НІБУЛОН ТОВАРИСТВО З ОБМЕЖЕНОЮ ВІДПОВІДАЛЬНІСТЮ
СІЛЬСЬКОГОСПОДАРСЬКЕ ПІДПРИЄМСТВО

# REPORT

## On the Environmental Impact Assessment

## New construction of a transport infrastructure object – a river port (terminal) in Izmail, Izmail district, Odesa region with a railway access track - adjacent to the Izmail station of the "Odesa Railway" regional branch

**20225199566**

A registration number of a case on the environment impact assessment of the planned activities

**MYKOLAYIV - 2022**

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# *I. DESCRIPTION OF THE PLANNED ACTIVITIES*

## *1.1. Description of the location of the planned activities.*

Planned activities are a new construction of a transport infrastructure object - a river port (terminal) with a railway access track - adjacency to the Izmail station of the "Odesa Railway" regional branch. The place of realization of the planned activities is Izmail, Izmail District, Odesa Region, the coast of the left bank of the Danube River.

The land plot for the construction and operation of the object of the planned activities is located in the southern part of Izmail, within the boundaries of Portova street, Luki Kapikrayana Embankment and Dunayska street, registration address Luki Kapikrayana Embankment, 14. Land acquisition area is 19.7 ha, lease for 49 (forty-nine) years for the construction and operation of a transport infrastructure facility - a river port (terminal), land category is transport lands (Resolution of the Izmail City Council No. 2045-VIII dd 15.04.2022 - appendix 1).

Geographical coordinates of the industrial site centroid determined by WGS 84 system are 45°19'23.8" 28°50'39,0'. Situational map-scheme of the object of the planned activities with the drawings of centroid of the industrial site, the sanitary protection zone, and zone of impact on the ambient air quality is attached (Drawing 1).

The land plot of 19.0 ha (cadastral number 5110600000:01:047:0206, Abstract No. HB-3201089442022 of 19.09.2022 - appendix 1) is free from construction and overgrown with self-seeding green plants, on the land plot of 0.7 hectares, there are buildings that will be used for construction. The land plot located in the industrial zone of Izmail with saturated coastal infrastructure and intensive navigation. The territory is perspective for joining the existing transport and energy infrastructure, and also meets the requirements for the construction and operation of the port facility.

The land plot has compatible boundaries:

- from the north - the land of the Izmail City Council (roadway of Dunayska St.);
- from the east - the lands of the Izmail City Council and PJSC "UKRAINIAN DANUBE SHIPPING COMPANY " (cadastral number is not determined), LLC "Fish cannery "Danube";
- from the south - the Danube river;
- from the west - the lands of SE "IZMAIL SEA TRADING PORT" (5110600000:01:047:0179), Izmail City Council (Luka Kapikrayan Embankment), SE "ADMINISTRATION OF SEA PORTS OF UKRAINE" (5110600000:01:047:0175) and SE "Danube Blaze" LLC.

The planned activities provide for the allocation of a land plot of 10.4357 ha from the water fund for the reconstruction and construction of hydrotechnical structures, including the operational water area of the berthing facility and the approach channel to it. The specified section of the Danube River water area stretches along the shipping channel "Vylkove - Izmail Ceatal" from 91.09 km to 91.55 km with a width from the boundary of the shipping channel to the left bank. Currently, the water area is referred to the water area of the seaport of Izmail (Resolution of the Cabinet of Ministers of Ukraine dated 07.10.2009 №1208 "Boundaries of the water area of the seaport of Izmail" [29]).

The territory does not belong to the objects of the nature and reserve fund, monuments of architecture, history, culture there are no objects which are equated with objects of construction.

### *1.2. Purposes of the planned activities*

The planned activities are the development of the investment program of NIBULON LLC, which includes the construction of silos and river terminals, the creation of its own fleet, the development of water transport infrastructure, in particular, implementation of dredging works and the construction of hydraulic structures.

The construction of a river port (terminal) on the Danube River with a railway access track is of strategic importance for ensuring the food security of the state in wartime conditions and is aimed at the development of agricultural production and the region as a whole, in particular:

- the reorientation of freight flows from highways to railways and inland waterways will minimize congestion on highways, which will further improve their technical condition and the environmental situation in populated areas;
- bringing grain traders closer to agricultural producers will help to reduce the cost of transporting grain cargoes, and as a result, increasing the profitability of agricultural production;
- minimization of the prime cost of transporting of one ton of grain cargoes, which in turn will make it possible to use the freed funds to increase the purchase prices for grain;
- the construction of modern enterprises will ensure the sustainable development of the local community due to stable tax deductions to local budgets of all levels, the creation of additional workplaces and the improvement of working conditions.
- reorientation of fuel delivery to rail transport with the approach of fuel distribution points to direct consumers.

### *1.3. Description of the characteristics of the activity during realization of preparatory and construction works and implementation of planned activities*

The planned activities in accordance with the Law of Ukraine "On Environmental Impact Assessment" [1] belong to the first category of planned activities and objects that could have a significant impact on the environment and are a subject to environmental impact assessment, such as the construction of hydrotechnical structures of sea and river ports, which could accept ships with a tonnage of more than 1350 tons (paragraph 6 of point 7, part 2, article 3).

The planned activities require the allocation for the use of NIBULON LLC for a period of 49 years of three land plots, classifying them in the category: "Lands of industry, transport, communications, energy, defense and other purposes", purpose - for placement and operation of buildings and structures of river transport:

- - a land plot with an area of 19.0 ha from reserve land (Resolution of the Izmail City Council No. 2045-VIII dd. 15.042022 - appendix 1). The plot includes a plot for the construction of a railway access track - connecting the railway track of the river port to the Izmail station of the regional branch of the “Odesa Railway". The commission for choosing the place of adjacency was held on 15.04.2022.;
- a land plot with an area of 10,4357 hectares from the lands of the water fund for the reconstruction and construction of hydrotechnical structures, including the operational water area of the berth structure and the approach channel to it;
- a land plot with an area of 0.7 ha with the category "lands of transport", which is used by PJSC "UKRAINIAN DANUBE SHIPPING COMPANY".

The coastal protective strip on the land plot with an area of 19.0 hectares has not been established in accordance with the provisions of Art. 88 of the Water Code [15] on land plots related to land for inland water transport (code for use according to the classification of the types of

purpose of the land: i. 12.03 - for the placement and operation of buildings and structures of river transport).

Inspection of green areas.

On a land plot with an area of 19.0 hectares, which is planned for the construction and operation of a transport infrastructure object - a river port (terminal), a commission examination of green areas was carried out, according to the commission's conclusion, 841 trees and 740 bushes are subject to removal (Protocol No. 54 dd. 20.04.2022. examination of green areas to be removed - appendix 1)

Preparatory works:

- installation of a temporary fence around the perimeter of land acquisition;
- organization of around-the-clock power supply of construction works from diesel generators;
- carrying out topographic and geodetic and engineering and geological surveys;
- carrying out geodetic preparation with the creation of a detailed geodetic base and the construction of buildings physical;
- vertical planning of the territory with raising the level of the site by 1 m;
- arrangement of places for temporary storage of construction materials and structures;
- depth measurements in the water area of the Danube River and diving examination;
- arrangement of the alluvium map;
- freeing the water area from floating objects located in the area of dredging works, with preliminary development of the soil directly in front of them;
- rebasing of the technical fleet, installation and fixing of hydraulic equipment according to the work organization plan;
- assembling and laying the pulp pipeline, hanging working bodies, checking the operability of moving parts of hydraulic equipment.

Project works.

Development of the working project "New construction of a transport infrastructure object – a river port (terminal) of NIBULON LLC in Izmail, Izmail district, Odesa region, within the boundaries of Portova Street, Luki Kapikrayana Embankment and Dunayska street" taking into account the requirements of current legislation, as well as:

- Land management project;
- Urban development conditions and restrictions approved by the Resolution of the Executive Committee of the Izmail City Council;
- Technical conditions for joining the centralized water supply and drainage network, issued by the Municipal Enterprise "Izmail production management of water supply and sewage management";
- Technical conditions of connection to the gas distribution system, issued by JSC “Odesagaz”;
- Technical conditions for connecting the object to electric networks, issued by JSC "DTEK Odeski Elektromerezhi"

Construction works.

The construction of the object of the planned activities is planned to be carried out by start-up complexes with alternate (5 stages) construction of buildings and structures and equipping them with technological equipment:

**Stage I** provides for the construction and installation of the following facilities:

- fence of the port territory, security checkpoint;
- railway access track of 835 m long - adjoins the extraction track No. 13 of the Izmail-port park of the New Izmail station of the "Odesa Railway" regional branch and 2 railway branches on the territory of the river port (one track with a length of about 900 m, the second one is up to 530 m);
- department for unloading railway wagons on two tracks (two wagons on each track), underground gallery, elevator tower and 2 bunkers for loading of road transport;
- railway scales (BULAT) with the dockers' room;
- administrative and household building with a laboratory and canopy (a temporary building – 4 trailers);
- 2 car scales with an operator's office;
- mechanized warehouse of floor storage of grains with a capacity of 9 thousand tons with equipping by an underground gallery, inner overpass, unloading station for road transport with a canopy and elevator tower;
- overpass connecting the elevator tower of the mechanized warehouse with the overpass for shipment to water transport;
- overpass for shipment to the water transport with two loading machines;
- transshipment floating complex with loading machine, overpass and elevator tower on the deck of the parking vessel of the project FCM-2037 (2016, Istanbul);
- ship loading post according to the scheme "road transport – shipment area - FUCHS loader - ship";
- compressor room (modular);
- distribution point with operator's office (a temporary building – 2 trailers);
- fire tanks of 200 m3 (2 pcs.) with a fire extinguishing pumping station and a diesel generator;
- a household building with a workshop and a warehouse (temporary – existing building of the warehouse);
- filling station (a temporary building);
- engineering networks of water supply, household and storm sewer systems, electricity supply with territory lighting, firefighting water main;
- treatment facilities of the storm sewer systems with a tank of treated runoff ($200m^3$);
- treatment facilities of the storm sewerage system of car parking with a tank of treated wastewater ($60\ m^3$);
- yard sewer toilets (3 pcs.);
- truck parking for 40 car-places and temporary car parking for 23 car-places;
- intraplot roads necessary for the operation of the complex of the first stage of construction;
- 2 arbors for the rest with the improvement of the territory;
- operational water area and an approach channel with an area of 10,4357 ha (dredging to a depth of 4.0m from "0" of the Izmail port) with navigational facilities;

**Stage II** provides the construction and installation of the following facilities:

- grain storage with 6 containers of 5.5 thousand tons each with underground and above-ground galleries and 2 metal platforms for cyclone-type filters;
- administrative and household building with a laboratory and canopy;

- transformer substation;
- overpass for shipment of grain to river and road transport;
- a road transport unloading point with a canopy for 2 intake pits and underground gallery which connects it with working tower;
- a mechanized workshop with a warehouse, a fire station and a garage
- working gran cleaning tower with 5 waste hoppers;
- intraplot roads with concrete surface and land improvement according to the stage II of the construction;
- technological equipment of the grain supply line from the wagons unloading point to the grain shipment overpass to the water transport;
- cable overpass from the distribution point to the working grain cleaning tower;
- 2 arbors for the rest with the improvement of the territory.

**Stage III** provides the construction and installation of the following facilities:

- transshipment floating complex with loading machine, overpass and elevator tower (floating berth);
- mechanized warehouse of floor storage (the second) with equipping by an underground gallery, inner overpass, unloading station for road transport with a canopy and elevator tower;
- overpass connecting the elevator tower of the mechanized warehouse with the overpass for shipment to water transport;
- overpass for shipment to the water transport with two loading machines;
- wet grain silos for 500 tons each - 3 pcs., connected with a working tower;
- a 100 t/h dryer on the foundation and with over-the-dryer hopper, connected to a working tower;
- a house for business travelers;
- intraplot gas networks with a distribution point;
- operational water area and an approach channel with an area of 10,4357 ha (dredging to a depth of 7, 32 m from "0" of the Izmail port);

**Stage IV** provides the construction and installation of the following facilities:

- a cafe for internal use
- fountain, land improvement and landscaping of the territory;
- bank stabilization;

**Stage V** provides the construction and installation of the following facilities:

- grain storage with 12 containers of 5.5 thousand tons each with above-ground overpasses and underground galleries and 3 metal platforms for cyclone-type filters;
- metal overpasses and underground galleries connecting new containers with the existing complex, additional equipment in the underground gallery and the working tower;
- garbage incinerator;
- fuel filling station for 2 tanks of 75m3 each;
- operational water area and an approach channel with an area of 10,4357 ha (dredging to a depth of 8,23 m from "0" of the Izmail port – if necessary, related to carrying out of dredging works by Ukraine on the shipping channel "Vylkove-Izmail Ceatal" on reaching its project depth of 8,23 m from "0" of the Izmail port, which was approved by the resolution of the Cabinet of Ministers of Ukraine of February 9, 2022 N 136[28]).

During the Stage I of construction, it is planned to install temporary module trailers instead of fundamental structures, which will be replaced by fundamental structures as the construction progresses. (Stage II of construction). Totally 6 trailers are planned to be used for the specified purposes:

- 4 trailers of 9 m long each (paired two by two in two floors) - for the administrative building with a laboratory, which is sewered, equipping each floor with a bathroom and the laboratory (second floor) with a shower;
- 2 trailers with a length of 6 m and 12 m – for distribution point and operator`s office, not sewered.

Also, during I stage of construction, a filling complex for non-commercial usage will be temporarily installed on the territory of the planned activity - for servicing the company's vehicles, after the commissioning of the filling station (V stage of construction), the complex will be deinstalled.

The filling complex is installed on a concrete surface, which is bunded around the perimeter. Drainage of rainwater is provided by the slope of the territory towards the rainwater inlets of the Port's storm sewer systems

The filling station complex includes: horizontal steel ground tank, double-walled RG-40-2200 and fuel dispenser "NOVA"-1KED-50-0,25-1-A-1-01, equipped with filler hoses with quick-release connectors. Fuel is delivered by specialized transport (tanker truck). At the filling station, in addition to diesel fuel, transport with SCR system (selective catalytic reduction system) can be refueled with AdBlue® liquid, which is used to reduce the level of nitrogen oxide (NOx) in the exhaust gases of diesel engines. AdBlue® liquid is a 32.5% solution of urea and purified water injected into the exhaust pipe. The carbamide contained in AdBlue® releases ammonia ($NH_3$) into the exhaust gases heated to high temperatures, which reacts with nitrogen oxide (NO and $NO_2$) in the catalytic converter and forms harmless nitrogen (N2) and water vapor ($H_2O$). When storing and refueling cars with AdBlue® liquid, no pollutants are formed and are not emitted into the atmosphere.

### *1.3.1. Technical alternatives*

The planned activities envisage the consideration of two technical alternatives related to the water supply of the river port:

***technical alternative 1*** – the water supply of all the needs of the river port (economic and household, industrial, firefighting needs, needs for the improvement of the territory) from the surface water intake from the Danube River, which is the object of the new construction;

***technical alternative 2*** – the water supply for economic and household, industrial, firefighting needs of the port due to the connection of the water supply to municipal networks, providing of needs for the improvement of the territory - from the surface water intake from the Danube River, which is the object of new construction.

The considered technical alternatives provide for the construction of the following facilities:

***Technical alternative 1:***

surface water intake pumping station with two suction pipelines, equipped with a filter-type fish protection head;

water supply networks made of plastic pipes;

water treatment system with storage tanks.

*The pumping station with a capacity of 150 m$^3$/hour* is a separate building on the bank of the Danube with the dimensions of 8.0 x 6.0 m in the plan, which includes a sunken engine room, an electrical panel room and a pump maintenance platform. The project provides for the installation of two groups of pumps and a drainage pump in the pumping station:

- the first group for supplying water for firefighting needs - two pump units with a capacity of 110 m$^3$/hour and a pressure head of 71 m, with electric motors with a capacity of 37 kW (1 working and 1 reserve);
- the second group for supplying water to meet the needs of the enterprise (including for drinking and sanitary and hygienic needs) - two pump units with a capacity of 40 m$^3$/hour and a pressure head of 69 m, with an electric motor with a power of 18.5 kW (1 working and 1 reserve);
- the drainage one - for emergency discharge of water when the engine room is flooded.

The suction and pressure parts of the pump units are equipped with valves with a manual drive for possible disconnection of each of the units in case of repairs. The suction pipelines are designed in two strands of steel pipes Ø273x9 mm with a fish-protecting head of the filter type at the end, each strand is designed for the passage of water (150 m$^3$/hour). The estimated area of the filtering surface of the fish protection head for each of the suction pipelines is 0.509 m$^2$, the filter cassette is a cube with dimensions of 0.5 x 0.5 x 0.4 m, filled with crushed stone of various fractions 40 ÷ 70 mm and 10 ÷ 40 mm, laid in layers with a layer height of 0.15 m.

*Water treatment systems with storage tanks are* a complex of specialized equipment combined in a single technological cycle for the production of high-quality drinking water to meet the economic and household and industrial needs of the port. An insulated 40-foot container of 11.9 x 2.3 m size in plan is installed to accommodate the system, which is connected to the port's water, sewage and electrical networks. In addition to the water treatment equipment, water storage tanks with a total volume of 25 m$^3$ are installed in the container.

Accounting for water taken from a surface source is carried out by a water meter.

***Technical alternative 2***:

economic - household water pipeline, which is connected to the water supply networks of Izmail;

technical water supply of surface water (for the needs of improvement of the port area);

surface water intake pumping station with a pipeline equipped with a fish protection device.

*Pumping station with a capacity of 40 m$^3$/hour*, one pumping unit with a capacity of 40 m$^3$/hour and a pressure head of 69 m with an electric motor with a power of 18.5 kW, equipped with a filter-type fish protection device filled with crushed stone.

The environmental impact assessment of the planned activities under the two technical alternatives was conducted in the relevant sections of this report. The decision to choose one of the two presented technical alternatives will be made based on the result of a comparison of the environmental, social and ecological, social and economic consequences of the implementation of the planned activities according to technical alternatives 1 and 2.

### *1.3.2. Dredging works. Description of technology. Organization of subsoil coastal dumps*

The planned activities provide for the new construction of hydrotechnical structures of the Port (operational water area with an approach channel) on the area of 10.4357 ha in the developed part of the Danube River water area, which is located along the shipping channel "Vylkove - Izmail

Ceatal" from 91.09 to 91.55 km and is referred to the water area of the seaport of Izmail (Resolution of the Cabinet of Ministers of Ukraine No. 1208 "Boundaries of the seaport of Izmail" dated 07.10.2009 [29]).

The Vylkove - Izmail Ceatal shipping channel in accordance with the Resolution of the Cabinet of Ministers of Ukraine dated February 9, 2022. N 136[28] is an inland waterway of Ukraine with the approved design (passport) dimensions: length 95.445 km; width 120 m; depth 8.23 m (from the mark "0" of the respective seaports), in relation to the design depth of 8.23 m, the clarification "depth not reached due to incomplete construction work on the project" was provided.

Construction of hydrotechnical structures provides for dredging works in several stages to reach the depths: up to 4.0 m; from 4.0 m to 7.32 m; the last one, from 7.32 m to the design depth of 8.23 m from "0" of the Izmail seaport, will be implemented in case of initiation of dredging works by the state of Ukraine on the shipping channel "Vylkove - Izmail Ceatal" and downstream sections of the shipping route and water areas. As a result of the dredging works, safe approach and maneuvering of the designed vessel type within the operational water area of the cargo berth of the Port will be ensured.

According to the Plan of control depth measurement in the Danube River water area, which is provided for the construction of hydrotechnical structures of the Port, depth level rises from 1.3 to 14.4 m. Dredging will be carried out in places where the actual bottom markings do not correspond to the design ones, the main volume is the – the coastal zone. Maximum estimated area of dredging works 2,32 ha, with the excavation of bottom soil in the volume of 112,000 m3 its storage in a coastal dump which is planned to organize on the land plot allocated for the construction of the Port.

The plan of the control depth measurement with drawings of the operational water area with the approach channel and the location of the coastal dump is attached (Drawing 3). Depth measurements were performed by «NIBULON» LLC on 16.07.2022 using a digital hydrographic dual-frequency echo sounder made in the USA (Calibration Certificate dated 21.02.2020), the depths on the plan are given to "0" of the Izmail seaport (-0.18m Baltic Altitude system). The organizer and performer of dredging works is NIBULON LLC (Certificate of recognition № 25-4-13-22 dated 24.06.2022., issued by the Shipping Register of Ukraine - Appendix 2).

- When performing dredging works, the hydraulic equipment owned by NIBULON LLC will be used:

- - a self-propelled vessel (dredger) of the SDS-15 project, commissioned in 2017, with an engineering complex on board of interchangeable bodies used for different types of soil: a set of buckets with a volume of 2.5 and 3.37 m3, a soil pump with a loosening cutter and hydraulic hammer (Certificate on prevention of pollution by oil, sewage, garbage and atmosphere No. 311-10656-17 dated 10.27.2022, issued by the Register of Shipping of Ukraine – Appendix 2);

- Dredger Watermaster Classic IV, commissioned in 2011, with an engineering complex on board of interchangeable bodies: bucket with a volume of 1,0 $m^3$, a soil pump with a loosening cutter (Certificate on prevention of oil, sewage and garbage pollution No. 31105484-19 dated 04.07.2019, issued by the Shipping Register of Ukraine - Appendix 2);

- booster station Dragflow SGT 400 S, commissioned in 2017, with the possibility of transferring pulp to a distance of 1.5 km and a capacity of 2.5 thousand $m^3$ per hour (if necessary);

- motor boat, commissioned in 2018 (maintenance of hydraulic equipment during the period of work), 7.3 kW engine, runs on gasoline that meets the requirements of DSTU 7687:2015 "Automotive gasoline Euro. Technical conditions", specific fuel consumption 5 l/h.

Technical characteristics of hydraulic equipment

table 1.3.2.1.

| № i/o | Name | Indicators | |
|---|---|---|---|
| | | Watermaster Classic IV | Self-propelled vessel of the SDS-15 project |
| 1 | Productivity in pulp $m^3$ per hour | 600 | 2400 |
| 3 | The drive | diesel | |
| 4 | Installed power, kW | 168 | 514 |
| 5 | Diameter of the pulp duct, mm | 200 | 450 |
| 6 | Depth of soil development, m | Up to 6,0 | Up to 9,0 |
| 7 | Draft in working condition, m | 0,7 | 1,5 |
| 8 | Pulp transportation distance, m | 1500 | 2500 |
| 9 | Soil/water ratio | 1:5 | 1:6 |

Due to the hostilities in Ukraine, the characteristics of the excavators intended for dredging may differ from those specified in this report.

