise under the agreement.

Reagent packaging (paper, cardboard). It is generated when using reagents. As accumulated is transferred to a specialized enterprise under the agreement.

Construction waste - silicon-containing remnants of building materials, broken brick, remnants of cement, mortar, concrete, etc. The waste is generated during the construction and installation work. The construction waste is directly transported by special companies for disposal.

Used tires. The process when the waste formation occurs is the operation of vehicles. Contaminating component: rubber of tires. As accumulated is transferred to a specialized enterprise under the agreement.

Food waste. It is collected in the sealed labeled containers installed on specially equipped sites of the enterprise. As accumulated is transferred to a specialized enterprise under the agreement.

Domestic waste. This type of waste is generated in the process of human life and activities. Waste consists of cardboard, paper, glass, plastic and other items. As accumulated is transferred to a specialized enterprise under the agreement.

Solid sediment from sewage treatment plants. It is formed during the treatment of wastewater (surface water) polluted with petroleum products. As accumulated is transferred to a specialized enterprise under the agreement.

3.4.3 Types of waste and the volume of their formation

This section considers the physical and chemical characterization of the waste by hazard level and determines the estimated amount of waste generated, as well as the methodology for calculating the total amount of waste generated during the operation of the second concentration plant.

Characterization of waste by hazard levels

According to the Waste Classifier, the Order of the Minister of Environmental Protection of May 31, 2007. No. 169-p [9], all waste generated during production activities can be divided into three hazard levels:

- Green - G index;
- Amber – A index;
- Red – R index.

And also waste TMO – concentration waste.

Below is a description of the waste by hazard levels and a brief description of the process of their formation.

Hazard levels for waste production and consumption:

Amber list

- waste lead batteries;
- waste fluorescent lamps;
- waste oil;
- waste filter material (polyurethane foam)
- waste oil and fuel filters;
- waste bags and filter elements
- oil sludge;
- solid sediment of sewage treatment plants.
- oily rags;

Green list:

- ferrous scrap;
- steel waste and scrap;
- old pneumatic tires;
- stubs of welding electrodes;
- construction waste;
- wood waste;
- container for reagents;
- waste rubber products;
- waste polypropylene filter fabric of vacuum belt filter;
- domestic waste (domestic solid waste - DSW);
- food waste.

Concentration waste

- final tailings (thickened).

The volumes of DSW generation are determined based on the number of working personnel.

1. Domestic solid waste (DSW), hazard level - Green (GO060).

Number of employees: construction period - 2500 people, operation period - 700 people. Operation mode 365 days a year. The amount of generated DSW according to the norms will be 75 kg per person:

0,075 t/year x 2500 = 187,5 t / year

0,075 t/year x 700 = 52,5 t / year

DSW will be stored in special containers and, as it is accumulated, will be trasnfered by the contracting organization for further processing and disposal.

2. Oily rags - 0,508 t, hazard level - amber (AD060).

Oily rags are formed as a result of operation, maintenance, repair of mining equipment and vehicles, wiping the hands and is a textile polluted with petroleum products (fuel and lubricant materials).

The standard amount of waste formation is determined on the basis of the actual consumption of the fabric to be used for the rags at the enterprise (Mo, ton/ ear), the standard content of oils (M) and moisture (B) in the rags according to the formula:

$H = Mo + M + B$, ton/year

Where $M = 0,07 \times Mo$ – the standard content of oils in the rag;

The planned consumption of cloth to be used for rags will be 0,475 ton/year. Standard formation of oily rag:

$H = 0,475 + (0,07 \times 0,475) = 0,508$ ton/year

Oily wiping rags will be temporarily stored in closed containers, and transported to a special enterprise under the agreement.

3. Waste oils not suitable for their intended use, hazard level - amber (AC030).

The amount of waste oils generated during the operation will be 20,2 tons/year. The amount is adopted according to the project.

Used oils, mainly represented by engine, transmission and lubricating special oils, greases, are temporarily collected in metal containers with subsequent re-use for the repair of equipment with further transportation to a special enterprise under the contract.

4. Lead batteries, whole or broken, hazard level - amber (AA170).

The volume of generation of waste batteries will be 1,1 ton/year in the construction period and 0,98 ton/year in the operation period. The amount of accumulation of batteries is taken as for similar production type.

Used batteries will be transferred for recycling to a specialized organization under the contract.

5. Waste pneumatic tires, hazard level - Green (GK020).

The volume of waste tires generation will be 9,54 ton/year and during the construction will be 10 ton/year. The volume of waste tire formation is accepted as for similar production.

Waste is formed as a result of wear of pneumatic tires during the operation of vehicles. Waste tires will be placed on a special site (with a shelter) for temporary storage or in a garage and will be sent for recycling under an agreement with a specialized organization.

6. Scrap metal – hazard level - Green (GA080).

The amount of formation during the operation period is 2,5 tons, and during the construction period is 10 ton/year. The amount of formation is taken as for similar production.

The process when the waste is generated: maintenance and repair of process equipment.

7. Waste and scrap steel – hazard level - Green (GA070).

The volume of waste formation is 5000 tons.

Waste steel balls used in the mills. The standard of waste generation is taken according to the project.

8. Remnants and stubs of welding electrodes, hazard level - Green (GA090).

Waste generation process: welding. Electrode consumption, kg, M = 2650 kg / year for the operation period, 4650 kg / year - for the construction period.

The amount of waste generated, ton/year

G = K * M/100000 = 6,5 *2,65 / 100 = 0,172 ton/year;

G = K * M/100000 = 6,5 *4,65 / 100 = 0,302 ton/year;

K - hardly removable loss of electrodes on stubs,%, K = 6,5.

Scrap metal, including stubs of welding electrodes are temporarily stored on a special hard-coated storage area for scrap metal for subsequent shipment to a specialized enterprise under the agreement.

9. Reagent packaging.

Calculation of waste generation from using the reagents

The waste packaging is formed as a result of the unpacking of the reagents used in the enterprise. The amount of packaging depends on the consumption of raw materials. Based on the project data, the number of packaging (bags) of the reagents is:

- paper bag - 8000 pieces/year (weight of 1 bag = 400 g);
- Big bags 1000 kg - 5000 pcs / year (weight of 1 bag = 2.1 kg);
- Eurocube 1000 l – 2000 pieces / year (weight of 1 tank = 60 kg).

The rate of waste formation will be [19]:

M = n x m/1000, t/year

where n is the number of bags, pcs;

m is the weight of one bag, kg.

- paper bag - 8000 x0.4 / 1000 = 3,2 t / year;
- big bag 1000 kg - 5000 x 2,1 = 10,5 t/year;
- Eurocube 1000 l pcs / year - 1000 x 60 = 60 ton/year.

Final table

Waste code	Waste name	Q-ty, t/year
GH010	Packages for reagents	*3,2*
GH010	Big bag 1000 kg	*10,5*
GH011	Eurocube 1000 l	*60*
GH010+GH011	TOTAL	***73,2***

There is a specially equipped area for temporary accommodation of the reagent warehouse on the site. Plastic tanks-eurocubes are transferred to specialized enterprises for sale or disposal.

Waste packaging paper and polypropylene big bags resulting from the unpacking of flocculant, xanthate, soda and copper sulfate are collected in containers on the industrial waste area, then pressed into cubes and transferred to the specialized enterprises for sale or disposal.

10. Waste filtering material (polyurethane foam), waste hazard level -AD060 (amber).

Waste is formed on the storm water oil trap. The volume of formation will be – 1,0 tons / year. As accumulation the waste filter material will be transported under an agreement with a specialized organization.

11. Waste fuel oil filters, hazard level - amber AD060.

Waste fuel oil filters are formed as a result of replacement during maintenance and repair of motor vehicles. The main replacement work is performed at the vehicle repair. The rate of waste generation is 0,42 tons, taken according to a similar project. Filters are collected in metal containers with lockable lids with subsequent transfer to specialized enterprises.

12. Wood waste, hazard level - Green, GL010.

Wood waste is generated during the routine repairs. The formation volume is 19,7 tons taken according to the project data. As they accumulate, they are sold to the population or delivered to the landfill of industrial waste under an agreement.

13. Construction waste, hazard level - Green, GG170.

Construction waste is generated during the ongoing repairs. The main replacement work is performed at the vehicle repair site. The rate of waste generation is 5,0 ton/year - for the operation period, 50 tons / year - for the construction period, is adopted according to the project data. Construction waste is directly transported by specialized organizations for disposal.

14. Waste fluorescent lamps. Hazard level - amber, AA100.

Waste is the used fluorescent lamps, which are used to illuminate the territory of industrial sites. The formation volume is 0,0202 tons taken according to the project. After failure, they are stored in specially equipped containers (metal boxes with a cover), in a special room with natural ventilation and a concrete floor, in places with limited accessibility. Waste lamps are subject to demercurization under the contract.

15. Waste bags and filter elements of gas cleaning equipment, hazard level - amber AD040.

The bags and filtering elements of gas-cleaning equipment are formed as a result of operation, maintenance and repair of bag filters for exhaust gases cleaning, replacement of filter elements in filters of various brands. The volume of waste formation is 0,147 tons, according to the project data. As it accumulates, it is transported to the landfill of industrial waste under the contract.

The waste filter elements are collected in containers, transported to a temporary storage site and transferred to a specialized enterprise for recycling.

16. Waste polypropylene filter fabric vacuum belt filter, hazard level - Green GN014.

Waste polypropylene filter cloth is formed as a result of operation of the vacuum belt filter. The volume of formation is 27,8 tons according to the project data.

Waste polypropylene filter cloth is collected in containers, transported to a temporary storage site and transferred to a specialized enterprise for recycling.

17. Waste rubber products, hazard level - Green GK010.

Waste rubber is formed as a result of the use of rubber products at the enterprise (conveyor belts, belts, hoses, tubes, mill lining, etc.), as well as in the process of repairing equipment and motor vehicles, etc.

The amount is determined by the project. Waste rubber products (conveyor belts, hoses, tubes, rubber lining, etc.) are collected in containers, transported to a temporary storage area and transferred to a specialized enterprise for recycling.

Final table

Waste code	**Waste name**	**Q-ty, ton/year**
GK010	Conveyor belt	1,28
GK010	Lining	50,0
GK010	Hoses, gaskets, hoses, etc.	0,72
GK010	TOTAL	52,0

18. Solid sediment from sewage treatment plants, hazard level of waste AE 020 (amber).

Waste is generated during the treatment of wastewater from sewage treatment plants. The volume of solid sediment formation during the operation of the designed treatment plant will be – 2,9 ton/year. As accumulated the solid sediment will be trasnported under an agreement with a specialized organization.

19. Final tailings, thickened (TMO).

It is formed after bulk flotation of sulphide ore and extraction of copper and molybdenum into concentrate. The volume of formation is 24,685,122 thousand tons.

The standards for flotation tailings are not sent in this EIA section, because they will be made during the implementation of the EIA section to the project of the 2 phase of the tailing dump.

Characteristics of the waste generated during construction are shown in table 3.4.1, and during the operation of Concentrator in table 3.4.2.

Proposals for the disposal of waste generated during the operation of the facilities for the construction period are shown in table 3.4.3, for the period of operation 2022-2028 - in tables 3.4.4 - 3.4.6.

Table 3.4.1 – Specification of waste formed during the construction period

Waste name	Waste source	Hazard class	Amount of waste generation, t	Hazard level	Waste code under Waste Classifier	Physical-and-chemical characteristics of waste			
						Physical form (aggregate state)	Solubility	Volatility	Content of the main components,%
1	2	3	4	5	6	7	8	9	10
Containers for paints and varnish	Painting works	AD070 Amber	3,5	Flammable solids	N080100//Q1// P2+S6//C10//H3// R13//A702//AD070	Solid	Nonsoluble	-	Paints and varnishes – 6% Meyal iron – 94 %
Oily rags	Using the rags for wiping the machines and equipment	AD060 Amber	0,508	Flammable solids	N150101//Q5//S11+S 18//C84//H4.1//D5+R 13//A840//AD060	Solid	Nonsoluble	-	Fabric, textiles - 73% Mineral oil - 12% Water - 15%
Stubs of welding electrodes	Welding works	GA090 Green	0,302	Ecotoxic substances	N120299//Q10//S9+S 6//C10+C15+C18//H 12//R13//A227// GA090	Solid	Nonsoluble.	-	Iron metal - 90% Ash - 0.05% Manganese - 0.5% Soot (carbon black) - 6% Titanium - 2% Silicon dioxide - 1.45%
Construction waste	Building works	GG170 Green	50	Ecotoxic substances	N170101//Q7//S12+S 14+S18//C10//H4.1// R13//A280// GG170	Solid	Nonsoluble	-	Wood - 73% Iron metal - 10% Concrete - 7%, Glass - 7% Ceramics - 4%
Ferrous scrap metal Metal shavings	Remains of pipes and metal structures during equipment installation	GA080 Green	10	Ecotoxic substances	N120101//Q10//S10+ S6//C10//H12// R13//A231//GA080	Solid	Nonsoluble	-	Iron oxide - 2% Iron metal - 95% Soot (carbon black) - 3%
Domestic solid waste	Staff life and activities	GO060 Green	187,5	Ecotoxic substances	N200100//Q16//S14+ S18+S13+S12//C13// H4.1+ H6.2// D5//A920//GO060	Solid	Nonsoluble	-	Food waste - 30-38% Paper waste - 25-30% Textile waste - 4-7% Broken glass and Glass container 5-8% Bones - 0.5-2%
Waste fluorescent lamps	Expiry of operational life	AA100 Amber	0,0202	Toxic matter	N200318//Q6//M7//C 01+C19+C26//H6.1// R13//A940//AA100	Solid	Nonsoluble	-	Glass - 79% Phosphor - 3% Mercury 0,015 -0,3% Other 17%

Waste name	Waste source	Hazard class	Amount of waste generation, t	Hazard level	Waste code under Waste Classifier	Physical-and-chemical characteristics of waste			
						Physical form (aggregate state)	Solubility	Volatility	Content of the main components,%
1	2	3	4	5	6	7	8	9	10
Waste batteries	Battery expiration	AA170 Amber	1,1	Toxic matter	N200502//Q6//M7//C21+C2C7+C31//H11+H4.1//R13//A161//AA170	Solid	Nonsoluble	-	Metal dust - 3.59% Sulfuric acid - 32,12% Water - 6.17% Lead - 58% Arsenic - 0.12%
Waste oils	Oil replacing in the lubrication systems of equipment	AC030 Amber	20,2	Highly inflammable liquids	N150100//Q9//L8//C01+C10//H4.1//R13//A941//AC030	Liquid	Slightly soluble	-	Water - 5% Mineral oil - 78% Mechanical impurities - 17%
Waste filters (oil and fuel)	Formed dueing the vehicle operation	AC030 Amber	0,4 2	Flammable solids	N150100//Q9//L8+M7//C01+C10//H4.1//R13//A941//AC030	Solid	Nonsoluble	-	Iron metal - 25% Aluminum - 17.3% Oil mineral oil - 10% Synthetic rubber - 9% Cellulose - 38.7%
Waste tire	Formed during the operation of vehicles as a result of tire wear	GK020 Green	10	Flammable solids	N200402//Q6//S18//C10+C15+C18//H4.1//R13//A731//GK020	Solid	Nonsoluble	-	Synthetic rubber - 96% Manganese - 1.2%; Silicon - 0.05% Iron metal - 2.45% Carbon - 0.3%
Waste plastic	Formed due to the use of materials packed with film	GH010 Green	3,5	Ecotoxic substances	N160399//Q5//S//C00//H13//D15+R13//A224//GH010	Solid	Nonsoluble	-	Polyethylene
Solid sediment of treatment plants	Solid sediment from sewage treatment plants of surface stormwater, car wash	AE020 Amber	2,9	Ecotoxic substances	N 050107//Q9//P1//C84+C81//H13//D10+R14//A160//AE020	Solid	Nonsoluble	-	Petroleum products, sand, groun, water

Table 3.4.2 – Specification of waste formed during the operation period

Waste name	Waste source	Hazard level	Amount of waste generation, t	Hazard class	Waste code under Waste Classifier	Physical-and-chemical characteristics of waste			
						Physical form (aggregate state)	Solubility	Volatility	Content of the main components,%
1	2	3	4	5		6	7	8	9
Waste fluorescent lamps	Expiry of operational life	AA100 Amber	0,0202	Toxic matter	N200318//Q6//M7//C01+C19+C26//H6.1//R13//A940 //AA100	Solid	Nonsoluble	-	Glass - 79% Phosphor - 3% Mercury 0,015 -0,3% Other 17%
Waste batteries	Battery expiration	AA170 Amber	0,98	Toxic matter	N200502//Q6//M7//C21+C2C7+C31//H11+H4.1//R13 //A161// AA170	Solid	Nonsoluble	-	Metal dust - 3.59% Sulfuric acid - 32,12% Water - 6.17% Lead - 58% Arsenic - 0.12%
Waste oils	Oil replacing in the lubrication systems of equipment	AC030 Amber	20,2	Highly inflammable liquids	N150100//Q9//L8//C01+C10//H4.1// R13//A941//AC030	Liquid	Slightly soluble	-	Water - 5% Mineral oil - 78% Mechanical impurities - 17%
Waste filters (oil and fuel)	Formed during the vehicle operation	AC030 Amber	0,42	Flammable solids	N150100//Q9//L8+M7//C01+C10//H4.1//R13//A941// AC030	Solid	Nonsoluble	-	Iron metal - 25% Aluminum - 17.3% Petroleum mineral oil - 10% Synthetic rubber - 9% Cellulose - 38.7%
Scrap tires	Formed during the vehicle operation	GK020 Green	9,54	Flammable solids	N200402//Q6//S18 //C10+C15+C18 //H4.1//R13//A731//GK020	Solid	Nonsoluble	-	Synthetic rubber - 96% Manganese - 1.2%; Silicon - 0.05% Iron metal - 2.45% Carbon - 0.3%
Oily rag	Using the rags for wiping the machines and equipment	AD060 Amber	0,508	Flammable solids	N150101//Q5//S11+S18//C84//H4.1//D5+R13//A840// AD060	Solid	Nonsoluble	-	Fabric, textiles - 73% Mineral oil - 12% Water - 15%
Stubs of welding electrodes	Welding works	GA090 Green	0,172	Ecotoxic substances	N120299//Q10//S9+S6//C10+C15+C18//H12//R13//A227// GA090	Solid	Nonsoluble	-	Iron metal - 90% Ash - 0.05% Manganese - 0.5% Soot (carbon black) - 6% Titanium - 2% Silicon dioxide - 1.45%

