O'ZBEKISTON RESPUBLIKASI
"O'ZBEKISTON METALLURGIYA KOMBINATI"
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STIR 200460222, H/r 20210000800468183001
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Toshkent viloyati

РЕСПУБЛИКА УЗБЕКИСТАН
АКЦИОНЕРНОЕ ОБЩЕСТВО
«УЗБЕКСКИЙ МЕТАЛЛУРГИЧЕСКИЙ КОМБИНАТ»
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2020_____ _____ 01/05-01/02-357 Dated July 29, 2020

To Mr S.S. Yuldashev
Director of State Unitary Enterprise
Central State Expert Review Agency

Dear Sokhib Sergeevich!

Herewith I ask you to accept for consideration and provide the feedback of the State Environmental Expert Review Agency on customizing the draft EIS for the reconstruction and expansion of production capacity of Uzmetkombinat JSC with the construction of casting and rolling complex located in the city of Bekabad, Tashkent region, as well as to issue an invoice for payment of environmental expert review activities.

Bank Details:
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Mustafaev J.I.
Deputy Chairman of the Board

APPROVED BY:

_____ J. I. Mustafaev
Acting Deputy Chairman of the Board
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science and innovation Uzmetkombinat JSC
"___" _____ 2020

ENVIRONMENTAL IMPACT STATEMENT (DRAFT EIS) FOR THE RECONSTRUCTION AND EXPANSION OF PRODUCTION THE FACILITIES UZMETKOMBINAT JSC WITH FURTHER CONSTRUCTION OF A CASTING AND ROLLING COMPLEX (PROJECT ADJUSTMENT) IN BEKABAD CITY OF TASHKENT REGION

Agreed with:

Manager of Casting and Rolling Complex
Under Uzmetkombinat JSC

_____S.A. Chaykovskiy

Head of HSE and Nature Conservation
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Developed by:

General Director of
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_____ Kelesh I.Y.

_____ 2020

Bekabad city – 2020

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INTRODUCTION

Environmental impact assessment is an exercises that is intended to determine the possible impact on the environment during the development of engineering and design documents being developed for the execution of engineering and project decisions, alleged changes in the environment, as well as the prediction of its state in the future to decide whether it would be possible or unfeasible to undertake the engineering decisions.

The facility being subjected to environmental impact assessment, is Uzbek Metallurgical Plant namely Uzmetkombinat JSC located in Bekabad city of Tashkent region.

At present, the following environmental standards are being exercised at Uzmetkombinat JSC:

- Draft environmental standards emissions limits of polluting substances into the atmosphere (State Environmental Expert Review Agency Summary No 18 / 1729z dated 28.12.2015);
- Draft environmental standards of education and waste disposal (State Environmental Expert Review Agency Summary No 18 / 1736z dated 29.12.2015);
- Draft environmental regulations limit values for dumping of the wastewater filled with contaminants into open water basins (State Environmental Expert Review Agency Summary No 18 / 1681z dated 18.12.2015)

In accordance with the Decree of the President of the Republic of Uzbekistan dated 09.01.2018. PP-3468 on the "Development program of Uzmetkombinat JSC for the period of year 2018 to 2020" the plant had stared execution of the investment project "Reconstruction and expansion of production capacities of Uzmetkombinat JSC with the construction of casting and rolling complex".

In 2018, draft EIS was developed for the reconstruction and expansion of production capacities of Uzmetkombinat JSC with the construction of a casting and rolling complex with a capacity of 700 thousand tons of hot-rolled sheet of smelted steel per year, for which a positive conclusion of the State Environment Expert Review Agency No. 03-01/13-08-1547 was received on July 26, 2018 (Appendix A).

In October 2018, scientific and technical council of Uzmetkombinat JSC (Minutes №12 / 2018 is presented in Appendix B), had ruled that Italian company Danieli & C. Officine Meccaniche S.P.A. was announced as the supplier of metallurgical equipment, with an increase in the productivity of the projected casting and rolling complex from 700 thousand tons to 1.04 million tons of hot rolled sheet.

The present adjustment of the draft EIS was made taking into account the increase in the originally planned productivity of the projected casting and rolling complex.

In accordance with the environmental legislation of the Republic of Uzbekistan, the selection of production site, production equipment and technology, is accompanied by environment impact assessment carried out under the draft statement on the impact on the environment (EIS Project).

The main objectives of this work are:

- Prevention of possible environmental degradation under the influence of the planned economic activity;
- Determination of the qualitative nature, quantitative expression and boundaries of the spread of this influence;
- Ensuring the ecological stability of the territory of the area where the object is located;

- Creation of favorable states for the development of the natural environment of the study area;
- Minimization of environmental impact.

To determine the nature and scale of upcoming changes in the state of the environment, an analysis of the features of technological processes of foundry and rolling industries was carried out. The sources and priority types of impact, accompanied by the introduction of emissions, discharges, waste, and the withdrawal of natural resources, have been identified. The scale and degree of transformation of the elements of the environment during the normal operation of the enterprise are revealed, and the nature of the impact in emergency situations is considered, measures are provided to minimize the impact and reduce the negative consequences.

The project was developed on the basis of regulatory enactments in the field of environmental protection:

- Law of the Republic of Uzbekistan on the "Nature Conservation" No. 754-XII dated 09.12.1992.
- Law of the Republic of Uzbekistan on the "Protection of atmospheric air" No. 353-I of 27.12.1996.
- Law of the Republic of Uzbekistan on the "Water resources and use of water" No. 681-I of 29.08.1998.
- Law of the Republic of Uzbekistan "On Waste" No. 362- II of 05.04.2002.
- Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 949 dated November 22, 2018 on the "Approval of the Regulation on the state ecological expert review agency".
- RD 118.0027714.24-93. Instruction on the procedure for conducting an environmental impact assessment (EIA) when selecting a site, developing feasibility studies and construction projects (reconstruction, expansion and technical re-equipment) of economic facilities and complexes. Tashkent. State Nature Conservation Committee of Uzbekistan. 1993 year

In accordance with the list of activities that are subject to state ecological expertise (Appendix №2 to the Resolution of the Cabinet of Ministers №949 from 22.11.2018g.) A About «Uzmetkombinat" refers to companies of the 1st category of environmental hazard (Claim 14 - Plants ferrous and nonferrous metallurgy).

1. GENERAL INFORMATION ABOUT THE COMPANY
1.1 Existing production

Joint Stock Company "Uzmetkombinat" is located in Bekabad city of Tashkent region.
An overview image of the area where the enterprise is located is shown in Figure 1.1.

Figure 1.1 - Overview image of the location of the Uzmetkombinat JSC.

Geographically, Uzmetkombinat JSC is located at six industrial sites within the city. The first site includes the main production facilities, 5 sites - household boilers located in residential areas of the city.
Uzmetkombinat JSC is the leading ferrous metallurgy enterprise in the republic. The Uzbek Metallurgical Plant was put into production in 1944.
Currently, the production capacity of Uzmetkombinat designed to smelt 850 thousand tons annual steel production to 810 thousand tons of finished rolled steel.

The range of manufactured products is presented in Table 1.1.

Table 1.1

Ferrous metal rolled products	Hardware	Copper and copper alloy rolling	Non-metallurgical products
- steel balls	- welding electrodes	- copper foil and tape,	- thermal insulation materials based on basalt

- fittings - a circle - square - band - corner - channel - hexagon -ferroalloys -katanka in riots -wire	- hardware (nails, bolts, nuts, mesh netting) - enameled dishes	brass - brass strips - copper and brass radiator tapes - copper and copper alloys for general purposes, for the electrical industry, construction purposes	(slabs, mats, rolls) - welding fluxes - iron scale - steelmaking slag - nitrogen, argon, oxygen gaseous - liquid technical oxygen

Business hours:

- Main production facilities utilizing 3 shifts, 330 working days per year;
- Auxiliary facilities utilizing 3 shifts, 330 working days and 1 shift 250 days per year.

The number of employees at the enterprise is 9488 people, including: General administration staff - 646 people, engineers and technicians - 401 people, workers - 7719 people, office workers - 722 people.
The total area of the enterprise covers 452 hectares.
Geographically, the main production (site I) borders on Tajikistan from the northeast, from the east and southeast. The residential area is located in the west, north-west, south-west direction. Around the enterprise, a sanitary protection zone (SPZ) has been established, the border of which in the north-east, east and south-east runs along the border of Tajikistan. The nearest residential buildings are located 50m from the western border of the SPZ. Syrdarya River flows at a distance of 250m to the south-west of the enterprise border.
The situational plan for the location of Uzmetkombinat JSC is shown in Figure 1. 2.

On site following main workshops, the divisions, auxiliary areas and I (the main production area of the plant) are located:

- Electric arc furnace shop (Meltshop);
- Long products rolling shop No. 1 (LPS-1);
- Section rolling shop No. 2 (LPS-2);
- Steel wire shop;
- Mechanical repair shop (MRS);
- Energy (Utilities) Shop (ES);
- Production of consumer goods (PCG);
- Slag dump processing workshop (SDPW);
- Production of non-ferrous metals (PCM);
- Ferroalloys production shop;
- Production of thermal insulation materials (PTIM);
- Workshop of Steel structures;
- Construction and installation division (CID);
- Electrical repair shop;
- Plant central laboratory (PCL) ;
- Chemical warehouse;
- Oxygen compressor shop (OCS);
- Metallurgical equipment repair shop (MERS);
- Railway workshop (RW);
- Control of measuring devices and automation (instruments and automation);

- Factory warehouse of fuels and lubricants (OMTS);
- Motor transport workshop (ATC);
- Fire station;
- Warehouses;
- Administrative building (plant management);
- Intake of surface water from the Dalverzin canal with filters;
- Pumping stations of the 1st lift for utility and technical needs;
- Drinking water treatment station;
- Pumping stations of the II rise for potable and industrial water;
- Local treatment facilities;
- Industrial and storm water treatment facilities;
- "Metallurgy" substation.

The general plan of the main territory of the enterprise is shown in Figure 3.

Sites II - VI are part of the landscaping and gardening workshop (CD&O), each of which has 1 boiler room. Boiler houses are located within the city's residential area. All boiler rooms are designed to provide household facilities with hot water and heating.

Uzmetkombinat JSC is one of the largest industrial facilities in the country therefore, the social sphere is widely developed at the plant, which provides the needs of workers with various types of services. The balance of the plant contains more than a dozen social and cultural facilities, which are located in different parts of the city and district.

The objects of social purpose, located in Bekabad city, and subordinate joint-stock company "Uzmetkombinat" include:

- Metallurg Stadium;
- Sports and recreation complex (named after Anokhin);
- Metallurg hotel;
- Affiliate hotel;
- Palace of Arts and Culture;
- Palace of Youth;
- Wedding Ceremonies Hall;
- Charity Center;
- Children's recreation and entertainment park;
- Yoshlar Sports complex;
- Sanatorium-preventorium;
- Tennis court;
- Housing Administration (boiler rooms).

Brief historical background of the development of Uzmetkombinat JSC

Uzmetkombinat JSC is a leading ferrous metallurgy enterprise in the Central Asian region.
The Uzbek Metallurgical Plant was put into production in 1944.
The first Uzbek steel was smelted on March 5, 1944 in the open-hearth shop.
Rolling shop No. 1 was put into operation in 1946.
The shop for the production of consumer goods was put into operation in 1974.
The electric steelmaking shop was put into operation in 1978.
Rolling shop No. 2 was put into operation in 1984.
The shop for the production of non-ferrous metals was commissioned in 2006. Today it is a modern, efficiently operating workshop with the latest technologies and equipment.
In 2004, workshop for the processing of its own slag dumps was organized.

The steel wire shop was reorganized from the steel wire department in 2007.

A workshop for the production of thermal insulation materials was commissioned in 2014.

Due to low profitability and high costs of raw materials and energy resources, in 2014 it was decided to suspend the operation of the open-hearth production.

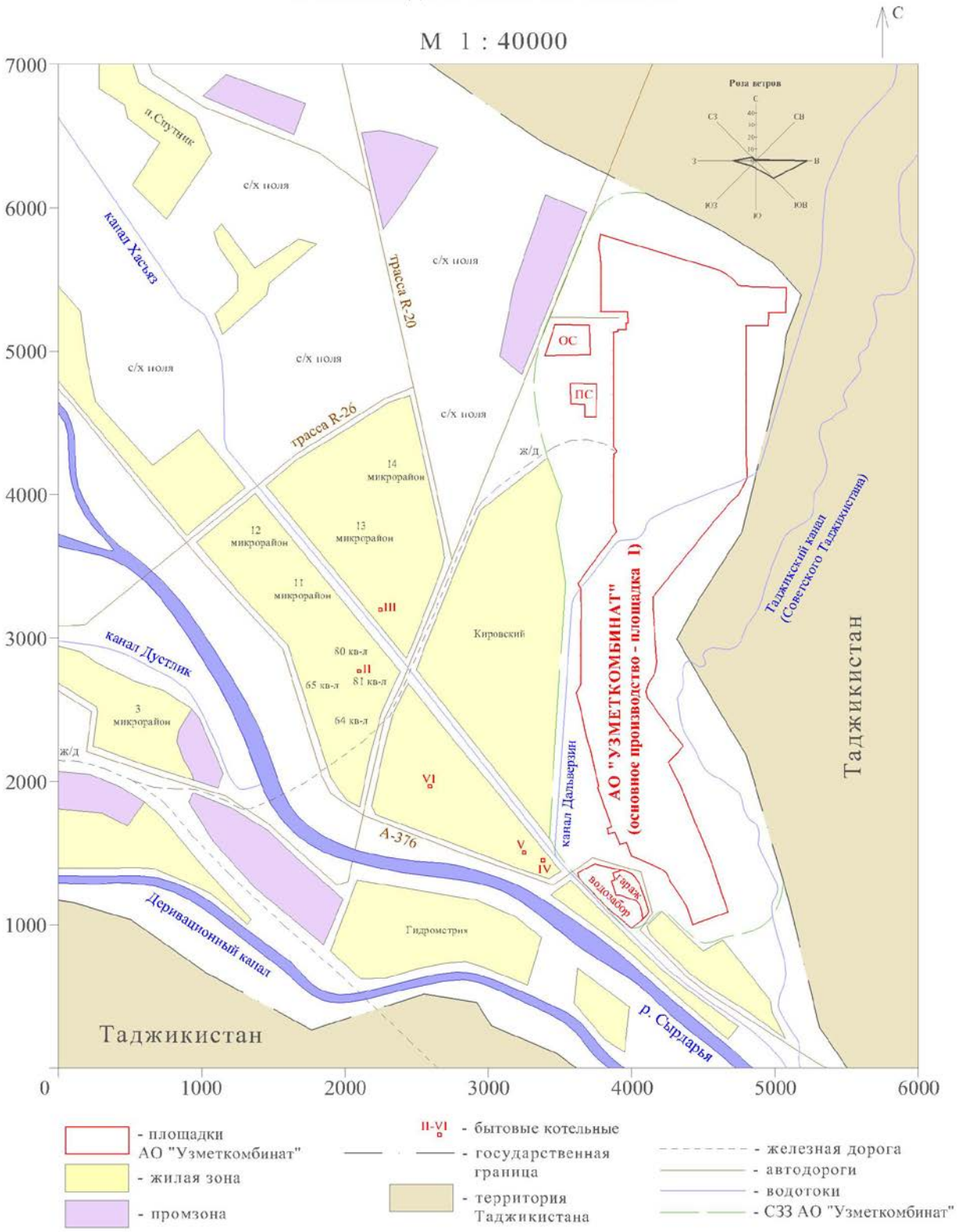
In accordance with the Resolution of the President of the Republic of Uzbekistan from 09.01.2018, for №PP-3468 on the "Development program of Uzmetkombinat JSC for 2018-2020 in order to ensure further sustainable growth of the industrial potential of Uzmetkombinat JSC, to increase the production of export-oriented, competitive products with high added value, as well as to better meet the growing demand of the republic for rolled ferrous metals, the following projects have been implemented:

- Ferroalloy workshop of up to 25 thousand tons per year, including ferrosilicon - 15 thousand tons / year and ferrosilicon manganese - 10 thousand tons / year. The workshop was commissioned in 2018. This project resulted in a significant contraction tit amount of used raw materials imported by imports.

- In 2019, the investment project “Production of steel wire rod at the mill“ 300 LPS-2 was successfully implemented. The production capacity of this facility provides for the production of wire rod and rebar in coils of up to 100 thousand tons per year.

Throughout its production activities, the enterprise constantly carries out work on reconstruction, technical re-equipment and modernization of production, which allows it to produce high-quality competitive products that are supplied to industrial enterprises and for the development of the construction industry of the republic, as well as are shipped for export.

Рисунок 1.2 - Ситуационный план-схема расположения АО "УЗМЕТКОМБИНАТ" в г.Бекабад Ташкентской области



1.2 Characteristics of the planned activity

To increase the capacity of Uzmetkombinat JSC, the plant provides for the construction of a casting and rolling complex (CRC) consisting of:

- Electric Arc Furnace EAF-1 2 0 ;
- Ladle furnace unit (LF) ;
- Steel degassing unit (SDU);
- Fume treatment system;
- Thin slab casting machine (Slab Caster);
- Tunnel Furnace;
- Hot rolling mill;
- Water treatment plant;

The construction of the CRC is envisaged in free areas near the electric steel-making shop (Meltshop) and section rolling shop No. 2 (LPS-2).

The capacity of projected CRC shall be 1,093 million tons per year of molten steel, with the release of up to 1040 tons / year of finished steel.

The total amount of melted liquid steel at the mill after its expansion shall be equal to 1,94 million tons / year, including 1,093 million tons / year - at the new casting and rolling complex.

The Italian company Danieli & C. Officine Meccaniche SPA was approved as the supplier of metallurgical equipment.

The projected CRC is intended for the production of hot rolled sheet in coils from low carbon, low alloy high quality and ordinary quality steels.

The need for manpower on the introduced into operation of CRC, will be 1253 people, including 1091 workers and 162 managers, professionals, employees.

2. THE STATE OF THE ENVIRONMENT IN THE AREA WHERE THE ENTERPRISE IS LOCATED

2.1 Physical, geographical and climatic features of the area

The city of Bekabad is located in the mouth of the Fergana Valley at the exit to the Golodnaya Steppe plain at an altitude of 250-300 m above sea level. On the central part of the city flows Sirdarya river, with numerous canals. The enterprise borders on Tajikistan from the northeast, east and southeast. The residential zone is located in the western direction at a distance of 150-200 m, and in the southwestern direction - 400-500 m from the plant and is adjacent to its sanitary protection zone. Dalverzin, Khasyaz and Upper Dalverzin canals, borders the territory of Uzmetkombinat JSC on all sides.

The climate of the region is continental-subtropical, arid. The average annual air temperature is 15 ◦C, the average monthly temperature of the hottest month (July) is 35.3 ◦C, of the coldest - 1.7 ◦C, the absolute maximum reached +41.4 ◦C.

In summer, the soil warms up to a temperature of 68 ◦C with an average annual value of 17 ◦C. The high temperature regime with low precipitation (343.0 mm / year) causes dryness of the underlying surface.

In the mouth of the Fergana Valley, when it enters the Golodnaya Steppe plain, the Ursatiev wind arises. Its greatest speed is observed in winter and reaches 40 m / sec and more. Bekabad has one of the highest average wind speed - 4.0 m / s. The frequency of weak winds (0-1 m / s) and with a higher speed (2-3 m / s and more) is practically the same. Strong winds (12-15 m / sec, and more) are recorded in more than 9% of cases.

Calm situations (37.9%) and weak winds create states for the accumulation of pollutants from low fugitive sources. In high winds, pollutants from hot, high emission sources are transported over long distances and dust is lifted from a loose surface.

The wind direction in Bekabad is predominantly east (49%).

The climatic characteristics of the area where the object is located are presented in table 2.1.

Table 2.1

Characteristic	Units and Measurement	The quantity
Coefficient A, which depends on the temperature stratification of the atmosphere and determines the states of horizontal and vertical dispersion of pollutants in the atmospheric air	-	200
Average temperature of the hottest month	°□C	+35.3
Average temperature of the coldest month	°□C	-1.7
Average annual rainfall	mm	343
Average annual frequency of wind directions	%	
FROM		1
SV		1
AT		8
SE		49
YU		1
SW		5
Z		6
SZ		29

Average annual wind speed	m / s	4.0
Wind speed, the frequency of which is exceeded is 5%	m / s	8.0

2.2 State of atmospheric air

The city of Bekabad belongs to an area with a high atmospheric pollution potential – APP from 2.0 to 2.5. Hazardous emissions from industrial enterprises in the Syrdarya region and the Fergana valley create high air pollution in the city. Since in the city of Bekabad the left bank and right-bank parts differ greatly in relation to the Syrdarya river, we will consider the state of the atmosphere separately for each part.

The left bank is an area that is exposed to rather strong adverse impact on the atmospheric air, created by emissions from Bekabadcement JSC, cargo yard, a railway, and the Syrdarya State District Power Plant. The right bank part of the city is mainly influenced by emissions from Uzmetkombinat JSC.

In accordance with the climatic states for the spread of impurities, the location of the object in question should belong to zone 4. It is characterized by a high potential for atmospheric pollution equal to 2.4 APP. The APP includes surface and uplifted inversions with a rather high wind speed above 2 m / s, which occurs for a rather short time, as well as fogs, air stagnation and other unfavorable meteorological factors. Depending on the combination of these unfavorable states, an increase in the level of atmospheric pollution by 20-30% is possible.

2.3 State of surface waters

The main waterway of the city is the Syrdarya river.

The Syrdarya belongs to the rivers of snow and glacier feeding. The intra-annual runoff distribution is as follows: low-water period covers the period from the second half of September to March. At this time, the minimum values of water discharge are noted, especially in October. The average annual flow rate of the river is 626 m^3/ sec, the maximum is 2730 m^3/ sec, the minimum is 169 m^3/ sec. A significant increase in runoff begins in April. The most abundant month is June, during which 28% of the annual flow occurs. The average duration of high water is 180 days. The river flow is regulated by the Toktogul reservoir, located on the territory of Kyrgyzstan, and the Kairakum reservoir, on the territory of Tajikistan. Most of the tributaries are concentrated in the Fergana Valley.

Syrdarya water to Bekabad polluted effluents of various objects located on the territory of Kyrgyzstan and the Fergana valley.

The river water discharges below Bekabad "Suvokova" compared with a control section (Bekabad) phenols content increased to 0.002 mg / l (2PDK); sulfates from 476.0 mg / L to 493.1 mg / L (MPC 100 mg / L) and sodium ions - from 89.1 mg / L to 101.4 mg / L (MPC 120 mg / L). A and γ - HCH (0.001 and 0.003 μg / L) appear. Mineralization at the level of 1100 mg / l (1.1 MPC). The oxygen regime is satisfactory (11.8-11.6 mgO_2/ l). The nitrite content increased - 0.046-0.026 mg / l (2.3-1.3 MPC). Other impurities are within the normal range, in particular, the average annual concentration of copper increases from 0.7 μg / L to 1.0 μg / L (MPC 1.0 μg / L), zinc, respectively, from 3.6 μg / L to 4, 0 μg / L (MPC 10.0 μg / L).

The III class of moderately polluted waters characterizes the water quality. By the totality of hydrobiological indicators in the sections above and below the city of Bekabad, the water quality also corresponded to class III. The ecological state is satisfactory.

2.4 Groundwater state

The groundwater within the lithological strata variegated in structure has differences both in the depth of occurrence and in chemical composition. The proximity of irrigation facilities and irrigated areas has a great impact on groundwater.

The groundwater level in the territory of the plant, where loamy deposits are developed, lies deeper than in areas where lenses of permeable rocks are encountered in the section. During the period of maximum, GWL lie at a depth of 2.5 m from the surface.

According to the results of chemical analysis, groundwater is characterized by the content of HCO_3^- - 400 mg / l, SO_4^{2-} - 782 mg / l, CL^- - 177 mg / l, dry residue - 1840 mg / l. Groundwater is characterized as non-corrosive to concrete on Portland cement.

2.5 State of soil, vegetation, fauna

The soils of the region under consideration are alluvial-meadow. In the soddy horizon, lying at a depth of 50-60 cm, the humus content is about 2%.

The level of contamination of soil by toxic industrial origin about the z.Bekabad defined Glavgidromet following:

- the content of mobile forms of metals in soil samples is within the following limits: lead - 3.08 ÷ 23.99 mg / kg, cadmium - 0.67 ÷ 1.49 mg / kg, copper - 1.82 ÷ 6.72 mg / kg, zinc 1.0 ÷ 30.48 mg / kg. Average concentrations of copper and zinc do not exceed the MPC (3.0 mg / kg and 23.0 mg / kg, respectively).

- with the content of mercury ranges from 0.001 to 0.017 mg / kg, sulfates - 0.016 to 0.64 g / kg, i.e. within the MPC.

- arsenic concentrations were noted at the level of 3.96 ÷ 13.49 mg / kg (MPC for arsenic 2 mg / kg, in the soils of Central Asia, a high background value). The highest values of mercury, arsenic, sulfates are recorded in the western direction.

- the concentration of nitrates (0.003 - 0.137 g / kg), water-soluble fluorine (2.8 - 7.8 mg / kg) did not exceed the standard values.

Consequently, the level of soil contamination around Bekabad city is low, but in a westerly direction to 5km from the city area marked by high content of lead, copper and zinc, which is presumably due to the activities of Bekabad Metallurgical Plant.

The state of the soil cover is acceptable.

Uzmetkombinat JSC, as well as the entire Bekabad city, located on the alluvial plain of terraced formed Syrdarya, gently sloping towards the river.

Alluvial deposits are represented by soils of the Syrdarya complex of loams, sandy loams and clay with sand interlayers with a total thickness of up to 390 m. Fine-earth rocks are underlain by gravel-pebble strata.

Eastern bank of the river. The Syr Darya from the surface is composed of loess-like loams underlain by gravel. To a depth of 5-6 m, the section of floodplain-channel deposits includes sand and gravel material. Gravel and pebbles are well rounded, oval, ovoid, less often angular. The sand is mostly fine-grained, clayey.

The vegetation cover is represented by both artificial tree and shrub plantations and agricultural lands, and natural secondary cenoses, consisting mainly of forbs.

In floodplain, Sirdarya and left terrace formed shrub-grass mangroves with predominance Tamarix in herbage yantak prevails. On the ledges of the second terrace, there is an overgrowth of tamarix, reed, and licorice. On high terraces on the outskirts of fields, roads, as well as along fallows, weeds are developed - creeping wheatgrass, reed grass, Bermuda grass, from forbs - kendyr, alfalfa, verbena.

Woody vegetation is represented by tall poplars with a lush crown, plane trees, elm. Ash, mulberry, willow, thuja and fruit trees - apple, apricot, quince, etc. grow. Most of the agricultural land is occupied by corn, cotton, and garden crops.

The list of representatives of the animal world is limited to those species of animals that were able to adapt to life in anthropogenic states. Large mammals characteristic of uninhabited areas are completely absent. The ubiquitous representatives of rodents are often found - the gray rat, the house mouse, and sometimes the eared hedgehog.

Of the birds, typical urban representatives live here. This is a large number of gray sparrow, myna, turtle dove, swifts and swallows, crows.

The variety of reptiles is rather limited. The most prominent representatives are the swift foot-and-mouth and the gray gecko.

Among the insects are those species that live in the grass: crickets, grasshoppers, etc.; among the bushes and in the vineyard, praying mantises, wasps, hornets.

3. BASIC TECHNOLOGICAL SOLUTIONS

3.1 Architectural and planning solutions

The construction site of the projected Casting and rolling complex (TIC) is located in the grounds of the enterprise Uzmetkombinat JSC and is based in Bekabad, Tashkent region, Uzbekistan.

The site of the projected complex is very cramped and limited:

- from the north - by electric steel-smelting and piling shops;
- from the east - an oxygen station with the facilities of the complex;
- from the west - rolling shops.

The site is free from buildings. The relief of the site is even. The elevation difference is 300.50-301.70 m, with a slope from west to east.

On the designated construction site, it is planned to place:

- electric arc furnace shop (Meltshop) as part of the furnace and distributing aisles;
- department of continuous casting of steel (Slab Caster) as part of the casting bay, tundish service area, department of repair and adjustment of equipment of Slab Caster Machine;
- rolling shop;
- auxiliary facilities of the complex.

The plan of the proposed location of industrial and auxiliary buildings and structures of the projected casting and rolling complex is shown in Figure 3.

The Casting and Rolling Complex (CRC) is a single production complex comprising Slab Caster and one rolling mill operating in the same technological mode.

The departments work in a single process flow with an electric arc furnace shop (Meltshop).

The electric steel-smelting shop was built in blockage with the existing building of the electric steel-making shop, with partial dismantling of the existing spans of the building. The rolling shop is attached to the Slab Caster. The block with Slab Caster provides for a service area for molds and roller segments.

Roll grinding shop, tunnel kiln roller service area are attached to the rolling mill. The SCM service workshop is located in the area of the circulating cycle of the existing oxygen workshop.

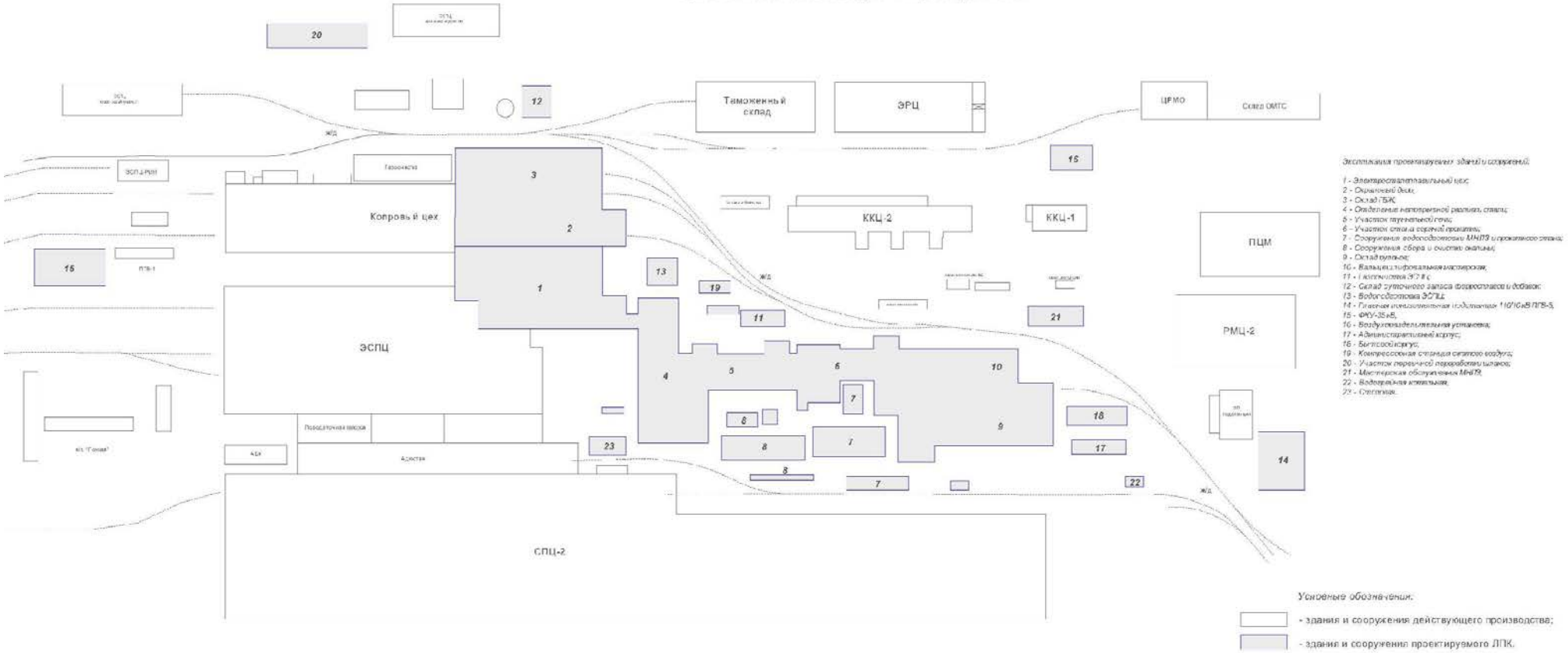
The placement on the general plan of the Meltshop with a casting and rolling complex and attached auxiliary premises was carried out taking into account the preservation of the existing turnover cycle.

To supply the Meltshop with prepared scrap, a two-span building is being erected on the southern side of the existing scrap yard. On the east side, a HBI warehouse span is attached to the newly designed building.

Warehouse facilities including: a spare parts storage area, a refractory and alloying materials area and a fuel and lubricants storage area are located in the warehouse of a centralized casting and rolling complex.

The cylinder warehouse is located on the western side of the roll warehouse, along the existing railway track, taking into account the fire breaks and the size of the approaching buildings.

Рисунок 3 - План предполагаемого размещения производственных цехов и вспомогательных сооружений проектируемого ЛПК



Reverse water supply cycles are close to technological equipment. The water treatment plant of the steelmaking department is located in the immediate vicinity of the electric steel making plant. Laminar cooling water treatment, Slab Caster Machine, rolling shop and recycling cycles are close to consumers and are located on the western side of the main process equipment.

Oxygen facilities: OCP (oxygen control point), recipients of air separation products are located in the area of existing OCP and recipients, taking into account the current standards.

Gas control points (SHGRP) are close to consumers and are located on the side of the supply of energy carriers from the existing hydraulic fracturing, which is subject to reconstruction.

The compressor station is close to the Meltshop and is located to the east of the projected fume treatment of the Meltshop.

To supply the projected complex with air separation products, it is planned to build an air separation unit (ASU). The ASU is located in the areas of the oxygen station, between the oxygen shop No. 1 and the railway tracks.

Technological and suction fume treatment plants are constructed in close proximity to the emission sources of technological equipment.

In terms of power supply, it is envisaged to reconstruct the existing substations "Metallurgy" SS 220/110 kV, "Pechnaya" SS 220/35 kV and build a new main step-down substation 110/10 kV PGV-5. Electrical rooms, distribution and complete transformer substations are located in the immediate vicinity of consumers or are made in blocking.

Laboratory facilities include:

- Laboratory of the steelmaking shop, located in the area of the Meltshop on the southern side between the Meltshop and the water treatment plant;
- Laboratory of the casting and rolling complex is built in a lock with a roll storage.

Slag from the Meltshop is transported by auto slag trucks to the primary slag processing section located in the area of the pile-up shop. The cooled slag is loaded into dump trucks and sent to dumps for further processing.

The preparation of slag bowls by spraying with lime mortar is carried out at the site for preparing lime mortar with a bowl spraying unit located on the north side of the Primary Slag Processing Area.

Household services for the personnel of the projected complex are carried out in the amenity building located on the south side of the roll warehouse.

A pedestrian gallery is being erected for the workers to reach their workplaces.

The administrative building is located to the west of the service building.

3.2 CRC performance

The capacity of the projected CRC will be equal to 1093 thousand tons of liquid steel per year.

The production of finished rolled products will be 1040 thousand tons per year, including:

- Hot (r / k) of rolls intended for the production of thin cold (x / k) of the sheet - 540 thousand tons;
- Rolled products for the domestic market - 400 thousand tons;
- Rolled products for export - 100 thousand tons.

The grades of the melted steels are presented in Table 3.2.1.

Table 3.2.1

Class	**steel grade**	**GOST / Technical states**	**The volume of production, thousand tons per year**
Structural carbon steel of ordinary quality	St1ps, St1sp, St3ps, St3sp, St4ps, St4sp	GOST 380-2005	540
Quality structural carbon steel	08, 10, 10ps, 15, 15ps, 20, 20ps, 30, 40, 50, 08ГСЮТ, HSLA, LCS	GOST 9045-93 GOST 1050-2013 EN	
Quality structural carbon steel	08ps	GOST 9045-93 GOST 1050-88	250
Quality structural carbon steel	08U	GOST 9045-93 GOST 1050-88	250
TOTAL			1040

Sizes Gauge g / to the rolls must keeping up 5 requirements GOST 19903-15 and GOST 16523-97.

Hot rolled coil parameters:

- strip thickness, mm 1.6 ÷ 12.0
- strip width, mm 800 ÷ 1300
- inner diameter of the roll, mm 762/850
- outer diameter of a roll, mm up to 2100
- coil weight, t up to 3 0

To calculate the productivity of the timber industry, an average strip thickness of 1.8 mm with a width of 1 30 0 mm is taken.

3.3 CRC Operating Mode

In accordance with the adopted technological solutions, the operating mode of the projected CRC is as follows:

Index	*days*	*hours*
General fund of working time	365	8760
Annual scheduled shutdowns	7	168
Scheduled stops	17	408
Unplanned plant malfunctions	31	744
Total annual production time	**310**	**7 44 0**

The operating mode of the casting and rolling complex is adopted according to a continuous four- brigade schedule in two shifts of 12 hours each.

3.4 Specifications of the raw materials

The following materials will be used to ensure the smelting of a given range of steel in the EAF metal filling station - steel scrap, hot briquetted iron (HBI), ferroalloys and alloying materials, lime, lump and powder carbonaceous materials.

In Stockyard TIC will flow only marker prepared with scrap bulk density of 0.6 ÷ 2.7 t / m ^{3} - steel scrap and waste 3A and 3B, the steel swarf briquettes 6A, the packages (without chips) 8A, 8B, 9A and 10A in accordance with GOST 2787–75.

Dimensions and weight of individual pieces of scrap: length - no more than 1 m, maximum weight of a piece - no more than 0.7 tons.

The bulk of HBI is represented by briquettes with the following approximate dimensions:

- Length, mm 100 ÷ 120
- Width, mm 45 ÷ 55
- Thickness, mm 30 ÷ 40
- Mass of briquette, kg 0.5 ÷ 2.0.

The share of HBI in the metal charge is assumed to be 50%. HBI is an abrasive material. The composition and characteristics of HBI are shown in Table 3.4.1.

Table 3.4.1

Indicator name	Unit measurements	The quantity
Metallization degree	%	≥ 92
Fetot	%	≥ 90
Femet	%	≥ 83
FROM	%	≥ 1
S	%	<0.02
P	%	<0.015
Si O $_2$	%	<4.5
Briquette density	g / cm ^{3}	5
Bulk density	t / m3	2.3-2.5
Fines content <4 mm	%	≤ 5

As a slag forming material will be applied freshly burned lime, dolomite and fluorite, indicative chemical composition is given in Table 3. 4.2.

Table 3. 4.2

Name	CaO + MgO	MgO	SiO $_2$	S	R	CaF $_2$	CaCO $_3$
Lime	≥ 92.0	≤ 5.0	≤ 2.0	≤ 0.08	≤ 0.03	-	-
Fluorspar	-	-	≤ 1.0	≤ 0.2	≤ 0.1	≥ 97.0	≤ 1.5

The chemical and granulometric composition of carbon-containing materials is shown in Table 3.4.3.

Table 3.4.3

Composition	C, %	Ash,%	S,%	Moisture,%	Size (mm)
Powdered carbon-containing material for blowing into the furnace	> 95	<8	<0.3	<0.5	1 ÷ 3 not less than 90%
Lump carbonaceous material	> 85	<7	<1.0	<4	10 ÷ 60 not less than 90%

When smelting and out-of-furnace processing of steel, ferroalloys and materials will be used in accordance with the following GOSTs and TUs:

- Ferrosilicon (GOST 1415-93);
- Silicocalcium (GOST 4762-71);
- Ferrovanadium (GOST 27130-86);
- Silicomanganese (GOST 4756-91);
- Ferromanganese (GOST4755-91);
- Secondary aluminum (GOST 295-98);
- Primary aluminum (GOST 11069-2001);
- Medium-carbon ferromanganese (TU 14-139-145-95);
- Flux-cored wire with various fillers (GOST 4762-71, TU 14-1-4923- 90, TU 14-1-5450-2002);
- Aluminum wire rod (TU 13843-78);
- Metallurgical lime (TU 5744-248-05757676-2002);
- Metallurgical coke (OST 14-7-234-90) lump and powder.

Granulometric composition of lumpy materials - 10-50 mm.
The annual demand for materials and raw materials is presented in table 3.4.4.

Table 3.4.4

Item No.	Material name	Annual consumption, thousand tons
1	Metal charge	
1.1	Scrap metal	635.96
1.2	HBI	635.96
	Total	1271.92
2	Supplementary materials	111.75
2.1	Carbon containing powder	16.71
2.2	Lump coke	8.91
2.3	Lime	62.4
2.4	Dolomite	20.06
2.5	Fluorspar	3.67
3	Electrodes	1.97
3.1	EAF	1.62
3.2	UCP	0.35
4	Refractories	19.33
4.1	Refractory products	7.53
4.2	Refractory powders	11.80
	including magnesite powder	4.20
5	Alloying materials	10.17
5.1	Ferroalloys	8.20
5.2	Aluminum	1.64
5.3	Flux-cored wire CaSi	0.33
6	Slag-forming and heat-insulating mixtures	0.61
	Total	1415.75

Note: the requirement is taken taking into account the norms of material consumption for the II variant of the smelting charge (50% scrap and 50% HBI), given in the documentation of the Danieli company.

3.5 Brief description of the technological processes of production

3.5.1 Steelmaking process

Steel-making production of the casting and rolling complex under construction is represented by an electric steel-making shop (Meltshop).

The Meltshop provides for the following technological operations:

- Loading of charge materials into an electric arc steelmaking furnace;
- Steel smelting in EAF-120;
- Out-of-furnace steel processing;
- Slag drainage and cleaning.

Steel casting at the Slab Caster Machine is carried out in the continuous steel casting department (Slab Caster).

The Meltshop includes a furnace bay and a distribution bay with equipment for smelting and out-of-furnace steel processing.

The Meltshop is supplied with prepared scrap and HBI from the extended part of the scrap yard and HBI warehouse.

Smelting and out-of-furnace steel processing

The following main technological equipment is installed in the Meltshop for steel smelting and out-of-furnace processing:

- Electric arc furnace EAF-120;
- Two position ladle furnace (LF);
- Two position installation for Degassing of steel VD- OB (Steel Degassing Unit).

Smelting steel in EAF

An arc steelmaking furnace (EAF) is designed for melting a liquid semi-product with subsequent adjustment of the chemical composition and temperature of steel to the required parameters at the ladle furnace (LF).

The technological process of metal melting in EAF provides for the use of the following technologies:

- melting with a liquid start (furnace capacity - 140 tons, mass of the melt produced - 120 tons, liquid residue - 20 tons);
- intensification of the melting process due to purge the bath oxygen fuel burners;
- the guidance of foamy slag due to the injection of carbon-containing powder materials.

The presence of molten metal residue and deoxidized slag in the furnace creates optimal states for early slagging and phosphorus removal.

In addition, the liquid residue protects the refractory lining of the furnace when filling the first portion of the metal charge, and the presence of foamy slag during the smelting process reduces the harmful effects of electric arcs on the lining of the lower part of the furnace walls.

Steel smelting is envisaged from a charge consisting of both 100% scrap metal and with the addition of hot briquetted iron (HBI).

The smelting can be mixed in three ways:

Option I - 100% scrap metal;

Option II - 50% scrap metal and 50% HBI;

Option III - 70 % scrap metal and 30% HBI.

Taking into account the assortment and quality requirements of the smelted steel, as well as the need to use original iron-containing raw materials, the smelting charge during steel smelting in EAF is adopted according to option 2 (50% scrap metal and 50% HBI), which will provide:

- the possibility of producing "clean" steel of the required quality;
- increasing the density of the charge in the filling;
- Reducing the number of fillings and reducing energy consumption.

Steel scrap is supplied to the Meltshop from the scrap yard in loading baskets with a capacity of 125 m ^{3} by two self-propelled electric-driven scrap trucks.

HBI from the warehouse is fed by its own conveyor to the supply bins of the Meltshop, from where it flows through the chutes to the EAF.

Slag-forming, lumpy coke is loaded into the furnace in the course of melting in portions from the EAF bunker system.

The melting and heating process is intensified by oxy-fuel burners with pulverized coal fuel injection, providing additional energy input due to the oxidation reaction of carbon and impurities in the metal, as well as due to the afterburning of carbon monoxide.

Sampling is carried out after the metal charge has melted, in the middle of the liquid bath blowing and before the metal is tapped.

Upon reaching the required content of carbon and phosphorus, as well as the temperature, the metal is poured into a steel-pouring ladle of 120 tons, preheated to a temperature of at least 1000 °C.

The bay window system of metal tapping ensures the fastest possible drainage of the melt, which reduces the likelihood of absorption of oxygen, hydrogen and nitrogen from the air by the melt, as well as minimal ingress of furnace slag into the steel-pouring ladle at the outlet.

In the process of tapping the metal from the furnace, ferroalloys are fed into the ladle (to the lower limit of the specified analysis for alloying elements) and slag-forming ones to introduce a new reducing slag, and the steel is blown with argon through a porous plug in the bottom of the ladle.

Draining formed furnace slag produced from each melt through a working window in the furnace slag bowl capacity of 22 m ^{3,} mounted on a concrete floor.

Excess slag is drained by gravity through the threshold of the working window of the furnace at the end of the melting stage and in the course of refining.

Slag removal from the Meltshop is carried out by self-propelled slag trucks.

After steel tapping, the steel-pouring ladle is sent to the ladle-furnace unit.

Steel processing at ladle-furnace unit (LF)

The LF is designed for finishing liquid steel in a steel-pouring ladle, smelted in a EAF.

Steel processing at the LF performs the functions of deoxidation, alloying, desulfurization and metal heating.

After tapping the heat from the EAF, the ladle is installed by crane on one of the two LF steel carriers.

Processing at the LF begins with feeding the ladle on the steel carrier under the cover with electrodes and connecting the ladle to the bottom inert gas purge system.

The provision of argon blowing of steel in the ladle on the steel carrier is carried out through a quick-detachable connection. For this purpose, an upper half-coupling is

installed on the ladle with a piping system for supplying argon to the purge plugs; a lower half-coupling is installed on the steel carrier, to which argon is supplied.

When sweeping the purge plug, the metal is purged using a submersible lance device located on the work site.

Then the electrodes are lowered, the arc is ignited and the heating of the metal begins at a rate of up to 5.0 ° C / min.

During heating, slag-forming materials and deoxidizers are fed into the ladle to induce a highly basic slag. The materials are fed into the bucket from the bunker system in automatic mode.

Sampling, measurement of temperature and oxygen activity is carried out using an automatic device located on the work platform near the water-cooled cover, equipped with appropriate replaceable measurement probes.

To send metal and slag samples for chemical analysis, a receiving and sending station is located at the working site.

After receiving the results of the analysis of samples, in order to correct the chemical composition of the steel, the main amount of ferroalloys is added to the ladle, as well as slag-forming materials to adjust the composition of the slag. The temperature rises to the set level.

Upon reaching the specified chemical composition and temperature, the treatment process ends.

Deoxidation and modification of the metal is carried out with aluminum and flux-cored wire introduced into the ladle using a tribe at the end of processing.

Wire feed control is carried out in automatic or manual mode from the local control panel.

The steel finishing process and the LF mechanisms are controlled from the control room.

The average duration of steel processing at the LF is taken as 48-49 minutes.

Degassing of steel

The Degassing of steel makes it possible to increase the degree of purity of the metal by reducing the content of gases and non-metallic inclusions (oxygen, nitrogen, hydrogen, sulfur), the removal of which occurs depending on the state of the melt at various stages of the process. And also, due to the high vacuum in the vacuum chamber and intensive blowing with an inert gas, a high level of steel homogenization is ensured throughout the entire volume of the steel-pouring ladle, which contributes to the final averaging of steel by chemical composition and temperature before casting on the SCM.

Envisioned to install vacuum degasser will allow for the processing of steel in ladle two technological process:

- VD process - vacuum degassing of steel in a steel-pouring ladle (without oxygen blowing);
- OM process - vacuum degassing, used to obtain low-carbon steel grades and accompanied by blowing the steel in the steel-pouring ladle with oxygen (decarburization process).

Before Degassing, the temperature is measured and a metal sample is taken to determine the chemical composition, while the temperature of the metal in the ladle must exceed the lower limit of the processing completion temperature by 25-30 ° C.

When a steel-pouring ladle is installed in a vacuum chamber, an argon line is automatically connected to the ladle with metal and argon blowing begins.

Then, after closing the chamber and turning on the vacuum pumps, the vacuum build-up process begins.

Of feed bins, placed on the lid of the unit, through a system of vacuum locks in the bucket sit down essential alloying materials.

For deoxidation and alloying of steel, aluminum wire or wire with a filler is used, fed into the ladle using a tribe apparatus.

To prevent splashes during metal foaming during processing, the height of the free side above the level of the metal in the steel-pouring ladle before Degassing is at least 1200 mm. When the metal is stirred with an inert gas, as the pressure in the vacuum chamber decreases, its consumption is reduced in order to exclude excessive "boiling" of the metal.

The metal is blown with oxygen from above using a water-cooled lance (OB process). The duration of the oxygen purge is approximately 15 minutes.

When the oxygen purge is stopped, the argon purge under vacuum is maintained, while the chemical composition is adjusted.

The duration of steel processing on Steel Degassing Unit is:

- Degassing of steel without oxygen purging (VD process) - about 45 minutes;
- degassing the steel by blowing oxygen (OS process) - depending on the steel grade - 45- 60 min.

Casting steel

In this section, measures have been developed for the construction of facilities of the casting and rolling complex (CRC), including:

- Department of continuous casting of steel (Slab Caster) CRC as part of the equipment of thin-slab Slab Caster Machine (SCM);
- Auxiliary facilities of the main production facilities - section for preparation of tundishes, section for temporary storage of containers with radioisotope devices, etc.

The continuous steel casting department (Slab Caster) includes the equipment of one vertical-type thin-slab Slab Caster Machine (SCM) with bending of a solid billet.