***Description of dredging technology***

Dredging works are planned to carry out by three stages, corresponding to the construction stages:

table. 1.3.2.2.

| Stage | Project characteristics | Involved dredger and working body | Volume of bottom soil development, $m^3$ |
|---|---|---|---|
| I | Dredging to the mark of 4.0 m, the area of bottom damage - 1.0 hectares | Watermaster Classic IV, bucket | 22000 |
| | Cleaning of the bottom to the mark of 4.0 m, the area of bottom damage - 1.0 hectares | Watermaster Classic IV, cutter, soil pump | 10000 |
| III | Dredging to the mark of 7.32 m, the area of bottom damage - 2.2 hectares | self-propelled vessel of the SDS-15 project, cutter, soil pump | 53000 |
| V | Dredging to the mark of 8.23 m (if necessary), the area of bottom damage - 2.32 hectares | self-propelled vessel of the SDS-15 project, cutter, soil pump | 27000 |
| Total volume of bottom soil development | | | 112000 |

Taking into account the information of Tables 1.3.2.1 and 1.3.2.2, the estimated amount of water that will be used for pulp formation is 530000 $m^3$.

Dredging to a depth of 4,0 m will be carried out by a Watermaster Classic IV multifunctional diesel dredge in two modes: excavator with usage of a bucket and a soil pump with a loosening cutter attachment and a slurry pipeline, through which the bottom soil will be transported to the coastal dump using water.

Dredger "Watermaster classic IV" does not require the help of expensive lifts, cranes or other auxiliary equipment, as well as the use of barges. Delivery to the work site is carried out fully assembled on a trailer, on which the dredger enters and exits by itself, as well as submerges and exits the water using its front and rear stabilizers and excavator boom.

Dredger "Watermaster classic IV" is able to move through water independently due to the equipment of its own propulsion system and excavator mechanism. Stabilizers serve not only for movement, but also for stabilization during work, which allows not using for these purposes anchors and steel cables that can interfere with shipping in the area of work.

Maneuvering in the water area, the dredger reaches the required point of work and is fixed in place with the help of stabilizers. Development begins with deepening the cutter to the required depth with gradual cutting of the soil layer. The soil developed by the milling machine is sucked up by the soil pump and transported through the pulp pipeline in the form of pulp (mixture of soil and water) to the site of the coastal dump. In the case of a large distance between the dredger and the dump, a booster station is used, which, by maintaining the pressure in the pulp pipeline, will ensure the necessary performance of the work.

Dredging works are carried out up to "0" of the Izmail port (-0.18 m). The resulting depths will depend on the water level at the time of the work. During dredging and surveying works, regular control of the water level is carried out using a water gauge. The frequency of removing the level is every 4 hours. After developing the soil in the access zone of the cutter, the stabilizers of the dredger are raised, the dredger is moved to the next point.

Dredging at depths from 4,0 m to 7,32 m and, if necessary, to 8,23 m will be carried out by a dredger of the SDS-15 project suction mode using a soil pump with a loosening cutter attachment and a slurry pipeline, through which the bottom soil will be transported to the coastal dump using water.

The total duration of dredging works is 52 days excluding downtime due to the completion of the construction stage, with preparatory work, adverse weather conditions, scheduled and unscheduled repairs, etc.

***Organization of place for coastal dumps for bottom soil.***

- The bottom soil dump site was chosen taking into account the criteria of economy, efficiency and environmental friendliness, namely:
- to be located in relative proximity to the dredging site;
- not to affect the drift of dredging objects;
- the soil that is formed should not be eroded by rise and falls of the waves and flow which is ensured by the construction of the coastal dump;
- the soil capacity of the coastal dump should correspond to the design volume of soil excavation.

The site with the area of 1.24 ha, located in the coastal zone of the Port, meets the above criteria, the depth measurement control plan with the drawings of operational water area with the approach channel and the place of the coastal dumping is attached (Drawing 3).

A site for the dumping of bottom soil is surrounded along the perimeter by a 2.5 m high embankment dam made of local soil, its base is planned with the formation of alluvium maps and a

sedimentation zone with a Ø200 m discharge pipe for discharging clarified water. The alluvium maps and sedimentation zone are separated from each other by distribution dams, the height of which depends on the planned amount of soil alluvium. A drainage ditch with a depth of 0.5 m and a sole width of 1.0 m is provided along the embankment dam, which is directed with a constant slope in the direction of the river to discharge water that has filtered through the embankment dam.

The soil, which enters the coastal dump in the form of pulp, is deposited under the action of gravitational forces on its alluvium maps, and the clarified water is returned to the water area through the discharge pipe and the drainage ditch.

After drying, the surface of the coastal dump is reclaimed with rough and fine planning and preparation of the site for the construction of the second part of the cargo berth.

In the process of dredging and after their completion, the depth of development is controlled in order to identify shortages and their further elimination, as well as to calculate the total volumes of extracted soil.

When the dredging work is done, the navigation equipment shall be arranged, the types of aids to navigation (AtoN) and their placement shall be agreed with the State Hydrographic Service of Ukraine.

### *1.4. Description of the main characteristics of the planned activities*

The planned activities require the allocation of three plots of land for the use of NIBULON LLC, classifying them into the category: "Lands of industry, transport, communication, energy, defense and other purposes", in particular "Lands of transport", according to the intended purpose - for construction and operation of the transport infrastructure object:

- a land plot with an area of 19.0 ha from reserve land (Resolution of the Izmail City Council No. 2045-VIII dd. 15.04.2022 - appendix 1). The plot includes a plot for the construction of a railway access track - adjoining the railway track of the river port to the Izmail station of the regional branch of the “Odesa Railway". The commission for choosing the place of adjacency was held on 15.04.2022.;

- a land plot with an area of 10,4357 hectares from the lands of the water fund for the reconstruction and construction of hydrotechnical structures, including the operational water area of the berth structure and the approach channel to it.

- a land plot with an area of 0,7 of the category: «Lands of transport», which is under the control of the PJSC "UKRAINIAN DANUBE SHIPPING COMPANY ".

Land use is provided on the basis of a land lease agreement with the Izmail City Council for a period of 49 (forty-nine) years.

As part of the river port (terminal), the construction and operation of the industrial transshipment complex with a multivariate scheme for the movement of grain, leguminous, and oilseed crops during their receiving from the railway, road, and water transport, storage, and bringing to market standards (cleaning, drying) and shipment to water and road transport are provided.

The technical and economic characteristics of the technological complex for the transshipment of grain cargoes are:

– throughput capacity – 3 100 thousand tons per year of grain products, including reception from railways – 1 000 thousand tons, from vehicles – 2 000 thousand tons, from water transport – 100 thousand tons;

– the volume of simultaneous storage of grain products – 118.5 thousand tons;

– work schedule – three shifts, 365 days a year;

– number of employees – 100 full-time staff, including engineering and technical personnel – 31 workplaces;

Grain products include crops: cereals (wheat, corn, barley, rye, millet, oats, and sorghum), legumes (soybeans, peas, lentils, beans), and oilseeds (sunflower seeds and rapeseed).

Grain cargoes moving across the state border of Ukraine are subject to fumigation, which is carried out on a contractual basis by specialized quarantine units that have the appropriate license and permits for the implementation of this type of activity, qualified and professionally trained personnel and material-technical base. Fumigation of grain cargoes is carried out in the holds of ships moored at port berths.

The planned activities involve the implementation in wartime of a simplified technological scheme for the shipment of grain cargoes on water transport. In this case, the technological process can take place according to three options:

with accumulation in mechanized warehouse of floor storage - grain cargoes are conveyed by chain conveyors and bucket elevators from the point of unloading from railway cars or from the point of unloading of road transport to the mechanized floor storage warehouse where the transport batch is formed, then through the tanks the loading of the road transport occurs, which delivers the cargo to the shipment area organized in the coastal area of Port, from which agricultural products are reloaded in holds of the water transport by a TEREX FUCHS hydraulic loader, installed on the transshipment floating complex (floating berth);

direct option with shipment from road transport directly to the ship – grain cargoes are transported by the road transport to the shipment area organized in the coastal area of Port, from which agricultural products are reloaded in holds of the water transport by a TEREX FUCHS hydraulic loader, installed on the transshipment floating complex (floating berth).

direct option with shipment from railway cars directly to the ship – by chain conveyors and bucket elevator, grain cargoes from the point of unloading from railway wagons are conveyed to loading hoppers of the road transport and are poured to the road transport. Grain cargoes are transported by the road transport to the shipment area organized in the coastal area of Port, from which agricultural products are reloaded in holds of the water transport by a TEREX FUCHS hydraulic loader, installed on the transshipment floating complex (floating berth).

These three options for shipment of grain cargoes to water transport are carried out using a temporary structure - a shipment area with a maximum size in plan of 13.2m * 8.4m, arranged in the coastal zone of the Port by laying the sole plates and fencing the perimeter on three sides with concrete blocks of 1.2m high. A front loader operates at the shipment site, which provides hilling of agricultural products poured from the truck.

The transshipment complex combines into a single technological scheme of construction and equipment, the construction of which is planned as part of various launch complexes:

- unloading point from railway cars (two tracks with two cars), a closed hangar with shutter gates, and an aspiration system for complete localization of dust emissions generated during the unloading of railway cars;
- two mechanized warehouses with floor grain storage with a capacity of 9,0 thousand tons each with equipping of each one with road transport unloading point with a canopy, shutter gates, and an aspiration system for complete localization of dust emissions generated during the unloading of road transport;

- two shipment floating complexes with a loading machine with a capacity of 500 t/h on each one;
- two shipment posts of ships under the scheme «road transport - shipment area- FUCHS loader - ship»;
- working grain cleaning tower with 5 hoppers for waste;
- unloading point for road transport for 2 intake pits connected with working tower, a canopy, shutter gates and aspiration system for complete localization of dust emissions generated during vehicle unloading;
- 18 metal tanks (silos) with a capacity of 5.5 thousand tons each;
- electronic railway and automobile scales;
- three metal tanks (silos) for wet grain with a capacity 500 tons each;
- grain dryer with a capacity of 100 t/h;
- closed conveyor galleries, overpasses and elevator towers;
- floating crane for reloading cargo according to the "ship-to-ship" option.

In connection with the climatic features of the area of the planned activities (significant fluctuations in the surface water level of the Danube River), the role of a cargo berth is performed by two shipment floating complexes, (floating berths), structural characteristics of which are determined in accordance with the characteristics of the calculated vessel, the placement of technological machines. Floating berths are equipped with chipping and wheel chipping devices, lighting and grounding of metal structures.

As a floating berth in the first stage of construction, a platform (vessel) of the FCM-2037 project (2016, Istanbul) with the following characteristics will be used: length - 48.0m; width - 18.56m; draft - 2.482m, hull height - 3.15m, gross tonnage - 744.00t. The Shipping Register of Ukraine issued Act No. 103-03979-22 on the technical supervision of the vessel for its state registration, the Maritime and Inland Water Transport and Shipping Service of Ukraine issued a Certificate of ownership of the vessel "PP-01" АВ№001754 № АРС-280 dated 28.09.2022 (Appendix 2).

After equipping the platform (vessel) with a loading machine, rail tracks for its movement, an overpass with a chain conveyor and inserts for connecting a transshipment machine, a bucket elevator tower and an operator's room, it is a floating reloading complex itself.

Each of the floating berths is held relative to the shore by two rods, one end of which is fixed in the coastal zone, the hinged fastening of the rod ensures vertical movement of the floating berths, what is important at the water level fluctuation in the river. Mooring of the transport vessel is carried out using mooring devices installed in the floating berth and coastal zone of the Port

When carrying out cargo operations, the level of cargo is constantly monitored. The correctness of cargo handling operations is determined by the following data: the draft of the vessel, the amount of received/removed cargo, the amount of cargo residues, and the duration of the operation.

Upon completion of construction, all technological operations related to the transshipment of grain and oilseed crops are mechanized and automated, and the operation of technological equipment is controlled from the control room. The technological scheme of the complex provides the ability to:

simultaneous reception of grain cargoes from three types of transport – road, rail, and water;

simultaneous execution of receiving and shipping operations;

simultaneous acceptance of three types of grain crops through the points of unloading vehicles;

simultaneous execution of internal operations (bringing to market standards (cleaning, drying) and moving grain from silo to silo for ventilation or formation of a shipment batch) and external operations (reception and shipment).

As part of the planned activities on the territory of the river port (terminal), it is planned to build a fuel-filling station with a maximum annual capacity of 1950 t/year, which includes:

- drain railway overpass for 2 tank wagons;
- two underground storage tanks V=75 $m^3$;
- control room;
- the place of filling diesel fuel into vehicles;
- watercraft filling station.

For the delivery of grain products and diesel fuel, as part of the planned activities, the construction of a railway access track with a length of 835 m is provided – adjoining the team track No. 13 of the Izmail-port park of the New Izmail station of the regional branch of the «Odessa Railways». The construction of an access track is planned on a land plot that the Izmail City Council leased to NIBULON LLC for 49 (forty-nine) years (Abstract No HB-3201089442022 dated19.09.2022 Appendix 1) with the intersection of two public highways at one level.

The planned activities take into account two technical alternatives regarding the water supply of the river port:

***technical alternative 1*** – water supply for the needs of the river port (household and practical needs, industrial, fire-fighting needs, and needs for land improvement) from the surface water intake from the Danube, which is the object of new construction;

***technical alternative 2*** – water supply of the household and practical needs, production and fire protection needs of the port due to the connection of the port water supply to the municipal networks, provision of the needs for the improvement of the territory – from the surface water intake from the Danube River, which is the object of new construction.

The analysis of the given technical alternatives is carried out in the relevant sections of this report. The decision to choose one of the two presented alternatives will be made based on the result of a comparison of the environmental, socio-ecological, and socio-economic consequences of the implementation of planned activities according to technical alternatives 1 and 2.

The planned activities involve the construction of buildings and structures:

*Administrative and household building with a laboratory and a canopy,* a two-story building equipped with engineering systems and communications: cold and hot water supply, sewerage, power supply. Ventilation of the premises is natural (through the windows) and supply and exhaust, bathrooms and showers – natural duct exhaust. The premises are heated by a solid-fuel boiler that runs on briquettes.

To meet the sanitary needs of the workers, changing rooms with showers and toilets, as well as a primary health care center are provided.

*A transformer substation with a distribution station and a control room*, a two-story building has separate rooms: two transformer chambers, 10 kV switchgear, a distribution station, and two operating compartments for electricians. The control room occupies the second floor.

*Weighing control room*, one-story building, electric heating. The building is equipped with

engineering systems and communications: water supply, sewerage, and power supply. Ventilation of the premises is natural (through the windows) and supply and exhaust, bathrooms – natural duct exhaust.

*The cafe for staff and agricultural producers* is a one-story building, the premises are heated by a solid-fuel boiler that runs on briquettes, and food preparation is done by electric stoves.

Building equipped with engineering systems and communications: cold and hot water supply, sewerage, power supply. Ventilation of the premises is natural (through the windows) and supply and exhaust, bathrooms – natural duct exhaust.

*A mechanical workshop with a garage, a warehouse, and a firefighting station, is* a one-story building divided into premises: a garage with parking for vehicles and specialized equipment; a warehouse with racks for storing assembly equipment, spare parts, assemblies, etc.; a mechanical workshop with a section for mechanical processing of metals, a welding section, a painting section, a fire station for one fire truck. The premises are heated by a solid-fuel boiler that runs on briquettes.

The building is equipped with utility systems and services: water supply, sewerage, and electricity supply. The ventilation of premises is natural (through small ventilation windows) and inflow exhaust one.

*Toilets (three),* the one-story building is equipped with utility systems and services: cold and hot water supply, sewerage, and electricity supply, with their connection to the river port (terminal) system. The ventilation of premises is natural (through small ventilation windows) and inflow exhaust one, water closet – natural exhaust ducted one.

*The house for business travelers,* a one-story building for simultaneous residence of 15 people. The building has private rooms with all amenities and a dining room.

The building is equipped with utility systems and services: water supply, sewerage, and electricity supply. The ventilation of premises is natural (through small ventilation windows) and inflow exhaust one. The premise is heated by a solid fuel boiler running on pellets.

To provide hot water supply to buildings, installation of a Vaillant auroFLOW plus solar system is provided, which converts solar energy into thermal energy with automatic adjustment of the heat carrier temperature. The principle of operation: the energy of the sun is accumulated by the heat carrier in the collector fields installed on the roof, the thermal energy of the heat carrier is transferred to water in the heat exchanger. A mixture of water and propylene glycol is used as the heat carrier, when the heat carrier overheats, excess pressure is created in the solar system, and the safety valve is activated with an emergency release of heat carrier vapors. The Vaillant auro FLOW plus solar system is closed, hermetic, not completely filled with heat carrier and not under pressure.

Elements of the solar system: a tank of heat carrier, two solar pumps with a safety valve installed in a boiler room, and connected with collector fields by the network of pipes. Elements of water heating system: heat exchanger, pump, temperature sensors installed in a boiler room and connected by a network of pipes with water heater from which hot water through the system of hot water supply is headed to the consumer.

It is provided to build on the territory of the Port 2 tanks for firefighting needs with a volume of 200 $m^3$ each with a branching system of dry pipes of the fire-fighting water supply system and the output of taps for connecting a fire truck.

Also, the new construction involves the installation of the engineering infrastructure of the river port: water supply, household, and storm sewer systems which will ensure the regulatory processes of water supply and drainage at the Port.

The storm sewer system provides collection of surface wastewater from the port area,

treatment of surface runoff in local treatment facilities of the storm sewer system with a capacity of 25 l/s and 150 l/s, consisting of an oil product separator and a sorption filter, and removal of treated surface runoff to the Danube River through one organized outlet.

For the maintenance of ships during their calls into the port, in the coastal zone of the Port, laying engineering networks is provided with the installation of:

- a well for receiving household sewage from ships with its connection to the port sewage system;
- a well with a hydrant for bunkering ships with potable water with its connection to the water supply system of the port;
- station for receiving blige water from ships, which includes: a pumping station connected by a pipeline to a hermetic storage tank. Sewage received from ships is diverted through the pipeline to a container, as it fills up, sewage as hazardous waste will be transferred for disposal to an organization with an appropriate license;
- station for localization and liquidation of possible emergency fuel spills during bunkering of ships, equipped with appropriate tools and consumables;
- electric devices with their connection to the port's electrical networks;
- fire-fighting water mains with hydrants and fire-fighting posts of normative equipment.

Planned activities provide for improvement of the territory with forming green zones on the area of 7,2 hectares and places of rest with installation of 4 arbors and a fountain. The fountain will be supplied with water from the municipal networks of the city, discharge - into the storm sewer of the Port.

*The operational water area of the cargo berth with the approach channel* The operational water area with the approach channel is bounded by a broken line with corner coordinates:

1. 45°19'22.1249"N 028°50'22.7431"E
2. 45°19'16.3133"N 028°50'35.2572"E
3. 45°19'14.9011"N 028°50'40.2011"E
4. 45°19'07.4597"N 028°50'36.1842"E
5. 45°19'08.8176"N 028°50'32.5536"E
6. 45°19'19.3549"N 028°50'18.8807"E

Situation diagram of the operational water area and water approach - Drawing 1.

Design characteristics of newly constructed hydrotechnical structures of area - 10,4357 hectares; design depth - 8.23 m from "0" of the Izmail Sea Port, which have to ensure safe approach and maneuvering within its limits of the calculated type of vessels. The depth of the water area will be provided by dredging in accordance with the order of construction: Stage I - to a depth of 4.0 m from the "0" of the Izmail seaport, Stage III - to a depth of 7.32 m from the "0" of the Izmail seaport, Stage V - to a depth of 8, 23 m from "0" of the port of Izmail - if necessary, which is associated with the dredging of the shipping channel "Vylkove - Izmail Ceatal" by Ukraine to reach its design depth of 8.23 m from "0".

Upon completion of every stage of construction, the newly built hydrotechnical structures will be equipped with aids to navigation with the approval of the types of signs and their placement by the government agency «State Hydrography». Also hydrotechnical constructions are subject to certification, based on the results of their inspection of hydrotechnical facilities, the Register of Shipping of Ukraine issues a Certificate of suitability of the hydrotechnical facility for operation, and information about the hydrotechnical facility is entered into the database of hydrotechnical facilities.

The government agency «State Hydrography» in accordance with the tasks assigned to it

will update the Navigational River Map of the Danube River, issue a guide and a handbook for shipping.

New construction of transport infrastructure facility - River port (terminal) of "NIBULON" LLC in Izmail, Izmail district, Odesa region (3-D format - Drawing 4).

The object of the planned activities, according to the results of the identification carried out by self-employed entrepreneur Tokarchuk O.S. (Qualification Certificate: series AR No. 017922, issued by the Architectural and Construction Certification Commission of the All-Ukrainian Public Organization "Guild of Designers in Construction" dated 22.11.2021), is recognized as a potentially hazardous object that does not belong to high-risk objects and objects of the civil protection category.

***Sanitary protection zone of the object of the planned activities***

According to the sanitary classification of enterprises, productions and buildings (Appendix No. 9 of DSP 173-96 "State Sanitary Rules for Planning and Development of Populated Areas" (approved by Order of the Ministry of Health of Ukraine dated 19.06.1996 No. 173 [45], registered in the Ministry of Justice on 24.07.1996 under No. 379/1404), the normative size of the sanitary protection zone of sea and river ports from the borders of the areas of transshipment and storage of dusty cargoes is 300m.

In accordance with point 2.1.27 of the State sanitary rules and norms for sea and river ports (DsanPiN 7.7.4.- 046-99), approved by the resolution of the chief state health inspector of Ukraine dated 01.12.1999. No. 46 [47], ports and port facilities, depending on the degree of harmfulness with which they affect the environment, taking into account the sanitary characteristics of the cargo processed there, their volume, transshipment technology and measures to prevent harmful emissions into the atmosphere, are divided into five classes with the size of sanitary protection zone from 1000 m (I class) to 50 m (V class). The object of the planned activities belongs to the III class, because in addition to the transport and technical schemes of transshipment and storage of grain cargoes, which exclude the removal of dust into the external environment, a simplified technological scheme with open places of transshipment of cargoes will be used in wartime.