Waste name	Waste source	Hazard level	Amount of waste generation, t	Hazard class	Waste code under Waste Classifier	Physical-and-chemical characteristics of waste			
						Physical form (aggregate state)	Solubility	Volatility	Content of the main components,%
1	2	3	4	5		6	7	8	9
Construction waste	Repair works	GG170 Green	5,0	Ecotoxic substances	N170101//Q7//S12+S14+S18//C10//H4.1//R13//A280//GG170	Solid	Nonsoluble	-	Wood - 73% Iron metal - 10% Concrete - 7%, Glass - 7% Ceramics - 4% Dimethylbenzene (xylene) - 0.5% Butyl acetate - 0.5%
Ferrous scrap metal Metal shavings	Remains of pipes and metal structures during equipment repair	GA070 Green	2,5	Ecotoxic substances	N120101//Q10//S10+S6//C10//H12//R13//A231// GA070	Solid	Nonsoluble	-	Iron oxide - 2% Iron metal - 95% Soot (carbon black) - 3%
Waste and scrap steel	Waste balls	GA070 Green	5000	Ecotoxic substances	N200308 // Q16 // S6 // C10 // H00 // D16+R4 // A214 // GA070	Solid	Nonsoluble	-	Iron oxide - 2% Metal steel - 95% Soot (carbon black) - 3%
Wood waste	Repair works	GL010 Green	19,7	Ecotoxic substances	N200317 // Q16 // S18 // C00 // H4.1// R13+D1 // A781 // GL010	Solid	Nonsoluble	-	Wood chips, sawdust
Waste filtering material	Formed at the local storm water treatment planst	AD060 Amber	1,0	Ecotoxic substances	N150100 // Q5 // WS00 // C81 // H13 //D16+R14 // A214 // AD 060	Solid	Nonsoluble	-	Polyurethane foam sand, gound, oil products
Containers of reagents	Formed as a result of reagent using	GH010 Green	73,2	Ecotoxic substances	N150200//Q5//S//C00//H13//D15+R13//A224//GH010	Solid	Nonsoluble	-	Polyethylene
Domestic solid waste	Life and activities of the personell	GO060 Green	52,5	Ecotoxic substances	N200100//Q16//S14+S18+S13+S12//C13// H4.1+H6.2// D5//A920//GO060	Solid	Nonsoluble	-	Food waste - 30-38% Paper waste - 25-30% Textile waste - 4-7% Glass scrap and glass containers 5-8% Bones - 0.5-2%
Sweepings from the hard surfaces	Territory cleaning	-	13,0	Non hazard		Твердые	Nonsoluble	-	Soil, sand, plant remains
Waste hoses and filter elements of gas-cleaning equipment.	They are formed as a result of operation, maintenance and repair of bag filters for cleaning exhaust gases, replacement	AD140 Amber	0,147	Ecotoxic substances	N150100 //Q5// WS00 //C81//H13//D16+R14 //A214//AD 140	Solid	Nonsoluble	-	Polyethylene

Waste name	Waste source	Hazard level	Amount of waste generation, t	Hazard class	Waste code under Waste Classifier	Physical-and-chemical characteristics of waste			
						Physical form (aggregate state)	Solubility	Volatility	Content of the main components,%
1	2	3	4	5		6	7	8	9
	of filter elements in filters of various brands.								
Waste polypropylene filter fabric of the vacuum belt filter.	Formed as a result of operation of the vacuum belt filter,	GH014 Green	27,8	Infectious substances	N150100//Q5//S//C00//H13//D15+R13//A224//GH040	Solid	Nonsoluble	-	Polypropylene
Rubber waste	They are formed as a result of the use of rubber products at the plabt (conveyor belts, hoses, tubes, mill lining, etc.).	GK010 Green	52,0	Non hazard	N200799//Q6//S18 //C10+C15+C18 //H4.1//R13//A731//GK010	Solid	Nonsoluble	-	Rubber
Solid sediment from sewage treatment plants	Solid sediment from sewage treatment plants of surface storm sewage, car wash	AE020 Amber	2,9	Ecotoxic substances	N 050107//Q9//P1// C84+C81//H13//D10+ R14//A160//AE020	Solid	Nonsoluble	-	Oil products sand, grpund, water
Final talings (concentration waste)	Concentrating plant Ore concentration	TMO	24685122	Non hazard		Solid	Nonsoluble	-	Copper - 0.059%; Molybdenum - 0.002%; Gold - 0,012; Silver - 0.597 g / t Silicon dioxide- 60-70%

3.4.4 Proposals for production and consumption waste disposal standards

Table 3.4.3 - Waste disposal standards for 2019-2022 for the construction period

Waste name	Waste generation, ton/year	Disposal, ton/year	Transfer to third party, ton/year
Total	**296,4502**		**296,4502**
Including, production waste	**108,7002**		**108,7002**
Construction waste	**187,75**		**187,75**
Amber hazard level			
Oily rags	0,508		0,508
Waste filters (oil and fuel)	0,42		0,42
Waste oil (grease)	20,2		20,2
Waste batteries	1,1		1,1
Waste fluorescent lamps	0,0202		0,0202
Containers for paints and varnish	3,5		3,5
Oil contaminated ground	6,5		6,5
Solid sediment of treatment plants	2,9		2,9
Green hazard level			
Domestic waste	187,5		187,5
Stubs of welding electrodes	0,302		0,302
Waste tires	10,0		10,0
Waste plastic	3,5		3,5
Construction waste	50,0		50,0
Ferrous scrap metal	10,0		10,0

Table 3.4.4 - Standards for waste disposal during operation period for the years 2022-2028

Waste name	Waste generation, ton/year	Disposal, ton/year	Transfer to third party, ton/year
Total	**5268,5872**		**5268,5872**
Including, production waste	**5216,0872**		**5216,0872**
Construction waste	**52,5**		**52,5**
Amber hazard level			
Oily rags	0,508		0,508
Waste filters (oil and fuel)	0,42		0,42
Waste oil (grease)	20,2		20,2
Waste batteries	0,98		0,98
Waste fluorescent lamps	0,0202		0,0202
Solid sediment of treatment plants	2,9		2,9
Waste bags and filter elements of the gas-cleaning equipment	0,147		0,147
Waste filtering material	1,0		1,0
Green hazard level			
Domestic waste	52,5		52,5
Stubs of welding electrodes	0,172		0,172
Waste tires	9,54		9,54
Containers of reagents	73,2	-	73,2
Construction waste	5,0		5,0
Wood waste	19,7		19,7
Ferrous scrap metal	2,5		2,5
Waste and scrap steel (linig, balls)	5000,0		5000,0
Waste polypropylene filter fabric of the vacuum belt filter.	27,8		27,8
Rubber waste	52,0		52,0

3.4.5 Waste Management Program

Waste Management Program was executed in accordance with Article No. 212 of the Environmental Code of the Republic of Kazakhstan and the Rules for Developing a Waste Management Program, approved by Order of the Minister of Energy of the Republic of Kazakhstan No. 146 dated November 25, 2014 on the approval of Rules for developing a Waste Management Program.

Waste Management Program aims to improve the effectiveness of procedures for assessing changes in the volume and composition of waste to develop operational waste minimization policies using economic or other mechanisms to make positive changes in production and consumption patterns by:

- improvement of production processes, including through the introduction of low-waste technologies;
- reuse of waste or its transfer to individuals and legal entities interested in their use;
- processing, recycling or disposal of waste using the best available technologies or other reasonable methods.

The Waste Management Program contains the following sections:

- objectives and goals;
- qualitative and quantitative indicators.
- necessary resources and sources of their financing.
- action plan for the implementation of the program.

The resulting production and consumption wastes should be temporarily stored in specially designated areas of the enterprise and then transported to specialized organizations as per contracts for processing and disposal.

Temporary storage of waste is done strictly in specialized places, in tanks and on specialized sites, which reduces or completely eliminates pollution of environmental components. The qualitative and quantitative characteristics of harmful substances are determined by a calculation method according to approved methods.

The main activities during production processes include:

- waste fluorescent lamps;
- waste lead batteries;
- used engine oil;
- waste oil and fuel filters;
- oily rags;
- ferrous scrap;
- waste and scrap steel;
- stubs of electrodes;
- container from reagents (packing remains);
- used tires;
- wood waste;
- waste sleeves and filter elements of gas cleaning equipment;
- oil products from treatment facilities;
- solid residue from sewage treatment plants;
- consumed filtering material at the local stormwater treatment facilities (polyurethane foam);
- waste rubber products;
- waste polypropylene filter fabric;
- enrichment wastes - tailings (condensed);

Consumption waste includes:

- mununicipal waste (municipal solid waste – MSW).

3.4.5.1 Waste Management Methods

According to the legislative and regulatory legal acts adopted in the Republic of Kazakhstan, production and consumption waste must be collected, stored, disposed of, transported and buried, taking into account their environmental impact.

The company adheres to a clear hierarchy of production and consumption waste management methods.

Preventing or minimizing waste generation ranks first in the hierarchy of methods. This approach saves money on waste management activities, and also leads to increased productivity and reduced specific use of resources.

Disposal / burial of waste is the least acceptable technology for waste management, therefore recycling contracts are concluded only with those organizations that have appropriate waste treatment facilities

In accordance with the approved Waste Management Plan of the Company, all generated waste of production and consumption is sorted at the places of their formation and collected in containers.

As it accumulates, waste is transported to the temporary waste storage site, where it is sorted again. If sorted waste can be reused (for example, wooden boxes, metal products, cardboard boxes, polypropylene bags, etc.), materials are transferred for production needs.

If it is impossible to reuse, the waste is compressed, packaged and prepared for transfer to a specialized company for disposal.

The waste collected in the tank, as it accumulates, will be transferred to specialized enterprises for disposal or recycling. Liquid waste - waste oils from motor transport will be collected in special barrels with lids, stored on a special site and transported also to the depot with subsequent delivery for recycling. Empty cans, plastic tanks and various metal barrels will be reused.

Transportation of waste is assumed in closed special containers, eliminating waste environmental pollution during transportation or in the event of an accident of vehicles.

Used fluorescent lamps. Waste is used fluorescent lamps, which are used for lighting rooms, etc. After failure of thermometers, instruments and lamps, they are stored in specially equipped containers (metal boxes with a lid), in a special room with natural ventilation and a concrete floor, in places with limited accessibility. New and intact waste lamps and thermometers are stored in their original packaging (in cardboard boxes in special perforated packaging). Spent lamps are subject to demercurization under a special contract.

Used lead acid batteries. Waste is used batteries containing pollutants such as lead and sulfuric acid. The process of the waste formation: running out of its resource during the operation of batteries. As accumulated waste batteries are sent for recycling under a special contract.

Oiled waste (filters, rags). Dangerous components are petroleum products. The process of the waste formation: a variety of auxiliary work, operation and repair of machines, equipment, machinery and vehicles. They are gathered in special containers. As accumulated, this waste is shipped under a recycling contract.

Used motor oils. The contaminating components are petroleum products. The process of the waste formation: the operation of vehicles, process equipment. They are collected in containers (barrels), which are installed on a specially equipped site. As accumulated, waste oils are sent for processing under a special contract.

Oil sludge (bottom sediment). Waste is precipitation in process tanks for fuel storage.

Scrap metal. The process of the waste formation: various construction work, maintenance and repair of process equipment, ball wear on mills.

Scrap metal, including the stumps of welding electrodes are transferred to third parties for recycling

Temporary storage of scrap metal with subsequent transfer to recycling to third-party organizations is cyclical in nature through the “storage - temporary storage - shipment”

technological chain. With such a technological functioning of temporary storage sites, a certain part of the scrap metal is for objective reasons located at the storage sites, which, however, cannot be considered as a waste disposal due to its cyclical nature and, therefore, the temporary storage volumes of scrap metal is not subject to rationing.

Construction waste - silicon-containing remnants of building materials, broken brick, remnants of cement, mortar, concrete, etc. The process of the waste formation: the current construction work. Construction waste is directly transported by specialized organizations for disposal.

Wood waste - sawn timber waste, sawdust, shavings. Sold to the population for domestic needs.

Used tires. The process of the waste formation: the operation of vehicles. Contaminating component: tire covers.

Tires (tubes) of automotive equipment after temporary storage in an open area with a canopy, are periodically transferred for recycling to a specialized organization as per one-time coupons. Temporary storage of tires with the subsequent transfer to recycling to third-party organizations is cyclical in nature through the "warehousing - temporary storage - shipment" technological chain. Transportation is carried by automobile transportation.

Reagent packaging

Plastic containers, eurocubes, packaging paper waste and polypropylene MKR, resulting from the unpacking of flocculant, xanthate, soda are pressed into high-density briquettes and transferred to specialized enterprises for sale or disposal.

Spent hoses and filter elements of gas cleaning equipment.

Spent filter elements are collected in containers, transported to a temporary storage site and transferred to a specialized enterprise for recycling.

Vacuum belt filter polypropylene filter fabric waste.

Polypropylene filter fabric waste is collected in containers, transported to a temporary storage site and transferred to a specialized enterprise for recycling.

Rubber products waste.

Rubber products waste are collected in containers, transported to a temporary storage site and transferred to a specialized enterprise for recycling.

Solid sediment from sewage treatment plants.

The captured solid sediment is collected in hermetic containers and, as it is accumulated, transported to a specialized enterprise under a contract.

Municipal waste. This type of waste is generated in the process of human life, the functioning of a camp.

During periods of solid waste accumulation, they are temporarily stored in the territory of an enterprise in special places, equipped in accordance with the applicable rules and regulations. MSW is temporarily stored in metal containers with a capacity of 1.0 m3 installed in specialized open areas. As the containers are filled, MSW is removed for disposal at the MSW landfills under a contract.

PET bottles are collected in special mesh containers and, as they accumulate, are crushed on the crushing equipment (shredder) into plastic chips for subsequent sale.

Paper and cardboard packaging is collected separately, for further compaction on the pressing equipment for sale.

Waste storage sites.

According to the legislative and regulatory legal acts adopted in the Republic of Kazakhstan, production and consumption waste must be collected, stored, disposed of, transported and buried, taking into account their environmental impact.

The waste generated until the removal under contracts will be temporarily stored in the territory of the projected production for a period not exceeding 6 months.

For this purpose, special sites will be constructed on the territory of the enterprise for the temporary storage of all types of waste. Special containers will be used to collect waste.

Containers are planned to be stored in specially designated places at a sufficient distance from any explosive and fire hazardous area. Methods of handling solid industrial and household waste are given in the technological regulations and work instructions during production activities. All operations performed with waste should be recorded in " Production and Consumption Waste Journal".

The temporary storage site for old pneumatic tires is located on the territory of the repair unit. On the site there shoud be a canopy. The area of the site is 100 m2. Used tubes and tires are transferred to a specialized organization for recycling. Due to the large amount of worn tire formation, their partial placement and storage is provided prior to the transfer to a specialized organization.

The waste collected in the tank, as it accumulates, will be removed for disposal depending on the type of waste to the sites of disposal, recycling or processing. Liquid waste - waste oils from motor vehicles will be collected in special barrels with lids, stored on a special site and transferred to specialized enterprises. Empty cans, plastic tanks and various metal barrels will be reused. Used fluorescent lamps, will be placed in special metal containers in a warehouse in the original carton pachaging before transferring them to de-mercurization. The manufacturer packaging minimizes breakage and, consequently, the ingress of mercury and its compounds into the natural environment. Scrap metal will be temporarily stored at a special site. Municipal solid waste will be stored in containers at a special concreted site and, as it accumulates, will be removed under a contract to the MSW landfill.

Waste transportation is assumed in closed special containers, excluding waste environmental pollution during transportation or in the event of a vehicles accident.

All waste is transported under strict control, and all waste is recorded (ie. type, quantity, description, route, marking number, category, starting point, destination, waybill number, date, signature).

Production and consumption wastes can mainly affect soil and vegetation cover. To reduce the impact proposed is the next set of measures:

- comply with the sanitary and hygienic requirements, timely dispose of production and consumption wastes, store and transport them to special polygons; cleaning the area from domestic waste;
- introduce a system of waste management in the enterprise (with control over the process of waste formation, reception, sorting, separate storage and disposal);
- conducting continuous monitoring of exposure;
- strict control over the temporary storage of production and consumption waste in the territory of the designed production in specially designated areas.

3.4.5.2 Goals and objectives of Waste Management Program

The program offers the best solution to the problem, ensuring a reduction in waste storage at the enterprise and a reduction in the man-caused impact on the environment.

As priority goals and objectives is established implementation of measures aimed at improving the environmental situation through the introduction of a modern system for the production and consumption waste removal, disposal and burial.

The program provides for:

- timely collection of waste in special containers or containers for temporary waste storage;
- transfer of all waste to contractors for removal and further disposal / burial to specialized sites;
- documentation recording for waste collection with indication of waste volumes;
- information recording on waste disposal in the accounting logs and computer databases of the enterprise;
- drawing up reports and providing reporting data to the authorized state bodies;

- the annual conclusion (prolongation) of contracts for waste removal of from the enterprise territory.