The Slab Caster casts steels melted in the Meltshop at the Slab Caster Machine to obtain suitable thin slabs with a cross section of 40 + 46 x 800 + 1300 mm, up to 59 m long for hot-rolled coils.

The following technological operations are performed in Slab Caster:

- Reception of a steel-pouring ladle with metal from the Meltshop;
- Preparatory operations before the start of casting;
- Casting of steel to obtain a continuously cast billet of a given section and length;
- Transfer of blanks to the heating furnace of the rolling mill of the CRC;
- Preparation of the Slab Caster Machine for the next series and waiting;
- Discharge and cleaning of slag after casting at Slab Caster Machine (ladle residues);
- Repair of the main technological and auxiliary equipment of the Slab Caster Machine.

The continuous casting department of the CRC works in a single process flow with the Meltshop.

After the metal melting in EAF-120 and secondary treatment in ladle or furnace degasser in the span EAFP dispensing, casting ladle of Meltshop 120 m with a weight of 120 tonnes of metal casting cock g / n 200/63/15 t set to ladle for transferring ladle in Slab Caster.

In Slab Caster with a casting crane with a lifting capacity of 200/63/15 t, a ladle with metal from a steel carrier is installed on a lifting and rotating stand of a Slab Caster Machine with a lifting capacity of 2 x 200 t in a reserve position.

The ladle is covered with a lid, the slide gate of the steel-pouring ladle is connected to the hydraulic system and by turning the stand is transferred to the working position for metal casting.

Prior to the start of casting, the following preparatory operations are carried out at the Slab Caster Machine:

- Installation of the tundish into a working position (after pre-heating of the lining in the reserve position to a temperature 1100-1200 ° C for 90- 1 20 minutes);
- Hanging on the tundish of a submerged nozzle for casting “under the level” and protecting the metal stream from secondary oxidation (after preheating to a temperature of 1100-1200 ° C for ~ 60 minutes); the introduction of the seed into the mold and its compaction.

After installing the steel-pouring ladle in the working position, the secondary cooling system, the system of equipment for pulling straightening machines (TPM), hydraulic shears and equipment for slab transportation are switched on.

Casting of steel begins with filling the tundish with liquid metal, the rocking mechanisms of the mold are activated and then the mold is filled. The dummy bar and slab pulling system is activated.

Drainage of metal from the steel-pouring ladle into the tundish is carried out through a submersible refractory pipe with a neutral gas supply to it.

An intermediate ladle with a capacity of 30 tons ensures the distribution of steel along the strand and allows the replacement of steel-pouring ladles without interrupting the casting process. The residence time of the metal in the tundish is 10-15 minutes, which ensures the floating of non-metallic inclusions and the exclusion of their entry into the mold. A dosing unit is provided for the crystallizer, which consists of a ceramic monoblock stopper and a pouring nozzle.

The monoblock stopper has axial holes in the body and plug with a diameter of 4-6 mm for supplying argon to the bucket cup.

The tundish is equipped with an emergency gate designed to stop casting in case of unplanned situations.

A heat-insulating mixture is fed into the tundish in the amount of -0.3 + 0.4 kg / t of steel.

The metal is supplied from the tundish to the mold through a submersible nozzle, preheated to a temperature of 1100-1200 ° C.

During the casting process, the required metal level in the mold (within 100-5-120 mm from the upper edge) is maintained by means of a tundish stopper mechanism and a metal level control system - using a Co-60 radioactive sensor system.

To insulate the metal mirror in the mold, a slag-forming mixture is used in the amount of ~ 0.6 kg / t of steel.

During casting, with the help of a hydraulic mechanism, the mold makes a reciprocating movement (swinging), which makes it possible to exclude the adhesion of liquid metal to the walls of the mold. The oscillation frequency of the mold is up to 490 cycles / min., The swing amplitude is ± 8 mm.

After leaving the mold, the slab enters the secondary water cooling zone and undergoes "soft" reduction within 1 + 25 mm. The "soft" reduction mode has a decisive influence on the macrostructure of the slab, providing low segregation and porosity due to displacement and crushing of the liquid phase, as well as the absence of axial cracks.

The secondary water cooling zone ensures uniform cooling of the slab and prevents its crust from deformation under the influence of hydrostatic pressure, and has a number of roller sections to support and guide the thin slab. The secondary cooling zone is equipped with a suction system for steam generated during the casting process.

After the secondary cooling zone, the slab enters the bending device, pulling-straightening unit and then into the descaling device. The pinch rolls, slab bending and straightening devices are designed taking into account the permissible deformations to obtain high quality, both of the inner regions of the slab and its surface.

To pull out the slab, a rigid dummy bar is provided, which is stored in a specially designated place and, before casting, is fed into the mold by means of driven rollers. The head of the dummy bar is detached using a special roller, after which the dummy bar is transported to its original position.

After exiting the pulling-straightening device and the descaling device, the straightened slab goes to the pendulum shear, where the head of the slab is cut off and cut to length. The surface temperature of the slabs before cutting is at least 850 ° C.

To control the macrostructure of the slab in the course of casting, a section of transverse templates is provided. The templates are marked and sent for analysis to the macro-template laboratory.

After cutting, the blanks are transferred to the heating furnace of the rolling part of the CRC.

At the end of casting, with a bridge casting crane with a lifting capacity of 200/63/15 t, the slag (ladle residues) from the steel ladle is poured into a slag bowl with a volume of 22 m^3 located in a special compartment (bins), and then the slag bowl with ladle residues is transferred to to the site of primary slag processing (PSPA).

3.5.2 Rolling Area

The technological process for the production of hot-rolled strip includes the following technological operations:

- cutting of a thin continuously cast slab on shears (as part of SCM);
- the task of the cut slab in a continuous Tunnel Furnace, in which it is heated to the rolling temperature;
- water descaling from the surface of a thin slab with high pressure water after heating in a roller furnace;
- rolling the slab in 5 continuous stands up to the final strip thickness;
- control of strip parameters at the exit from the group of stands using a measuring device;
- strip cooling by a laminar system on the discharge roller table to the required coiling temperature;
- coiling of strips into a roll on an underground coiler;
- strapping, weighing, marking and delivery of rolls to the finished product warehouse using a conveyor for harvesting rolls with walking beams and electric bridge cranes;
- strip inspection and sampling on the inspection line. Manual binding of the roll and transferring it to the warehouse for cooling;
- cooling of hot-rolled coils in the warehouse;
- shipment of finished products to the Consumer by rail and road.

Heating of billets before rolling

The casting and rolling unit will include a roller hearth furnace, which is a kinematic and technological connecting link between the Slab Caster Machine and the rolling mill.

The oven performs the following two tasks:

1. In order to create optimal states for rolling in the mill, the temperature along the length and cross-section of the thin slab should be within a certain range. This temperature range is set in the furnace, and the thin slab is homogenized.

2. The kiln must be able to accumulate thin slabs produced in the Slab Caster Machine during roll handling. The capacity is provided by the length of the oven. After completion of the roll transfer, the storage space is freed up again.

The furnace consists of modules for ease of installation. The module length is 9600 mm. Each module has slurry-type descaling bins. A removable roof is provided on the module for maintenance of the furnace.

The furnace frame is a metal welded structure. The frame elements are made of rolled sections and sheet metal.

Ceramic fiber is used as a furnace lining. Surfaces exposed to mechanical stress are insulated with cast refractory concrete with an additional heat-insulating layer of piece refractories.

The furnace is equipped with an in-furnace roller conveyor with water-cooled rollers. The rollers are insulated from the outside with refractory concrete. Heat-resistant steel bandages are welded onto each roller, which ensure the movement of a thin slab. Bandages on adjacent rollers are staggered. Roller pitch 1200 mm. Free-standing support structures are provided for the rollers, located along the furnace. This constructive solution makes it possible to exclude the effect of thermal expansion of the furnace frame on the roller conveyor, as well as to avoid the transmission of vibration from the movement of a thin slab to the furnace frame. Removal of the rollers from the oven is provided by special mechanisms (C- hook). Dismantling of the rollers is possible while the oven is running.

The furnace is equipped with a gas-air duct system. The necessary shut-off, shut-off, control and registration valves are installed on the gas-air ducts.

The fuel is natural gas. Calorific value of natural gas Q = 8500 kcal / Nm $^{3.}$

For fuel combustion, impulse two-wire premix burners are used. The burners are designed according to the latest technology and are characterized by minimal NO_x emissions.

The furnace is also equipped with a pilot burner system for igniting a flame and a flame control system.

The maximum fuel consumption for the furnace is 2800 Nm ^{3} / h.

The air for fuel combustion is supplied from two radial fans (one operating and one standby), heated in a heat exchanger to 520 °C.

Air heating in the heat exchanger is carried out by waste products of combustion, which are removed from the furnace through the chimneys, and after the heat exchanger, with the help of natural draft, are released into the atmosphere through a metal lined pipe, 55 meters high.

In front of the heat exchanger, to protect it from overheating, there is a fan supplying atmospheric air to dilute the combustion products. A system for dumping excess hot air is provided on the air line behind the heat exchanger.

To regulate the vacuum pressure in the furnace, a control valve is provided behind the heat exchanger.

The loading and unloading ends of the furnace are equipped with pneumatically operated dampers.

To monitor the internal state of the furnace and the shape of the flame of the burners, hatches are provided in the side walls of the furnace.

The scale is accumulated in the bunkers and through pneumatically driven slide gates is removed into the underfloor space into the container. The container is transported by a loader to the place of unloading.

Getting hot rolled steel

The thin slab passes along a roller table equipped with side guides, through a flame cutting machine and a descaling device. It then reaches the mill, where it is rolled to the required specified thickness.

The mill consists of 5 stands. The finishing stands are of a four- high design, i.e. they are equipped with 2 (two) work rolls and 2 (two) backup rolls.

The slab thickness at the mill entrance is 50-60mm, width - 800-1300mm.

The range of thicknesses of the strip obtained is 1.6-12.7 mm.

This is followed by the supply of sheet metal to a winding device for rolling metal into a roll, then air cooling and packaging is carried out.

The rolls are sent to the finished product warehouse.

3.5.3 Warehousing

To provide the technological units of the projected complex with the necessary materials, it is planned to build the following warehouse facilities:

- Hot briquetted iron (HBI) warehouse.
- Conveyor system for HBI supply to the ESPC;
- Section for loading alloying additives into the baskets of the ESPC;
- Area for receiving alloying additives;
- Area of injection of carbon-containing powder;
- Centralized timber complex warehouse;
- Warehouse for daily stock of ferroalloys and additives;
- Platform for refueling special equipment;
- Storage of cylinders;
- Scrap yard.

HBI warehouse

The warehouse is located in the AA-A span of the scrap yard building.

Span width - 30 m. Length - 144 m. Height to crane girders - 17 m. The warehouse building is unheated. Fire and explosion category "B 3".

Heated service and utility rooms are built in the warehouse building.

The warehouse is intended for the reception, storage and subsequent shipment of HBI to the technological units of the existing and projected Meltshop.

HBI is supplied to the warehouse at the railway station. open-top wagons with a lifting capacity of 69 tons. During the day, 7 trains of 8 railways are delivered from the station to the warehouse. open box cars.

Unloading railway open box cars arriving at the warehouse are made using an unloading complex. The complex includes: car dumper; car pusher; mechanized HBI supply line from the car dumper to the bin.

Unloading railway open box cars are produced using a stationary side car dumper.

Alternate railway supply open box cars into a car dumper for unloading is carried out by a car pusher. At the same time, another loaded railway. open box car supplied for unloading pushes out empty railway open box car outside the platform of the tipper car.

Approximate cycle time for unloading one railway. open box car 6-8 min.

From the railway. HBI open box car is unloaded into receiving bins (V-3 * 40 = 120 m^3). Feeders are installed under the bunkers, simultaneously unloading HBI onto the collecting belt conveyor BC-1.

The spill generated during unloading from the car dumper is collected in the spill hopper and by the system of belt conveyors BC-3, BC-4 is transferred to the conveyor BC-1.

The BC-1 conveyor supplies HBI to vertical belt conveyor (VBC), which loads it onto the BC-2 belt conveyor.

The conveyor BC-2 includes an unloading trolley, which, moving along the conveyor, allows unloading HBI at a given bin location.

Conveyor path capacity 700 t / h.

From shelters in places of overload, aspiration suction is provided with cleaning of dusty air in the aspiration unit.

HBI is stored in a buried concrete bin located along the railway. warehouse paths. Displacement of the stack - 20 thousand m $^{3.}$

The amount of HBI stored in the bins is -46 - 51 thousand tons.

The warehouse is designed to meet the demand for HBI of the projected and existing Meltshop.

In the warehouse bay there are two electric bridge cranes with a lifting capacity of 16 tons, equipped with mounted electro-hydraulic grabs V = 4 m3, with the help of which a stack is formed in the bin.

The amount of material entering the warehouse is fixed by conveyor scales installed on the BC-1 belt conveyor.

The unloading process is controlled remotely from the operator's room of the car dumper.

In case of failure of the car dumper (emergency mode), HBI is unloaded from the railway open box cars in the bins and the receiving bunker are produced by electronic overhead warehouse cranes.

Railway cleaning open box cars after unloading with a grab is carried out using an electromagnet.

Conveyor system for HBI supply to Meltshop

The supply of HBI from the warehouse to the Meltshop is carried out using conveyor transport.

HBI is fed from the car dumper by a belt conveyor BC-2 to the receiving hopper (V = 43 m ^{3}). The volume of the bunker is selected based on the capacity of one railway open box car (69 t). Bunker filling monitoring is fixed by level sensors. The vibratory feeder unloads HBI from the hopper onto a conveyor path (vertical belt conveyor L KB, belt conveyor No. 1), which transports it to a storage silo with a volume of V = 700 m $^{3.}$ Conveyor transport capacity 390 t / h.

The amount of HBI loaded into the silo is recorded by level sensors.

The silo loading unit is equipped with an emergency discharge system into the container.

HBI is unloaded from the storage silo using two vibrating feeders.

One vibratory feeder unloads HBI onto a belt conveyor No. 2, which transports it to a transfer unit, where it is loaded onto a conveyor path that supplies HBI to the supply bins of the designed Meltshop. The second vibrating feeder unloads HBI onto a conveyor belt that transports it to the existing Meltshop.

Conveyor scales installed on the transporting conveyors fix the amount of HBI dispensed from the warehouse to the Meltshop (designed and existing).

In the event of failure of the car dumper or conveyor transport system of the warehouse, HBI is loaded into the receiving bunker using an electric bridge crane and a front-end loader.

Section for loading alloying additives into baskets of Meltshop

The site is used to load lime and coke into the baskets of the Meltshop. The site is located along the "C" axis of the scrap yard, above the rail tracks of the bogies moving the loading baskets of the Meltshop.

Lime and coke, supplied in dump trucks from the warehouse of the daily stock of ferroalloys and additives, are unloaded into the appropriate bin. From the bin, using a front loader, materials are loaded into the appropriate receiving hopper.

As required, materials (one by one) are unloaded from the bunker by a vibrating feeder onto a conveyor scales and then by a vertical belt conveyor are fed to the equalizing bunker. Bunker filling is monitored by a level sensor. After filling the hopper, the shut - off valve opens and the material is discharged into the loading basket. 2 baskets are installed under the loading, which are loaded one by one using a swivel chute.

Receiving portion alloying constituents additives

The site is located along row D of the projected building of the Meltshop in the axes of columns 9-10.

The required additives are delivered to the site by a dump truck and unloaded into the receiving hopper.

From the bunker with the help of a vibrating feeder, materials are unloaded onto a vertical belt conveyor and fed to a conveyor path that transports materials into the service bins of the Meltshop.

Injection area for carbon-containing powder

The carbon-containing powder, unpacked at the daily storage of ferroalloys, is delivered by a cement truck (tank volume V = 26 m^3) to the injection section located near the building of the Meltshop and is unloaded into one of the receiving bins (V = 3x45 = ~ 135 m^3).

The silo filling is monitored using level sensors. Waste media is cleaned in an aspiration filter installed on the silo. A safety valve is installed to control overpressure on the silo.

From the silo, the carbonaceous powder is gravitationally loaded into a single-chamber pneumatic pump of cyclic action. The pneumatic chamber pump alternately, through one of the pneumatic pipelines, delivers the carbonaceous powder to the Meltshop.

Centralized casting and rolling complex warehouse

The Central Warehouse of the CRC is intended for the reception, unloading, storage and shipment of ferroalloys, refractory materials, CRC spare parts, spare parts for the replacement equipment, tools, hardware, rubber goods seals, personal protective equipment, etc.

The casting and rolling complex has the following sections:

- storage area for refractory materials;
- storage area for ferroalloy materials and alloying additives; storage area for spare parts, replaceable equipment, tools; storage area for instrumentation, samplers, thermocouples and probes;
- customs control area;
- storage area for PPE and household equipment;
- area for storage of lubricants.

Technological sites are proposed to be located in an existing building (construction in progress). The building is closed, unheated, consisting of 3 (three) bays 400 m long and 54 m wide (18 m each bay), total area 22,000 m^2. To carry out lifting work in the warehouse areas, it is proposed to place the following crane equipment:

- single girder electric crane with lifting capacity 1 ton - 1 pc.;
- single girder electric crane with lifting capacity 10 tons - 9 pcs.;

- single girder electric crane with a lifting capacity of 16 tons, 2 pcs.

The height of the crane beams is 7.0 m.

The warehouse is provided with car entrances and railways. way.

All materials and spare parts will be delivered to the Central Warehouse of the casting and rolling complex in closed railway wagons and by road. Unloading railway wagons using electric forklifts.

Refractory storage area

The site is intended for receiving, unloading, storing and shipping refractory materials, graphite electrodes and other auxiliary materials. In the refractory storage area, bricks / blocks will be supplied on wooden pallets, refractory concrete, ramming masses, mixtures and other types of refractory materials will be supplied in soft containers such as big bags, graphite electrodes in braided bars.

The area of the refractory storage area and its capacity are calculated for a storage reserve of at least a month.

Ferroalloy materials and alloying additives storage area

The site is intended for receiving, unloading, storing and shipping ferroalloys, deoxidizers, rare earth metals, bulk, coils of flux-cored and aluminum wire, carbon-containing materials.

At the ferroalloy storage site, materials will be delivered in soft containers such as big bags, flux-cored wire and aluminum rod will be delivered in coils on pallets. Rare earth metals and expensive ferroalloys (ferrovanadium, ferromolybdenum, ferroniobium, etc.) will be supplied in metal barrels.

The site provides a storage reserve of at least one month for each material.

Warehousing and storage of materials in big bags is provided in separate bins with dividing walls for each material to avoid mixing.

For storage and storage of coils of flux-cored and aluminum wires, separate places are provided in the warehouse area.

Warehousing and storage of rare earth metals and expensive ferroalloys in (ferrovanadium, ferromolybdenum, etc.) is provided in a separate fenced off place, ensuring the safety of the material.

Storage area for spare parts, replaceable equipment, spare parts

The site is intended for storage of removable equipment and spare parts, tools, hardware, etc., with subsequent shipment to timber industry customers by road. The site provides a non-decreasing stock of storage of spare parts and replacement equipment for at least one year.

At the site of spare parts and replacement equipment - the goods will arrive on euro pallets in separate boxes, coils, etc.

The site provides for block division into large-sized equipment, rack storage, small-piece storage.

In the areas of rack and small-piece storage, it is planned to place a rack system with trays for fasteners and tiers for small-piece packages and individual products of small size.

Storage area for instrumentation, samplers, thermocouples and probes

Portion for receiving, unloading, storing and shipping of control - instruments, thermocouple, samplers blocks probes SHI and SCM.

In the storage area for instrumentation, samplers, thermocouples and probes, sensors and instruments will arrive in boxes on pallets.

The site provides a non-decreasing storage reserve for each item for at least one year.

A separate room with a storage temperature of at least +20 ° C is provided for thermocouples, sampler blocks, Steel Degassing Unit and SCM probes. In the room for storing boxes with thermocouples, blocks of samplers,

Steel Degassing Unit and SCM probes, racks of sections are provided. One section contains 28-30 boxes.

Customs control area

The territory of the customs warehouse is a customs control zone and is located in the "A" aisle on the north side of the building of the centralized casting and rolling complex warehouse.

Storage area for PPE and household equipment

The site is intended for storage and distribution of personal protective equipment (safety shoes, overalls, helmets, goggles, masks, respirators, mittens, gloves, etc.) and household equipment (shovels, buckets, brooms, etc.).

The unloading and loading operations at the warehouse are provided with the help of crane beams and forklifts.

For weighing rare earth metals and expensive ferroalloys (ferrovanadium, ferromolybdenum, ferroniobium, etc.), floor scales with a weighing limit of 200 kg are provided in the warehouse.

Lubricant storage area

The lubricants storage area is intended for receiving, storing and dispensing hydraulic fluids, oils and lubricants for the equipment of the complex facilities. Fire and explosion category "B".

Delivery of lubricants from suppliers is provided by road transport. Lubricants can be stored in metal drums with a capacity of 200 liters and in smaller containers.

An automobile ramp is provided for unloading barrels from vehicles. Barrels from the car body are unloaded onto a hydraulic hand trolley (rocker) and fed to the container compartment for storage. The storage and storage of drums is provided in two tiers on pallets.

To carry out loading and unloading operations, an electric single-girder crane with a lifting capacity of 1 t is installed.

The transportation of barrels and pallets is carried out by a crane-beam using special load-gripping devices. Lubricants supplied to the warehouse in small containers are stored on racks.

From the warehouse, lubricants are sent to the consumer by road transport both in metal drums with a capacity of 200 liters, and in small containers.

The filling of lubricants from drums into small containers is carried out by pumps. If it is necessary to warm up the lubricants before shipment to the consumer, devices for electric heating of drums are provided in the warehouse.

Warehouse for daily stock of ferroalloys and additives

The warehouse is located in a building with dimensions in plan 15x30 m, height up to crane beams 1 4 m. The warehouse building is not heated.

Attached to the warehouse building are: a lime reception and storage area (not a heated building); service premises.

Receipt of materials to the warehouse by road:

- lime - in bulk;
- alloying additives - in "big bags" with a volume of V = 1 m^3.

Storage of materials in the warehouse: lime - in bunkers; alloying materials - in "big bags" in the appropriate bins.

To carry out loading and unloading operations, two single-girder overhead cranes with a lifting capacity of 5 tons are installed in the warehouse.

Lime delivered to the warehouse from a dump truck is unloaded into a receiving hopper (1 4 m^3). Lime is discharged from the hopper with the help of a vibrating feeder onto the vertical conveyor LKV and then by the mobile belt conveyor BC-1 it is loaded into one of the storage hoppers (V = 4 * 80 = 320 m^3).

Fixation of the amount of lime loaded into the bunker - using level sensors.

Lime from the bunkers, one by one, is unloaded by a vibrating feeder onto a collecting belt conveyor Zh-2 and, using a special device (dust-free loading), is loaded into a dump truck and transported to the Meltshop. Control of the amount of shipped lime - using conveyor scales installed on a collecting belt conveyor.

Remote control of the process of receiving and dispatching lime (from the operator's room).

Additives and carbonaceous powder are delivered to the warehouse in "big bags" and are stored in the appropriate bin using a crane.

For reloading additives from "big bags" into vehicles in the warehouse, there are two unloading units (one for powdery material, the other for lumpy material).

"Big-bag" from the bin is installed by a crane on the installation, where with the help of knives its bottom is cut and the material is gravitationally loaded into the installation bunker. From the hopper, the material is loaded into vehicles using a special device (dust-free loading). Additives are loaded into a dump truck, powders are loaded into a cement truck (tank volume V = 13.6m^3). Local control of installations.

The control of the amount of materials entering the warehouse in big bags and sent to the Meltshop is recorded using a crane scale.

Refueling platform for special equipment

The site serves for refueling specialized vehicles serving the Primary Slag Processing Area. Refueling of vehicles is carried out by a mobile filling station (PAZS).

The number of vehicles serving the site is 7 units, a slag truck - 2 units, a dump truck - 2 units, a caterpillar excavator - 1 unit, a front loader - 2 units.

Cylinder warehouse

The cylinder warehouse is a one-story unheated building with dimensions in the plan of 14.5x6.0 m, the floor elevation of the warehouse is +1.2 m.

The warehouse building is divided into two rooms. In one room (in terms of size 11 0 x 6, 0 m) located storage tanks oxygen and nitrogen.

Oxygen is intended for use in the repair of equipment of auxiliary facilities of the complex, nitrogen - for refueling the hydraulic systems of accumulator stations of the Meltshop.

The cylinder warehouse is designed to store 64 filled cylinders and 64 empty cylinders. Cylinders in the warehouse are installed in special containers (8 cylinders in each).

The fire hazard category of the premises is "D".

The second room (size in the plan 6.0x3.5 m) houses a warehouse for acetylene cylinders.

Acetylene is intended for use in the repair of equipment of auxiliary facilities of the complex. The cylinder warehouse is designed to store filled cylinders and 16 empty cylinders.

The fire hazard category of the premises is "A".

The premises are separated by a fire barrier.

Cylinders in the warehouse are installed in special containers (8 cylinders in each).

Delivery of cylinders to the warehouse and shipment from the warehouse is provided by road.

Loading and unloading operations are carried out using hand carts.

3.5.4 Mechanization of the materials supply to the technological units

The material handling system consists of the following systems:

- systems for supplying hot briquetted iron (HBI) to EAF-120 ;
- a system for feeding bulk materials and ferroalloys to EAF, steel ladle, to LF and Steel Degassing Unit - VOD.

The HBI feed system is designed for storage and mechanized feeding of material into an arc steelmaking furnace (EAF).

The HBI supply system consists of the following components:

- silos of daily supply as part of the bunker overpass;
- equipment for transportation, dosing, weighing and feeding of hot briquetted iron into EAF.

The system for feeding bulk materials and ferroalloys is designed for storage and mechanized feeding of materials and ferroalloys into an arc steelmaking furnace (EAF), a two-position ladle furnace (LF), and a two-seat steel vacuuming unit (Steel Degassing Unit).

The system for feeding bulk materials and ferroalloys consists of two main parts:

- silos of daily supply as part of a bunker overpass - designed for accumulation and storage of materials and ferroalloys. Material is fed to the bunker trestle by conveyors from the UDH 02 unloading bunker ;
- equipment for transportation, batching, weighing and feeding of materials into a EAF, a steel ladle, a two-position LF unit and a double Steel Degassing Unit unit.

The bunker trestle is designed to store the following materials: hot briquetted iron (HBI), additives and alloying materials.

The equipment for transportation, batching, weighing and feeding of materials includes vibrating feeders, weighing bins, belt feeders, conveyors, chutes and rotary trays.

3.5.5 Processing of Steel Slags

In operation, the electrical arc furnace (EAF-120), depending on the embodiment blending smelting formed from 147.6 thousand. Thousand tons to 209.9.T year steel slags.

When the secondary treatment process portion EAFP steel equipment (UE, SHI) and SCM formed NASA - 19,13 thousand tons a year after the pouring ladle residues in SCM.

The total amount of formed slag to be processed will be from 166.73 thousand tons per year to 229.03 thousand tons per year.

Primary Slag Processing Area (PSPA)

All slag generated in the Meltshop and Slab Caster is processed at the Primary Slag Processing Area (PSPA).

The site includes four conventional bins. At the same time, three conventional bins are intended for receiving steelmaking (furnace) slag, and one bin - for ladle residues.

The supply of hot liquid steelmaking slag from Meltshop and ladle slag from Slab Caster to the Primary Slag Processing Area with magnetic separation is carried out by slag trucks in slag bowls with a volume of 22 $m^{3.}$

Loading of cooled steelmaking slag at the primary processing site into a dump truck is carried out by a front-end loader with special wheels resistant to high temperatures (fire-resistant with chains) and a crawler excavator, followed by transportation of the cooled steelmaking slag by a dump truck according to the existing scheme at the plant - and to the existing storage site slags.

The supply of ladle residues from the Slab Caster to the primary processing area is also carried out by auto slag trucks in slag bowls with a volume of 22 m^3 into a special bin for storage and extraction of the metal component, with their subsequent transfer by dump trucks to the existing site for storage and processing of slags.

The slag primary processing section is an open structure consisting of four conventional bins for receiving, cooling and unloading slag, including three bins for steelmaking slag and one bin for receiving, cooling and unloading ladle slag (ladle residues).

The total length of the section is 120 m, the width is 44.4 m. The width of the bins proper is 20.0 m; length - 68.0 m; floor depth - 3.0 m.

The walls and the floor of the site are made of heat-resistant concrete, the floor is filled with cold crushed slag 0.5 m high.

The site from the side of slag shipment to dump trucks is fenced with protective screens up to elevation from the wind. +3.0 m. In addition, the bins of the UP PSh from the two extreme ends are fenced with protective screens up to elevation +3.0 m to protect it from the wind and prevent the possible release of hot slag in case of its getting on the remaining non-evaporated water, which is fed to the slag irrigation for cooling and thermal crushing.

At the site, steelmaking slag with a temperature of 1300 ° -1500 ° C is discharged into one of three conventional bins, in which the slag is currently being stored. At the same time, to prevent the possibility of liquid hot slag spillage along the entire front of work, partitions between the bins are formed by frontal loaders from the cooled slag of previous heats.

In the specified bins, the steelmaking slag is irrigated with water, with an intensity of about 0.6-2.0 m^3/ t. Irrigation is carried out in between slag discharge; water is supplied immediately after the end of the bowl tilting.

The water supply to the steelmaking slag stops at least 5 minutes before the next slag bowl arrives. Irrigation of slag with water of one melting in the first day is carried out on average about 40 minutes.

When slag is irrigated with water, cooling and the process of thermal crushing of the slag occurs - through the cracks in the upper layers, water will penetrate into the lower layers, intensifying the cooling process.

Following two days of this slag bins is intensively cooled by water, on the fourth day will be bins with loading development of cooled slag dump for subsequent transportation, the existing circuit at a metallurgical plant, to place a long vylozhivaniya and processing or in the CM PN O.

The specified specific water consumption at the site of primary processing of furnace slag is optimal, taking into account the recommendations and operating experience of slag processing facilities at other enterprises, and which ensures: uniform water supply to the surface of the slag; slag cooling with the required intensity; thermal crushing of slag before further processing.

When slag is irrigated with water, 100% of the water will evaporate on the first day (in between slag discharge). On the second day, about 30% of the water will evaporate.

To supply and drain water for slag irrigation, the site provides for a circulating water supply cycle. Waste water discharged from the site enters the sump, and then, after processing, returns to the circulating water supply cycle.

In the remaining two bins, used for storing the steel-making donkey, the slag is settled and shipped. As the storage bins are filled, the functions of the three bins alternately change (one for draining the liquid slag, the second for thermal crushing and cooling, the third for development and transfer to the shipping area).

Taking into account the total time of application of irrigation with water for thermal crushing of the slag during the first day about 20 hours and intensive cooling of the slag in the next two days, according to the experience of operating enterprises, the cooling of the slag to a temperature of 100 ° C will be completed by the end of the third day, after which the development of the bin with additional crushing is carried out slag (if necessary), magnetic separation and slag shipment.

Shipment of cooled slag at the primary processing site to dump trucks located at elevation minus 2.5 m, is carried out by a front-end loader, with further transportation of the cooled slag to the existing slag storage and processing site or to the Central Processing Plant, respectively. Fractional composition of shipped slag 0 ^ -120 mm, temperature - up to 100 ° C.

If it is necessary to unload slag into a dump truck from the compartment (bins) where the liquid slag is drained, the unloading work should be carried out only during periods when there is no slag unloading operation. At this time, the working personnel must be removed to a closed room (comfort block).

Simultaneous operation of two bins for the discharge of liquid slag and the shipment of cooled slag is possible, when the work is carried out in the first and third bins. In this case, a safe distance is provided for carrying out the specified work.

At the Primary Slag Processing Area, magnetic separation and additional crushing (if necessary) of slag is performed. For this, a special crawler excavator is provided on the site with an electromagnetic washer or a hydraulic hammer attached to the boom.

The metal extracted from the slag by means of magnetic separation is loaded with an electromagnet into a dump truck and transferred to the scrap cutting section, which is part of the Primary Slag Processing Area, or back to production - to the scrap yard.

As part of the Primary Slag Processing Area there is a section for storing electrode breakage and a section for cutting scrap, where, if necessary, with the help of a gas-oxygen post, large-sized scrap is cut before being sent to the batch yard.

The chemical composition of the shipped magnetic fraction - up to 60% metallic iron, the rest - oxides of calcium, iron, manganese, magnesium, etc., fraction - 0-200 mm.

At the Primary Slag Processing Area, works are carried out to clean the slag bowls from solidified metal and slag residues, and to repair the actual slag bowls.

Cleaning of slag bowls is carried out using an excavator equipped with replaceable attachments (bucket with a volume of 1 m^3 or a hydraulic hammer).

Considering that during long-term operation, the bowls are exposed to thermal (during slag filling) and mechanical (when cleaning from solidified residues) shocks, as a result, various cracks can form in them.

Cracks will be welded on the site. Welding is planned to be carried out by electric welding with electrodes or flux-cored wire with preliminary and concurrent heating, with forging of seams and delayed cooling after welding.

To increase the service life of the slag bowl by preventing burnout of the bottom and excluding the adhesion of hot slag to it, it is provided:

• Backfilling of the bottom of the slag bowl with dry slag from previous heats. To do this, after draining the slag into the bin, the slag truck delivers the empty slag bowl to the bin, where the cooled slag is shipped to the dump truck and, using an excavator with a hinged grab, the bottom of the bowl is filled with dry slag with a fraction of up to 50 mm to a height of 50-60 cm from the bottom.

At the same time, during the operation of the bowl prepared by the proposed method, a powerful stream of slag falls on the bottom of the bowl. The speed and impulse of the jet is extinguished by the upper, largest fraction, the melt spreads and passes through the pores in the coarse slag layer to the lower layer. Almost cooled slag is suitable for the lowest shallow layer of bedding.

• Construction of a lime mortar preparation department with a slag bowl spraying unit - after draining the slag into the bin, the slag truck delivers the bowl to the department where spraying is performed.

At the primary slag processing site, it is envisaged that one of the four existing bins will be used for receiving, storing and further shipment of ladle slag to dump trucks, for its subsequent transportation according to the existing scheme at the metallurgical plant.

Delivery of the specified type of slag to the bins of the Primary Slag Processing Area and the method of shipment are similar to the supply and shipment to the furnace slag section - by auto-slag carriers in slag bowls with a volume of 22 m^3 and front-end loaders, respectively.

Taking into account the increased content of sulfur compounds in the ladle slag, in order to reduce the emission of harmful substances (hydrogen sulfide, sulfurous anhydride) into the atmosphere, which have an unpleasant odor, irrigation in the bin of the specified slag with water for thermal crushing is not carried out. The slag crushing, if necessary, is carried out by a mounted hydraulic hammer on a crawler excavator.

At the same time, work on shipment of ladle slag to a dump truck from a bin should be carried out only during periods when there is no slag discharge operation. During the discharge of the ladle slag into the bin, the working personnel must be removed to a closed room (comfort block).

Department for the preparation of lime mortar with installation for spraying slag bowls

The installation for spraying slag bowls is intended for spraying the inner surface of slag bowls with a volume of 22 m^3 with lime mortar in order to provide a lime coating. To ensure the envelope approximation slag carrier truck heads are lifting spray heads ensure an even layer of lime mortar is applied on the inner surface of the bowl (bottom and sides of the wall to the very top).

The burnt lump lime is fed into the hopper from a self-unloading tank with a single-girder crane. From the hopper, lime through an electric vibrating feeder enters the lime slaking apparatus, which consists of a loading and unloading funnels, a drum and a drive for its rotation.

Lime mortar from the drum is drained into a sand trap for cleaning from mechanical impurities. From the sand trap, the solution enters the mixer tank. Mechanical impurities from the sand trap are transported by the auger into a self-emptying container for waste.

After each spraying, the lime mortar lines are purged with compressed air to remove the mixture from the system to prevent freezing.

The platform slag truck drives with an empty hot slag bowl (the temperature of the slag bowls up to 300 ° C) under the device for spraying the slag bowls into the spraying position, the device is lowered, the operator turns on the milk of lime supply, the device evenly applies the milk of lime to the inner surface of the bowl. When milk gets on the hot walls and bottom of the bowl, moisture evaporates, intense vaporization occurs, and a layer of lime up to 1.5 mm forms on the surface. The processing time for one bowl is 3... 5 minutes.

The equipment operation is provided in automated or manual modes. In the automated control mode, the equipment operation cycle is switched on by the signal of the lime solution level sensor in the mixing tank. The density of the lime solution is controlled

using the Areometer AON-2 device. The sequence of switching on: sand trap, lime extinguisher, electric vibrating lime feeders and hot water supply to the drum.

When the maximum level of lime solution is reached in the mixing tank, the mechanisms are turned off in the reverse order. At the signal from the density sensor of the solution, an electrically driven gate valve is automatically opened to supply water to the mixer tank and turn off when the required density is reached.

Waste slaking lime from the drum and sand from the sand trap enter a self-dumping tank. Provides for heat removal from the lime slaking apparatus, mixing tank, sand trap to the filter with subsequent discharge into the atmosphere.

In manual control mode, each mechanism is switched on and off from local control posts.

3.5.6 Fume treatment equipment

The work of the Meltshop and auxiliary shops of steel production is accompanied by the release of a large amount of dust. For localization and cleaning up to standard values of dust emissions, the following aspiration and fume treatment facilities are provided:

- Fume treatment Meltshop.
- Slab Caster. Crystallizer air suction units and smoke and vapor removal system from cooling chambers.
- HBI warehouse. Dust removal system for ferroalloys and additives;
- Suction system for the car dumper. HBI warehouse.
- Suction system of the receiving hopper. Daily storage of ferroalloys and additives.
- Collection conveyor of the suction system. Daily storage of ferroalloys and additives.
- Suction system of the decompressor. Daily storage of ferroalloys and additives.

Fume treatment Meltshop

The unit is designed to extract and clean exhaust gases from:

- 4th hole on the roof of the EAF-120 furnace;
- exhaust hood for secondary gases;
- primary waste gases from a two-position ladle-furnace unit;
- systems for feeding bulk materials into the EAF, into the ladle-furnace unit (LF) and into the two-position steel Degassing unit (Steel Degassing Unit);
- two-position Steel Degassing Unit;
- from the building of the collecting dust bin (dust silo).

The gas treatment includes the following equipment, buildings and structures:

- Exhaust hood (located on the roof of the Meltshop building).
- Dust collection chamber.
- Gas outlet for primary gases.
- Gas outlet of secondary gases.
- Booster fan for removing dust from the LF.
- Booster fan from Steel Degassing Unit.
- Booster fan from the system for supplying ferroalloys and additives (included in the system for dedusting ferroalloys and additives).
- Booster fan of dust silo.
- Surface cooler (heat exchanger)
- Spark arrester (axial cyclone).
- Bag filter with impulse regeneration of filter elements.

- Main fans - 3 pcs., 1500 kW.
- System for collecting and transporting captured dust.
- Discharge pipe.

Total gas purification performance (flow rate), in view of air flow from the dust silo 6 in an amount of 0000 m ^{3}/ h is:

- in technological modes release / smelting 2,086,000 m ^{3}/ h;
- technological mode melting 1 450 000 m ^{3}/ h.

The annual working time of the main fume treatment equipment corresponds to the annual working time of the EAF-120 and is 310 days (7440 hours).

The final concentration of dust in the air emitted into the atmosphere is not more than 10 mg / Nm ^{3}/ h.

In addition to the listed dust emission points, serviced by the Meltshop fume treatment station, there is one more dust emission point in the workshop, which is not connected to the Meltshop fume treatment station - a tundish tilting stand.

This dust extraction unit is provided with a rolling exhaust hood, an exhaust fan and air ducts for transporting dusty air for release into the atmosphere. According to the basic engineering of Danieli, the capacity of this plant is 27,000 m ^{3}/ h.

Dust caught in the baghouse bins, in the bunker of the axial cyclone-spark arrestor and in the bins of the cooler (heat exchanger) by the chain conveyor system is transported to the collecting chain conveyor, and then by means of the chain elevator is transferred to the collecting dust bin

To collect dust, a metal hopper with a volume of 180 m ^{3} is provided.

Cleaning of dust from bunkers is carried out around the clock.

The total amount of captured dust, composition and t is about 71.454 t / day.

From the collecting hopper, as required, the dust is loaded onto vehicles using a screw conveyor and a special device for dust-free dust loading (telescopic pipe).

After unloading, the dust is sent for disposal by road transport.

To prevent dust from hanging when unloading from the hopper, an internal dilution system is installed on its conical part to ensure a constant supply of dust to the downstream screw conveyor.

The hopper loading with dust is recorded using level sensors.

A mini-filter is installed on the hopper cover to clean the displaced air.

Slab Caster. Crystallizer aspiration units and smoke and vapor removal system from cooling chambers

To remove the smoke generated when hot metal enters the mold, a mold Suction system is provided.

The system consists of an umbrella connected to a fixed mold cover, gas ducts and an exhaust fan.

Number of exhaust fans - 1 pc.

Performance exhaust fan is 5000 n m ^{3}/ h.

The fan power is 15 kW.

The smoke is diverted into the cooling chamber of the swing mechanism and the cooling of the roller sections. The smoke and steam mixture is removed from the cooling chamber outside the workshop by a smoke and vapor removal system. The system consists of the flues 2 and exhaust fans performance rate 120 000 n m ^{3}/ h each.

Dedusting system for ferroalloys and additives. HBI warehouse.

This unit consists of two parts, internal and external, and is supplied by Danieli for localization and removal of dust emissions from the supply system of HBI, ferroalloys and additives.

The indoor unit serving the raw material supply system includes:

- local suction;
- booster exhaust fan capacity of 99 000 m^3 / h;
- air duct system.

The external unit serving the conveyor system for supplying HBI to the Meltshop includes:

- bag filter complete with suction fan, performance rate 17,500 m3/h;
- air duct system (after the booster fan, the aspiration air ducts are connected to the fume treatment unit of the Meltshop);
- local suction.

Aspiration units provide the final concentration of dust in the air emitted into the atmosphere, not more than 10 mg / nm^3.

Car dumper Suction system (PU)

The Suction system is designed for capturing and purifying dusty air when unloading hot briquetted iron (HBI) at the appropriate warehouse. The HBI warehouse is equipped with a car dumper and a conveyor system for supplying HBI to the Meltshop.

The unloading point of the car dumper is protected by a shelter. The shelter is divided into two sections by a partition. Each section is connected to a duct network.

Overloading conveyors also provide for shelters, and suction from them.

Dusty air is transported through a network of aspiration air ducts to a bag filter installed 5 meters south of the slag yard.

The bag filter has a compressed air regeneration system and is equipped with all the necessary automation to carry out the regeneration process in an automatic mode. Dust trapped in the baghouse filter enters the dust collection system and is collected in a dust collection bin.

The filter equipment is housed in a tent. The filter is designed for outdoor use.

On the branches of the network of aspiration air ducts, aspiration dampers (gate) are installed, for the possibility of regulating the Suction system.

The cleaned air is removed through the chimney using a double-inlet smoke exhauster.

In order to ensure the standard sound pressure, a silencer is installed behind the exhauster.

There are platforms and ladders for servicing the filter and smoke exhauster.

Cleaning hatches are provided for servicing the duct network.

Since the process of unloading the wagons occurs periodically, the Suction system has the ability to reduce performance using the frequency converter of the electric motor.

Aspiration of daily storage of ferroalloys and additives

The daily warehouse of ferroalloys and additives is served by three independent Suction systems:

- Suction system of the receiving hopper,
- collecting conveyor Suction system,
- Suction system of races from the tare.

Hopper suction system

The Suction system (PU 1) serves the receiving hopper, vertical conveyor and lime feed hoppers. The filter, fan and chimney are located to the south of the daily storage of ferroalloys and additives.

System capacity - 73 800 m ^{3}/ h.

Number of smoke exhausters - 1 pc. Exhaust fan power - 170 kW.

Collection conveyor suction system

The Suction system (PU 2) serves the system for unloading material from the bins onto the collecting conveyor.

The system is a bag filter in a housing with a fan in the upper part. The system is located at the lime reception area.

The system productivity is 2,200 m ^{3}/ h.

Number of fans - 1 pc. Fan power - 2.2 kW.

Suction system of races from the hopper

The Suction system (PUZ) is designed to collect dust when loading races from the tester with big bags, and loading vehicles.

The system is a bag filter in a housing with a fan in the upper part. The system is located in the warehouse.

The system capacity is 2,500 m ^{3}/ h.

Number of fans - 1 pc. Fan power - 2.2 kW.

Aspiration units of the daily storage of ferroalloys and additives provide the final concentration of dust in the air emitted into the atmosphere, no more than 10 mg / nm ^{3}.

3.6 The list of the main technological equipment of casting and rolling facilities

The list of the main technological equipment of CRC facilities is presented in Table 3.6.