Thus, the object of the planned activities – river port (terminal) according to point 5.22 and appendix №9 of State sanitary rules 173-96 [45], and also to the DsanPiN 7.7.4.- 046-99 "State sanitary rules and norms for sea and river ports. Transport sanitaryness." [47] is referred to the objects of III class with a standard sanitary protection zone – 300 m from boundaries of transshipment areas and open storage of dusty cargoes.

For the rest of the production facilities located on the territory of the Port, according to the sanitary classification of enterprises, productions and facilities (approved by the Order of the Ministry of Health of Ukraine dated 19.06.1996 No. 173[45]), the sanitary protection zone has the following size:

- grain storage - 50 m;
- elevators (grain drying and cleaning) - 100 m
- fuel filling station (expendable and base storage of fuel liquids) - 100 m;
- parking of cars with the number of 11-50 units - 15 m;
- welding post (metalworking industry enterprises with heat treatment without foundries) - 50 m.

The total size of the sanitary protection zone for the entire river port (terminal) is determined by the integrated connection of the above sanitary protection zones for all production facilities on the industrial site, taking into account their mutual location.

The residential buildings of Izmail are located in the north, north-east and north-west directions from the site of the new construction. The minimum distance from the sources of emissions of polluting substances to the residential buildings of Izmail is 555 m. The standard sanitary protection zone is respected.

To control atmospheric air for compliance with hygienic standards at the border of residential buildings, sanitary protection zone and recreation zone, four control points No. 1-4 have been adopted. Control points and distances from residential buildings are drawn on the Situational Map-scheme.

The situational diagram of the object of the planned activities with the centroid of the industrial site, the sanitary protection zone and the zone of its impact on air quality is attached (Drawing 1).

***Description of technical alternatives for the organization of the water supply system. Organization of the water drainage system of the Port.***

The planned activities envisage two technical alternatives for the organization of the Port's water supply system:

***technical alternative 1*** water intake from the surface water intake from the Danube River (new construction facility) to meet all the needs of the river port (household and domestic, industrial, fire-fighting needs, needs for the improvement), drainage from the sewerage facilities of the port - to the centralized sewerage network of Izmail, surface wastewater (rain, melt and irrigation-washing) - through the coastal outlet to the waters of the Danube River;

***technical alternative 2*** - mixed water supply: from the municipal water supply network of Izmail - household, industrial and fire-fighting needs of the port, from the surface water intake from the Danube River (new construction facility) - landscaping needs; drainage from the sewerage facilities of the port to the centralized sewerage network of Izmail, surface wastewater (rain, melt and irrigation and washing) - through the coastal outlet to the Danube River.

The presented technical alternatives 1 and 2 refer to the water supply options for the Port, the organization of the water drainage system is the same, only the volume of wastewater discharge to the municipal sewerage network changes due to the operation of the water treatment system (technical alternative 1).

In this section, the analysis of technical alternatives is reduced to a detailed description of port water supply schemes for each of the options separately.

***Technical alternative 1***– all water needs of the river port are provided by the water supply system consisting of:

a pumping station of a surface water intake with a suction pipeline equipped with a filter-type fish protection head;

water supply networks made of plastic pipes;

water treatment systems to bring the quality of surface water to the normative indicators of DSanPin 2.2.4-171-10[48] with storage tanks of drinking water with a total volume of 25 $m^3$

technical water supply of surface water for landscaping and filling fire tanks (without water treatment).

*The pumping station* provides for the intake of water from the Danube River - a separate building, which includes an electrical switchboard and a pump maintenance site.

The pumping station is designed to provide water supply to the port, both in regular mode and for fire-fighting needs. The project provides for the installation of two groups of pumps and a drainage pump in the pumping station:

the first group for supplying water for firefighting needs;

the second group for supplying water to meet the needs of the enterprise (including for drinking and sanitary-hygienic needs);

drainage - for emergency discharge of water when the engine room is flooded

When carrying out water intake for drinking and sanitary-hygienic needs, it is necessary to observe the legal regime of zones of sanitary protection of drinking water intake. And the I belt of the sanitary protection zone (strict regime) of the surface source of water supply of the river port is organized within the territory of the enterprise. The access of third parties to the territory of zone sanitary protection - I belt is limited by fencing it off from the rest of the company's territory with a fence, and from the side of the water area - by buoys.

The boundaries of the II and III zones of the sanitary protection zone are determined taking into account the sanitary, climatic and hydrological features of the water supply source, the existing production infrastructure of the River Port and the complex of water treatment equipment that produces drinking water before being fed into the water supply system of the enterprise.

*Water treatment systems with storage tanks* are a complex of specialized equipment combined in a single technological cycle for the production of high-quality drinking water to meet the port's economic, domestic and industrial needs.

In order to select the water treatment equipment in the area of the planned water intake from the Danube River, surface water samples were taken and examined for compliance with the requirements of DSanPiN 2.2.4-171-10 "Hygienic requirements for drinking water intended for human consumption" [48] for organoleptic, physicochemical parameters. The research was carried out by the chemical and technological laboratory of «NIBULON» LLC (Certificate of recognition of the ability to conduct measurements PH-018/2021 dated 14.04.2021 - Appendix 3), Protocol of surface water research №39 dated 10.09.2022 - Appendix 3.

The technology of high quality drinking water production includes:

– preliminary purification of incoming water from mechanical impurities of large fractions (sand, silt, rust, etc.) in two disk filters "Arkal 2", in which the filtering element is polypropylene disks. Due to the original design, the filter efficiency is higher compared to conventional filters, the use of filters of this type significantly extends the service life of the main water treatment equipment;

– oxidation and disinfection of incoming water by injecting sodium hypochlorite into the incoming water in portions dosed by a pulse flow meter of the proportional dosing station operating in automatic mode;

– fine purification from mechanical impurities up to 20-40 microns in size, suspended solids, turbidity and color of water in the multimedia treatment plant with natural mineral Filter AG with a filter element based on silicon dioxide, which has operational advantages over traditional sand and mixed loads. Restoration of the filter operating parameters is carried out automatically by loosening the filter element by the reverse flow of water;

– removal of residual chlorine, chlorination by-products, large organic molecules (humic acids), high molecular weight organic compounds (petroleum products, pesticides, surfactants) and improvement of organoleptic characteristics (odor, taste) is carried out in the sorption treatment unit, where the sorption element is bituminous granular activated carbon, manufactured by special

technology. Restoration of the operating parameters of the plant is carried out automatically by loosening the sorption element by the reverse flow of water;

– removal of ammonium and organic compounds in the complex treatment plant with a unique patented filter material ECOMIX, automatic operation of the plant is provided by a multifunctional valve. Restoration of the operating parameters of the filter material is carried out automatically using salt and water compressed into tablets;

– disinfection of purified water with sodium hypochlorite, portions of which are automatically injected into the tanks of purified water from the dosing station to stabilize the microbiological background of water supplied to the water supply network.

The capacity of the water treatment equipment for drinking water is 3 $m^3$/h, selected in accordance with the needs for drinking water and taking into account the capacity of the drinking water reserve of 25 $m^3$. Surface water is used for irrigation of green areas, washing the territory and filling fire tanks without water treatment.

The operation of the water treatment system is associated with water consumption for own technological needs (filter washing), the resulting technological flows are discharged into the domestic sewage system.

***Technical alternative 2*** – mixed water supply system of the Port, which includes:

economic - household water supply made of plastic pipes connected to the water supply networks of Izmail;

surface water intake pumping station with a pipeline equipped with a fish protection device;

surface water technical pipeline (for the needs of the port territory improvement).

*economic and domestic water supply -* to meet drinking, sanitary and hygienic needs, ensuring the operation of the technological laboratory, canteen, fire extinguishing needs and fountain. At the object of the planned activities, the use of tap water from the water supply networks of the city of Izmail is provided by concluding an agreement with the Municipal enterprise "Izmail Production Management of Water Supply and Sewage Management (after - the ME "Izmail VUVKG"). The specified municipal enterprise produces underground fresh water from the Izmail underground water deposit. he total number of underground water intakes is 45 wells with a flow rate of 12.775 million $m^3$/year. According to the Technical Conditions of the Municipal Enterprise "Izmail Production Department of Water Supply and Sewerage" of the Izmail City Council No. 10 dated 03.05.2022, the place of connection of the Port's water supply network to the existing water supply network Ø150 mm along Dunayskaya Street;

*surface water intake pumping station -* consists of a pump immersed in a pit with a capacity of up to 40 м3/h, which is equipped with a cassette-type fish protection device with bulk filter material (keramzit/gravel). The organization of sanitary protection zones for technical water intake is not required.

*surface water technical pipeline -* for irrigation of green spaces, washing of roads, sidewalks, the use of surface water from the Danube River and purified surface runoff (recycled water) is provided. Technical needs of the Port according to the calculations (Appendix 4) are 234,500 $m^3$/day, 14450,000 $m^3$/year, including

watering of green areas and lawns - 180.0 $m^3$/day, 9000.0 $m^3$/year;

for washing of roads and pavements with hard surface and dust suppression - 54,500 $m^3$/day, 54500,000 $m^3$/year.

***Organization of the water drainage system of the Port***

Recycled water of the river port consists of:

- domestic wastewater, which is discharged by the domestic sewage system from the sewerage facilities of the port on a contractual basis to the sewerage network of Izmail, which is operated by the Municipal Enterprise " Izmail Production Department of Water Supply and Sewerage";
- surface wastewater (rain, melt and irrigation-washing) collected by the storm sewer system is treated at local storm water treatment facilities and discharged to the Danube River through the coastal outlet.

*The domestic sewage system* is provided as a part of gravity and pressure sewage networks and a well on the berth for receiving sewage from ships.

Taking into account the absence of any specific processes in the use of water for the needs of the Port, the quality of recycled water discharged to the municipal sewerage network of the city must meet the requirements of the Rules for acceptance of wastewater to the centralized sewage system (Appendix №2,4,5), approved by the Order of the Ministry of Regional Development, Construction, Housing and Municipal Services of Ukraine dated 01. 12.2017 №316 [38], registered with the Ministry of Justice of Ukraine on 15.01.2018 № 56/31508 and the Rules for acceptance of wastewater from enterprises into the municipal sewerage system of Izmail, approved by the decision of the Izmail City Council of 27.06.2014 №527 [60].

Domestic and industrial wastewater of the Port is centrally transferred to the sewerage network of Izmail for further treatment at the biological treatment facilities of PJSC "Izmail Pulp and Paper Mill". According to the Technical Conditions of the Municipal Enterprise "Izmail Production Department of Water Supply and Sewerage" of the Izmail City Council No. 10 dated 03.05.2022, the place of connection of the Port's sewer outlet to the existing sewer network Ø1200 mm on Chkalova Street, 2.

Normative calculation of the volumes of domestic sewage is performed in accordance with Building code B 2.5-64:2012 [52] "Internal water supply and sewerage. Part I. Design. Part II Construction", the results are presented in Table 1.4.1.

Drainage from watercraft is seasonal and periodic, depending on the duration of the navigation period and the availability of grain products for shipment. For the calculation, the volume of sanitary tanks of the tugboat type "NIBULON" was taken - 13.1 $m^3$; time of wastewater discharge 6.5 hours / day - according to the capacity of the sanitary pump 2.0 $m^3$ / hour; number of ship calls - 1 / per day; 50 / per year.

The calculation of the normative volumes of water consumption (drinking, sanitary and industrial needs) and water drainage (domestic and industrial recycled water) was performed in accordance with Building code B 2.5-64:2012 [52] "Internal water supply and sewerage. Part I. Design. Part II Construction" and equipment passport data, the results are presented in Table 1.4.1.

Based on the made calculations (Table 1.4.1), the water consumption and drainage volumes of the Port according to the considered technical alternatives are as follows:

**Technical alternative 1.**

Total water intake from the Danube River - 282,497 $m^3$/day, 20501,394 $m^3$/year, including for:

- household needs of the Port - 6,030 $m^3$/day, 2131,785 $m^3$/year;
- production needs of the Port - 35,727 $m^3$/day, 3184,928 $m^3$/year;

- technological needs of the water treatment system - 6,240 $m^3$/day, 734,681 $m^3$/year
- technical needs of the Port - 234,500 $m^3$/day, 14450,0000 $m^3$/year.

The total volume of water discharge to municipal sewerage networks - 30,597 $m^3$/day, 4990,994 $m^3$/year, including:

- domestic wastewater - 6,030 $m^3$/day; 2131,785 $m^3$/year;
- industrial wastewater - 18,327 $m^3$/day; 2124,528 $m^3$/year;
- technological flows of water treatment system - 6,240 $m^3$/day; 734,681 $m^3$/year.

**Technical alternative 2.**

Total volume of water intake from municipal networks - 41,757 $m^3$/day, 5316,713 $m^3$/year, including for supply

- domestic needs - 6,030 $m^3$/day, 2131,785 $m^3$/year;
- production needs - 35,727 $m^3$/day; 3184,928 $m^3$/year.

The total volume of water intake from the Danube River to meet the technical needs of the Port is -234,500 $m^3$/day, 14450,000 $m^3$/year.

Total volume of water discharge to municipal sewerage networks - 24,357 $m^3$/day, 4256,313 $m^3$/year, including

- domestic wastewater - 6,030 $m^3$/day; 2131,785 $m^3$/year;
- industrial wastewater - 18,327 $m^3$/day; 2124,528 $m^3$/year.

The average annual volume of surface runoff discharged into the surface waters of the Danube River is estimated to be 51,602.01 m3/year. A detailed description of the stormwater drainage system and the treatment facilities within it, as well as the estimated volumes of treated recycled water discharged by the Port into the Danube River are provided in Section 1.5.2 of this Report and Appendix 4.

An analysis of the environmental impacts of technical alternatives 1 and 2 is presented in Section 1.5. of the report.

## STANDARD CALCULATION OF THE VOLUMES OF WATER CONSUMPTION AND DRAINAGE
## (drinking, sanitary and hygienic and production needs)

table 1.4.1.

| № | Name of water consumers | unit of measurement | Number of water consumers | The rate of water consumption by consumers,l/day | Normative document | Water consumption | | | | Drainage system | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | number of hours per day | $m^3$/day | number of days per year | $m^3$/year | Waste water disposal rate per unit of measurement l/day | Normative document | $m^3$/day | $m^3$ per year |
| 1 | **Household needs** | | | | | | | | | | | | |
| 1.1. | Management body staff | perso | 31 | 15 | DBN V.2.5-64:2012 | 8 | 0,465 | 312 | 145,080 | 15 | DBN V.2.5-64:2012 | 0,465 | 145,080 |
| 1.2. | Working staff (three shifts of 23 people) | perso | 23 | 25 | | 8 | 1,725 | 365 | 629,625 | 25 | | 1,725 | 629,625 |
| 1.3 | Shower units (one shift) | pcs | 2 | 500 | | 8 | 1,000 | 365 | 365,000 | 500 | | 1,000 | 365,000 |
| 1.4 | Shower units (two shifts) | pcs | 2 | 500 | | 16 | 2,000 | 365 | 730,000 | 500 | | 2,000 | 730,000 |
| 1.5. | Showers at the rooms of the guest house | pcs | 6 | 140 | | 24 | 0,840 | 312 | 262,080 | 140 | | 0,840 | 262,080 |
| | **Total (household needs)** | | | | | | **6,030** | | **2131,785** | | | **6,030** | **2131,785** |
| 2. | **Production need** | | | | | | | | | | | | |
| 2.1 | D-4 water distiller (4l/ hour) | pcs | 1 | 32 | Passport data of the equipment | 8 | 0,032 | 365 | 11,680 | 32 | Passport data of the equipment | 0,032 | 11,680 |
| 2.2 | Cooling of water distiller D-4 (120l/ hour) | units | 1 | 960 | | 8 | 0,960 | 365 | 350,400 | 960 | | 0,960 | 350,400 |
| 2.3 | Device PChP-3 (for the determination of the falling number in fodder wheat) | pcs | 1 | 960 | | 8 | 0,960 | 365 | 350,400 | 960 | | 0,960 | 350,400 |
| 2.4 | Service of watercrafts | units | 1 | 16500 | | 24 | 16,500 | 50 | 825,000 | 13100 | | 13,100 | 655,000 |
| 2.5 | Washing laboratory dishes and equipment in the sink | units | 1 | 10 l/hour | Building code B.2.5-64:2012 | 8 | 0,080 | 365 | 29,200 | 10 l/hour | Building code B.2.5-64:2012 | 0,080 | 29,200 |
| 2.6 | Dining room (with cooking 18 seats) | meals | 107 | 12 | | 1 | 1,284 | 312 | 400,608 | 12 | | 1,284 | 400,608 |
| 2.7 | Mechanical laundry (washing machine) | kg linen | 5 | 75 | | 1 | 0,375 | 312 | 117,000 | 75 | | 0,375 | 117,000 |
| 2.8 | Restrooms:<br>- toilet with a drain tank | pcs | 6 | 12 l/hour | | 8 | 0,576 | 365 | 210,240 | 12 l/hour | | 0,576 | 210,240 |
| | - - washbasin with a faucet | pcs | 6 | 20 l/hour | | 8 | 0,960 | 365 | 350,400 | 20 l/hour | | 0,960 | 350,400 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2.9 | Filling the fountain (drainage to the storm sewer, see. Appendix 4) | pcs | 1 | 14000 | Technical data | 8 | 14,000 | 10 | 140,000 | - | Technical data | - | - |
| 2.10 | Filling of fire-fighting tanks: two with a volume of 200 m3 | pcs | 2 | - | | - | - | - | 400,000 | - | | - | - |
| 2.11 | * Technological needs of water preparation equipment (technical alternative 1) | pcs | 1 | 13% of total volume of water treatment | From the experience of equipment | 24 | 6,240 | 365 | 734,681 | 13% of the total volume of water treatment | From the experience of equipment | 6,240 | 734,681 |
| | **Total (production needs))** | | | | | | **41,967** | | **3919,609** | | | **24,567** | **2859,209** |
| | ***Total household needs and production needs and drainage system*** | | | | | | **47,997** | | **6051,394** | | | ***30,597*** | ***4990,994*** |

* the volume of water treatment takes into account the water needs of all water consumers, except for the volume of filling fire reservoirs

***1.5. Assessment by types and quantities of expected waste, emissions (discharges), water, air, soil and subsoil pollution, noise, vibration, light, heat and radiation pollution, as well as radiation arising from preparatory and construction works and implementation of the planned activities***

***1.5.1. During preparatory and construction works***

Construction and preparatory works affect the components of the environment, for the environmental and economic assessment of the impact of these works are identified:

- nomenclature and volumes of waste generated, as well as ways of waste management;
- emission sources, types of pollutants emitted into the atmosphere and their volumes;
- sources of water pollution, estimated volumes of pollutant discharges into surface water bodies;
- sources of soil and subsoil pollution, soil studies conducted;
- sources and types of impacts on flora and fauna, including the state of ichthyofauna and aquatic biocenoses, compensatory measures for fisheries;
- sources of noise, vibration, light, heat and radiation impact with relevant calculations.

***Assessment by type and quantity of waste generation by technical alternatives during preparatory and construction works***

As a result of construction and assembly works, the following types of waste are expected:

-waste pile, identified according to the state waste classifier DK 005-96 [40] as "Reinforced concrete and metal structures and iron and steel parts spoiled (damaged) or unidentified", code 4510.2.9.06.

The weight of waste piles is determined by the formula:

$$M = K \times t \times (1 - B) = 79 \times 5{,}5 \times (1 - 0{,}99) = 4{,}345 \text{ t}$$

Where K = 79 units – the number of piles used during construction;
t = 5,5 t – the weight of one pile;
B = 0,99 – coefficient of use of pile length (based on construction experience).

-electrode cinders, identified according to the state waste classifier DK 005-96[40] as "Waste obtained in welding processes", code 2820.2.1.20. The amount of electrode cinder formation according to TNTP 09-92 (Temporary norms for the technological design of machine-building enterprises) is 10% of the total consumption of electrodes:

$$M = 0{,}1 \quad E = 0{,}659 \text{ t},$$

where E = 6,592 t - consumption of electrodes used in the construction of facilities under technical alternative 1;

$$M = 0{,}1 \quad E = 0{,}618 \text{ t},$$

where E = 6,183 t - consumption of electrodes used in the construction of facilities under technical alternative 2;

- paint containers identified according to the state waste classifier DK 005-96 [40] as "Used metal containers, including small, excluding waste generated during transportation", code 7710.3.1.07. Waste is formed when using paint and varnish materials.

Volume of formation of metal containers:

$$M = \frac{E\,net}{e} \times m = \frac{4{,}200}{0{,}02} \times 0{,}002 = 0{,}420\ t,$$

where Enet = 4,200 t – total consumption of paint used in construction Port under the technical alternative 1;

e = 0,02 t – amount of paint in one container;

m = 0,002 t – mass of one container.

$$M = \frac{E\,net}{e} \times m = \frac{3{,}886}{0{,}02} \times 0{,}002 = 0{,}389\ t,$$

where Enet = 3,886 $t$ – total consumption of paint used in construction Port under the technical alternative 2;

e = 0,02 t – amount of paint in one container;

m = 0,002 t – mass of one container.

- household waste, which according to the state waste classifier DK 005-96 [40] is identified as "Municipal (city) mixed waste, incl. garbage from bins", code 7720.3.1.01, their estimated amount is determined on the basis of the "Rules for the provision of services for the removal of household waste", approved by the Resolution of the Cabinet of Ministers of Ukraine No. 1070 dated 10.12.2008,. [24], and is:

$N=n \times m/1000 \times n=2{,}760\ t$, where

n = 400 per – the number of workers involved in the construction of the river port;
m=0,075 kg – daily amount of household waste per employee;
$n$= *92 days* – duration of construction.

The planned activities involve the consideration of two technical alternatives, the implementation of which is associated with the generation of waste: electrode cinders, paint containers.

Thus, during the construction of the object of the planned activities, the generation of waste of the IV hazard class is expected, the volumes of which according to the options of technical alternatives are:

technical alternative 1 - industrial - 5,424 tons, domestic - 2,760 tons;

technical alternative 2 - industrial - 5,352 tons, domestic - 2,760 tons.

Waste generated as a result of construction and preparatory works, as it accumulates, is transferred to specialized enterprises under signed contracts for recycling or disposal. Damage to the natural environment during the placement of waste is compensated by appropriate payments.