Achievement of the objectives of the Program will be carried out through the implementation of integrated activities. The plan of measures provides for specific measures for the implementation of the Program and specifies the implementers, the timing of implementation, as well as the expected sources and amounts of financing.

3.4.5.3 Waste Management Program Indicators

Control over safe waste handling is carried out during implementation of the planned measures of the waste management plan and includes:

- waste identification by type and hazard level;
- equipping special sites in accordance with the existing SNiP in the Republic of Kazakhstan, for temporary parking of special equipment and vehicles, as well as temporary storage of necessary equipment and materials used during foperation;
- separate collection of various waste types;
- planning organizational and technical measures;
- methods for waste collecting and transporting;
- transfer of all waste for disposal / burial to specialized organizations.

The company will exercise clear control over waste collection, disposal and burial. The specialist responsible for waste collection and disposal ensures the proper waste separation, storage, processing and loading, waste must be removed from the production cites and transferred to third-party organizations on a contractual basis.

As part of the implementation of Waste Management Program, the main qualitative and quantitative indicators will be the transfer of industrial waste in full to the contracting company (under the contract)

Expected results from the implementation of the waste management program

In the course of measures aimed at the effective production and consumption waste management, the expected results will be:

- implementation of the system of separate collection, temporary storage on specially designated sites / containers of all waste with their further transfer for disposal / burial;
- reduduction of the negative waste impact on the environment;
- introduction of the system of control and objective recording of temporary production and consumption waste collection and subsequent disposal using financial leverage

Recommendations for Waste Management System organization

Enterprise Waste Management is the management of waste management procedures at all stages of the technological cycle, starting from waste generation to the final point of waste disposal.

The enterprise Waste Management System includes the following steps:

- development and approval of administrative documents on functions and responsibilities allocation for waste management activities;
- development and approval of all types of environmental regulatory documents of the enterprise for waste management;
- development and implementation of waste collection and disposal plan;
- organization and equipping of temporary waste storage sites that comply with regulatory requirements;
- preparation, execution and signing of contracts for the reception and transfer of waste for disposal, use, etc.

Responsible persons at all stages of waste management are the head of the enterprise, heads of industrial sites, sites, environmental specialists of the enterprise.

All types of production and consumption waste at the facilities of the enterprise, as well as raw materials, materials that have become unusable during storage, transportation, etc., are subject to recording (since they cannot be used for their intended purpose).

The list of wastes to be recorded is established based on the results of the waste sources inventory.

Temporary waste storage on the enterprise territory and the removal frequency should be carried out in accordance with regulatory documents and taking into account the technological conditions of waste generation, availability of specially prepared places for temporary storage, their area (volume), toxicological compatibility of waste disposal.

Waste collection for temporary storage is carried out in specially designated places and platforms, in labeled accumulative containers, containers, crates, barrels, bags.

In accordance with the requirements of the Environmental Code of the Republic of Kazakhstan (Article 289), passpots for all types of waste must be developed and submitted to the territorial environmental protection authority.

The most effective methods that can be used in the development of environmental programs of the enterprise on waste management are presented in the table

Table 3.4.7 – Methods for environmental pollution prevention in terms of waste management

Measures	Main provisions	Achievable result
Pre-planning	Certification of waste. Identification of types, sources, indicative volumes of waste generation; Identification of the requirements of legal acts in terms of waste management; Development of a waste management program	Compliance with environmental legislation requirements; Reducing the negative impact of planned activities; Improving the economic efficiency of production
Proper management and maintenance	Preventive maintenance and maintenance of equipment in proper order and cleanliness Using pallets to collect waste or equipment leaks; Removal of all types of waste from production sites after completion of work; Repair equipment on impermeable surfaces or coatings; Storage of chemicals and materials in rooms protected from the effects of natural phenomena, having secondary insulation as waterproof berms and curbs. Tanks must be labeled for easy identification without opening;	Reducing leaks, spills of fuel, oil, chemicals and other materials; Reducing the amount of contaminated soil formation, volume of materials unsuitable for subsequent use and attributable to waste (used oils, etc.); Reduced waste management costs and contaminated soil and wastewater treatment;
Inventory Management	Purchase of all materials at the right time and in the right amount. It is critical when working with reagents and materials of a short shelf life; Purchase of possibly non-hazardous materials to be recycled or disposed of; The use of a bar code to track the use of materials in the enterprise, their internal exchange between departments of the enterprise.	Reduced waste generation; Reducing waste management costs; Reduced operating costs
Product Substitution	Use in technological processes of non-toxic or low-toxic reagents and materials instead of substances with a high toxicity class	Waste reduction

3.4.5.4 Activities under Waste Management Program

To prevent and mitigate the negative impact of production and consumption waste during the work, technical and organizational measures should be foreseen and implemented:

- compliance with environmental requirements of laws and regulations of the Republic of Kazakhstan, international norms and standards;
- the appointment of persons responsible for production control in waste management, the development of appropriate job descriptions;
- keeping records of waste formation, movement, certification;
- ensuring full collection, timely disposal and removal of waste;
- waste disposal in designated areas in compliance with environmental requirements;
- organization and carrying out of waste transportation in ways that exclude their loss, the creation of emergency situations, harm to the environment, human health, economic and other objects.

Conclusion of contracts with specialized enterprises for waste removal and disposal.

During construction

The organization engaged in the construction of the designed facilities should be equipped with mobile waste collection equipment: waste bins to collect construction and other types of waste at work sites, containers and containers for collecting materials.

Waste of secondary raw materials category (ferrous metal scrap, welding electrodes stubs, construction waste), as it accumulates and at the end of construction, is transferred as secondary raw materials to interested organizations. Municipal solid waste, as it accumulates and at the end of construction, is transferred for storage at the MSW landfill under an appropriate contract or agreement

Compliance with environmental requirements for waste management during the construction of the designed facility should be ensured by the observance of a number of activities:

- the organization of places for waste collection and temporary storage (in containers and tanks) to prevent leakage, waste leakage;
- transfer of waste, in accordance with the relevant contracts, to specialized organizations for subsequent disposal, on the basis of the waste passports.

During the facility operation special protective measures are provided for handling production and consumption waste:

- organization of the site for waste collection and temporary storage with the use of anti-filtration materials - a monolithic reinforced concrete slab with a concrete base and a waterproofing layer of plastic film;
- transfer of waste, according to the relevant contracts, to specialized organizations for subsequent disposal.

Temporary waste storage at waste the collection and temporary storage sites and subsequent transfer is performed as follows:

- waste transformer oil, oily rags - closed metal tanks are installed in a storage place protected from precipitation for their collection. Removal and disposal will be executed on a contractual basis.
- municipal solid waste, dust from hard surfaces - collection is provided in closed containers. Removal and disposal will be executed on a contractual basis.

Temporary waste accumulation places equipped in accordance with the environmental requirements of the will not be sources of excessive impact on the environment components.

Table 3.4.8 shows the actions under Waste Management Program.

Table 3.4.9 shows the actions plan under Waste Management Program.

Table 3.4.8 – Program Implementation Actions

№ п/п	Actions	Indicator (qualitative/ quantitative)	Completion	Responsible	Execution Term	Estimated costs	Financing Sources
1	2	3	4	5	6	7	8
1.	Transfer for removal and disposal / burial of industrial waste to Contracting Companies	Ensuring environmental safety in industrial waste management	Regular disposal for disposal / burial by contracting companies as waste accumulates	Department of Environmental Protection	2019 – 2028	12436 thousand tenge	Own funds
2.	Proper handling of municipal solid waste	Ensuring environmental safety in waste management	Regular disposal for disposal / burial by contracting companies as waste accumulates	Department of Environmental Protection	2019 – 2028	1416 thousand tenge	Own funds

Actions Plan for the implementation of the program

The Actions Plan is an integral part of the Program and is a complex of organizational, economic, scientific, technical and other activities aimed at achieving the goal and objectives of the program, indicating the necessary resources, responsible performers, completion forms and deadlines.

The Actions Plan for the implementation of the program is compiled in accordance with the annex to the Rules of waste management program development.

In drawing up the Actions Plan, the following basic concepts were used:

- waste management - the use of waste as secondary material or energy resources;
- waste disposal - storage or disposal of production and consumption waste;
- waste recycling - physical, chemical or biological processes, including sorting aimed at extracting raw materials and (or) other materials from waste to be used later in the production (manufacturing) of goods or other products, as well as changing the waste properties to facilitate handling, reducing their volume or hazardous properties;
- waste storage - storage of waste in specially designated places for subsequent disposal, processing and (or) removal.
- transfer of waste - transfer of waste to third parties for recycling or disposal on a contractual basis.

The Actions Plan for the implementation of the production and consumption waste management program is given in table 3.4.9.

Implementation of the Actions Plan for the implementation of the production and consumption waste management program will reduce the amount of production waste accumulation and disposal and their recycling at the enterprise.

Actions plan
for the implementation of Waste Management Program of the concentrating plant

Table 3.4.9.

№ п/п	Actions	Indicator (qualitative/ quantitative)	Completion	Responsible	Execution Term	Estimated costs, tenge*	Financing Sources
1	2	3	4	5	6	7	8
1	Reuse of waste in the enterprise	0,0	-	-	-		
1.1.	The use of waste in the enterprise is not planed	0,0	-	-	-	*0,0*	
2	Recycling at the enterprise	0,0					
2.1.	*Recycling at the enterprise is not planned*	-	-	-	-	*0,0*	
3	Recycling at the enterprise, including:	0,0					
4	Waste storage						
4.1	*Temporary storage of waste in specially designated places for subsequent disposal, processing and (or) removal, total*	Up to 5268,5872 tons/year					
	including:						
4.1.1.	Municipal solid waste	Up to 52,5	Removal of waste for disposal	Head of the cite	As accumulated	As per the contract	Own funds of the enterprise
4.1.2.	Oily rags	Up to 0,508	Removal of waste for disposal	Head of the cite	As accumulated		
4.1.3.	Used filters (oil, fuel)	Up to 0,42	Removal of waste for disposal	Head of the cite	As accumulated	As per the contract	Own funds of the enterprise
4.1.4.	Waste oil	Up to 20,2	Removal of waste for disposal	Head of the cite			
4.1.5.	Waste batteries	Up to 0,98	Removal of waste for disposal	Head of the cite	As accumulated		
4.1.6.	Used Fluorescent Lamps	Up to 0,0202	Removal of waste for disposal	Head of the cite	Till 31 December		

4.1.7.	Spent hoses and filter elements of gas cleaning equipment	Up to 0,147	Waste loading for burial	Head of the cite	As accumulated		
4.1.8.	Vacuum belt filter polypropylene filter fabric waste	Up to 27,8	Waste loading for burial	Head of the cite	As accumulated		
4.1.9.	Solid sediment from sewage treatment plants	Up to 2,9	Waste burial	Head of the cite	As accumulated		
4.1.10.	Used filtering material	Up to 1,0	Waste burial	Head of the cite	As accumulated		
4.1.11.	Welding electrode ends	Up to 0,172	Waste recycling	Head of the cite	till 31 December annually		
4.1.12.	Used tires	Up to 9,54	Waste recycling	Head of the cite	till 31 December annually		
4.1.13	Reagent containers	Up to 73,2	Waste to supplier	Head of the cite	As accumulated		
4.1.14.	Construction waste	Up to 5,0	Waste burial	Head of the cite	As accumulated		
4.1.15.	Ferrous scrap metal	Up to 2,5	Waste recycling	Head of the cite	As accumulated		
4.1.16.	Waste and scrap steel	Up to 5000	Waste recycling	Head of the cite	As accumulated		
4.1.17.	Wood waste	Up to 19,7	Waste to population	Head of the cite	As accumulated		
4.1.21.	Rubber waste	Up to 52	Waste recycling	Head of the cite	As accumulated		
4.1.22.	Vacuum belt filter polypropylene filter fabric waste	Up to 27,8	Waste burial	Head of the cite	As accumulated		

№ п/п	Actions	Indicator (qualitative/ quantitative)	Completion	Responsible	Execution Term	Estimated costs, tenge*	Financing Sources
4.2	*Locating on the territory of the enterprise, total*	*0*					
	including:						
5	Waste disposal	*0*					
6	Reclamation of waste sites	0,0			-	0,0	Financing not required
6.1	*Reclamation of waste disposal sites during 2019-2028 not planed*	-	-	-	-	-	
7	Waste destruction	0,0				0,0	Financing not required
7.1.	*The destruction of waste in the enterprise is not planned*	-	-	-	-	-	
8	Waste disposal, total:	Up to 5268,5872 tons/year				As per contracts	
	including:						
8.1	*Waste transfer for reuse*	***Up to 60***				***0,0***	
8.1.1	Reagent containers	Up to 60					
8.2	*Transfer of waste for recycling, everything, including*	***5 032,892***					
8.2.1	Waste batteries	Up to 0,98					
8.2.2	Ferrous scrap metal	Up to 2,5					
8.2.3	Waste and scrap steel	Up to 5000					
8.2.4	Welding electrode ends	Up to 0,172					
8.2.5	Used tires	Up to 9,54					

8.2.6	Wood waste	Up to 19,7					
8.2	*ransfer of waste for disposal, total,*	***123,6952***					
	including:						
8.3.1	Oily rags	Up to 0,508	Waste burial	Head of the cite	As accumulated	As per the contract	Own funds of the enterprise
8.3.2.	Used filters (oil, fuel)	Up to 0,42	Waste burial	Head of the cite	As accumulated		
8.3.3.	Waste oil	Up to 20,2	Waste burial	Head of the cite			
8.3.4.	Used Fluorescent Lamps	Up to 0,0202	Waste burial	Head of the cite	till 31 December		
8.3.5.	Spent hoses and filter elements of dust cleaning equipment	Up to 0,147	Waste burial	Head of the cite	As accumulated		
8.3.6.	Solid sediment from sewage treatment plants	Up to 2,9	Waste burial	Head of the cite	As accumulated		
8.3.8.	Spent filtering material	Up to 1,0	Waste burial	Head of the cite	As accumulated		
8.3.10.	Construction waste	Up to 5,0	Waste burial	Head of the cite	As accumulated		
8.3.11.	Reagent containers	Up to 13,7	Waste burial	Head of the cite	As accumulated		
8.3.12.	Rubber products waste	Up to 52,0	Waste burial	Head of the cite	As accumulated		
8.3.13.	Vacuum belt filter polypropylene filter fabric waste	Up to 27,80	Waste burial	Head of the cite	As accumulated		
8.4	*Transfer of waste to burial, total*	Up to *52,5 tons/year*					
	including:						
8.4.1	Municipal solid waste	Up to 52,5 tons/year	Waste acceptance document by a specialized organization		As accumulated annually	As per the contract	Own funds of the enterprise
8.5	*Transfer of waste for neutralization*	*0,0*				*0,0*	*Financing not required*
8.5.1.	Waste transfer for neutralization is not planned	-	-	-	-	-	

8.6	*Transfer of waste to destruction*	*0,0*				*0,0*	*Financing not required*
9	Equippping temporary waste storage in compliance with all requirements	Compliance with the requirements of the instructions	Waste storage	Head of the enterprise	Regularly	-	Own funds of the enterprise
10	Installation of additional containers for separate collection of MSW by morphological composition	4 units	Reducing the solid waste disposal volume at the landfill	Head of Enterprise	-	-	
11	Staff training on waste management rules	Conducting classes on the rules	Journal entry, confirmed by the signature of the head	Ecologist of the enterprise	1 per year	-	
12	Verification of staff knowledge on waste management	Exam	Assessment of knowledge	Ecologist of the enterprise	1 per year	-	

3.4.6 Proposals for organizing production control on waste management

Production control on waste management provides for the maintenance of records on the waste volume, composition, mode of formation, storage and shipment with a frequency sufficient to complete the internal production and state reporting formats on hazardous waste sent to the territorial environmental authorities.

Handling of all types of waste, their disposal should be carried out in accordance with the document regulating the waste management procedures. This document covers all toxic and general waste that may be generated during the production activities of the enterprise. Compliance with the provisions of this document during organization of waste collection and disposal will provide:

- compliance with environmental legislation and regulatory documents on waste management in the Republic of Kazakhstan;
- compliance with health, safety and environmental risk control policies;
- prevention of environmental pollution.

For all types of waste generated at the designed enterprise during production activities, it is necessary according to Article 289 of paragraph 1 of the Environmental Code to compile and hand over hazardous waste passports. Copies of passports of hazardous waste are mandatory to be submitted to the company transporting this type of waste, as well as to each consignee of this batch of waste.

All production and consumption wastes are temporarily stored on the territory of the designed facility and, as they accumulate, are exported under contracts to specialized enterprises for processing and disposal.

Safe handling of waste involves storing them in special rooms, containers and platforms.

There is a need for constant monitoring of the waste amount and the timely export for recycling or disposal to enterprises that have their own landfills.

The following wastes that are generated after the shipment under the contract are subject to processing: scrap metal, batteries, tires. The scrap batteries, tires generated at the enterprise are stored at special sites and, as they accumulate, are handed over to a specialized organization.

Used filters and oily rags, dust, used containers are planned to be exported under contracts to specialized landfills. Municipal solid waste is exported under the contract to the landfill. The transfer of waste is documented by an acceptance certificate with an attachment of a copy of the hazardous waste passport. Information on waste generation and its movement should be recorded in the journal " Production and Consumption Waste Records”.

3.4.7 Assessment of the designed facility production and consumption waste impact on the environment.

The negative impact of production and consumption waste can occur when proper requirements are met, as well as as a result of unforeseen situations at certain stages of transportation, storage or disposal at their delivery.

The greatest danger to the environment is represented hazardous toxic industrial waste. In case of improper collection, storage, transportation and disposal of all types of waste, the impact on all components of the ecological system can be observed:

- soil and vegetation cover;
- animal world;
- atmospheric air;
- surface and groundwater.