Table 3.6

Item No.	Equipment name, brief description	number
1	2	3
1	**Hot briquetted iron (HBI) warehouse**	
	Lifting equipment	
1.1	Electric overhead crane, lifting capacity 16 tons, complete with:	2
	- electro-hydraulic grab V = 4 m ^{3}	2
1.2	Electric hoist, lifting capacity 3.2 tons Npod. = 25 m	2
1.3	Front-end loader, V bucket = 4.2 m ^{3}	1
	Technological equipment	
1.4	Gate	3
1.5	Feeder	3
1.6	Belt conveyor BC-1, V-1000, L = 32 m	1
1.7	Vertical belt conveyor L KB-1	1
1.8	Belt conveyor L K -2 with unloading trolley, B = 1000, L = 100.8 m	1
1.9	Belt conveyor Л K -3, B = 650, L = 18 m	1
1.10	Belt conveyor ЛК-4, B = 650, L = 15 m	1
1.11	Stationary side car dumper	1
1.12	Car pusher	1
1.1	***Conveyor system for HBI supply to Meltshop***	
1. 1.1	Pin shutter	3
1. 1.2	Vibrating feeder	1
1.1.3	Vertical belt conveyor	1

Item No.	Equipment name, brief description	number
1	2	3
1.1.4	Belt conveyor No. 1	1
1.1.5	Deflecting chute	1
1. 1.6	Vibrating feeder	2
1.1.7	Belt conveyor No. 2	1
2	**Scrap Yard (SY)**	
	Technological equipment	
2.1	Self -propelled scrap truck with weighing system for transportation of scrap-loading baskets	2
	Lifting and transporting equipment	
2.2	Bridge crane with a lifting capacity of 25 t with an electromagnet and an electrohydraulic gripper	4
2.3	Electric hoist for crane maintenance with a lifting capacity of 3.2 t	4
2.1	***Section for loading alloying additives into baskets of Meltshop***	
2. 1.1	Pin shutter	2
2. 1.2	Vibrating feeder Q = 45 t / h	2
2.1.3	Conveyor scales Q = 45 t / h	1
2.1.4	Vertical belt conveyor Q = 45 t / h	1
2.1.5	Gate valve with pneumatic drive	1
2. 1.6	Rotary chute	1
2.1.7	Front-end loader bucket V = 3.0 м ³	1
3	**Electric steelmaking shop (Meltshop)**	
	Main technological equipment	
3.1	Arc furnace EAF-120/140 with a mass of melting 120 tonnes *(without transformer* output 124 MVA + 10%), and completely with mechanical Specifications equipment, automation systems, ladle serving equipment replaceable parts	1 to-t
3.2	A two-position ladle furnace with a melting mass of 120 t *(without* a 27 MBA *transformer*) complete with mechanical and electrical equipment. technical equipment, automation systems, 2 steel trucks, service equipment	1 to-t
3.3	Double unit for vacuumizing steel chamber type Steel Degassing Unit - VOD, complete with mechanical vacuum pumps, el. technical equipment, automation systems, service equipment	1 to-t
3.4	Scrap-filling basket 125 m ³ assembled	3
3.5	Machine for breaking lining for EAF, steel and tundish with remote control (BROKK type)	1
	Auxiliary equipment	
3.6	Steel ladle drying stand	2
3.7	Horizontal stand for steel ladle heating	2
3.8	Vertical stand for steel ladle heating	1
3.9	Transfer steel truck for transporting a ladle to the building of Slab Caster CRC	1
3.10	Transfer steel carrier for transporting a ladle into the existing span of the Slab Caster Machine	1
3.11	Traverse for lifting the EAF casing	1
3.12	Steel ladle capacity 120 t and bucket slide gate	ten
3.12.1	Mortar unit (concrete mixer)	1
3.12.2	Brick Cutting Machine	1
3.13	Ladle cover	3
3.14	Vertical stand for full ladle	2
3.15	Ladle lining replacement area	1

Item No.	Equipment name, brief description	number
1	2	3
3.16	Vertical stand for empty steel ladle	2
3.17	Horizontal stand of steel ladle	3
3.18	Maintenance stand. bucket gate	1
3.19	Enclosure support stand	2
3.20	Arch support stand	1
3.21	Template for lining the EAF arch	1
3.22	Template for lining the roof of the ladle furnace	1
3.23	Shotcrete equipment, pressure vessel	1
3.24	Filling machine	1
3.25	Slag bowl 22 $м^3$	7
3.26	Slag truck for transporting hot slag	2
3.27	Bulldozer (breaking the EAF threshold)	1
	Lifting and transporting equipment	
3.28	Filling crane with lifting capacity 150 (220) / 32/15 t	1
3.29	Filling crane with lifting capacity 200/63/15 t	1
3.30	Bridge crane with a lifting capacity of 75/20 t	1
3.31	Bridge crane with a lifting capacity of 65/20 t	1
3.32	Console crane with a lifting capacity of 3.2 t for servicing the stand for steel ladle lining replacement	1
3.33	Cantilever crane with a lifting capacity of 2 t for servicing stands for repairing a steel ladle gate valve	1
3.34	Cantilever crane with a lifting capacity of 2 t for supplying coils with wiring for tribes LF	2
3.35	Console crane with a lifting capacity of 5.5 t for servicing the stand for building up EAF electrodes	1
3.36	Console crane with a lifting capacity of 3.2 t for servicing the stand for building up electrodes LF	1
3.37	Tali email for servicing cranes, hydraulics rooms and transformers for EAFs and LF	ten
3.1	***Material handling system***	
	Technological equipment	
3.1.1	Extraction equipment for the main silo (feeders)	2
3.1.2	Loading equipment ferroalloys and additives for silage daily stock SBN 0.2-0.3 (conveyor)	1 1
3.1.3	Feeding equipment for ferroalloys and additives for daily silo SBN 04-19 (conveyor)	1 1 1
3.1.4	Equipment for extraction from bins SBN 02-05 (batching scales, conveyor)	2 3 1
3.1.5	Equipment for feeding into EAF and outgoing (conveyor)	1 1
3.1.6	Equipment for feeding into the LF (conveyor)	1 1
3.1.7	Equipment for feeding into Steel Degassing Unit - VOD (conveyor, screen)	1 1 2
3.1.8	Loading equipment for ferroalloys and scrap bucket additives (conveyor scales, elevator conveyor)	1 1
	Tali	

Item No.	Equipment name, brief description	number
1	2	3
3.1.9	Hoist manual worm movement g / n 1t under UDH 01,	2
3.1.10	Hoist manual worm mobile l / c 1 t scrap basket	1
3.1.11	Hoist manual worm movement g / n 1t under UDH 02,	2
3.1.12	Hoist manual worm mobile, l / c 1t for UDH 03-04	1
3.1.13	Electric hoist mobile, l / c 2.5 t for SBN 01	1
3.1.14	Electric mobile hoist with a lifting capacity of 2.5 t on a dock tower EBC 02-NBC 06	1
3.1.15	Electric mobile hoist with a lifting capacity of 2.5 t on a docking tower EBC 20-NBC 02	1
3.1.16	Hoist manual worm mobile l / c 1t for repair work	4
3.2	***Dopant reception area***	
3.2.1	Pin shutter	1
3.2.2	Vibrating feeder	1
3.2.3	Vertical belt conveyor	1
3.3	***Injection area for carbon-containing powder***	
3.3.1	Pneumatic chamber pump	3
3.3.2	Minifilter	3
3.3.3	Safety valve	3
3.3.4	Safety valve	3
3.3.5	Fluidization system	3
4	**Department of continuous casting of steel (Slab Caster)**	
	Main technological equipment	
4.1	Slab Caster Machine (SCM) for casting of the thin slab cross section of 40 - 60 x 800- 1 to 300 mm, a maximum length of 59.0 m, and completely with mechanical specifications equipment, automation systems, equipment servicing	1 to-t
	Technological equipment	
4.2	Staple cover	2
4.3	System of gutters, emergency ducts, overflow tanks and safety barriers	1 to-t
4.4	Roller section extraction guides	1
4.5	Storage stand for tundish	4
4.6	Installation for liner change and tundish repair	1
4.7	Service stand for tundish stoppers	1
4.8	Service stand for tundish emergency slide gates	1
4.9	Rack for locking rod mechanism	1
4.10	Rack for tundish emergency slide gate	2
4.11	Working platform for tundish service stands	1
4.12	Installation of shotcrete working layer of tundish	1
4.13	Tundish lining template	1
	Auxiliary equipment	
4.14	Tundish lining drying unit	1
4.15	Tundish lining cooling fan	2
4.16	Tundish tilter	1
4.17	Instrumentation for energy carrier systems	1 to-t
4.18	Lubrication and hydraulic systems	1 to-t
4.19	Spare and replacement parts, including:	1 to-t
	- intermediate bucket, tank. 30 t	5
	- tundish cover	4
	- overflow box	1

Item No.	Equipment name, brief description	number
1	2	3
	- emergency box	1
	Lifting and transporting equipment	
4.20	Filling crane with lifting capacity 200/63/15 t	1
4.21	Bridge crane with a lifting capacity of 75/20 t at the tundish preparation section	1
4.22	Gantry crane l / c Ut of the tundish preparation section	1
4.23	Cantilever crane with a lifting capacity of 2 t for priming	1
4.24	Console crane with lifting capacity 3 t for Slab Caster Machine maintenance	1
4.25	Crane for technological maintenance with a lifting capacity of 10 t	1
4.26	Electric hoists for servicing cranes with a lifting capacity of 10 t, 5 t, 3.2 t	3
4.27	Hoists for servicing the premises of Slab Caster	
4.27.1	Tal electr. l / c 5 t above the opening to the basement of the Slab Caster Machine	2
4.27.2	Hand hoist with a lifting capacity of 3.2 t for servicing the steam removal fan	1
4.27.3	Hand hoist, l / c 2 t for service of the pulling-straightening machine	1
4.27.4	Hand hoist, lifting capacity 2 t, for servicing the hydraulics room at elevation 0.000	1
4.27.5	Hand hoist, lifting capacity 2 t, for servicing the hydraulics room at elevation -5,000	1
4.27.6	Hand hoist, lifting capacity 2 t, for maintenance of the SCM basement at elevation -5,000	1
5	**Tunnel kiln area**	
	Technological equipment	
5.1	Tunnel kiln 120 m long, complete with mechanical and electrical equipment, fuel combustion and smoke removal systems, automation system, in-furnace roller conveyor, refractory materials	1 to-t
	Lifting and transporting equipment	
5.2	Suspended crane with a lifting capacity of 3.2 t, span 8.6 m. Control - pendant control	1
5.3	Electric bridge crane with a lifting capacity of 10 tons, span 16.5 m. Control-remote control	1
5.4	Electric hoist for crane maintenance, l / c 1.0 t	1
6	**Hot rolling mill section**	
	Technological equipment	
6.1	Equipment of the mill entrance section, including: - slab cutting machine; - roller conveyor with rulers; - installation of water stripping with a pressure of 380 bar	1 to-t
6.2	Section of the finishing group of stands, including: - 5 stands "quarto" finishing group; - working line with drives; - roll transfer system; - supporting structures of sites; - strip parameters control devices	1 k-m, stand No. 6 - option
6.3	Strip cooling section, including: - discharge roller conveyor; - laminar strip cooling system, including a buffer tank for water accumulation; - roller table in front of the coiler	1 to-t
6.4	Section for coiling strip into coils and transportation to the warehouse, including: - pulling rollers in front of the coiler;	1 k t, machine for radial strapping

Item No.	Equipment name, brief description	number
1	2	3
	- underground coiler; - trolley-take-off of rolls with a C-shaped bracket; - roll transport system; - devices for linking, weighing and marking	rolls - optional
6.5	Lubrication and hydraulic systems	1 to-t
6.6	Auxiliary equipment	1 to-t
6.7	Spare parts	1 to-t
6.8	Traverse for installing the bed	1
	Lifting and transporting equipment	
6.9	Electric overhead crane with lifting capacity 75/20 t, span 27.5 m. Control - remote control	1
6.10	Electric bridge crane with lifting capacity 60 t, span 18.5 m. Control - remote control	1
6.11	Electric hoists for service of bridge cranes	
	- lifting capacity 3.2 t	1
	- lifting capacity 5.0 t	1
6.12	Electric hoists for maintenance of equipment in the basements of the rolling mill	
	- lifting capacity 2.0 t	5
	- lifting capacity 5.0 t	2
	- lifting capacity 10.0 t	2
6.13	Jib crane with a lifting capacity of 5 t with an outreach of 7.5 m for servicing. equipment. Control - pendant	1
7	**Roll warehouse**	
7.1	Inspection and sampling station	1 to-t
	Lifting and transporting equipment	
7.2	Electric overhead crane with lifting capacity 35/10 t, span 27.5 m. Control - from the cab, moving along the beam	2
7.3	Electric overhead crane with a lifting capacity of 35 t, span of 27.5 m. Control - from the cab, moving along the beam	2
7.4	Electric hoist for servicing bridge cranes with a lifting capacity of 3.2 t	4
7.5	Trolley for moving finished products (rolls), capacity 60 t	2
8	**Fume treatment and Suction systems**	
8.1	***Fume treatment Meltshop***	
8. 1.1	Bag filter complete with pulse regeneration system of filter elements	1
8. 1.2	Dust collection chamber	1
8.1.3	Water cooled gas duct	1
8.1.4	Heat exchanger	1
8.1.5	Spark arrester	1
8. 1.6	The main fans are complete with noise mufflers. Q Fan - 695 000 m ^{3}/ h, engine power - 1500 kW, t exhausted air - 80 ° C	3
8.1.7	Valves and dampers	1 to-t
8. 1.8	Booster fan of the high pressure dust removal system	1
8.1.9	Booster fan of the dust removal system from the LF	1
8. 1.10	Booster fan of the system for removing dust from the supply of ferroalloys and additives	1
8. 1.1 1	Booster fan of dust collection bin building Suction system	1
8. 1.12	Dust collection system including: - chain conveyor (under the filter)	2

Item No.	Equipment name, brief description	number
1	2	3
	- chain conveyor (under the cyclone)	1
	- flap valve (under the cyclone hopper)	1
	- chain conveyor (under the cooler hopper)	2
	- rotary valve of the cooler	2
	- prefabricated chain conveyor	1
	- chain elevator	1
	- collecting hopper of dust, equipped with a device for internal pseudoliquefaction of dust	1
	- emergency dust unloading device	1 to-t
8.1.13	Booster fan for tundish tilting stand	1
	- valves and dampers	1 to-t
8.1.14	Booster fan of ladle lining breaking stand	1
	- valves and dampers	1 to-t
8.1.15	Booster fan of the scardovine burning stand from steel ladles	1
	- valves and dampers	1 to-t
8.2	**Suction systems Slab Caster**	
8. 2.1	*Crystallizer Suction system*	
8. 2. 1.1	Exhaust fan with a capacity of 5 000 m ^{3}/ h with el. 15 kW motor	1
8. 2.2	*Smoke and vapor removal system from SCM cooling chambers*	
8. 2. 2.1	Exhaust fan with a capacity of 120 000 m ^{3}/ h with el. 132 kW engine	2
8.3	**Suction systems for HBI storage**	
8.3.1	*Dedusting system for HBI conveyor supply to the Meltshop*	
8.3.1.1	Bag filter complete with pulse regeneration system of filter elements	1
8.3.1.2	Exhaust fan	1
8.3.2	*Car dumper Suction system*	
8.3. 2.1	Bag filter complete with pulse regeneration system of filter elements	1
8.3. 2.2	Smoke exhauster	1
8.3.2.3	Valves and dampers	1 to-t
8.4	**Warehouse for daily stock of ferroalloys and additives**	
8.4.1	*The Suction system of the receiving hopper* as a part of a bag filter, a smoke exhauster is powerful. 170 kW. Productivity - 73 800 m ^{3}/ h	1 to-t
8.4.2	*The Suction system of the collecting conveyor* includes a bag filter, a powerful fan. 2.2 kW. Productivity - 2 200 m ^{3}/ h	1 to-t
8.4.3	*Uncleaner Suction system* as part of a bag filter, a powerful fan. 2.2 kW. Productivity - 2 500 m ^{3}/ h	1 to-t
nine	**Repair and instrumentation facilities**	
9.1	***Service area for molds and roller segments***	
9.1.1	Stand for water testing of the crystallizer	1
9.1.2	Segment 0 water test bench	1
9.1.3	Water test bench for segments 1-4	1
9.1.4	Equipment cleaning station (washing machine cabin)	1
9.1.5	Wide Face Water Jacket Storage Stand	1
9.1.6	Narrow edge water jacket storage stand	1
9.1.7	Thermocouple test bench	1
9.1.8	Mold assembly and disassembly stand	1
9.1.9	Mold assembly and hydraulic testing stand	1
9.1.10	Segment 0 alignment stand	1
9.1.11	Stand for testing the hydraulic system and aligning segments 1-4	1

Item No.	Equipment name, brief description	number
1	2	3
9.1.12	Roller repair table	1
9.1.13	Traverse for lifting rollers	1
9.1.14	Storage table for roller units	4
9.1.15	Segment 0 rotator	1
9.1.16	Segment storage stand 0	5
9.1.17	Segment rotator 1-4	1
9.1.18	Stand for storage of crystallizer and segment 0	2
9.1.19	Transfer cart for transporting molds and segments	1
9.1.20	Bridge crane el. g / p 40/10 t, radio control	1
9.1.21	Gantry crane with a lifting capacity of 5 t	1
9.1.22	Electric hoist, carrying capacity 3.2 t	1
9.1.23	Traverse for mold and segment 0 with storage stand	1
9.1.24	Segment traverse with 2 storage stands	2
9.1.25	Segment extraction chain with storage legs	1
9.1.26	Compact type hydraulic system	1
9.1.27	SEN alignment tool (laser system)	1
9.1.28	Special tools	1 to-t
9.2	***Roll grinding workshop***	
9.2.1	Scissor Knife Grinding Machine	1
9.2.2	Roll grinding machine for grinding work rolls	1
9.2.3	Universal Vapor Grinding Machine	1
9.2.4	Pillow tilter	1
9.2.5	Bearing washer installation	1
9.2.6	Capacity for washing and preserving PZhT	1
9.2.7	Installation of mounting and dismounting of work roll chocks	1
9.2.8	Installation of mounting and dismounting of back-up roll chocks	1
9.2.9	Installation of washing backup and work rolls	1
9.2.10	Double stand for storing back-up rolls without pillows	6
9.2.11	Double stand for storage of work rolls without chocks of stands F 1- F 2- F 3	2
9.2.12	Double stand for storage of work rolls without chocks of stands F 4- F 5	2
9.2.13	Double stand for storage of work rolls with stands F 1- F 2- F 3	ten
9.2.14	Double stand for storage of work rolls with chocks of stands F 4- F 5	nine
9.2.15	Double stand for storage of backup rolls with pillows	5
9.2.16	Work roll cooling unit	1
	Lifting and transporting equipment	
9.2.17	Electric double-girder bridge crane, lifting capacity 75/20 t, radio control	1
9.2.18	Electric hoist, lifting capacity 5.0 t	1
9.2.19	Stationary rotary console crane electr. lifting capacity 1.0 t	2
9.2.20	Stationary rotary console crane electr. lifting capacity 2.5 t	1
9.2.21	Stationary rotary console crane electr. lifting capacity 1.0 t	1
9.2.22	Set of slinging devices	1 to-t
9.3	***Tunnel kiln roller service area***	
9.3.1	Drying oven	1
9.3.2	Cement mixer	1
9.3.3	Injection mold	1
9.3.4	Roller stand	1
9.3.5	Vibrator for casting	1
9.3.6	Pneumatic hammer	1

Item No.	Equipment name, brief description	number
1	2	3
9.3.7	Sander	1
9.3.8	Welding machine	1
9.3.9	Electric hoist, lifting capacity 5.0 t	1
9.4	***Slab Caster Machine maintenance workshop***	
9.4.1	Lathe machining center (MRS-2000)	1
9.4.2	Turning and revolving machining center (MRS-1000)	1
9.4.3	Hydraulic press, 1000 kN force	1
9.4.4	Stationary rotary console crane electr. l / c 1 t	1
9.4.5	Welding transformer, rated current - 400 A	1
9.4.6	Milling machine	1
9.4.7	Installation of induction heating of rollers	1
9.4.8	Surfacing installation	1
9.4.9	Bell thermostat	1
9.4.10	Electric chamber furnace with bogie hearth	1
9.4.11	Grinding machine, 2 circles, diameter 400 mm	1
9.4.12	Two-pillar bench workbench with vice	4
9.4.13	Tool cabinet	3
9.4.14	Electric single-girder overhead traveling crane, lifting capacity 5.0 t, radio control	1
9.4.15	Telescopic assembly lift	1
9.4.16	Detachable containers	3
ten	**Water management facilities**	
10.1	*Water treatment of Meltshop*	
10. 1.1	The pump unit is centrifugal horizontal console. Productivity - 1980 m ^{3}/ h; head - 70 m of water column; email engine - 550 kW	4
10. 1.2	The pump unit is centrifugal horizontal console. Productivity - 200 m ^{3}/ h; head - 50 m of water column; email engine - 55 kW	2
10.1.3	The pump unit is centrifugal horizontal console. Productivity - 370 m ^{3}/ h; head - 42 m of water column; email engine - 75 kW	2
10.1.4	Fan cooling tower two-section, productivity - 6010 m ^{3}/ h	1
10.1.5	Reagent dosing station, set	3 sets
10. 1.6	Emergency water storage tank 40 m ^{3}, steel	1
	Lifting and transporting equipment	
10.1.7	Single-girder overhead pavement crane, lifting capacity 5 t, control from the floor; Lifting H -5 m; span -5m	1
10.2	*Water treatment of SCM and rolling mill*	
	Closed cooling circuits of the mold and equipment of the Slab Caster Machine	
10. 2.1	The pump unit is centrifugal horizontal console. Productivity - 304 m ^{3}/ h; head - 100 m of water column; email engine - 132 kW	4
10. 2.2	Horizontal cantilever centrifugal pumping unit (booster). Productivity - 381 m ^{3}/ h; head - 90 m of water column; email engine - 200 kW	3
10.2.3	Plate heat exchanger	1
10.2.4	Reagent dosing station, set	2 sets
10.2.5	Emergency water storage tank 50 m ^{3}, material: steel	1
	Lifting and transporting equipment	
10. 2.6	Single-girder overhead pavement crane, lifting capacity 5 t, control from the floor; Lifting H 5 m; span - 5m	1
	Open contactless cooling circuits of SCM and rolling mill	
10.2.7	The pump unit is centrifugal horizontal console. Productivity - 560 m ^{3}/ h; head	4

Item No.	Equipment name, brief description	number
1	2	3
	- 60 m of water column; email engine - 160 kW	
10. 2.8	The pump unit is centrifugal horizontal console. Productivity - 950 m ^{3}/ h; head - 32 m of water column; email engine - 132 kW	2
10.2.9	The pump unit is centrifugal horizontal console. Productivity - 240 m ^{3}/ h; head - 42 m of water column; email engine - 552 kW	2
10. 2.10	Fan cooling tower, two-section, productivity - 2705 m ^{3}/ h	1
10. 2.11	Reagent dosing station	3 sets
10. 2.12	Emergency water storage tank 20 m ^{3}, material: steel	1
	Open contact cooling circuits of SCM and rolling mill	
10.2.13	The pump unit is centrifugal horizontal console. Productivity - 861 m ^{3}/ h; head - 138 m of water column; email engine - 630 kW	5
10.2.14	The pump unit is centrifugal horizontal console. Productivity - 980 m ^{3}/ h; head -55 m of water column; email engine - 250 kW	2
10.2.15	The pump unit is centrifugal horizontal console. Productivity - 405 m ^{3}/ h; pressure - 102 m vs..T ; email engine - 200 kW	3
10.2.16	The pump unit is centrifugal horizontal console. Productivity - 140 m ^{3}/ h; head -15 m of water column; email engine - 11 kW	2
10.2.17	Horizontal cantilever centrifugal pumping unit (booster). Productivity - 250 m ^{3}/ h; head -110m water column; email engine - 110 kW	3
10.2.18	Fan cooling tower two-section, capacity - 5150 m ^{3}/ h	1
10.2.19	Reagent dosing station, set	3 sets
10. 2.20	Emergency water storage tank 50 m ^{3}, material: steel	1
10.3	*Laminar cooling water treatment*	
10.3.1	The pump unit is centrifugal horizontal console. Productivity - 1500 m ^{3}/ h; head - 23 m of water column; email engine - 160 kW	4
10.3.2	The pump unit is centrifugal horizontal console. Productivity - 500 m ^{3}/ h; head -33 m of water column; email engine - 75 kW	4
10.3.3	Horizontal cantilever centrifugal pumping unit (booster). Productivity - 140 m ^{3}/ h; head - 105 m of water column; electric motor - 75 kW	2
10.3.4	Submersible pump. Productivity - 50 m ^{3}/ h; head -15 m of water column; electric motor - 7.5 kW	1
10.3.5	Fan cooling tower, two-section, capacity - 1500 m ^{3}/ h	1
10.3.6	Reagent dosing station, set	3 sets
10.3.7	Laminar section tank 65 m ^{3}, material: steel	1
	Lifting and transporting equipment	
10.3.8	Single-girder overhead pavement crane, lifting capacity 5 t, control from the floor. Lifting H -5 m; span -5m	1
10.4	*Make-up water treatment plant*	
10.4.1	The pump unit is centrifugal horizontal console. Productivity - 500 m ^{3}/ h; head - 20 m of water column; email engine - 45 kW	2
10.4.2	The pump unit is centrifugal horizontal console. Productivity - 20 m ^{3}/ h; head - 20 m of water column; email engine - 4 kW	8
10.4.3	Mixer	2
10.4.4	Reagent dosing station, set	2 sets
10.4.5	Reverse osmosis plant	1
	Lifting and transporting equipment	
10.4.6	Single-girder overhead pavement crane, lifting capacity 5 t, control from the floor. Lifting H - 5 m; span - 5 m	1
10.5	*Primary scale sump*	
10.5.1	Submersible pump. Productivity - 1150 m ^{3}/ h; head - 25 m of water column; email engine - 110 kW	5

Item No.	Equipment name, brief description	number
1	2	3
10.5.2	Submersible pump. Productivity - 300 m ^{3}/ h; head - 30 m of water column; email engine - 55 kW	1
10.5.3	Oil centrifugal horizontal cantilever pumping unit. Productivity - 20 m ^{3}/ h; head - 20 m of water column; email engine - 2.2 kW	1
10.5.4	Oil collecting device	1
10.5.5	Oil collection tank	1
10.5.6	Reagent dosing station	1 to-t
10.5.7	M / design of a primary settler for separating scale (hydrocyclone)	1
	Lifting and transporting equipment	
10.5.8	Gantry grab crane with lifting capacity 5 t control from the cabin; Lifting H - 30 m; crane span -14 m	1
10.6	*Secondary scale sump*	
10. 6.1	The pump unit is centrifugal horizontal console. Productivity - 1175 m ^{3}/ h; head - 28 m of water column; email engine - 132 kW	5
10. 6.2	Oil centrifugal horizontal cantilever pumping unit. Productivity - 20 m ^{3}/ h; head - 20 m of water column; email engine - 2.2 kW	2
10.6.3	Oil collecting device	2
10.6.4	Oil collection tank	2
10.6.5	Scraper bridge for horizontal sump	2
10. 6.6	Technological hoist with a lifting capacity of 3.2 t including: electric hoist; grab	1
	Lifting and transporting equipment	
10.6.7	Single-girder suspended overhead crane with a lifting capacity of 3.2 t control from the floor. H under. -5 m; span cr. - 3.5 m	1
10.7	*Sand filter area*	
10.7.1	Double-chamber vertical clarifying filter 0 3800 mm	thirteen
10.7.2	Rotary blower. Productivity - 800 m ^{3}/ h; head - 0.8 bar; email engine - 37 kW	1
10.7.3	Submersible pump. Productivity - 140 m ^{3}/ h; head -15 m of water column; email engine - 15 kW	1
10.7.4	Mixer	1
10.8	*Dehydration area*	
10. 8.1	Horizontal cantilever centrifugal slurry pumping unit. Productivity - 5 m ^{3}/ h; head -20m water column; email motor -1.5 kW	4
10. 8.2	Sludge thickener, diameter -11m	1
10.8.3	Belt filter press	1
10.8.4	Mixer	2
10.8.5	Reagent preparation and dosing station	2 sets
10.9	*Reverse cycle of the primary slag processing site*	
10.9.1	The pumping unit is vertical dry execution. Productivity - 64 m ^{3}/ h; head - 45 m of water column; email engine - 18.5 kW	4
10.9.2	Submersible pump with a productivity of 10 m ^{3}/ h; head - 10 m of water column; email engine - 1 kW	3
10.10	*Pumping station for pumping drinking and fire-fighting water*	
10. 10.1	The pump unit is centrifugal horizontal console. Productivity - 500 m ^{3}/ h; head - 50 m. v.st.; electric motor -132 kW	3
10. 10.2	The pump unit is centrifugal horizontal console. Productivity - 200 m ^{3}/ h; head - 40 m. in. Art.; electric motor - 5.5kW	4
10.10.3	Pumping station. Productivity - 80 m ^{3}/ h; head - 40 m of water column; electric motor - 12 kW	1
10.10.4	Service water storage tank with a volume of 750 m ^{3}	2

Item No.	Equipment name, brief description	number
1	2	3
10.10.5	Drinking water storage tank with a volume of 18 m ³	3
	Lifting and transporting equipment	
10. 10.6	Single-girder overhead pavement crane with lifting capacity 2 t control from the floor. H under. -6 m; span cr. - 8 m	1
10.11	*Automatic fire extinguishing pumping station*	
10. 11.1	Monoblock automatic pumping unit. Productivity - 210 m ³/ h; head - 50 m of water column; electric motor power - 40 kW	1
10. 11.2	Fire-fighting equipment: system of proportional mixing of liquid with a foaming agent; foam mixer; control units	1
	Lifting and transporting equipment	
10.11.3	Electric hoist, l / c 2 t	1
10.12	*Sewage pumping station*	
10. 12.1	Complete mine pumping station. Productivity - 20 m ³/ h; head - 20 m of water column; container material - high density polyethylene; 0 1500 mm	1
10.13	*Rain pumping station*	
10.13.1	Complete mine pumping station. Productivity - 100 m ³/ h; head-20 m v.st.; container material - high density polyethylene; 0 2000 mm	2
10.14	*Drainage*	
10.14.1	The pumping unit is downhole. Productivity - 250 m ³/ h; head - 50 m of water column; electric motor power - 45 kW	ten
eleven	**Slag primary processing section (PSPA)**	
11.1	Front-end loader with bucket V = 5.5 m ³	2
11.2	Crawler excavator with hydraulic hammer and electromagnet for slag separation	1
12	**Department for the preparation of lime mortar with installation for spraying slag bowls**	
	Technological equipment	
12.1	Self-unloading container Pack = 2.75 m ³	2
12.2	Waste container Vn = 2 m ³	4
12.3	Lime bin load cell	3
12.4	Installation of spraying slag bowls	1
12.5	Hopper gate	1
12.6	Apparatus for slaking lime	1
12.7	Sand trap	1
12.8	Agitator tank Vn = 7.5 m	1
12.9	Mobile trolley with roll-out mechanism (2 carts and 4 roll-out mechanisms)	2
12.10	Electric vibrating feeder	1
	Lifting and transporting equipment	
12.11	Electric suspended crane, lifting capacity 8 t	1
12.12	Electric hoist, carrying capacity 3.2 t	1
12.13	Hand chain hoist, mobile, l / c 1.0 t	1
thirteen	**Compressed air compressor station**	
13L	Complete centrifugal turbocharger with water cooling, G = 100 Nm ³/ min, P = 0.75 MPa, N = 660 kW	3
13.2	Adsorption air dryer with thermal regeneration, G = 6000 nm ³/ h, P = 0.75 MPa, dew point (minus 30 ° C), complete with:	2
	- pre-filter	
	- final filter	
13.3	Air collector V = 20 m ³, P = 1.0 MPa	2
13.4	Electric single-girder suspended overhead crane, lifting capacity 10 t, span -	1

Item No.	Equipment name, brief description	number
1	2	3
	8 m	
fourteen	**Warehouse facilities**	
14.1	***Warehouse for daily stock of ferroalloys and additives***	
14.1.1	Single-girder suspended electric crane with a lifting capacity of 5 t. Lnp = 16 m, Hп = 12 m	2
14.1.2	Cement truck with tractor and compressor, V tanks = 26 m ^{3}	1
14.1.3	Sluice feeder	1
14.1.4	Telescopic loading device for open loading with integrated Suction system	2
14.1.5	Vertical conveyor B = 800 mm, Q = 100 t / h, L = 12.5 m, Hк = 21.0 m	1
14.1.6	Rolling belt conveyor B = 800 mm, Q = 100 t / h, L = 12.0 m	1
14.1.7	Belt conveyor B = 800 mm, Q = 1 00 t / h, L = 26.0 m	1
14.1.8	Support vibrating feeder	1
14.1.9	Suspended vibrating feeder	4
14.1.10	Suspended vibrating feeder	1
14.1.11	Hinged crane scales 3 t	2
14.1.12	Conveyor scales	1
14.2	***Centralized casting and rolling complex warehouse***	
	Lifting equipment	
14.2.1	Single-girder electric crane with lifting capacity 1.0 t. Hп = 8 m, Lnp. = 16.5 m	1
14.2.2	Single- girder electric crane with lifting capacity 10.0 t. Hп = 8 m, Lnp = 16.5 m	nine
14.2.3	Electric single-girder support crane, lifting capacity 16.0 t. Hп = 8 m, Lnp. = 16.5 m	2
14.2.4	Electric forklift l / c 1, 6 t	4

4. ENVIRONMENTAL ANALYSIS OF ENGINEERING DECISIONS FOR PLANNED ACTIVITIES

Practically any type of production and industrial activity is accompanied by an environmental impact. The intensity of the impact is determined by the type of production and technological processes, the type of equipment used, the degree of implementation of environmental technologies in production, the efficiency of the dust and fume treatment equipment and many other factors.

According to the accepted terminology, the impact is understood as a one-time or periodic act, or a constant process of introduction or removal of any material substance in relation to the environment.

The degree of environmental impact is determined and depends on the type of economic or industrial activity, the volume of processing of raw materials and materials, production technology, type and type of equipment used, engineering and technological solutions in terms of protecting atmospheric air and water resources from pollution.

The objective of this study is to assess possible changes in the impact of Uzmetkombinat JSC on the environment, subject to the implementation of the planned construction of the casting and rolling complex.

4.1 Impact on atmospheric air

According to the current draft MPE (2015), 294 sources of emission of pollutants into the atmosphere were registered in all production areas of Uzmetkombinat, including 180 organized and 114 unorganized. In total, these sources emit 2879.1007 t / year of 58 types of pollutants. Sources of emissions, equipped with PGOU - 89. According to the

results of the program calculation of dispersion fields, excess of the established quotas of surface concentrations, no substance has been identified, emissions are accepted as permissible.

Analysis of preliminary ENGINEERING DECISIONS shows that the functioning of the projected casting and rolling complex will be accompanied by the release of pollutants into the atmospheric air during the operation of the following technological equipment or performing technological operations:

- The processes of preparation of scrap arriving for processing on the territory of the scrap yard, using manual gas cutting devices, are accompanied by the release of such pollutants as iron oxide, manganese dioxide, carbon oxide, nitrogen oxide.

- On the territory of the HBI warehouse, two Suction systems are provided. The Suction system is designed for capturing and cleaning dusty air when unloading hot briquetted iron (HBI) at the appropriate warehouse. Cleaning of dusty air with HBI dust (taken for iron oxide) will be carried out in a bag filter with a standard efficiency of up to 99.9%. The conveyor system for feeding hot briquetted iron, designed for storage and mechanized feeding of material into an arc steelmaking furnace (EAF), is equipped with an Suction system. Dusty air will be cleaned with HBI dust in a bag filter with a standard efficiency of up to 99.9%.

- On the territory of the daily warehouse of ferroalloys and additives, three Suction systems are provided. The Suction system (AC 1) serves the receiving hopper, vertical conveyor and lime hoppers. The Suction system (AC 2) serves the system for unloading lime from storage bins onto a collecting conveyor. The Suction system (AC3) is designed to capture dust when unloading the decompressor with big bags, and loading vehicles with bulk and lumpy additives. All three systems are equipped with bag filters with a standard efficiency of up to 99.9%.

- In the furnace section of the Meltshop, the processes of steel smelting in an electric arc furnace, as well as the subsequent processes of metal production and processing at the ladle-furnace and steel vacuuming unit, are associated with a large emission of dust and gases, including: inorganic dust (steelmaking), carbon oxide, nitrogen dioxide, nitrogen oxide, sulfur dioxide, hydrogen cyanide and fluoride. The dusty air will be cleaned according to a two-stage scheme - at the first stage, a cyclone-spark arrester, at the second - a bag filter. The standard efficiency of the two-stage cleaning system will be up to 99.5%. Only inorganic dust (steelmaking) is cleaned.

- Also in the Meltshop, the sources of emission of carbon oxide, nitrogen oxides, sulfur dioxide and benzopyrene are installations using natural gas combustion, such as: tundish heating stand (2 pcs.), Tundish drying stand (1 pc.).

- At the site of injection of carbon-containing powder, the emission of dust of carbon-containing powder (soot) occurs in the process of loading the receiving hoppers (3 pcs.) Using pneumatic transport. Each hopper is equipped with a dust collector (bag filter) with a standard cleaning efficiency of up to 99.9%.

- In the department of continuous casting of steel, the sources of carbon oxide, nitrogen oxides, sulfur dioxide and benzopyrene are emitters that use natural gas combustion, such as: a vertical stand for heating a steel ladle (1 pc.), A horizontal stand for heating steel ladle (2 pcs.), stand for drying the steel ladle (2 pcs.).

- Also in the department of continuous casting of steel, to remove the smoke generated when hot metal enters the mold, a mold Suction system is provided. The smoke is diverted into the cooling chamber of the swing mechanism and the cooling of the roller sections. The smoke and steam mixture is removed from the cooling chamber outside the workshop by a smoke and vapor removal system. Separation of products of incomplete combustion (oxidation) of mineral oil from the surface of the crystallizer. Air pollutants from incomplete combustion of mineral oil are carbon monoxide and hydrocarbons.

- In the rolling mill, the main source of emission of pollutants is a tunnel heating furnace fueled by natural gas. The combustion of natural gas in the burners of the furnace is accompanied by the release of such pollutants as carbon oxide, nitrogen oxides, sulfur dioxide, benzopyrene. The combustion products of natural gas are discharged into the atmosphere through a chimney.

- In the service area of the rollers of a tunnel kiln, a drying kiln is a source of pollutant emission. In the drying oven, the lining of the repaired roller is dried. The combustion of natural gas in the burners of the furnace is accompanied by the release of such pollutants as carbon oxide, nitrogen oxides, sulfur dioxide, benzopyrene. The combustion products of natural gas are discharged into the atmosphere through a chimney.

- In the roll grinding shop, three grinding machines are sources of emission of abrasive dust and metal dust.

- In the maintenance workshop of the Slab Caster Machine, the sources of the emission of pollutants are metalworking machines (turning, milling, sharpening, electric welding machine).

- At the site of primary slag processing, the source of emission of inorganic dust with SiO_2 content <20% is the processes of slag loading after its cooling into dump trucks using a bucket loader.

- In the laboratory of the steel-making shop, the source of inorganic dust emission is the processes of crushing and grinding of slag in a laboratory crusher and a ball mill.

- In the CRC laboratory, the sources of the emission of pollutants are metal-working machines (cutting, turning, milling, drilling, sharpening, grinding).

- The hot water boiler house is equipped with three hot water boilers. The combustion of natural gas in the boiler furnace is accompanied by the release of such pollutants as carbon oxide, nitrogen oxides, sulfur dioxide, benzopyrene. The products of natural gas combustion are discharged into the atmosphere through a common chimney.

Calculated amount of pollutant emissions from the sources of the projected CRC be 2 407.329391 m / year.

According to the preliminary calculation data, from entering into the production process of the new TIC, the shafts of the first ejection at the mill as a whole will increase 2407.329391 tons / year (up to 52 86, 430 091 t / year), the number of emission sources to increase by 2 7 (up to 3 21 sources), the number of items of emitted pollutants will increase by 1 substance, due to calcium fluoride (up to 5 9 items).

Clarification of possible sources of emission and emissions will be carried out at the next stage of environmental support (in the EPZ project), when the working project of the casting and rolling complex is approved in full.

Description of emission sources

This chapter uses the following conventions:

H is the height of the emission source, m ;
D is the diameter of the emission source, m ;
V is the speed of the gas-air mixture, m / s ;
Q is the volume of the gas-air mixture, m^3 / s ;
T is the temperature of the gas-air mixture, ^oC.
M - emission of a pollutant per unit of time, g / s ;
Y is the annual emission of the pollutant, t / g.

According to the current inventory of emission sources, the last registered source was assigned the number 356.

To account for new sources of emission, continuous numbering is introduced.

SOURCE No. 357

CRC. SCRAP YARD

A fugitive source of pollutant emissions. Emission of polluting components takes place as a result of the following equipment and operations:

GAS CUTTER FOR METAL - 2 pcs.

The morphometric and dynamic parameters of the source are characterized by the following data: H = 2.0 m; D = 0.56 m; V = 3.6 m / s; Q = 0.886 m ^{3}/ s; T = 24 $^\circ$C.

To trim random oversized units of the incoming scrap metal, two manual gas cutting devices are provided.

When a gas cutting apparatus is operated using a propane-butane mixture, such pollutants as iron oxide, manganese dioxide, carbon oxide, nitrogen oxide are released.

The duration of the gas cutting machine will be 3720 hours per year.

According to Table 3.20 [8], specific pollutant components of straight and gas cutting metal (carbon steel with thickness up to 20mm) average: iron oxide - 194 g / hour; manganese dioxide - 6.0 g / hour, carbon oxide - 65 g / hour, nitrogen oxide - 53.2 g / hour.

The estimated power of the emission of pollutants is:

M iron oxide = 194/3600 = 0.0 53889 g / s
Iron oxide = 0.053889 x 3720 x 3600/10 ^{6} = 0.721680 t / g

M manganese dioxide = 6/3600 = 0.00 1667 g / s
Manganese dioxide = 0.00 1667 x 3720 x 3600/10 ^{6} = 0.0 22320 t / g

M carbon oxide = 65/3600 = 0.018055 g / s
Carbon oxide = 0.01 8055 x 372 0 x 3600/10 ^{6} = 0, 241800 t / g

M nitrogen oxide = 53.2 / 3600 = 0.014778 g / s
For nitrogen oxide = 0.01 4778 x 372 0 x 3600/10 ^{6} = 0.17904 t / g

SOURCE No. 358

CRC. HBI WAREHOUSE

Organized source of pollutant emissions. Emission of polluting components takes place as a result of the following equipment and operations:

HBI WAGON SPEEDER - 1 pc.

The morphometric and dynamic parameters of the source are characterized by the following data: H = 50 m; D = 3.0 m; V = 13 8 m / s; Q = 97.222 m ^{3}/ s; T = 2 0 $^\circ$C.

The Suction system is designed for capturing and cleaning dusty air when unloading hot briquetted iron (HBI) at the appropriate warehouse. The HBI warehouse is equipped with a car dumper and a conveyor system for supplying HBI to the Meltshop. The unloading point of the car dumper is protected by a shelter. The shelter is divided into two sections by a partition. Each section is connected to a duct network. Places of reloading from conveyor to conveyor also provide for shelters, and suction from them.

Cleaning of dusty air with HBI dust (taken for iron oxide) will be carried out in a bag filter with a standard efficiency of up to 99.9%.

The unloading time for one wagon with a carrying capacity of 72t is about 6 minutes. The capacity of the car dumper installation is

720 t / h. With an annual volume of incoming HBI - 635.96 thousand tons, p Operating mode car dumper will be about 883 hours s in the year.

According to the design data, the concentration of dust in the polluted aspiration air (before cleaning) will be up to 10,000 mg / m ^{3,} at the exit from the bag filter (after cleaning) - no more than 10 mg / m $^{3.}$

The estimated power of the emission of pollutants is:

Before cleaning

M iron oxide = 10000 x 97.222 / 1000 = 972.220 g / s

Iron oxide = 972.220 x 883 x 3600/10 ^{6} = 3090.492936 t / g

After cleaning

M iron oxide = 10 x 97.222 / 1000 = 0.972220 g / s

In the iron oxide = 0.972220 x 883 x 3600/10 ^{6} = 3.090493 m / z

SOURCE No. 359

CRC. HBI WAREHOUSE

Organized source of pollutant emissions. Emission of polluting components takes place as a result of the following equipment and operations:

CONVEYOR SYSTEM FOR SUPPLYING HBI TO Meltshop - 1 pc.

The morphometric and dynamic parameters of the source are characterized by the following data: H = 3 0 m; D = 0.63 m; V = 15.6 m / s; Q = 4.861 m ^{3} / s; T = 2 0 $^{\circ}$C.

The conveyor system for feeding hot briquetted iron, designed for storage and mechanized feeding of material into an arc steelmaking furnace (EAF), is equipped with an Suction system.

Cleaning of dusty air with HBI dust (taken for iron oxide) will be carried out in a bag filter with a standard efficiency of up to 99.9%.

When the performance of the conveyor system up to 390 t / h, and the annual volume of incoming HBI - 635.96 thousand tons, while the equipment will be about 1631 hours per year.

According to the design data, the dust concentration in the contaminated air aspiration (before purification) is up to 4 000 mg / m $^{3.}$

The estimated power of the emission of pollutants is:

Before cleaning

Iron oxide M = 4 000 x 4.861 / 1000 = 19.4440 g / c

Iron oxide = 19.4440 x 1631 x 3600/10 ^{6} = 1 14, 167390 t / g

After cleaning

M iron oxide = 19.444 0 x (100 - 99.9) / 100 = 0.0 19444 g / s

Iron oxide = 0.0 19444 x 1631 x 3600/10 ^{6} = 0.114167 t / g

SOURCE No. 360

CRC. DAILY WAREHOUSE OF FERROALOYS AND ADDITIVES

Organized source of pollutant emissions. Emission of polluting components takes place as a result of the following equipment and operations:

RECEIVING HOPPER FOR LIME - 1 pc.

VERTICAL BELT CONVEYOR - 1 pc.

Lime storage hopper - 4 pcs.

The morphometric and dynamic parameters of the source are characterized by the following data: H = 50 m; D = 1.5 m; V = 1 1, 6 m / s; Q = 20.500 m ^{3} / s; T = 2 0 $^{\circ}$C.

The Suction system serves the receiving hopper, vertical conveyor and lime hoppers.

Cleaning of dusty air with lime dust (taken for calcium oxide) will be carried out in a bag filter with a standard efficiency of up to 99.9%.

When performance reception system and supplying lime to 100 tonnes / hour and annual volume behaving minutes lime - 6 2.4 thousand tons, while the equipment will be about 624 per hour and per year.

According to the design data, the dust concentration in the contaminated air aspiration (before purification) is up to 6 000 mg / m $^{3.}$

The estimated power of the emission of pollutants is:

Before cleaning

M calcium oxide = 6 000 x 20,500 / 1000 = 1 23.0 g / c

At calcium oxide = 1 23.0 x 624 x 3600/10 ^{6} = 276.3072 m / z

After cleaning

M calcium oxide = 1 23.0 x (100 - 99.9) / 100 = 0.1 230 g / s

At calcium oxide = 0, 1230 × 6 24 x 3600/10 ^{6} = 0, 276 307 t / a

SOURCE No. 361

CRC. DAILY WAREHOUSE OF FERROALOYS AND ADDITIVES

Organized source of pollutant emissions. Emission of polluting components takes place as a result of the following equipment and operations:

ASSEMBLY BELT CONVEYOR FOR LIME - 1 pc.

The morphometric and dynamic parameters of the source are characterized by the following data: H = 18 m; D = 0.25 m; V = 12.5 m / s; Q = 0.611 m ^{3} / s; T = 2 0 ^{o} C.

The Suction system serves the system for unloading lime from the storage bins onto the collecting conveyor.

Cleaning of dusty air with lime dust (taken for calcium oxide) will be carried out in a bag filter with a standard efficiency of up to 99.9%.

When feeding lime system performance of up to 100 t / h, and the annual volume of the incoming lime - 62.4 thousand tons, while the equipment will be about 624 hours a year.

According to the design data, the concentration of dust in the polluted aspiration air (before cleaning) will be up to 1500 mg / m $^{3.}$

The estimated power of the emission of pollutants is:

Before cleaning

M calcium oxide = 3500 x 0.611 / 1000 = 2.1385 g / s

For calcium oxide = 2.1385 x 624 x 3600/10 ^{6} = 4.803926 t / g

After cleaning

M calcium oxide = 2.1385 x (100 - 99.9) / 100 = 0.002138 g / s

Calcium oxide = 0.002138 x 624 x 3600/10 ^{6} = 0.004804 t / g

SOURCE No. 362

CRC. DAILY WAREHOUSE OF FERROALOYS AND ADDITIVES

Organized source of pollutant emissions. Emission of Emission of polluting components takes place as a result of the following equipment and operations:

ADDITIVES EXPANDING UNIT - 2 pcs.

The morphometric and dynamic parameters of the source are characterized by the following data: H = 18 m; D = 0.25 m; V = 1 4.2 m / s; Q = 0.6 94 m ^{3} / s; T = 2 0 ^{o} C.

The Suction system is designed to collect dust when loading the decompressor with big bags, and when loading vehicles.

Cleaning of dusty air with dust of various additives will be carried out in a bag filter with a standard efficiency of up to 99.9%.

The following additives will be delivered to the warehouse in big bags:

• Ferroalloys	8.20 thousand tons
• Carbon containing powder	16.71 thousand tons
• Lump coke	8.91 thousand tons
• Dolomite	20.06 thousand tons
• Fluorspar	3.67 thousand tons

When system performance rasstarivaniya up to 100 t / h, while the equipment will be about 576 hour s per year, including: ferroalloys - 82 hours / year; for carbon-containing powder - 167 hours / year; for coke - 89 hours / year; dolomite - 201 hours / year; by melting - 37 hours / year.

During the unloading of the bulky materials and dust emission occurs Match to have constituent materials of ferroalloys - dust ferroalloys; from carbon-containing powder and coke - carbon black (soot); from dolomite - calcium oxide (by the main component) ; from fluorspar - calcium fluoride.

According to the design data, the dust concentration in the contaminated air aspiration (before purification) may be s to 60 00 mg / m $^{3.}$

The estimated power of the emission of pollutants is:

Before cleaning

M ferroalloys = 60 00 x 0.6 94 /1000 = 4.164 g / c
For ferroalloys = 4.164 x 82 x 3600/10 ^{6} = 1.229213 t / g

M carbon black = 60 00 x 0.6 94 /1000 = 4.164 g / c
For soot = 4.164 x (167 + 89) x 3600/10 ^{6} = 3.837542 t / g

M calcium oxide = 6000 x 0.694 / 1000 = 4.164 g / s
Calcium oxide = 4.164 x 201 x 3600/10 ^{6} = 3.013070 t / g

M calcium fluoride = 6000 x 0.694 / 1000 = 4.164 g / s
Calcium fluoride = 4.164 x 37 x 3600/10 ^{6} = 0.554645 t / g

After cleaning

M ferroalloys = 4.164 x (100 - 99.9) / 100 = 0.004164 g / s
For ferroalloys = 0.004164 x 82 x 3600/10 ^{6} = 0.001229 t / g

M soot = 4.164 x (100 - 99.9) / 100 = 0.004164 g / s
For soot = 0.004164 x (167 + 89) x 3600/10 ^{6} = 0.003837 t / g

M calcium oxide = 4.164 x (100 - 99.9) / 100 = 0.004164 g / s
Calcium oxide = 0.004164 x 201 x 3600/10 ^{6} = 0.003013 t / g

M calcium fluoride = 4.164 x (100 - 99.9) / 100 = 0.004164 g / s
Calcium fluoride = 0.004164 x 37 x 3600/10 ^{6} = 0.000555 t / g

SOURCE No. 363

CRC. Meltshop. FURNACE AREA

Organized source of pollutant emissions. Isolation polluting components will take place as a result of the following equipment and operations:

- *Electric Arc Furnace EAF-12/140 - 1 pc.*
- *Ladle Furnace Unit - 1 pc.*
- *Bulk Material Feeding System - 1 pc.*
- *Steel Vacuum Unit - 1 pc.*
- *Building Of Collective Dust Bin - 1 pc.*

The morphometric and dynamic parameters of the source are characterized by the following data: H = 150.0 m ; D = 9, 0 m; V = 9.1 m / s; Q = 579.444 m ^{3}/ s; T = 45 ^{o}C.

The fume treatment system of the Meltshop is designed to extract and purify waste gases from:

- *4th hole on the roof of the EAF-120 furnace;*
- *exhaust hood for secondary gases;*
- *primary waste gases from a two-position ladle-furnace unit;*
- *systems for feeding bulk materials into the EAF, into the ladle-furnace unit (LF) and into the two-position steel Degassing unit (Steel Degassing Unit);*
- *two-position Steel Degassing Unit;*
- *from the building of the collecting dust bin (dust silo).*

The processes of steel smelting in electric arc furnaces, as well as the subsequent processes of metal tapping and its processing at the ladle-furnace unit and the steel Degassing unit, are associated with a large emission of dust and gases, including: inorganic dust (steelmaking), carbon oxide, nitrogen dioxide, nitrogen oxide and sulfur dioxide and hydrogen, cyanide the fluoride. The dusty air will be cleaned according to a two-stage scheme - at the first stage, a cyclone-spark arrester, at the second - a bag filter. Regulatory efficiency two-stage cleaning system will make up 99, 5 %. Only inorganic dust (steelmaking) is cleaned.

The productivity of the steelmaking furnace is 1 46.5 t / h of smelted steel.

Operating mode of electric steel-making production, composition and t 7 440 h / year.

According to table 3.3 [7], the specific emission of gaseous pollutants from electric arc furnaces is: carbon oxide - 1.5 kg / t of steel ; nitrogen oxides - 0.29 kg / t; sulfur dioxide - 1.6 g / t; hydrogen cyanide - 28.4 g / t; hydrogen fluoride - 0.56 g / t.

The total emissions of nitrogen oxides (NO_x) are divided into nitrogen dioxide (NO_2) and nitrogen oxide (NO). The transformation ratios are generally taken at the level of the maximum set transformation, i.e. 0.8 - for NO_2 and 0.13 - for NO from NO_x.