Quantitative and qualitative characteristics of waste, as well as ways of handling them, are given in table1.5.1.1.

table 1.5.1.1.

| Name of waste according to DK 005-96 | Hazard class | Estimated amount of waste by technical alternatives, t | | Chemical (in percentages of components or other measurement units) and morphological composition | Waste management |
|---|---|---|---|---|---|
| | | 1 | 2 | | |
| 1 | 2 | 3 | 4 | 5 | 6 |
| 4510.2.9.06 Reinforced concrete and metal structures and iron and steel parts are spoiled (damaged) or not identified (waste piles) | 4 | 4,345 | | Chemical composition: $SiO_2$ – 73,58; CaO –14,07 %; $H_2O$ –5,75 %; $Al_2O_3$ – 3,72 %; $Fe_2O_3$ – 1,30 %; others –1,58 %. Composition: gravel, crushed stone, sand, their remains, etc. building waste that cannot be used as intended | They are used in the construction of coastal fortifications |
| 2820.2.1.20 Waste obtained in welding processes (electrode cinders) | 4 | 0,659 | 0,618 | Iron oxides (FeO, MnO, $Mn_2O_3$) –5%, iron – 95%, carbon– 6,67%, silicon–0,3%, chrome–0,03%, nickel–0,03%, manganese–0,3%, mics–4,5%, liquid glass. | They are removed from the construction site by the organization performing the work, with their subsequent transfer to specialized organizations under concluded contracts |
| 7710.3.1.07. Used metal containers, incl. small, with the exception of waste generated during transportation (paint containers) | 4 | 0,420 | 0,389 | Carbon (C)-0,1045%, manganese (Mn) - 0,475%, silicon (Si) - 0,0285%, chrome (Cr) 0,095%, iron (Fe) - 89,297%, resin 1,078%, titanium dioxide ($TiO_2$ ) - 3,100%, white spirit 0,822%, paint residue 5,000% | |
| 7720.3.1.01 Municipal (city) mixed waste, incl. garbage from the bin | 4 | 2,760 | | Organic compounds – 56-72%, food –30%, packaging materials –70% | Placement at the local landfill |

***Assessment by type and quantity of emissions during preparatory and construction works***

Preparatory and construction works are associated with emissions of pollutants into the atmospheric air, which are carried out during:

- operation of diesel generators;
- the operation of construction machines and mechanisms, motor vehicles and hydraulic engineering, which carries out dredging works;
- welding and gas cutting works;
- earthworks, unloading and storage of dusty materials;
- insulation works;
- painting works.

Quantitative values of pollutant emissions into atmospheric air during construction and assembly work are determined by the calculation and balance method based on current methods, calculations of emissions during construction are given in Appendix 5.

The estimated amount of pollutants emitted into the atmosphere during construction and assembly works, taking into account the options of the adopted technical alternatives is

**Technical alternative 1**

- stationary sources - 5,10956 t and greenhouse gases - 80,27038 t

- mobile sources - 47.95187 t and greenhouse gases - 1534.96367 t.

**Technical alternative 2**

- stationary sources - 4,81900 t and greenhouse gases - 80,27038 t

- mobile sources - 47,89033 t and greenhouse gases - 1533,90531 t.

The volumes of pollutant emissions broken down by substances are presented in Table 1.5.1.2.

Table 1.5.1.2.

| Code of substance | Name of pollutant | Emission volumes by technical alternatives, t | |
|---|---|---|---|
| | | 1 | 2 |
| *Stationary sources of emissions* | | | |
| 03000/11510 | Substances in the form of suspended solid particles (microparticles, fibers)/Aerosol of paint materials | 0,94383 | 0,84585 |
| 01003/123 | Iron and its compounds (in terms of iron) | 0,07714 | 0,03902 |
| 01010/203 | Chrome and its compounds (in terms of chromium trioxide) | 0,00008 | |
| 11030/ 616 | Xylene | 0,98493 | 0,91428 |
| 01104/ 143 | Manganese and its compounds in terms of manganese dioxide | 0,00537 | 0,00272 |
| 03001/ 2907 | Substances in the form of suspended solid particles (microparticles, fibers)/ Inorganic dust, | 0,26712 | |

| | | | |
|---|---|---|---|
| | with silicon dioxide content in %: - above 70 (dinas, etc.) | | |
| 03000/ 2908 | Substances in the form of suspended solid particles (microparticles, fibers) / Inorganic dust, with silicon dioxide content in %: - 70-20 (chamotte, cement, etc.) | 0,96706 | 0,96689 |
| 03000/ 323 | Substances in the form of suspended solid particles (microparticles, fibers)/ Amorphous silicon dioxide (Aerosil-175) | 0,00322 | |
| 16000/ 343 | Fluorine and its compounds / Fluorides are well soluble | 0,01012 | |
| 16000/ 344 | Fluorine and its compounds / Fluorides are poorly soluble | 0,00514 | |
| 16000/ 342 | Hydrogen fluoride / Hydrogen fluoride | 0,00230 | |
| 11000/ 2752 | Non-methane volatile organic compounds / White spirit | 0,55529 | 0,49229 |
| 04001/ 11815 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | 0,85404 | 0,84392 |
| 05001/ 330 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | 0,10264 | |
| 11000/ 2754 | Non-methane volatile organic compounds (NMVOCs) / Hydrocarbons saturated | 0,10954 | 0,10948 |
| 11007/ 1401 | Acetone | 0,00119 | – |
| 11009/ 1210 | Butyl ether of acetic acid | 0,00055 | – |
| 11041/ 621 | Toluene | 0,00285 | - |
| 06000/ 337 | Carbon oxide | 0,04393 | |
| 03004/ 328 | Soot | 0,17000 | |
| ***Total stationary sources, without greenhouse gases*** | | ***5,10956*** | ***4,81900*** |
| 07000/11812 | Carbon dioxide | 80,26436 | |
| 12000/ 410 | Methane | 0,00328 | |
| 04001/ 301 | Nitrogen(1)oxide(N2O) | 0,00274 | |
| ***Total greenhouse gases*** | | ***80,27038*** | |
| *Mobile emission sources* | | | |
| 04001/ 301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | 14,92565 | 14,91715 |
| 04003/ 303 | Ammonia | 0,00018 | 0,00018 |
| 05001/ 330 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | 1,95802 | 1,95726 |
| 13101/ 703 | Benz(a)pyrene | 0,01440 | 0,01439 |
| 11000/ 2754 | Non-methane volatile organic compounds (NMVOCs) / Hydrocarbon limit values | 4,87950 | 4,87264 |
| 06000/ 337 | Carbon oxide | 24,45994 | 24,41504 |
| 03004/ 328 | Soot | 1,71418 | 1,71367 |
| ***Total mobile sources, without greenhouse gases*** | | ***47,95187*** | ***47,89033*** |
| 07000/11812 | Carbon dioxide | 1534,76942 | 1533,71125 |
| 12000/ 410 | Methane | 0,13927 | 0,13911 |

| | | | |
|---|---|---|---|
| 04001/ 301 | Nitrogen(1)oxide(N2O) | 0,05498 | 0,05495 |
| ***Total greenhouse gases*** | | ***1534,96367*** | ***1533,90531*** |

According to the information in Table 1.5.1.2. total emissions of suspended particles, undifferentiated by composition, are: for technical alternative 1 - 2.35123 t; for technical alternative 2 - 2.25308 t. Under suspended particles, undifferentiated by composition is understood the sum of pollutants, which by the order of the Ministry of Ecology and Natural Resources of Ukraine of March 14, 2002. N 104 [37] are included in the list of solids: inorganic dust, with silicon dioxide content in %: - 70-20 (chamotte, cement, etc.), inorganic dust with silicon dioxide content in %: - above 70 (dinas, etc.), amorphous silicon dioxide (Aerosil-175), soot, paint aerosol.

Parameters of pollutant emission sources of the planned activity during preparatory and construction works taking into account variants of the adopted technical alternatives 1,2 are given in Annex 7. General plan of the River port (terminal) with the drawing of the sources of pollutant emissions of the planned activities (construction) is attached. (Drawing 2).

***Assessment of discharges and sources of surface water pollution during preparatory and construction works***

The impact on the water environment during construction is due to the proximity of the site of the planned activities to the water body (Danube River) and may be manifested as a result of:

- deposition of emissions of suspended particles, not differentiated by composition, on the open surface of the water body during earthworks, pouring and storage of loose building materials;
- increase in surface water turbidity due to the transition of the finely dispersed bottom soil component to a suspended state and its loss during dredging;
- pollution of surface water in case of an accident, in particular, accidental spillage of oil products and their entry into the water body.

The total volume of emissions of suspended particles, undifferentiated by composition, is determined according to the information in Table 1.5.1.2. of this report and is: for technical alternative 1 - 2.35123 t; for technical alternative 2 - 2.25308 t. Taking into account that the area of the water surface of the Danube River within the area accepted for the calculation of dispersion (a square with a side of 2 km) is 24,25%, we assume that after dispersion in the atmosphere to surface waters 24.25% of suspended particles not differentiated by composition are deposited, namely: for technical alternative 1 - 0.57017 t; for technical alternative 2 - 0.546372 t (given as estimates).

The impact of dredging works on the aquatic environment is estimated by gross discharges of suspended substances in the Danube River, the quantitative values are determined by the calculation and balance method in accordance with the Methodological instructions for calculating payments for unorganized discharge of pollutants into water bodies, 1998, using coefficients from DSTU B D.2.2-1:2012[51].

During dredging operations, the main source of suspended substances entering the surface water body is the process of dewatering the bottom soil at the site of the coastal dump, while suspended substances are carried to the surface waters of the Danube River together with water, which leads to an increase in the concentration of suspended substances in the surface water. The volume of suspended solids discharged with water into the surface waters of the Danube River is

estimated to be 281,344 t, the negative impact on the surface waters of the Danube is compensated by the payment to the local budget of the environmental tax for the discharge of pollutants in the amount of UAH 31 189,80.

According to the calculations, the maximum length of the turbidity plume reaches 69,23 m, the maximum time for the water environment to return to the standard state is – 1,0 hours.

Calculation of indicators of impacts of dredging on the state of surface waters is given in Annex 6, Calculation of tax liability for environmental tax levied for environmental pollution during dredging - Annex 7.

To reduce the likelihood of an emergency situation that could lead to surface water pollution, the following measures have been taken at the construction site:

- arrangement of places for assembly of construction materials and parking of construction equipment outside the water protection zone of the surface water object;
- shelter of loose construction materials during transportation and storage, moistening during use (if possible);
- localization of areas where spreads and spills are inevitable;
- compliance with the rules of operation of construction machinery and motor vehicles, control of their technical condition;
- storage of equipment on pallets (temporary, for the construction period);
- cleaning of the construction site with moistening of roads where freight transport and construction equipment move;
- installation on the construction site of posts for localization and liquidation of oil pollution, equipped with appropriate tools and a stock of sorption materials.

Limiting conditions for minimizing the impact on the aquatic environment are also established for hydraulic engineering that carries out dredging works:

- use of technically serviceable mechanisms and watercraft equipped with closed systems for the accumulation of blige water;
- the use of water-based lubricants in the bearings of weight drives, special ropes that do not require lubrication;
- transfer to specialized organizations of used oil products, oil-containing and sanitary wastewater, household waste of the technical fleet;
- availability of a constant supply of sorbents on board: sand, biodestructor of the "Econadine" type;
- organization of fuel bunkering operations with the involvement of specialized refuelers, use of integral certified oil product supply hoses.
- tightness of pipelines for hydraulic transport of pulp, tightness and ease of overlapping of valves and other locking devices;
- termination of work in the water area in case of disturbance with a wave height of 3% probability up to 1.0 m; wind force up to 20 m/s; ambient temperature up to -5$^0$C.

***Assessment of sources of soil and subsoil pollution during preparatory and construction works.***

The impact on the soil is due to the execution of earthworks and can be manifested as a result of:

- vertical planning of the construction site;
- soil development during the construction of pits for the foundations of buildings and structures and during dredging works;
- storage of bottom soils in a coastal dump;
- storage of waste in violation of regulatory conditions for their storage;
- soil contamination in the event of an accident, in particular spillage of petroleum products, spreads of building materials and mixtures.

The planned activities are not related to the removal of fertile soil layer, since the fertile layer is actually absent. According to the results of engineering and geological surveys, the top layer is mainly composed of sands with silty layers. Laboratory testing of the soils showed that they are poor in nutrients (Measurement Protocol - Appendix 3).

During the engineering preparation of the construction site and territory planning, the soil in the volume of 79633.405 $m^3$ is subject to removal, the area of the territory is 19.0 hectares, during dredging - 112.0 $m^3$ of bottom soil on the area of 2.32 hectares with its transfer to the coastal alluvium map with area of 1.24 hectares.

As a result of dredging works, there will be a change in the topography of the bottom, which can be considered as an impact on the geological environment. However, the dredging works are aimed at the capital construction of a hydrotechnical structure, the depths of which are 8.23 m from the "0" of the Izmail seaport and do not exceed the passage depths of the existing shipping channel of the Danube River, as announced by the resolution of the Cabinet of Ministers of Ukraine dated February 9, 2022. No. 136 "On approval of the List of inland sea waters and inland waterways classified as navigable."[28].

To assess the bottom soils as a possible source of contamination of local soils in the area of the coastal dump, the laboratories of "NIBULON" LLC (Certificate of recognition of capacity - Annex 3) conducted a set of studies to determine the fertility indicators and detect anthropogenic contaminants of organic and inorganic nature in the bottom and local soils: hydrogen index, units. pH; mass fraction of organic matter, %; exchangeable ammonium in terms of ammonium nitrogen, mg/kg; nitrates in terms of nitrate nitrogen, mg/kg; sulfates, mg/kg; phosphorus, mg/kg; oil products, microgram/kg; lead, mg/kg; cadmium, mg/kg; copper, mg/kg; zinc, mg/kg; manganese, mg/kg; mercury, mg/kg; iron (mobile forms), mg/kg. As a background, a sample of local soil, taken at the site planned for the organization of maps of the coastal dump, was examined according to the same indicators. Measurement protocols – Appendix 3.

The storage of bottom soil in a coastal dump will not lead to contamination of local soils, as the results of research on selected bottom soil samples have determined:

- bottom soils are ecologically safe and do not contain significant amounts of man-made pollutants of organic and inorganic origin;
- the content of pollutants in bottom soils at the site of their development is at the background level (soil at the site of the coastal dump);

- bioaccumulation and formation of poorly soluble compounds fully corresponds to natural processes occurring in water bodies;
- the substrate has a slightly alkaline reaction.

Information on the types and quantities of waste generated during the preparatory and construction works, as well as environmentally safe ways of their management are given in Table 1.5.1.1. of this report.

***Assessment of sources of impact on flora and fauna during preparatory and construction works.***

Planned activity is carried out on the coast of the Danube River and in its water area in the industrial zone of Izmail City with rich coastal infrastructure and intensive shipping. Land category is industrial lands, transport, communications, energy, defense and other purposes.

In the considered area, the following companies conduct their production activities: Service Station "BLAZ", SE "Izmail Sea Trading Port", Izmail Cannery, PJSC "Ukrainian Danube Shipping Company", SE "Administration of Sea Ports of Ukraine", Fish Processing Plant "Danube" LLC, SE " Danube Blaz" LLC.

The land plot on dry land is free from buildings and overgrown with self-seeding green plants. According to the order No. 22 dated April 13, 2022 of the Department of Housing and Municipal Service of Izmail district of Odesa region, the composition of the commission regarding the removal of green spaces in Izmail City was approved. According to the results of the commission's survey, 841 trees and 740 bushes, which are dangerous, defective, and withered, are subject to removal in the area of the planned activity. According to the act, the replacement value of the green areas to be demolished is UAH 10542,36. (Act No. 54 of April 20, 2022, inspection of green areas to be removed).

The planned activity envisages the organization of green areas on an area of 7.2 hectares, which is 38% of the total territory of the Port. The planned costs for landscaping are considered a compensatory measure.

Taking into account the industrial saturation of the area of the planned activity, it can be predicted that the area is not favorable for the development of flora and fauna and the life activities of their representatives, there are no objects of the nature reserve fund.

The impact of the planned activity on possible representatives of flora and fauna can be manifested through pollution of atmospheric air, water and soil. During the construction, this impact is limited by the location and time of the construction works and is minimized by means of the implementation of protective measures, the description of which is presented in the relevant sections of this report.

Dredging works are a potential source of influence on hydrobionts of the Danube River, however, the water area of the Danube basin in the area from 91.09 to 91.55 km in length and width from the coastline to the border of the «Vylkove - Izmail *Ceatal»* shipping channel, where the dredging work is planned, is classified as the water area of the Izmail seaport (resolution of the Cabinet of Ministers of Ukraine dated June 10, 2009 No. 1208).

Taking into account the location of planned activity, as well as being guided by the provisions of the resolution of the Cabinet of Ministers of Ukraine of May 22, 1996 No. 552 "On Approval of the List of Industrial Plots of Fishery Water Bodies (parts thereof)", this territory, as a *hydrotechnical structure and a place of intensive navigation (ports, shipping lanes)* is not an industrial area of the Danube River basin.

Dredging leads to a deterioration in the living conditions of the ichthyofauna and aquatic biocenoses (loss of fish products) due to the spread of turbidity in the water volume of 2481.2 $m^3$, the

destruction of the forage base (zoobenthos, plankton) in the amount of 0.0053 240044 tons, the loss of hard roe and juvenile fish 0.240044 tons.

The assessment of the impact of hydrotechnical works on the state of ichthyofauna and aquatic biocenoses was carried out on a contractual basis by the *Institute of Fisheries and Marine Ecology* (IFME) [64] - Scientific and biological justification, Appendix 8.

According to the results of the calculations, the amount of compensatory measures for the fishing industry in terms of value is UAH 23,662.67 without VAT, provided that dredging works are carried out in the non-spawning period. Compensatory funds are directed for their further usage in carrying out activities for the reproduction of fish stocks in the Danube River.

***Assessment of noise pollution during preparatory and construction works***

A significant amount of anthropogenic noise, some of which a person does not even hear, negatively affects his well-being and health. Basically, these noises arise during the operation of machines and mechanisms. The sensation of noise depends not only on the sound pressure level, but also on the spectral composition of harmonic oscillations, taking this into account the following octave bands of average geometric frequencies are 63, 125, 250, 500, 1000, 2000, 4000 and 8000 Hz.

Sources of noise during construction and installation works are cargo vehicles; construction cranes and towers; bulldozers, graders, excavators; diesel grinder; construction equipment (compressors, diesel generators, jackhammers) and hydraulic equipment.

Production noise and vibration on dredges are specific working conditions regulated by sanitary regulations on water transport. During the operation of the dredger, the noise level from its mechanisms at a distance of 3 m should not exceed 85 dB, which is within the limits of permissible noise loads.

The planned activity envisages the usage of mechanisms that have sanitary and hygienic certificates for usage in the declared area. Their technical condition, including noise characteristics, is periodically checked for compliance with permissible standards during technical inspections and certificates.

In order to assess the noise impact during the construction of the River Port, a control point, located north of the facility, was adopted at the border of the residential development.

The noise calculation was performed in accordance with the State Building Standards (SBS) V.1.1-31:2013 "Protection of Territories, Buildings and Structures from Noise" [50]. The calculation is based on the assumption of simultaneous operation of all noise sources, which, compared to the actual situation, is the worst of the construction work conditions. Calculations are given in Appendix 9.

According to the results of the calculation, the maximum total equivalent sound level does not exceed the permissible sound level at the border of the residential area at night is 45 dBA and is:

- for technical alternative 1 – 42.76 dBA,
- for technical alternative 2 – 41.76 dBA.

***Assessment of sources of vibration, electromagnetic, light, heat, and radiation impact during preparatory and construction works.***

***- vibration pollution*** - the sources of vibration are engines of construction machines and mechanisms. The vibration levels of the equipment used in construction and installation works do not exceed the permissible normative values, according to the requirements of SSN 3.3.6.039-99 "State Sanitary Norms (SSN) of industrial general and local vibration". At the border of the nearest residential building, the vibration level is defined as "absent" according to sanitary and hygienic standards.

***- electromagnetic radiation*** – during construction works, sources of radiation are electric

welding devices and electric generators installed on construction equipment. The voltage of these electrical installations is lower than 330 kV, therefore the intensity of their electromagnetic radiation does not affect the health of people who are within the radiation field.

On watercraft, one of the largest sources of electromagnetic radiation (EMR) are radio transmitters. Research results show that the effect of the biological impact of EMR of radio waves depends not only on the intensity and frequency of the field but also on its duration. Thus, radio frequency EMR in populated areas is a harmful physical factor and is subject to regulation.

When performing construction works, the impact of sources of electromagnetic radiation on the population is permissible and does not exceed the permitted limits under conditions of:

- Usage of radio transmitters with appropriate sanitary and hygienic certificates.
- Performance of periodic inspections of the technical condition of radio transmitters for compliance with permissible standards, technical inspections, and certificates by the Register of Shipping;
- Of the short-term and local impact.

***- radiological pollution*** – building materials used in the implementation of construction works are necessarily subject to radiation contamination control, as a result of which the building material supplier is issued a document on the radiation quality of the supplied building material.

Upon commissioning of the completed facility, the final radiation control of the facility is provided.

***- light and thermal pollution***. There are no sources of potential light and thermal pollution during construction works.

### *1.5.2. During the implementation of the planned activity*

The object of the planned activity affects the components of the natural environment, in order to conduct an environmental and economic assessment of the impact of its production, the following are determined:

- types and amount of waste generation and conditions of their handling;
- sources of emissions, types of pollutants emitted into the atmosphere air, and their volumes;
- sources of pollution of the aquatic environment, estimated volumes of discharges of pollutants into a surface water body;
- sources of soil and subsoil pollution;
- sources and types of influences on flora and fauna, including on the state of ichthyofauna and aquatic biocenoses;
- sources of noise, vibration, light, heat, and radiation exposure with appropriate calculations.

***Assessment on types and amount of waste generation under the implementation of planned activity***

The volumes of waste generation of the planned activity according to the calculations are:

Code 1561.2.9.04 «Grain Residues after the Grain Cleaning»

- with a content of grain> 2% (by product) – formed as a result of the cleaning of grain crops in the separator (broken, crushed, feeble grain that has passed through the holes of the sieve), is collected

in the waste bins provided for in the technological process, with subsequent removal to another unit for use in the production of compound feed.