With the accumulation of solid waste in open, spontaneous dumps, without regard to their maintenance and conditions of natural neutralization unsanitary conditions are created contributing to a negative impact on the quality of the air basin, groundwater and surface water, as well as on the productive soil layer at the landfill site and adjacent territories.

During the operation of the processing plant, the final tailings of the control collective flotation are formed, which are stored in the designed tailing dump, the second stage of which is carried out by a separate project. To reduce the volumes of slurry tailings, thickening is provided in high-performance concentrators. Adding flocculant makes it possible to achieve a solid content in the tailings of 68%, as a result, the consumption of the slurry tailings delivered to the tailing dump is reduced.

Flotation tailings are a technogenic raw material and further processing is possible. Accepted design solutions provide for safe storage of technological tailings (waste).

Contamination of soil with wastes containing chemicals can impact the soil air regime, cause a lack of oxygen, enrichig the soil with chemicals, will increase the number of anaerobic and spore-forming microorganisms and decrease the content of mobile phosphorus.

To assess the level of pollution of environmental components in accordance with the requirements of Art. 132 and 305 of the Environmental Code, on the territory of the designed facility, it will be necessary to carry out monitoring activities, the study of groundwater, atmosphere and soil on the border of the SPZ.

3.4.8 Information on possible emergency situations

To prevent accidents, waste storage conditions must comply with the following documents: General requirements to design solutions on temporary storage sites for industrial waste in the enterprise, to the maximum amount of toxic industrial waste in the enterprise, to fire safety regulations in the Republic of Kazakhstan and to fire safety instructions.

One of the important requirements critical to observe when handling wastes is their separate collection, storage, transportation, as some wastes, non-toxic and non-flammable, being in contact with each other become dangerous.

Care must be taken when collecting, storing, transporting and disposing of used mercury lamps, preventing them from breaking up and dispersing mercury vapors into the environment. Mercury and its compounds have a strong toxic effect on living organisms, leading to mental, motor, neurological disorders, impaired kidney activity, gastrointestinal diseases, and even genetic changes.

It is not allowed to throw oily waste into containers for solid waste, it is necessary to transfer this type of waste (fire hazardous) for recycling to specialized organizations.

When handling waste planned during this project in compliance with the requirements of the conditions of collection, storage and timely removal, emergency situations do not occur.

3.4.9 Measures to reduce the waste impact on the environment

In order to reduce the impact of industrial waste on the environment, a list of measures has been developed, their execution is mandatory and subject to regular monitoring by authorized state environmental and sanitary-epidemiological agencies.

Metal containers with a capacity of 1.0 m3 should be installed on the industrial sites of the enterprise. There is an accumulation of garbage produced at all cites. Metal containers are installed on specialized open areas of approximately 6.0 m2.

Impounding should be carried out in compliance with the rules of environmental safety and occupational safety, providing for the creation and maintenance of conditions when waste cannot negatively impact the environment and human health.

Measures to reduce the waste impact on the environment are given in Table. 3.4.9.

Table 3.4.9 – Measures aimed at reducing the environmental impact of waste

№ п/п	Waste	Measure	Completion	Estimated efficiency
1	2	3	4	5
1	MSW	To organize the collection and temporary storage of waste. To regularly export for burial at a specialized landfill under the contract.	As accumulated	Compliance with sanitary standards and OS rules
2	Oiled wiping material, waste oil	To organize the collection and temporary storage of waste. To regularly export for burial at a specialized landfill under the contract.	As accumulated	Compliance with sanitary standards and OS rules
3	Scrap metal	Warehousing on the site for temporary accumulation of scrap metal	As accumulated	Exclusion of pollution

Taking into account the above, it can be concluded that, complying to the waste management system, while exercising constant control over the observance of safety, accumulation and storage, occupational safety, environmental safety rules for waste management and storage and control over the state of their temporary storage sites, timely removal from the territory, the impact of waste from the production activities of the enterprise on the environment will be within acceptable limits.

3.4.10 Conclusions on Assessment of Production and Consumption Waste Impact

In the course of its production activities, the enterprise exerts varying degrees of impact on environmental components.

Proper organization of the waste storage, disposal and recycling will prevent environmental pollution. This implies the elimination, alteration or reduction of types of activities leading to waste pollution of soil, waste reuse, recycling, and regeneration minimizing the impact on environmental components.

Waste temporarily stored at the enterprise should be stored in strictly designated areas in compliance with the rules of collection, storage and transportation to the organizations that accept this waste under a contract for processing or disposal. This will minimize or completely eliminate the environmental impact of this waste.

All stored waste during temporary storage does not affect the environmental components. Subject to compliance with the relevant rules and regulations by the enterprise, which will transfer the waste, their impact on the environment will be negligible.

3.5. ASSESSMENT OF IMPACT ON THE PLANT WORLD

The main types of human impact on vegetation are:

- physical destruction of vegetation cover as a result of earthworks during the construction of buildings, structures, utilities, ponds, septic tanks, waste storage sites, etc .;
- disruption of vegetation in recreational areas;
- change of moisture supply of plants as a result of water management facilities construction;
- impact of pollutants through the atmosphere;
- impact of pollutants through the soil

To exclude the physical destruction of vegetation, the project should provide for the removal of the fertile soil layer under the trunk and on-site utilities (roads, engineering networks), under industrial constructions (dumps, evaporator pond, buildings and structures of the industrial site, etc.). The removed soil layer will be stored in temporary dumps, and used for the improvement of industrial sites of the designed factory, improvement of unproductive lands and subsequent recultivation of disturbed lands. To strengthen the fertile soil layer dumps and preserve them for a long time, perennial grasses (wheat grass) will be sown throughout their area.

Vegetation disturbances in recreational areas will not occur due to the absence of such land near the construction site.

In areas affected by economic activity, where the groundwater level will rise or fall in the soil to a depth of more than 3 m, significant changes in vegetation cover will not occur, since the capillary fringe will not reach the zone of the root system of most herbaceous plants. Based on this, and bearing in mind the depth and increased mineralization of groundwater, it can be noted that the formation and development of a depression pit at the construction site will not affect the vegetation cover.

Herbaceous plants produce less terrestrial biomass and have a smaller leaf surface, as a result they are more resistant to air polluting substances compared to tree vegetation. According to the available limited data, the MPC values for herbaceous vegetation are approximately 5 times higher than the MAC values for woody vegetation. At the same time, for grassy vegetation, the impact will be limited practically to the industrial site, i.e. located within the SPZ. Due to these circumstances, it is obvious that the effect of pollutant emissions from the concentrating plant on the grass vegetation is practically excluded

According to the system adopted in the former USSR, the classes of plant species are determined by the dominant plant species, divided into subclasses and types according to the presence of secondary species and topography.

The impact on vegetation will be expressed by two factors: through the disturbance of vegetation cover and through emissions of pollutants into the atmosphere accumulated in the soil and plants.

The vegetation in the area of the field is semi-desert and desert, the vegetation cover is sparse, consists of drought-resistant perennial grasses (feather grass and fescue), low-growing shrubs (wormwood, camel thorn, various kinds of saltwort) of 1 - 2 m high.

There are no forest areas in the area of the designed factory.

Emissions of pollutants into the atmosphere will not significantly affect the flora, exceeding the maximum permissible concentrations for all ingredients at the SPZ boundary and in the residential area is not expected.

There are no rare or endangered plants in the zone of the designed factory. Natural food plants and medicinal plants are absent.

Thus, the assessment shows that the negative impact of the designed factory on the vegetation cover of the territory adjacent to the industrial site will be acceptable.

3.6 ASSESSMENT OF IMPACT ON THE ANIMAL WORLD

One of the main factors affecting the animal world is the factor of crowding animals out of their habitats.

The displacement of animals will be promoted directly by the withdrawal of land for the work site, resulting in reduction of food supply. First of all, animals in a small radius of activity (invertebrates, reptiles, small mammals) will suffer. Birds will be driven out due to disturbance. These factors will have a negligible effect on land animals due to their small numbers. In addition, animals living in the surrounding area can easily adapt to new conditions. The fauna of the adjacencies will remain in its present form, characteristic of the area.

Another significant factor affecting the animal world is air pollution by emissions of harmful substances into the atmosphere. Emissions of pollutants into the atmosphere will not significantly affect the animal world, since they are not constant in time, place (dispersed in the area of the work site).

Rare or endangered species of animals listed in the Red Book of Kazakhstan are not found in the area of work. There are no migration ways to through the territory of the site.

After completion of the work, the site will be recultivated.

Consequently, with the observance of all the rules of work, a significant negative impact on the animal world and changes in the genebank will not occur, the impact is assessed as acceptable.

3.7 LANDSCAPE

The geological allotment of the territory is not in close proximity to any reserve or national park.

In the area of work there are no picturesque rocks, waterfalls, lakes, precious tree species and other natural landmarks of historical, aesthetic, scientific and cultural value (Appendix 12).

Negative impact on the landscape when working at the field is estimated as acceptable.

3.8 MICROCLIMATE

The main factor influencing climate change is the temperature of technological processes. Since the temperature of the works is equal to the ambient temperature, then the microclimate does not change.

3.9 ASSESSMENT OF IMPACT ON HUMAN HEALTH

The impact of the works on human health can be through two environments: the hydrosphere and the atmosphere.

In the composition of emissions during the works there are substances from the operational equipment.

The nearest settlement is located at a distance of 25 km from the work site.

The results of the calculation of emissions of pollutants into the atmosphere during the work and analysis of their effects showed that their surface concentrations at the boundary of the SPZ, which is 500 m, do not exceed the maximum permissible concentrations.

Pollution of the hydrosphere in the area of influence of the enterprise does not occur.

No negative effect on human health occurs.

Calculation of emissions of pollutants into the atmosphere during the works and analysis of their impact showed that their surface concentrations at the boundary of the SPZ of 500 m. do not exceed the maximum permissible concentrations.

Pollution of the hydrosphere in the impact area of the enterprise does not occur.

No negative effect on human health occurs.

To ensure safe working conditions during construction and meeting the requirements for industrial sanitation and occupational hygiene, the workers should be provided with sanitary facilities, personal protective equipment, working clothes, safety shoes, noise and vibration protection equipment, respiratory protection equipment, and air control devices and the required level of illumination.

In order to ensure the safety of at the concentrating plant and the prevention of occupational diseases, it is necessary to provide for personal protective equipment: protective clothing, safety shoes, respiratory, organs of hearing, hands, face, and head protection equipments. The use of personal protective equipment is required by industry-specific "safety regulations". Delivery of protective clothing, footwear and other personal protective equipment is regulated by the “Sectoral Standards for the Delivery of Special Clothing, Special Footwear and Other Protective Equipment”

In order to create the necessary and sufficient level of illumination at workplaces to ensure safe working conditions, it is necessary to be comply with the industry standards for the design of artificial lighting in mining industry, as well as the requirements of the CR RK 2.04-104-2012 “Natural and artificial lighting”.

Summarizing the health effects, it can be noted that all potential negative effects are low.

All adverse effects described in this chapter are expected to be *minor*. In addition, minimal and minor impacts associated with air pollution and noise are stated based on the worst case scenario and, in fact, may not occur.

It is necessary to take into account the *positive impact*. Additional employment opportunities will increase, leading to increased incomes of people working on the project and those providing services to the project. Increased income will increase their purchasing power. This will allow people to buy products that improve their nutrition, and thus reduce morbidity and mortality, improve overall health and well-being. Increased income will give greater access to health care if needed.

4 ASSESSMENT OF THE ENVIRONMENTAL RISK AND RISK TO HUMAN HEALTH IN THE IMPLEMENTATION OF PLANNED ACTIVITIES

Environmental risk assessment was carried out using the Methodology (hereinafter the Methodology), "Guidelines for the assessment of the impact of an economic activity on the environment" (reviewed and approved by the Protocol No. 10 of 24.11.2009 of the meeting of the scientific and technical Council of the Ministry of Environmental Protection).

In assessing an environmental risk, man-made and anthropogenic factors, as well as emergency and cumulative risks, are distinguished as the main ones.

According to the Methodology, due to the fact that the effect of numerous factors affecting the natural and socio-economic environment cannot be quantified, a semi-quantitative (scoring) method of impact assessment has been adopted to assess environmental risk.

The value of natural components, the resistance of the landscape to the effects.

In accordance with the Law of the Republic of Kazakhstan “On Specially Protected Natural Territories” dated 07.07.2006 No. 175-3 and the International Convention on Biological Diversity (Resolution of the CM RK on approval dated 19.08.1994 No. 918), the main environmental limitations are related to the location of the planned economic activities within the specially protected areas, which include: nature reserves, wildlife reserves, ornithological areas, locations of cultural and architectural monuments, etc., as well as within the boundaries of water protection zones and areas of increased environmental hazard.

Environmental restrictions and associated environmental protection measures are required in the areas inhabited by the representatives of the flora and fauna listed in the Red Book.

In addition, the possibility to conduct economic activities is limited by the capacity of the environment to deal with man-made impact without irreversible changes.

The main characteristics that determine the environmental restrictions include:

- increased environmental value of the certain areas (specially protected natural areas, natural historical monuments);
- the presence of the coastal protective zones and the water protection zones;
- land use features;
- conditions of dispersion of the pollutants in the atmosphere;
- self-cleaning ability of the water bodies;
- the level of pollution and disturbance of the environmental components.

The characteristic of the territory of the planned construction referring to the environmental restrictions is presented below in Table 4.1.

Table 4.1 – Characteristics of the construction area referring to the environmental restrictions

№	Environmental restrictions	Characteristics of the construction area
1	Increased environmental value of certain areas (specially protected natural areas, natural historical monuments)	The territory for placement of the projected objects is not located within any natural protected areas (nature reserves and wildlife reserves, etc.), and also does not contain any valuable species of trees, plants, habitats of animals listed in the Red Book of Kazakhstan, valuable agricultural land. Environmental restrictions caused by the presence of rare and endangered species of plants and animals, mainly may be associated with the possibility of flight of the birds listed in the Red book from the nearby areas. The vegetation consists principally of wormwood and saltwort sagebrush communities. Plants listed in the Red Book of Kazakhstan were not found. The animal world is represented by mammals. Mammals include rodent-shrew species (ground squirrel, large jerboa, etc.); birds include larks, wheatears, Caspian plovers, etc. The territory on which construction of the factory facilities is planned does not fall within the protection zone of the objects of the cultural heritage of the Republic of Kazakhstan.
2	The presence of the coastal protective zones and the water protection zones;	The territory for placement of the projected objects is located at a considerable distance from the water protection zones and the water protection strips of surface-watercourses.
3	Land use features	The agricultural land value is low productive spring and autumn lands. The category of land that is allocated for the construction of the site is not suitable for agriculture. The functional significance of the territory under consideration is the developed territory. The territory will be represented by the technological objects, land and underground transport (railway, highway, power lines, water supply, sewage, communication lines), which activities are accompanied by environmental impact.
4	Conditions of dispersion of the pollutants in the atmosphere	According to the conditions of dispersion of harmful impurities in the atmospheric air, the territory of the projected works location is characterized by an increased potential of atmospheric pollution (Air Pollution Potential, zone III).
5	Self-cleaning ability of water bodies	The protection of groundwater Alb-Cenomanian deposits from man-made impacts due to their deep occurrence and high power of the aeration zone, composed of both permeable and impermeable rocks can be considered good.
6	The potential of soil remediation	Desertscape is easily vulnerable to anthropogenic pollution, as the possibilities of self-cleaning of the soil horizons and the daylight surface from coming pollutants are limited by the lack of free water and low surface runoff. The soil covering is represented by the meadow-brown saline light loamy soils. Low thickness and humus level determine the reduced ability of the soil remediation.
7	The level of pollution and disturbance of the environmental components	According to the degree of mineralization and the content of dissolved substances, the groundwater corresponds to a group of brines. The natural surface topography is disturbed by the traces of human activities.

The environmental risk and the human health risk assessment was carried out using the ERA-Risks module of the ERA-Air software package, which allows estimating health risks – if there is any possibility that the population will suffer from additional adverse health effects as a result of actual or potential air pollution.

Risk assessment of non-carcinogenic effects of acute exposures is carried out on the basis of the calculation of the values of surface concentrations on short-term models. Based on the ERA-Air software package calculation of the average annual surface concentrations, the following assessment was conducted:

-the risk of non-carcinogenic effects of chronic exposure;
- hazard index of non-carcinogenic effects on a critical organ (system);
- risk of carcinogenic effects;
- carcinogenic risks with simultaneous exposure of several chemicals;
- individual and population risks.

Date: 18.06.2018 Time: 16:16:52

POPULATION HEALTH RISK ASSESSMENT UNDER EXPOSURE OF CHEMICALS POLLUTING THE ATMOSPHERIC AIR.