Since the regulatory and technical literary sources do not provide information on the specific dust release during the operation of liquid steel processing plants (there is information only during the operation of smelting furnaces), the parameters of the emission and emission of dust are taken by the calculation method, according to the passport data of the dust and fume treatment equipment. The dust concentration in the polluted aspiration air (before cleaning) can be up to 1500 mg / m ^{3,} at the exit from the bag filter (after cleaning) - no more than 1 0 mg / m $^{3.}$

The estimated power of the emission of pollutants is:

Before cleaning

M steelmaking dust = 1 5 00 x 579.444 / 10 00 = 869.166 g / s

In steelmaking dust = 869.166 x 7 440 x 3600/10 ^{6} = 23279.742 m / z

After cleaning

Steelmaking dust M = 869.166 x (100 - 99 5) / 100 = 4,3 4583 g / s

For steelmaking dust = 4.34583 x 7 400 x 3600/10 ^{6} = 116.398711 t / g

M carbon oxide = 1.5 x 10 ^{3} x 146.5 / 3600 = 61.041667 g / s

Carbon oxide = 61.041667 x 7 440 x 3600/10 ^{6} = 1 634.940 t / g

M nitrogen oxides = 0.29 x 10 ^{3} x 146.5 / 3600 = 11.801389 g / s, including:

M nitrogen dioxide = 11.801389 x 0.80 = 9.441111 g / s
For nitrogen dioxide = 9.441111 x 7 440 x 3600/10 ^{6} = 252.870717 t / g

M nitrogen oxide = 11.801389 x 0.13 = 1.534181 g / s
In nitrogen oxide = 1 534 181 x 7 440 x 3600/10 ^{6} = 41.091504 m / z

M sulfur dioxide = 1.6 x 146.5 / 3600 = 0.0 65111 g / s
Y = Sulfur dioxide 0.0 65 111 x 7 440 x 3600/10 ^{6} = 1, 743 936 t / a

M hydrogen cyanide = 28.4 x 146.5 / 3600 = 1.155722 g / s
For hydrogen cyanide = 1.155722 x 7 440 x 3600/10 ^{6} = 30.954864 t / g

M hydrogen fluoride = 0.56 x 146.5 / 3600 = 0.0 22789 g / s
Y = hydrogen fluoride 0.0 22789 x 7 440 x 3600/10 ^{6} = 0, 610 377 t / a

SOURCE No. 364, 365

CRC. Meltshop

Organized source of pollutant emissions. The release of pollutants occurs as a result of the operation of the following equipment and technological operations:

STAND FOR WARMING UP THE INDUSTRIAL BURNER - 2 pcs.

The morphometric and dynamic parameters of the source are characterized by the following data: H = 45.0 m; D = 0.7 m; V = 2.1 m / s; Q = 0.818 m ^{3} / s; T = 200 ^{o} C.

The source of the emission of pollutants is the stand for tundish heating. Natural gas serves as fuel for tundish heating. Natural gas combustion processes are accompanied by the release of such pollutants as carbon oxide, nitrogen oxides, sulfur dioxide, benzopyrene. The combustion products of natural gas are discharged into the atmosphere through a chimney.

The stand will work up to 3720 hours per year. Annual consumption of natural gas will amount to 892.8 thousand m $^{3.}$

The calculation of the emission of pollutants during the combustion of natural gas was carried out according to the formulas 1.96, 1.98, 1.101, 1.111 [7]:

Carbon oxide:

$$P_{with} = 0.001 \times C_{with} \times B \times (1 - q_4/100), \text{ t / r}$$

where: B - fuel consumption, thousand m ^{3} / year;

C_{with} - the output CO from fuel combustion, kg / t, calculated by the formula:

$$C_{co} = q_3 \times R \times Q_{ir}$$

q_3 - heat loss due to chemical incompleteness of fuel combustion, taken according to table 1.13.2, q_3 = 0.5%;

R - coefficient taking into account the share of heat loss due to chemical incompleteness of fuel combustion, due to the presence of carbon monoxide in the products of incomplete combustion, for gas R = 0.5;

Q_{ir} is the lowest calorific value of natural fuel, for natural gas we take Q_{ir} = 35.588 MJ / m ^{3};

q_4 - heat loss due to mechanical incompleteness of fuel combustion, taken according to table 1.13.2, q_4 = 0.5%.

$$C._{Stock} = 0.5 \times 0.5 \times 8.897 = 35.588 \text{ kg / thousand m}^3$$

$$P_{co} = 0.001 \times 8.897 \times 892.8 \times (1 - 0.5 / 100) = 7.903525 \text{ t / g}$$

$$P_{Stock} = 7.903525 \times 10^{6}/3720/3600 = 0.590168 \text{ g / s}$$

Nitrogen oxides:

$$P_{NO\,x} = 0.001 \times B \times Q_{ir} \times K_{NO\,x} \times (1 - \beta\square), \text{ t / g}$$

where: B - fuel consumption, thousand m^3/ year;

Q_{ir} is the lowest calorific value of natural fuel, for natural gas we take Q_{ir} = 35.588 MJ / m^3;

K_{NOx} - a parameter characterizing the amount of nitrogen oxides formed per 1 GJ of heat, K_{NOx} = 0.075 kg / GJ;

β - coefficient taking into account the degree of reduction of nitrogen oxide emissions as a result of the application of technical solutions, β = 0.

$$P_{NOx} = 0.001 \times 892.8 \times 35.588 \times 0.075 \times (1 - 0) = 2.382972 \text{ t / g}$$

$$N_{NOx} = 2.382972 \times 10^6/3720/3600 = 0.177940 \text{ g / s}$$

The total emissions of nitrogen oxides (NO_x) are divided into nitrogen dioxide (NO_2) and nitrogen oxide (NO). The transformation ratios are generally taken at the level of the maximum set transformation, i.e. 0.8 - for NO_2 and 0.13 - for NO from NO_x.

P_{NO2} (nitrogen dioxide) = 2.382972 x 0.8 = 1.906378 t / g

P_{NO2} (nitrogen dioxide) = 0.177940 x 0.8 = 0.142352 g / s

P_{NO} (nitrogen oxide) = 2.382972 x 0.13 = 0.309786 t / g

P_{NO} (nitrogen oxide) = 0.177940 x 0.13 = 0.023132 g / s

Sulfur dioxide:

$$P_{SO2} = 0.02 \times B \times S^r \times (1 - \eta'_{SO2}) \times (1 - \eta''_{SO2}), \text{ t / g}$$

where: B - fuel consumption, thousand m^3/ year;

S^r is the sulfur content in the fuel, S^r = 0.0018%;

η'_{SO2} - the proportion of sulfur oxides associated with fly ash, η'_{SO2} = 0;

η''_{SO2} - the proportion of sulfur oxides captured in the ash collector, η''_{SO2} = 0.

$$P_{SO2} = 0.02 \times 892.8 \times 0.0018 \times (1 - 0) \times (1 - 0) = 0.032141 \text{ t / g}$$

$$N_{SO2} = 0.032141 \times 10^6/3720/3600 = 0.002400 \text{ g / s}$$

Benzopyrene:

$$Q_{bp} = C_{bp} \times V_{in} / 10^{6,} \text{ g / s}$$

where: C_{bp} is the concentration of benzopyrene in the flame, for gas C_{bp} = 0.14 μg / m^3;

V_{in} - the volume of the gas-air mixture in one technological operation, m^3/ s.

$$Q_{bp} = 0.14 \times 0.818 / 10^6 = 0.0000001 \text{ g / s (traces)}$$

$$Q_{bp} = 0.0000001 \times 3720 \times 3600/10^6 = 0.000001 \text{ t / g}$$

SOURCE No. 366

CRC. Meltshop

Organized source of pollutant emissions. The release of pollutants occurs as a result of the operation of the following equipment and technological operations:

INDUSTRIAL DRYING STAND - 1 pc.

The morphometric and dynamic parameters of the source are characterized by the following data: H = 45.0 m; D = 0.6 m; V = 2.2 m / s; Q = 0.614 m^3/ s; T = 200 °C.

The source of the release of pollutants is the tundish drying stand. Natural gas serves as the fuel for drying the tundish. Natural gas combustion processes are accompanied by the release of such pollutants as carbon oxide, nitrogen oxides, sulfur dioxide, benzopyrene. The combustion products of natural gas are discharged into the atmosphere through a chimney.

The stand will work up to 7440 hours per year. Annual consumption of natural gas will amount to 1339.2 thousand m^3.

The calculation of the emission of pollutants during the combustion of natural gas was carried out according to the formulas 1.96, 1.98, 1.101, 1.111 [7]:

Carbon oxide:

$$P_{with} = 0.001 \times C_{with} \times B \times (1 - q_4/100), \text{ t / r}$$

where: B - fuel consumption, thousand m ^{3}/ year;

C_{with} - the output CO from fuel combustion, kg / t, calculated by the formula:

$$C_{co} = q_3 \times R \times Q_{ir}$$

q_3 - heat loss due to chemical incompleteness of fuel combustion, taken according to table 1.13.2, $q_3 = 0.5\%$;

R - coefficient taking into account the share of heat loss due to chemical incompleteness of fuel combustion, due to the presence of carbon monoxide in the products of incomplete combustion, for gas R = 0.5;

Q_{ir} is the lowest calorific value of natural fuel, for natural gas we take $Q_{ir} = 35.588$ MJ / m ^{3};

q_4 - heat loss due to mechanical incompleteness of fuel combustion, taken according to table 1.13.2, $q_4 = 0.5\%$.

$$C._{Stock} = 0.5 \times 0.5 \times 8.897 = 35.588 \text{ kg / thousand m}^3$$

$$P_{co} = 0.001 \times 8.897 \times 1339.2 \times (1 - 0.5 / 100) = 11.855288 \text{ t / g}$$

$$P_{with} = 11.855288 \times 10^6/7440/3600 = 0.442626 \text{ g / s}$$

Nitrogen oxides:

$$P_{NO_x} = 0.001 \times B \times Q_{ir} \times K_{NO_x} \times (1 - \beta), \text{ t / g}$$

where: B - fuel consumption, thousand m ^{3}/ year;

Q_{ir} is the lowest calorific value of natural fuel, for natural gas we take $Q_{ir} = 35.588$ MJ / m ^{3};

K_{NO_x} - a parameter characterizing the amount of nitrogen oxides formed per 1 GJ of heat, $K_{NO_x} = 0.075$ kg / GJ;

β - coefficient taking into account the degree of reduction of nitrogen oxide emissions as a result of the application of technical solutions, $\beta = 0$.

$$P_{NO_x} = 0.001 \times 1339.2 \times 35.588 \times 0.075 \times (1 - 0) = 3.574459 \text{ t / g}$$

$$N_{NO_x} = 3.574459 \times 10^6/7440/3600 = 0.133455 \text{ g / s}$$

The total emissions of nitrogen oxides (NO_x) are divided into nitrogen dioxide (NO_2) and nitrogen oxide (NO). The transformation ratios are generally taken at the level of the maximum set transformation, i.e. 0.8 - for NO_2 and 0.13 - for NO from NO_x.

$$P_{NO_2} \text{(nitrogen dioxide)} = 3.574459 \times 0.8 = 2.859567 \text{ t / g}$$

$$P_{NO_2} \text{(nitrogen dioxide)} = 0.133455 \times 0.8 = 0.106764 \text{ g / s}$$

$$P_{NO} \text{(nitrogen oxide)} = 3.574459 \times 0.13 = 0.464680 \text{ t / g}$$

$$P_{NO} \text{(nitrogen oxide)} = 0.133455 \times 0.13 = 0.017349 \text{ g / s}$$

Sulfur dioxide:

$$P_{SO_2} = 0.02 \times B \times S^r \times (1 - \eta'_{SO_2}) \times (1 - \eta''_{SO_2}), \text{ t / g}$$

where: B - fuel consumption, thousand m ^{3}/ year;

S^r is the sulfur content in the fuel, $S^r = 0.0018\%$;

η'_{SO_2} - the proportion of sulfur oxides associated with fly ash, $\eta'_{SO_2} = 0$;

η''_{SO_2} - the proportion of sulfur oxides captured in the ash collector, $\eta''_{SO_2} = 0$.

$$P_{SO_2} = 0.02 \times 1339.2 \times 0.0018 \times (1 - 0) \times (1 - 0) = 0.048211 \text{ t / g}$$

$$N_{SO_2} = 0.048211 \times 10^6/7440/3600 = 0.001800 \text{ g / s}$$

Benzopyrene:

$$Q_{bp} = C_{bp} \times V_{in} / 10^6, \text{ g / s}$$

where: C_{bp} is the concentration of benzopyrene in the flame, for gas $C_{bp} = 0.14$ μg / m ^{3};

V_{in} - the volume of the gas-air mixture in one technological operation, m ^{3}/ s.

$$Q_{bp} = 0.14 \times 0.614 / 10^6 = 0.00000008 \text{ g / s (traces)}$$

$$Q_{bp} = 0.00000008 \times 7440 \times 3600/10^6 = 0.000002 \text{ t / g}$$

SOURCE No. 367-369

CRC. Meltshop. AREA OF INJECTING CARBON- CONTAINING POWDER

Organized source of pollutant emissions. The release of pollutants occurs as a result of the operation of the following equipment and technological operations:

RECEIVING HOPPER FOR CARBON-CONTAINING POWDER - 3 pcs.

The morphometric and dynamic parameters of the source are characterized by the following data: H = 18 m; D = 0.2 m; V = 8.2 m / s; Q = 0, 257 m ^{3}/ s; T = 2 0 ^{o}C.

Dust emission of carbon-containing powder (soot) occurs in the process of loading the receiving bins using pneumatic transport. Each bin is equipped with a dust collector (bag filter) with a standard cleaning efficiency of up to 99.9%.

The pneumatic loading capacity will be 50 t / h.

The volume of carbon-containing powder loaded into each bin will be about 5570 t / year.

The duration of loading processes for each bunker will be 111 hours per year.

The calculation of dust emission during pneumatic loading of carbon-containing powder was carried out by analogy with pneumatic loading of cement silos. According to table 1.4.14 [7], the concentration of dust in the air removed from cement silos is up to 17.5 g / m ^{3}.

The estimated power of the emission of pollutants is:

Before cleaning

M soot = 17.5 x 0, 257 = 4.4975 g / s

For soot = 4.4975 x 111 x 3600/10 ^{6} = 1.797201 t / g

After cleaning

M soot = 4.4975 x (100 - 99.9) / 100 = 0.00 4497 g / s

For soot = 0.00 4497 x 111 x 3600/10 ^{6} = 0.00 1797 t / g

SOURCE No. 370

CRC. Slab Caster

Organized source of pollutant emissions. The release of pollutants occurs as a result of the operation of the following equipment and technological operations:

VERTICAL STAND FOR HEATING STEEL LADLE - 1 pc.

The morphometric and dynamic parameters of the source are characterized by the following data: H = 45.0 m; D = 0.7 m; V = 2.6 m / s; Q = 1.023 m ^{3}/ s; T = 200 ^{o}C.

The source of the release of pollutants is a vertical stand for heating the ladle. Natural gas serves as fuel for heating the ladle. Natural gas combustion processes are accompanied by the release of such pollutants as carbon oxide, nitrogen oxides, sulfur dioxide, benzopyrene. The combustion products of natural gas are discharged into the atmosphere through a chimney.

The stand will work up to 7440 hours per year. Annual consumption of natural gas will amount to 2232 thousand m ^{3}.

The calculation of the emission of pollutants during the combustion of natural gas was carried out according to the formulas 1.96, 1.98, 1.101, 1.111 [7]:

Carbon oxide:

$$P_{with} = 0.001 \times C_{with} \times B \times (1 - q_4/100), \text{ t / r}$$

where: B - fuel consumption, thousand m ^{3}/ year;

C_{with} - the output CO from fuel combustion, kg / t, calculated by the formula:

$$C_{co} = q_3 \times R \times Q_{ir}$$

q_3 - heat loss due to chemical incompleteness of fuel combustion, taken according to table 1.13.2, q_3 = 0.5%;

R - coefficient taking into account the share of heat loss due to chemical incompleteness of fuel combustion, due to the presence of carbon monoxide in the products of incomplete combustion, for gas R = 0.5;

Q_{ir} is the lowest calorific value of natural fuel, for natural gas we take Q_{ir} = 35.588 MJ / m^3;

q_4 - heat loss due to mechanical incompleteness of fuel combustion, taken according to table 1.13.2, q_4 = 0.5%.

C. $_{Stock}$ = 0.5 x 0.5 x 8.897 = 35.588 kg / thousand m^3

P_{co} = 0.001 x 8.897 x 2232 x (1 - 0.5 / 100) = 1 9.758813 t / g

P_{Stock} = 19.7 58813 × 10^6/7440/3600 = 0.737709 g / s

Nitrogen oxides:

P_{NOx} = 0.001 x B x Q_{ir} x K_{NOx} x (1 - β□), t / g

where: B - fuel consumption, thousand m^3/ year;

Q_{ir} is the lowest calorific value of natural fuel, for natural gas we take Q_{ir} = 35.588 MJ / m^3;

K_{NOx} - a parameter characterizing the amount of nitrogen oxides formed per 1 GJ of heat, K_{NOx} = 0.07 5 kg / GJ;

β□ - coefficient taking into account the degree of reduction of nitrogen oxide emissions as a result of the application of technical solutions, β□ = 0.

P_{NOx} = 0.001 x 2232 x 35.588 x 0.07 5 x (1 - 0) = 5.957431 t / g

N_{NOx} = 5.957431 × 10^6/7440/3600 = 0.222425 g / s

The total emissions of nitrogen oxides (NO_x) are divided into nitrogen dioxide (NO_2) and nitrogen oxide (NO). The transformation ratios are generally taken at the level of the maximum set transformation, i.e. 0.8 - for NO_2 and 0.13 - for NO from NO_x.

P_{NO2} (nitrogen dioxide) = 5.957431 x 0.8 = 4.765945 t / g

N_{NO2} (nitrogen dioxide) = 0.222425 x 0.8 = 0, 177 940 g / s

P_{NO} (nitrogen oxide) = 5.957431 x 0.13 = 0.774466 t / g

P_{NO} (nitrogen oxide) = 0.222425 x 0.13 = 0.028915 g / s

Sulfur dioxide:

P_{SO2} = 0.02 x B x S^r x (1 - η'_{SO2}) x (1 - η''_{SO2}), t / g

where: B - fuel consumption, thousand m^3/ year;

S^r is the sulfur content in the fuel, S^r = 0.0018%;

η'_{SO2} - the proportion of sulfur oxides associated with fly ash, η'_{SO2} = 0;

η''_{SO2} - the proportion of sulfur oxides captured in the ash collector, η''_{SO2} = 0.

P_{SO2} = 0.02 x 2232 x 0.0018 x (1 - 0) x (1 - 0) = 0.0 80352 t / g

N_{SO2} = 0.0 80 352 × 10^6/7440/3600 = 0.0 03000 g / s

Benzopyrene:

Q_{bp} = C_{bp} x V_{in} / $10^{6.}$ g / s

where: C_{bp} is the concentration of benzopyrene in the flame, for gas C_{bp} = 0.14 μg / m^3;

V_{in} - the volume of the gas-air mixture in one technological operation, m^3/ s.

Q_{bp} = 0.14 x 1.023 / 10^6 = 0.00000 0 1 g / s (traces)

Q_{bp} = 0.00000 0 1 x 7440 x 3600/10^6 = 0.0000 04 t / g

SOURCE No. 371, 372

CRC. Slab Caster

Organized source of pollutant emissions. The release of pollutants occurs as a result of the operation of the following equipment and technological operations:

HORIZONTAL STAND FOR HEATING THE STALKER - 2 pcs.

The morphometric and dynamic parameters of the source are characterized by the following data: H = 45.0 m; D = 0.7 m; V = 2.6 m / s; Q = 1.023 m ^{3}/ s; T = 200 ^{o}C.

The source of the release of pollutants is a horizontal stand for heating the ladle. Natural gas serves as fuel for heating the ladle. Natural gas combustion processes are accompanied by the release of such pollutants as carbon oxide, nitrogen oxides, sulfur dioxide, benzopyrene. The combustion products of natural gas are discharged into the atmosphere through a chimney.

The stand will work up to 3720 hours per year. Annual consumption of natural gas will amount to 1 116 thousand m $^{3.}$

The calculation of the emission of pollutants during the combustion of natural gas was carried out according to the formulas 1.96, 1.98, 1.101, 1.111 [7]:

Carbon oxide:

$$P_{with} = 0.001 \times C_{with} \times B \times (1 - q_4/100), \text{ t / r}$$

where: B - fuel consumption, thousand m ^{3}/ year;

C_{with} - the output CO from fuel combustion, kg / t, calculated by the formula:

$$C_{co} = q_3 \times R \times Q_{ir}$$

q_3 - heat loss due to chemical incompleteness of fuel combustion, taken according to table 1.13.2, q_3 = 0.5%;

R - coefficient taking into account the share of heat loss due to chemical incompleteness of fuel combustion, due to the presence of carbon monoxide in the products of incomplete combustion, for gas R = 0.5;

Q_{ir} is the lowest calorific value of natural fuel, for natural gas we take Q_{ir} = 35.588 MJ / m ^{3};

q_4 - heat loss due to mechanical incompleteness of fuel combustion, taken according to table 1.13.2, q_4 = 0.5%.

$$C._{Stock} = 0.5 \times 0.5 \times 8.897 = 35.588 \text{ kg / thousand m}^3$$

$$P_{with} = 0.001 \times 8.897 \times 1116 \times (1 - 0.5 / 100) = 9,879\,406 \text{ t / a}$$

$$P_{with} = 9\,879\,406 \times 10^{6} / 372\,0/3600 = 0.737709 \text{ g / s}$$

Nitrogen oxides:

$$P_{NO_x} = 0.001 \times B \times Q_{ir} \times K_{NO_x} \times (1 - \beta), \text{ t / g}$$

where: B - fuel consumption, thousand m ^{3}/ year;

Q_{ir} is the lowest calorific value of natural fuel, for natural gas we take Q_{ir} = 35.588 MJ / m ^{3};

K_{NO_x} - a parameter characterizing the amount of nitrogen oxides formed per 1 GJ of heat, K_{NO_x} = 0.075 kg / GJ;

β - coefficient taking into account the degree of reduction of nitrogen oxide emissions as a result of the application of technical solutions, β = 0.

$$P_{NO_x} = 0.001 \times 1116 \times 35.588 \times 0.075 \times (1 - 0) = 2.978715 \text{ t / g}$$

$$N_{NO_x} = 2.978715 \times 10^{6} / 3720 /3600 = 0.222425 \text{ g / s}$$

The total emissions of nitrogen oxides (NO_x) are divided into nitrogen dioxide (NO_2) and nitrogen oxide (NO). The transformation ratios are generally taken at the level of the maximum set transformation, i.e. 0.8 - for NO_2 and 0.13 - for NO from NO_x.

$$P_{NO_2} \text{(nitrogen dioxide)} = 2.978715 \times 0.8 = 2.382972 \text{ t / g}$$

$$N_{NO_2} \text{(nitrogen dioxide)} = 0.222425 \times 0.8 = 0,177\,940 \text{ g / s}$$

$$P_{NO} \text{(nitrogen oxide)} = 2.978715 \times 0.13 = 0.387233 \text{ t / g}$$

$$P_{NO} \text{(nitrogen oxide)} = 0.222425 \times 0.13 = 0.028915 \text{ g / s}$$

Sulfur dioxide:

$$P_{SO_2} = 0.02 \times B \times S^{r} \times (1 - \eta'_{SO_2}) \times (1 - \eta''_{SO_2}), \text{ t / g}$$

where: B - fuel consumption, thousand m ^{3}/ year;

S^{r} is the sulfur content in the fuel, S^{r} = 0.0018%;

η'_{SO_2} - the proportion of sulfur oxides associated with fly ash, $\eta'_{SO_2} = 0$;

η''_{SO_2} - the proportion of sulfur oxides captured in the ash collector, $\eta''_{SO_2} = 0$.

$$P_{SO_2} = 0.02 \times 1116 \times 0.0018 \times (1 - 0) \times (1 - 0) = 0.0\ 40176 \text{ t / g}$$

$$N_{SO_2} = 0.0\ 40\ 176 \times 10^6 / 3720 / 3600 = 0.003000 \text{ g / s}$$

Benzopyrene:

$$Q_{bp} = C_{bp} \times V_{in} / 10^{6,} \text{ g / s}$$

where: C_{bp} is the concentration of benzopyrene in the flame, for gas $C_{bp} = 0.14$ μg / m ^{3};

V_{in} - the volume of the gas-air mixture in one technological operation, m ^{3}/ s.

$$Q_{bp} = 0.14 \times 1.023 / 10^6 = 0.0000001 \text{ g / s (traces)}$$

$$Q_{bp} = 0.0000001 \times 372\ 0 \times 3600/10^6 = 0.00000\ 2 \text{ t / g}$$

SOURCE No. 373, 374

CRC. Slab Caster

Organized source of pollutant emissions. The release of pollutants occurs as a result of the operation of the following equipment and technological operations:

STAND FOR STEEL DRYING - 2 pcs.

The morphometric and dynamic parameters of the source are characterized by the following data: H = 45.0 m; D = 0.7 m; V = 2.6 m / s; Q = 1.023 m ^{3}/ s; T = 200 ^{o}C.

The source of the emission of pollutants is the ladle drying stand. Natural gas is used as fuel for drying the ladle. Natural gas combustion processes are accompanied by the release of such pollutants as carbon oxide, nitrogen oxides, sulfur dioxide, benzopyrene. The combustion products of natural gas are discharged into the atmosphere through a chimney.

The stand will work up to 3720 hours per year. Annual consumption of natural gas will amount to 1 116 thousand m $^{3.}$

The calculation of the emission of pollutants during the combustion of natural gas was carried out according to the formulas 1.96, 1.98, 1.101, 1.111 [7]:

Carbon oxide:

$$P_{with} = 0.001 \times C_{with} \times B \times (1 - q_4/100), \text{ t / r}$$

where: B - fuel consumption, thousand m ^{3}/ year;

C_{with} - the output CO from fuel combustion, kg / t, calculated by the formula:

$$C_{co} = q_3 \times R \times Q_{ir}$$

q_3 - heat loss due to chemical incompleteness of fuel combustion, taken according to table 1.13.2, $q_3 = 0.5\%$;

R - coefficient taking into account the share of heat loss due to chemical incompleteness of fuel combustion, due to the presence of carbon monoxide in the products of incomplete combustion, for gas R = 0.5;

Q_{ir} is the lowest calorific value of natural fuel, for natural gas we take $Q_{ir} = 35.588$ MJ / m ^{3};

q_4 - heat loss due to mechanical incompleteness of fuel combustion, taken according to table 1.13.2, $q_4 = 0.5\%$.

$$C._{Stock} = 0.5 \times 0.5 \times 8.897 = 35.588 \text{ kg / thousand m}^3$$

$$P_{co} = 0.001 \times 8.897 \times 1116 \times (1 - 0.5 / 100) = 9.879406 \text{ t / g}$$

$$P_{Stock} = 9.879406 \times 10^6/3720/3600 = 0.737709 \text{ g / s}$$

Nitrogen oxides:

$$P_{NO_x} = 0.001 \times B \times Q_{ir} \times K_{NO_x} \times (1 - \beta), \text{ t / g}$$

where: B - fuel consumption, thousand m ^{3}/ year;

Q_{ir} is the lowest calorific value of natural fuel, for natural gas we take $Q_{ir} = 35.588$ MJ / m ^{3};

K_{NO_x} - a parameter characterizing the amount of nitrogen oxides formed per 1 GJ of heat, K_{NO_x} = 0.075 kg / GJ;

β - coefficient taking into account the degree of reduction of nitrogen oxide emissions as a result of the application of technical solutions, β = 0.

$$P_{NO_x} = 0.001 \times 1116 \times 35.588 \times 0.075 \times (1 - 0) = 2.978715 \text{ t / g}$$

$$N_{NO_x} = 2.978715 \times 10^6 / 3720 / 3600 = 0.222425 \text{ g / s}$$

The total emissions of nitrogen oxides (NO_x) are divided into nitrogen dioxide (NO_2) and nitrogen oxide (NO). The transformation ratios are generally taken at the level of the maximum set transformation, i.e. 0.8 - for NO_2 and 0.13 - for NO from NO_x.

P_{NO_2} (nitrogen dioxide) = 2.978715 x 0.8 = 2.382972 t / g

N_{NO_2} (nitrogen dioxide) = 0.222425 x 0.8 = 0, 177 940 g / s

P_{NO} (nitrogen oxide) = 2.978715 x 0.13 = 0.387233 t / g

P_{NO} (nitrogen oxide) = 0.222425 x 0.13 = 0.028915 g / s

Sulfur dioxide:

$$P_{SO_2} = 0.02 \times B \times S^r \times (1 - \eta'_{SO_2}) \times (1 - \eta''_{SO_2}), \text{ t / g}$$

where: B - fuel consumption, thousand m^3 / year;

S^r is the sulfur content in the fuel, S^r = 0.0018%;

η'_{SO_2} - the proportion of sulfur oxides associated with fly ash, η'_{SO_2} = 0;

η''_{SO_2} - the proportion of sulfur oxides captured in the ash collector, η''_{SO_2} = 0.

$$P_{SO_2} = 0.02 \times 1116 \times 0.0018 \times (1 - 0) \times (1 - 0) = 0.040176 \text{ t / g}$$

$$N_{SO_2} = 0.040176 \times 10^6 / 3720 / 3600 = 0.003000 \text{ g / s}$$

Benzopyrene:

$$Q_{bp} = C_{bp} \times V_{in} / 10^{6,} \text{ g / s}$$

where: C_{bp} is the concentration of benzopyrene in the flame, for gas C_{bp} = 0.14 μg / m^3;

V_{in} - the volume of the gas-air mixture in one technological operation, m^3 / s.

$$Q_{bp} = 0.14 \times 1.023 / 10^6 = 0.0000001 \text{ g / s (traces)}$$

$$Q_{bp} = 0.0000001 \times 3720 \times 3600 / 10^6 = 0.000002 \text{ t / g}$$

SOURCE No. 375

CRC. Slab Caster (SCM)

Organized source of pollutant emissions. The release of pollutants occurs as a result of the operation of the following equipment and technological operations:

CRYSTALLIZER - 1 pc.

COOLING CHAMBER OF THE ROCKER AND ROLLER SECTIONS - 1 pc.

The morphometric and dynamic parameters of the source are characterized by the following data: H = 45 m; D = 2.5 m; V = 13.6 m / s; Q = 66.667 m^3 / s; T = 4 0 °C.

To remove the smoke generated when hot metal enters the mold, a mold Suction system is provided. The smoke is diverted into the cooling chamber of the swing mechanism and the cooling of the roller sections. The smoke and steam mixture is removed from the cooling chamber outside the workshop by a smoke and vapor removal system. The system consists of gas ducts and 2 exhaust fans with a capacity of 120,000 nm^3 / h each.

The equipment will operate for 7440 hours per year.

Separation of products of incomplete combustion (oxidation) of mineral oil from the surface of the crystallizer. Air pollutants from incomplete combustion of mineral oil are carbon monoxide and hydrocarbons.

With incomplete combustion of 1 g of mineral oil on the surface of the metal mirror in the crystallizer, 0.0107 m^3 of smoke is formed with a carbon monoxide content of 58 mg /

m ^{3} and hydrocarbons - 24 mg / m ^{3}. The amount of used mineral oil will be about 50.06 tons / year. The amount of generated smoke from the crystallizer per hour is about 72 m ^{3}.

The estimated power of the emission of pollutants is:

M carbon oxide = 58 x 72/1000/3600 = 0.00116 g / s

At carbon monoxide = 0.00116 x 7440 x 3600/ 10 ^{6} = 0.031069 m / z

M hydrocarbons = 24 x 72/1000/3600 = 0.00048 g / s

For hydrocarbons = 0.00048 x 7440 x 3600/10 ^{6} = 0.012856 t / g

SOURCE No. 376

CRC. ROLLING MILLSHOP

Organized source of emission of pollutants. The release of pollutants occurs as a result of the operation of the following equipment and technological operations:

TUNNEL HEATING FURNACE - 1 pc.

The morphometric and dynamic parameters of the source are characterized by the following data: H = 7 5.0 m; D = 2, m 0; V = 3.0 m / s; Q = 9.549 m ^{3} / s; T = 3 50 ^{o}C.

For heating the metal before rolling, a continuous tunnel kiln with a roller hearth is provided. The furnace is fueled by natural gas. The combustion of natural gas in the burners of the furnace is accompanied by the release of such pollutants as carbon oxide, nitrogen oxides, sulfur dioxide, benzopyrene. The combustion products of natural gas are discharged into the atmosphere through a chimney.

The running time of the tunnel heating furnace will be 7440 hours per year. Annual consumption of natural gas will amount to 15,716.4 thousand m ^{3}.

The calculation of the emission of pollutants during the combustion of natural gas was carried out according to the formulas 1.96, 1.98, 1.101, 1.111 [7]:

Carbon oxide:

$$P_{with} = 0.001 \times C_{with} \times B \times (1 - q_4/100), \text{ t / r}$$

where: B - fuel consumption, thousand m ^{3} / year;

C_{with} - the output CO from fuel combustion, kg / t, calculated by the formula:

$$C_{co} = q_3 \times R \times Q_{ir}$$

q_3 - heat loss due to chemical incompleteness of fuel combustion, taken according to table 1.13.2, q_3 = 0.5%;

R - coefficient taking into account the share of heat loss due to chemical incompleteness of fuel combustion, due to the presence of carbon monoxide in the products of incomplete combustion, for gas R = 0.5;

Q_{ir} is the lowest calorific value of natural fuel, for natural gas we take Q_{ir} = 35.588 MJ / m ^{3};

q_4 - heat loss due to mechanical incompleteness of fuel combustion, taken according to table 1.13.2, q_4 = 0.5%.

$$C._{Stock} = 0.5 \times 0.5 \times 8.897 = 35.588 \text{ kg / thousand m}^3$$

$$P_{co} = 0.001 \times 8.897 \times 15716.4 \times (1 - 0.5 / 100) = 139.129667 \text{ t / g}$$

$$P_{with} = 139.129667 \times 10^6 / 7440 / 3600 = 5.194507 \text{ g / s}$$

Nitrogen oxides:

$$P_{NOx} = 0.001 \times B \times Q_{ir} \times K_{NOx} \times (1 - \beta), \text{ t / g}$$

where: B - fuel consumption, thousand m ^{3} / year;

Q_{ir} is the lowest calorific value of natural fuel, for natural gas we take Q_{ir} = 35.588 MJ / m ^{3};

K_{NOx} - a parameter characterizing the amount of nitrogen oxides formed per 1 GJ of heat, K_{NOx} = 0.07 kg / GJ;

β - coefficient taking into account the degree of reduction of nitrogen oxide emissions as a result of the application of technical solutions, β = 0

$$P_{NO_x} = 0.001 \times 15716.4 \times 35.588 \times 0.07 \times (1 - 0) = 39.152067 \text{ t / g}$$

$$N_{NO_x} = 39.152067 \times 10^6 / 7440 / 3600 = 1.461771 \text{ g / s}$$

The total emissions of nitrogen oxides (NO_x) are divided into nitrogen dioxide (NO_2) and nitrogen oxide (NO). The transformation ratios are generally taken at the level of the maximum set transformation, i.e. 0.8 - for NO_2 and 0.13 - for NO from NO_x.

P_{NO_2} (nitrogen dioxide) = 39.152067 x 0.8 = 31.321654 t / g

P_{NO_2} (nitrogen dioxide) = 1.461771 x 0.8 = 1.169417 g / s

P_{NO} (nitrogen oxide) = 39.152067 x 0.13 = 5.089769 t / g

P_{NO} (oxide nitrogen) = 1.461771 x 0.13 = 0.190030 g / s

Sulfur dioxide:

$$P_{SO_2} = 0.02 \times B \times S^r \times (1 - \eta'_{SO_2}) \times (1 - \eta''_{SO_2}), \text{ t / g}$$

where: B - fuel consumption, thousand m^3 / year;

S^r is the sulfur content in the fuel, S^r = 0.0018%;

η'_{SO_2} - the proportion of sulfur oxides associated with fly ash, η'_{SO_2} = 0;

η''_{SO_2} - the proportion of sulfur oxides captured in the ash collector, η''_{SO_2} = 0.

$$P_{SO_2} = 0.02 \times 15716.4 \times 0.0018 \times (1 - 0) \times (1 - 0) = 0.565790 \text{ t / g}$$

$$N_{SO_2} = 0\,565\,790 \times 10^6 / 7440 / 3600 = 0.0\,21124 \text{ g / s}$$

Benzopyrene:

$$Q_{bp} = C_{bp} \times V_{in} / 10^6, \text{ g / s}$$

where: C_{bp} is the concentration of benzopyrene in the flame, for gas C_{bp} = 0.14 μg / m^3;

V_{in} - the volume of the gas-air mixture in one technological operation, m^3 / s.

$$Q_{bp} = 0.14 \times 9.549 / 10^6 = 0.000001 \text{ g / s}$$

$$Q_{bp} = 0.000001 \times 7440 \times 3600 / 10^6 = 0.000036 \text{ t / g}$$

SOURCE No. 377

CRC. ROLLING MILLSHOP. TUNNEL FURNACE ROLLER SERVICE AREA

Organized source of emission of pollutants. The release of pollutants occurs as a result of the operation of the following equipment and technological operations:

DRYING OVEN - 1 pc.

The morphometric and dynamic parameters of the source are characterized by the following data: H = 37 m; D = 0.20 m; V = 3.6 m / s; Q = 0, 114 m^3 / s; T = 125 °C.

In the drying oven, the lining of the repaired roller is dried. Natural gas is used as fuel. The combustion of natural gas in the burners of the furnace is accompanied by the release of such pollutants as carbon oxide, nitrogen oxides, sulfur dioxide, benzopyrene. The combustion products of natural gas are discharged into the atmosphere through a chimney.

The operating mode of the drying oven will be up to 1000 hours a year.

The average consumption of natural gas will be 4 m^3 / hour, 4.0 thousand m^3 / year.

The calculation of the emission of pollutants during the combustion of natural gas was carried out according to the formulas 1.96, 1.98, 1.101, 1.111 [7]:

Carbon oxide:

$$P_{with} = 0.001 \times C_{with} \times B \times (1 - q_4/100), \text{ t / r}$$

where: B - fuel consumption, thousand m^3 / year;

C_{with} - the output CO from fuel combustion, kg / t, calculated by the formula:

$$C_{co} = q_3 \times R \times Q_{ir}$$

q_3 - heat loss due to chemical incompleteness of fuel combustion, taken according to table 1.13.2, q_3 = 0.5%;

R - coefficient taking into account the share of heat loss due to chemical incompleteness of fuel combustion, due to the presence of carbon monoxide in the products of incomplete combustion, for gas R = 0.5;

Q_{ir} is the lowest calorific value of natural fuel, for natural gas we take Q_{ir} = 35.588 MJ / m^3;

q_4 - heat loss due to mechanical incompleteness of fuel combustion, taken according to table 1.13.2, q_4 = 0.5%.

C. $_{Stock}$ = 0.5 x 0.5 x 8.897 = 35.588 kg / thousand m^3

P_{co} = 0.001 x 8.897 x 4.0 x (1 - 0.5 / 100) = 0.035410 t / g

P_{Stock} = 0.035410 × 10^6 / 1000 /3600 = 0.009836 g / s

Nitrogen oxides:

P_{NOx} = 0.001 x B x Q_{ir} x K_{NOx} x (1 - β□), t / g

where: B - fuel consumption, thousand m^3 / year;

Q_{ir} is the lowest calorific value of natural fuel, for natural gas we take Q_{ir} = 35.588 MJ / m^3;

K_{NOx} - a parameter characterizing the amount of nitrogen oxides formed per 1 GJ of heat, K_{NOx} = 0.07 kg / GJ;

β□ - coefficient taking into account the degree of reduction of nitrogen oxide emissions as a result of the application of technical solutions, β□ = 0.

P_{NOx} = 0.001 x 4.0 x 35.588 x 0.07 x (1 - 0) = 0.009965 t / g

N_{NOx} = 0.009965 × 10^6 / 1000 /3600 = 0.002768 g / s

The total emissions of nitrogen oxides (NO_x) are divided into nitrogen dioxide (NO_2) and nitrogen oxide (NO). The transformation ratios are generally taken at the level of the maximum set transformation, i.e. 0.8 - for NO_2 and 0.13 - for NO from NO_x.

P_{NO2} (nitrogen dioxide) = 0.009965 x 0.8 = 0.007972 t / g

P_{NO2} (nitrogen dioxide) = 0.002768 x 0.8 = 0.002214 g / s

P_{NO} (nitrogen oxide) = 0.009965 x 0.13 = 0.001295 t / g

P_{NO} (nitrogen oxide) = 0.002768 x 0.13 = 0.000360 g / s

Sulfur dioxide:

P_{SO2} = 0.02 x B x S^r x (1 - η'_{SO2}) x (1 - η''_{SO2}), t / g

where: B - fuel consumption, thousand m^3 / year;

S^r is the sulfur content in the fuel, S^r = 0.0018%;

η'_{SO2} - the proportion of sulfur oxides associated with fly ash, η'_{SO2} = 0;

η''_{SO2} - the proportion of sulfur oxides captured in the ash collector, η''_{SO2} = 0.

P_{SO2} = 0.02 x 4.0 x 0.0018 x (1 - 0) x (1 - 0) = 0.0 00144 t / g

N_{SO2} = 0 000 144 × 10^6 / 1000 /3600 = 0.0 00040 g / s

Benzopyrene:

Q_{bp} = C_{bp} x V_{in} / $10^{6.}$ g / s

where: C_{bp} is the concentration of benzopyrene in the flame, for gas C_{bp} = 0.14 μg / m^3;

V_{in} - the volume of the gas-air mixture in one technological operation, m^3 / s.

Q_{bp} = 0.14 x 0.114 / 10^6 = 0.00000 00 1 5 g / s (trace)

Q_{bp} = 0.00000 00 1 5 x 1000 x 3600/10^6 = 0.0000 0006 t / g (traces are not taken into account)

SOURCE No. 378

CRC. ROLLING MILL AREA. ROLLER GRINDING SHOP

Unorganized source of emission of pollutants. The release of pollutants occurs as a result of the operation of the following equipment and technological operations:

GRINDING MACHINE - 3 pcs.

The morphometric and dynamic parameters of the source are characterized by the following data: H = 2.0 m ; D = 0.56 m ; V = 3.6 m / s; Q = 0.886 m ^{3}/ s; T = 2 0 ^{o}C.

The source of the release of pollutants is the grinding of parts and ingots on grinding machines.

The equipment will operate for about 1200 hours per year.

According to table 1.8.1. [7], the specific emission of dust during the operation of a cylindrical grinding machine with a grinding wheel diameter of 300 mm will be: abrasive dust - 0.017 g / s, metal dust - 0.026 g / s.

Since the equipment operates inside the laboratory, in the calculations we use a reduction factor of 0.005, which characterizes the degree of closure of emission sources from 4 sides.

The estimated power of the emission of pollutants is:

M dust abrasive = 0.017 x 3 x 0.005 = 0.000255 g / s

For abrasive dust = 0.000255 x 1200 x 3600/10 ^{6}= 0.001102 t / g

M metal dust = 0.026 x 3 x 0.005 = 0.00039 g / s

For metal dust = 0.00039 x 1200 x 3600/10 ^{6}= 0.001685 t / g

SOURCE No. 379

CRC. ROLLING MILLSHOP. WORKSHOP FOR MAINTENANCE OF SCM

An unorganized source of emissions of harmful substances. The release of harmful substances occurs as a result of the operation of the following equipment and technological operations:

TURNING CENTER RMC-2000 - 1 pc.
TURNING CENTER RMC-1000 - 1 pc.
MILLING MACHINE - 1 pc.
SHARPENING MACHINE D = 400 mm - 1 pc.
FLOATING UNIT - 1 pc.
AC ELECTRIC WELDER - 1 pc.

The morphometric and dynamic parameters of the source are characterized by the following data: H = 2.0 m ; D = 0.56 m ; V = 3.6 m / s; Q = 0.886 m ^{3}/ s; T = 2 0 ^{o}C.

In the maintenance workshop of the Slab Caster Machine, steel products are machined on machine tools, tools are sharpened on a grinding machine D = 400 mm - 1 pc., Metal electric welding, metal surfacing on repaired parts.

Equipment operating time: metal-cutting machines: 5 hours per day, 300 working days per year, 1500 hours per year, sharpening machine 100 hours per year, electric welding post - 200 hours per year,

Power of metal-cutting machines is: turning center RMC-2000 - 40 kW, turning center RMC-1000 - 25 kW, milling machine - 60 kW. Consumption of electrodes grade ANO-4 - 750 kg / year, consumption of fused flux AN-60 - 5400 kg / year.

The source of the emission of pollutants is the sharpening of tools and the grinding of parts on a sharpener with a 400 mm abrasive wheel.

According to table 1.9.1. [7], the specific emission of dust from a grinding machine with a D grinding wheel of 400 mm is on average: abrasive dust - 0.019 g / s, metal dust - 0.029 g / s.

Using the cover factor K = 0.005, the emission of pollutants will be: abrasive dust - 0, 000 095 g / s, metal dust = 0,000145 g / s.

According to table 1.9.1 [7], the specific release of mineral oil when cooled with emulsol of metal-cutting machines with an emulsol content of 3-10% is 0.045 * 10 $^{-5}$g / s per 1 kW of machine power.

The total estimated power of the emission of mineral oil from the operation of all metal-cutting machines of the Slab Caster Machine service workshop is 125 kW

M mineral oil = 125 * 0.045 * 10^{-5} = 0.000056 g / s.

Metal cutting is carried out in the workshop. Welding is carried out using an electric welding machine with ANO-4 electrodes. One kg of electrodes is burned in 2 hours of work. At the post, the consumption of ANO-4 electrodes will be up to 100 kg / year. The duration of the welding work will be 200 h / y

According to table 1.12.1 [7], the specific emission from combustion of 1 kg of electrodes of the ANO-4 grade is: iron oxide - 5.41 g / kg, manganese dioxide - 0.59 g / kg. The estimated power of the emission of pollutants from the processes of electric arc welding is: iron oxide - 0.000751 g / s, manganese dioxide - 0.000082 g / s.

The workshop also repairs parts using a surfacing installation using fused flux AN-60, with an annual flux consumption of 540 kg / year. Duration of surfacing works will be 3000 h / y

According to table 1.12.1 [7], the specific emission from 1 kg of grade AN-60 is: iron oxide - 0.08 g / kg, manganese dioxide - 0.01 g / kg.

The design power of the emission of pollutants from the surfacing processes is: iron oxide - 0.000043 t / year, 0.000004 g / s, manganese dioxide - 0.000005 t / year, 0.000001 g / s.

The estimated power of the emission of pollutants is:

M dust abrasive = 0.000095 g / s
For abrasive dust = 0.000003 t / g

M metal dust = 0.000145 g / s
For metal dust = 0.000052 t / g

M mineral oil = 0.000056 g / s
Mineral oil = 0.000302 t / g

M iron oxide = 0.000755 g / s
Iron oxide = 0.000543 t / g

M manganese dioxide = 0.000083 g / s
Manganese dioxide = 0.000060 t / g

SOURCE No. 380

CRC. SECTION OF PRIMARY SLAG PROCESSING

An unorganized source of emissions of harmful substances. The release of harmful substances occurs as a result of the operation of the following equipment and technological operations:

LOADING SLAG IN DUMP TRUCKS - 1 pc.

The morphometric and dynamic parameters of the source are characterized by the following data: H = 2.0 m ; D = 0.56 m ; V = 3.6 m / s; Q = 0.886 m^3 / s; T = 2 0 °C.

The source of emission of inorganic dust with SiO_2 content <20% is the processes of slag loading after its cooling into dump trucks using a bucket loader.

The total amount of generated slag to be processed will be from 166.73 thousand tons per year to 229.03 thousand tons per year.

With a loading capacity of up to 150 t / h, the loading time will be about 1527 hours per year.

Inorganic dust emission capacity, calculated according to [7], the formula 1.36:

$$q = K_1 \times K_2 \times K_3 \times K_4 \times K_5 \times K_7 \times B \times G \times 10^6 / 3600 \text{ g / s}$$

where: K_1 - weight fraction of the dust fraction in the rock, K_1 = 0.05 (for slag) ;

K_2 - the proportion of flying dust passing into the aerosol, K_2 = 0.02 (for slag) ;

K_3 - coefficient taking into account the wind speed, K_3 = 1.2 (the average wind speed in the area is 3.6 m / s, i.e. in the range from 2 to 5 m / s) ;

K_4 - coefficient taking into account the closeness of the filling unit, K_4 = 0.5 (open from
3 sides) ;

K_5 - coefficient that takes into account the moisture content of the material, K_5 = 0.1 (up to 10%) ;

K_7 - coefficient taking into account the size of the material, K_7 = 0, 4 (the average size of the pieces is 50-100mm) ;

B - coefficient taking into account the height of the material filling, B = 0, 5 (up to 1m) ;

G - capacity of the filling unit, G = 1 50 t / h.

q = 0.05 x 0.02 x 1, 2 x 0.5 x 0.1 x 0, 4 x 0, 5 x 1 50 × 10^6/3600 = 0.5 g / s

The estimated power of the emission of pollutants is:

M dust of inorganic SiO_2<20% = 0.5 g / s

For inorganic SiO_2dust <20% = 0.5 x 1527 x 3600/10^6 = 2.7486 t / g

SOURCE No. 381

STEEL MELTING LABORATORY

Unorganized source of emission of pollutants. The release of pollutants occurs as a result of the operation of the following equipment and technological operations:

SLAG CRUSHER - 1 pc.