The planned volume of by-product formation was determined with using the "Temporary methodology for calculating planned indicators for the protection of atmospheric air of grain processing enterprises and elevators":

$$M = N \cdot (K_2 - K_3) = 50000 * 2,5 * 10^{-2} = 1250 \text{ t},$$

where: N = 50000 t/year – plan of grain crop cleaning;

$K_2$ = 4,5% - an average foreign matter of grain at the input to separator according to the laboratory;

$K_3$ = 2,0% – allowable foreign matter of grain according to international contracts;

- with a content of grain< 2% (aspiration dust) –is formed as a result of cleaning the air aspirated from the technological equipment in the dust cleaning equipment. The existing technological scheme does not provide for the extraction of grain (aspiration) dust from the technological process, the collected dust in the dust cleaning equipment is returned to the product. The annual production volume of 1140.2887 tons is given as an estimate based on the data in table 1.6.2.1 and as waste is not taken into account.

Code 7740.3.1.07 Another equipment (incl. for the scientific researches, printing, office) spoiled, used, nonrepairable

The use of light-emitting diode (LED) lamps, which are a modern economic and ecological alternative to fluorescent lamps, is provided for the lighting of premises, technological facilities and the territory. These lamps do not contain dangerous components (mercury, lead, etc.) and their handling does not require special disposal. Light-emitting diode (LED) lamps are not included in the state waste classifier (DK 005-96).

Volume of waste generation of LED lamps per year:

$$M = N \times m \times 10\text{-}3 = 482 \times 0,10 \times 10\text{-}3 = 0,048 \text{ t/year},$$

where:

m = 0,10 kg – average weight of one lamp;

N = n × T/ K= 1100*8765/20000 = 482– the amount of used lamps, (pcs),

where:

n – total amount of installed lamps, (pcs);

K - standard service life of one lamp (according to passport), (hours);

T – duration of work of one lamp, (hours/year).

Code 7730.3.1.06. «Wiping materials – spoiled, used or dirty (oiled clothes), formed during the work of the maintenance team.

Volume of generation per year:

$$M = N \times k = 0,02*6 = 0,120 \text{ t/year},$$

where $N$=0,020 t – standard of wiping materials generation for one worker who performs repair work according to TNTD 09-92 (Temporary norms of the technical design of machine-building enterprises);

$k$ = 6 – number of workers in the maintenance team.

Code 7710.3.1.08. «Ferrous steel scrap small-size and other», formed during the replacement of equipment and its particles.

Volume of generation per year:

$$M = (m \times k) + n = 8 * 0,2 + 4,5 = 6,100 \text{ t/year},$$

where $k$ = 20% generation of waste from metal consumption according to TNTD 09-92 (Temporary norms of the technical design of machine-building enterprises);

$m$ = 8 t – planned volume of metal or spare parts that are processed;

$n$ = 4,5 t – planned volume of writing-off of metal structures.

Code 7710.3.1.07 Used metal containers including small-size (tin cans etc.), except for waste of containers formed during the transportation

Metal containers after paint are formed as a result of painting work of technics and repair of premises. DSTU GOST 30766:2003 Metal cans for chemical products. General technical terms (GOST 30766-2001, IDT)

The volume of waste is calculated by formula:

$$M_i = p / S * N * n = 0,300 / 0,003 * 0,0002 = 0,020 \text{ t/year}$$

where: p - needs for paints – 0,300 t/year;

S – net weight of one can of paint – 0,003 t;

N- weight of empty can – 0,0002 t

Code 7730.3.1.05 Filter materials spoiled, used or dirty formed during the cleaning of dusty air at dust cleaning equipment.

Volume of generation per year:

$$\Sigma M_i = (m_i \times \kappa_s) = 0,0005 * 330 = 0,165 \text{ t/year}$$

where $M_i$ – weight of used filtering sleeves;

$m$ = 0,0005 t – weight of one used filtering;

$\kappa_s$ = 330 pcs. – amount of the installed sleeves.

Code 7740.3.1.04 Electronic equipment for general use spoiled, used or nonrepairable.

The maximum standard of generation of electronic equipment for general use spoiled, used or non-repairable is determined by the experience of operation, the weight of unit of deactivated equipment is determined by weighing. DSTU EN 50564:2016 «Electric, electronic and office equipment. Measuring of low energy consumption» $M = 0,200$ t/year.

Code 2820.2.1.01 «Fillings and turning chips of ferrous metals formed from the process of their formation (incl. hammer work, welding, pressing, drawing, turning work, cutting and filing)» formed during the operation of lathe.

Volume of generation per year:

$$M = m \times k = 2 * 0,2 = 0,400 \text{ t/year},$$

where $k$ = 20% generation of waste from metal consumption according to TNTD 09-92 (Temporary norms of the technical design of machine-building enterprises);

$m$ = 2 t – planned volume of metal that is processed on lathe.

Code 2820.2.1.20 «Waste obtained in welding processes» (welding rod stubs), formed during the repair work. Annually volume of generation according to TNTD 09-92 (Temporary norms of the technical design of machine-building enterprises) is 10% of yearly usage of rods:

$$M=0,1\times E_{year}= 0,25*0,1=0,025\ t/year$$

where $E_{year}$ = 0,250 t – yearly usage of rods.

***Waste of transport***

At the river port, it is planned to anchor five units of transport: ZIL (fire truck), a GAZ truck, a minibus, two passenger cars and auxiliary equipment - a Volvo–L20 loader, a TEREX FUCHS hydraulic machine.

To calculate the amount of waste, the generation of which is expected during the operation and maintenance of transport, the following models are adopted: ZIL 433362 (firefighting); minibus BAZ A079 (Etalon); GAZ 3309; passenger cars ZAZ TF 69 YO and Skoda Oktavia; VOLVO L20 loader, TEREX FUCHS hydraulic machine.

Code 6000.2.9.04 «Damaged or waste lead batteries»
Volume of generation per year:

$$\Sigma M_i = (m_i \times k_{bat})i,$$

where $M_i$ – weight of used batteries from one vehicle, t;
$m$ – weight of battery (depending on type 6CT90; 6CT60; 6CT75), t;
$K_{bat.}$– number of batteries of the same type on the vehicle, pcs

Code 6000.2.8.10 «Oils and engine lubricants, transmission oils, other spoiled or used lubricant oils».

The volume of formation per year: $\Sigma \quad M_i = 0,9 \times V_i \times \left(\frac{N_i}{n_i}\right)$,

where $M_i$ – is formed per year from one vehicle, t;
0,9 $m^3$/t– specific weight of used oil;
$V_i$ – the volume of used oil, which is drained during technical maintenance, $m^3$;
$N_i$ – planned vehicle mileage, km (engine hours);
$n_i$ – mileage of the vehicle before undergoing maintenance (for cars – 10000 km, for a loader 350 engine hours, for a hydraulic machine – 3000 engine hours).

Code 6000.2.9.22 «Transportation waste, not otherwise specified» (used oil and fuel filters).

The volume of formation per year: $\Sigma \ M_i = m_i \times \boldsymbol{k_i} \times \left(\frac{N_i}{n_i}\right)$,

where $M_i$ – the weight of used filters that are produced per year from one vehicle, t;
$m_i$ – the weight of one filter of the vehicle;
$k_i$ – the number of filters in one vehicle;
$N_i$ – planned vehicle mileage, km (engine hours);
$n_i$ – mileage of the vehicle before undergoing maintenance (for cars – 10000 km, for a loader 350 engine hours, for a hydraulic machine – 3000 engine hours).

Code 6000.2.9.22 «Transportation waste, not otherwise specified» (used air filters).

The volume of formation per year: $\Sigma M_i = m_i \times \left( \frac{N_i}{n_i} \right)$,

where $M_i$ – the weight of used air filters that are produced per year from one vehicle, t;

$m_i$ – the weight of one air filter of the vehicle, t;

$N_i$ – planned vehicle mileage, km (engine hours);

$n_i$ – mileage of the vehicle before undergoing maintenance (for cars – 10000 km, for a loader 350 engine hours, for a hydraulic machine – 3000 engine hours).

Code 6000.2.9.03: «Tires damaged before an operation, used, damaged, or contaminated during operation».

The volume of formation per year: $\Sigma M_i = \kappa_i \times m_i$,

where $M_i$ – a mass of tires that are formed from one vehicle, t;

$\kappa_i$ – the number of running wheels on each vehicle, pcs.;

$m_i$ – a mass of one tire on each vehicle, t;

Tire write-off is associated with exceeding its actual mileage (operating time) in comparison with the operating norm of the average resource, which is approved for each vehicle by the order of the Ministry of Transport of Ukraine dated 20.05.2006 No. 488.

Code. 6000.2.8.17 «Bilge oils from shipping, spoiled or used», is formed during the operation of mechanisms and equipment installed on ships and is a water-oil mixture.

The volume of formation per year: $N = q \times p_l$,

where $q = 600\ m^3$ – the total annual amount of blige water produced by the company's vessels (based on operational experience);

$p_l = 0{,}98\ t/m^3$ – density of liquid waters

The volumes of waste formed during the operation and technical maintenance of vehicles are summarized in Table 1.5.2.1.

Table 1.5.2.1.

| Name of waste according to DK 005-96 | The volume of generated waste from transport, t/year | | | | | | |
|---|---|---|---|---|---|---|---|
| | ZIL (fire truck) | Minibus | VOLVO L20 | GAS | ZAZ | Skoda | In total: |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Damaged or waste lead batteries, code 6000.2.9.04 | 0,035 | 0,020 | 0,035 | 0,028 | 0,024 | 0,024 | 0,166 |
| Oils and engine lubricants, transmission oils, other spoiled or used lubricant oils, code 6000.2.8.10 | 0,023 | 0,018 | 0,116 | 0,013 | 0,022 | 0,013 | 0,205 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Transportation waste, not otherwise specified (used oil and fuel filters), code 6000.2.9.22 | 0,001 | 0,003 | 0,006 | 0,001 | 0,003 | 0,003 | 0,018 |
| Transportation waste, not otherwise specified (used air filters), code 6000.2.9.22 | 0,001 | 0,002 | 0,003 | 0,001 | 0,002 | 0,002 | 0,009 |
| Tires damaged before an operation, used, damaged, or contaminated during operation, code 6000.2.9.03 | - | 0,050 | - | 0,162 | 0,024 | 0,028 | 0,264 |
| Bilge oils from shipping, spoiled, or spent. (bilge waters) code 6000.2.8.17 | - | - | - | - | - | - | 588,0 |

Code 6000.2.8.07. «Hydraulic oils spoiled or used», are formed during the maintenance of TEREX FUCHS truck loaders and hydraulic machines.

The volume of formation per year (t): $M = V \times \rho \times k \times n$,

where $\rho$ = 0,9 t/m$^3$ – specific weight of used oil;

$V$ = 0,5 m$^3$ – the volume of the hydraulic system of one car unloader, 0,69 m$^3$ – the volume of the hydraulic system of one hydraulic machine;

$n$ = 3 units – the number of car unloaders, 2 units – the number of hydraulic machines;

k – number of technical maintenance, twice a year.

The volume of oil formation from technological equipment and mechanisms is summarized in table 1.5.2.2.

Table 1.5.2.2.

| Name of waste according to DK 005-96 | The volume of generated waste, t/year | |
|---|---|---|
| | Car unloader | Hydraulic machine TEREX FUCHS |
| «Hydraulic oils spoiled or used» code 6000.2.8.07 | 2,700 | 2,484 |

Code 6000.2.9.17 «Residues from cleaning storage tanks containing petroleum products». It is formed when oil products are stored in containers. According to the technical regulations, cleaning is carried out once every 2 years.

The volume of formation per year (t):

$$M=V\times k = 1950*01/100 = 1,950 \text{ t/year},$$

where V= 1950 t/year – the planned amount of fuel passing through the gas station;

k = 0,1% – amount of oil sludge per 1m$^3$ of fuel.

Code 6000.2.9.22 «Transportation waste, not otherwise specified» (oiled sand), Formed at repair stations during the liquidation of emergency oil spills.

The volume of formation per year is accepted based on the experience of operation.

Code 6000.2.8.20 «Sludge of oil traps», is formed during the maintenance of the installations for surface wastewater treatment (petroleum product separator).

The volume of formation per year: $M = \frac{Q_p \times (K_{entr} - K_{exit})}{1000000}$,

where $Q_p$ = 51 602,01 m$^3$/year – the estimated volume of surface runoff, which is formed as a result of precipitation, snowmelt, and the implementation of watering and washing works; (calculation-Appendix 4);

$K_{entr.}$ = 70 mg/l – the average concentration of pollutants at the entrance to the storm sewer system according to the Rules of Control of the Drainage of Rain and Snow Wastewater from the Territories of Cities and Industrial Enterprises (DSTU 3013-95[53]);

$K_{exit}$ = 0,05 mg/l – the average concentration of oil products at the outlet of treatment facilities according to the passport characteristics of the manufacturer of local treatment facilities (information in subsection 1.5.2 of this report, table 1.5.2.7).

Code 9030.2.9.05. «Sludge from municipal wastewater treatment» – solid inclusions of inorganic and organic origin (sand, earth lumps, fallen leaves, grain husks), carried away by rainwater from the territory of the enterprise, are formed during the maintenance of the rainwater drainage system (cleaning of rain receivers, wells, and sewage pumping stations – once every two years) and can be used for filling and leveling the territory

The volume of formation per year: $= \frac{Q_p \times (K_{entr} - K_{exit})}{1000000}$,

where $Q_p$ = 51 602,01 m$^3$/year – the estimated volume of surface runoff, which is formed as a result of precipitation, snowmelt, and the implementation of watering and washing works;

$K_{entr}$ = 200 mg/l – the average concentration of suspended solids at the entrance to the storm sewer system for the territory with a high level of landscaping and regular mechanized wet cleaning (table. 1.5.2.7);

$K_{exit}$ = 5 mg/l – the average concentration of suspended solids at the outlet of treatment facilities according to the design characteristics of the VOC manufacturer (information in subsection 1.5.2 of this report, table. 1.5.2.7).

Sludge handling depends on the content of oil products in their composition, which is determined by an accredited laboratory. When a significant amount of oil products is detected, the batch of sludge is treated with the sorbent-biodestroyer "Econadin", which oxidizes hydrocarbon oils to water and carbon dioxide. Sludge treated with an adsorbent can be placed at a local landfill or used for the enterprise's own needs. Handling sludge in this way is ecologically reasonable and ensures environmental protection.

Code 9010.2.9.04 Fly ash – is formed by burning briquettes in solid fuel boilers and solid household waste from ships in an incinerator

$M = M_1 + M_2 = N_1 \times k_1 + N_2 \times k_2 = 414,74 \times 0,01 + 6,500 \times 0,07 = 4,150 + 0,455 = 4,605 t/year$

where $M_1 = N_1 \times k_1 / 100$ – the weight of ash from burning briquettes in solid fuel boilers of Port, t;

$N_1$ = 414,74 t/year – annual volume of burning briquettes;

$k_1$ = 1%, ash coefficient when burning briquettes;

$M_2 = N_2 \times k_2 / 100$ – the weight of ash when burning solid waste from ships in the incinerator, t;

$N_2 = n \times m \times z \times q/1000 = 1,215*10*5*107 = 6,500$ *t/year* – the annual amount of shipboard

solid waste that is subject to incineration;

$n$ = 10 – number of crew members;

$m$ = 1,215 kg/day – the rate of generation of household waste per 1 crew member, determined on the basis of the «State sanitary rules for river vessels of Ukraine DSP 7.7.4.048-99» [50], approved by the resolution of the Chief State Sanitary Inspector of Ukraine No. 48 dated 12.01.1999;

q = 5 days – voyage duration;

z = 107 – number of vessel calls;

$k_2$ = 7% – ash coefficient during waste incineration.

Code 7710.3.1.11 «Organic kitchen waste which is suitable for composting»

The volume of formation per year is determined on the basis of the «Rules for providing services for the removal of household waste», approved by the Resolution of the Cabinet of Ministers of Ukraine No. 1070 dated 10.12.2008. [24]

$$N = n \times m /1000 = 248,2*18 = 4,468 \text{ t/year},$$

where $n$ = 18 seats – the number of seats in the dining room;

$m$ = 248,2 kg/year – rate of formation waste for 1 seat.

Code 7720.3.1.01. «Municipal (urban) mixed waste, including trash from bins» – consists of waste generated at the object of the planned activity

$$N = n_1 \times m_1 + n_2 \times m_2 = 0,075*100 + 0,005*48000 = 247,5 \text{ t/year},$$

where N – volume of waste generation per year, tons;

$n_1$ = *100 people* – the number of employees;

$m_1$ = *0,075* t – the annual amount of household waste per employee is determined on the basis of the «Rules for the provision of household waste removal services» approved by the Resolution of the Cabinet of Ministers of Ukraine No. 1070 dated 10.12.2008. [24];

$n_2$ = 48000 $m^2$ – yard area to be cleaned;

$m_2$ = 0,005 t/$m^2$ – the standard for the generation of yard waste is determined on the basis of the «Rules for the provision of household waste removal services», approved by the Cabinet of Ministers of Ukraine No. 1070 of 10.12.2008. [24]

Chemical wastes and containers from them are not generated, since the production laboratory of the river port (terminal) does not use chemical materials in its activities, and waste containers from fumigants are the property of quarantine units that, under contractual conditions, provide services for fumigation of grain cargoes in the holds of ships, moored at the port berths, and upon completion of the works, they are removed from the Port territory together with other property.

As a result, it was established that during the implementation of the planned activity, the estimated volume of waste generation is:

- industrial waste – 1875,763 t/year, including by hazard classes: Ist hazard class – 0.0 t/year; II hazard class – 7,505 t/year; III hazard class – 591,892 t/year; IV hazard class – 1276,366 t/year;
- household waste – 247,500 t/year.

Operation of the object of planned activities is connected with generation of 23 types of waste that must be accounted by form №1-VT "Accounting of waste and packaging materials and containers" in compliance with the Instructions for its filling, approved by the order of the Ministry

of Environmental Protection of Ukraine dated 07.07.2008. No. 342 [38]. For each type of waste, technical passports must be formalized containing data on the name, place, conditions, and volumes of waste generation, its technical, physical and chemical, technological, ecological, economic, and other indicators, control methods, as well as information on existing and possible technologies for processing, storing, transporting, utilizing or removing this waste.

Information on the waste generation object (hereinafter referred to as the WGO) is submitted to the authorized body in the form of appropriate registration cards in the form approved by the order of the Ministry of Environmental Protection and Nuclear Safety of Ukraine dated February 17, 1999 No. 41 [35], and in the manner approved by resolution of the Cabinet of Ministers of Ukraine dated August 31, 1998 N 1360 [25].

The planned activities provide for the arrangement of places for the collection and temporary storage of industrial and household waste, the creation of conditions for environmentally safe storage of waste according to their type, aggregate state, and hazard class:

I class (extremely dangerous) - hermetically sealed containers;

II class (highly dangerous) – closed metal drums that prevent spread of the harmful substances (ingredients);

III class (moderately dangerous) – metal drums and polypropylene bags that provide the localized storage, allow to do loading-unloading and transport works and exclude the spread of harmful substances in the environment;

IV class (low-dangerous) – metal containers on the industrial site or in the warehouse.

As the waste accumulates, it is transferred to specialized enterprises under signed contracts for disposal or placement.

The results of calculations and information on waste generated during the operation of the object of the planned activities are summarized in Table 1.5.2.3.