Object: ***0001,LLP «KAZMinerals Aktogay» (operational cycle)***

Estimated base year: ***2018*** Estimated year: ***2018***

Estimated area: ***whithin the sanitary zone***

Initial data :

Acute non-carcinogenic effects are calculated at maximum concentrations of air pollution, obtained from the calculation of air pollution (short-term model, OND-86)

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Table 1.0
List of pollutants emitted into the atmosphere

Substance	Cas	Criterion used and its value (mg / m³)			Hazard class	Total emission, (t/year)	Shares of Emissions (%)
		MPC max one-time	MPC Average Daily	TSEL			
1. [2908] Inorganic dust containing silicon dioxide in%: 70-20 (chamotte, cement, cement production dust - clay, shale, blast furnace slag)		0,3	0,1	-	3	73,671	87,06%
2. [0337Carbon Oxide (Carbon Monoxide, Carbonic oxide) (584)	630-08-0	5,0	3,0	-	4	4,501	5,32%
3. [0301] Nitrogen (IV) dioxide (Nitrogen dioxide) (4)	10102-44-0	0,2	0,04	-	2	2,246	2,65%
4. [2732] Kerosene (654*)	8008-20-6	-	-	1,2	0	2,002	2,37%
5. [2704] Gasoline (petroleum, low sulfur) / expessed as carbon / (60)	8032-32-4	5,0	1,5	-	4	0,3808	0,45%
6. [0304Nitrogen (II) oxide (Nitrogen oxide) (6)	10102-43-9	0,4	0,06	-	3	0,3599	0,43%
7. [0328] Carbon (Soot, Carbon black) (583)	1333-86-4	0,15	0,05	-	3	0,3541	0,42%
8. [0330] Sulphurous anhydride (sulfur Dioxide, sulphurous acid anhydride, Sulfur (IV) oxide) (516)	7446-09-5	0,5	0,05	-	3	0,2587	0,31%
9. [0333] Hydrogen Sulfide (Dihydrosulfide) (518)	7783-06-4	0,008	-	-	2	0,13809	0,16%

10. [1048] 2-Methylpropan-1-ol (Isobutyl alcohol) (383)	78-83-1	0,1	-	-	4	0,1307	0,15%
11. [2736Pine flotation oil (MSF) (717*)		-	-	1,0	0	0,1152	0,14%
12. [1051Propane-2-ol (Sec-propyl alcohol) (469)	67-63-0	0,6	-	-	3	0,1021	0,12%
13. [0334] Carbon disulfide (519)	75-15-0	0,03	0,005	-	2	0,08865	0,10%
14. [0128Calcium Oxide (Quicklime) (635*)	1305-78-8	-	-	0,3	0	0,0755	0,09%
15. [0123] Iron (II, III) oxides (diethyl trioxide, iron oxide) / expressed in iron / (274)	1309-37-1	-	0,04	-	3	0,0579	0,07%
16. [0155] diSodium carbonate (Soda ash, Sodium carbonate) (408)	497-19-8	0,15	0,05	-	3	0,0477	0,06%
17. [2735] Mineral hydrocarbon oil (spindle, machine, cylinder, etc.) (716*)	8012-95-1	-	-	0,05	0	0,0302	0,04%
18. [2985] Anionic polyacrylamide AK-618 (AK-618) (964*)		-	-	0,25	0	0,0201	0,02%
19. [2902] Suspended particles (116)		0,5	0,15	-	3	0,0179	0,02%
20. [2930] Abrasive dust (Corundum white, Monokorund) (1027*)		-	-	0,04	0	0,011	0,01%
21. [0342] Fluoride gas compounds / expessed as fluorine / (617)	7664-39-3	0,02	0,005	-	2	0,006	0,01%
22. [0143] Manganese and its compounds / expessed as manganese (IV) oxide / (327)	7439-96-5	0,01	0,001	-	2	0,0036	0,00%
23. [0344] Inorganic fluorides poorly soluble - (aluminum fluoride, calcium fluoride, sodium hexafluoroaluminate) (Inorganic poorly soluble fluorides /		0,2	0,03	-	2	0,0002	0,00%
Total :						84,617	1

Table 1.1

Information about the risk of developing of the carcinogenic effects

Substance	CAS	Inhalation exposure			
		IARC	EPA	Sfi, (kg x day.)/mg	Uri, m^3/mg
1. [0328] Carbon (Soot, Carbon black) (583)	1333-86-4	1		3,1	0,9424
2. [2704] Gasoline (petroleum, low sulfur) / expressed as carbon / (60)	8032-32-4	2B	B2	0,035	0,01064

Note: IARC– classification of the International Agency for Research on Cancer; **EPA** (Environmental Protection Agency)-
classification of the degree of evidence of the Carcinogenicity for humans U.S. EPA; **Sfi** – факторы
Factors of the carcinogenic potential for the inhalation routes, (mg / (kg x day)) -1;

UR_i – a single risk at the inhalation exposure at 1 mg / m3.
A single risk is calculated using the Sfi value,
Standard human body mass (70 kg), daily air consumption, formula 1.1

$$\mathbf{UR_i}\ [m^3/mg] = \mathbf{SF_i}\ [(kg \times daily/мг)] \times \mathbf{1/70}\ [kg] \times \mathbf{(V_{out} \times T_{out} + V_{in} \times T_{in})}\ [m^3/daily \text{ , where} \qquad \mathbf{(1.1)}$$

T_{out}- time spent outdoors, hour / day

V_{out}- outdoor breathing rate, m3 / h

T_{in}- time spent indoors, hour / day

V_{in}- indoor breathing rate, m3 / h

Table 1.2.1

Information about the risk of developing of non-carcinogenic effects in acute exposure to chemicals

Substance	CAS	ARFC, mg/m^3	Critical organs of exposure	Data source
1. [0333] Hydrogen Sulfide (Dihydrosulfide) (518)	7783-06-4	0,1	respiratory system	Order of the Chairman of the Committee for Sanitary and Epidemiological Control №117 dated December 28, 2007.; Risk assessment of the chemical environmental factors exposure to public health. – Almaty,2004. – 42 p.
2. [2902] Suspended particles (116)		0,3	respiratory system, systemic diseases	Risk assessment of the chemical environmental factors exposure to public health. – Almaty,2004. – 42 p.
3. [0342Fluoride gas compounds / expressed as fluorine / (617)	7664-39-3	0,2	respiratory system	Risk assessment of the chemical environmental factors exposure on the public health. – Almaty,2004. – 42 p.
4. [0330] Sulphurous anhydride (sulfur Dioxide, sulphurous acid anhydride, Sulfur (IV) oxide) (516)	7446-09-5	0,66	respiratory system	Risk assessment of the chemical environmental factors exposure to public health. – Almaty,2004. – 42 p.
5. [0304] Nitrogen (II) oxide (Nitrogen oxide) (6)	10102-43-9	0,72	respiratory system	Order of the Chairman of the Committee for Sanitary and Epidemiological Control №117 dated December 28, 2007
6. [0301] Nitrogen (IV) dioxide (Nitrogen dioxide) (4)	10102-44-0	0,47	respiratory system	Order of the Chairman of the Committee for Sanitary and Epidemiological Control №117 dated December 28, 2007; Risk assessment of the chemical environmental factors exposure to public health. – Almaty,2004. – 42 p.

. 7. [0334] Carbon sulphur (519)	75-15-0	20,0	reproductive system, development, blood	«Guidance …» 2.1.10.1920-04
8. [1051] Propane-2-ol (sec-propyl alcohol) (469)	67-63-0	3,0	respiratory system	«Guidance …» 2.1.10.1920-04
9. [0337] 0337Carbon Oxide (Carbon Monoxide, Carbonic oxide) (584)	630-08-0	23,0	cardiovascular system, development	Order of the Chairman of the Committee for Sanitary and Epidemiological Control №117 dated December 28, 2007; Risk assessment of the chemical environmental factors exposure to public health. – Almaty,2004. – 42 p

Note: ARFC – the reference concentration for acute exposure.

Table 1.2.2

Information about the risk of developing of non-carcinogenic effects from chronic exposure to chemicals

Substance	CAS	RFC , mg/m^3	Critical organs of exposure	Data source
1. [0143] Manganese and its compounds / expressed as manganese (IV) oxide / (327)	7439-96-5	0,00005	Central nervous system, nervous system, respiratory system	Order of the Chairman of the Committee for Sanitary and Epidemiological Control №117 dated December 28, 2007
2. [0333] Hydrogen Sulfide (Dihydrosulfide) (518)	7783-06-4	0,001	respiratory system	Order of the Chairman of the Committee for Sanitary and Epidemiological Control №117 dated December 28, 2007; Risk assessment of the chemical environmental factors exposure to public health. – Almaty,2004. – 42 p
3. [2732] Kerosene (654*)	8008-20-6	0,01	liver	«Guidance …» 2.1.10.1920-04
4. [0344Inorganic fluorides poorly soluble - (aluminum fluoride, calcium fluoride, sodium hexafluoroaluminate) (Inorganic poorly soluble fluorides /		0,013	respiratory system, skeletal system, teeth	«Guidance» 2.1.10.1920-04
5. [2908] Inorganic dust containing silicon dioxide in%: 70-20 (chamotte, cement, cement production dust - clay, shale, blast furnace slag)		0,1	immune system, respiratory system	"Guidance …" 2.1.10.1920-04
6. [2902] Suspended particles (116)		0,1	respiratory organs, mortality	Risk assessment of the chemical environmental factors exposure to public health. – Almaty,2004. – 42 p
7. [2735] Mineral hydrocarbon oil (spindle, machine, cylinder, etc.) (716*)	8012-95-1	0,05	respiratory organs, liver, kidneys	"Guidance …" 2.1.10.1920-04; Target Organs of Carcinogenic Exposure - According to IARC
8. [2704] Gasoline (petroleum, low sulfur) / expressed as carbon / (60)	8032-32-4	0,071	Central nervous system, eyes, respiratory system, liver, kidneys	"Guidance …" 2.1.10.1920-04
9. [1048] 2- Methylpropane-1-ol (isopropyl carbinol) (383)	78-83-1	1,5		"Guidance …" 2.1.10.1920-04
10. [0342] Fluoride gaseous compounds / expressed as fluorine / (617)	7664-39-3	0,03	skeletal system, respiratory system	Risk assessment of the chemical environmental factors exposure to public health. – Almaty,2004. – 42 p.
11. [0330]] Sulphurous anhydride (sulfur Dioxide, sulphurous acid anhydride, Sulfur (IV) oxide) (516)	7446-09-5	0,08	respiratory organs, mortality	Risk assessment of the chemical environmental factors exposure to public health. – Almaty,2004. – 42 p.
12. [0328] Carbon (Soot, Carbon black) (583)	1333-86-4	0,05	respiratory organs, systemic diseases, teeth	Order of the Chairman of the Committee for Sanitary and Epidemiological Control №117 dated December 28, 2007.; Target Organs of Carcinogenic Exposure - According to IARC

13. [0304] Nitrogen (II) oxide (Nitrogen oxide) (6)	10102-43-9	0,06	respiratory organs, blood	Order of the Chairman of the Committee for Sanitary and Epidemiological Control №117 dated December 28, 2007
14. [0301] Nitrogen (IV) dioxide (Nitrogen dioxide) (4)	10102-44-0	0,04	respiratory organs, blood	Order of the Chairman of the Committee for Sanitary and Epidemiological Control №117 dated December 28, 2007; Risk assessment of the chemical environmental factors exposure to public health. – Almaty,2004. – 42 p.
15. [0123] Iron (II, III) oxides (diethyl trioxide, iron oxide) / expressed in iron / (274)	1309-37-1	0,04		«Guidance …» 2.1.10.1920-04
16. [0334] Carbon disulfide (519)	75-15-0	0,7	Central nervous system, development	«Guidance …» 2.1.10.1920-04
17. [1051]] Propane-2-ol (sec-propyl alcohol) (469)	67-63-0	7,0	liver, kidneys, development	«Guidance …» 2.1.10.1920-04
18. [0337] 0337Carbon Oxide (Carbon Monoxide, Carbonic oxide) (584)	630-08-0	3,0	Blood, cardiovascular system. development, central nervous system	Order of the Chairman of the Committee for Sanitary and Epidemiological Control №117 dated December 28, 2007; Risk assessment of the chemical environmental factors exposure to public health. – Almaty,2004. – 42 p.

Note: **RFC** – reference concentration for chronic exposure.

Table 1.3

Chemicals analyzed at the hazard identification stage

Substance	CAS	Reason for inclusion in the list	Reason for exclusion from the list
1. [0328] Carbon (Soot, Carbon black) (583)	1333-86-4	Calculation onMPC max one-time	
2. [2704] Gasoline (petroleum, low sulfur) / expressed as carbon / (60)	8032-32-4	Calculation on MPC max one-time	
3. [0143] Manganese and its compounds / expressed as manganese (IV) oxide / (327)	7439-96-5	Calculation on MPC max one-time	
4. [0333] Hydrogen Sulfide (Dihydrosulfide) (518)	7783-06-4		the calculation was not carried out for 2018
5. [2732] Kerosene (654*)	8008-20-6		no data on hazard effects of acute exposure
6. [0344] Inorganic fluorides poorly soluble - (aluminum fluoride, calcium fluoride, sodium hexafluoroaluminate) (Inorganic poorly soluble fluorides /			the calculation was not carried out for 2018
7. [2908] Inorganic dust, containing silicon dioxide in%: 70-20 (chamotte, cement, cement production dust - clay, shale, blast furnace slag)		Calculation on MPC max one-time	
8. [2902] Suspended particles (116)			the calculation was not carried out for 2018
9. [2735] Mineral hydrocarbon oil (spindle, machine, cylinder, etc.) (716*)	8012-95-1		no data on hazard effects of acute exposure
10. [1048] 2- Methylpropane-1-ol (isopropyl carbinol) (383)	78-83-1		the calculation was not carried out for 2018
11. [0342]] Fluoride gaseous compounds / expressed as fluorine / (617)	7664-39-3		the calculation was not carried out for 2018
12. [0330] Sulphurous anhydride (sulfur Dioxide, sulphurous acid anhydride, Sulfur (IV) oxide) (516)	7446-09-5	Calculation on ArfC	
13. [0304] Nitrogen (II) oxide (Nitrogen oxide) (6)	10102-43-9	Calculation on ArfC	
14. [0301] Nitrogen (IV) dioxide (Nitrogen dioxide) (4)	10102-44-0	Calculation on ArfC	
15. [0155] diSodium carbonate (Soda ash, Sodium carbonate) (408)	497-19-8		the calculation was not carried out for 2018

16. [0123] Iron (II, III) oxides (diethyl trioxide, iron oxide) / expressed in iron / (274)	1309-37-1		no data on hazard effects of acute exposure
17. [0334] Carbon disulfide (519)	75-15-0		the calculation was not carried out for 2018
18. [2985] Polyacrylamide anionic AK -618 (AK-618) (964*)			the calculation was not carried out for 2018
19. [2930] Abrasive dust (Corundum white, Monokorund) (1027*)			no data on hazard effects of acute exposure
20. [2736] 2736Pine flotation oil (MSF) (717*)			the calculation was not carried out for 2018
21. [1051] Propane-2-ol (sec-propyl alcohol) (469)	67-63-0		the calculation was not carried out for 2018
22. [0337] Carbon Oxide (Carbon Monoxide, Carbonic oxide) (584)	630-08-0	Calculation on ArfC	
23. [0128] Calcium Oxide (Quicklime) (635*)	1305-78-8		the calculation was not carried out for 2018

Table 1.4

Priority carcinogenic pollutants

Substance	Cmax (average annual), mg/m³	MPE, t / year	MPC average daily, mg/m³	Carcinogenic hazard (according to IARC *)	Factor of carcinogenic potential, SF	Comparative Hazard Index, HRIc
1. [0328 Carbon (Soot, Carbon black) (583)	-	0,3541	0,05	1	3,1	0,01
2. [2704] Gasoline (petroleum, low sulfur) / expressed as carbon / (60)	-	0,3808	1,5	2B	0,035	0,0001

* IARC - International Agency for Cancer Research.

The estimation of the comparative carcinogenic hazard index (HRIc) is presented in formula 1.2

HRIc = E x **Wc** x **P/10 000,** where **(1.2)**

HRIc – comparative carcinogenic hazard index;

Wc – the weighting coefficient of a carcinogenic effect;

P – population size (P = 1, calculated per person);

E – value of conditional exposure should be given in points:

delivery in the amount of <10 t / year - 1 point, 10-100-2 points, 100-1000 - 3 points,

1,000 - 10,000 - 4 points,> 10,000 - 5 points.

The weighting coefficients for evaluating of the carcinogenic effects (Wc)

Carcinogenic potential factor, mg / kg	Carcinogenicity group by classification U.S. EPA	
	A/B	C
< 0,005	10	1
0,005 – 0,05	100	10
0,05 – 0,5	1000	100
0,5 – 5	10000	1000
5 – 50	100000	10000
> 50	1000000	100000

Table 1.5.1

Priority pollutants non-carcinogens of acute exposure

Substance	Cmax (max one-time), mg / m3	MPE, t / year	MPC max one-time, mg/m³	ARFC, mg/m³	HRI, index
1. [0330*]* Sulphurous anhydride (sulfur Dioxide, sulphurous acid anhydride, Sulfur (IV) oxide) (516)	0,006	0,2587	0,5	0,66	0,0001
2. [0304] Nitrogen (II) oxide (Nitrogen oxide) (6)	0,004	0,3599	0,4	0,72	0,0001
3. [0301] Nitrogen (IV) dioxide (Nitrogen dioxide) (4)	0,0252	2,246	0,2	0,47	0,0001
4. [0337] Carbon Oxide (Carbon Monoxide, Carbonic oxide) (584)	0,62	4,501	5,0	23,0	0,00001

Table 1.5.2

Priority pollutants non-carcinogens of chronic exposure

Substance	Cmax (average annual), mg/m³	MPE, t / year	MPC average daily, mg/m³	RFC, mg/m³	HRI, индекс
1. [0328] Carbon (Soot, Carbon black) (583)	-	0,3541	0,05	0,05	0,001
2. [2704]] Gasoline (petroleum, low sulfur) / expressed as carbon / (60)	-	0,3808	1,5	0,071	0,001
3. [0143] Manganese and its compounds / expressed as manganese (IV) oxide / (327)	-	0,0036	0,001	0,00005	1,0
4. [2908] Inorganic dust containing silicon dioxide in%: 70-20 (chamotte, cement, cement production dust - clay, shale, blast furnace slag)	-	73,671	0,1	0,1	0,002
5. [0330] Sulphurous anhydride (sulfur Dioxide, sulphurous acid anhydride, Sulfur (IV) oxide) (516)	-	0,2587	0,05	0,08	0,001
6. [0304] Nitrogen (II) oxide (Nitrogen oxide) (6)	-	0,3599	0,06	0,06	0,001
7. [0301] Nitrogen (IV) dioxide (Nitrogen dioxide) (4)	-	2,246	0,04	0,04	0,001
8. [0337] Carbon Oxide (Carbon Monoxide, Carbonic oxide) (584)	-	4,501	3,0	3,0	0,00001

3. Characteristics of the risk to public health

3.2. Risk assessment of non-carcinogenic effects during acute exposure

In case of inhalation intake, the calculation of the hazard coefficient (HQ) is carried out according to the formula 3.2.1:

$$\mathbf{HQ_i = AC_i/ARFC_i,}$$ where

(3.2.1)

HQ – the hazard coefficient;

AC_i – maximum concentration (according OND-86) of the i-substance, mg/m^3;

$ARFC_i$ – reference (safe) concentration for acute inhalation effects Of *i* substance, mg/m^3.