SLAG GRINDING MILL - 1 pc.

The morphometric and dynamic parameters of the source are characterized by the following data: H = 2.0 m; D = 0.56 m; V = 3.6 m / s; Q = 0.886 m^3/ s; T = ^{20o}C.

The source of the release of inorganic dust is the processes of crushing and grinding of slag in a laboratory crusher and ball mill. The equipment capacity will be up to 50 kg / h. The amount of crushed slag will be about 25.6 t / year. The working time of the laboratory crusher and mill will be about 512 hours / year. The equipment works alternately.

The dust extraction capacity from the crusher and ball mill is on average 11.1 g / kg of the crushed material.

Since the equipment operates inside the laboratory, in the calculations we use a reduction factor of 0.005, which characterizes the degree of closure of emission sources from 4 sides.

The estimated power of the emission of pollutants is:

M dust of inorganic SiO_2<20% = 11.1 x 50 x 0.005 / 3600 = 0.000771 g / s

For inorganic dust SiO_2<20% = 0.000771 x (512 + 512) x 3600/10^6 = 0.002841 t / g

SOURCE No. 382

CRC LABORATORY

Unorganized source of emission of pollutants. The release of pollutants occurs as a result of the operation of the following equipment and technological operations:

CUTTING BAND SAW MACHINE - 1 pc.

BAND SAW - 1 pc.

MILLING MACHINE - 1 pc.

SCREW-CUTTING LATHE - 1 pc.

VERTICAL DRILLING MACHINE - 1 pc.

FLAT SANDING MACHINE D = 400 mm - 1 pc.

SHARPENING MACHINE D = 300 mm - 1 pc.

The morphometric and dynamic parameters of the source are characterized by the following data: H = 2.0 m ; D = 0.56 m ; V = 3.6 m / s; Q = 0.886 m ^{3}/ s; T = 2 0 ^{o}C.

In the laboratory of CRC, steel products are machined on machine tools, tools are sharpened on a grinding machine D = 300 mm - 1 pc., Parts are ground on a surface grinding machine with D = 400 mm - 2 pcs.

Equipment operating time - 6000 hours per year.

The source of the release of pollutants is the sharpening of tools and grinding on a grinding machine with a 300 mm abrasive wheel diameter.

According to table 1.9.1. [7], the specific emission of dust from a grinding machine with a grinding wheel diameter of 300 mm is on average: abrasive dust - 0.013 g / s, metal dust - 0.020 g / s.

Using the cover factor K = 0.005, the emission of pollutants will be: abrasive dust - 0, 000065 g / s, metal dust = 0.000100 g / s.

The source of the emission of pollutants is the grinding of parts and ingots on a surface grinding machine with an abrasive wheel diameter of 400 mm.

Specific emission of dust from a surface grinding machine with a grinding wheel D of 400 mm according to table. 1.8.1. [7] will be: abrasive dust - 0.022 g / s, metal dust - 0.033 g / s.

Using the cover factor K = 0.005, the emission of pollutants will be: abrasive dust - 0, 00011 g / s, metal dust = 0.000165 g / s.

Specific emission of dust from the dust band machine according to table. 1.8.1. [7] will be: metal dust - 0.014 g / s (cutting machine). With K = 0.005, the emission will be 0.00007

The total emission of dust from all sharpening, grinding and band sawing machines will be: abrasive dust - 0.000175 g / s, metal dust - 0.000335 g / s.

According to [7], table 1.9.1, the specific release of mineral oil when cooled with emulsion of metal-cutting machines with an emulsion content of 3-10% is 0.045 * 10 $^{-5}$g / s per 1 kW of machine power. Machine power is:

Screw-cutting lathe - 5.2 kW

Milling machine - 9.7 kW

Total - 14.9 kW.

The total estimated power of the emission of mineral oil from the operation of all metal-cutting machines of the CRC laboratory is:

M mineral oil = 14.9 x 0.045 x 10 $^{-5}$= 0.000007 g / s

The estimated power of the emission of pollutants is:

M dust abrasive = 0.000017 g / s

For abrasive dust = 0.003780 t / g

M metal dust = 0.000335 g / s

For metal dust = 0.007236 t / g

M mineral oil = 0.000007 g / s

Mineral oil = 0.000151 t / g

SOURCE No. 383

CRC. WATER BOILER

Organized source of emission of pollutants. The release of pollutants occurs as a result of the operation of the following equipment and technological operations:

WATER BOILER - 3 pcs.

The morphometric and dynamic parameters of the source are characterized by the following data: H = 45.0 m; D = 1.0 m; V = 4.9 m / s; Q = 3.874 m ^{3}/ s; T = 150 ^{o}C.

To meet the demand for heat, it is planned to build a hot water boiler house (VK) consisting of two hot water boilers with a heating capacity of 4.65 MW (4.0 Gcal / h) each and one hot water boiler with a heating capacity of 0.6 MW (0.52 Gcal / h). The total thermal power of the boiler house is 9.9 MW (8.52 Gcal / h). The processes of burning natural gas in the boiler furnace are accompanied by the release of such pollutants as carbon oxide, nitrogen oxides, sulfur dioxide, benzopyrene. The products of natural gas combustion are discharged into the atmosphere through a common chimney.

The boiler house will operate 8,760 hours per year. Annual consumption of natural gas will amount to 2981.0 thousand m^{3}.

The calculation of the emission of pollutants during the combustion of natural gas was carried out according to the formulas 1.96, 1.98, 1.101 [7]:

Carbon oxide:

$$P_{with} = 0.001 \times C_{with} \times B \times (1 - q_4/100), \text{ t / r}$$

where: B - fuel consumption, thousand m^3 / year;

C_{with} - the output CO from fuel combustion, kg / t, calculated by the formula:

$$C_{co} = q_3 \times R \times Q_{ir}$$

q_3 - heat loss due to chemical incompleteness of fuel combustion, taken according to table 1.13.2, $q_3 = 0.5\%$;

R - coefficient taking into account the share of heat loss due to chemical incompleteness of fuel combustion, due to the presence of carbon monoxide in the products of incomplete combustion, for gas R = 0.5;

Q_{ir} is the lowest calorific value of natural fuel, for natural gas we take $Q_{ir} = 35.588$ MJ / m^3;

q_4 - heat loss due to mechanical incompleteness of fuel combustion, taken according to table 1.13.2, $q_4 = 0.5\%$.

$$C._{Stock} = 0.5 \times 0.5 \times 8.897 = 35.588 \text{ kg / thousand } m^3$$

$$P_{co} = 0.001 \times 8.897 \times 2981.0 \times (1 - 0.5 / 100) = 26.389347 \text{ t / g}$$

$$P_{with} = 26.389347 \times 10^6/8760/3600 = 0.836801 \text{ g / s}$$

Nitrogen oxides:

$$P_{NOx} = 0.001 \times B \times Q_{ir} \times K_{NOx} \times (1 - \beta), \text{ t / g}$$

where: B - fuel consumption, thousand m^3 / year;

Q_{ir} is the lowest calorific value of natural fuel, for natural gas we take $Q_{ir} = 35.588$ MJ / m^3;

K_{NOx} - a parameter characterizing the amount of nitrogen oxides formed per 1 GJ of heat, $K_{NOx} = 0.07$ kg / GJ;

β - coefficient taking into account the degree of reduction of nitrogen oxide emissions as a result of the application of technical solutions, $\beta = 0$.

$$P_{NOx} = 0.001 \times 2981.0 \times 35.588 \times 0.07 \times (1 - 0) = 7.426148 \text{ t / g}$$

$$N_{NOx} = 7.426148 \times 10^6/8760/3600 = 0.235482 \text{ g / s}$$

The total emissions of nitrogen oxides (NO_x) are divided into nitrogen dioxide (NO_2) and nitrogen oxide (NO). The transformation ratios are generally taken at the level of the maximum set transformation, i.e. 0.8 - for NO_2 and 0.13 - for NO from NO_x.

$$P_{NO2} \text{(nitrogen dioxide)} = 7.426148 \times 0.8 = 5.940918 \text{ t / g}$$

$$P_{NO2} \text{(nitrogen dioxide)} = 0.235482 \times 0.8 = 0.188386 \text{ g / s}$$

$$P_{NO} \text{(oxide nitrogen)} = 7.426148 \times 0.13 = 0.965399 \text{ t / g}$$

$$P_{NO} \text{(nitrogen oxide)} = 0.235482 \times 0.13 = 0.030613 \text{ g / s}$$

Sulfur dioxide:

$$P_{SO2} = 0.02 \times B \times S^r \times (1 - \eta'_{SO2}) \times (1 - \eta''_{SO2}), \text{ t / g}$$

where: B - fuel consumption, thousand m^3 / year;

S^r is the sulfur content in the fuel, $S^r = 0.0018\%$;

η'_{SO_2} - the proportion of sulfur oxides associated with fly ash, $\eta'_{SO_2} = 0$;
η''_{SO_2} - the proportion of sulfur oxides captured in the ash collector, $\eta''_{SO_2} = 0$.

$$P_{SO_2} = 0.02 \times 2981.0 \times 0.0018 \times (1 - 0) \times (1 - 0) = 0.107316 \text{ t / g}$$

$$N_{SO_2} = 0.107316 \times 10^6/8760/3600 = 0.003403 \text{ g / s}$$

Benzopyrene:

$$Q_{bp} = C_{bp} \times V_{in} / 10^{6,} \text{ g / s}$$

where: C_{bp} is the concentration of benzopyrene in the flame, for gas $C_{bp} = 0.14$ μg / m^3;
V_{in} - the volume of the gas-air mixture in one technological operation, m^3 / s.

$$Q_{bp} = 0.14 \times 3.874 / 10^6 = 0.000001 \text{ g / s}$$

$$Q_{bp} = 0.000001 \times 8760 \times 3600/10^6 = 0.000017 \text{ t / g}$$

Qualitative and quantitative characteristics of the considered selection of sources and emissions and projected timber industry, are shown in Tables 4.1.1, 4.1.2.

Sources of emission of pollutants

Table 4.1.1

Name of production, workshop, site	Selection source name	Product name (performed operation)	Selection source operating time, hour		Pollutant name	The amount of pollutant outgoing from the source of emission			
			per day	per year		average, mg / m ^{3}	maximum		total, t / year
							mg / m ^{3}	g / s	
1	2	3	4	5	6	7	8	nine	ten
CRC. SCRAP YARD	Gas cutting machine - 2 pcs.	Metal cutting		3720	Iron oxide Manganese dioxide Carbon oxide Nitrogen oxide			0.053889 0.001667 0.018055 0.014778	0.721680 0.022320 0.241800 0.197904
CRC. HBI WAREHOUSE	HBI car dumper - 1 pc.	Unloading HBI		883	Iron oxide			972,220	3090.492939
	Conveyor system for HBI supply to the Meltshop - 1 pc.	Transport of HBI		1631	Iron oxide			19.4440	114.167390
CRC. DAILY WAREHOUSE OF FERROALOYS AND ADDITIVES	Receiving hopper for lime - 1 pc. Belt vertical conveyor -1 pc. Accumulating hopper for lime - 4 pcs.	Storage and handling of ferroalloys and additives		624	Calcium oxide			123.0	276,3072
	Prefabricated belt conveyor for lime - 1 pc.	Moving ferroalloys and additives		624	Calcium oxide			2.1385	4.803926
	Installation for aging additives - 2 pcs.	Aging additives		201	Ferroalloys Soot Calcium oxide Calcium fluoride			4.164 4.164 4.164 4.164	1.229213 3.837542 3.013070 0.554645
CRC. Meltshop. FURNACE AREA	Electric Arc Furnace EAF - 12/140 - 1pc. Ladle furnace installation - 1 pc. Bulk material feeding system - 1 pc. Dust collection bin building - 1 pc.	Steel smelting and processing. Bulk material feeding		7440	Steel-making dust Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Cyanide hydrogen Hydrogen fluoride			869,166 61.041667 9.441111 1.534181 0.065111 1.155722 0.022789	23279,742 1634,940 252,870717 41.091504 1.743936 30.954864 0.610377
CRC. Meltshop	Stand for tundish heating - 1 pc.	Natural gas combustion		3720	Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Benzopyrene			0.590168 0.142352 0.023132 0.002400 0.0000001	7.903525 1.906378 0.309786 0.032141 0.000001
	Stand for tundish heating - 1 pc.	Natural gas combustion		3720	Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Benzopyrene			0.590168 0.142352 0.023132 0.002400 0.0000001	7.903525 1.906378 0.309786 0.032141 0.000001
	Tundish drying stand - 1 pc.	Natural gas combustion		7440	Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Benzopyrene			0.442626 0.106764 0.017349 0.001800 0.00000008	11.855288 2.859567 0.464680 0.048211 0.000002
CRC. Meltshop. AREA OF INJECTING CARBON-CONTAINING POWDER	Receiving hopper for carbon-containing powder –1 pc.	Dusting carbon powder		5570	Soot			4.4975	1,797201
	Receiving hopper for carbon-containing powder - 1 pc.	Dusting carbon powder		5570	Soot			4.4975	1,797201

Name of production, workshop, site	Selection source name	Product name (performed operation)	Selection source operating time, hour		Pollutant name	The amount of pollutant outgoing from the source of emission			
			per day	per year		average, mg / m ^{3}	maximum		total, t / year
							mg / m ^{3}	g / s	
1	2	3	4	5	6	7	8	nine	ten
	Receiving hopper for carbon-containing powder - 1 pc.	Dusting carbon powder		5570	Soot			4.4975	1,797201
CRC. Slab Caster	Vertical stand for heating the ladle - 1 pc.	Natural gas combustion		7440	Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Benzopyrene			0.737709 0.017794 0.028915 0.003000 0.0000001	19.758813 4.765945 0.774466 0.080352 0.000004
	Horizontal stand for steel ladle heating - 1 pc.	Natural gas combustion		3720	Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Benzopyrene			0.737709 0.017794 0.028915 0.003000 0.0000001	9.879406 2.382972 0.387233 0.040176 0.000002
	Horizontal stand for steel ladle heating - 1 pc.	Natural gas combustion		3720	Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Benzopyrene			0.737709 0.017794 0.028915 0.003000 0.0000001	9.879406 2.382972 0.387233 0.040176 0.000002
	Ladle drying stand - 1 pc.	Natural gas combustion		3720	Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Benzopyrene			0.737709 0.017794 0.028915 0.0030000 0.0000001	9.879406 2.382972 0.387233 0.040176 0.000002
	Ladle drying stand - 1 pc.	Natural gas combustion		3720	Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Benzopyrene			0.737709 0.017794 0.028915 0.0030000 0.0000001	9.879406 2.382972 0.387233 0.040176 0.000002
	Crystallizer - 1 pc. Cooling chamber for the swing mechanism and roller sections - 1 pc.	Casting steel		7440	Carbon oxide Hydrocarbons			0.00116 0.00048	0.031069 0.012856
CRC. ROLLING MILLSHOP	Tunnel heating furnace - 1 pc.	Natural gas combustion		7440	Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Benzopyrene			5.194507 1.169417 0.190030 0.021124 0.000001	138,129667 31.321654 5.089769 0.565790 0.000036
CRC. ROLLING MILLSHOP. TUNNEL FURNACE ROLLER SERVICE AREA	Drying oven - 1 pc.	Natural gas combustion		1000	Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Benzopyrene			0.009836 0.002214 0.000360 0.000040 0.00000001	0.035410 0.007972 0.001295 0.000144 0.00000006
CRC. ROLLING MILLSHOP. WALZESHLI - FOVAL WORKSHOP	Grinding machine - 3 pcs.	Metal processing		1200	Abrasive dust Dust metal			0.000255 0.000390	0.001102 0.001685
CRC. ROLLING MILLSHOP. WORKSHOP FOR MAINTENANCE OF	Turning machining center RMC-2000 - 1 pc. Lathe machining center RMC-1000 - 1 pc.	Metal processing, electric welding		1500	Abrasive dust Dust metal			0.000095 0.000145	0.000003 0.000052

Name of production, workshop, site	Selection source name	Product name (performed operation)	Selection source operating time, hour		Pollutant name	The amount of pollutant outgoing from the source of emission			
			per day	per year		average, mg / m ^{3}	maximum		total, t / year
							mg / m ^{3}	g / s	
1	2	3	4	5	6	7	8	nine	ten
SCM	Milling machine - 1 pc. Sharpening machine - pcs. Surfacing installation - pcs. AC electric welding machine - 1 pc.				Mineral oil Iron oxide Manganese dioxide			0.000056 0.000755 0.000083	0.000302 0.000543 0.000060
CRC. Primary Slag Processing Area	Slag loading into dump trucks - 1 pc.	Slag filling		1527	Inorganic dust SiO $_2$ <20%			0.5	2.7486
STEEL MELTING LABORATORY	Slag crusher - 1 pc. Slag mill - 1 pc.	Slag crushing and grinding		512	Inorganic dust SiO $_2$ <20%			0.000771	0.002841
CRC LABORATORY	Cutting band saw machine - pcs. Band saw - pcs. Milling machine - pcs. Screw-cutting lathe - pcs. Vertical drilling machine - pcs. Surface grinding machine - D = 400 mm - 1pc. Sharpening machine D = 300 mm - 1 pc.	Metal processing		6000	Abrasive dust Dust metal Mineral oil			0.000017 0.000335 0.000007	0.003780 0.007236 0.000151
CRC. WATER BOILER	Hot water boiler - 3 pcs.	Natural gas combustion		8760	Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Benzopyrene			0.836801 0.188386 0.030613 0.003403 0.000001	26.389347 5.940918 0.965399 0.107316 0.000017

Sources of pollutant emissions

Table 4.1.2

Name of production, workshop, site	Selection sources	Naimenova - of the emission source	Working time, hour / year	Source No. on the map	Height, m	Mouth diameter, m	Gas-air mixture parameters			Source coordinates on the schematic map, m					Pollutant name	Emissions of pollutants		
							Volume, m ^{3} / s	Speed, m / s	Temperature, ^{0}C	One end point, linear, planar		The second end of point, linear, planar		Width, m		g / s	mg / m ^{3}	t / y
										X1	Y 1	X2	Y2					
1	2	3	4	5	6	7	8	nine	ten	eleven	12	thirteen	fourteen	fifteen	sixteen	17	eighteen	19
CRC. SCRAP YARD	Gas cutting machine for metal - 2 pcs.	Unorganized	3720	357	2.0	0.56	0.886	3.6	24						Iron oxide Manganese dioxide Carbon oxide Nitrogen oxide	0.053889 0.001667 0.018055 0.014778		0.721680 0.022320 0.241800 0.197904
CRC. HBI WAREHOUSE	HBI car dumper - 1 pc.	Trumpet	883	358	50	3.0	97,222	13.8	20						Iron oxide	0.972220		3.090493
	Conveyor system for HBI supply to the Meltshop - 1 pc.	Trumpet	1631	359	thirty	0.63	4.861	15.6	20						Iron oxide	0.019444		0.114167
CRC. DAILY WAREHOUSE OF FERROALOYS AND ADDITIVES	Receiving hopper for lime - 1 pc. Belt vertical conveyor -1 pc.	Trumpet	624	360	50	1.5	205	11.6	20						Calcium oxide	0.123000		0.276307

Name of production, workshop, site	Selection sources	Naimenova - of the emission source	Working time, hour / year	Source No. on the map	Height, m	Mouth diameter, m	Gas-air mixture parameters			Source coordinates on the schematic map, m					Pollutant name	Emissions of pollutants		
							Volume, m³/ s	Speed, m / s	Temperature, °C	One end point, linear, planar		The second end of point, linear, planar		Width, m		g / s	mg / m³	t / y
										X1	Y 1	X2	Y2					
1	2	3	4	5	6	7	8	nine	ten	eleven	12	thirteen	fourteen	fifteen	sixteen	17	eighteen	19
	Accumulating hopper for lime - 4 pcs.																	
	Prefabricated belt conveyor for lime - 1 pc.	Trumpet	624	361	eighteen	0.25	0.611	12.5	20						Calcium oxide	0.002138		0.004804
	Installation for aging additives - 2 pcs.	Trumpet	201	362	eighteen	0.25	0.694	14.2	20						Ferroalloys Soot Calcium oxide Calcium fluoride	0.004164 0.004164 0.004164 0.004164		0.001229 0.003837 0.003013 0.000555
CRC. Meltshop. FURNACE AREA	Electric Arc Furnace EAF - 12/140 - 1 pc. Ladle furnace installation - 1 pc. Bulk material feeding system - 1 pc. Dust collection bin building - 1 pc.	Trumpet	7440	363	150.0	9.0	579,444	9.1	45						Steel-making dust Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Cyanide hydrogen Hydrogen fluoride	4.35583 61.041667 9.441111 1.534181 0.065111 1.155722 0.022789		116.398711 1634,940 252,870717 41.091504 1.743936 30.954864 0.610377
CRC. Meltshop	Stand for tundish heating - 1 pc.	Trumpet	3720	364	45.0	0.7	0.818	2.1	200						Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Benzopyrene	0.590168 0.142352 0.023132 0.002400 0.0000001		7.903525 1.906378 0.309786 0.032141 0.000001
	Stand for tundish heating - 1pc.	Trumpet	3720	365	45.0	0.7	0.818	2.1	200						Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Benzopyrene	0.590168 0.142352 0.023132 0.002400 0.0000001		7.903525 1.906378 0.309786 0.032141 0.000001
	Tundish drying stand - 1 pc.	Trumpet	7440	366	45.0	0.6	0.614	2.2	200						Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Benzopyrene	0.442626 0.106764 0.017349 0.001800 0.0000000		11.855288 2.859567 0.464680 0.048211 0.000002
CRC. Meltshop. AREA OF INJECTING CARBON-CONTAINING POWDER	Receiving hopper for carbon-containing powder –1 pc.	Trumpet	5570	367	18.0	0.2	0.257	8.2	20						Soot	0.004497		0.001797
	Receiving hopper for carbon-containing powder - 1 pc.	Trumpet	5570	368	18.0	0.2	0.257	8.2	20						Soot	0.004497		0.001797
	Receiving hopper for carbon-containing powder - 1 pc.	Trumpet	5570	369	18.0	0.2	0.257	8.2	20						Soot	0.004497		0.001797
CRC. Slab Caster	Vertical stand for heating the ladle - 1 pc.	Trumpet	7440	370	45.0	0.7	1.023	2.6	200						Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Benzopyrene	0.737709 0.017794 0.028915 0.003000 0.0000001		19.758813 4.765945 0.774466 0.080352 0.000004

Name of production, workshop, site	Selection sources	Naimenova - of the emission source	Working time, hour / year	Source No. on the map	Height, m	Mouth diameter, m	Gas-air mixture parameters			Source coordinates on the schematic map, m					Pollutant name	Emissions of pollutants		
							Volume, m³/ s	Speed, m / s	Temperature, °C	One end point, linear, planar		The second end of point, linear, planar		Width, m		g / s	mg / m³	t / y
										X1	Y 1	X2	Y2					
1	2	3	4	5	6	7	8	nine	ten	eleven	12	thirteen	fourteen	fifteen	sixteen	17	eighteen	19
	Horizontal stand for steel ladle heating - 1 pc.	Trumpet	3720	371	45.0	0.7	1.023	2.6	200						Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Benzopyrene	0.737709 0.017794 0.028915 0.003000 0.0000001		9.879406 2.382972 0.387233 0.040176 0.000002
	Horizontal stand for steel ladle heating - 1 pc.	Trumpet	3720	372	45.0	0.7	1.023	2.6	200						Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Benzopyrene	0.737709 0.017794 0.028915 0.003000 0.0000001		9.879406 2.382972 0.387233 0.040176 0.000002
	Ladle drying stand - 1 pc.	Trumpet	3720	373	45.0	0.7	1.023	2.6	200						Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Benzopyrene	0.737709 0.017794 0.028915 0.0030000 0.0000001		9.879406 2.382972 0.387233 0.040176 0.000002
	Ladle drying stand - 1 pc.	Trumpet	3720	374	45.0	0.7	1.023	2.6	200						Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Benzopyrene	0.737709 0.017794 0.028915 0.0030000 0.0000001		9.879406 2.382972 0.387233 0.040176 0.000002
	Crystallizer - 1 pc. Cooling chamber for the swing mechanism and roller sections - 1 pc.	Trumpet	7440	375	45.0	2.5	66,667	13.6	40						Carbon oxide Hydrocarbons	0.00116 0.00048		0.031069 0.012856
CRC. ROLLING MILLSHOP	Tunnel heating furnace - 1 pc.	Trumpet	7440	376	75.0	2.0	9,549	3.0	350						Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Benzopyrene	5.194507 1.169417 0.190030 0.021124 0.000001		139,129667 31.321654 5.089769 0.565790 0.000036
CRC. ROLLING MILLSHOP. TUNNEL FURNACE ROLLER SERVICE AREA	Drying oven - 1 pc.	Trumpet	1000	377	37.0	0.2	0.114	3.6	125						Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Benzopyrene	0.009836 0.002214 0.000360 0.000040 0.0000000		0.035410 0.007972 0.001295 0.000144 0.00000006
CRC. ROLLING MILLSHOP. ROLLING WORKSHOP	Grinding machine - 3 pcs.	Unorganized	1200	378	2.0	0.56	0.886	3.6	20						Abrasive dust Dust metal	0.000255 0.000390		0.001102 0.001685
CRC. ROLLING MILLSHOP. WORKSHOP FOR MAINTENANCE OF SCM	Turning machining center RMC-2000 - 1 pc. Lathe machining center RMC-1000 - 1 pc. Milling machine - 1 pc. Sharpening machine - pcs.	Unorganized	1500	379	2.0	0.56	0.886	3.6	20						Abrasive dust Dust metal Mineral oil Iron oxide Manganese dioxide	0.000095 0.000145 0.000056 0.000755 0.000083		0.000003 0.000052 0.000302 0.000543 0.000060

Name of production, workshop, site	Selection sources	Naimenova - of the emission source	Working time, hour / year	Source No. on the map	Height, m	Mouth diameter, m	Gas-air mixture parameters			Source coordinates on the schematic map, m					Pollutant name	Emissions of pollutants		
							Volume, m^3/s	Speed, m / s	Temperature, ^0C	One end point, linear, planar		The second end of point, linear, planar		Width, m		g / s	mg / m^3	t / y
										X1	Y 1	X2	Y2					
1	2	3	4	5	6	7	8	nine	ten	eleven	12	thirteen	fourteen	fifteen	sixteen	17	eighteen	19
	Surfacing installation - pcs. AC electric welding machine - 1 pc.																	
CRC. Primary Slag Processing Area	Slag loading into dump trucks - 1 pc.	Unorganized	1527	380	2.0	0.56	0.886	3.6	20						Inorganic dust SiO_2 <20%	0.5		2.7486
STEEL MELTING LABORATORY	Slag crusher - 1 pc. Slag mill - 1 pc.	Unorganized	512	381	2.0	0.56	0.886	3.6	20						Inorganic dust SiO_2 <20%	0.000771		0.002841
CRC LABORATORY	Cutting band saw machine - pcs. Band saw - pcs. Milling machine - pcs. Screw-cutting lathe - pcs. Vertical drilling machine - pcs. Surface grinding machine - D = 400 mm - 1pc. Sharpening machine D = 300 mm - 1 pc.	Unorganized	6000	382	2.0	0.56	0.886	3.6	20						Abrasive dust Dust metal Mineral oil	0.000017 0.000335 0.000007		0.003780 0.007236 0.000151
CRC. WATER BOILER	Hot water boiler - 3 pcs.	Trumpet	8760	383	45.0	1.0	3.874	4.9	150						Carbon oxide Nitrogen dioxide Nitrogen oxide Sulfur dioxide Benzopyrene	0.836801 0.188386 0.030613 0.003403 0.000001		26.389347 5.940918 0.965399 0.107316 0.000017

Characterization of pollutants

During the operation of the projected CRC in air from 2 7 - E stationary emission sources will arrive pollutants 1 9 - 5 items. The list of pollutants is presented in table 4.1.3, the environmental characteristics of substances are taken from the hygienic standards [1 0].

Table 4.1.3

P / p No.	Name of pollutant substances	MPC m. r. (OBUV), mg / m ^{3}	Hazard Class
1	2	3	4
1	Steel-making dust (for iron oxide	0.2	3
2	Carbon o xid	5.0	4
3	Nitrogen dioxide	0.085	2
4	Nitrogen o xid	0.6	3
5	Sulfur dioxide	0.5	3
6	Iron oxide	0.2	3
7	Calcium oxide	(0.3)	-
8	Soot (technical carbon)	0.15	3
nine	Ferroalloy dust	(0.02)	-
ten	Calcium fluoride	0.5	3
eleven	Inorganic dust with SiO_2<20%	0, 5	3
12	Dust metal	0.05	3
thirteen	Abrasive dust	0.04	3
fourteen	Manganese dioxide	0.005	2
fifteen	Cyanide hydrogen	0.03	2
sixteen	Hydrogen fluoride	0.02	2
17	Benzopyrene	0.000001	1
eighteen	Mineral oil	0.05	4
19	Hydrocarbons	1.0	4

Total emissions of polluting substances from objects projected CRC, given in tables e 4.1.4.

Characteristics of dust and fume treatment equipment

According to the preliminary ENGINEERING DECISIONS, n and facilities CRC will be used in 9 dust and fume treatment plants:

- Emission source No. 358. The Suction system is designed to capture and purify dusty air when unloading hot briquetted iron using a car dumper at the HBI warehouse. The unloading point of the car dumper is protected by a shelter. The shelter is divided into two sections by a partition. Each section is connected to a duct network. Places of reloading from conveyor to conveyor also provide for shelters, and suction from them. Cleaning of dusty air with HBI dust (taken for iron oxide) will be carried out in a bag filter with a standard efficiency of up to 99.9%.

- Emission source No. 359. Conveyor system for HBI supply, designed for storage and mechanized feeding of material into an arc Electric Arc Furnace (EAF), is equipped with an Suction system. Cleaning of dusty air with HBI dust (taken for iron oxide) will be carried out in a bag filter with a standard efficiency of up to 99.9%.

- Source of emission no. 360. The Suction system serves the receiving hopper, vertical conveyor and lime feed hoppers at the daily storage of ferroalloys and additives. Cleaning of dusty air with lime dust (taken for calcium oxide) will be carried out in a bag filter with a standard efficiency of up to 99.9%.

- Source of emission No. 361. The Suction system serves the system for unloading lime from the storage bins onto the collecting conveyor at the daily warehouse of ferroalloys and additives. Cleaning of dusty air with lime dust (taken for calcium oxide) will be carried out in a bag filter with a standard efficiency of up to 99.9%.

- Source of emission No. 362. The Suction system is designed to collect dust when loading the decompressor with big bags, and when loading vehicles, at the daily warehouse of ferroalloys and additives. Cleaning of dusty air with dust of various additives will be carried out in a bag filter with a standard efficiency of up to 99.9%.

- Source of emission No. 363. The fume treatment system of the Meltshop is designed for exhaust gas extraction and purification from: the 4th hole on the roof of the EAF-120 furnace; exhaust hood for secondary gases; primary waste gases from a two-position ladle furnace; systems for feeding bulk materials into the EAF, into the ladle furnace (LF) and into the two-position steel vacuuming unit (Steel Degassing Unit); two-position Steel Degassing Unit; from the building of the collecting dust bin (dust silo). The processes of steel smelting in electric arc furnaces, as well as the subsequent processes of metal tapping and its processing at the ladle-furnace unit and the steel Degassing unit, are associated with a large emission of dust and gases, including: inorganic dust (steelmaking), carbon oxide, nitrogen dioxide, nitrogen oxide, sulfur dioxide, hydrogen cyanide and fluoride. The dusty air will be cleaned according to a two-stage scheme - at the first stage, a cyclone-spark arrester, at the second - a bag filter. The standard efficiency of the two-stage cleaning system will be up to 99.5%. Only inorganic dust (steelmaking) is cleaned.

- Sources of emission No. 367-369. Dust emission of carbon-containing powder (soot) occurs in the process of pneumatic loading of receiving hoppers at the site of injection of carbon-containing powder. Each bin is equipped with a dust collector (bag filter) with a standard cleaning efficiency of up to 99.9%.

The quantitative and qualitative characteristics of the dust and fume treatment equipment of the projected CRC are presented in Table 4.1.5.

Total emissions of pollutants into the atmosphere

Table 4.1.4

Name of pollutants	The amount of pollutants emitted from sources, t / year	Including		Of those received for cleaning			Total emitted into the atmosphere, t / year	Specific emission, t / thousand t of steel smelted
		thrown away without cleaning, t / year	goes for cleaning, t / year	emitted into the atmosphere, t / year	captured and rendered harmless			
					actually, t / year	of which is utilized, t / year		
1	2	3	4	5	6	7	8	nine
TOTAL	**29066,97041**	**2287.430884**	**26779.53953**	**119,898507**	**26659.64102**	**26659.64102**	**2407,329391**	**2.202497**
including SOLID :	**26783.04943**	**3.509902**	**26779.53953**	**119,898507**	**26659.64102**	**26659.64102**	**123,408409**	**0.112908**
Steel-making dust	23279,742	-	23279,742	116.398711	23163.343289	23163.343289	116.398711	0.106495
Iron oxide	3205,382552	0.722223	3204,660329	3.20466	3201,455669	3201,455669	3.926883	0.003593
Calcium oxide	284,124196	-	284,124196	0.284124	283.840072	283.840072	0.284124	0.000260
Soot	9.229145	-	9.229145	0.009228	9.219917	9.219917	0.009228	0.000008
Ferroalloy dust	1.229213	-	1.229213	0.001229	1.227984	1.227984	0.001229	0.000001
Calcium fluoride	0.554645	-	0.554645	0.000555	0.55409	0.55409	0.000555	0.000001
Inorganic dust SiO_2<20%	2.751441	2.751441	-	-	-	-	2.751441	0.002517
Manganese dioxide	0.02238	0.02238	-	-	-	-	0.02238	0.000020
Abrasive dust	0.004885	0.004885	-	-	-	-	0.004885	0.000004
Dust metal	0.008973	0.008973	-	-	-	-	0.008973	0.000008
GASEOUS AND LIQUID :	**2283,920982**	**2283,920982**					**2283,920982**	**2.089589**
Carbon oxide	1887,706068	1887,706068	-	-	-	-	1887,706068	1.727087
Nitrogen dioxide	311,111417	311,111417	-	-	-	-	311,111417	0.284640
Nitrogen oxide	50.753521	50.753521	-	-	-	-	50.753521	0.046435
Cyanide hydrogen	30.954864	30.954864	-	-	-	-	30.954864	0.028321
Sulfur dioxide	2.770735	2.770735	-	-	-	-	2.770735	0.002535
Hydrogen fluoride	0.610377	0.610377	-	-	-	-	0.610377	0.000558
Hydrocarbons	0.012856	0.012856	-	-	-	-	0.012856	0.000012
Mineral oil	0.000453	0.000453	-	-	-	-	0.000453	0.000000
Benzopyrene	0.0006906	0.0006906	-	-	-	-	0.0006906	0.000001

Performance indicators of dust and fume treatment (neutralization) installations

Table 4.1.5

Emission source no.	The name of the dust and fume treatment (decontamination) installation	The name of the pollutants used for cleaning	Substance concentration, mg / m ^{3}		Installation efficiency, %		Security ratio, %		Characteristics of the state of the dust and fume treatment (decontamination) installation, units		
			goes for cleaning	after cleaning	project	actual	normative	actual	Total	faulty	ineffective
1	2	3	4	5	6	7	8	nine	ten	eleven	12
358	Bag filter	Iron oxide	10000	10.0	99.9	99.9	100	100	1	-	-
359	Bag filter	Iron oxide	4000	4.0	99.9	99.9	100	100	1	-	-
360	Bag filter	Calcium oxide	6000	6.0	99.9	99.9	100	100	1	-	-
361	Bag filter	Calcium oxide	1500	1.5	99.9	99.9	100	100	1	-	-
362	Bag filter	Ferroalloys Soot Calcium oxide Calcium fluoride	6000 6000 6000 6000	6.0 6.0 6.0 6.0	99.9	99.9	100	100	1	-	-
363	I - stage - Cyclone spark arrester II - stage - Bag filter	Steel-making dust	1500	10.0	99.5	99.5	100	100	1	-	-
367	Bag filter	Soot	17500	17.5	99.9	99.9	100	100	1	-	-
368	Bag filter	Soot	17500	17.5	99.9	99.9	100	100	1	-	-
369	Bag filter	Soot	17500	17.5	99.9	99.9	100	100	1	-	-

Air pollution analysis

The calculation of the dispersion fields of surface concentrations of pollutants in the atmospheric air was carried out using a computer according to the unified program Ecologist.

The initial data for calculating the dispersion of harmful substances in the surface layer of the atmosphere were taken from the parameters of emission sources, meteorological characteristics and coefficients that determine the degree and nature of dispersion of chemicals in the atmosphere of the area where the enterprise is located, as well as regulatory documents on nature protection.

Quotas for the pollutants emitted are determined in accordance with Appendix No. 3 [6].

The results of calculating the surface concentrations of the considered pollutants in the atmospheric air are presented in Table 4.1.6.

Table 4.1.6

Name pollutant	Quota, share of MPC	Maximum concentration outside the SPZ, MAC share
1	2	3
Steel-making dust (for iron oxide)	0.25	0.14
Carbon oxide	0.33	0.02
Nitrogen dioxide	0.20	0.19
Nitrogen oxide	0.25	0.01
Sulfur dioxide	0.25	0.03
Iron oxide	0.25	0.04
Calcium oxide	0.25	0.14
Soot (technical carbon)	0.25	<0.01
Ferroalloy dust	0.25	0.22
Calcium fluoride	0.25	<0.01
Inorganic dust with SiO_2<20%	0.25	0.13
Dust metal	0.25	0.04
Abrasive dust	0.25	0.10
Manganese dioxide	0.20	0.08
Cyanide hydrogen	0.20	0.11
Hydrogen fluoride	0.20	0.01
Benzopyrene	0.17	0.03
Mineral oil	0.33	0.12
Hydrocarbons	0.33	0.16

An analysis of the fields of surface concentrations of the considered pollutants emitted during the operation of the projected casting and rolling complex, taking into account all the existing sources of the plant, emitted similar pollutants, shows that outside the SPZ, emissions for all ingredients will not exceed the established quotas.

Despite a significant increase in emissions of pollutants, the maximum surface concentrations of the pollutants under consideration do not increase. These results are due to a number of reasons, namely:

- the height of the mouth of the flue pipe main source ejection - №3 63 (after fume treatment EAF) and №376 (tunneling from the heating furnace) will be 150 m and 75 m, respectively, that will Contributing acce best dispersion of pollutants at a height;

- according to the current draft MPE, source No. 31 (fume treatment from the existing EAF) is not the main contributor to the formation of the maximum surface concentrations of the pollutants under consideration (the largest contribution is made by fugitive emission sources with an estimated height of 2 m, as well as organized sources with a pipe height of 5 to 30 m).

The graphic results of the fields of dispersion of pollutants in the atmospheric air are presented in Figures 4.1.1 ÷ 4.1.17.

Рисунок 4.1.1
Карта рассеивания загрязняющих веществ в приземном слое атмосферы

Объект: **АО "Узметкомбинат"**

Загрязняющее вещество: **Пыль сталеплавильная**

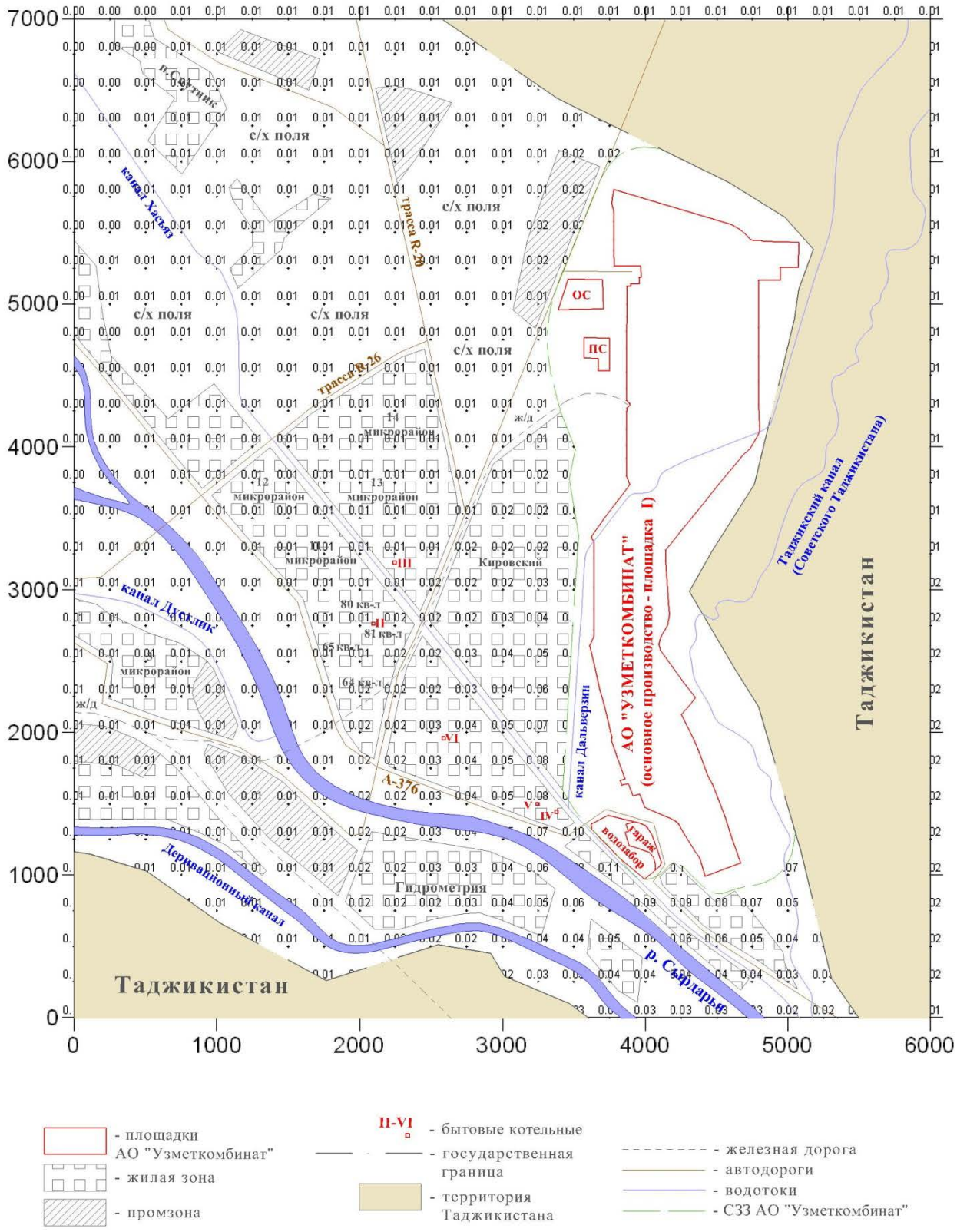


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Рисунок 4.1.2
Карта рассеивания загрязняющих веществ в приземном слое атмосферы

Объект: **АО "Узметкомбинат"**

Загрязняющее вещество: **Углерода оксид**

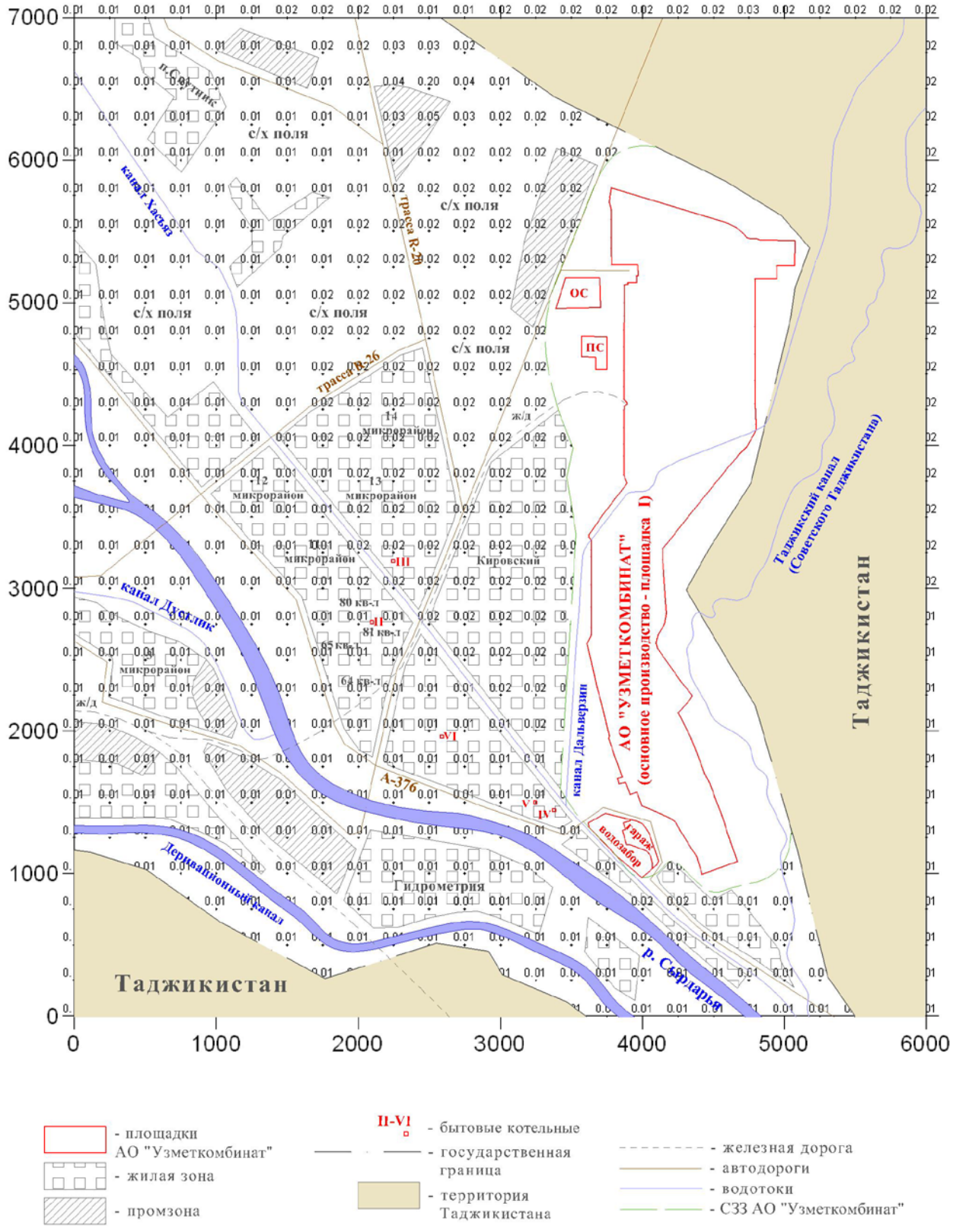

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Рисунок 4.1.3
Карта рассеивания загрязняющих веществ в приземном слое атмосферы

Объект: **АО "Узметкомбинат"**

Загрязняющее вещество: **Азота диоксид**

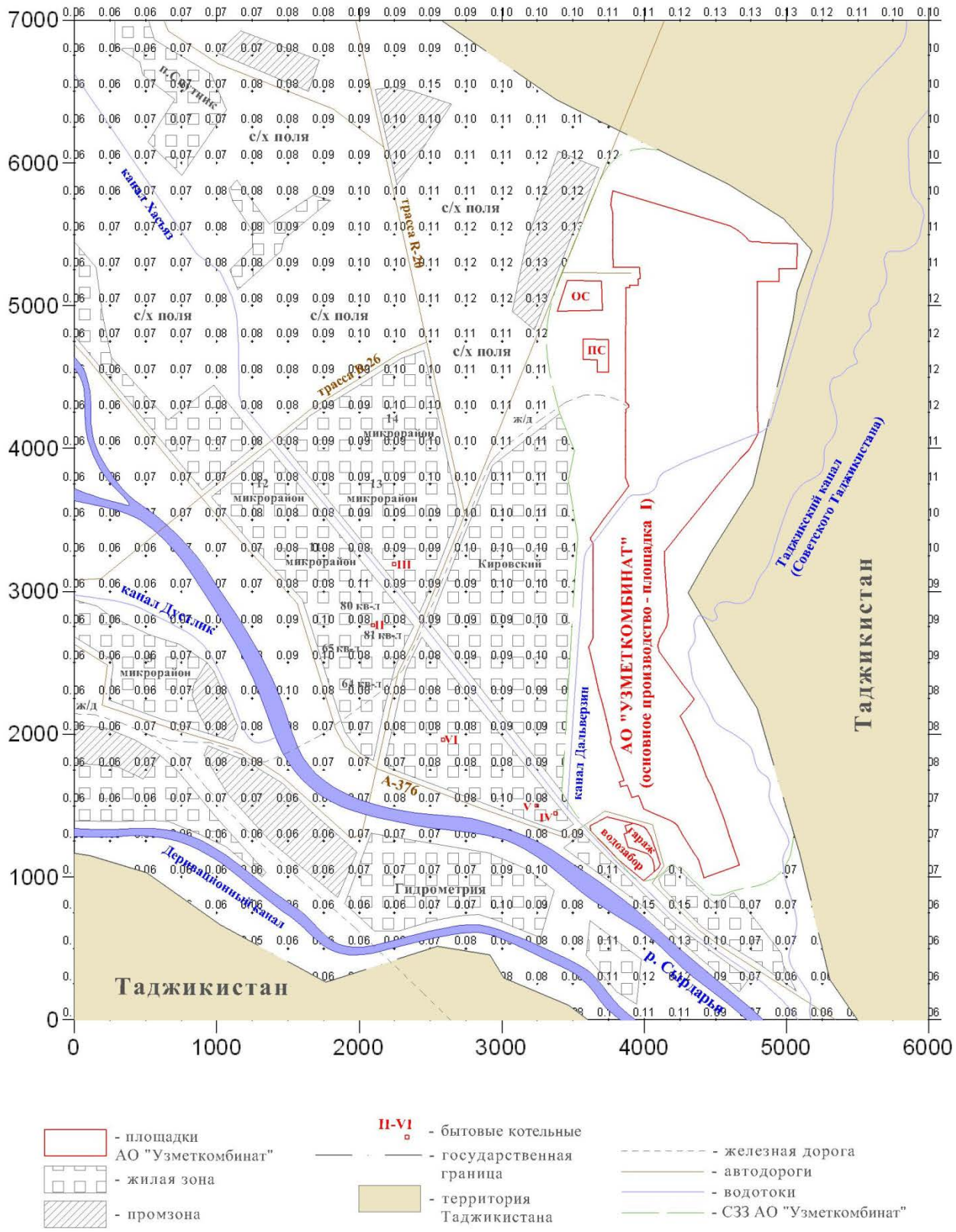

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Рисунок 4.1.4
Карта рассеивания загрязняющих веществ в приземном слое атмосферы