Table 1.5.2.3.

| Waste name according to DK 005-96 | Hazard class | Estimated volume of formation, t | Chemical (in percentages of components or other measurement units) and morphological composition | Waste handling |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| 6000.2.9.04<br>Damaged or waste lead batteries | 2 | 0,166 | Lead and its compounds – 61.40; sulfuric acid ($H_2SO_4$) – 20.40; distilled water – 9.25; polyvinyl chloride – 2.0; polypropylene – 6.95 | Transfer to an organization with an appropriate license for disposal |
| 6000.2.8.10<br>Oils and engine lubricants, transmission oils, other spoiled or used lubricant oils | 2 | 0,205 | Hydrocarbons (aromatic, saturated) – 95.26%, ash (sulfates) – 1.3%, zinc – 0.12%, phosphorus – 0.09%, calcium – 0.23%, mechanical impurities – 1%, water – 2% | |
| 6000.2.8.07<br>Hydraulic oils spoiled or used | 2 | 5,184 | Hydrocarbons (aromatic, saturated) – 95.26%, ash (sulfates) – 1.3%, zinc – 0.12%, phosphorus – 0.09%, calcium – 0.23%, mechanical impurities – 1%, water – 2% | |
| 6000.2.9.17<br>Residues from cleaning storage tanks containing oil products | 2 | 1,950 | Hydrocarbons (aromatic, saturated) – 63.12%; mechanical impurities – 28.59%; water – 8.29% | |
| 6000.2.9.22<br>Transportation waste, not otherwise specified (used oil and fuel filters) | 3 | 0,0180 | Hydrocarbons (aromatic, saturated) – 45.55%, mechanical impurities – 0.47%, cellulose – 12.94%, iron – 37.21%, rubber – 0.26%, zinc – 2.63%, water - 0 .94%. | |
| 7730.3.1.06<br>Damaged, used, or contaminated wiping materials | 3 | 0,120 | Hydrocarbons (aromatic, saturated) – 25.0; mech. pollution – 20.0; cotton – 55.0 | |
| 6000.2.9.22<br>Transportation waste, not otherwise specified (oiled sand) | 3 | 0,144 | Hydrocarbons (aromatic, saturated) – 35.0; silicon oxide – 65.0 | |

| | | | | |
|---|---|---|---|---|
| 6000.2.8.20<br>Sludge of oil traps | 3 | 3,610 | Hydrocarbons (aromatic, saturated) – 7%, water – 30%, mechanical impurities – 63% | |
| 6000.2.8.17<br>Bilge oils from shipping, spoiled or used | 3 | 588,000 | Hydrocarbons (aromatic, saturated) -10.0; mechanical impurities -4.0; water - 86.0 | |
| 7740.3.1.07<br>Other equipment (including for scientific research, printing, and office) that is damaged, used, or unrepairable (LED lamps) | 4 | 0,048 | Non-disassemble construction: Non-flammable plastic -30.0; fiberglass -7.50; polymer material -44.0; gallium nitride LED -14.0; solid-state electronic component -1.50; tin solder - 0.50; copper wire -2.55 | Transfer to an organization with an appropriate license for disposal |
| 2820.2.1.20<br>Waste obtained in welding processes (welding rod stub) | 4 | 0,025 | Iron oxides (FeO, MnO, $Mn_2O_3$) – 5%, iron – 83.17%, carbon – 6.67%, silicon – 0.3%, chromium – 0.03%, nickel – 0.03%, manganese – 0.3%, mica–4.5%, liquid glass. | Implementation as scrap metal |
| 7710.3.1.08<br>Small ferrous metal scraps, other | 4 | 6,100 | Iron, iron oxides (Fe, FeO, Fe2O3 – up to 90%), carbon (C – up to 5%). Iron, which contains various impurities, is quickly covered with rust. Iron is an active metal, which dissolves in hydrochloric and sulfuric acids. | |
| 2820.2.1.01<br>Turning shavings and shavings of ferrous metals, formed from the processes of their formation (including forging, welding, pressing, drawing, turning processes, cutting, and sawing) | 4 | 0,400 | Iron, iron oxides (Fe, FeO, $Fe_2O_3$ – up to 90%), carbon (C – up to 5%). Iron, which contains various impurities, is quickly covered with rust. Iron is an active metal, which dissolves in hydrochloric and sulfuric acids. | |
| 7710.3.1.07<br>Used metal containers, including small ones (cans, etc.), except for container waste generated during transportation | 4 | 0,020 | Carbon – 0.1045; manganese – 0.475; silicon – 0.0285; chromium – 0.095; iron – 89,297; resin – 1.078; titanium dioxide – 3.100; white spirit – 0.822; paint residues – 5.0 | Transfer to an organization with an appropriate license for disposal |
| 1561.2.9.04 | 4 | 1250 | Organic substances (residues of grain, husks, | Use in the manufacture |

| | | | | |
|---|---|---|---|---|
| Grain residues from grain cleaning (dead kernel) | | | dust, stalk particles, spikes, cobs, etc.) ~ 98%, mineral impurities (sand, earth lumps, pebbles) ~ 2% | of compound feed. |
| 6000.2.9.03<br>Tires damaged before an operation, used, damaged, or contaminated during operation | 4 | 0,264 | Rubber 65- 85% (caoutchouc 56-57.3%, technical carbon 28.1-30.3%, stearic acid 0.8-1.4%, petroleum jelly 4.5-4.6%, rosin 2, 2-2.3%, paraffin 0.8%), metal cord 15-35% (iron 97.9-98.4%, carbon 0.7-0.74%, silicon 0.17-0.37% , manganese 0.4-0.7%) | Implementation as recycled material |
| 6000.2.9.22<br>Transportation waste, not otherwise specified (air filters). | 4 | 0,009 | Mech. pollutants – 10.0 ($SiO_2$, $Al_2O_2$); cardboard 30%. $(C_6H_{10}O_5\text{-})n$; plastic 40% $(\text{-}CH_2\text{-})n$; metal 20% | Transfer to an organization with an appropriate license for disposal |
| 7730.3.1.05<br>Damaged, used or contaminated filter materials | 4 | 0,165 | Polyester – 87.5; mech. pollution – 12.5 | |
| 9030.2.9.05<br>Sludge from municipal wastewater treatment | 4 | 10,062 | Inorganic substances (sand, earth) – 65%, water – 10%, organic substances (grain waste, etc.) – 25% | Placement at the local landfill after preliminary treatment with the "Econadine" |
| 7740.3.1.04<br>Damaged, used, or non-repairable general purpose electronic equipment | 4 | 0,200 | Thermoplastic – 68.80; fiberglass – 19.30; polymer material – 3.11; rubber – 5.12; iron – 3.03; aluminum – 0.08; copper – 0.56 | Transfer to an organization with an appropriate license for disposal |
| 9030.2.9.04<br>Fly ash | 4 | 4,605 | Silicon dioxin 11.55; aluminum oxide – 4.0%; iron oxide – 4%; calcium oxide – 44%; sulfuric anhydride – 6%; carbon dioxin – 30.5% | Placement at the local landfill |
| 7710.3.1.11<br>Organic kitchen waste which is suitable for composting | 4 | 4,468 | Fats – 60.0; moisture – 10.0; proteins – 10.0; polyethylene – 10.0; cellulose – 5.0; other – 5.0 | |

| | | | | |
|---|---|---|---|---|
| 7720.3.1.01<br>Municipal (urban) mixed waste, including trash from bins | 4 | 247,500 | Cellulose – 35; food waste – 21; textiles – 2; wood – 5; glass – 12; others – 19. | |

***Assessment by types and quantity of emissions during the implementation of the planned activity***

During the implementation, the planned activity is related to emissions of pollutants into the atmospheric air, which will be carried out by 109 sources, of which: 46 are stationary organized; 54 – stationary unorganized, 9 – mobile unorganized.

Such sources are:

- exhaust hoods of the bag filters (unloading points for railway wagons on two tracks), sources №№ 1− 5, 76 − 80;
- exhaust hoods of the bag filters (loading bunkers for road transport), source №6;
- exhaust hoods of intake pit filters (aspiration systems of unloading points for road transport), sources №№ 7 - 9;
- exhaust hoods of the bag filters (aspiration systems of collecting conveyor), sources №№ 10 - 16;
- exhaust hoods of the bag filters (aspiration systems of working grain cleaning tower), sources №№ 17 - 18;
- exhaust hoods of spot filters (overpass of shipment onto the water transport with two loading machines), sources №№19 -21, 99-105;
- ventilation openings of grain storages for 18 tanks with a volume of 5,5 thousand t each – sources №№ 22 - 39;
- 100 t/h grain-dryer − source №40;
- fuel station with 2 tanks with a volume of 75 $m^3$ each: defueling from railtank cars and storage of diesel fuel oil, sources №№41,42; defueling of diesel fuel oil to road tanker, source №43; road transport fueling, source №44; water transport fueling, source №45;
- road transport, source № 46, 54;
- railway transport, source № 47;
- water transport, source № 48,81;
- pipes of solid fuel boiler units (mechanical workshop with warehouse, firefighting station and a garage, household complex with workshop and warehouse, administrative-household complex with laboratory and a canopy, café for internal use), sources №№49-52;
- two points of shipment of ships under the scheme «road transport – intake pit – FUCHS loader – ship» (shipment of grain to the intake pit, source №53,89; blowing from the grab, source №№55 - 56; operation of engines, source №57 – 58, shipment to the water transport, source №88);
- exhaust hood of extraction ventilation (burning station), source № 59;
- metal cutting work benches, source № 60;
- painting station, source № 61;
- place of storage for waste oil, source № 62;
- exhaust hood of extraction ventilation (café for internal use), source № 63;
- temporary parking for passenger car transport with 23 car-places, source № 64;
- truck parking for 40 car-places, source № 65;
- loading machine as a part of the shipment floating complex with an overpass and elevator tower, sources № 66, 67;
- tanks for waste, source № 68 - 72;

- silos of wet grain with the volume of 500 t each – 3 pcs., sources №№73 – 75;
- safety valve of solar system, sources № 82 – 84;
- gas distribution point (cabinet gas distribution point), source № 85;
- exhaust pipe of diesel genset, source № 86;
- shipment station to the road transport, source №87;
- point of shipment of ships under the scheme «ship – FUCHS loader– ship» (shipment of grain to hold of the ship, source №90, blowing from the grab, source № 91; operation of engine, source №92);
- reception point of the blige water from ships (pump that pumps water and oil mixture source №93); pipe of gas-equalizing system of vessel which transfers oily mixture to receiving pit, source №94 pump that pumps water and oil mixture source №95;
- smoke generator of garbage burner, source №96;
- exhaust hoods of breathing filters (loading bunkers of road transport), sources №№97 -98.
- exhaust hoods of spot filters (loading machine), sources №№106-109.

The planned activities provide for the installation of 39 units of filter dust-trapping facilities of four types, information about them is given in table 1.5.2.4

Table 1.5.2.4

| № | Type of gas-cleaning unit | The name of sources of emissions | № of source of emissions. | The amount of pollutant | | | |
|---|---|---|---|---|---|---|---|
| | | | | Is formed by the source of emission | | Emitted into the atmosphere after gas cleaning unit | |
| | | | | $M^{max}$, g/s | $M^{year}$, t/year | $M^{max}$, g/s | $M^{year}$, t/year |
| 1 | 2 | 3 | | 8 | 9 | 10 | 11 |
| 1 | Intake pit filter, bag | Unloading point of the railway wagons | 1 | 3,611111 | 52,00000 | 0,138889 | 2,00000 |
| 2 | | | 2 | 3,611111 | 52,00000 | 0,138889 | 2,00000 |
| 3 | | | 3 | 3,611111 | 52,00000 | 0,138889 | 2,00000 |
| 4 | | | 4 | 3,611111 | 52,00000 | 0,138889 | 2,00000 |
| 5 | | | 76 | 3,611111 | 52,00000 | 0,138889 | 2,00000 |
| 6 | | | 77 | 3,611111 | 52,00000 | 0,138889 | 2,00000 |
| 7 | | | 78 | 3,611111 | 52,00000 | 0,138889 | 2,00000 |
| 8 | | | 79 | 3,611111 | 52,00000 | 0,138889 | 2,00000 |
| 9 | | Points of unloading of road transport | 7 | 10,833333 | 103,99999 | 0,416667 | 4,00000 |
| 10 | | | 8 | 10,833333 | 103,99999 | 0,416667 | 4,00000 |
| 11 | | | 9 | 10,833333 | 103,99999 | 0,416667 | 4,00000 |
| 12 | Spot filter, | Chain conveyor, | 5 | 0,666667 | 9,60000 | 0,041667 | 0,60000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 13 | bag | unloading from the railway wagons | 80 | 0,666667 | 9,60000 | 0,041667 | 0,60000 |
| 14 | | Separator | 18 | 55,555556 | 40,00000 | 0,277778 | 0,20000 |
| 15 | | Chain conveyor | 19 | 0,777778 | 2,80000 | 0,048611 | 0,17500 |
| 16 | | Belt conveyor | 20 | 1,458333 | 5,25000 | 0,048611 | 0,17500 |
| 17 | | | 21 | 1,458333 | 5,25000 | 0,048611 | 0,17500 |
| 18 | | Inlet chute of the belt conveyor | 99 | 0,416667 | 3,00000 | 0,034722 | 0,25000 |
| 19 | | | 100 | 0,416667 | 3,00000 | 0,034722 | 0,25000 |
| 20 | | | 102 | 0,416667 | 3,00000 | 0,034722 | 0,25000 |
| 21 | | | 104 | 0,416667 | 3,00000 | 0,034722 | 0,25000 |
| 22 | | Belt conveyor tripper unit | 101 | 1,388889 | 20,00000 | 0,034722 | 0,50000 |
| 23 | | | 103 | 1,388889 | 20,00000 | 0,034722 | 0,50000 |
| 24 | | | 105 | 1,388889 | 20,00000 | 0,034722 | 0,50000 |
| 25 | | Inlet chute of the belt conveyor of shiploader | 106 | 1,458333 | 10,95150 | 0,048611 | 0,36505 |
| 26 | | | 108 | 1,458333 | 10,95150 | 0,048611 | 0,36505 |
| 27 | | Belt conveyor tripper unit of shiploader | 107 | 1,944444 | 14,60200 | 0,048611 | 0,36505 |
| 28 | | | 109 | 1,944444 | 14,60200 | 0,048611 | 0,36505 |
| 29 | Filter cyclone type, bag | Loading bunkers for road transport | 6 | 0,555556 | 8,00000 | 0,034722 | 0,50000 |
| 30 | | Collecting conveyors | 10 | 1,000000 | 1,20000 | 0,083333 | 0,10000 |
| 31 | | | 11 | 1,000000 | 1,20000 | 0,083333 | 0,10000 |
| 32 | | | 12 | 0,833333 | 1,00000 | 0,069444 | 0,08333 |
| 33 | | | 13 | 0,833333 | 1,00000 | 0,069444 | 0,08333 |
| 34 | | | 14 | 1,000000 | 1,20000 | 0,083333 | 0,10000 |
| 35 | | | 15 | 1,000000 | 1,20000 | 0,083333 | 0,10000 |
| 36 | | | 16 | 0,833333 | 1,00000 | 0,069444 | 0,08333 |
| 37 | | Equipment of working grain cleaning tower | 17 | 11,111111 | 240,00000 | 0,277778 | 6,00000 |
| 38 | Breathing filter, bag | Loading bunkers of road transport | 97 | 0,166667 | 1,00013 | 0,006944 | 0,04167 |
| 39 | | | 98 | 0,166667 | 1,00013 | 0,006944 | 0,04167 |
| **Total** | | | | | **1181,40723** | | **41,11853** |

Quantitative values of pollutant emissions were obtained by the calculation-balance method on the basis of current methods. Calculations of emissions from the sources of the planned activities are given in Appendix 10. Sources of pollutant emissions are depicted on the general plan of river port of LLC «NIBULON» which is attached (Drawing 5).

The estimated amount of pollutants emitted into the atmosphere by stationary sources is - 27.422607 g/sec; 70.53554 t/year and greenhouse gases - 676.926116 g/sec; 592.02063 t/year. The volumes of emissions from stationary sources by substance are given in table 1.5.2.5.

Table 1.5.2.5.

| | | | |
|---|---|---|---|
| 03000/11510 | Substances in form of suspended solid particles (microparticles, fibers)/Aerosol of paint and lacquer materials | 0,035525 | 0,03261 |
| 04001/301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + $NO_2$]) | 1,409058 | 1,36090 |
| 04001/301 | Nitrogen(1)oxide($N_2O$) | 0,006183 | 0,03581 |
| 11004/1301 | Acraldehyde | 1,47E-09 | 3,38E-09 |
| 11000/1314 | Non-methane volatile organic compounds (NMVOCs) / Propione aldehyde | 0,004028 | 0,00900 |
| 04003/303 | Ammonia | 0,000001 | 1,24E-06 |
| 05001/330 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | 0,052292 | 0,06278 |
| 11006/1317 | Acetaldehyde | 0,000071 | 0,00016 |
| 11000/2754 | Non-methane volatile organic compounds (NMVOCs) / Saturated hydrocarbons | 0,102324 | 0,35826193 |
| 06000/337 | Carbon monoxide | 3,499361 | 2,69720 |
| 07000/11812 | Carbon dioxide | 676,773075 | 587,81551 |
| 10002/1819 | Dimethylamine | 9,00E-08 | 4,42E-07 |
| 01003/123 | Iron and its compounds (in terms of iron) | 0,021850 | 0,01180 |
| 11028/1555 | Acetic acid | 0,000420 | 0,00016 |
| 11030/ 616 | Xylene | 0,027530 | 0,06752 |
| 01104/143 | Manganese and its compounds in terms of manganese dioxide | 0,00065 | 0,00035 |
| 11000/2735 | Non-methane volatile organic compounds (NMVOCs)/ Petroleum-based mineral oil (spindle, engine, cylinder, etc.) | 0,000004 | 0,00012 |
| 03001/10361 | Substances in form of suspended solid particles (microparticles, fibers)/Flour dust | 0,000104 | 0,00064 |
| 03000/10292 | Substances in form of suspended solid particles (microparticles, fibers)/Abrasive dust | 0,000003 | 0,00119 |
| 03001/10414 | Substances in form of suspended solid particles (microparticles, fibers)/Metallic dust | 0,000007 | 0,00277 |
| 03001/10417 | Substances in form of suspended solid particles (microparticles, fibers)/Grain dust | 7,448814 | 50,58210 |
| 03001/10523 | Substances in form of suspended solid particles (microparticles, fibers)/Dust of soybean seeds | 6,836314 | 5,78340 |
| 03001/10525 | Substances in form of suspended solid particles (microparticles, fibers)/Sunflower seed dust | 7,326314 | 6,94497 |

| | | | |
|---|---|---|---|
| 03001/328 | Substances in form of suspended solid particles (microparticles, fibers)/Soot | 0,475951 | 2,38176 |
| 11000/1034 | Non-methane volatile organic compounds (NMVOCs) /Propanediol | 0,067137 | 8,07E-06 |
| 01007/183 | Metal mercury | 0,000040 | 0,00007 |
| 05002/333 | Hydrogen sulfide | 0,000153 | 0,00007 |
| 11000/2754 | Non-methane volatile organic compounds (NMVOCs) /White spirit | 0,082701 | 0,17750 |
| 01009/184 | Lead and its compounds (in terms of lead) | 0,000005 | 0,00260 |
| -- | Benza(a)nthracene | 5,80E-08 | 8,80E-08 |
| 13101/703 | Benz(a)pyrene | 1,00E-08 | 1,80E-08 |
| -- | Benz(bk)fluoranthene | 8,70E-08 | 1,60E-07 |
| 15003/316 | Hydrogen chloride (hydrochloric acid as HCl molecule) | 0,031900 | 0,05750 |
| 11016/10509 | Dibenzo(a,j)anthracene | 4,90E-08 | 8,80E-08 |
| -- | Dioxins | 3,47E-13 | 6,30E-13 |
| 01004/133 | Cadmium and its compounds (in terms of cadmium) | 0,000047 | 0,00009 |
| -- | Polychlorinated biphenyls | 8,10E-08 | 1,50E-07 |
| -- | Fluoranthene | 0,000002 | 3,60E-06 |
| ***Total from stationary sources, without greenhouse gases*** | | 27,422607 | 70,53554 |
| 07000/11812 | Carbon dioxide | 676,773075 | 587,81551 |
| 12000/ 410 | Methane | 0,146858 | 4,16931 |
| 04001/ 301 | Nitrogen (1) oxide (N2O) | 0,006183 | 0,03581 |
| ***Total greenhouse gases from stationary sources*** | | 676,926116 | 592,02063 |

The estimated amount of pollutants emitted into the atmosphere by mobile sources - 4.786027 g/sec, 19.28627 t/year and greenhouse gases - 144.039248 g/sec; 583.87228 t/year. The volumes of emissions from mobile sources by substance are given in table 1.5.2.6.

Table 1.5.2.6.

| | | | |
|---|---|---|---|
| 04001/301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | 1,761825 | 5,79015 |
| 13101/703 | Benz(a)pyrene | 0,001373 | 0,00558 |
| 04003/303 | Ammonia | 0,000002 | 4,30E-06 |
| 11000/2754 | Non-methane volatile organic compounds (NMVOCs) / Saturated hydrocarbons | 0,337310 | 1,49528 |
| 06000/337 | Carbon monoxide | 2,162347 | 9,90156 |
| 05001/330 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | 0,199440 | 0,80122 |
| 03004/328 | Soot | 0,323657 | 1,29243 |
| ***All from mobile sources, without greenhouse gases*** | | ***4,786027*** | ***19,28627*** |

| | | | |
|---|---|---|---|
| 07000/11812 | Carbon dioxide | 144,006895 | 583,77822 |
| 12000/ 410 | Methane | 0,014226 | 0,06400 |
| 04001/ 301 | Nitrogen(1)oxide(N2O) | 0,018127 | 0,03006 |
| ***Total greenhouse gases from mobile sources*** | | ***144,039248*** | ***583,87228*** |

According to the information in tables 1.5.2.5 and 1.5.2.6, the total volume of emissions of suspended particles, undifferentiated by composition, is 65.72944 t/year. Suspended particles, undifferentiated by composition, mean the sum of pollutants that, by the order of the Ministry of Ecology and Natural Resources of Ukraine dated March 14, 2002 No. 104 [33], are included in the list of solid substances: soot, abrasive dust, metal dust, paint aerosol, dust grain, sunflower seed dust, flour dust.

The parameters of the pollutant emission sources of the planned activities during operation are given in Appendix 10.

***Assessment of discharges and pollution of surface water during the implementation of the planned activity***

During the implementation of the planned activity, potential factors of surface water pollution of the Danube River are:

- surface runoff (rainwater, snowmelt, watering and washing), collected by the storm sewer system, is treated at local rainwater treatment plants and discharged to the Danube waters through the coastal outlet.

- suspended particles, not differentiated by composition, settling on the open surface of a water body as a result of technological operations with agricultural products.

*The storm sewer system* provides for the collection and removal of surface wastewater (rainwater, snowmelt, watering and washing):

- from the territory of the main production area with an area of 17.13 hectares, which takes into account the area of roofs of buildings and structures, areas with a hard surface and lawns, - through rain receivers and gravity storm sewer networks to local sewage treatment facilities with a capacity of 150 l/s with subsequent discharge of purified wastewater into a tank with a volume of 200 $m^3$ for further use for watering and washing needs of the port and discharge of the remaining volume of purified wastewater into the Danube through one organized release;

- from the territory of the temporary truck parking area and the temporary parking lot of passenger cars with a total area of 0.97 hectares - through rain receivers and gravity storm sewer networks to local sewage treatment facilities with a capacity of 25 l/s, followed by the discharge of purified wastewater into a tank with a volume of 60 $m^3$ for further use for watering and washing needs of the port.

All underground buildings and communications of household and rain sewer systems have enhanced waterproofing.

Normative calculation of the volume and flow of surface runoff, as well as selection of the productivity of treatment facilities, was carried out according to DBN V.2.5-75:2013 "Sewerage, external networks and structures. Basic provisions of design", the calculation is given in Appendix 4.

According to calculations, the average annual volume of the surface runoff which is collected from the territory of the port and treated at the local treatment facilities is 51 602,01 $m^3$/year, including:

- rainwater runoff – 21621,93 $m^3$/year
- snow (melted) water runoff – 27115,08 $m^3$/year
- watering and washing water runoff and fountain – 2865,0 $m^3$/year

The entire volume of surface runoff from the territory of the Port, before being discharged to the Danube, is treated in the local treatment facilities of the Port.

The maximum calculated flow rate of surface runoff which is collected by the storm sewer system from the main production area and is transported to the treatment is 142.6 l/s, from the territory of parking for trucks and passenger cars (total area – 0,97 ha) – 23.77 l/s.

According to the specified indicators of surface runoff, two local treatment facilities were selected - oil product separators with a capacity of 150 l / s and 25 l / s (manufacturer Energoresurs-Invest Corporation), which are designed to ensure standard treatment of surface wastewater from possible impurities of oil products.

The separator includes:

- installation for cleaning surface wastewater from sand, suspended solids and oil products with a thin-layer and coalescent module UOTK 200-150 (complete set) and bypass Ø 600;
- sorption filter for post-treatment of surface wastewater from suspended solids and oil products SF-150 (complete set), neck height 600 mm and bypass Ø 600.

The estimated efficiency of treatment facilities is determined based on the data of the Conclusion of the State Sanitary and Epidemiological Examination No. 12.2-18-1/6381 dated March 26, 2020. (Appendix 11), the calculation results are summarized in table 1.5.2.7.