Hazard index for conditions of simultaneous intake of several substances through inhalation is calculated by the formula 3.2.2:

$$\mathbf{HI_j = \Sigma HQ_{ij},}$$ где

(3.2.2)

HQ_i – the hazard coefficient for *i* affecting substances on *j* system(organ).
In case of combined intake of several substances in any way, the total hazard index is determined for substances affecting one system (organ).

Table 3.2.1

Characteristics of non-carcinogenic risk of acute exposures

Substance	Coordinates		AC, mg/m³	HQ(HI)
	X	Y		
1. [0143] Manganese and its compounds / expressed as manganese (IV) oxide / (327)				
reference point 1:	1531	3130	0,00008	0,008
reference point 2:	1542	3133	0,00008	0,008
reference point 3:	1554	3136	0,00008	0,008
reference point 4:	1566	3139	0,00008	0,008
reference point 5:	1578	3141	0,00008	0,008
reference point 6:	1590	3144	0,00008	0,008
reference point 7:	1602	3145	0,00008	0,008
reference point 8:	1614	3147	0,00008	0,008
reference point 9:	1626	3148	0,00008	0,008
reference point 10:	1638	3149	0,00008	0,008
reference point 11:	1650	3150	0,00008	0,008
reference point 12:	1663	3150	0,00008	0,008
reference point 13:	1675	3150	0,00008	0,008
reference point 14:	1687	3150	0,00008	0,008
reference point 15:	1699	3149	0,00008	0,008
reference point 16:	1711	3148	0,00008	0,008
reference point 17:	1723	3147	0,00008	0,008
reference point 18:	1735	3146	0,00008	0,008
reference point 19:	1748	3144	0,00008	0,008
reference point 20:	1760	3142	0,00008	0,008
reference point 21:	1772	3140	0,00008	0,008
reference point 22:	1783	3137	0,00008	0,008
2. [0301] Nitrogen (IV) dioxide (Nitrogen dioxide) (4)				
reference point a 1:	5072	2377	0,0252	0,053617
3. [0304] Nitrogen (II) oxide (Nitrogen oxide) (6)				
reference point 1:	4990	2403	0,004	0,005556
reference point 2:	5002	2401	0,004	0,005556
reference point 3:	5014	2397	0,004	0,005556
reference point 4:	5026	2394	0,004	0,005556
reference point 5:	5037	2390	0,004	0,005556
reference point 6:	5049	2386	0,004	0,005556
reference point 7:	5060	2382	0,004	0,005556
reference point 8:	5072	2377	0,004	0,005556
4. [0328] Carbon (Soot, Carbon black) (583)				
reference point 1:	-21	2424	0,0018	0,012
reference point 2:	171	2580	0,0018	0,012
reference point 3:	511	2821	0,0018	0,012
reference point 4:	523	2825	0,0018	0,012
reference point 5:	534	2829	0,0018	0,012
reference point 6:	734	2889	0,0018	0,012
5. [0330] Sulphurous anhydride (sulfur Dioxide, sulphurous acid anhydride, Sulfur (IV) oxide) (516)				
reference point 1:	5060	2382	0,006	0,009091
reference point 2:	5072	2377	0,006	0,009091
6. [0337] Carbon Oxide (Carbon Monoxide, Carbonic oxide) (584)				
reference point 1:	734	2889	0,62	0,026957
7. [2704] Gasoline (petroleum, low sulfur) / expressed as carbon / (60)				

reference point 1:	734	2889	0,085	0,017
8. [2908] Inorganic dust containing silicon dioxide in%: 70-20 (chamotte, cement, cement production dust - clay, shale, blast furnace slag)				
reference point 1:	4532	2508	0,1215	0,405
Point max. Non-carcinogenic acute exposure:	4532	2508		
[0143] Manganese and its compounds / expressed as manganese (IV) oxide / (327) {РДК max one-time =0.01 mg/m^3}			0,00002	0,002
[0301] Nitrogen (IV) dioxide (Nitrogen dioxide) (4) {ARFC=0.47 mg/m^3}			0,0136	0,028936
[0304] Nitrogen (II) oxide (Nitrogen oxide) (6) {ARFC=0.72 mg/m^3}			0,0024	0,003333
[0328] Carbon (Soot, Carbon black) (583) {РДК max one-time =0.15 mg/m^3}			0,0009	0,006
[0330] Sulphurous anhydride (sulfur Dioxide, sulphurous acid anhydride, Sulfur (IV) oxide) (516) {ARFC=0.66 mg/m^3}			0,003	0,004545
[0337] Carbon Oxide (Carbon Monoxide, Carbonic oxide) (584) {ARFC=23.0 mg/m^3}			0,055	0,002391
[2704] Gasoline (petroleum, low sulfur) / expressed as carbon / (60) {РДК max one-time =5.0 mg/m^3}			0,01	0,002
[2908] Inorganic dust containing silicon dioxide in%: 70-20 (chamotte, cement, cement production dust - clay, shale, blast furnace slag), {РДК max one-time =0.3 mg/m^3}			0,1215	0,405
respiratory system				0,036815
the cardiovascular system				0,002391
development				0,002391

Table 3.2.2

The points of maximum indexes of the adverse effects of acute exposures on critical organs (systems)

Critical organs (systems)	Coordinates		HI
	X	Y	
1. respiratory system			
reference point 1:	5072	2377	0,068263
2. the cardiovascular system			
reference point 1:	734	2889	0,026957
3. development			
reference point 1:	734	2889	0,026957

If the calculated hazard coefficient (HQ) does not exceed one, then the probability of harmful effects development in humans, with daily intake of the substance during the life, is insignificant and such exposure is characterized as permissible. If HQ is greater than one, the likelihood of adverse effects is substantial and increases proportionally to HQ. The total hazard index (HI), which characterizes the allowable intake should also not exceed one.

Levels of public health risks from acute non-carcinogenic exposure

№	*Code*	*Item*	*Critical organs*	*ARFC { MPC max one-time }, mg/m3*	*HQ max in SPZ*
1	2908	Inorganic dust containing silicon dioxide in%: 70-20 (chamotte, cement, cement production dust - clay, shale, blast furnace slag)	not set	{ 0.30}	0,405
2	0301	Nitrogen (IV) dioxide (Nitrogen dioxide) (4)	respiratory system	0,47	0,053617
3	0337	Carbon Oxide (Carbon Monoxide, Carbonic oxide) (584)	the cardiovascular system, development	23	0,0269565
4	2704	Gasoline (petroleum, low sulfur) / expressed as carbon / (60)	not set	{ 5.00}	0,017

5	0328	Carbon (Soot, Carbon black) (583)	not set	{ 0.15}	0,012
6	0330	Sulphurous anhydride (sulfur Dioxide, sulphurous acid anhydride, Sulfur (IV) oxide) (516)	respiratory system	0,66	9,09E-03
7	0143	Manganese and its compounds / expressed as manganese (IV) oxide / (327)	not set	{ 0.01}	8,00E-03
8	0304	Nitrogen (II) oxide (Nitrogen oxide) (6)	respiratory system	0,72	5,56E-03

If the calculated hazard coefficient (HQ) does not exceed one, then the probability of harmful effects development in humans, with daily intake of the substance during the life, is insignificant and such exposure is characterized as permissible. If HQ is greater than one, the likelihood of adverse effects is substantial and increases proportionally to HQ. The total hazard index (HI), which characterizes the allowable intake should also not exceed one.

Critical organs(systems) subjected to acute exposure

№	*Critical organs*	*Influencing agents*	*HI max in SPZ*
1	the respiratory system	0301,0330,0304	0,0682635
2	the cardiovascular system	0337	0,0269565
3	development	0337	0,0269565

If the calculated hazard coefficient (HQ) does not exceed one, then the probability of harmful effects development in humans, with daily intake of the substance during the life, is insignificant and such exposure is characterized as permissible. If HQ is greater than one, the likelihood of adverse effects is substancial and increases proportioanally to HQ. The total hazard index (HI), which characterizes the allowable intake should not exceed one.

4.1 THE PROBABILITY OF EMERGENCY SITUATIONS, SOURCES, TYPES, FREQUENCY, AREA OF EXPOSURE TO EMERGENCY SITUATIONS

The Sulphide Concentrator is a hazardous production facility, where:

- combustible substance is used;
- works on the processing of mineral raw materials are carried out;
- toxic substances (sodium sulphide) are used and stored at the production sites;
- all types of electrical installations are operated;
- hydraulic structures are operated;
- the following dangerous technical equipment is used: lifting mechanisms and equipment operating under pressure of more than 0.07 MPa (compressed air system).

Accident is the destruction of buildings, structures and (or) technical devices used at a hazardous production facility, uncontrolled explosion and (or) emission of hazardous substances (Law of the Republic of Kazakhstan On Civil Protection of April 11, 2014 No. 188-V LRK).

Emergency situation is a condition of a potentially hazardous facility, characterized by the violation of the limits and / or conditions of safe operation, but not passed into an accident, in which all adverse effects of the sources of danger on personnel, the public and the environment are kept within acceptable limits by the appropriate technical means provided by the project.

The main causes of emergency situations at various facilities are violations of technological processes at industrial enterprises, technical errors of maintenance personnel, violations of fire prevention and safety regulations, shutdown of power supply, water supply and waste water disposal systems, natural disasters, terrorist acts, etc.

Potential sources of the possible accidents can be:

- dangerous substances - explosive substances, hazardous substances.

- dangerous modes of operation of the equipment and facilities, characterized by such technological parameters as pressure, vacuum, temperature, voltage, composition of the technological environment, etc.

- potential hazards for each piece of equipment (istallation, machine) and the process occurring in it are fire, explosion (inside the equipment, in buildings or the surrounding space), rupture or destruction of the equipment, emission of harmful substances, a combination of the listed types of danger.

In the flow process fire-hazardous materials are pine oil, waste toxic substances (fluorescent lamps, oily rags, used oil).

Waste mercury lamps contain in their composition harmful toxic substance-mercury.

The general category of fire and explosion hazard for technological facilities (buildings and constructions) of the Sulphide Concentrator is defined as category “G” and “D” according to RSTD 01-94 (Ministry of Internal Affairs of the Republic of Kazakhstan) Republican Standards for Technological Design. Definition of categories of premises, buildings and structures for explosion and fire safety.

Category D includes premises in which non-combustible substances and materials are (treated) in a hot, red-hot, or molten state, the processing of which is accompanied by the release of radiant heat, sparks and flames; combustible gases, liquids and solids that are burned or disposed as the fuel.

Category D includes non-combustible substances and materials in a cold state.

According to the Criteria for assessing the degree of risk in the field of fire and industrial safety, Civil Defense, approved by the order of the Minister of Emergency Situations of the Republic of Kazakhstan dated 11.02.2011 № 46, industrial facilities with categories “G” and “D” for fire and explosion hazard are considered to be of a low risk level.

The complex of technical solutions includeded in the project is aimed at preventing or eliminating emergency situations and is based on the following principles:

- minimizing the likelihood of emergency situations, through the use of complex measures aimed at eliminating the causes of their occurrence;

- ensuring safety of the maintenance personnel, the public, and minimizing damage from environmental pollution.

Fire safety of construction materials depends on their nature, which predetermines the possible negative consequences of their destruction that occur when a set of extreme factors influences a material during a fire.

Therefore, among the main operational and technical properties of the construction material, along with a frost resistance and a corrosion resistance, the main place is occupied by a parameter “fire resistance” .

Fire resistance characterizes the ability of the material and the products to maintain physical and mechanical properties when exposed to fire and high temperatures which are developing in a fire.

The probability of emergency and volley emissions during the operation of the Sulphide Concentrator does not exist.

There are the following organizational and technical measures: timely repair of technological equipment, carrying out performance adjustment work, compliance with the technology of the processes of the Sulphide Concentrator.

4.1.1 Emergency situations prevention and relieving their consequences

One of the main measures to reduce the risk of emergency situations is the introduction of the process control systems, automatic, automated and remote control. Automated process control system (APCS) minimizes the likelihood of emergency situations. The permanent workplaces of the process support personnel are special premises in which the equipment control systems are located, ensuring the safe maintenance of the engineering process. Workers of the Sulphide Concentrator are provided with a protective clothing in accordance with the enforceable standards.

At the production site the most dangerous in terms of its consequences is the failure of the process equipment. When depressurization of capacitive equipment and technological pipelines, pulp emission is possible, the danger of spilled pulp lies in toxic and chemical effects on the human body, as they contain residual concentrations of reagents.

To prevent pulp spreading, the floors are divided into maps, have slopes and pitches equipped with pumps. After relieving the concequences of the accident, the pulp will be pumped into technological tanks (sumps) and returned to the technological process.

The reagent site is located in the main building and is made of reinforced concrete with a separator for removal of spilled drains into the tail sump. Reagents coming to the Sulphide Concentrator are stored in the reagent warehouse. The admission of staff in the warehouse of reagents is limited.

At the reagent site of the main building, emergency ventilation is provided interlocked with the operation of gas analyzers. At the reagent site, workers should work in the protective clothing against splashing of solutions, in rubber boots, rubber gloves and safety goggles. In case of an emergency, an emergency shower, eye wash fountains, and gas masks are provided at the site.

At the ore crushing complex, a possible emergency situation is also the fall of the dump truck into the initial crusher receiving bin and the derailment of the conveyor belt when it breaks in steeply inclined sections of the conveyor route.

Dump tails are stored on the designed tailing in a condensed form in a natural hollow. This allows to reduce almost to zero the possibility of a blowby.

The following measures are provided to ensure a trouble-free and safe technological process:

- protection of the capacitive equipment from overflow (overflow hole on the containers, alarm and automatic cutoff of the supply of the products in the container when they reach the maximum level);
- automatic cutting in of the backup pumps when the main pumps shutdown;
- the floors are made of chemically resistant materials and covered with the corrosion-resistant roll waterproofing;
- dump truck approaches the place of unloading after the allowing signals of the technological traffic light;
- installation of the wheel-breaking devices into the receiving bins of crushers from the side of unloading of dump trucks;
- installation of the device for capturing the belt when it breaks and devices for continuous monitoring of the belt tension;
- during the hard frosts, the conveyor lines operated outside go into idling mode, the belt moves at a reduced speed, about 0.5 m / s;
- trouble-free supply of water and compressed air of specified parameters;
- electrical insulation and equipment grounding are provided to prevent the personnel from the electrical shock.;
- use of the light and sound alarm at the time of start-up of all the equipment;
- control of the technological process and the main parameters of the state of the equipment and emergency protection using the microprocessor technology of the instrumentation and control systems;
- use of the aspiration systems and the local drain in the places where emission of harmful substances and dust is possible;
- interlocking the aspiration systems with the process equipment;
- wet cleaning of premises (buildings and galleries);
- keeping in constant readiness of forces and means of the emergency response (fire-fighting units);
- carrying out activities aimed at the prevention and relieving of accidents and their consequences;
- immediate informing of the authorized state body in the field of industrial safety, central executive bodies and bodies of local government, population and employees;

- keep records of the accidents;
- to insure civil liability for causing damage to the life, health or property of other people and the environment in case of the accidents at the hazardous production facilities.

4.1.2 Environmental risk reduction measures

The main measures to prevent emergency situations are strict observation of technological and production discipline, the implementation of project solutions and operational control.

In order to prevent emergency situations at the enterprise, it is necessary to develop special measures.:

- design all structures with taking into account seismic loads;
- control of the pressure and the temperature of the transported mixture;
- carrying out scheduled inspections and repairs of the process equipment.

The main elements of risk assessment include the following procedures.

1. Hazard detection - identification of the risk sources and the risk factors, as well as the areas and objects of their potential impact, the main forms of such exposure.

At first, a list of enterprises or technologies using the high-energy equipment, high pressures, aggressive and toxic components, or producing potentially dangerous products, such as chemicals (pesticides, etc.), is determined. Then it is identified the risk factors affecting human health and the environment during the statutory operation of an engineering object, as well as those released during salvo emissions and accidents.

2. Identification of objects and areas of a potential negative impact.

3. Determination of the type of an impact of the risk factors on the objects and the degree of its danger, for example, the degree of toxicity of a chemical.

4. Analysis of the risk factors impact on the population and the environment, in particular the establishment of a standard (regulation). This implies the determination of the level of the impact that is safe for humans and the environment, certain destabilizing factors or their combinations. It is at this stage that they find out whether a harmful threshold effect exists. Most often this is done empirically.

If a person has been exposed to the effect less than a standard (regulation), then that person is safe. This concept has been adopted in many states, including the Republic of Kazakhstan.

5. The exposure assessment, i.e. the real impact of the risk factors on humans and the environment. At this stage, the scale (level) of exposure, its frequency and duration are determined.

6. Full (cumulative) risk description using the qualitative and quantitative parameters established at the previous stages for each risk factor.

Prevention of emergency situations is a set of measures taken in advance and aimed at the maximum possible reduction of the risk of emergency situations, the preservation of people's health and life, the reduction of damage and material losses.