Объект: **АО "Узметкомбинат"**

Загрязняющее вещество: **Азота оксид**

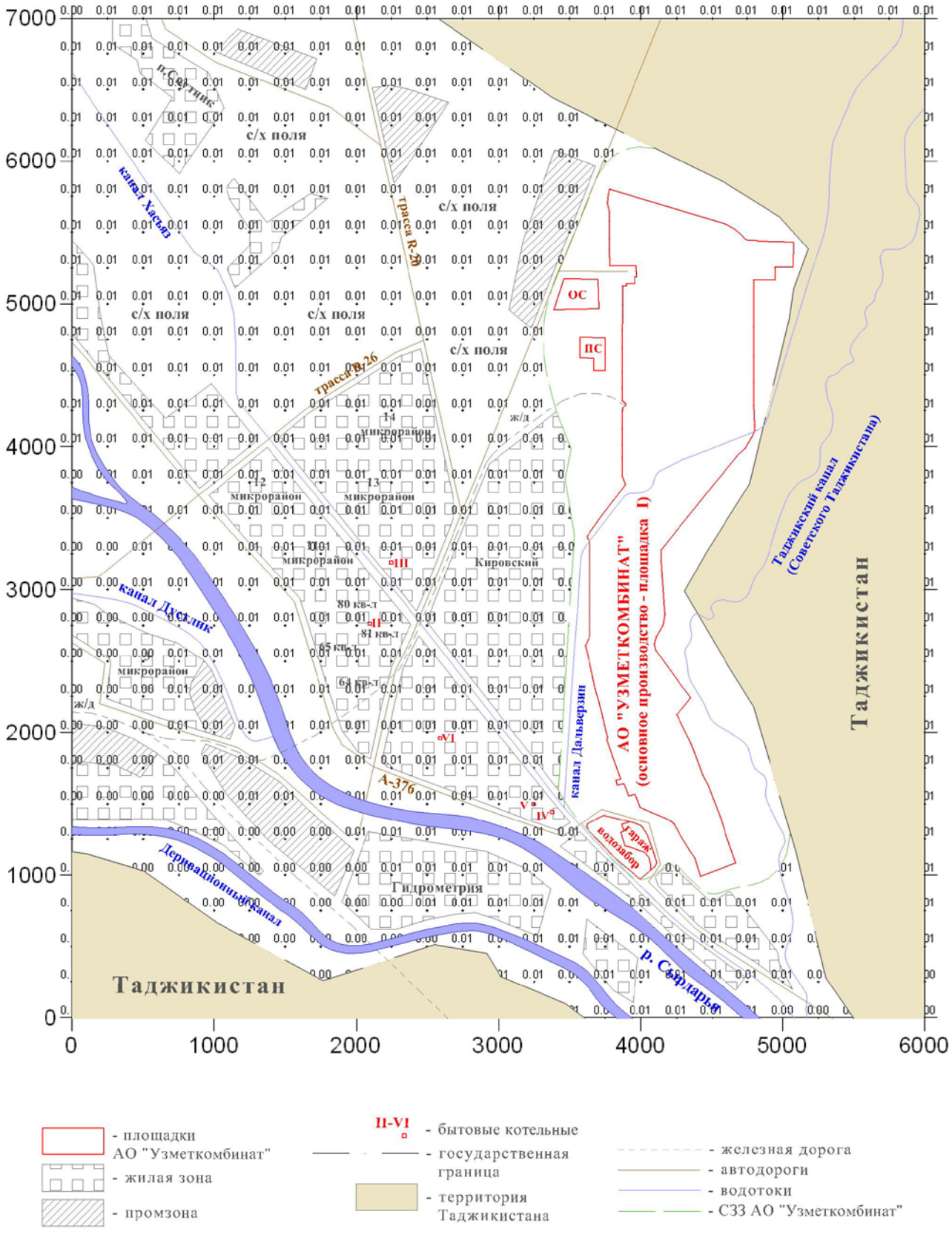

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Рисунок 4.1.5
Карта рассеивания загрязняющих веществ в приземном слое атмосферы

Объект: **АО "Узметкомбинат"**

Загрязняющее вещество: **Серы диоксид**

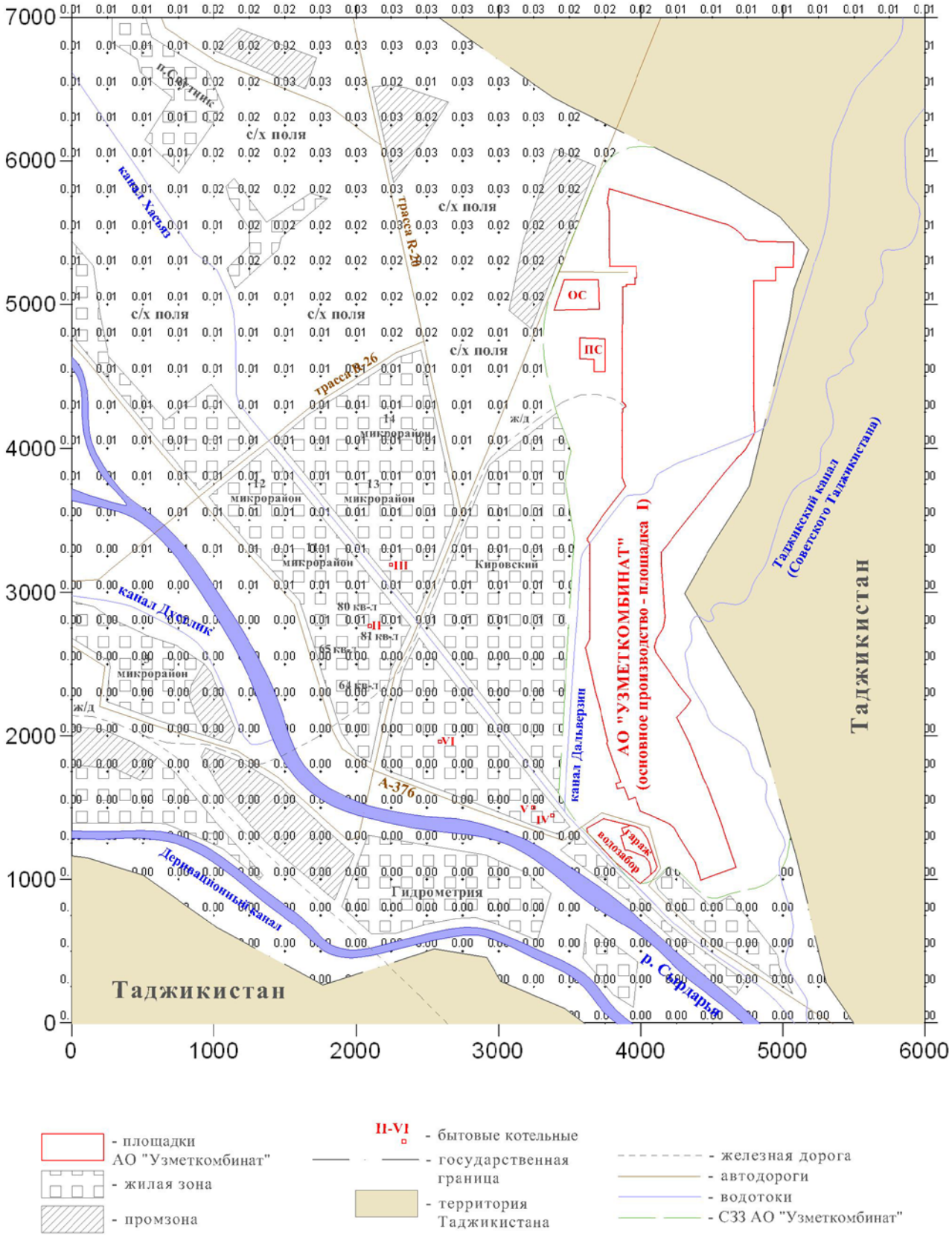

Рисунок 4.1.6
Карта рассеивания загрязняющих веществ в приземном слое атмосферы

Объект: **АО "Узметкомбинат"**

Загрязняющее вещество: **Железа оксид**

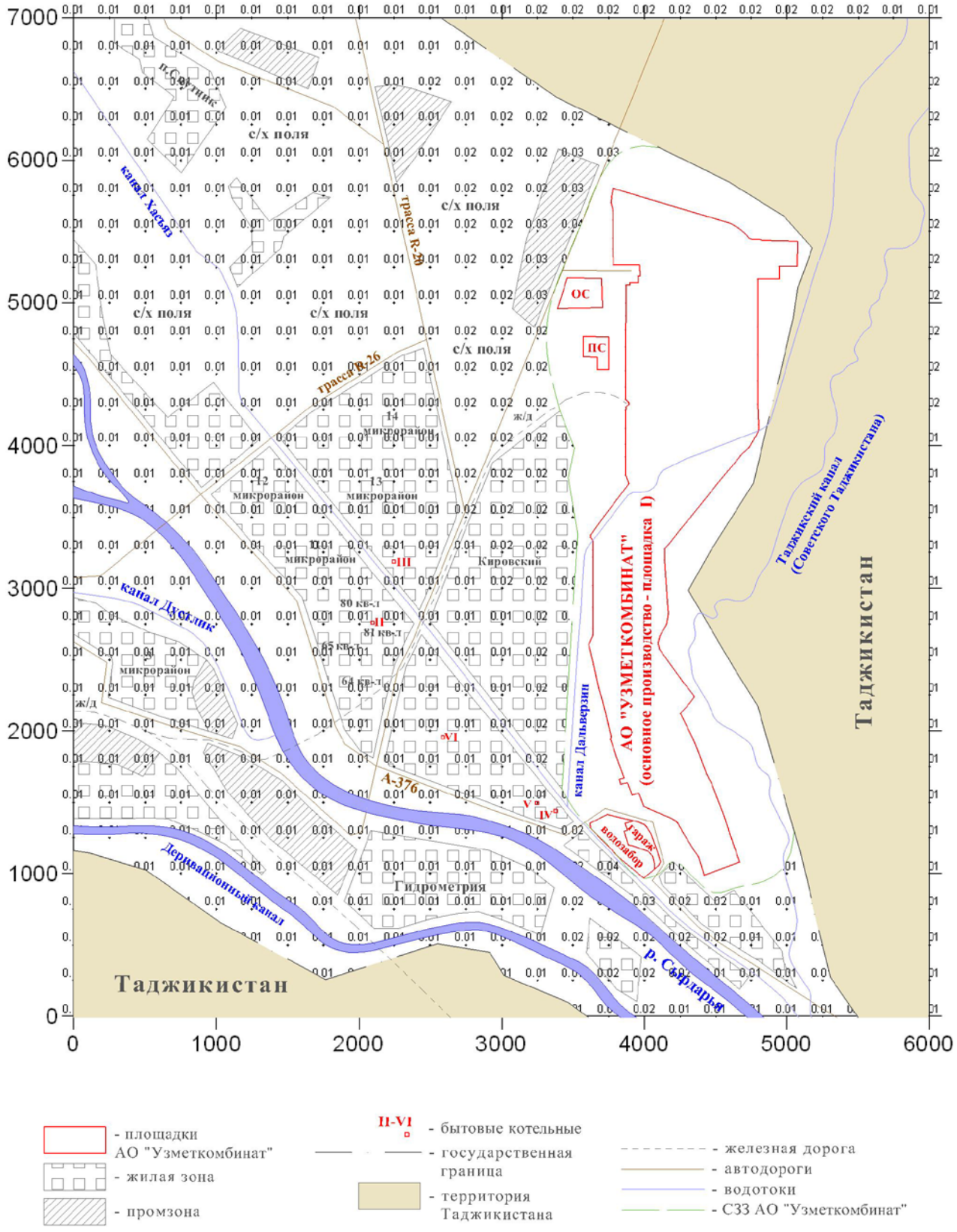

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Рисунок 4.1.7
Карта рассеивания загрязняющих веществ в приземном слое атмосферы

Объект: **АО "Узметкомбинат"**

Загрязняющее вещество: **Кальция оксид**

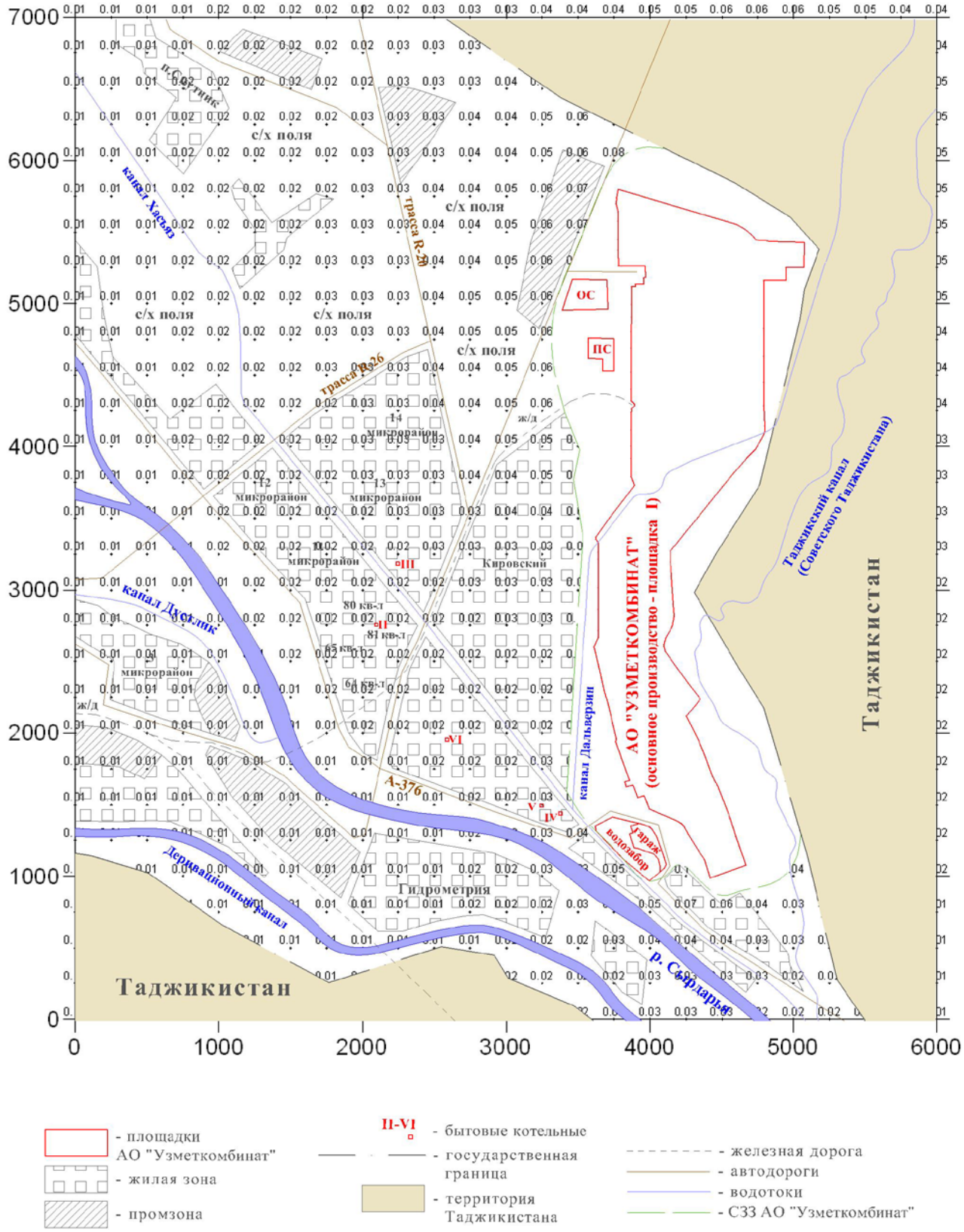

Рисунок 4.1.8
Карта рассеивания загрязняющих веществ в приземном слое атмосферы

Объект: **АО "Узметкомбинат"**

Загрязняющее вещество: **Пыль ферросплавов**

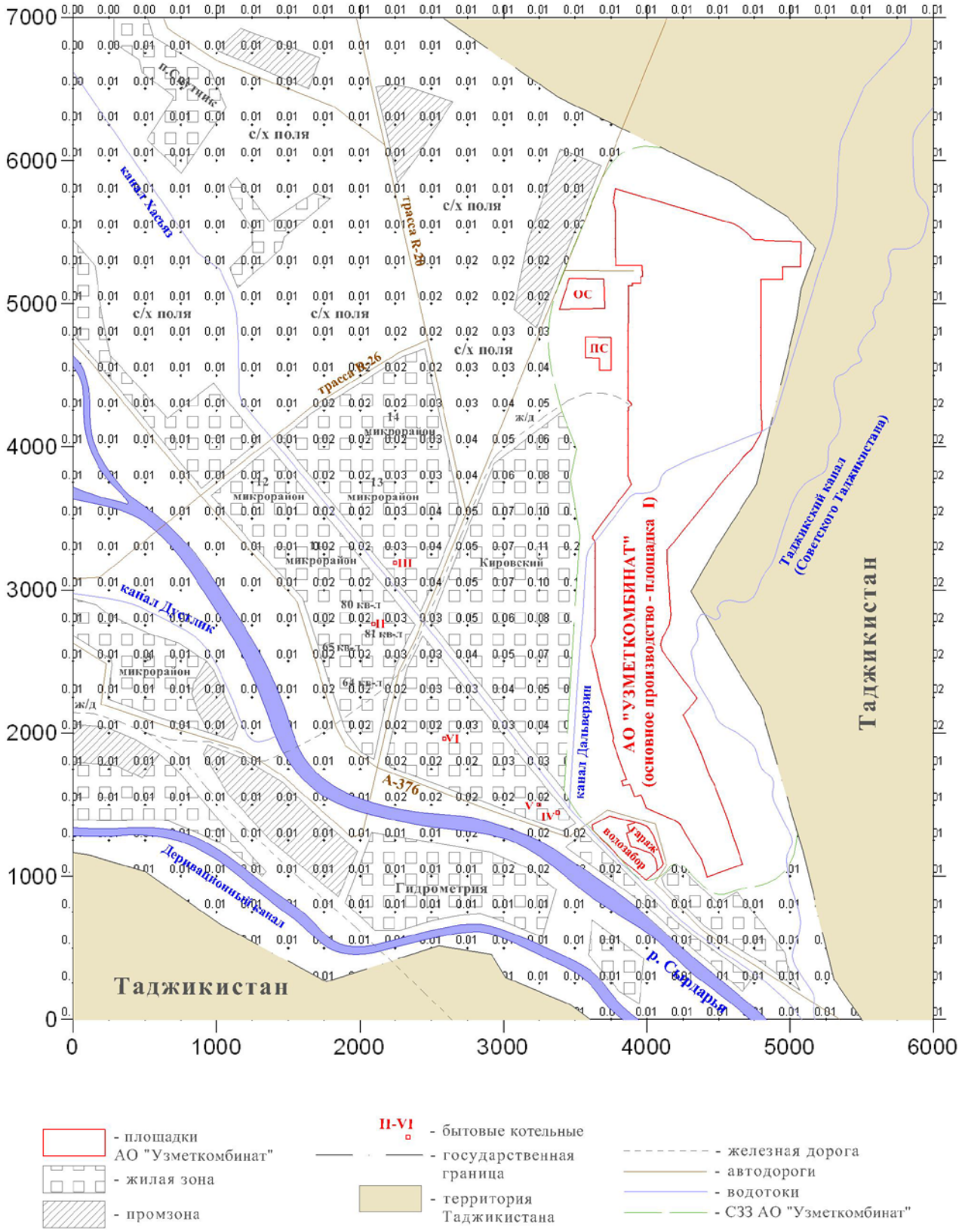

Рисунок 4.1.9
Карта рассеивания загрязняющих веществ в приземном слое атмосферы

Объект: **АО "Узметкомбинат"**

Загрязняющее вещество: **Пыль неорганическая SiO_2<20%**

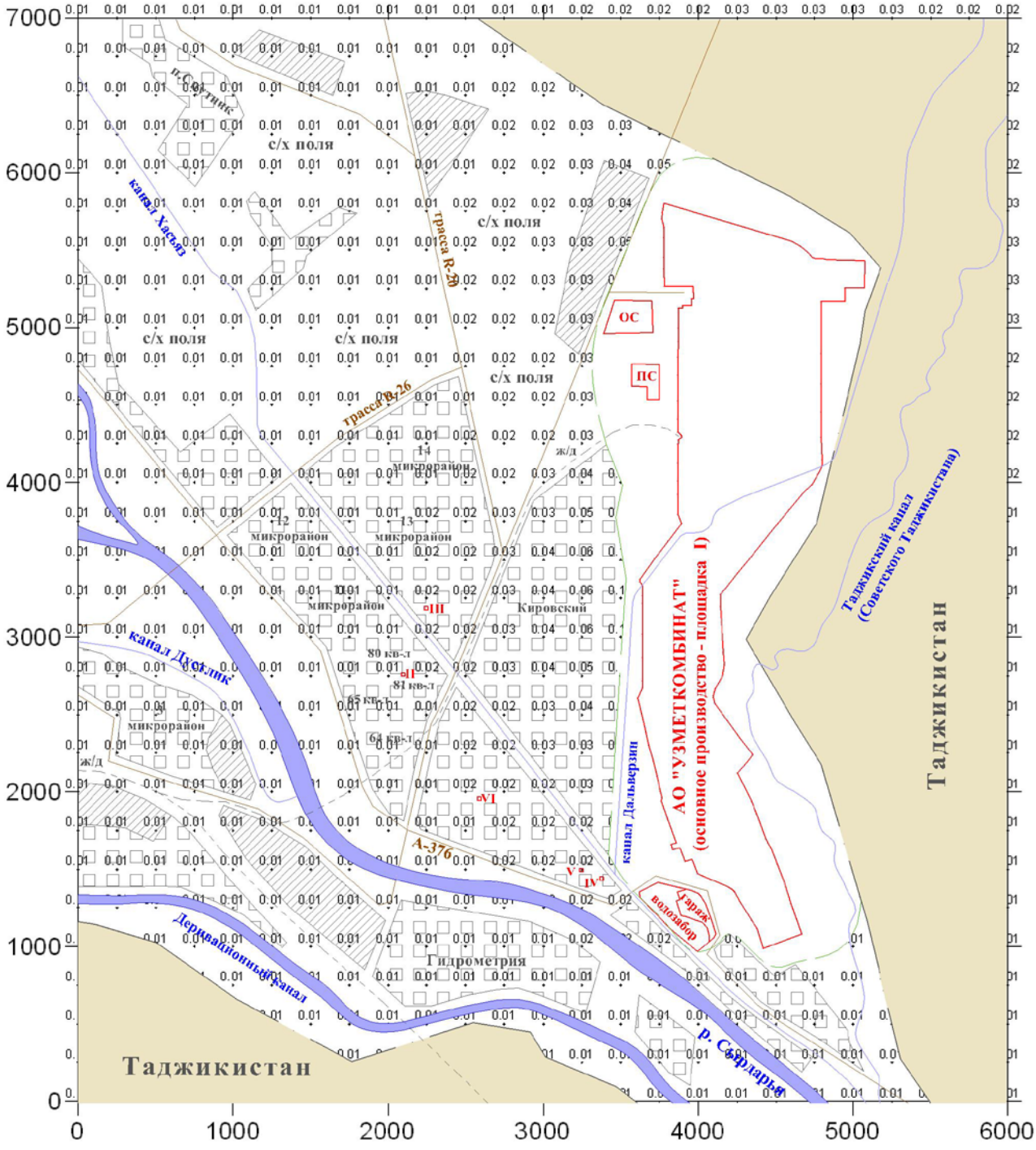

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Рисунок 4.1.10
Карта рассеивания загрязняющих веществ в приземном слое атмосферы

Объект: **АО "Узметкомбинат"**

Загрязняющее вещество: **Пыль металлическая**

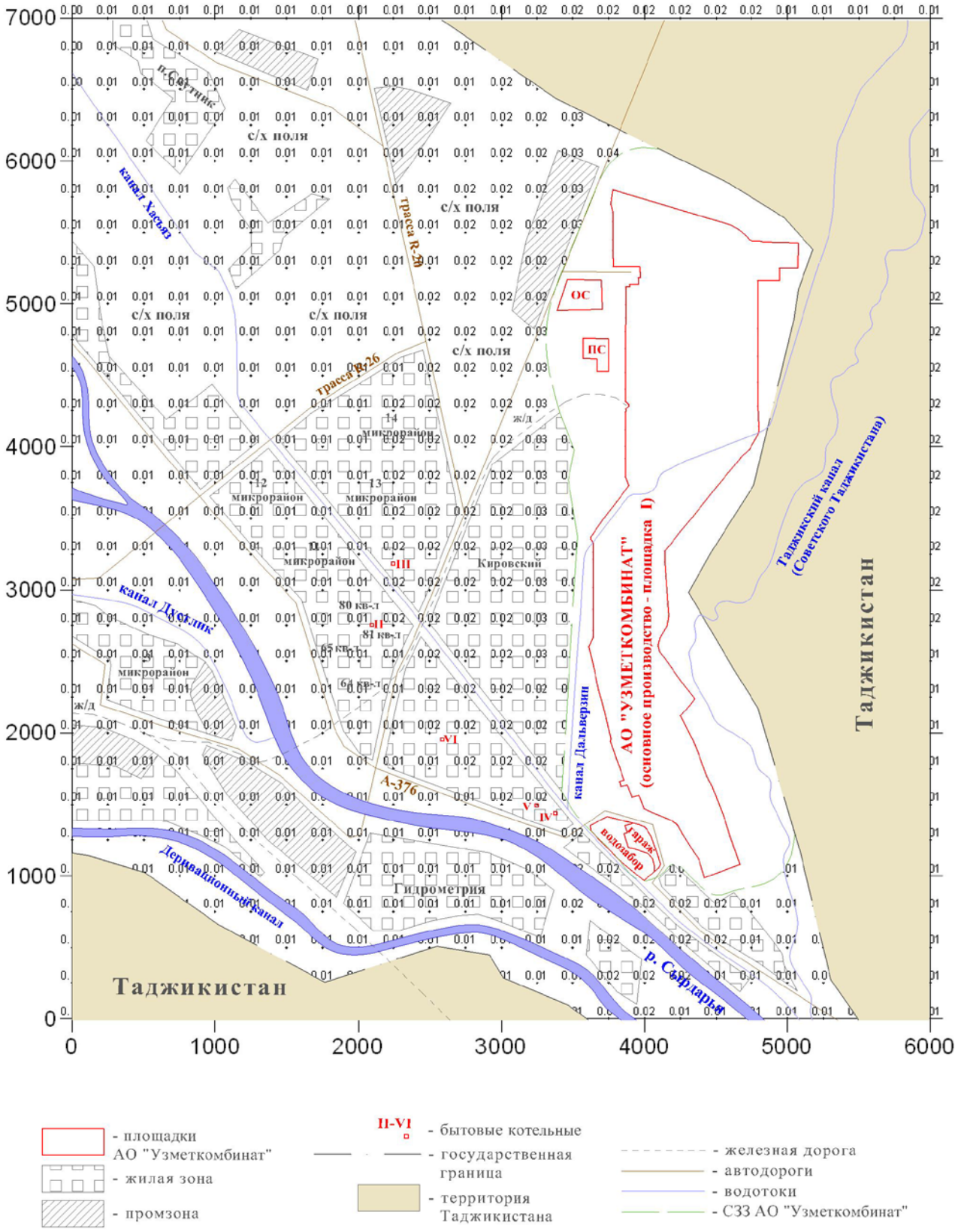

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Рисунок 4.1.11
Карта рассеивания загрязняющих веществ в приземном слое атмосферы

Объект: **АО "Узметкомбинат"**

Загрязняющее вещество: **Пыль абразивная**

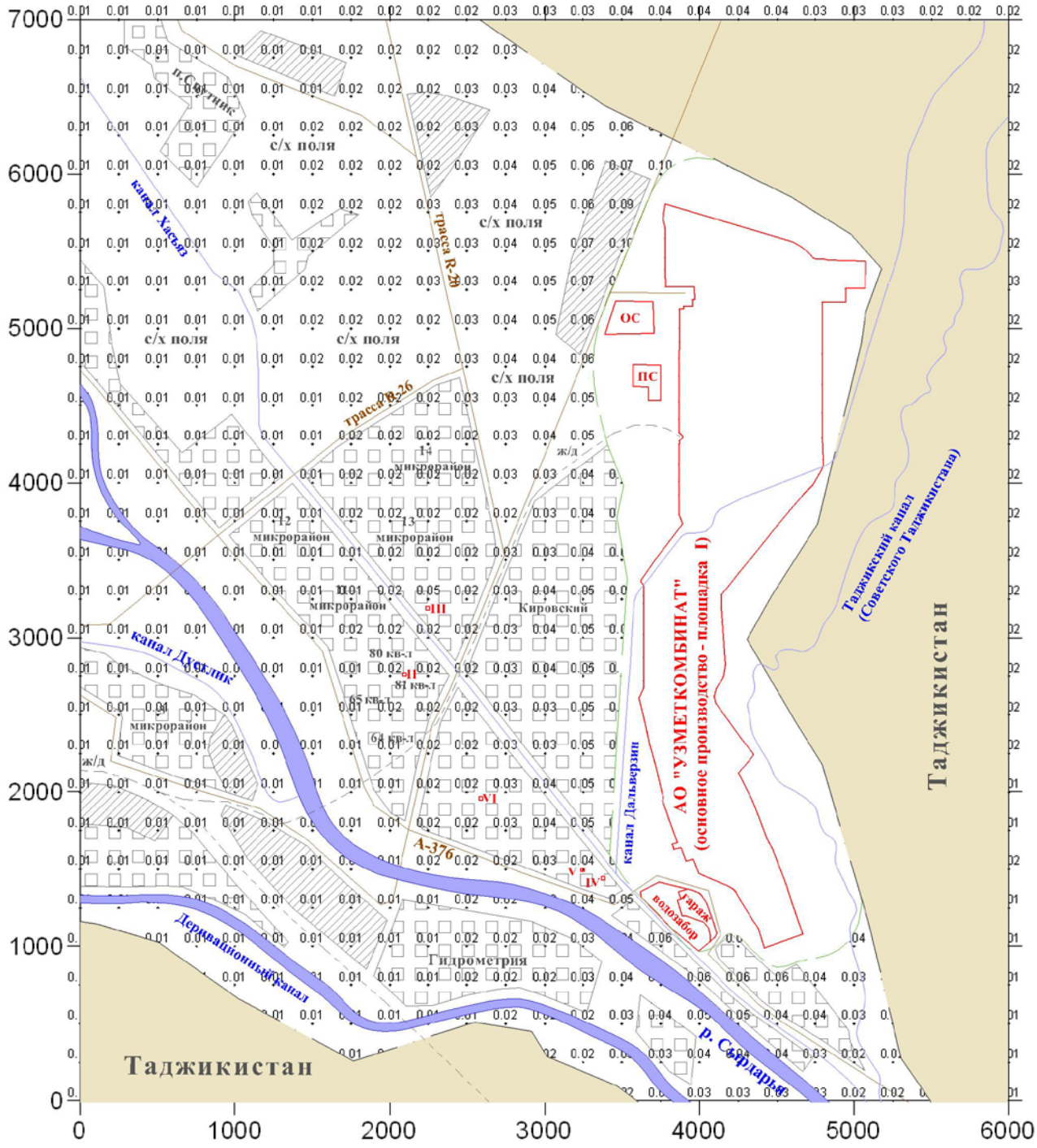

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Рисунок 4.1.12
Карта рассеивания загрязняющих веществ в приземном слое атмосферы

Объект: **АО "Узметкомбинат"**

Загрязняющее вещество: **Марганца диоксид**

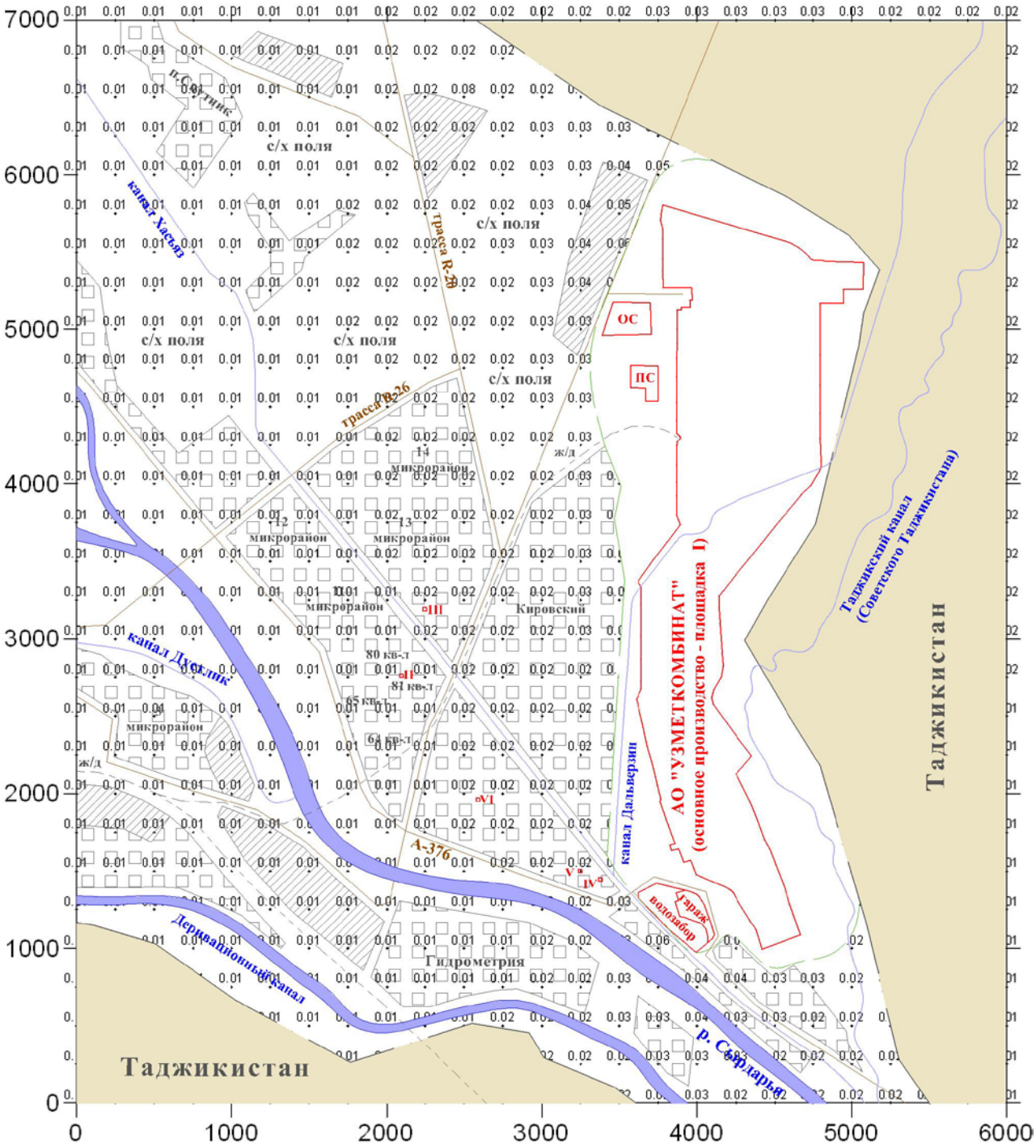

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Рисунок 4.1.13
Карта рассеивания загрязняющих веществ в приземном слое атмосферы

Объект: **АО "Узметкомбинат"**

Загрязняющее вещество: **Водород цианистый**

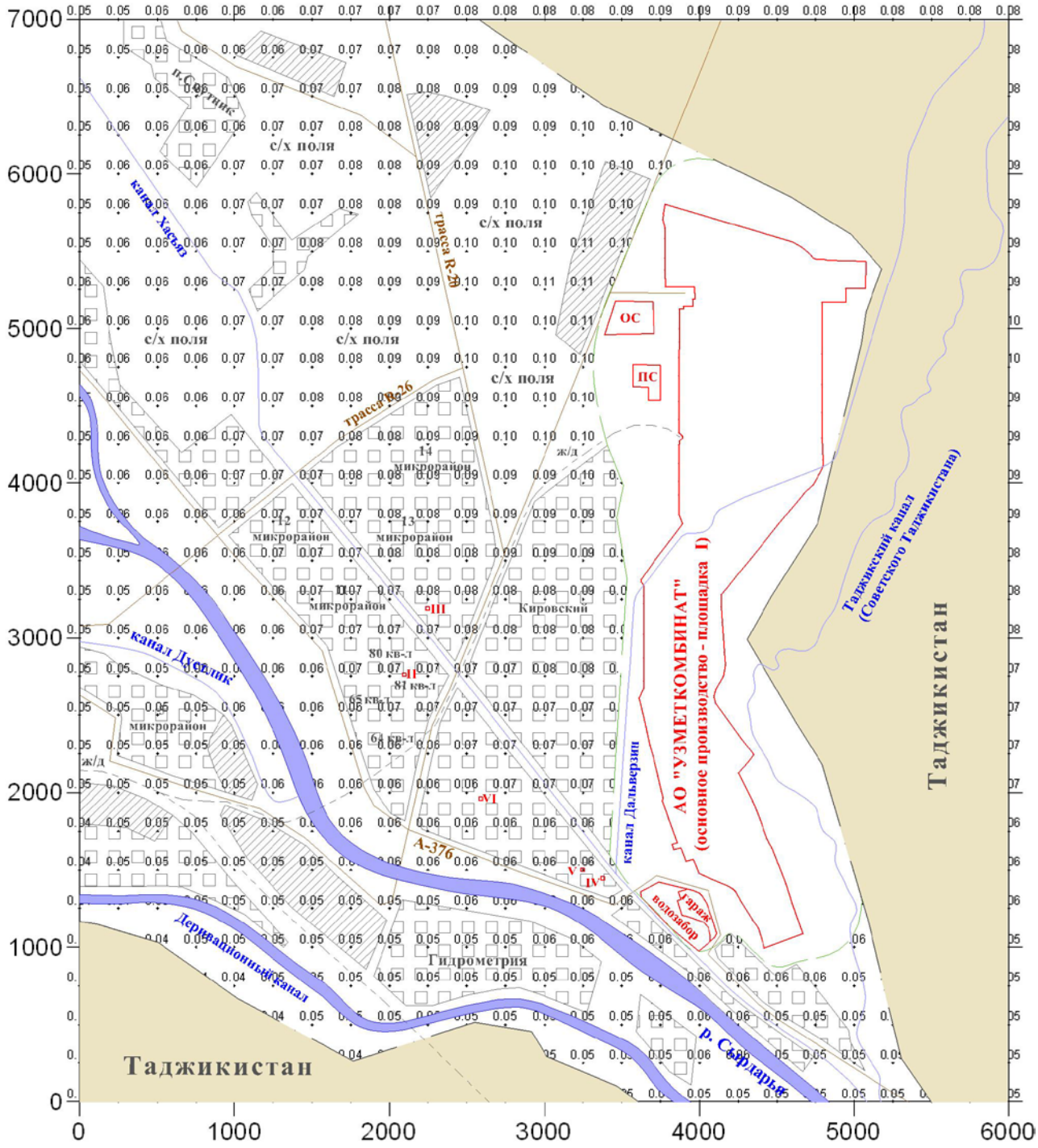

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Рисунок 4.1.14
Карта рассеивания загрязняющих веществ в приземном слое атмосферы

Объект: **АО "Узметкомбинат"**

Загрязняющее вещество: **Водород фтористый**

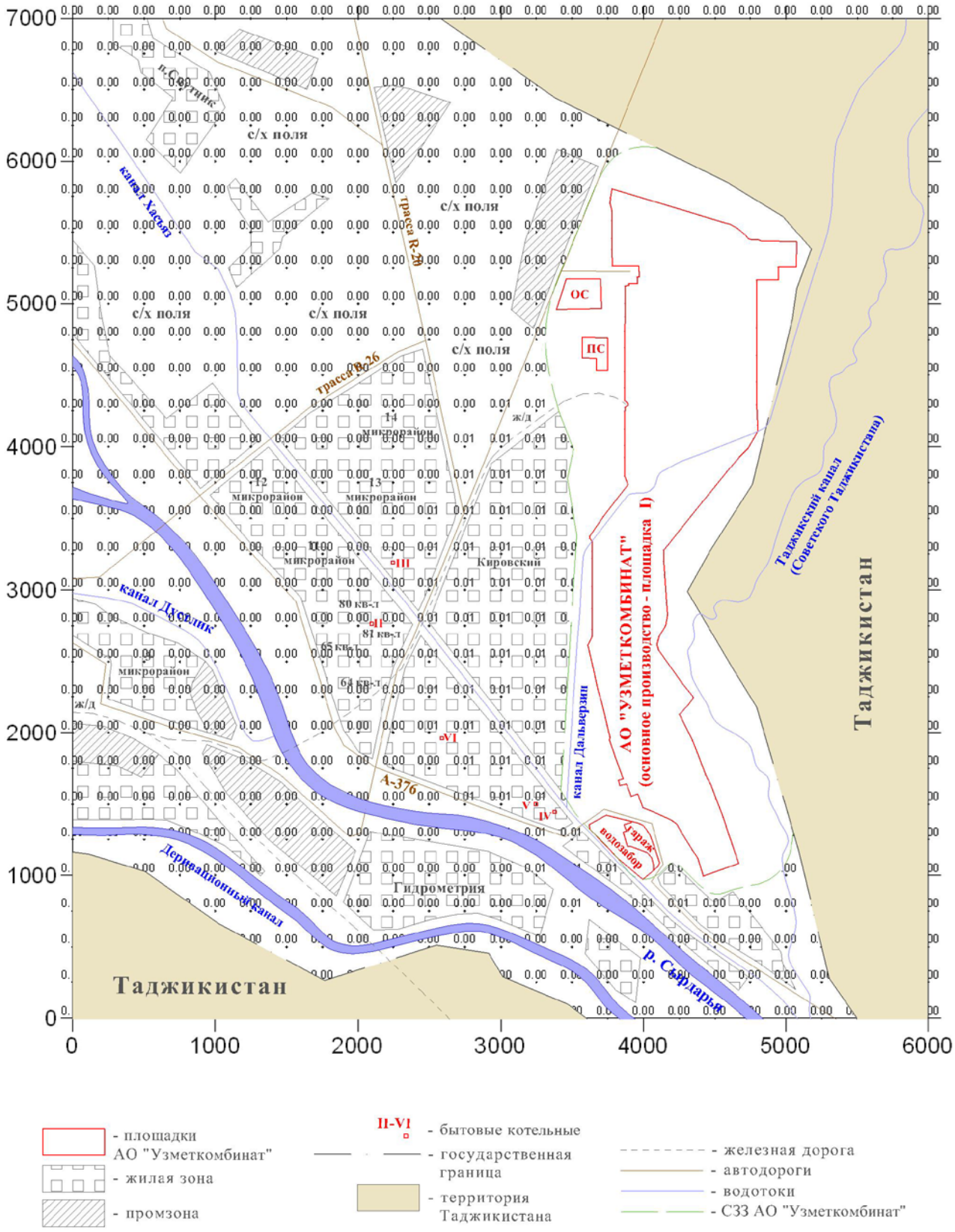

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Рисунок 4.1.15
Карта рассеивания загрязняющих веществ в приземном слое атмосферы

Объект: **АО "Узметкомбинат"**

Загрязняющее вещество: **Бенз(а)пирен**

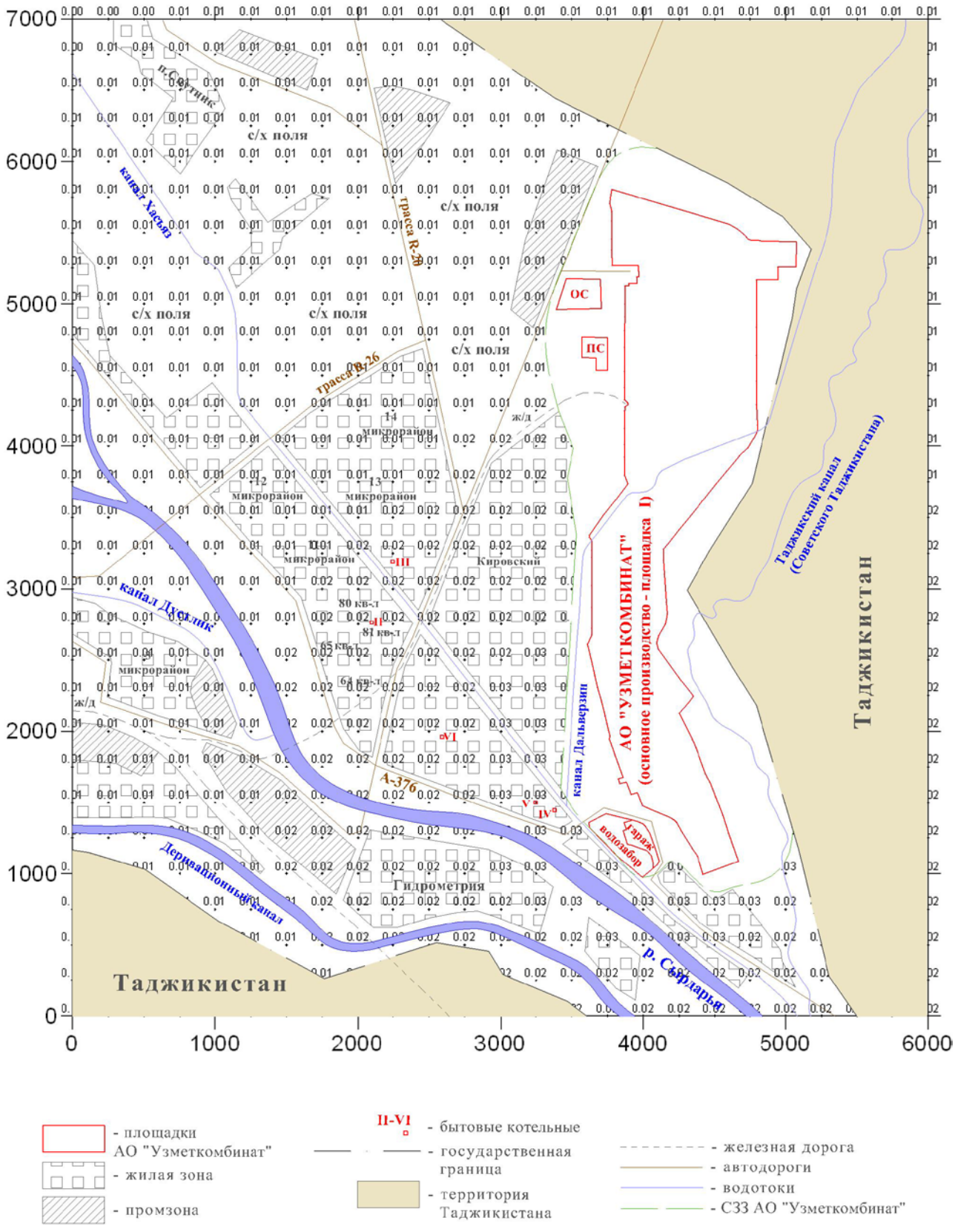


Рисунок 4.1.16
Карта рассеивания загрязняющих веществ в приземном слое атмосферы

Объект: **АО "Узметкомбинат"**

Загрязняющее вещество: **Масло минеральное**

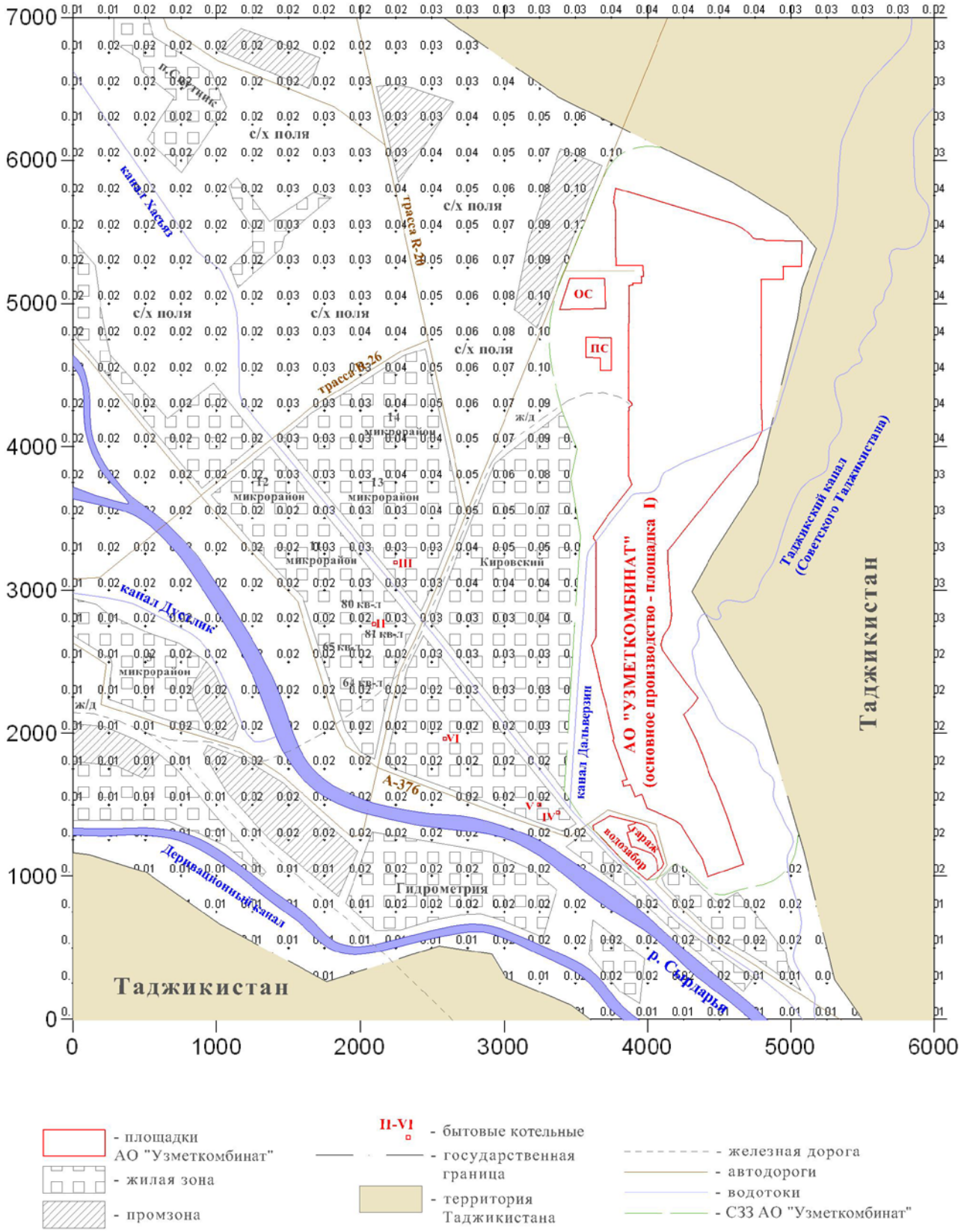
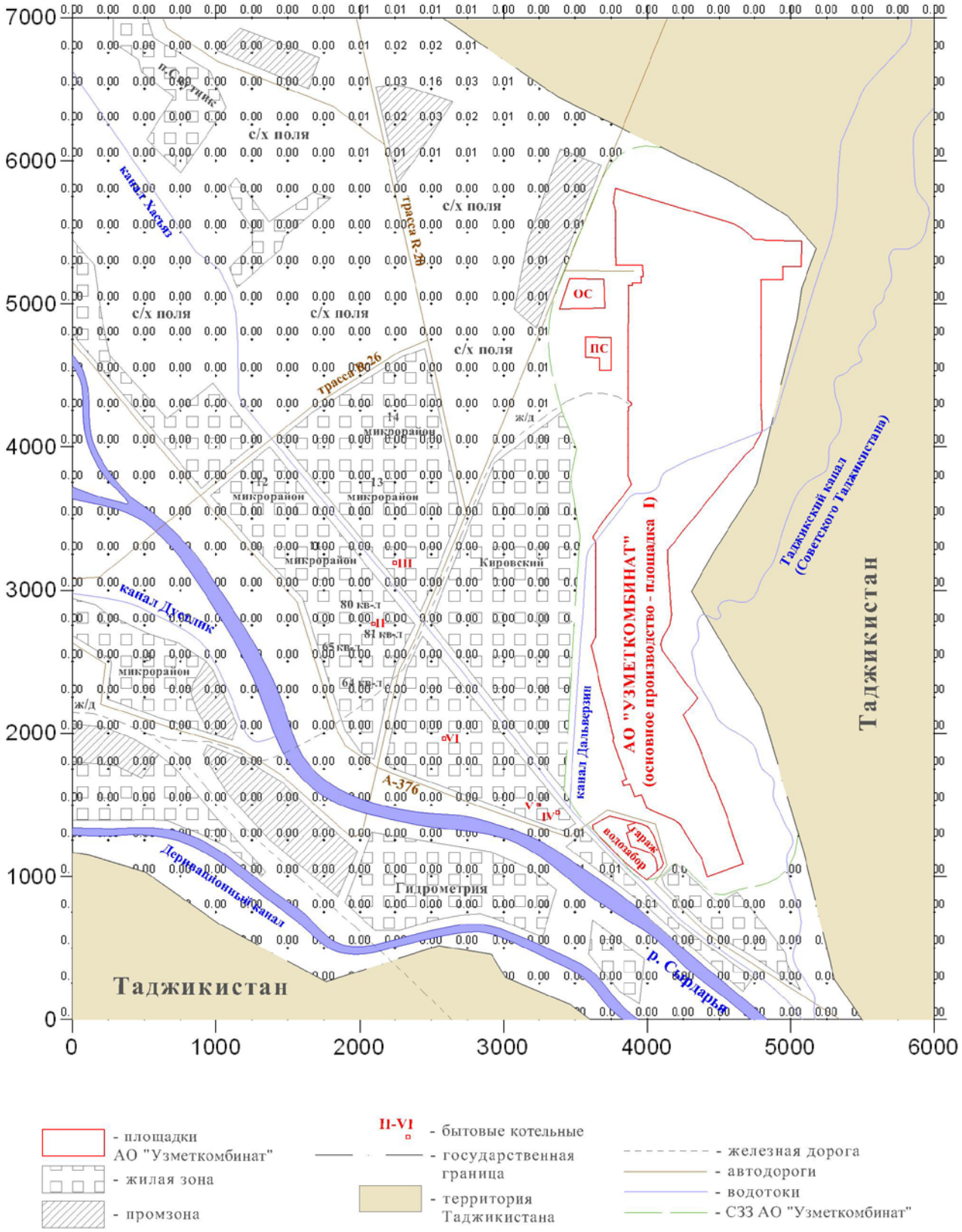


Рисунок 4.1.17
Карта рассеивания загрязняющих веществ в приземном слое атмосферы

Объект: **АО "Узметкомбинат"**

Загрязняющее вещество: **Углеводороды**



- площадки АО "Узметкомбинат"
- жилая зона
- промзона
- II-VI бытовые котельные
- государственная граница
- территория Таджикистана
- железная дорога
- автодороги
- водотоки
- СЗЗ АО "Узметкомбинат"

4.2 Impact on the water resources

At present, according to the current draft PDS (2015), the source of the drinking and main industrial water supply of the enterprise, as well as the residential settlement of the plant, is its own surface water intake, consisting of a settling bucket, a receiving chamber for drinking water, a pumping station for the 1st rise of drinking water, receiving chamber of service water, pumping station of the 1st rise of service water.