Table 1.5.2.7.

| № | Characteristic | Maximum concentrations of pollutants in surface wastewater, mg/l | | Wastewater treatment efficiency, % |
|---|---|---|---|---|
| | | at the entrance to the treatment facilities | at the exit from the treatment facilities | |
| 1. | Suspended solids | 200 | 5,0 | 97,5 |
| 2. | Oil products | 70 | 0,05 | 99,9 |

According to the initial design indicators of the content of suspended solids and oil products, the oil product separator of the UOTK model with an SF sorption filter will ensure compliance with the established MPCs for these indicators, which are determined for sections of surface water bodies located within settlements.

Norms of maximum allowable discharge (MAD) of polluting substances with purified return water (rainwater, snowmelt, watering and washing), discharged by the object of the planned activity to the Danube River through one outlet.

The procedure for developing standards for the MAD of polluting substances into water bodies, which was approved by the resolution of the Cabinet of Ministers of Ukraine dated September 11, 1996. No. 1100 [29], regulates the development of standards for MAD of polluting substances as part of project documentation for new construction facilities.

According to project decisions, only surface water (rainwater, snowmelt, watering and washing) of the port is discharged into the Danube River:

- discharge volume - 51,602.01 $m^3$/year, 513.36 $m^3$/h;
- the place of release is the south-eastern part of the object of the planned activity;
- the concentrations of pollutants in return waters are taken at the level of the standard values of the water intake, namely the MPC of domestic water bodies (section 15 of the Methodological recommendations for the development of standards for the maximum allowable discharge of pollutants into water bodies with return waters, approved by order of the Ministry of Health of 05.03.2021 No. 173[34]);
- the background concentration of substances in the Danube River at the discharge point was adopted in accordance with the Measurement Protocol No. 39 dated 10.09.2022. (Appendix 3) issued by the chemical-technological laboratory of LLC "NIBULON" based on the analysis of water samples taken directly at the location of the planned discharge;
- distance to control station - 500 m downstream from the place of discharge of return waters (section 3 of the Guidelines for the development of standards for the maximum permissible discharge of pollutants into water bodies with return waters, approved by order of the Ministry of Environment dated 05.03.2021 No. 173 [34]);
- estimated flow rate of the river at 95% availability – 6430 $m^3$/s;
- the average width of the river section is 500 m;
- the average depth of the river section is 4.50 m;
- the average speed of the river is 1.0 m/s;
- the meandering coefficient of the river section is 1.71;
- release distance from the shore - 2,000 m;
- the depth of the release is 2,000 m.

The results of calculations of the maximum allowable discharge of return water (rainwater, snowmelt, watering and washing) of the object of the planned activity are summarized in table 1.5.2.8

Table 1.5.2.8

| Return water composition index | Actual calculated concentration, mg/l | Actual discharge, g/h | Approved permissible concentrations of mg/l | Approved MAD, g/h | Discharge, calculated in t/year (estimated) |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |
| suspended solids | 0,000 | 0,000 | 5,000 | 2566,800 | 0,258010 |
| biochemical oxygen demand | 0,000 | 0,000 | 4,510 | 2315,254 | 0,232725 |

| | | | | | |
|---|---|---|---|---|---|
| (bod5) | | | | | |
| chemical oxygen demand (COD) | 0,000 | 0,000 | 30,000 | 15400,800 | 1,548060 |
| oil products | 0,000 | 0,000 | 0,050 | 25,668 | 0,002580 |
| ammonium nitrogen | 0,000 | 0,000 | 2,000 | 1026,720 | 0,103204 |
| nitrites | 0,000 | 0,000 | 3,300 | 1694,088 | 0,170287 |
| iron (total) | 0,000 | 0,000 | 0,300 | 154,008 | 0,015481 |
| sulfates | 0,000 | 0,000 | 500,00 | 256680,000 | 25,801000 |
| nitrates | 0,000 | 0,000 | 45,000 | 23101,200 | 2,322090 |
| chlorides | 0,000 | 0,000 | 350,000 | 179676,000 | 18,060700 |
| phosphates | 0,000 | 0,000 | 3,500 | 1796,760 | 0,180507 |

The properties of return water must comply with the following:

- floating impurities: absent;
- smell, aftertaste: intensity of smells with more than 1 point;
- color (transparency): should not be detected in a column of 10 cm;
- temperature: exceeding no more than 3 °C;
- reaction (pH): within 6.5-8.5;
- dissolved oxygen, mg O2/l: at any time of the year should be at least 4 mg/dm$^3$;
- coli phages: no more than 100 in 1 dm$^3$;
- lactose-positive Escherichia coli: no more than 5,000 in 1 dm$^3$;
- viable helminth eggs: 0 in 1 dm$^3$;
- total radioactivity: does not exceed the background;
- water toxicity: not toxic.

The calculated concentrations of pollutants in the control structure (500 m from the outlet) are summarized in Table 1.5.2.9

Table 1.5.2.9

| Indicator of the composition of water in a water body | Background concentration, mg/l | Control section line , mg/l |
|---|---|---|
| suspended solids | 9,000 | 8,18438 |
| biochemical oxygen demand (bod5) | 3,170 | 3,44347 |
| chemical oxygen demand (COD) | 21,930 | 23,57551 |
| oil products | 0,011 | 0,01896 |
| ammonium nitrogen | 0,150 | 0,52740 |
| nitrites | 0,0072 | 0,63849 |
| iron (total) | 0,230 | 0,24429 |
| sulfates | 26,860 | 123,41918 |
| nitrates | 2,370 | 11,06436 |

| | | |
|---|---|---|
| chlorides | 25,410 | 91,65286 |
| phosphates | 0,022 | 0,73167 |

According to the results of calculations, during the discharge of return water of the object of the planned activity, the concentration of pollutants in the control section line 500 m below the outlet does not exceed the established permissible norms. Determination of the estimated water quality of the watercourse (The Danube River) in the control body - Appendix 12.

Taking into account the data in table 1.5.2.8, during the implementation of the planned activity, 48.69474 t/year of pollutants are discharged into the surface waters of the Danube River together with the return waters. As a compensatory measure, an ecological tax is paid to the local budget for the discharge of pollutants into the surface waters of the Danube River, the amount of the tax is UAH 12,651.76/year. Calculation of the tax liability from the environmental tax levied for environmental pollution during the implementation of the planned activity - Appendix 13

Water intake from the Danube River, in accordance with Art. 49 of the Water Code of Ukraine, is carried out on the basis of a permit for special water use, which is issued by the State Water Agency sector in the Odesa region.

*Sedimentation of suspended particles*, undifferentiated in composition, on the open surface of a water body.

The total volume of the emissions of the suspended particles undifferentiated by composition is determined in table 1.5.2.5 and 1.5.2.6 of this report and is 65,72944 t/year. Taking into account that the area of water surface of the Danube within the site appropriate for dispersion calculation (square with 2 km side) is 24,25 %, it is expected that after the dispersion in the atmosphere the deposition on the surface water of suspended particles undifferentiated by composition is 24,25 %, which is 15,93939 t/year.

During the implementation of the planned activity, dredging works (operational dredging) are possible, which are designed to restore the passable depths of the water area and the water approach. The impact of dredging operations on environmental objects, including surface water pollution, is assessed in subsection 1.5.1 of this report.

### *Assessment of sources of soil and subsoil pollution during implementation of planned activities*

The operation of the object of the planned activities does not involve a direct intensive impact on the soil, provided that a set of measures is implemented to minimize the occurrence of soil pollution in the event of possible emergency situations related to oil spills:

- arrangement of special places with a concrete surface: temporary parking lot for trucks with 40 car-places, temporary parking lot for cars with 23 car-places;
- arrangement of intra-site roads with concrete surface;
- compliance with the rules of transportation and storage of petroleum products, localization of areas where their spills are inevitable;
- compliance with the rules of motor vehicle operation, control of its technical condition;
- organization of posts for the localization and liquidation of emergency oil spills with appropriate equipment and a constant supply of sorbents.

The planned activities are not related to the use of dangerous chemicals, specific technologies and

mechanisms that can negatively affect lands and soils due to contamination with dangerous substances, lead to erosion and landslide-hazardous processes, cause deterioration or loss of useful properties and functions of land in the territory of the planned activity and its sanitary protection zone (within a radius of 300 m).

The potential sources of the impact of the planned activities on the soil during the operation of the object of the planned activities are:

- waste and ways of handling it;
- dredging works in the water area and approach channel (operational dredging);
- emergency situations related to oil spills.

The impact of the planned activities on the soil is caused by the generation of waste and the observance of environmentally safe conditions for handling it. The operation of the object of the planned activities involves the generation of 23 types of waste, including:

industrial waste - 1875.763 t/year, including by hazard classes: I hazard class - 0.0 t/year; II class of danger - 7,505 t/year; III class of danger - 591,892 t/year; IV class of danger - 1276.366 t/year;

- household waste - 247,500 t/year.

In the territory of the planned activities, it is envisaged to create conditions for environmentally safe storage of waste in accordance with their type, aggregate state and hazard class. Information on waste and ways of handling it is given in subsection 1.5.2. of this report.

### *Assessment of sources of influence on flora and fauna during the implementation of the planned activity*

Planned activities are carried out on the coast of the Danube River and in its water area in the industrial zone of the city of Izmail with rich coastal infrastructure and intensive shipping. Land category – industrial land, transport, communications, energy, defense and other purposes.

The water area of the Danube River from 91.09 to 91.55 km from the left bank to the conditional border of the shipping channel "Vylkove - Izmail Ceatal" was assigned to the water area of the sea port of Izmail by the resolution of the CMU dated 07.10.2009 No. 1208 [29] and is a place of intensive shipping.

The territory of the planned activities belongs to the technologically developed industrial zone of the city where the following enterprises conduct their production activities: Service Station "BLAZ", SE "Izmail Sea Trading Port", Izmail Cannery, PJSC "Ukrainian Danube Shipping Company", SE "Administration of Sea Ports of Ukraine", Fish Processing Plant "Danube" LLC, SE " Danube Blaz" LLC, sorting station of Ukrzaliznytsia "Izmail-Port Novy", 35 kW substation and 1 MW Industrial solar power plant - Izmail.

Taking into account the industrial density of the area of the planned activity, it can be predicted that the area is not favorable for the development of flora and fauna and the life of their representatives. According to the available cartographic materials, it was established that there are no objects of the nature reserve fund and territories reserved for the creation of NRF on the territory of the planned activity and in the zone of its territorial influence (within a radius of 683 m from the point "0" of the coordinate system of the industrial site).

The nearest objects of the nature reserve fund are those whose minimum distance from point "0" of the coordinate system of the industrial site of the planned activity is:

- Landscape park «Izmail Islands»: Malyi Tataru - 9.7 km, Malyi Damer - 16.5 km, Velykyi Damer – 18.6 km;

- the system of Danube lakes (the area of 1068.67 km2 is located in the Danube delta of

Odesa region) - the distance to the nearest water body in the system is 7.2 km;

- Danube Biosphere Reserve (area 1068.47526507 km², located on the territory of Kiliya and Tatarbunarskyi districts of Odesa region) - 58.43 km.

Thus, in the zone of impact of the planned activities, which is the territory limited to a radius of 687 m from the centroid of the industrial site, there are no objects of the nature reserve fund.

Also, this territory is not characterized by the presence of distribution areas of hunting, red list and other valuable species of animals, there are no representatives of wild flora and natural habitats of wild fauna in the territory of the planned activity. Also, the territory is not a migratory eco-corridor for rare species of birds, does not belong to the territories of the "Emerald Network" and Natura 2000 projects.

The impact on the flora and fauna adapted to live in the industrial environment is caused by the deterioration of the living conditions of its organisms, which is manifested by the pollution of the atmospheric air, aquatic environment and soils. According to the relevant sections of this report, the specified impact does not exceed the regulatory limits and is compensated by measures aimed at reducing emissions, discharges and ensuring their regulatory cleaning, as well as measures to reduce the noise impact on the environment and landscaping of the territory.

The planned activity involves the organization of green zones on an area of 7.2 hectares, which is 38% of the total territory of the Port.

The implementation of the planned activity is related to the overloading of agricultural crops on water transport, during these operations, dust from grain and oil crops or the product itself is likely to enter the surface waters of the Danube. Taking into account that the object of influence is a food product and due to the implementation of protective measures, the impact is considered to be minimal.

During the implementation of the planned activity, bottom cleaning works (operational dredging) are possible. The assessment of the impact of hydrotechnical works on the state of ichthyofauna and aquatic biocenoses was carried out by the Institute of Fisheries and Marine Ecology (IFME) [64] – Scientific and biological justification, Appendix 8. The impact is considered acceptable when carrying out dredging works in compliance with the technology given in subsection 1.5.1 of this report during the non-spawning period with the direction of compensatory funds for their further use in the implementation of measures for the reproduction of fish stocks in the Danube River.

***Assessment of noise pollution during the implementation of the planned activity***

When conducting the planned activities, the sources of noise impact are ventilators of aspiration units, grain dryer, chain conveyors, road and rail transport.

The planned activity involves the use of mechanisms that have sanitary and hygienic certificates for use in the declared area. Their technical condition, including noise characteristics, is periodically checked for compliance with permissible standards during technical inspections and certificates.

To assess the noise impact of the regular operation of the object of the planned activity, a control point, located to the north of the object, was adopted at the border of the residential building.

The noise calculation was performed in accordance with SBS DSN V.1.1-31:2013 "Protection of territories, buildings and structures from noise" [51]. The calculation is based on the assumption of simultaneous operation of all noise sources, which, compared to the actual situation, is the worst of the construction work conditions. Calculations are given in Appendix 14.

According to the calculation results, the maximum total equivalent sound level does not exceed the permissible sound level at the border of the residential area at night - 45 dBA and is 41.93 dBA.

***Assessment of sources of vibration, electromagnetic, light, heat and radiation impact during the implementation the planned activity***

***- vibration pollution*** – the sources of vibration are engines of construction machines and mechanisms. The vibration levels of the equipment used in construction and installation work do not exceed the permissible normative values, according to the requirements of DSN 3.3.6.039-99 "State sanitary norms of industrial general and local vibration". At the border of the nearest residential building, the vibration level is defined as "absent" according to sanitary and hygienic standards.

***- electromagnetic radiation*** - the planned activity is not related to the consumption of electricity with a voltage of more than 400 kV, there are no sources of electromagnetic radiation that have a negative impact on the environment, on personnel - it is within permissible limits;

***- radiological pollution*** – the planned activity does not involve the use of equipment that is a source of ionizing radiation, there is no impact related to radiation pollution of the environment;

***- light and thermal pollution***. There are no sources of potential light and thermal pollution during construction work.

## *2. DESCRIPTION OF THE JUSTIFIED ALTERNATIVES*

Territorial alternatives for the planned activities were not considered. The planned activity is related to the construction and operation of a transport infrastructure object - a river port (terminal), therefore the land plot on the Danube River coast in the industrial zone of the city of Izmail is the most promising for joining the existing transport and energy infrastructure, and also meet the requirements provided for the construction and operation of the transshipment complex for grain, leguminous and oil crops, which is planned to be built on the territory of the Port.

The planned activity involves two technical alternatives regarding the organization of the water supply system of the Port:

***technical alternative 1*** – the water supply of all the needs of the river port (economic and household, industrial, firefighting needs, needs for the improvement of the territory) from the surface water intake from the Danube River, which is the object of the new construction;

***technical alternative 2*** – mixed water consumption: from the municipal water supply network of the city of Izmail - household, industrial and fire-fighting needs of the port, from the surface water intake from the city of Danube (new construction object) - improvement needs.

The organization of the Port drainage system is the same for the two technical alternatives: from the port's sewer facilities to the Izmail sewer network, surface wastewater (rainwater, snowmelt, watering and washing) - through the coastal outlet to the Danube waters after preliminary treatment in the local sewage treatment facilities. Only the volumes of water discharged into the

municipal sewerage network are changed due to the connection of the water treatment system (technical alternative 1).

Based on the data presented in subsection 1.5. of this report, an analysis of accepted technical alternatives was carried out according to environmental criteria: the amount of generated waste, pollution of surface waters of a water body, impact on atmospheric air due to emissions of pollutants, noise intensity of mechanisms and other indicators related to the planned activity at the stages of its development. The comparative analysis is given in table 2.1.

According to the result of the comparison of the environmental criteria of impact according to the variants of technical alternatives 1 and 2 (data in Table 2.1), the following was established:

- at the stage of preparatory and construction works

technical alternative 2 has advantages over technical alternative 1 in all criteria of impact on environmental factors, as it has lower quantitative indicators of emissions, discharges, generated waste and noise impact;

- at the stage of implementation of the planned activity

technical alternatives 1 and 2 have the same quantitative indicators of emissions, discharges, waste generation and noise impact according to the criteria of impact on environmental factors: atmospheric air, aquatic environment, climate, soils;

with technical alternative 2, the volume of water abstraction from the Danube River is 30% less than with technical alternative 1, compared to the average annual volume of the Danube river flow within the Odessa region (about 123,000 thousand $m^3$/year), the water intake of the Port does not affect water availability the Danube river;

- with technical alternative 2, water intake is carried out from the municipal water supply network the water supply of which is carried out from underground aquifers, while there is no water intake under technical alternative 1. However, this will not lead to the depletion of underground aquifers, according to calculations, the planned volume of water consumption of the port will be 0.1% of the total capacity of operational wells involved in the water supply of the city of Izmail (12.775 million $m^3$/year);

- technical alternative 1 is related to the operation of the water treatment system, which, in comparison with technical alternative 2, will lead to an increase in the volume of water consumption and drainage by 3.58% due to its technological water demand (flushing of filters).

**Table 2.1.**

| Environmental factors | Environmental impact criteria | Technical alternative | |
|---|---|---|---|
| | | 1 | 2 |
| ***The stage of preparatory and construction work*** | | | |
| Soil, aquatic environment | The amount of production waste generation (table 1.5.1.1) | 5,424 t/year | 5,352 t/year |
| Atmospheric air | Volumes of pollutant emissions into atmospheric air from stationary and mobile sources (without greenhouse gases) (Table 1.5.1.2) | 53,06143 t/year | 52,70933 t/year |
| | The intensity of the noise action of mechanisms | 42,76 dBA | 41,76 dBA |
| Aquatic environment | Sedimentation of emissions of suspended particles, undifferentiated by composition, on surface waters | 0,570170 t/year | 0,546372 t/year |
| Climate | The volume of greenhouse gas emissions from stationary and mobile sources (table 1.5.1.2) | 1615,23405 t/year | 1614,17569 t/year |
| ***The stage of implementation of the planned activity*** | | | |
| Aquatic environment | The volume of water intake from the Danube river | 20501,394 $m^3$/year | 14450,000 $m^3$/year |
| | The volume of water intake from municipal water networks | absent | 5316,713 $m^3$/year |
| | The need to organize a sanitary protection zone (SPZ) of a water intake for drinking purposes (legislative requirement) | required | not required |
| | The volume of drainage into the surface waters of the Danube River | 51 602,01 $m^3$/year | 51 602,01 $m^3$/year |
| | Volumes of discharges of polluting substances into the surface waters of the Danube River with return waters | 48,69474332 t/year | 48,69474332 t/year |
| | Sedimentation of emissions of suspended particles, undifferentiated by composition, on surface waters | 15,93939 t/year | 15,93939 t/year |
| Soil, aquatic environment | Production waste generation (table 1.5.2.3) | 1875,763 t/year | 1875,763 t/year |

| | | | |
|---|---|---|---|
| Atmospheric air | Emissions of pollutants into the atmosphere from stationary and mobile sources (without greenhouse gases (Table 1.5.2.5, 1.5.2.6) | 89,82181 t/year | 89,82181 t/year |
| | The intensity of the noise action of mechanisms | 41,93 dBA. | 41,93 dBA. |
| Climate | The volume of greenhouse gas emissions from stationary and mobile sources (tables 1.5.2.5 and 1.5.2.6) | 1175,89291 t/year | 1175,89291 t/year |

Considering the ecological impact criteria chosen for comparison, technical alternative 2 can be characterized as ecologically justified, which will ensure the implementation of a set of norms, rules, requirements for environmental protection, use of natural resources, and ecological safety, as well as state sanitary norms and rules.

The calculated volumes of water consumption and drainage of the object of the planned activity are accepted as for technical alternative 2:

The total volume of water consumption is 276,257 $m^3$/day, 19,766,713 $m^3$/year, including:
from municipal networks – 41,757 $m^3$/day, 5316,713 $m^3$/year to ensure:

household needs – 6,030 $m^3$/day, 2131,785 $m^3$/year:

production needs - 35,727 $m^3$/day; 3184.928 $m^3$/year.

from the Danube River - 234,500 $m^3$/day, 14,450,000 m3/year to meet technical needs:

watering of green areas and lawns - 180.0 $m^3$/day, 9000.0 $m^3$/year;

washing of roads and sidewalks with a hard surface and dust suppression - 54.5 $m^3$/day, 5450.0 m3/year.

The total volume of return water drainage:
to municipal sewage networks - 24,357 $m^3$/day; 4256.313 $m^3$/year, including:

household wastewater - 6,030 $m^3$/day; 2131.785 $m^3$/year;

industrial wastewater – 18,327 $m^3$/day; 2124.528 $m^3$/year.

to the surface waters of the Danube - 51,602.01 $m^3$/year, including:

rainwater wastewater - 21621.93 $m^3$/year

snow (melt) wastewater - 27115.08 $m^3$/year

watering and washing wastewater and fountain - 2865.0 $m^3$/year.

## 3. DESCRIPTION OF THE CURRENT STATE OF THE ENVIRONMENT (BASIC SCENARIO)

The current state of the environment is characterized by the features of the climate (average annual indicators of meteorological values), the quality of the atmospheric air by the content of pollutants, the relief features, the distribution of lands and their ground cover, the state of water bodies, flora and fauna, nature conservation areas, cultural heritage monuments, etc.