Emergency relieve is a rescue, emergency recovery and other urgent works carried out in an emergency situation and aimed at saving people lives and preservation of their health, reducing damage and material losses, as well as localizing emergency zones.

The main principles of protection of the population, the environment and business facilities in emergency situations of natural and man-made character are:

- informing the public and organizations about the projected emergency situations, measures for their prevention and elimination;
- early determination of the degree of risk and harmfulness of the activities of organizations and citizens, if it carries a potential danger, train the population in protection methods and take measures to prevent emergency situations;
- compulsory rescue, emergency and other urgent work to eliminate the emergency situations, the provision of emergency medical care, social protection of the population and injured workers, compensation of the damage caused by the emergency situations to health, property of citizens, the environment and business facilities;
- participation of the civil defense forces in activities for the prevention and elimination of natural

and man-made emergencies.

Organizations, regardless of the form of ownership and departmental affiliation, are obliged in the field of natural and man-made emergencies:

- plan and carry out activities to improve the sustainability of its operation and ensure the safety of workers and the public;
- to train the employees in protection methods and actions in emergency situations as part of non-military units, to create and maintain in constant readiness local emergency warning systems;
- to carry out protective measures, rescue, emergency, restoration and other urgent work to relieve emergency situations at subordinate industrial and social facilities and in the surrounding areas in accordance with the approved plans;
- in cases specified by the legislation, to provide compensation for the damage caused by emergency situations to employees and other citizens, to carry out, after the elimination of emergency situations, measures to improve the environment, restore economic activities of organizations and citizens.

Participants of emergency situations response from public associations should have special training, confirmed by the state certification.

Due to the fact that the area is seismically safe, the development of this situation is not considered by the project.

Hydrogeological conditions of the site are relatively simple and will not create difficulties for its development.

This project does not provide wastewater discharge.

The analysis of the technical solutions provided by the project for the organization and operation of the enterprise, in combination with possible "involuntary" conditions that lead to emergency situations, showed that its work is not associated with the occurrence of emergency situations.

During the implementation of the designed works, the production of all works must be carried out in strict accordance with the project documentation and the applicable safety standards and regulations.

5. PROPOSALS FOR ORGANIZATION OF THE OPERATIONAL ENVIRONMENTAL MONITORING

5.1 TYPES AND ORGANIZATION OF OPERATIONAL MONITORING

Operational monitoring is an element of the operational environmental monitoring performed for receiving the objective data with a fixed frequency. The operational monitoring program is developed on the basis of an assessment of the planned work impact on the environment and is approved by the subsoil user. The duration of the operational monitoring depends on the duration of the exposure.

Conducting of the operational monitoring is obligatory to obtain permission for emissions.

Operational monitoring of the environment is carried out by industrial or independent laboratories accredited in accordance with the legislation of the Republic of Kazakhstan

Operational monitoring data are used to assess the state of the environment within the Unified State System for Monitoring the Environment and Natural Resources.

The system of the operational environmental monitoring is focused on the organization of observations, data collection, analysis, assessment of the impact of the enterprise on the environment, with the aim of taking timely measures to prevent, reduce and eliminate environmental impact.

Monitoring can be carried out by the subsoil user individually, as well as under an agreement with a specialized enterprise that have an accreditation. Monitoring is carried out on the following components of the environment:

- atmospheric air monitoring;
- groundwater monitoring;
- soil monitoring;
- radiation monitoring;
- monitoring of emergency situations.
- soil monitoring;
- radiation monitoring;
- monitoring of emergency situations

5.1.1 Atmospheric Air Monitoring

The system ECP (environmental control program) of the atmospheric air includes:

- observations of the sources of emission and discharge of pollutants;
- monitoring air pollution at the border of the SPZ

Control on the emission sources is required to conduct in accordance with “the Guidelines for the Control of Atmospheric Pollution Sources”, RRD 211.3.01.06-97, Almaty, 1997. These observations are made to monitor compliance with the MPE standards and are made on the sources of organized emissions. Monitoring compliance with the standards of the MPE at the emission sources should be carried out by specialized and accredited laboratories in accordance with the developed ECP Program.

Control on the unorganized sources is carried out by a calculation method and instrumental measurements at the SPZ border.

The second type of observations will allow to control effectively air pollution from unorganized emission sources. At the same time, observation points will be located on the border of the estimated SPZ. Additional observation points may be in the direction of the prevailing winds outside the boundaries of the estimated SPZ, in the direction of environmental protection facilities, as well as in the direction of solid waste collectors (within or outside the SPZ boundary). The observed parameters will be air temperature, wind direction and speed, the content of inorganic dust in the air with SiO2 less than 20%, nitrogen dioxide, carbon monoxide, sulfur dioxide. The location of the

monitoring observation points and the SPZ should be adjusted after the information on actual areas of the pollutants impact is obtained and accumulated.

In fulfillment of the Decree of the President of the Republic of Kazakhstan dated January 8, 2013 No. 464, the enterprise plans to install an automatically controlled station of environmental monitoring in real time, which will allow to monitor the concentration of the major pollutants constantly and, if it is exceeded, take urgent measures to reduce harmful emissions into the atmosphere, preventing the accumulation of the pollutants in the atmospheric surface layer and the growth of their concentration.

Design solutions for the installation of a stationary complex for monitoring the state of the atmospheric air at the border of the sanitary protection zone of the enterprise will be developed in a

5.1.2 Monitoring of ground and surface water

As a part of the hydrogeological report of the Preliminary Feasibility Study "The construction project of the Aktogai Sulphide Concentrator," carried out by the company SRK Consulting, in 2009, hydrogeological field studies were realized to determine the depth of groundwater, regional groundwater flows and the quality of groundwater in the immediate proximity to the proposed mine.

According to the results of this work, the quality of regional groundwater has been determined. It is revealed that there is a strong correlation between the lithology of rocks and the salinity or mineralization of the groundwater. The groundwater in the hilly terraced areas, located under magmatic granodiorites and volcanic tuffs, has a very high salinity. Better waters can be found, as a rule, in sandy primary aquifers in the valley. In some areas, this high salinity ratio extends into valleys covered with low-thickness quaternary sediments that lie beneath the tuffs.

The groundwater of the region has varied mineralization from 1.2 to 9.4 g / dm3. According to the chemical composition, water is sulphate sodium with a salinity of up to 5 g / dm3. The groundwater with a salinity of 1-3 g / dm3, common in the southeastern part of the field, is characterized by a sulfate-sodium chloride composition with a predominance of the sulfate anion. The sulfate ion content ranges from 514 to 1500 mg / l, chlorine ion — from 142 to 773 mg / l, bicarbonate-ion — from 67 to 317 mg / l. In general, the groundwater at the Aktogay field according to the Sanitary Regulations № 209 dated 03/16/2015 is unsuitable for drinking purposes.

Remoteness from surface watercourses, a small amount of precipitation, the presence of poorly permeable top sediments, an increase in rock density with depth, associated with a decrease in total porosity (including fissures), colmatation of cracks in the upper part of the section by weathering products and hydrothermal changes in rocks caused weak water cut. The groundwater salinity varies depending on the composition of aquifers and the degree of atmospheric water supply. The prevalence of sulphate or chloride ions in the groundwater is determined, in some areas they are two or three-component.

At the present time, observations in the areas of a potential groundwater pollution are organized in the aeration zone to the depth of the groundwater level of the first aquifer from the surface, mainly in deluvial-proluvial upper quaternary sediments and in the zone of open fracture of the Paleozoic within the production infrastructure area, according to the "Project of organization of the observation network and monitoring of the groundwater in the zone of activity of the Aktogai Sulphide Concentrator", the Protocol of "Vostkaznedra" №138 dated 11/17/2016, conclusion of the state environmental expertise №KZ 09VDC00056654 dated 12.22.2016 and the Operational Environmental Control Program based on the approved Project "Construction of the Aktogai Sulphide Concentrator with infrastructure", section Evaluation of the environmental impact ", the conclusion of the state environmental impact assessment № KZ17VCY00092510 dated 10.03.2017.

According to the "Project of the organization of the observation network and monitoring of the groundwater in the zone of activity of the Aktogai Sulphide Concentrator" for the period of 2016-2017 observations were organized at the groundwater transit sections from the supply area towards the unloading zones and to the boundaries of the sanitary protection zone of the enterprise. A network of observation wells up to 35 m deep along the border of the sanitary protection zone of production

facilities is provided on the same horizon (open pit with infrastructure and open pit drainage system, overburden heaps and poor sulfide ore dumps, heap leaching site, liquid extraction and electrolysis plant, concentration plant on the processing of sulphide ores, tailing, workers' camp and infrastructure facilities of the enterprise) (Appendix 2).

As data is collected and the situation is analyzed, the observation network will be revised and expanded to reflect changes in the hydrogeological situation.

Considering that the deposit area is covered from the surface by slightly permeable, almost anhydrous deluvial-proluvial cover deposits, the main potential objects of anthropogenic impact are aquifers of medium-upper Quaternary alluvial-proluvial deposits (apQII-III) and modern alluvial deposits (aQIV), adjoining to the border of the sanitary protection zone of the mine from the Northern, North-Western and southern sides of the deposit. There are no aquifers with fresh or slightly brackish water, which may be subject to pollution, at the field itself within the developed mining area.

Under the ECP Program, hydrochemical testing quarterly monitors the following indicators: pH, dry residue, total hardness, surfactants, permanganate oxidation, phenols, sulfates, aluminum, arsenic, boron, barium, beryllium, calcium, cadmium, chlorides, cobalt, carbonates, cyanides, chromium, copper, fluorides, total iron, mercury, potassium, magnesium, manganese, molybdenum, sodium, ammonium salt, nickel, nitrites, nitrates, lead, zinc, strontium, selenium, vanadium, phosphates, antimony , oil products, xanthates.

In addition, observations are made of the groundwater regime, including the level and the temperature of groundwater.

5.1.3 Soil monitoring

Soil monitoring will be carried out:

- on the border of the calculated SPZ at 4 points;

The frequency of observations - once a year. Soil samples are taken for analysis on the content of heavy metals and selected toxicants (copper, molybdenum, zinc, lead, manganese, strontium, cadmium, aluminum, iron, sulfur).

Monitoring will be carried out by third-party accredited laboratories on contractual terms according to the environmental control Program (ECP) approved by the enterprise.

The composition of controlled ingredients will be specified during the implementation of the environmental control program.

Frequency of observations:

- for indicators of general physical and chemical properties - once every three years;
- for indicators of chemical pollution - once a year, in the autumn (before the autumn precipitation) - the period of maximum concentrations.

Monitored Parameters:

- physical and chemical properties - humus content, gross forms of nitrogen and phosphorus, carbonates (CO2), pH, absorption capacity and composition of exchange cations, amount of water-soluble salts (complete analysis of the aqueous extract), mechanical composition.

In addition to the monitoring of the soil pollution with the gross forms of heavy metals, samples need to be studied on the distribution of their mobile forms. The concentration of mobile forms of heavy metals must be determined by the existing standard methods. In soils, mobile forms of the following elements will be determined: lead, copper, zinc, nickel, cobalt, molybdenum

In addition to sampling for heavy metals, soil samples will be taken at the industrial site to determine concentrations of petroleum products.

Soil monitoring should also be done by visual observation of unauthorized discharges of process fluids on the terrain of the enterprise.

Identified areas of contaminated soils are subject to immediate cleaning with the removal of contaminated soils in specially designated storage sites, followed by rehabilitation of disturbed areas.

5.1.4 Snow cover monitoring

Monitoring of snow cover pollution at the boundary of the SPZ determines the dust load over the period of accumulation of snow cover (February – March) and the concentration coefficient of the harmful substances. An indicator of total air pollution is the analysis of snow cover at the end of the winter period. Snow samples should be analyzed for the content of heavy metals and certain toxicants (copper, molybdenum, etc.). Sampling is carried out in the same points that are installed to control the soil and air.

The composition of the controlled ingredients will be clarified during the implementation of the environmental control program.

5.1.5 Monitoring of waste formation and management

Operational environmental monitoring for the designed facility in waste management consists of monitoring of production and consumption waste management

Production control in the field of waste management in general includes:

1. Checking the order and rules of waste management.
2. Analysis of the existing industries, in order to identify the opportunities and ways to reduce the amount and degree of hazard of the formed waste.
3. The accounting of the formed, used, neutralized, transferred to other persons or received from other persons, and also the placed waste.
4. Finding the hazard class of the waste according to the degree of a possible adverse impact on the environment with direct or indirect effects of the hazardous waste on it.
5. Preparation and approval of the hazardous waste Passport.
6. Determination of the mass of the disposed waste in accordance with the issued permits.
7. Monitoring of the state of the environment in the places of storage (accumulation) and (or) waste disposal facilities.
8. Verification of the effectiveness and safety of the operation of waste disposal facilities for the environment and public health.

The collection of waste, prior to its removal from the enterprise, should be carried out in specially marked, in accordance with their purpose, containers or reservoirs with the tight-fitting lids. Containers should be installed on specially equipped sites.

The transportation of waste should be carried out by specially equipped transport (dump truck with a pressurized body, tank truck) with issued passports for the delivery of waste.

Utilization of waste of production and consumption will be made under the contract with the specialized enterprise.

5.1.6 Radiation monitoring

Radiation monitoring at the designed facilities is carried out to study the radiation situation at the production facilities and in the sanitary protection zone.

Radiation background measurements should be carried out near the main production facilities.

Radioactive pollution is considered an increase in the concentrations of physical or natural radionuclides in excess of the established sanitary and hygienic standards for maximum permissible concentrations (MPC) in the environment (soil, water, air) or maximum permissible levels of radiation (MPLR), as well as above-standard concentrations of radioactive elements in building materials, on the surface of process equipment and in industrial waste.

The effective dose of exposure by natural sources of radiation of the employees in the working environment should not exceed hygienic standards

The production control program for KAZ Minerals Aktogay LLP (KAZ Minerals Aktogay) during the operation of the Aktogay concentrator will be developed by the separate documentation in accordance with the current Environmental Code of the Republic of Kazakhstan. Recommended components for monitoring the state of environmental components are presented in the table below.

Reports on the program of production and environmental control (PEC) are developed quarterly and provided to the authorized body in the field of environmental protection.

PROGRAM OF OPERATIONAL ENVIRONMENTAL MONITORING DURING WORKS

Station, point of observation	Measured components	Frequency of measurements	Expected results
1	2	3	4
АТМОСФЕРНЫЙ ВОЗДУХ			
SPZ border, points №№ 1-8 See Annex 2, sheet 4	Nitrogen dioxide	Once a quarter (instrumental measurements)	Determination of the content of harmful substances and assessment of the level of air pollution
	Sulphur dioxide		
	Carbon monoxide		
	Total dust		
Ore feed to crusher, transfer units	Inorganic dust SiO_2 70-20 %	Once a quarter (instrumental measurements)	Determination of the content of harmful substances and assessment of the level of air pollution
Coarse ore feed to the mill	Inorganic dust SiO_2 70-20 %	Once a quarter (instrumental measurements)	
Hopper warehouse of lime powder	Calcium oxide	Once a quarter (instrumental measurements)	
Main and auxiliary areas of the plant (stationary and fugutive emission sources)	Nitrogen dioxide	Once a quarter (calculation method)	Determination of the content of harmful substances and assessment of the level of air pollution
	Nitrogen oxide		
	Sulphur dioxide		
	Carbon monoxide		
	Inorganic dust with SiO2 70-20 % content		
	Calcium oxide		
	Soot		
	Benzapiren		
	Formaldehyde		
	Sodium hydroxide		
	Hydrochloric acid vapors		
	Sulfuric acid vapors		
	Iron oxide		

Table 5.1.1 continuation

1	2	3	4
SNOW COVER			
SPZ border, in 4 points See Annex 2, sheet 4	Hydrogen value (pH)	Annualy (1st quarter) instrumental measurements	Determination of the content of harmful substances and assessment of the contamination level of the snow cover
	Dry residue PH (pH)		
	Cl		
	SO_4		
	Fe general		
	Ca		
	Mg		
	F		
	CN		
	PO_4		
	NO_2		
	NO_3		
SOIL COVER			
SPZ border, in 4 points See Annex 2, sheet 4	Al_2O_3	Annualy (3rd quarter) instrumental measurements	Determination of the content of harmful substances and assessment of soil contamination
	SiO_2		
	P_2O_5		
	K_2O		
	CaO		
	TiO_2		
	Ba		
	V		
	Cr		
	MnO		
	Ni		
	Fe_2O_3		
	Cu		
	Zn		
	Pb		
	As		
	Mo		
	Br		

1	2	3	4
WATER IN THE CONCENTRATION TAILINGS			
Discharge into the tailing dump The place of selection is determined after the completion of installation work.	pH	Once a quarter (instrumental measurements)	Determination of harmful substances and assessment of groundwater pollution
	Dry residue		
	Total hardness		
	Surfactants		
	Permanganate oxidation		
	Phenols		
	SO_4		
	Al		
	As		
	B		
	Ba		
	Be		
	Ca		
	Cd		
	Cl		
	Co		
	CO_3		
	Cr		
	Cu		
	F		
	Fe general		
	Hg		
	K		
	Mg		
	Mn		
	Mo		
	Na		
	NH_4		
	Ni		
	NO_2		
	NO_3		
	Pb		
	PO_4		
	Sb		
	Petroleum products		

Table 5.1.1 continuation

1	2	3	4
GROUNDWATER			
Observation wells №№ 1-4 №23, 25, 21, 11 – existing	pH		Determination of harmful substances and assessment of groundwater pollution level
	Dry residue		
	Total hardness		
	Surfactants		
	Permanganate oxidation		
	Phenols		
	SO_4		
	Al		
	As		
	B		
	Ba		
	Be		
	Ca		
	Cd		
	Cl		
	Co		
	CO_3		
	Cr		
	Cu		
	F		
	Fe general		
	Hg		
	K		
	Mg		
	Mn		
	Mo		
	Na		
	NH_4		
	Ni		
	Pb		
	PO_4		
	Petroleum products		
	Xanthogenate		

Table 5.1.1 continuation

1	2	3	5
PRODUCTION WASTE			
Waste generation accounting will be carried out by conducting an annual inventory of waste and compiling reports on hazardous waste in accordance with article 154 of the Environmental Code of the Republic of Kazakhstan. Assessment of the level of environmental pollution in the area of the production and consumption waste pond by the enterprise will be carried out annually in accordance with RDD 03.3.0.4.01-96.			
RADIATION RESEARCH			
Plant facilities	Rate of γ-radiation dose	Annualy	Determination of radiation
Production premises and administrative buildings	Rate of γ-radiation dose	Annualy	
	Equivalent equilibrium volumetric radon activity	Annualy	

6 ENVIRONMENTAL AND ECONOMIC ASSESSMENT OF DAMAGE FROM ENVIRONMENTAL POLLUTION

In accordance with the Environmental Code of the Republic of Kazakhstan the economic methods of influencing the enterprises - the environmental emission charge are introduced as measures to protect the environment and to compensate for the inevitable damage to natural resources.