Water that has undergone water treatment from the Dalverzin canal is supplied to the plant's drinking water storage, which consists of two tanks with a volume of 1000 m ^{3,} and then to fill the pumps in the pumping station of the 2nd lift to all consumers of potable water. Process water is supplied to the industrial water storage of the plant, which consists of two tanks with a volume of 10,000 m ^{3,} and then for filling the pumps of the 2nd lift station to all consumers of industrial water.

Water from the Dalverzin canal at Uzmetkombinat JSC is used for household needs, production needs, partly for irrigation of the territory, roads and green spaces, for fire extinguishing purposes, and for transfer to third-party consumers.

In addition to the main water intake No. 1, on the territory of the residential settlement of the enterprise, there is a surface water intake No. 2 from the Dalverzin canal, consisting of a K-80/160 pump with a capacity of 100 m ^{3}/ hour, designed for irrigation of green spaces of a residential settlement with an area of up to 57.0 hectares.

To lower the level of groundwater in the main production area of Uzmetkombinat JSC there are 51 lowering wells, including: 19 pcs. - drainage operational (d / e); 17 pcs. - drainage reserve (d / r); 14 pcs. - drainage observational (d / n).

Water from lowering wells is used for the following needs:

- makeup of the circulating water supply system No. 1;
- watering the territory and green spaces of the enterprise;
- watering of the irrigated field, nursery and greenhouse.

The rest of the water from the depressing wells is consumed as follows: it is supplied to the industrial storm water system (up to 65%) and emergency discharges through outlets No. 2 (up to 15%), No. 3 (up to 8%) and No. 4 (up to 12%) are discharged into the channel Dalverzin.

Cash-normative water consumption at the mill a total of 82,204.637 m ^{3}/ day. 24299.294 thousand m ^{3}/ year, of which:

- *for household needs - 2633.838 m ^{3}/ day, 821.03 thousand m ^{3}/ year;*
- *for production needs - 31027.001 m ^{3}/ day, 9924.203 thousand m ^{3}/ year;*
- *including reused water - 12981.82 m ^{3}/ day, 4284.0 thousand m ^{3}/ year;*
- *Irrigation of the territory and green spaces - 15715.0 m ^{3}/ day, 2844.05 thousand m ^{3}/ year;*
- *transferred to third-party consumers - 737.326 m ^{3}/ day, 269.124 thousand m ^{3}/ year;*
- *unused water from lowering wells - 32091.472 m ^{3}/ day, 10440.887 thousand m ^{3}/ year.*
- *Standard calculated volume of total water intake 70994.506 m ^{3}/ day. 20153.741 thousand m ^{3}/ year, including:*
- *surface water (from the Dalverzin canal) - 29744.506 m ^{3}/ day, 7861.241 thousand m ^{3}/ year;*
- *groundwater (lowering wells) - 41250.0 m ^{3}/ day, 12292.5 thousand m ^{3}/ year.*

During the construction of the casting and rolling complex, measures for the reconstruction of existing circulating systems for the facilities of the plant are not

provided. The provision of water to the main industrial consumers of the casting and rolling complex under construction is envisaged through the construction of new circulating systems.

The source of water supply and wastewater receiver of the projected complex are the existing networks of Uzmetkombinat JSC.

Connection of the projected water supply and sewerage networks is envisaged to the existing networks of Uzmetkombinat JSC in accordance with the technical specifications to the following systems:

- Household and drinking water supply;
- Industrial water supply;
- Firefighting water supply;
- Household sewage line;
- Rain water sewage line.

Water supply to the facilities of the projected complex is provided for the following systems:

Domestic drinking water supply

Connection point: the existing loop-back pipeline of utility and drinking water supply Ø 200 mm in the area of the CNS-4 and the headframe section of the Coprovy shop.

Pressure at the connection point: P = 1.5-2.0 kg / cm $^{2.}$

Laying depth: 2.00 m.

At the points of connection to the existing Ø 200 mm network, disconnecting valves are installed.

To ensure the pressure of water in the drinking water supply network, it is envisaged to install a group of pumps for pumping drinking water located in the pumping station for pumping drinking and fire-fighting water with storage tanks.

Industrial water supply

The source of industrial water supply for the plant is water from underground sources. Water is supplied to consumers from the existing main networks of Ø 630 mm of the plant's dewatering wells. The productivity of the dewatering wells provides an increase in the plant's demand for fresh water during the construction of the casting and rolling complex.

Connection is provided to 2 points:

First point: the existing main water network of lowering wells Ø 630 mm in the area of the existing road oxygen-compressor shop and EAF.

Connection point pressure: P = 1.5 kg / cm $^{2.}$

The water conduit runs along the overpass at least 6.2 m.

Second point (reserve): the existing main line Ø 600 mm in the area of the Customs warehouse and KKTs.

Connection point pressure: P = 2.5 kg / cm $^{2.}$

Laying depth: 2.00 m.

Fire fighting water supply

Connection point: looped main water conduit Ø 219 mm in the area of CNS-4 and Trestle No. 3 of the Scrap Yard Shop.

Pressure at the connection point: P = 1.5-2 kgf / cm $^{2.}$

Laying depth: 2.00 m.

To ensure the water pressure in the network of the fire-fighting water supply system of the drinking water supply system, the device of 2 groups of pumps is provided:

- a group of pumps for supplying water for production needs;
- a group of pumps for water supply for fire-fighting needs.

To store water for fire-fighting and industrial needs, water storage tanks are provided.

Process water is supplied to the site of the complex through two water pipelines made of polymeric materials (100% reserve).

The technical solutions adopted in the development of the project for the water supply of the complex ensure the maximum reduction in the intake of fresh water from water sources.

Industrial water supply of the complex is organized according to the circulating scheme.

The technical solutions adopted during the development of the wastewater disposal project of the plant ensure the reduction of the discharge of industrial wastewater into the environment and the disposal of waste generated during the wastewater treatment process.

A summary of preliminary data on water consumption and water disposal of the designed facilities of the timber industry complex are presented in Table 4.2.

Table 4.2 Key indicators for water supply and sanitation

Name	Working limits, m^3/ h	Working boundaries, m^3/ day	Working boundaries, thousand m^3/ year
Industrial water for production needs, including:	627 (630)	12873 (12945)	3990.63 (4012.95)
- preparation of makeup water for reverse circuits (feed to U1DSH)	477 (480)	11448 (11520)	3548.88 (3571.2)
- other water consumers	150	1425	441.75
Industrial water for fire-fighting needs	900	918	-
Recycled water	19070 (19748)	457680 (473952)	141880.80 (146925.12)
Drinking water, including:	67.75	143.82	52.49
- for household needs	66.17	137.59	50.22
- for production needs	1.58	6.23	2.27
Domestic waste water, including:	67.75	143.82	52.49
- household needs	66.17	137.59	50.22
- production needs	1.58	6.23	2.27
Surface runoff, rain and melt	99,00	2371	191,678
Industrial sewerage, including:	365	7940	2461.4
- production (stateally clean)	60	620	192,200
- blowdown effluents from circulating cycles	255	6120	1897.20
- concentrate after preparation of demineralized water from the demineralization unit	50	1200	372

4.2.1 Intake

Household and drinking and household needs

The calculation of the need for household cold and hot water is given in tables 4.2.1.1 and 4.2.1.2.

Table 4.2.1.1

Cold water data

Name of water consumers	number		Water consumption rate		Water consumption			
	in max. shift	per day	l / h	l / day	water consumption		drainage	
					m ³/ h	m ³/ day.	m ³/ h	m ³/ day.
1 Household needs								
1.1 RCC employees	115	129	4.0	16.0	0.46	2.06	0.46	2.06
1.2 Workers in cold areas	247	365	9.4	25.0	2.32	9.13	2.32	9.13
1.3 For hot production	187	265	14.1	45.0	2.37	11.93	2.37	11.93
Total (p. 1.1 + 1.3)	549	759			5.15	23.12	5.15	23.12
1.4 Shower nets	110	150	500.0	500.0	55,00	75.00	55,00	75.00
1.5 Cooking meals	1647	2277	12.0	12.0	19.76	26.96	19.76	26.96
Total p.p. 1.1-1.5					60.15	125.08	60.15	125.08
Reserve 10 %					6.02	12.51	6.02	12.51
Total (clauses 1.1-1.5) including the provision					66.17	137.59	66.17 [1]	137.59
2 Production needs								
2.1 Steel Workshop Laboratory					0.16	0.62	0.16	0.62
2.2 Laboratory of the casting and rolling complex					1.28	5.04	1.28	5.04
Total (pp 2.1-2.2)					1.44	5.66	1.44	5.66
Reserve 10%					0.14	0.57	0.14	0.57
Total (p. 2.1-2.2) taking into account the reserve					1.58	6.23	1.58	6.23
Total (p. 1-2), taking into account the reserve					67.75	143.82	67.75	143.82

Table 4.2.1.2

Hot water data

Name of water consumers	number		Water consumption rate		Water consumption			
	in max. shift	per day	l / h	l / day	water consumption		drainage	
					m ³/ h	m ³/ day.	m ³/ h	m ³/ day.
1 Household needs								
1.1 RCC employees	115	129	2.0	7.0	0.23	0.9	0.23	0.90
1.2 Workers in cold areas	247	365	4.4	eleven	1.09	4.02	1.09	4.02

1.3 For hot production	187	265	8.4	24.0	1.57	6.36	1.57	6.36
1. 4 Shower nets	110	150	230.0	230,	25.30	34.50	25.30	34.50
1.5 Cooking meals	1647	2277	4.0	4.0	6.59	8.99	6.59	8.99
Total p.p. 1.1-1.5					28.19	54.77	28.19	54.77
Reserve 10 %					2.82	5.48	2.82	5.48
Total (clauses 1.1-1.5) including the provision					31.01	60.25	31.01	60.25

Notes:

1. Drinking water consumption rates are adopted in accordance with KMK 2.04.01-98 "Internal water supply and sewerage of buildings".
2. Estimated water consumption is taken taking into account a reservation of 10% (unaccounted consumers and leaks in the system).
3. The calculated hourly consumption did not include the consumption according to item 1.5, since "Peak" expenses for dining and showers do not coincide in time.

Just for drinking and household needs of staff projected CRC demanding tsya water - 143.82 m ^{3}/ d, 52.49 thousand m. ^{3}/ year.

Production needs

Reverse water supply of the casting and rolling complex (CRC)

In accordance with the data on the requirements for the quality of water supplied to consumers according to the basic engineering of the DANIELI company, as well as to reduce water use from external sources, it is planned to organize circulating water supply systems for the CRC. Consumers with similar quality of source and waste water in terms of chemical and physical indicators, taking into account the required pressure, are combined into one circulating circuit.

The main equipment supplier and developer of basic engineering turnaround cycles was selected in the name of DANIELI company.

The balance and the list of recycled water supply systems of the timber industry complex are shown in Table 4. 2.1.3.

	Consumers	Water consumption, m ^{3}/ hour	Irrecoverable water losses in the process and on cooling towers, m ^{3}/ h	System blowdown, m ^{3}/ h	System make-up, m ^{3}/ h	Inlet water temperature, ° c	Leaving water temperature, ° c
1	Closed cooling circuits of the mold and equipment of the Slab Caster Machine, consisting of:	912	2	-	2	37	49
1.1	Cooling of the crystallizer "QW1"	762	1	-	1	37	49
1.2	Equipment cooling (rolls and bearings) " QW 2"	150	1	-	1	37	47
2	Open contactless cooling circuits of SCM and rolling mill, consisting of:	2585 (2705)				34	44

2.1	SCM. Cooling of auxiliary and hydraulic equipment " CW 1"	190	23	45	68	34	41
2.2	Tunnel Furnace. Cooling of rollers and measuring devices " CW 2"	300				34	54
2.3	Rolling mill. Cooling of auxiliary, hydraulic equipment and measuring instruments " CW 2"	1183 (1303)				34	40
2.4	Closed loop heat exchanger cooling	912				34	46
3	Open contactless cooling circuits of the electric steel-making shop of the Meltshop, consisting of:	6020	90	110	200	35	52
3.1	Arc furnace EAF-120. Cooling equipment " CW "	2115				35	50
3.2	Installation of ladle furnace UPK. Cooling equipment " CW "	555				35	50
3.3	Fume treatment unit. Water-cooled gas duct " CW "	2450				35	55
3.4	Steel Degassing Unit vacuumator. Cooling equipment " CW "	580				35	50
3.5	Substation. Static reactive power compensation system " CW "	120				35	45
3.6	Compressor station. Basic cooling " CW "	200				35	50
4	Open contact cooling circuits of SCM and rolling mill, consisting of:	5153 (5711)	40 (43)	70	110 (113)	35	45
4.1	SCM. Secondary direct cooling - spray circuit " KW 1"	500				35	50
4.2	SCM. Tertiary direct cooling - auxiliary circuit " KW 6"	310				35	45
4.3	Rolling mill. Cooling of low pressure equipment " KW 2"	901				35	41
4.4	Rolling mill. Cooling of high pressure equipment " KW 3"	3442 (4000)				35	41
5	Open contact circuits for laminar cooling	4250	17	thirty	47	35	37
5.1	Rolling mill. Transverse jet cooling of the strip (descaling) " KW 5"	140				35	37
5.2	Rolling mill. Laminar cooling of strip and rollers " KW 4"	4110				35	37

CRC recycling water supply systems include:

- closed cooling circuits of the mold and equipment of the Slab Caster Machine "water quality QW 1, QW 2";
- open contactless cooling circuits of the Slab Caster Machine and the rolling mill "water quality CW 1, CW 2";
- open contactless cooling circuits of the electric steel-smelting shop of the Meltshop "water of quality CW ";
- open contact cooling circuits of the SCM and the rolling mill "water quality KW 1, KW 2, KW 3, KW 6";
- open contact circuits of laminar cooling "water quality KW 4, KW 5";
- installation for the preparation of make-up water;
- interdepartmental water supply networks laid on the overpass;
- intrashop networks of industrial circulating water supply.

The equipment of the recycling water supply systems of the CRC is located in the following facilities (areas) supplied by the company " DANIELI ": water treatment of the Meltshop; water treatment of SCM and rolling mill; laminar cooling water treatment; make-up water treatment plant; primary scale sump; secondary scale settler; sand filter area; dehydration section.

Pumping stations for increasing pressure for a closed cooling circuit " QW 1" and an open contact circuit " KW 1" and are built-in rooms located in the buildings of the CRC. Emergency water storage tanks are located on the roof of the CRC buildings.

The initial filling and make-up of the recycling water supply systems of the CRC is performed from the make-up water treatment plant.

In order to prevent the accumulation of salts in the system, a partial discharge ("blowdown") of water from the circulating water supply systems into the sewerage system is provided.

To prevent the formation of corrosion and deposits on equipment and pipelines, as well as to prevent the growth of microbiology, an inhibitor and a biocide are dosed into the circulating water of the circulating systems.

Circulating water supply pipelines (along ramps, in tunnels and in workshops) are made according to a one-pipe system with a device of reserve places. Reserve places are intended for laying pipelines and promptly switching with existing pipelines as they wear out. The load on building structures is taken taking into account the laying of pipelines at the main and reserve locations of the overpass.

For interdepartmental networks of industrial circulating water supply, an above-ground laying is provided along an overpass made of steel electric-welded pipes DN 80-4000 mm. Make-up water piping material stainless steel.

In-shop pipelines supplying water to the industrial circulating water supply are laid along the building structures of buildings, as well as in tunnels and are provided from steel electric-welded pipes DN 80-4000 mm.

The control mode of the equipment, the scope of automation and filling with instrumentation devices are specified by the supplier " DANIELI ".

The operating mode of the equipment of the circulating systems of industrial water supply of the CRC is constant (310 days).

Analysis of water and effluent is carried out in the laboratory located in the water treatment plant of the Slab Caster Machine and the rolling mill.

The required amount of water for the projected CRC will be provided from the existing water supply networks of the plant (domestic and drinking water supply and technical water supply), supplied from the main operating surface water intake of the plant (from the Dalverzin canal). The surface water intake capacity allows water intake in the amount of up to 80 thousand m ^{3} / day., T hen as currently water

from the channel to the needs of the plant Dalverzin (calculation- normative th) is about 29.744 thousand m³/ day. Additional water intake will not require additional measures to expand or increase the capacity of the existing water intake facilities.

4.2.2 Wastewater disposal

According to the current draft PDS (2015), in the process of economic use of water, household wastewaters of polluted water, industrial wastewater are formed. Also, wastewater from the territory of the enterprise is formed as a result of atmospheric precipitation (rain, snow). Water consumption for irrigation of the territory and green spaces is irrevocable, runoffs are not formed.

The estimated and standard volume of effluents generated at the plant as a whole is 40,904.155 m³/ day, 13232.903 thousand m³/ year, of which:

- *Reset "stateally clean" drains Dalverzin channel (releases №2,3,4) - 2633,838 m³/ day, 821.03 th.. M³/ year;*
- *Discharge into the sewage system of the city of Bekabad - 1979.328 m³/ day, 647.757 thousand m³/ year;*
- *Served on the industry storm OS plant - 27,692.812 m³/ day, 8930.835 thousand.. M³/ year;*

  of which:
- *reuse (circulation of treated effluents) - 12981.82 m³/ day, 4284.0 thousand m³/ year;*
- *discharge into the Syrdarya river (outlet No. 1) - 14710.992 m³/ day, 4646.835 thousand m³/ year.*

Reset all industrial and storm drains, and the water (unused) lowering of wells main production plant area is carried out in industrial storm sewage Enterprise, and fed to the mechanical treatment facilities (industry storm sumps) power to 30.0 thousand m³/ day. Industrial storm treatment facilities are represented by two horizontal two-section settling tanks with a volume of 7000 m³ each.

In order to reduce the volume of consumption of fresh water and wastewater discharges, there are facilities for recirculating treated industrial and storm water after mechanical OS (about 50%), for their reuse for technological needs.

Industrial waste water after mechanical (industrial storm) treatment facilities of the plant, with one outlet (D = 400 mm), is discharged into the Syrdarya river. The distance from the plant's treatment facilities to the Syrdarya River is 4.6 km southward.

Stateally clean waste water from the lowering wells of Uzmetkombinat JSC is discharged without purification by three outlets # 2, # 3 and # 4 into the Dalverzin canal.

The maximum permissible wastewater discharge of Uzmetkombinat JSC is set for outlet No. 1 at the level of the maximum throughput of the industrial storm treatment facilities of the plant, for outlets No. 2-4 - at the level of the standard-design discharge, and is:

- *outlet No. 1 - 30,000 m³/ day, 10,950 thousand m³/ year;*
- *Issue №2 - 4813,721 m³/ day, 1566.133 thousand m.³/ year;*
- *outlet No. 3 - 2567.318 m³/ day, 835.271 thousand m³/ year;*
- *release No. 4 - 3850.977 m³/ day, 1252.906 thousand m³/ year.*

Discharge of wastewater from the projected facilities of the timber industry complex will be carried out into the existing networks of household, rainfall and industrial sewerage of Uzmetkombinat JSC.

In accordance with the requirements of the production technology for wastewater disposal, the following sewerage systems are provided:

- household sewerage;
- rainwater drainage;
- industrial sewerage.

According to the above technical states, the provision of effluent discharges from the sewage systems of the facilities of the projected CRC is provided for:

For household sewerage

Connection of the designed domestic sewage system is provided for 2 points of existing gravity networks:

- header Ø 200 mm (well No. 88) on the territory of the KKTs near the filling station;
- header Ø 300 mm (well No. 28) on the territory of the RMC in the area of the football field LPS-2.

The depth of the existing pipelines Ø 200 and Ø 300 mm at the connection points: "minus 3.00 m".

Non-pressure and pressure pipelines for the projected complex are provided from polymeric materials.

Rainwater sewer fi ns

Connection of the projected rainwater drainage system is provided for 2 points of existing gravity networks:

- header Ø 250 mm (well No. 90) on the territory of Meltshop in the area of CNS-4 of the Power shop;
- header Ø 600 mm (well No. 155) on the territory of the KKTs in the area of the bomb shelter LPS-2

The depth of the existing pipelines Ø 250 and Ø 600 mm at the connection points: "minus 3.00 m".

Manufacturing sewer fi ns

There are no technical specifications.

Household sewerage

The household sewerage system is intended for collection and disposal of household wastewater from the projected casting and rolling complex facilities that have household facilities (bathrooms, showers, etc.), a buffet and canteens.

The calculation of domestic wastewater is shown in Table 4.2.

The domestic sewerage system includes:

- intrashop gravity domestic sewage networks;
- on -site gravity domestic sewage networks;
- on -site pressure networks of household sewerage;
- sewage pumping station.

Domestic waste water from the facilities of the plant is discharged through gravity pipelines into the existing domestic sewage network.

To be able to connect the projected networks to the existing networks, it is planned to install a household sewage pumping station SPS.

SPS are provided for complete delivery.

Connection to gravity networks is provided through a pressure damper well.

The estimated and normative amount of domestic wastewater from the needs of the personnel of the projected CRC is 143.82 m ^{3}/ day, 52.49 thousand m ^{3}/ year.

Rainwater drain

The rainwater drainage system is designed for:

- collection and removal of surface (rain and melt) water from the CRC site; reception of stateally clean water when emptying water supply systems during maintenance and repair work;
- acceptance of emergency overflows from production facilities of the plant; reception of stateally clean wastewater from small consumers at the facilities of the complex.

The rainwater drainage system includes:

- intrashop gravity rainwater drainage networks;
- intrashop gravity networks of industrial sewerage (stateally clean);
- on -site gravity rainwater drainage network;
- on -site pressure rainwater networks;
- sewage pumping stations.

For the possibility of connecting the projected networks to the existing networks, it is planned to install rainwater pumping stations.

SPS No. 1 and SPS No. 2 are provided for complete delivery.

Connection to gravity networks is provided through a pressure damper well.

The on-site networks of gravity and pressure sewerage are designed from plastic pipes.

The estimated and normative amount of storm and melt runoff is 2371 m ^{3}/ day, 191.678 thousand m ^{3}/ year.

Industrial sewerage

For the drainage of sewage that cannot be treated, an industrial sewage system is provided.

There are no technical specifications for the discharge of industrial wastewater. According to these decisions, it is proposed to discharge industrial effluents into the rain sewer.

The following drains are discharged into the existing rainwater drainage system through the networks of the projected industrial sewage system in the amount of 365 m ^{3}/ h, including:

- flushing effluents from the UPPV make-up water treatment plant with a flow rate of 50 m ^{3}/ h;
- drains of "blowdown" circulating system at a flow rate of 255 m ^{3}/ h;
- industrial effluents from the facilities of the complex, which have minor traces of oil and acid residues with a flow rate of 60 m ^{3}/ h;
- stateally clean drains (overflows, accidental drains, emptying of cooling tower tanks during repairs, etc.) and periodic.

The estimated and standard amount of industrial wastewater from the needs of the projected CRC is 7940 m ^{3}/ day, 2461.4 thousand m ^{3}/ year.

In general, the mill (subject projected CRC) expected to increase discharge wastewater to 2705.568 thousand m ^{3}/ year.

4.3 Generation of the production and consumption waste

According to the current PDO project (2015), 45 types of waste are generated on the territory of the plant. The total amount of generated waste is 136,232.7791 tons / year, of which: industrial waste - 124205.2851 tons / year (91.17%), household waste - 12027.494 tons / year (8.83%).

List of waste generated:

1	*Meltshop furnace slag*
2	*Furnace slag PCM*
3	*Furnace slag foundry section RMC*
4	*Trapped dust of PGOU*
5	*Waste refractory materials*
6	*Scrap of ferrous metal*
7	*Non-ferrous scrap (copper and its alloys)*
8	*Scale*
9	*Limestone screening*
10	*Lime screening*
11	*Sludge of the pickling section of PTNP*
12	*Waste PTNP frit*
13	*Fume treatment sludge of the PTNP frit section*
14	*Waste sorting of incoming scrap metal*
15	*Waste conveyor belt*
16	*Chemical water treatment plant sludge*
17	*Waste graphite stamps*
18	*Sludge from the settling tank PCM*
19	*Cooling tower sludge*
20	*Waste filter cloth*
21	*Waste of the coating mass of electrodes and rejected electrodes*
22	*Waste sorting of slag heaps*
23	*Worn out workwear*
24	*Waste soap powder*
25	*Cuttings from the pickling and drilling site*
26	*Substandard asphalt*
27	*Waste oil products*
28	*Waste motor oils ATC*
29	*Waste tires ATC*
30	*Waste batteries ATC*
31	*Waste from cleaning of tanks for oil products ATC*
32	*Sand-oil waste*
33	*Water-oil emulsion*
34	*Waste rubber products*
35	*Cullet*
36	*Waste molding materials*
37	*Waste polymer products*
38	*Paper packaging materials (waste paper)*
39	*Wood waste*
40	*Waste fluorescent lamps*
41	*Waste incandescent lamps*
42	*Waste cleaning cloth*
43	*Food waste*
44	*MSW*
45	*Garbage from cleaning the territory*

All waste generated is classified as follows:
1 class - highly hazardous - 1 type of waste (4.3932 t / y 0.0032%)
Class 2 - hazardous - 5 types of waste (113.04 t / y 0.0830%)
Class 3 - moderately hazardous - 13 types of waste (29345.7981 t / y 21.5409%)
Class 4 - low hazardous - 15 types of waste (55304.6828 t / y 40.5957%)
Class 5 - practically non-hazardous - 11 types of waste (51,464.865 t / y 37.7771%)

Disposal of the generated production and consumption waste is carried out as follows:
- disposed of at the enterprise - 12 types of waste (40413.6198 t / y 29.665%)
- are rented to specialized
organizations - 17 types of waste (29,158.1831 t / y 21.403%)
- are stored on their own territory in anticipation of the operation
on its use - 11 types of waste (17182.9989 t / y 12.613%)
- removed to the landfill of solid waste - 5 types of waste (49477.9773 t / y 36.319%)

The analysis of technological solutions provided for by this project shows that during the operation of the facilities of the projected casting and rolling complex, the following types of industrial waste will be generated:

Meltshop
The main waste products of steelmaking are:
- steel-making slag;
- dust from fume treatment plants;
- waste of graphite electrodes;
- battle of refractories;
- cleaning materials, used up and contaminated.

Slab Caster
The following types of waste will be generated in the department:
- mill scale;
- slag after casting at Slab Caster Machine;
- scrap in the steel ladle;
- sump in the tundish;
- waste materials and products from refractories;
- technological scrap;
- cleaning materials, used up and contaminated.

Rolling shop
The main waste is:
- metal scrap and undershoots,
- mill scale, oil content no more than 1%;
- dry kiln scale;
- waste materials and products made of refractories (refractory breakage);
- waste lubricants;
- scrap rolls and shavings.

Site of primary slag processing and scrap yard
The main waste of the site are:
- slag scrap;
- industrial waste;

- cleaning materials, used up and contaminated;
- garbage from cleaning the territory.

Centralized casting and rolling complex warehouse

The main wastes of the separation of bulk materials and ferroalloys are:

- packing big bags;
- used metal containers for ferroalloys and lubricants.

Auxiliary production

For the auxiliary production, the main types of waste are: waste from repair facilities (maintenance area for molds and roller segments, roll grinding workshop, maintenance area for tunnel kiln rollers, maintenance workshop for Slab Caster Machines), as well as laboratory facilities (steelmaking shop and casting and rolling complex laboratories).

The main waste of repair facilities are:

- abrasive and metallic dust;
- waste lubricants;
- used abrasive wheels;
- waste of ferrous and non-ferrous metals (scrap and shavings);
- cleaning materials, used up and contaminated;
- refractory concrete.

The main waste of laboratory facilities are:

- abrasive belt, grinding stone, used abrasive wheels;
- waste lubricants;
- cleaning materials, used up and contaminated;
- sludge (with Fe content up to 2 g / dm ^{3}), when preparing templates.

Water management facilities

Water management facilities (primary and secondary scale settling tanks, sludge dewatering station) - trapped waste oils. Waste of iron scale from the rolling mill and sludge from the Slab Caster Machine, captured in the settling tanks and dewatering stations, are indicated above from the respective industries.

Heat and power facilities

The main types of waste for the heat power sector are:

- waste oil from air and booster compressors, expander booster;
- used lubricants;
- cleaning materials, used up and contaminated.

In the process of life of the workers of the projected objects, solid household waste is generated.

In addition, as a result of the activities of the designed objects, garbage is generated from cleaning the territory. Waste collection from the premises and production area is carried out in waste bins. Garbage removal is provided for the solid waste landfill.

Worn-out overalls are also used as rags in production.

In general, the plant is expected to increase the volume of waste generated by 318691.7011 tons / year (from 136,232.7791 tons / year to 454924.4802 tons / year). The number of names of generated waste will remain at the same level (45 items).

The enterprise has established strict control over the timely collection, storage and disposal of generated production and consumption waste. The

corresponding plans for the collection, storage and disposal of production waste are updated annually.

Table 4.3 presents summary data (according to preliminary design decisions) on the characteristics of the waste generated by the projected casting and rolling complex and the way of handling them.

Characteristics of the waste generated by the projected casting and rolling complex and ways of handling them

Table 4.3

Waste name	Place of waste generation (production, technological process)	Waste hazard class	Physical and technical characteristics of waste (composition, content of elements, state, moisture)	The amount of waste generated, t / year	Storage	Disposal method
1	2	3	4	5	6	7
1. Steelmaking slag and slag from Slab Caster Machine	Meltshop and Slab Caster	4	Solid (oxides of iron, calcium, manganese, magnesium, silicon, etc.)	228986	It is removed from the Meltshop and Slab Caster in a slag bowl and transferred to the primary slag processing section	Warehousing at the site of primary slag processing (PSPA) with further processing according to the existing scheme at the plant.
2. Breakage of refractories, (waste from foundry forms of ferrous metals)	Meltshop, Slab Caster, tundish preparation section	5	Hard (refractory concrete, ceramic fiber, siliceous with SiO_2 content up to 98% and AL_2O_3 up to 2 %)	16500	Disposed of in a bunker by road	Transfer for utilization under existing contracts (partially transferred to Ogneupor JV for processing, partially used for own needs during the repair of furnace lining)
3. Break of furnace refractories (scrap of fireclay bricks)	Heating furnace, tunnel furnace roller service area	5	Solid (chamotte brick scrap)	99.4	Disposed of in a bunker by road	
4. Waste graphite electrodes (graphite electrodes not contaminated with hazardous substances)	Meltshop	5	T hard (carbon - 100%)	450	Disposed of in a bunker by road	Transmission for recycling the existing scheme in the enterprise (is sold to third party organizations to re- use)
5. Technological scrap of Slab Caster and rolling mill, under-rolling and scrap of rolling mill rolls, repair support (scrap and waste of steel products in lump form,	NASA, rolling mill, parts of the repair software	5	Solid (steel) in lumpy form	7721.3	Disposed of in a bin for recycling	Directed at Stockyard for re- use

Waste name	Place of waste generation (production, technological process)	Waste hazard class	Physical and technical characteristics of waste (composition, content of elements, state, moisture)	The amount of waste generated, t / year	Storage	Disposal method
1	2	3	4	5	6	7
uncontaminated)						
6. Waste metal, including shavings of the rolling mill and maintenance workshop of the Slab Caster Machine (steel shavings, uncontaminated)	Rolling mill, Slab Caster Machine maintenance workshop	4	Hard (metal shavings, steel, cast iron)	81.3	Special closed boxes	Sent to the scrap yard for reuse
7. Sump in a ladle (ferrous metal smelting waste)	Slab Caster	4	Solid (iron oxides, slag)	4167	Disposed of in a bin for recycling	Sent to the scrap yard for reuse
8. Furnace mill mill scale, SCM mill scale (mill scale during mechanical cleaning of ferrous metal parts made by hot stamping)	Heating furnace, Slab Caster Machine, Slab Caster	4	Iron oxides, br ll amas metal dust (SCM)	7695	Special containers (kiln scale), goes to settling tanks and dewatering station (mill scale)	Transfer for utilization according to the existing scheme at the enterprise (implemented by cement plants)
9. Rolling mill scale, including laminar cooling slimes (oily scale <15%)	Rolling mill, cutting units	4	Metal dust sludge	3135	Enters the settling tanks and dewatering station	Transfer for utilization according to the existing scheme at the enterprise (implemented by cement plants)
10. Scrap in stalerazlivoch - SG NASA ladle slag and scrap from Primary Slag	Slab Caster, Primary Slag Processing Area	5	Solid (steel + slag)	9641	Disposed of in a bunker for vehicles	Sent to the scrap yard for reuse

Waste name	Place of waste generation (production, technological process)	Waste hazard class	Physical and technical characteristics of waste (composition, content of elements, state, moisture)	The amount of waste generated, t / year	Storage	Disposal method
1	2	3	4	5	6	7
Processing Area (scrap steel uncontaminated)						
11. Industrial waste (waste sorting scrap and waste of ferrous metals)	Scrap yard	4	Solid (waste plastic, wood, etc.)	12000	Special closed boxes	Transferred for placement at the solid waste landfill
12. Scrap of non-ferrous metals (scrap and waste of copper products without coating, not contaminated)	Service area for molds and roller segments	4	Solid (copper plates SCM)	13.0	Special closed boxes	Transfer for utilization according to the existing scheme at the enterprise (implemented by Vtortsvetmet enterprises)
13. Copper shavings (uncontaminated copper shavings)	Slab Caster Machine maintenance workshop	4	Hard (copper shavings)	2.84	Special closed boxes	
14. Waste abrasive (abrasive waste overt circles)	Val bu eshlifovalnaya workshop, m asterskaya service caster, Laboratory steel plant	4	Hard (waste grinding wheels, stone and belt)	0.466	Disposed of in a bunker by road	Transfer for disposal according to the existing scheme at the enterprise
15. Waste abrasive metal dust (abrasive dust with a metal content> 50%)	Roll grinding workshop. Slab Caster Machine maintenance workshop	3	T hard (abrasive and metallic dust)	0.26	Special closed boxes	Transfer for disposal according to the existing scheme at the enterprise
16. Waste lubricants (waste lubricants based on petroleum oils)	Roll grinding workshop. Slab Caster Machine service workshop. Air separation unit. Laboratory facilities	2	Waste oils (mixture of hydrocarbons - 94 *%;* water - 4%; mechanical impurities - 2%)	1.7481	Barrel	Submitted for recovery / disposal by a licensed third party
17. Waste oil (waste mineral	Rolling mill	2	Liquid oils	79.2	Sealed containers	

Waste name	Place of waste generation (production, technological process)	Waste hazard class	Physical and technical characteristics of waste (composition, content of elements, state, moisture)	The amount of waste generated, t / year	Storage	Disposal method
1	2	3	4	5	6	7
hydraulic oils, halogen-free)						
18. Waste compressor oils (waste mineral compressor oils)	Air separation unit. Compressor station	2	Liquid oils	2.21	Sealed containers	
19. Sludge generated during grinding (abrasive dust with metal content <50)	CRC laboratory	3	T hard (abrasive and metallic dust)	1.54	Special closed containers	Transfer for disposal according to the existing scheme at the enterprise
20. Petroleum products, from lovlennye water recycling systems (waste from other mineral oils)	Wastewater treatment of circulating cycles	2	Petroleum products	683	Special closed containers	Transferred to regeneration / recycling hundred sided organizational tion having corresponding - conductive licensed
21. Packaging containers (waste containers, packaging materials made of polyethylene, not contaminated)	Storage facilities	4	Bags and big b e gi	48.616	In the back rooms	Transfer for disposal according to the existing scheme at the enterprise (transfer under a contract to a third-party organization specializing in the processing of polymer materials)
22. Containers made of ferrous metals contaminated oil (content of refined - ucts at least 15%)	CRC central warehouse	4	Solid (metal containers contaminated with oils and hydraulic greases)	18.73	In utility rooms, covered, with closed lids	Transfer for disposal according to the existing scheme at the enterprise
23. Metal containers in which ferroalloys are delivered	CRC central warehouse	5	Solid (metal containers)	39.49	In the back rooms	Disposed of at the enterprise according to the existing scheme

Waste name	Place of waste generation (production, technological process)	Waste hazard class	Physical and technical characteristics of waste (composition, content of elements, state, moisture)	The amount of waste generated, t / year	Storage	Disposal method
1	2	3	4	5	6	7
(scrap and waste containing ferrous metals in the form of products, pieces, not sorted)						
24. Cleaning materials (cleaning materials contaminated with oil or oil products, oil content less than 15%)	Industrial premises	4	Solid	21.8	Containers	Is directed to the utilization of specialized organization is essentially yuschim contracts
25. Worn clothes (clothes of natural, fibers having lost the consumer - skie properties suitable for the manufacture rags)	Industrial premises	4	Solid	5.56	Containers	Used in the enterprise as a rag
26. Dust from aspiration units (fume treatment waste)	Meltshop, HBI warehouse, daily warehouse of ferroalloys and additives	3	Solid (steel dust, iron oxide, calcium oxide, soot)	26659, 641	Prefabricated bunker	Transfer for utilization according to the existing scheme at the enterprise (partly use for own needs for secondary use, partly implementation of cement production, to interested buyers)
27. Household waste (unsorted garbage from office and household premises of organizations)	Industrial and domestic premises, canteens	4	Household rubbish, solid	62.6	Special closed containers	Transferred for placement at the municipal solid waste landfill under a contract
28. Waste obtained in the process of cleaning	Cleaning of the territory of the projected objects	5	Industrial waste, dirt, sand, vegetation	575	Special closed containers	

Waste name	Place of waste generation (production, technological process)	Waste hazard class	Physical and technical characteristics of waste (composition, content of elements, state, moisture)	The amount of waste generated, t / year	Storage	Disposal method
1	2	3	4	5	6	7
the territory (estimates from the territory of enterprises)			remains, and other waste			
TOTAL				**31869 1,7011**		

4.4 Exposure to acoustic noise and vibration

Noise is a complex of sounds perceived by the human hearing organ, regardless of the nature and nature of occurrence. The amount of noise is characterized by two indicators: the sound pressure level and the equivalent (in energy) sound level. Sound pressure level is a measure of continuous noise and is measured in decibels (dB). Equivalent sound level is a measure of intermittent, impulsive noise and is measured in decibels on the "A" scale (dBA).

Prolonged exposure to intense noise can decrease the sensitivity of the hearing aid. Through the auditory system, noise has a harmful effect on the entire body and primarily on the human nervous system. In addition, industrial noise interferes with the concentration of the worker while performing the work and reduces his performance.

The main sources of noise in any production are the following equipment: machines with electric, pneumatic and motor drives, lifting and transport mechanisms; auxiliary engineering equipment - compressors, pumps, fans, transformers, as well as technological operations for the processing of materials.

The projected CRC source and the m and the noise will be substantially all major equipment - Furnace installation-ladle furnace, a continuous flow machine the ingot, a rolling mill material handling system.

To reduce the noise level, the correct operation of mechanisms and modern preventive maintenance are of great importance. The noise of ventilation units is reduced by air ducts lined with sound-absorbing materials.

Planning decisions are taken for the construction of timber industry within the current main production site plant near the existing EAF and SOC-2.

All the main technological equipment of the CRC will be located in production facilities, which will significantly reduce the noise and vibration produced.

The distance from the production halls CRC to the closest dwelling houses will be 1 100 m.

The impact of acoustic noise and vibrations exerted by the considered technological equipment of the projected CRC will not spread beyond the industrial site of the plant, and, accordingly, will not have a negative impact on the residential area.

5. MEASURES TO REDUCE THE NEGATIVE IMPACT ON THE ENVIRONMENT

Measures for the protection of atmospheric air

Operation projected CRC involves the use of dust- gas wastewater treatment 's SET on K, which s to provide and so reducing the negative impact on the air to acceptable levels.

As can be seen from the analysis of the level of atmospheric air pollution, the surface concentrations for all considered pollutants outside the SPZ of the plant will not exceed the established maximum permissible levels, taking into account the emission quotas.

The basis of all measures should be strict adherence to the technological regulations of production, constant control by the relevant services over the technical state of dust and fume treatment equipment.

In order to fulfill the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 737 dated 09/05/2019. "On improving the monitoring of the natural environment of the Republic of Uzbekistan ", at the next stage of the environmental impact assessment (EIA), when implementing the EPZ project (Statement on environmental consequences), it is necessary to provide for equipping the main sources of emission of pollutants into the atmosphere (making the greatest contribution into the gross emissions of the enterprise) by systems of continuous

monitoring of the quantitative and qualitative composition of emissions. Chimneys from the fume treatment system of the EAF furnace and the slab heating furnace before rolling must be equipped with stationary flue gas analyzers with periodic automatic data collection on a special server connected to the Unified Geoinformation Database of the RUz Environmental Monitoring Systems.

Measures for the protection of water bodies

In order to protect and prevent pollution, groundwater and surface waters, as well as to ensure sanitary and epidemiological reliability in accordance with KMK 2.04.02.-97 and SN 245-71 "For water supply facilities", a number of measures are envisaged to exclude the possibility of waste water getting into soil and groundwater of the site:

- use of equipment, fittings and pipelines resistant to the corrosive and chemical properties of wastewater;
- waterproofing is used for sewerage and water supply wells, chambers and tank structures;
- the use of anti-seismic building structures.

The concrete of the structures in the ground is made on sulfate-resistant Portland cement. The outer surfaces of these structures, in contact with the ground, are coated with hot bitumen twice with crushed stone-bitumen preparation.

For the complete absence of a negative effect on the groundwater of the location of the enterprise, a sufficiently strict supervision over the tightness of the elements of the water supply network, circulating water supply systems, sewerage systems is sufficient.

Measures for the protection of the environment during the collection, storage, treatment and disposal of waste

The period of operation of the projected CRC will be accompanied by the formation of a significant amount of industrial waste. About 30% of the generated waste will be completely utilized at the plant through secondary use. The rest (about 69%) will be sold to specialized organizations for use as secondary raw materials or processing. An insignificant part of waste (less than 1%), which is not valuable for recycling, and is hazardous to the environment, will be disposed of to the municipal solid waste landfill.

The enterprise has established strict control over the timely collection, storage and disposal of generated production and consumption waste. The corresponding plans for the collection, storage and disposal of production waste are updated annually.

6. ANALYSIS OF POSSIBLE EMERGENCY SITUATIONS

The danger of negative impact on the environment and working personnel may arise in the event of an emergency.

An accident is understood to mean the release of an industrial enterprise's own energy storage, in which raw materials, intermediate products, enterprise products and production waste, as well as technological equipment installed at an industrial site, can create damaging factors for personnel, the population, the environment and the enterprise itself.

The object of impact is, first of all, the personnel of the enterprise and the population living in the adjacent territory.

The quantitative characteristic of possible emergency situations is determined by several parameters such as:

- the value of possible irrecoverable human losses, which is understood as the number of fatalities as a result of an accident;
- the value of possible sanitary human losses, i.e. the number of victims who need hospitalization;
- frequency of accidents.