Payments from enterprises are charged for both standard emissions (discharges, waste disposal) of pollutants and for the excess emissions.

Fees for standard and excess emissions (discharges, waste disposal) are charged at approved rates.

According to the "Instructions for Environmental Impact Assessment" approved by Order No. 204-p of 28 June 2007 of the Minister of MEP of the Republic of Kazakhstan, the assessment of inevitable damage to the environment and public health as a result of planned economic activity is carried out in the form of an approximate calculation of regulatory payments for special nature use, as well as calculations of the amount of possible compensation payments for excess damage to the environment as a result of possible emergencies.

7 ANALYSIS OF THE APPLIED TECHNOLOGY FOR THE COMPLIANCE WITH THE BEST AVAILABLE TECHNOLOGIES AND TECHNICAL SPECIFIC REGULATIONS

With the development of modern production with its scale and growth rates, the problems of developing and introducing the environmentally efficient and resource-saving technologies are becoming increasingly topical. Their early decision in a number of countries is considered as a strategic direction for the rational use of natural resources and environmental protection.

As it is known, almost all raw materials are complex, and on average more than a third of its quantity consists of accompanying elements, which can be extracted only in a comprehensive processing.

This project envisages a bulk-diffenretial flowsheet for the concentration of copper-molybdenum ores from the Aktogay deposit with the separation of bulk concentrate by the method that excludes steaming, but uses the sodium sulphide as a copper mineral depressant mixed with sodium hydrosulfide. Refuse to use the live (jet) steam helps to reduce energy intensity and increase the safety level of the process. In addition, the advantage of the adopted technology is the relatively low consumption of sodium sulphide, which improves the sanitary working conditions.

The resulting copper and molybdenum concentrates contain the precious metals. With the aim of further processing, the concentrates will be sent for complex processing to the existing copper smelters owned by the Company, which excludes the construction of new ones. This principle is primarily associated with the preservation of natural and social resources such as air, water, land surface, recreational resources, public health.

It should be emphasized that the implementation of this principle is feasible only in combination with effective monitoring, developed environmental regulation and multistage environmental management.

In the overall work related to environmental protection and rational development of natural resources, it is necessary to identify the main directions of creating the resource-saving and environmentally efficient technologies and industries. These include the integrated use of raw materials and energy resources; improvement of existing and development of fundamentally new technological processes and production and related equipment; the introduction of water and gas circulation cycles (based on efficient gas and water treatment methods); cooperation of production with the use of waste of some industries as a raw material for others and the creation of non-waste technologies.

CONCLUSION

In the course of development of the EIA, the basic principles of its performance were followed, namely:

- integration (complexity) – the consideration of the impact of economic activities on the environment, the local population, agriculture and industry is carried out in their conjunction with technological, technical, social, economic planning and other solutions;
- taking into account the ecological situation in the territory that is in the impact area of the activity;
- understanding of the integral nature of the procedures being performed, their implementation, taking into account the relationship of emerging environmental impacts with social, environmental and economic factors.

According to the social and environmental impact assessment during the construction and operation of the second processing plant at the Aktogay mine, there are a number of potential impacts associated with the construction, operation and bandonment of the mine, which can pose risks to both humans and the environment, if appropriate measures to manage and reduce the environmental impact would not be established.

This paper presents the results of the current state of the environment and it were made a qualitative and quantitative assessment of the environmental impact during the implementation of the Project "Aktogai Sulphide Concentrator Expansion". Based on the materials presented in this work, the following conclusions can be made:

1. As the pollution calculations showed, at the border of the SPZ and in the residential zone, the MPC excess both in the summation group and by separate elements are not expected. Due to the remoteness of the residential area from the project under consideration, it does not harmfully affect the quality of atmospheric air in the setllement. *The impact on the atmospheric ambient air is rated as acceptable.*

2. The impact on groundwater and surface water, from the side of their pollution, is expected to be *insignificant.* During the Concentrator operation the wastewater discharge is not planned.

The probable impact on the hydrogeology of groundwater due to the use of its reserves in the process, can be assessed as significant. However, this probable impact will extend over a small area, but performance of work using the full water cycle in the technological process and the rehabilitation strategy after completing the work will restore the original groundwater regime.

3. The main pollution of the soil will occur due to dust emissions. Given that the dust composition will not differ from the composition of the soil, *the impact on soil is estimated as acceptable.*

4. The activity of the enterprise will not lead to a change in the existing species composition of the plant and animal world. The vegetation of the considered area is scarce in diversity and in the herbage production, and by the end of the summer, it practically dries out. The fauna of this area is adapted to local conditions (poor vegetation, drying lakes and streams).

The impact on the biological environment is assessed as acceptable.

5. The impact on socio-economic aspects is assessed as positively significant, both for the economy of Kazakhstan and the local economy, and for the employment of the local population.

There are not any natural zones, historical or cultural monuments included in the list of objects protected by the state in the area of work.

Due to the location of the plant within the enterprise and the insignificance of the contribution to the general state of the environment, no negative impact on public health is expected.

6. *Emergency situations*. In order to avoid emergency situations and ensure safety at all stages of work, the compliance with design standards is necessary. To reduce the degree risk in the organization of work, measures are provided to prevent (reduce) emergencies, which include the

organizational measures, a list of persons 'responsibilities, a message transmission plan, details of the emergency service, etc.

In general, the impact of industrial and economic activities on the environment in the area of the second concentrating plant is estimated as acceptable, there are no such environmental and socio-economic impacts or significant risks that would impede the implementation of the project.

The planned production activities in case of observance of the recommended environmental protection measures, will not significantly disturb the existing ecological balance with undoubtedly a major socio-economic effect - providing employment for the population, obtaining a valuable product - copper and molybdenum and related products of gold and silver, with other positive consequences.

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STATEMENT OF ENVIRONMENTAL EFFECTS (SEE) AKTOGAY SULFIDE CONCENTRATOR EXPANSION PROJECT IMPLEMENTATION

GENERAL INFORMATION

1.	Investor (Client)	LLP “KAZ Minerals Aktogay”
2.	Company details	Legal address: 1, Zh. Omarova Street, Almaty, 050020, Kazakhstan, Phone: +7 727 244-0353, fax +7 727 244-7196, e-mail: info@kazminerals.com BIN 090840006023, Account: IBAN №KZ 1583201T0250320019 to JSC BIK CITIKZKA, KBE 17. JSC "Citibank Kazakhstan".
3.	Sources of financing	Investments, own funds
4.	Plant location	Republic of Kazakhstan, East Kazakhstan region, Ayagoz district, 25 km east of the village Aktogay, 110 km in a straight line to the south-east of the town of Aagoz
5.	Full name, abbreviation, departmental affiliation or indication of the owner	Limited Liability Partnership "KAZ Minerals Aktogay" LLP “KAZ Minerals Aktogay”
6.	Submitted project materials (full title of documentation)	Aktogay Sulfide Concentrator Expansion Project
7.	General design contractor (name, details, name of chief executive officer of the project	LLP “PSI Engineering”

PROJECT SPECIFICATION

1.	Estimated area of land allotment, ha	78,4726 ha
2.	Radius and area of sanitary protection zone (SPZ)	Over 500 m
3.	Quantity and number of floors of production buildings	- Crusher building - Concentrating plant building - Warehouses - Equipment maintenance shop - Garage for various vehicles
4.	The planned construction of related social and cultural facilities	Tailing dump (construction of the second stage is planned)
5.	Range of main products and the volume of production in physical terms (design indicators at full capacity)	1. Copper concentrate - 460000-500000 tons / year. 2. Molybdenum concentrate - 2700 tons / year.
6.	Main technological processes	Crushing and grinding of ore, crushing of ore pebbles. Flotation, thickening and filtration of copper and molybdenum concentrates. Tailing thickening, pumping the thickened tailings to the tailing dump. Dehydration of copper and molybdenum concentrates, shipment to the consumer
7.	Justification of the socio-economic necessity of the planned activity	1. The Aktogay deposit is one of the major undeveloped copper deposits in the world. Expansion of Aktogai mine and construction of the second concentrator allows the sulphide ores of the Aktogay deposit to be involved in the processing and provides an increase in copper production. 2. Meeting the growing needs of the national economy in liquid metals, replenishing the revenue base of the budget through tax revenues, creating and improving the existing infrastructure of nearby communities, creating additional jobs, employing the local population.

8.	Scheduled dates for the construction: first phase - full capacity -	Concentrator – 2019-2022 Concentrator – 2022-2028
9.	Consumption of materials	
9.1	Process and power fuel	-
9.2	Power supply	Construction of a new 220/35 kV main substation (220/35 kV main switchgear) “Concentrating Plant-2” with the installation of two 220/35 kV transformers with a capacity of 100/125 MVA. Construction of two 220 kV overhead lines from the 500/220 kV SS Aktogay Concentrator to the 220/35 kV SS (completed under a separate project).
9.3	Heat supply	From electric boiler
9.4	Types and volumes of raw materials: local imported, t / year-	Sulfide copper-molybdenum ore 25 million tons / year. Lime powder - 17500. Molybdenum foamer (pine oil) - 250. Collector of Molybdenum - 125. Isobutyl sodium xanthate - 625. Sodium sulfide with sodium hydrosulfide - 15. Methylisobutylcarbinol (MIBK) - 625. Flocculant for concentrating concentrates (Magnoflok) - 50. Flocculant for tailings thickening (Magnoflok) - 550.

CONDITIONS OF NATURE RESOURSE USE AND THE PROBABLE IMPACT OF THE PLANNED ACTIVITY ON THE ENVIRONMENT

1.	Atmosphere		
	Construction period:		
1.1	List and amount of pollutants expected to be emitted into the atmosphere (during construction)		
1.1.1 1.1.2	total emission, tons / year: - solid - gaseous standard emission, tons / year: - solid - gaseous	112,30880366 37,82764494 74,48115872 108,94300252 37,62985 71,31315252	
	Operation period:		
1.2	List and amount of pollutants expected to be emitted into the atmosphere (with planned capacity)		
1.2.1 1.2.2	total emission, tons / year: - solid - gaseous standard emission, tons / year: - solid - gaseous	35,1875374 25,0952974 10,09224 25,2190964 37,62985 71,31315252	
1.3	Calculated surface concentrations at calculated points - the contribution of the enterprise (numerator - MPC units, denominator - mg/m^3)		
	Pollutant	Border of the residential area	Border of the SPZ
1.3.1	Iron oxide		0.00315/0.00126
1.3.2	Manganese and its compounds		0.0055/0.00006
1.3.3	Nitrogen dioxide		0.56619/0.11324
1.3.4	Nitrogen oxide		0.28484/0.11394
1.3.5	Carbon (soot)		0.36422/0.05463
1.3.6	Sulfur dioxide		0.27628/0.13814
1.3.7	Hydrogen sulphide		0.00628/0.00005
1.3.8	Carbon monoxide		0.15809/0.79045
1.3.9	Gasoline (petroleum, low-sulfur)		0.01508/0.07538
1.3.10	Kerosene		0.1758/0.21096
1.3.11	Mineral petroleum oil		0.12522/0.00626
1.3.13	Inorganic dust containing silica in%: 70-20		0.22305/0.06692
1.3.14	Abrasive dust		0.0035/0.00014
1.3.15	Aluminum oxide		0.02111/0.00211
1.3.16	Suspended particles		0.028391/0.0085173
1.3.17	Calcium oxide		0.0029/0.00087
1.4	Sources of physical impact, their intensity and possible impact areas		
1.4.1	Electromagnetic emissions		None
1.4.2	Acoustic		
1.4.3	Vibration		Within normal limits

2	Water environment	
2.1 2.1.1 2.1.2	Fresh water intake: single, for filling water circulation systems, m^3 constant, m^3 / day	 1500 73512,92
2.2	Water sources:	
2.2.1	- surface, pieces / (m^3/day)	-
2.2.2	- underground, pieces / (m^3/day)	1/73512,92

2.3	Amount of discharged wastewater:		
2.3.1	- to natural water bodies and water courses, m^3/year	-	
2.3.2	- to storage ponds, m^3/year	-	
2.3.3	- to industrial water ponds, m^3/year	108613,05	
2.3.4	- to outside sewer systems, m^3/year	-	
2.4	Concentration and volume of main pollutants contained in wastewater (by ingredients)	mg/dm^3	t/year
2.4.1	No discharge of wastewater into natural water bodies and watercourses is foreseen		
2.5	Concentration of pollutants by ingredients in the nearest place of water use (if there is a discharge of sewage into reservoirs or watercourses) a well for production purposes - mg/dm^3		
2.5.1			
2.5.2			
2.5.3			
3.	Land plots		
3.1	Specification of the land plot to be allocated:		
 3.1.1 3.1.2 3.1.2.1 3.1.2.2	Area: for permanent use, ha for temporary use, ha including: - arable land - forest vegetation - pasture		 78,4726 -- -- --
3.2	Disturbed land requiring reclamation, pcs/ ha		
 3.2.1	Including: - Concentrating plant with infrastructure		78,4726

4.	Subsoil (for mining enterprises and territories)	
4.1	Type and method of mining, including the building materials, t / year:	Open mining – 25 000 000
4.2	Integrity and efficiency of the use of rocks extracted from the subsurface: main raw material - related components	Copper-Molybdenum Ore
4.3	Volume of waste stored on the surface, t: annually	
5.	Vegetation	
5.1	Types of plants subject to partial or complete destruction, including:	Steppe vegetation (wormwood, fescue, feather grass, etc.)
5.1.1	Area of wood cutting, ha	No
5.1.2	Volume of wood produced, m^3	-
5.2	Pollution of vegetation including the crops with toxic substances (estimated)	-
5.3	Agriculture crops, ha	-
6.	Fauna	
6.1	Sources of direct impact on the animal world including on the hydrofauna.	-
6.2	Impacts on protected areas (reserves, national parks, conservancy areas)	-
7.	Production waste	
7.1	Volume of non-recyclable waste	
7.1.1	Including the toxic	None
7.2	Proposed methods for the neutralization and disposal of waste	
8	Existence of radioactive sources	None
9	Probable emergencies	
9.1.	Potentially dangerous process lines and facilities	If the safety rules are observed- no
9.2	Radius of probable impact	---
10	Complex assessment of environmental changes caused by the plant impact and also its impact on human life conditions and health	On air basin – admissible impact On water basin - admissible impact On soil and ground - admissible impact On biological system - admissible impact Social –economic sphere – positive impact for the economics and population employment.

11	Forecast of environment and possible consequences in social and public sphere by the results of the plant operation	In the event of observance of all environmental protection measures and requirements, the plant doesn't cause any negative impact on human health, environment and surrounding landscape.
12	The Client's responsibilities (initiator of the economic activity) to create the favorable conditions for the population during the construction, operation and abandonment of the plant	The Client shall provide: 1. To observe all design solutions, production process regime, environmental standards and regulations during the plant operation. 2. In the process of works to clean the territory from the garbage, dispose scrap metal and other waste. 3. By the end of operation perform the land reclamation.

8.	Наличие радиоактивных источников, оценка их возможного воздействия	Отсутствует
9.	Возможность аварийных ситуаций	
9.1	Потенциально опасные технологические линии и объекты.	
9.2	Вероятность возникновения аварийных ситуаций	При соблюдении правил безопасности - отсутствует
9.3	Радиус возможного воздействия	--
10.	Комплексная оценка изменений в окружающей среде, вызванных воздействием объекта, а также его влияния на условия жизни и здоровье населения	На воздушный бассейн – воздействие допустимое На водный бассейн воздействие допустимое На почвы и землю – воздействие допустимое На биологическую систему - воздействие допустимое Социально-экономическое – позитивное для экономики и трудоустройства населения
11.	Прогноз состояния окружающей среды и возможных последствий в социально-общественной сфере по результатам деятельности объекта	При соблюдении всех природоохранных мероприятий и требований негативного влияния на здоровье человека, окружающую среду и прилегающий ландшафт не оказывает
12.	Обязательства заказчика (инициатора хозяйственной деятельности) по созданию благоприятных условий жизни населения в процессе строительства, эксплуатации объекта и его ликвидации	Заказчик обязуется: 1. В процессе эксплуатации объекта соблюдать проектные решения, технологический режим производства, экологические нормы и требования. 2. В процессе производства работ проводить очистку территории от мусора, металлический лом, мусор удалить с участка работ. 3. По окончании работ произвести рекультивацию нарушенных земель.

Руководитель проекта Филиала компании «KAZ Minerals Projects B.V.» действующего за и от имени ТОО «KAZ Minerals Aktogay» (КАЗ Минералз Актогай), в Республике Казахстан **Брайан Томлинсон**