Irrecoverable and sanitary losses are determined by the number of people within the affected zones. An accident is considered major if the expected irrecoverable loss is 10 people.

The source of impact or danger can be: elements of main and auxiliary activities, storage facilities and means of transport. Each source, except for transport, is localized in space and can be associated with one or more hazardous substances. Hazardous substances can be: flammable liquids or gases, flammable gases under pressure, explosive and toxic substances, namely: toxic gases, powders and combustion products.

In the process of performing technological operations and work, damage, equipment malfunctions and emergencies may occur.

Malfunctions, depending on their nature and consequences, the severity of equipment damage, are classified as accidents, failures in work of I or II degree.

An enterprise accident is:

- damage to equipment requiring refurbishment within 7 days or more;
- destruction of equipment, if their restoration is impossible or impractical;
- collapse of building structures.

Violations with lesser consequences, as well as equipment downtime for repairs beyond the permitted period, are classified as failures in operation of I and II degrees.

Accidents and malfunctions cause prolonged downtime and interruptions in the operation of equipment, and in some cases - significant destruction of structures and serious injuries of the maintenance personnel. Accidents can be divided into the following groups for reasons of occurrence:

- due to the fault of the service personnel;
- due to the fault of equipment manufacturers and installation organizations;
- for other reasons.

Equipment damage that occurred due to improper actions of the operating personnel or non-compliance with the normal operating mode is called regime damage, and damage caused by design imperfections, installation defects and materials is called structural.

The most serious consequences, causing material damage and group accidents, are caused by accidents at explosive and fire hazardous industries, which are inherent in any metallurgical enterprise.

In terms of the number of accidents associated with explosions and fires, the metallurgical industry is in second place after chemical and oil refining facilities. The number of fires and explosions is 4 times less than in the oil refining industry, but significantly exceeds their number in other industries.

Despite the improvement of processes and technologies in metallurgical production, the situation in the field of industrial safety is not improving, the number of accidents and the level of injuries at metallurgical enterprises remain high. Enterprises of metallurgical complex, from the point of view of occurrence of equipment caused accidents, feature : large volumes
of substances and materials, in fact including chemically hazardous ; significant heat radiat ion ; use of powerful units, machines and mechanisms in technological processes that cre ate industrial hazards ; large territories ; location enterprises near large population of items, as well as near rivers and reservoirs ; use of a large number of labor resources in technological processes and their maintenance.

Development of measures to prevent / reduce emergency situations is an integral part of the environmental protection management system.

Ferrous metallurgy is one of the most dangerous among other industries in terms of accidents. Most of the emergency cases is necessary to :

- explosions due to the supply of raw charge, burnout of tuyeres in metallurgical units (24.5%);
- burnout of the hearth, tuyeres, refrigerators, air ducts of blast furnaces (20.2%);
- leaving of metal, slag from metallurgical units (18.1%).

Analysis of possible emergency situations during the operation of Electric Arc Furnaces:

- Collapse of a significant part of the roof lining and in the development of the accident - the complete collapse of the furnace roof. In this case, the ejection of hot metal and slag from the furnace through the working window is possible, overflowing the slag bowl with hot metal, filling the slag trolley rails. In order to avoid rupture of the water-cooling fittings of the furnace due to heating and vaporization, immediately raise the sleeves of the electric holders to the upper position, raise the roof and take the shaft, all personnel should immediately be taken to a safe area.

After cooling (darkening) of the furnace space, bring the shaft to the furnace and start changing the roof. Work on removing the vault should be performed only in woolen overalls. Fill the slag pit and the slag trolley track with water and remove the "goats".

This emergency situation is likely in case of explosions, increased wear, and electrode breakage. The prerequisites for such an accident may be untimely replacement of the furnace roof, non-observance of pyrotechnic control, as well as inadequate scrap quality - the presence of explosive elements.

- Water leaks from water-cooled panels, an explosion in the furnace space and the ejection of molten metal and slag is possible.

With a weak water leak (it does not hover inside the furnace), take measures for the prompt release of the melt, and with a strong water leak, shut off the water, if the slope has stopped soaring, take measures for the early release of the melt, if the slope continues to soar, close the water on the panel. Remove people who are not associated with the production to eliminate the accident to a safe place. After tapping the melt, install a heat-insulating platform (plate) and start to eliminate the accident, i.e. water leaks. After eliminating the malfunction, start the oven into operation.

- Stopping the water supply to the water-cooled elements of the furnace. This will entail the release of hot steam, rupture of the water-cooled elements.

If this situation arises, remove all people from the danger area, turn off the oven, raise the roof and open the portal to reduce the influence of the temperature of the metal and lining on the water-cooled panels. The subsequent supply of water for cooling should be carried out gradually in order to avoid thermal ruptures in the panels, bringing to the norm with the portal set aside.

This emergency situation is possible in case of failure of the circulating water supply pumping system, an accident on the water pipelines.

- Eating the bottom or slope and leaving the metal under the furnace.

In this case, a fire is possible in the area of metal leaving. In the first minutes of an emergency, it is necessary to take measures to free the furnace from liquid metal, remove people to a safe place, turn off the oxygen and gas supply from the main shop gas and oxygen pipeline and act in accordance with the PLA - urgently call the duty electricians, locksmiths, power engineers, fire department to the furnace command.

The reason for such an accident may be the unsatisfactory state of the lining of the walls, hearth and water-cooled elements, the ingress of water onto the lining. To prevent this situation from occurring, regular monitoring of the state of the furnace lining is required.

- Main bucket burnout.

If the technological instructions for pouring the steel ladle are violated, an emergency situation is possible, which will lead to a breakdown of the steel ladle and then the water supply, gas pipeline, oxygen pipeline.

In this accident, all personnel who are not involved in the elimination of the accident must be immediately taken to a safe place, inform the dispatcher and shop management.

Such an accident can arise and develop as a result of untimely repair and failure of the main bucket gate valve - in case of an emergency shutdown of oil supply to the cylinder, voltage decrease. In this case, if metal gets on moisture, explosions are possible.

The plant organized timely repairs of intermediate and steel-pouring ladles, but the likelihood of such an accident at the plant is not excluded.

Similar to this accident, situations are likely associated with the breakdown of the tundish, burnout of the tundish, as a result of non-observance of the temperature regime, the use of an incorrect stream of metal of the main ladle.

In addition, non-opening of the tundish stopper caused by a failure in the assembly of the stopper, improper, uneven heating of the tundish can lead to ignition of the oxygen hose.

In this situation, it is necessary to run in the stopper by lowering the metal level in the tundish.

- In case of violation of the technological instructions and as a result of the use of docked oxygen hoses of mismatched diameters, an emergency situation is possible caused by burning of the tundish nozzles and ignition of the oxygen pipeline. This will result in injury, burns, and oxygen poisoning in the vicinity of workers. It is necessary to urgently close the oxygen valve, main valves, cool the place of fire. Call the power engineer on duty, the foreman, replace the hose.
- If the mode of carbon oxidation is violated, an explosion is likely, which will entail the release of hot metal and slag through the working window of the steelmaker. It is necessary to remove all people from the danger zone and take measures to eliminate the accident.
- Violation of the tightness of the hydroaccumulators of the NAS of the electric arc furnace and the ladle furnace installation. In case of failure of threaded connections and valves, it will lead to gas pollution, a fire, and if nitrogen leaks, people may be poisoned. It is necessary to close the UAS room, call the gas rescue service and do not resume work until the air in the UAS room contains 19-22% oxygen. All personnel must be moved to a safe area immediately.
- Burnout of the main ladle at the UPK, caused by violation of the technological instructions for filling the main ladle. The increased temperature of the main ladle can lead to breakdown of the steel ladle and metal escape into the blow-out plug at the UPC. A fire is possible at the metal leaving area, it is urgently required to take the shop workers to a safe place.
- Breakdown of the main ladle on a steel carrier during processing of steel at the UPC and leaving the metal under the steel carrier.

It is urgent to remove the ladle from the steel truck, fill the slag pit and rail tracks with water and remove it. Inspect the state of the steel carrier and start replacing it. Turn off and disassemble the circuit on the control panel of the steel carrier.

Remove unauthorized people not related to the production of work at the CPC.

- An accident on the water pipelines and the failure of the pumping system of the water supply will lead to the cessation of water supply to the water-cooled panels of the UPK vault, and steam will be released, the water-cooled elements and water inlets will rupture. It is necessary to turn off the UPC oven, remove the vault. Remove people from the danger area.
- If the instructions for assembling the bay window are violated and water gets into the lining of the walls, the bottom of the EAF furnace and the bay window is

eaten away, the metal will go into the bay window and the bottom will be consumed. A fire is possible in the area of metal leaving and an explosion if the metal gets wet.

In this situation, it is necessary to shut off the water for cooling the bay window, tilt the stove towards the working window to stop the metal leaving through the bay window. Fill the slag pit and the rail tracks of the slag carriage and the steel truck with water and remove the “goats”. Remove bystanders not related to the production of electric furnace work. Urgently call on duty electricians, mechanics and power engineers, fire brigade to the stove. Observance of overhaul periods, proper control of the state of the bay window and the lining of the furnace and water-cooled elements is necessary.

- The gap welding joint pipeline for regulative minutes installation HRU g ds (not) illuminated possibly poisoning of people in the danger zone at elevated gas content in the air is possible explosion and fire. In the event of this situation, shouting to warn about a gas accident people who are near the leak and gas fire. Immediately remove the operating personnel and bystanders from the danger zone, turn off the stove, set up posts to fence off the gas-contaminated area at the accident site and immediately reduce the pressure and close the gas supply. Disable the operation of the ventilation units of the stoves.

Take measures to rescue and provide first aid to the victim, immediately call the duty rescuers of the State Security Service, an ambulance, if necessary, as well as a fire brigade.

Report the accident to the workshop dispatcher, plant dispatcher, safety department.

- Rupture of the welding joint of the gas pipeline and to the EAF. Mr. al burns may result in fire around the underlying materials, e. wires or technical room.

With a shout, warn about a gas accident people in the area (leakage) of gas ignition.

The maintenance personnel must immediately remove unauthorized persons from the danger zone, turn off the furnace, set up posts to fence off the gas-contaminated area at the accident site and immediately reduce the pressure or close the gas supply. Disable the work of ventilation, installations of those. premises

Immediately call the emergency rescuers of the SCA on duty, an ambulance, if necessary, as well as the fire brigade. Take urgent measures to rescue and provide first aid to victims.

Report the accident to the dispatcher of the shop, the plant, the head of the shop, the gas service, the safety department.

- Fire of oxygen line.

With a shout, warn all workers in the danger zone about an accident, remove workers from the danger zone, close the main valve on the oxygen pipeline, call the power engineer on duty, report to the site foreman, extinguish the fire site with water, sand or a foam fire extinguisher, replace the oxygen hose

- Leakage of oil or nitrogen into the accumulator due to loose threaded connections or rupture of the casing can lead to an emergency.

Notify operator immediately. Transfer the operation of power pumps to manual mode, close the valve of the accumulator.

Bleed nitrogen into the atmosphere outside the US.

Drain the oil from the accumulator into the oil tank.

Report the accident to the dispatcher of the plant, the head of the shop, the head of the rolling mill, the master mechanic of the mill.

- A drop in pressure in the hydraulic system of the HAC due to increased oil leakage (pipeline rupture, g / equipment) if the valve does not operate below its level.

Close the valves of the hydroaccumulators, the control panel of the TPU stands.

Give a command to end casting.

Turn on the water cooling system at maximum flow.

Inform the casting master, shop manager, head of the Slab Caster Machine.

Call the locksmiths on duty, determine the location of the leak, take measures to eliminate the accident.

- Termination of water from the pumping station to the water-cooled EAF elements.

Turn off the oven, burners and remove the oven roof. Remove all non-furnace workers from the work area. Call the staff on duty. Check the automatic water supply from the emergency water conduit, if the automatics did not work, carry out the water supply through the mechanical valve gradually to avoid thermal ruptures of the water-cooled elements. Then carefully inspect the state of the burners and water-cooled elements of the furnace and, in the absence of a malfunction, start the furnace into operation

- Stopping the supply of air, oxygen, gas, nitrogen to the EAF.

In this case, it is necessary to turn off the oven, burners. Check the solenoid valves and the pressure on the manifolds - air, oxygen, gas, nitrogen.

Call a shift foreman, mechanic, power engineer on duty, electrician and instrumentation.

- Lack of traction on the electric furnace, flue gases are discharged into the workshop.

This emergency situation is possible in case of spontaneous shutdown of the electric motor of the exhauster and if the supply of compressed air to the regeneration system of the filter sleeves has stopped, the pneumatic valves on the gas outlet have closed.

The development of this accident will lead to failure of the units of the electric furnace, poisoning of workers who maintain the furnace and those nearby, as well as to environmental pollution outside the workshop, enterprise.

It is necessary to monitor and comply with TI every shift.

Personnel actions in case of accidents

Analysis of accidents shows that most of them are the result of NON-COMPLIANCE WITH THE PRODUCTION INSTRUCTIONS and WRONG PERSONNEL ACTIONS.

Accordingly, the main state for preventing accidents is the strictest observance of the rules of technological regulations and fire safety of production. Failure to comply with them leads to accidents, fires, explosions in production.

The most important state for the correct elimination of an emergency situation is the maintenance of calm by the personnel, the absence of confusion and interference by unauthorized persons, the issuance of clear orders and their prompt implementation. In the event of an accident in the shop, the supervisor of the shop shift supervises the actions of the personnel, and in the case of a general plant - the director or principal engineer of the plant. The basis for the correct elimination of the accident is the preservation of the equipment and the prevention of major destruction due to improper actions of personnel or delay in the elimination of the accident, as well as the exclusion of injury to personnel. Any equipment that has defects that threaten personnel must be stopped immediately. If an accident occurred at the junction of shifts, the personnel taking over the shifts is involved in the elimination of the accident and fulfills the orders of the personnel of the shift, eliminating the accident. Repair personnel and personnel of other workshops can be involved in the elimination of the accident.

CONCLUSION

EIS project of reconstruction and expansion of production capacities of JSC " Uzmetkombinat " with the construction of a Casting and rolling complex is made on the basis of the Law " On Environmental Impact Assessment " №73-11 from 20.05.2000g.

In accordance with the list of activities for which the State Environmental Expertise is carried out (Appendix No. 2 to the Resolution of the Cabinet of Ministers No. 949 dated November 22, 2018), Uzmetkombinat JSC belongs to enterprises of the 1st category of environmental hazard (clause 1 4 - factories ferrous and nonferrous metallurgy).

The production area of Uzmetkombinat JSC is located in the city of Bekabad, Tashkent region.

The capacity of the projected CRC will be 109 3 thousand tons of liquid steel per year, with the output of finished rolled products up to 1040 thousand tons / year.

The implementation of the planned activities will necessarily lead to changes in the quantitative and qualitative indicators of the company's impact on the environment.

Impact on atmospheric air

During the operation of the projected CRC in air from 2 7 - E stationary emission sources will arrive pollutants 1 9 ti names. The approximate amount of pollutant emissions from the sources of the projected casting and rolling complex will be 2407.329391 t / year, including: solids - 123.408409 t / year (5.13%), gaseous substances - 2283.920982 t / year (94.87 %).

The main contribution to the formation of the gross emissions of the projected casting and rolling complex will be made by the following pollutants:

1. Carbon oxide - 1887.706068 t / g 78.41%
2. Nitrogen dioxide - 311.111417 t / g 12.92%
3. Steel - making dust - 116.398711 t / g 4.84%

TOTAL 2315.216196 t / y 96.17%

Thus, the share of the above three pollutants will account for more than 96% of the gross emissions from the equipment of the projected casting and rolling complex.

The operation of the projected CRC provides for the use of fume treatment units, which will ensure the reduction of the negative impact on the atmospheric air to an acceptable level.

According to preliminary estimates, with the introduction of a new casting and rolling complex into the production process, the gross emission of the plant as a whole will increase by 2407.329391 t / year (up to 5286.430091 t / year), the number of emission sources will increase by 27 (up to 321 sources), the number of names of pollutants emitted will increase by 1 substance due to calcium fluoride (up to 59 names).

An analysis of the fields of surface concentrations of the considered pollutants emitted during the operation of the projected casting and rolling complex, taking into account all the existing sources of the plant, emitted similar pollutants, shows that outside the SPZ, emissions for all ingredients will not exceed the established quotas.

Impact on water resources

The water consumption of the projected CRC will consist of the household needs of the personnel, production needs, and fire safety needs.

The required amount of water for the projected CRC will be provided from the existing water supply networks of the plant.

For household purposes, the water will be used for household and drinking needs of the personnel, in showers, in the dining room. In total, for the household, drinking and household needs of the personnel of the projected CRC, water is required - 143.82 m^3/ day, 52.49 thousand m^3/ year.

Water consumption for the production needs of the projected CRC is provided for the cooling of technological equipment. For the needs of the projected CRC, an individual recycling water supply system will be provided to provide the main technological equipment in cooling water. The volume of the circulating water supply system will be about 457 680 m^3/ day. In total, the production needs of the projected CRC require water - 12873 m^3/ day, 3990.63 thousand m^3/ year.

Analysis of the technological solutions provided for in this project shows that the functioning of the projected casting and rolling complex will be accompanied by the formation of household and industrial wastewater.

Domestic waste water generated from domestic and drinking needs of the staff of the projected timber industry, canteens, showers, in a total amount of 143.82 m ^{3}/ day., 52.49 thousand m ^{3}/ year, according to the current intra-plant sewage network will be discharged to the city sewer network of Bekabad.

The estimated amount of industrial wastewater (flushing wastewater from the make-up water treatment plant, wastewater from the "blowdown" of the circulating systems, wastewater from the facilities of the complex that have minor traces of oil and acid residues, stateally clean wastewater - overflows, accidental wastewater, emptying of cooling towers repair, etc.) from the needs of the projected CRC is 7940 m ^{3}/ day, 2461.4 thousand m ^{3}/ year.

The estimated amount of storm and melt runoff is 2371 m ^{3}/ day, 191.678 thousand m ^{3}/ year.

Industrial and storm wastewater will be discharged into the industrial storm sewer system with the subsequent supply of wastewater to treatment facilities.

Production and consumption waste generation

The analysis of technological solutions provided for by this project shows that during the period of operation of the projected CRC, the following types of industrial waste will be generated: steelmaking slag; dust from fume treatment plants; waste of graphite electrodes; refractory breakage; wiping materials, waste and contaminated; dross of Slab Caster Machine; slag after casting at Slab Caster Machine; scrap in the steel ladle; sump in tundish; used refractory materials and products; technological scrap; slag scrap; industrial waste; packaging big bags; used metal containers for ferroalloys and lubricants ; metal scrap and undershoots; mill scale, oil content no more than 1%; dry kiln scale; waste materials and products from refractories (refractory breakage); waste lubricants; scrap rolls and shavings; abrasive and metal dust; used abrasive discs; waste of ferrous and non-ferrous metals (scrap and shavings); refractory concrete.

Household waste will include: food waste; solid household waste ; garbage from cleaning the territory.

About 30% of the generated waste will be completely utilized at the plant through secondary use. The rest (about 69%) will be sold to specialized organizations for use as secondary raw materials or processing. An insignificant part of waste (less than 1%), which is not valuable for recycling, and is hazardous to the environment, will be disposed of to the municipal solid waste landfill.

In general, the plant is expected to increase the volume of waste generated by 318691.7011 tons / year (from 136,232.7791 tons / year to 454,924.4802 tons / year). The number of names of generated waste will remain at the same level (45 items).

The enterprise has established strict control over the timely collection, storage and disposal of generated production and consumption waste. The corresponding plans for the collection, storage and disposal of production waste are updated annually.

The enterprise has established strict control over the timely collection, storage and disposal of generated production and consumption waste. The corresponding plans for the collection, storage and disposal of production waste are updated annually.

In the projected casting and rolling complex, noise sources will be practically all the main technological equipment - a Electric Arc Furnace, a ladle furnace, a Slab Caster Machine, a rolling mill, and material transportation systems.

Planning decisions for the construction of the casting and rolling complex are made within the existing main production site of the plant, near the Meltshop.

All the main technological equipment of the CRC will be located in production facilities, which will significantly reduce the noise and vibration produced.

The distance from the CRC production workshops to the nearest residential buildings will be 1100 m.

The impact of acoustic noise and vibrations exerted by the considered technological equipment of the projected CRC will not spread beyond the industrial site of the plant, and, accordingly, will not have a negative effect on the residential area.

The paper highlights the most dangerous place of production taking place in the operation and design of the industrial plants as well and possible emergency situations. The measures to prevent the occurrence of emergency situations are described.

The operation of the projected CRC in normal technological mode will not lead to global changes in the state of the environment in the area of the enterprise.

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Appendix A

UZBEKISTAN STATE COMMITTEE FOR ENVIRONMENT PROTECTION AND NATURE CONSERVATION

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SUMMARY
of the State Environmental Audit Committee

For the facility:	Assessment of the environmental impact of the reconstruction and expansion of production capacities with the construction of a casting and rolling complex (CRC) on the territory of Uzmetkombinat JSC in the city of Bekabad, Tashkent region (draft EIS)
Customer:	Uzmetkombinat JSC
Developer:	ECO PROM KONSALTING LLC
Document is addressed to	Deputy Chairman of the Board for Prospective Development and Investments of Uzmetkombinat JSC – Mrs D.A. Usmonova
Copy to:	Department of Ecology and Environmental Protection of the Tashkent region

The materials of the first stage of the environmental impact assessment of the reconstruction and expansion of production capacities with the construction of a casting and rolling complex (CRC) on the territory of Uzmetkombinat JSC, located in the city of Bekabad, Tashkent region, have been submitted to the state ecological expertise.
Uzmetkombinat JSC is the leading enterprise of ferrous metallurgy in the republic and has been operating since 1944. Geographically, the plant's subdivisions are located on seven industrial sites within the city of Bekabad, which occupy a total area of 474.13 hectares.
The main industrial site No. 1 borders: in the north - with the territory of the Bekabad region, in the northeast, in the east and southeast - with the territory of the Republic of Tajikistan, in the west with a residential area. The nearest residential buildings are located 5 0 m from the western border of the plant. The Syrdarya River, flowing 250 m southwest of the plant, represents surface watercourses.

As part of the industrial site No. 1 there are: electric arc furnace shop (Meltshop), long products rolling shops No. 1 and No. 2 (LPS-1, LPS-2), steel wire and open-hearth shops, MRS, Energy (Utilities) Shop (ES), Consumer goods production area (CGPA), Slag Dump Processing Workshop (SDPW), Production of non-ferrous metals (PNFM), Production of thermal insulation materials (PTIM), metal products workshop, Construction and Installation department (CID), electrical equipment repair shop, railway center, fuel and lubricants warehouse, fire station, administrative building, area for surface water intake from Dalverzin canal, pumping stations of I and II rise for household

and technical needs, drinking water preparation station, local and industrial storm treatment facilities, as well as Metallurgy" substation, etc.

On site II, located 1.5 km north-west of site I, there is an asphalt concrete plant (ABZ), storage and auxiliary premises, and on the rest of sites III - VII there are landscaping and gardening workshops, where each of which has 1 boiler room for heating.

As part of the expansion of the plant, the project provides for the construction of a casting and rolling complex on the basis of an Meltshop (at industrial site No. 1) on a territory free from buildings with an area of 5.0 ha. The structure of the CRC will include a steel-smelting section, where a Electric Arc Furnace EAF-100 and a ladle furnace (UPK) will be installed, a casting and rolling section with an LPA unit, which will combine a continuous casting plant (UNRS), a hot-briquetted iron workshop (HBI) with a gallery for transportation and fume treatment, which will occupy 4.5 hectares and the construction of a circulating water supply system - 0.5 hectares.

At present, the plant's production capacity is designed to melt 850 thousand tons / year of steel and produce 810 thousand tons / year of finished rolled ferrous metal. The design capacity of the CRC will be 850 thousand tons / year of liquid steel, including 700 thousand tons / year of hot-rolled (hot-rolled) coils intended for the production of thin cold - rolled (cold - rolled) sheet with a coating at JV LLC Tashkent metallurgical plant "(TMZ). The total volume of steel smelted in the Meltshop after expansion will amount to 1.7 million tons / year, including 850 thousand tons / year - at the new casting and rolling complex.

As part of the CRC, an arc steelmaking furnace (EAF) is provided for the production of low-carbon, low-alloy high-quality and ordinary steels. The following materials will be used to ensure the smelting of a given range of steel in the EAF metal filling machine - steel scrap, HBI, pig iron, ferroalloys and alloying materials, lime, lumpy and powder carbonaceous materials.

Steel is melted by a single-slag method on an AC electric EAF. Installed capacity of the transformer is 125 MBA. According to the smelting technology, after filling the furnace with metal charge, 3 burners of the electric furnace and a door burner with an oxygen lance are switched on, then 3 electric holders are started (from the contact of the electrode with the metal, an electric arc arises, which is supported by the burners, which melts the steel).

In the "basement" process, a charge, lime, fluorspar and carbonaceous materials are added to the metal. In the process of "finishing" slag is downloaded, which is collected in the slag thicket. In these processes, the formation of pollutants carbon monoxide, nitrogen oxides, sulfur dioxide, inorganic dust, cyanide and hydrogen fluoride occurs.

The emissions from the furnace will be captured by an Suction system and sent to fume treatment, then to a chimney 150 m high, which contributes to the best dispersion of pollutants.

Upon reaching the preset temperature, the melt is tapped into a steel-pouring ladle pre-purged with nitrogen. Further, the metal is fed to the UPC for processing and fine-tuning to the specified parameters in terms of chemical composition and temperature by heating the metal with an electric arc with simultaneous mixing of the bath with an inert gas under vacuum and supplying metered portions of bulk materials and ferroalloys.

These processes are accompanied by intense dust release. The general fume treatment system of the CRC will provide removal and cleaning of dusty air from the bucket and from the bunker rack for supplying materials.

Steel will be cast on a single-strand Slab Caster Machine. Liquid steel is poured into a preheated ladle, flows down into the crystallizer, which is cooled by water. The hardened

steel is pulled out of the mold and cooled with spray water. The resulting blanks are fed to a flame cutting machine. At the same time, carbon and nitrogen oxides are released, which are sent to the Suction system.

For coarse cleaning of the upper and lower surface of the slab with low pressure water before mixing the slab to the shears and into the furnace, a slab cleaning system is provided, which is integrated with the pendulum shear. To heat the slab to the required feed temperature to the furnace, an induction heating system is provided, which consists of 4 electric generators with a capacity of 4500 kW each. The LPA includes a roller-hearth heating furnace fired with natural gas with a maximum flow rate of up to 750 m^3 / hour (5310 thousand m^3 / year). During the operation of the furnace, carbon monoxide, sulfur and nitrogen are formed, which enter the pipe 80 m high.

New gas purification system will be equipped with water-cooled EAF afterburner (oxygen supply to the air-gas flow) to enable a complete afterburning of CO to $C0_2$, as well as N 0 to $N 0_2$. Cleaning gases in a bag filter provided with a normative efficiency - 99.9%, which detects inorganic dust. According to the project, the concentration of dust in the gas-air flow after cleaning will not exceed 5 mg / m^3.

Based on the analysis of the existing situation (conclusion of MPE - 18 / 1729z dated December 28, 2015), there are 294 stationary sources of emissions on the territory of Uzmetkombinat JSC, including 180 organized and 114 unorganized. In total, these sources emit 2879.1 t / year of pollutants of 58 names. At the same time, PGOUs were installed at 89 emission sources.

With the commissioning of the projected facility, the number of emission sources will increase by 2 sources (Nos. 357 and 358), from which 6,440.32 tons / year of 6 types of pollutants will be emitted. Of these, 6106.92 tons are supplied for treatment and 333.39 tons are thrown out without treatment. Of the pollutants received for treatment, 6045.85 tons are captured and 61.06 tons are released into the atmosphere.

Thus, the total emission of the projected CRC is 394.46 tons / year and the total amount of pollutants for the whole plant is 3273.56 tons / year. The composition of emissions will not change and will remain at the same level (58 species).

According to the current state of maximum ground-level concentrations of pollutants over the outside of the industrial site do not exceed quotas. According to the calculations presented, after the implementation of the project, the maximum concentrations of pollutants for all ingredients will remain unchanged and will amount to 0.14 MPC for steelmaking dust with a quota of 0.25 MPC, for nitrogen dioxide - 0.19 MPC with a quota of 0.20 MPC, for hydrogen cyanide - 0.11 MPC with a quota of 0.20 MPC.

In accordance with the conclusion of the state environmental impact assessment 18 / 1681з dated 12/18/2015, issued to the draft environmental standards of the maximum permissible concentration, the water supply of the plant was decided through the water intake system (No. 1 and No. 2) from the Dalverzin canal. The systems consist of sedimentation tanks, water intake chambers, pumping stations of the 1st and 2nd rises and tanks with a volume of 10 thousand m^3. In addition, there are wells that lower the groundwater level (51 units), the water of which is used to feed the circulating water supply system No. 1 and to irrigate the territory and green spaces.

In the existing state of the overall water consumption of the enterprise is (thous.m^3) - 82.2 days. or 24299.3 years, of which 2.63 days for household drinking. or 821.03 years and for production needs (equipment cooling) - 31.02 days. or 9924.2 years, including reused water - 12.98 days. or 4284.0 years. Calculation standard volume of total water intake - 70.99 days. or 20153.74, of which surface water (from the canal) - 29.74 from morning. or 7861.24 years and groundwater (wells) - 41.25 days. or 12292.5 years.

The implementation of the project will affect the existing balance of household, drinking and industrial water consumption of the plant, since it requires water consumption for additional personnel (600 people), taking into account the dining room and shower in the amount of 72.03 m ^{3} / day or 23.73 thousand m ^{3} /year.

For the production needs of the timber industry complex, water is used to feed the cooling systems, which are grouped into clean and dirty cycles. The cooling system of the EAF, UPK and MNZL is referred to the clean cycle No. 1 and No. 2, and the systems of the induction and heating furnace and the rolling mill are referred to the dirty cycle No. 3. Estimated water consumption CRC amount - 7.03 thousand m ^{3} / day or 10183.1 thousand m ^{3} / year. In general, the mill will increase computational and normativnog of the total volume of water intake with 7861.24 thousand. M ^{3} / year to 10183.1 thousand. M ^{3} / year. The water intake scheme from the Dalverzin Canal does not change and does not require additional measures to expand the water intake facilities.

Wastewater disposal of the plant was solved by discharging it into the sewer network of the city of Bekabad and into the Dalverzin canal through outlets No. 2, 3 and 4. To save fresh water consumption and waste water discharge, the facilities for turning over treated industrial storm water (up to 50%) are in operation, for their reuse for technological needs. Discharge of all industrial and storm water flows, as well as part of the water from the lowering wells, are sent to the industrial storm sewer system (sedimentation tanks) and supplied to mechanical treatment facilities (OS) - up to 65% and emergency discharges at outlets No. 2 - up to 1 5%, No. 3 - up to 8% and No. 4 - up to 12% is discharged into the Dalverzin channel.

Maximum permissible discharge of waste water plant, set for release №1 at the maximum capacity of industrial storm OS (10950 thous. M ^{3} / year), for issues №2-4 - at the level of the regulatory calculation Foot Relief (№2 releases - 1566 1 thousand cubic meters. ^{3} / year; №3 - 835.27 thous. m ^{3} / year and №4 - 1252.9 thous. m ^{3} / year). Host domestic sewage 1.97 thousand m ^{3} / day are dumped into urban sewage.

Estimated households and domestic wastewater CRC will be - 72.03 m / day or 23.73 thousand m ^{3} / year. Industrial effluents are not formed, since they are irrecoverable. In general, it combines with the CRC will increase reset host domestic waste water with an existing 647.75 to 671.46 thousand m ^{3} / year, which requires making adjustments to CEN, developed and approved for the plant.

According to the current PDO project (conclusion No. 18 / 1736z dated December 29, 2015), 45 types of waste are generated on the territory of the plant in a total amount of 136,232.8 t / year (production - 91.2% and household - 8.8 %), including hazard class I waste - 1 type, class II - 5 types, class III - 13 types (21.5%), class IV - 15 types (40%) and class V - 11 types (37%). Waste disposal of 12 types is carried out at the enterprise itself, 17 types of waste are handed over to specialized organizations for processing, 11 types of waste are stored on the territory of the plant in anticipation of operations for its disposal or further use, and 5 types of waste are taken to the regional solid waste landfill.

With the commissioning of the CRC, only the quantitative composition of the industrial waste of the plant will change. Waste generated in the casting and rolling complex is similar to waste generated in the Meltshop, such as used fluorescent lamps (hazard class I) - 0.61 t / year, collected separately for delivery for demercurization, industrial oils (I class) - 48.0 t / year, collected in containers for delivery to the oil depot, scale - 4250 t / year and the captured dust from PGOU - 6000 t / year (III class), added to the metal charge when smelting steel in the Meltshop or sold at the cement production plant, wiping thorn - 2.0 t / year, burned in boiler furnaces. Wastes of IV hazard class are formed: furnace slag with EAF

- 2900 t / year, which is taken out to slag dumps, used filter cloth - 6.11 t / year, taken out to the solid waste landfill, used conveyor belts

- 0.8 t / year and worn-out overalls - 3.06 t / year, used for own needs (as seals, shelters for dusty places and gaskets, as well as cleaning cloth), solid household waste - 30 t / year, taken out to the solid waste landfill.

Class V includes spent refractory materials - 4000 t / year (part of suitable refractories are used as secondary raw materials in the production of refractory materials, and part - for the repair of heating furnaces, the unusable part is located on the territory of slag dumps of TsPShO), scrap metal
- 26350 t / year, which is utilized by adding to the metal charge during steel smelting, as well as food waste - 7.13 t / year, is taken out to a subsidiary farm for livestock feed. In this regard, upon completion of the design solution, it is expected that the volume of waste generated will increase by 103,597.71 t / year and for the enterprise as a whole to 239830.48 t / year.

The most significant impacts for the environment and the health of personnel will arise in the event of an accident associated with explosions due to the supply of raw charge, the burnout of tuyere in metal aggregates, the escape of metal, slag from metal aggregates, the collapse of a significant part of the roof lining and the complete collapse of the furnace roof. As a result of a leakage of the water cooling panels, an explosion can occur in the space of the furnaces and the release of molten metal.

For the purpose of environmentally safe operation of the CRC, appropriate organizational and technical measures are envisaged related to compliance with the requirements of technological regulations, installation at PGOU, ensuring the tightness of all connections of apparatus, pipelines and automatic fire alarm equipment.

The presented comparative analysis of the situation in general for the enterprise of Uzmetkombinat JSC showed that when implementing ENGINEERING DECISIONS for the introduction of a new foundry complex, there is an increase in the gross emission of pollutants into the atmosphere, wastewater into surface waterways, as well as production and consumption waste only in quantitative terms, and the quality indicators will remain as they are.

In this regard, at the next stage of environmental design, as part of the modernization of production, it is advisable to propose additional measures to reduce the equipment caused load on the atmospheric air, as well as to argue the sufficiency of the proposed measures by calculations as a whole for the entire operating enterprise, to resolve the issue of disposal of 11 types of waste stored on the territory of the plant awaiting further use.

The environmental impact assessment of the project showed that the submitted materials comply with the requirements of environmental documents for the first stage of environmental impact assessment. Subject to the implementation of environmental measures provided for in the draft EIS and strict adherence to technological regulations, no excess impact on the environment during the period of the casting and rolling complex operation is predicted.

The State Committee of the Republic of Uzbekistan for Ecology and Environmental Protection approves the draft Statement on the environmental impact of the reconstruction and expansion of production facilities with the construction of a casting and rolling complex (CRC) on the territory of Uzmetkombinat JSC located in the city of Bekabad, Tashkent region.

Uzmetkombinat JSC is necessary before the commissioning of the object under consideration, it is necessary to develop and submit for the state ecological expertise a Statement on environmental consequences for the whole plant in the manner prescribed by law, in which it follows:

- to calculate the standards of pollutants into the atmosphere for emissions, discharges and waste, taking into account the sources of the existing production;

- to propose additional measures to reduce the equipment caused load on the atmospheric air throughout the operating enterprise, as well as to argue the sufficiency of the proposed measures by calculations;
- to provide a certificate of inspection of the plant, approved by the regional department for ecology and environmental protection, for the implementation of environmental measures specified in the conclusion of the state environmental expertise.

The Department for Ecology and Environmental Protection of the Tashkent region should provide for control over the development and submission of the Statement on environmental consequences for the state ecological expertise, as well as compliance with Uzmetkombinat JSC in the process of organizing a casting and rolling complex on the territory of the plant.

"APPROVED BY"
Acting Chairman of the Board,
Chairman of the Scientific and Technical
Council Board of Uzmetkombinat JSC

_____T.T.Azamatov

_____October, 2018

PROTOCOL NO.
Scientific and technical council board of Uzmetkombinat JSC
Year 2018, Bekabad city

Chaired by: T.T. Azamatov

Attended by:		**Members of the Scientific and technical council board**
1	**S.A. Vyunenko**	First Deputy Chairman of the Management Board for Production - Deputy Chairman of the Scientific and Technical Council
2	**D.A. Usmanova**	Acting Deputy Chairman of the Board for Prospective Development, Investments, Science and Innovation
3	**S.A. Saydullaev**	Principal Engineer
4	**R.N. Inamov**	Head of production department
5	**A.M. Tadjibaev**	Principal power engineer
6	**N.J. Turakhojaev**	Head of the Department "Foundry technology" of the Tashkent State Technical University named after I. Karimov - Doctor of Technical Sciences, Prof. quarrels
7	**V.S. Nikitin**	principal project engineer of State Unitary Enterprise "Uzgeorangmetliti"
8	**B.S. Aliyev**	Head of the Investment Department of JSC "AGMK"
9	**S.A. Chaykovskiy**	project manager for technical and production issues FE LLC "SFI Management Group"
10	**N.O. Umerov**	Head of the Investment Department - Secretary of the Industry Scientific and Technological Council
Specially invited guests		
11	**R.Y. Ahmedov**	Head of project management
12	**A.S. Gaynazanov**	Principal mechanic
13	**E.H. Ernazarov**	Head of Capital Construction Department
14	**E.B. Ibragimov**	Head of Marketing Department

AGENDA:

1. Consideration of the issue of increasing the design capacity from 0.7 million tons / year to 1.0 million tons / year of production of hot-rolled sheet steel in coils under the project "Construction of a casting and rolling complex" and making a decision.

THE SPEECH WAS MADE BY:

Vyunenko S.A. - First Deputy Chairman of the Management Board for Production.

In accordance with the decree of the President of the Republic of Uzbekistan dated 09.01.2018 No. PP-3468 "On the Development Program of Uzmetkombinat JSC for 2018-2020", the plant has begun implementation of the investment project "Reconstruction and expansion of production capacities of Uzmetkombinat JSC with the construction of casting and rolling complex".

The goal of the project is:

1. Mastering the production technology of a new type of import-substituting hot-rolled sheet products in coils with a thickness of 1.6 to 12.0 mm and a width of 800 to 1300 mm in the volume of 1.04 thousand tons per year.

2. Increase in the export potential of the republic due to the sale and finished products in the amount of 250.0 thousand tons / year for export.

As part of the implementation of this project, it is planned to create new jobs with employment of more than 400 people.

Casting and rolling complex is a technology with continuous production of hot-rolled sheet products in coils with a thickness of 1.6 ^ -12.0 mm, a width of 800-1300 mm and a coil weight of up to 30 tons. This technology and equipment will ensure the production of liquid steel and continuously cast slabs, as well as the production of hot rolled sheet steel in coils from them.

In order to attract modern technologies within the framework of the implementation of this project, in the period from October 2017 to September 2018, Uzmetkombinat JSC held negotiations and worked out various technologies of a casting and rolling complex with the remaining metallurgical equipment - Danieli & C Officine Meccaniche SPA (Italy), SMS Group (Germany) and Primetals (Austria).

Based on the selection results and taking into account the above, the offer of Danieli & C Officine Meccaniche SPA on the hot-rolled sheet production technology and at the price was recognized as preferable. In addition, the proposed technology of the company Danieli & C Officine Meccaniche SPA will increase the annual production from 700 thousand tons. up to 1.04 million tons hot rolled about sheet.

In order to ensure timely and quality implementation of the project, as well as the development of technical and technological part of the project and design documentation project it is anticipated to consider the design capacity of the project - 1.04 million tons per year of hot-rolled production Foot rolled sheet in coils, as well as to decide on the project design capacity.

Usmonova D.A. – Acting Deputy Chairman of the Board for Prospective Development, Investments, Science and Innovation.

An increase in oil production and an increase in prices for basic raw materials, a resumption of growth in real incomes, an increase in construction activity, as well as positive dynamics in mechanical engineering, allowed Uzbekistan to achieve the most significant GDP growth among all Central Asian countries, which was accordingly reflected in the consumption of rolled metal (+ 29% per year). At the end of the year, the consumption of rolled steel amounted to about 1.5 million tons, which is 29% higher than in 2016. Consumption of flat products - by 37%, to 798.3 thousand tons.

Dynamics of consumption of rolled metal in the Republic of Uzbekistan Table No. 1

Consumption of sheet metal by type	2010	2015	Feb 2016	2017	Growth in 2017 to 2010
Total sheet metal	412.1	625.2	582.7	798.3	193.7%

Hot rolled steel (sheet)	132.7	179.1	174.9	257.4	193.9%
Hot-rolled sheet	123.3	168.9	159.5	234.3	190.0%

Consumption of sheet metal by type	2010	2015	Feb 2016	2017	Growth in 2017 to 2010
Hot-rolled sheet metal	9.4	10.2	15.4	23.1	245.7%
Cold rolled steel	124.2	93.6	80.6	125.2	100.8%
Coated rental	155.3	352.6	327.2	416.0	267.8%

From the above table, there is an increase in consumption of hot-rolled sheet in the domestic market by an average of 194%. As a result of investment activity, as well as in connection with the development of the machine-building and construction sectors of the national economy, a steady growth in the consumption of flat products is expected in the medium and long term.

In accordance with the Decree of the President of the Republic of Uzbekistan dated March 29, 2018 No. PP-3638 "On additional measures for the further implementation of the investment project" Construction of the Tashkent Metallurgical Plant ", the production of cold rolled sheet in the amount of 500.0 thousand tons with the commissioning of the facility in December 2019. Within the framework of this investment project, the demand for hot-rolled sheet is 540.0 thousand tons per year, which ensures guaranteed sales of the products planned for production at Uzmetkombinat JSC in this volume.

The need for hot-rolled sheet with the largest enterprises of the Republic of Uzbekistan has also been worked out. The results of the study are shown in table 2.

The need of large enterprises (machine-building and heavy industry) of Uzbekistan for hot-rolled sheet products for 2018-2020

Table 2

No.	Name of enterprises	Average annual need,ton			
		2017	Oct 2018	Dec 2019	Feb 2020
			(forecast)		
1	Uzavgosanoat JSC:	100829	125 271	103 123	131,409
	GM Uzbekistan JSC	49934	63806	78755	104,274
	Avtokomponent JSC	4095	4,001	4 129	4 129
	Sam Auto LLC	3 103	3413	3560	3916
	UzAuto TRAILER LLC	2796	3 329	3904	4730
	Uzsungwoo LLC	8 078	15 479	9 130	10071
	Uz-SeMung Co JV JSC	26846	28188	0	0
	Uz Tong Hong Ko JV	1,077	1747	1738	2454
	Uzavto – Austem JV JSC	3236	3515	1 907	1836
	Avtosanoat Component LLC	1 665	1793	0	0
2	Uzagrosanoatmashholding HC:	2412	2644	2837	3044
3	Goskomgsology of the Republic of Uzbekistan:	20	25	25	25
4	Uzbekneftegaz JSC:	19127	72,757	72,757	72,757
	Uzneftegazmash JSC	18,041	20241	20241	20241
	Uztransgaz JSC	-	5	5	5
	Uznefteprodukt JSC	345	51,770	51,770	51,770
	Uzneftegazdobycha JSC	741	741	741	741

5	Other enterprises and organizations	75,000	85,000	95,000	105,000
	TOTAL	197388	285 697	273,742	312 235

Thus, the demand after 2020 for hot-rolled sheet, taking into account the needs of Tashkent Metallurgical Plant JV LLC (hereinafter referred to as TMZ JV LLC) will be at least 850.0 thousand tons (including TMZ JV LLC - 540 thousand tons).

Thus, it is planned to sell finished products to the domestic market in the amount of 832.0 thousand tons.

The market of neighboring countries was also studied, since by geographic location, these markets can be potential consumers of the products of Uzmetkombinat JSC.

Table 3

Dynamics of imports of rolled metal products to potential foreign markets

Name of the country of importer of sheet metal by countries	HS codes	2015		Feb 2016		2017		Growth in 2017 to 2015	
		qty (thou tons)	Amount (mln USD)	Qty (thou tons)	Amount (thou USD)	Qty (thou tons)	Amount (thou USD)	By Qty	By amount
The Republic of Kazakhstan	7208. 720854, 720825 720827, 720810. 720836 720840. 720890. 720851 720853	358.28	1 86.99	324.40	166.62	460.39	268.67	129%	144%
Republic Kyrgyzstan		73.28	35.90	84.21	40.63	95.24	52.22	130%	145%
Islamic Republic of Afghanistan		85.71	85.71	36.18	113.25	113.25	41.16	132%	48%
Republic Tajikistan		79.63	79.63	39.09	75.21	75.21	32.92	94%	41%
Total		596.90	388.22	483.88	395.71	744.09	394.97	125%	102%

** Source: Internet resource –* www.*data.trendeconomy.ru*

From the above table, there is also a steady growth in imports and consumption of flat products. If in 2015 the total imports for the above countries amounted to 596.9 thousand tons, then by the end of 2017, imports amounted to 744.09 thousand tons (or 125% on average). The growth of imports in physical terms compared to 2016 amounted to 153.7%.

The main suppliers of hot-rolled sheets to the markets of these countries are metallurgical enterprises of the Russian Federation and the Republic of Kazakhstan.

Thus, the demand of the external market (Kazakhstan, IRA, Tajikistan, Kyrgyzstan) for hot-rolled sheet is at least 395.0 thousand tons.

Within the framework of the investment project "Construction of a casting and rolling complex", it is envisaged to export products (hot-rolled sheet) in the amount of at least 208.0 thousand tons to Kazakhstan, the Islamic Republic of Afghanistan, Tajikistan and Kyrgyzstan, taking into account the convenient geographical location of the production facilities of Uzmetkombinat JSC.

Chaykovskiy S.A. - Project manager for technical and production issues of SFI Management Group FE LLC.

According to the approved technical specifications for the supply of the main technological equipment, the planned design capacity was 850,000 tons of steel per year. Of these, 700,000 tons for the production of hot-rolled coils, where:

- 500,000 tons for TMZ JV LLC;
- 200,000 for the domestic market;
- 150,000 for the transfer of liquid steel to the existing Electric Steel Smelting Shop (Meltshop) for the production of section steel (balls, fittings).

Meltshop productivity - 128 t / h. It is very important that the Meltshop and the rolling stock must operate in the same technological chain with the same hourly productivity.

The main state for potential suppliers is Steel ladle, interchangeable with the existing workshop, with a capacity of 120 tons for the transfer of (high-grade) liquid steel to existing Slab Caster Machines (SCM) No. 1, 2, 3

In the course of technical negotiations, the rolling technology was worked out and installed, where the speeds of the electric rolling mill and the Slab Caster Machine were identified and connected into one technological chain.

128 t / h * 7440 h / year = 952 000 t / year (minimum capacity).

- Casting speed 5.0 m / m. - steel ladle capacity - 120 t.

Slab parameters 1300 x 50 mm, with 1m. slab - 507 kg.

120,000kg. / 507kg = 237 m.

Casting speed 5.0 m / m

237 / 5.0 m / m = 47,3 minutes (casting time for one ladle).

This calculation will provide an opportunity to rationally use the equipment, while achieving a good cost price per 1 ton / year of sheet. The capacity of the ladle directly depends on the serial casting time of the Slab Caster Machine. The most important factor is the tundish refractories, the main task of which is to pour as much steel as possible into one set of tundish refractories.

A rolling mill that produces products of 128 t / h and at such a speed the capacity of the steel ladle directly depends on the hourly productivity, if the capacity is less, it means more often it is necessary to supply slugs to the Slab Caster Machine - at the same time, the EAF becomes a bottleneck, which will lag behind and interrupt the series of heats at the Slab Caster Machine. Short series have a characteristic cost impact.

If the annual productivity is reduced to 100 t / h ac (740,000 steel / year), then the capacity of the steel ladle decreases to 70-80 t, respectively, the casting speed remains unchanged 5.0 m / min, so the technology requires, which means that the casting time will be reduced one bucket - 30 minutes (the bottleneck is the Meltshop).

At the moment, Uzmetkombinat JSC has a shortage of billets (balls, rebar), this concept of the project "Construction of a casting and rolling complex" when planning an annual production program can cover the shortage of billets and fulfill the corresponding orders for the production of "balls" and " fittings "due to the transfer of liquid steel to the existing Meltshop at Slab Caster Machine No. 1,2,3.

Conclusion:

1. Having discussed the issue of increasing the design capacity from 0.7 million tons / year to 1.04 million tons / year for the production of hot-rolled sheet steel in coils under the project "Construction of a casting and rolling complex", the branch scientific and technical council decided:

1.1. Considering the high and growing demand both within the republic and in neighboring republics and the possibility of selling excess liquid metal in the form of blanks for further rolling and production of grinding balls and construction fittings, we consider it

expedient to increase the design capacity from 0.7 million tons / year to 1, 04 million tons / year of production of hot-rolled sheet steel in coils.

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