Sources of initial data on the state of the environment are:

- the results of observations of the Danube Hydrometeorological Observatory presented at the request of NIBULON LLC (Appendix 15);
- open data sources: Regional report on the state of the environment in the Odesa region in 2020[62], published on the official website of the Ministry of Ecology and Natural Resources of Ukraine;
- monitoring data on the state of water objects of the Basin Management of Water Resources of the Black Sea and Lower Danube rivers of the State Water Agency of Ukraine (open data of the Internet resource of the State Water Agency of Ukraine) [63];
- research results of laboratories of NIBULON LLC, certificate of recognition of capacity – Appendix 3;

- scientific work of Valentyn Khilchevskii «Hydrological and hydrochemical characteristics of the middle and lower part of the Danube basin» (Bulletin of the Taras Shevchenko National University of Kyiv. Geography. 1990. No. 34 [61]);
- scientific-biological substantiation «Assessment of the impact of hydrotechnical works on the state of fish stocks of the Danube River during the construction of a cargo berth with the operational water area of the river port in the city of Izmail, the Odesa region», performed by the Institute of Fisheries and Marine Ecology (IFME) [64];
- technical report «Engineering and geological surveys for the construction of a transport infrastructure facility – a river port (terminal) of NIBULON LLC in Izmail, Izmail district, the Odesa region», performed by PE «NACHALO» [65].

### *3.1. Physical and geographical characteristic of the area.*

The planned activities are envisaged in the southwestern part of Ukraine and occupy the following land plots:

with an area of 19,7 hectares in the southern part of Izmail, the Odesa region, within the boundaries of Portova, Luki Kapikrayana embankment, and Dunayska streets;

in the water area of the Izmail seaport with an area of 10.4357 hectares, along the shipping channel "Vylkove - Izmail Ceatal" from 91.09 km to 91.55 km with a width from the border of the shipping channel to the left bank.

The territory of the planned activities belongs to the technologically developed industrial zone of the city and is characterized by a rich coastal infrastructure, a formed communication system, and intensive shipping, and is promising for joining the existing transport and energy infrastructure. Neighboring industrial enterprises are Service Station "BLAZ", SE "Izmail Sea Trading Port", Izmail Cannery, PJSC "Ukrainian Danube Shipping Company", SE "Administration of Sea Ports of Ukraine", Fish Processing Plant "Danube" LLC, SE " Danube Blaz" LLC, which collectively form the state of the environment of the district and each of them is a potential polluter of the atmospheric air and aquatic environment.

Situational map diagram of the river port of NIBULON LLC with the mapping of the regulatory sanitary protection zone – Drawing 2.

### *3.2. Climatic characteristics of the area*

The climatic conditions of the region are formed under the impact of the proximity of the Black Sea and the development of cyclonic activity within its borders, which cause stable and strong winds from the north-east direction to the east in winter, also the weather has long periods of weak wind activity and a large number of dry, clear days in summer.

According to the data of the Basin Management of Water Resources of the Black Sea and Lower Danube Rivers of the State Water Agency of Ukraine (open data of the Internet resource of the State Water Agency of Ukraine), the climate of the Lower Danube sub-basin is mildly warm. It is characterized by mildly continentality, a short fine winter with frequent thaws, a long hot dry summer, and insufficient rainfall.

The average annual air temperature is above zero - about $+10^0$C. The warmest month of the year is July, the average temperature of which is +22 - $23^0$C, but on some days it reaches +38 - $41^0$C. The coldest month is February, the average temperature of which is from +0.2 to $1.4^0$C. In the summer, the air temperature is quite stable, but in the winter it is changeable, there are frequent

thaws. The total amount of precipitation varies from 370 to 525 mm/year. The largest amount (up to 60-70%) falls in the warm period (April-October) and amounts to 275-325 mm. In the cold period (November - March), the amount of precipitation rarely exceeds 30-40% of the annual amount (up to 200 mm). In winter prevails cloudy weather with frequent thaws (50-60 days) and short-term cooling.

The snow cover is unstable, is established in the first ten days of December, the average duration of its occurrence is less than 40 days. The main part of the year in the Lower Danube sub-basin dominate north and north-western winds. In the summer period prevail westerly and north-westerly winds. The average annual wind speed is 3,5 – 4,5 m/sec. Strong winds prevail in the cold seasons and reach a speed of 16-20 m/sec.

The Danube Hydrometeorological Observatory provided the climatic characteristics of the region for the period 2019-2021. (letter with ref. No. 9915-04-14/323 dated 22.04.2022 - Appendix 15):

1. Terrain relief coefficient K-1.
2. The coefficient which depends from the atmosphere stratification A-200.
3. Average annual air temperature: $12.9^0$C.
4. Average minimum air temperature of the coldest month: - $11.5^0$C.
5. Average maximum air temperature of the hottest month: 35.9 $^0$C.
6. Repeatability of wind direction and calm (annual average wind rose):

| Wind direction | Wind speed, m/sec | Repeatability in % |
|---|---|---|
| calm | 0,0 | 12 |
| northern | 3,3 | 17 |
| northeastern | 2,9 | 10 |
| east | 2,7 | 8 |
| southeastern | 2,5 | 9 |
| southern | 2,5 | 13 |
| southwestern | 2,3 | 6 |
| west | 2,2 | 11 |
| northwestern | 2,8 | 14 |

7. The average wind speed with repeatability, which exceeding 5% is - 9 m/s.
8. Amount of precipitation, mm:

| Month | I | II | II | IV | V | VI | VII | VIII | IX | X | XI | XII | Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| the average rainfall | 73,4 | 15,0 | 27,4 | 24,0 | 35,7 | 125,8 | 26,0 | 17,1 | 10,0 | 30,5 | 19,9 | 63,2 | 468,0 |

### *3.3. Soils and geological structure of the territory*

In tectonic terms, the studied area is located within the East European Platform and belongs to the Southern slope of the Ukrainian shield, the erosional surface of which dips in the southern direction under the Paleozoic and Meso-Cenozoic deposits of the sedimentary cover.

Archean-Proterozoic, Mesozoic, and Cenozoic formations are part of the geological structure of the considered area. The first ones form the foundation of the East European Precambrian platform. The Mesocainozoic forms the sedimentary cover of the East European Precambrian platform.

The delta system of the Danube River was formed, at the same time, by the river and the sea, the delta is searching for an optimal balance of the impact of accumulation and abrasion processes against of existing tectonic processes. Delta soils are most characterized by meadow, meadow-swamp, swamp soils and salt marshes. By mechanical composition, they are mainly heavy loamy and clayey. The marsh soils in the delta, naturally, occupy the largest areas. They are formed in almost all low-lying areas. They are usually poor in humus, which is confirmed by the research results of the NIBULON LLC laboratory (Measurement protocol - Appendix 3) and are characterized by low moisture content. Turf soils of various types were formed on the alluvial deposits of the Danube floodplain. Saline soils are represented by salt pans in which easily soluble salts are on the surface.

In the geological structure of the territory of the planned activity at a well drilling depth of up to 30.0 m, 6 engineering-geological elements (IGE) are distinguished based on stratigraphic features, grain size composition and physical and mechanical properties:

| | |
|---|---|
| Layer-1 | Sand is fine, gray to dark-yellow, heterogeneous, of medium density, with an admixture of organic matter and shell detritus, low-moist to water-saturated. |
| Layer -1a | The loam is light brown-fawn, with lenses and interlayers of sandy loam, hard to rigid plastic. |
| Layer -1b | The sand is brown-fawn, with lenses and layers of sand, hard. |
| EGE -№2 | The loam is heavy, dark gray, silty, with lenses and layers of sand, with an admixture of organic matter, heterogeneous, rigid to flowable. |
| EGE-№2a | The loam is heavy, clayey, silty, dark gray, with an admixture of organic matter, heterogeneous, flowable and plastic. |
| EGE -№3 | The clay is brown-green, silty, with an admixture of organic matter, soft-plastic to flowable. |
| EGE -№4 | Silt is loamy, dark gray to black, with an admixture of organic matter, heterogeneous, flowable. |
| EGE -№5 | Clay silt is dark gray to black, with an admixture of organic matter, rigid to flowable. |
| EGE -№6 | The loam is heavy, silty, dark gray, with lenses and layers of sand, with an admixture of organic matter, heterogeneous, soft-plastic to flowable. |
| EGE -№7 | Clay silt is dark gray to black, with an admixture of organic matter, semi-hard to soft-plastic. |
| EGE -№8 | The loam is light dark gray, with lenses and interlayers of sandy loam, soft-plastic to flowable. |
| EGE -№9 | The loam is light dark gray, with lenses and interlayers of sandy loam, soft-plastic to flowable. |
| EGE-№9a | The sand is fine, gray, heterogeneous, of medium density, saturated with water. |
| EGE-№9b | Gray alluvial sand, with lenses and layers of sand, flowing |
| EGE-№10 | The loam is heavy clayey, gray, soft plastic. |
| EGE-№11 | The clay is gray-blue, light, with thin layers of sand, hard to semi-hard. |

According to the results of engineering and geological investigations, the upper layer is mainly composed of sand with silty layers, there is no fertile layer.

Underground waters of natural origin are discovered by wells at depths of 1.00-4.10 m (absolute marks -1.20÷-2.40 m), underground waters of natural origin are hydraulically connected

with the waters of the Danube River, the fluctuation of the horizon level depends on fluctuations in the surface water level of the river. Seasonal fluctuations of the groundwater level can reach ±1.00 m.

According to the results of a set of studies of bottom soil at the area of planned dredging works and soil at the site of their coastal dump (background), carried out by the laboratories of "NIBULON" LLC, the soils are ecologically safe and do not contain significant amounts of man-made pollutants of organic and inorganic nature. Measurement protocols - Appendix 3.

### *3.4. Current state of atmospheric air*

Industrial emissions in the atmospheric air spread over a considerable distance, polluting the surface layer not only at the industrial site, but also in the adjacent populated areas. It is accompanied of unfavorable affecting for humans and the surrounding environment (water, soil, animal and plant). Harmful substances that have entered the human or animal organism cause health problems, only if their amount in the air exceeds the limit value for each substance. According to the data of the Danube Hydrometeorological Observatory (letter ref. No. 9915-04-14/323 dated 22.04.2022 - Appendix 15) the values of background concentrations of the most common pollutants in the atmospheric air of the city of Izmail, by the area of the planned activities, for the period 2019-2022 at different speeds (from 0 to 11 m/sec) and wind directions (northern, east, southern, west) are:

| **Suspended substances** | | | | | |
|---|---|---|---|---|---|
| Wind speed, m/sec. | 0-2 | 3-13 | | | |
| Wind direction, points of the compass | any direction | North | East | South | West |
| Background concentration, mg/ $m^3$ | 0,11195 | 0,15570 | 0,15570 | 0,15570 | 0,15570 |
| **Carbon monoxide** | | | | | |
| Wind speed m/sec. | 0-2 | 3-13 | | | |
| Wind direction, points of the compass | any direction | North | East | South | West |
| Background concentration, mg/ $m^3$ | 1,19262 | 1,19262 | 1,19262 | 1,19262 | 1,19262 |
| **Nitrogen dioxide** | | | | | |
| Wind speed m/sec. | 0-2 | 3-13 | | | |
| Wind direction, points of the compass | any direction | North | East | South | West |
| Background concentration, mg/ $m^3$ | 0,09025 | 0,09025 | 0,09025 | 0,09025 | 0,09025 |
| **Sulfur dioxide** | | | | | |
| Wind speed m/sec. | 0-2 | 3-13 | | | |
| Wind direction, points of the compass | any direction | North | East | South | West |
| Background concentration, mg/ $m^3$ | 0,03609 | 0,03609 | 0,03609 | 0,03609 | 0,03609 |
| **Hydrogen sulfide** | | | | | |
| Wind speed m/sec. | 0-2 | 3-13 | | | |
| Wind direction, points of the compass | any direction | North | East | South | West |
| Background concentration, mg/ | 0,00250 | 0,00250 | 0,00250 | 0,00250 | 0,00250 |

| | | | | | |
|---|---|---|---|---|---|
| $m^3$ | | | | | |

### *3.5. Hydrological conditions of the Danube River*

The planned activities are carried out on the left bank of the Danube, which is one of the largest rivers in Europe. The river basin is geographically located on the territory of 19 countries and has a total water intake area of 817 thousand km². Hydrographically, the river is divided into Upper, Middle and Lower Danube. It is part of the lower Danube, its Kiliya branch, that is located within the Odesa region of Ukraine.

The area of the Lower Danube sub-basin is integral, consisting of the Danube River basin within the borders of Ukraine, transitional waters and coastal waters (the Black Sea water area between the coastline and the line in the territorial sea at a distance of one nautical mile from the baseline used to determine the width of the territorial sea). The total area of the Lower Danube sub-basin is 6363 $km^2$. The border of the Lower Danube sub-basin runs along the state border with Romania, the Republic of Moldova and through populated areas along the watershed line (The Order of the Ministry of Ecology and Natural Resources of Ukraine dated 03.03.2017 No. № 103[44]).

According to the scientific work of Valentyn Khilchevskii "Hydrological and hydrochemical characteristics of the middle and lower part of the Danube basin" (Bulletin of the Kyiv National University named after Taras Shevchenko. Geography. 1990. No. 34) the area has a complex hydrological regime. Three of its phases are well defined: spring flood, summer and autumn floods, autumn and winter low water period. Spring flooding begins in February-April and may last until June. In the second half of summer, the water level drops, which is interrupted by small rises from rain floods. Rains in October–November are the cause of autumn floods. During cold winters, the Danube has the lowest levels. The annual amplitude of water level fluctuations is from 4.5 to 5.5 m. The average annual flow of water at the mouth of the river is 6,430 $m^3$/sec. The maximum flow of water in the bottom is about 20,000 $m^3$/s, the minimum is 1,800 $m^3$/sec. The average volume of runoff is about 203 $km^3$ per year (of which 123 $km^3$ is through the Kiliya branch). The Danube freezes only in cold winters for 1.5–2 months.

### *3.6. Hydrochemical regime of the Danube River*

The hydrochemical regime of the Ukrainian section of the Danube is formed under the impact of its internal water flow, the vital activity of aquatic organisms and wastewater from industrial enterprises, agriculture and settlements. Many ingredients of the hydrochemical regime are inversely related to the amount of river flow.

The main factor in the formation of seasonal dynamics of water mineralization is the water flow of the river. According to the dominance of ions, the water of the Ukrainian section of the Danube belongs to the hydrocarbonate class of the calcium group with mineralization: in spring - 360 mg/l, in summer - 355 mg/l, in autumn - 410 mg/l, in winter - 445 mg/l. Sulfate ion concentrations fluctuate significantly throughout the year within one observation point, in the area in March – 92.2 mg/l, May – 55.2, June – 70.1, August – 46.4, October – 48.5 mg/l. Its content is influenced, in addition to the water flow of the river, by the influx of phenomena from the Black Sea.

In the distribution of chlorides, there is an increasing trend from the Reni to the mouth of the river, which is mainly due to the impact of the sea. Because of this, their seasonal dynamics are unstable. The oxygen saturation of the water flow varies greatly down the river from the Reni to the Black Sea. Calculations of oxygen flows in the Reni, Izmail and Vylkove reservoirs showed that despite some qualitative differences caused by their transformation downstream, they directly

depend on the change in the volume of the river flow.

Ecological observations of Ukrainian scientific center of Ecology of Sea (UkrSCES)in 2020 allow us to state that the content of total nitrogen in the water area ranged from 0.486 mg/dm³ to 1.6280 mg/dm³, total organic phosphorus – from 0.0141 mg/dm³ to 0.0595 mg/dm³ (Table 3.6.1).

Hydrochemical indicators in the water of the Danube estuary region

Table. 3.6.1.

| Ingredient-indicator, mg/ dm³ | Approach channel, fluctuations (average) |
|---|---|
| PO43– | 0.0 – 0.0526 (0.0173) |
| $P_{org}$ | 0.0141 – 0.0595 (0.0290) |
| NH4+ | 0.0 – 0.0142 (0.0042) |
| NO2– | 0.0017 – 0.0242 (0.0099) |
| NO3– | 0.0485 – 1.2110 (0.4579) |
| $N_{org}$ | 0.4860 – 1.6280 (1.0811) |
| SiO32– | 0.1520 – 2.7920 (1.1415) |
| Salinity, ‰ | 0.0 - 2.6 |
| Oxygen mg/dm³ | 6.20 – 9.30 |
| Biochemical oxygen demand5, mg O/ dm³ | 2.73 – 3.29 |
| pH | 8.19 |
| Suspended substances | 93 - 242 |

The materials of the Danube Hydrometeorological Observatory for a 20-year period show that the turbidity of water in the branches of the Kiliya delta is characterized by lower values: in the Kiliya branch in Vylkove it is 158 g/m³. The average turbidity of the Danube water in the Vylkove area can vary from 93 to 242 g/m³; the highest monthly average value of turbidity in this body can reach 800 g/m³ (October), the lowest – 16.6 g/m² (November). The range of fluctuations in daily values of water turbidity in the Danube Delta is exceptionally wide - from a few grams to 2-3 kg/m of water.

According to the Regional Report on the State of the Environment in the Odesa Region in 2020 (an open internet resource of the Ministry of Ecology and Natural Resources of Ukraine), the main anthropogenic overloading due to the discharge of polluted recycled waters in the Odesa Region is carried out on the Danube River. Thus, in 2020, 19.037 million $m^3$ of polluted return water was discharged into the Danube River, which is 78% of the total volume of discharge of polluted effluents in the region.

According to monitoring data on the condition of water bodies, published by the State Water Agency of Ukraine on the "Clean Water" interactive map, for the period 2014-2020, in the Danube River basin (in the area of Izmail) exceeding the established maximum permissible discharges by the content of suspended substances and chemical oxygen demand (indicative index) was recorded.

The analysis of the spatial distribution of hydrochemical parameters shows that the research water area can be classified as anthropogenic-eutrophic and characterized by a high content of biogenic substances with a predominance of their organic forms.

### *3.7. Hydrobiological conditions of the Danube River*

**Phytoplankton.** The intensity of phytoplankton development is directly dependent on the amount of water turbidity, because finely dispersed mineral suspension prevents the penetration of solar energy into the water column. In addition, the suspension, having a mechanical effect on the pelagic cells, contributes to their sedimentation in the bottom layers. The degree of turbidity of the

Danube waters increases in the spring, during the flood period. In April, an extremely high content of suspended substance in the river water is observed not only in connection with hydrodynamic factors, but also due to the removal of a large amount of allochthonous organic matter. In addition to this factor, the decrease in the number and biomass of phytoplankton, compared to previous years, can be explained by the high level of pollution. The high content of metals and allochthonous organic matter in the water can be attributed to the factors of suppression of phytoplankton, especially in the delta.

In the waters of the Danube River, diatoms are the most diverse species, accounting for 64% of the floristic composition. Among diatoms, the most common with a duration of 48-78% are freshwater ones, representatives of marine flora are much less common. In terms of the number of species, green algae take second place after diatoms. In total, up to 67 intraspecific taxa of algae were found in the Danube and its branches.

**Zooplankton.** Analysis of the development of zooplankton shows that the formation of zooplankton in the river is influenced by water content. Zooplankton of the Danube, within Ukraine, is characterized by a significant species diversity. Its structure can include more than 82 taxonomic units. Rotifers and cyclops form the basis of the structure of the plankton community. Molluscs at an earlier stage of development (veliger) are found in small quantities and have a "non-viable" appearance. The development of zooplankton in different parts of the river is not homogeneous. In the Izmail district, as a rule, indicators of population and biomass are at an average level.

**Zoobenthos.** Up to 14 species of benthic invertebrates were noted along the Izmail-Reni dam - one each of worms and arachnids, 4 of molluscs, 2 of crustaceans, and 6 of insects (larvae and adults). The qualitative composition of the benthic fauna of the Danube River in the area of the port of Izmail is poor and is mainly represented by insect larvae (chironomids), oligochaetes and benthic crustaceans (gamarids, mysids, etc.).

**Ichthyofauna.** The aboriginal fauna of the Danube River is characterized by three main groups of fish with different types of reproduction: pelagophiles (Black Sea-Azov herring, chechonia); lithophiles (beluga, sevryuga, sterlet, vimba, whitefish, etc.); phytophiles (ram, bream, carp, crucian carp, etc.).

For many species of fish, anthropogenic eutrophication and pollution of the Danube waters, as well as the regulation of the river's flow and the embankment of the banks, have negatively affected the natural spawning conditions. In addition, the area of the planned activities is characterized by a fairly strong current, and most of the partial fish spawn in quiet areas, backwaters and creeks. Therefore, spawning practically does not occur in this area.

### *3.8. Biodiversity*

The territory of the planned activities does not belong to the objects of the nature reserve fund, but is an industrial zone within the city.

According to cartographic materials, the nearest objects of the nature reserve fund are those whose minimum distance from the object of the planned activities (from point "0" of the coordinate system of the industrial site) is:

- Landscape park «Izmail Islands»: Malyi Tataru - 9.7 km, Malyi Damer - 16.5 km, Velykyi Damer – 18.6 km;
- the system of Danube lakes (the area of 1068.67 km$^2$ is located in the Danube delta of Odesa region) - the distance to the nearest water body in the system is 7.2 km;
- Danube Biosphere Reserve (area 1068.47526507 km$^2$, located on the territory of Kiliya and Tatarbunarskyi districts of Odesa region) - 58.43 km.

### *3.9. Monuments of cultural heritage*

The historical and architectural heritage is a powerful element in the formation of a unique landscape, it contributes to the formation of the city residents' sense of belonging to the natural, social and cultural environment. The tourist attraction of the city is caused by various historical monuments and amazing architecture, in which the traditions of Romanian, Slavic and Turkish cultures are intertwined.

Izmail, as one of the oldest cities of Ukraine (end of the XVIth century), is included in the List of Historical Settlements of Ukraine, which was approved by the Resolution of the Cabinet of Ministers of Ukraine No. 878 of 26.07.2001. [27]

The key objects of the cultural heritage of Izmail according to cartographic materials are located at a considerable distance from the object of the planned activities (from point "0" of the coordinate system of the industrial site):

- Turkish mosque (XVI century) – 3090 m;
- Holy Intercession Cathedral (1st half of XI X century.) - 1838m;
- Royal Customs building (1 Bilhorod-Dnistrovska str.) - 1800m;
- The building of Izmail city administration - 1454 m.

## *4 DESCRIPTION OF ENVIRONMENTAL FACTORS WHICH ARE LIKELY TO BE AFFECTED BY THE PLANNED ACTIVITY AND ITS ALTERNATIVE OPTIONS*

Planned activities have a potential impact on environmental factors: atmospheric air, aquatic environment, soil and geological environment, public health, climatic factors, the state of fauna, flora, biodiversity, land, characterized by scale, intensity, dynamism and duration of action.

The planned activity involves consideration of two options of technical alternatives regarding the organization of the water supply system of the Port.

The description of environmental factors that are likely to be affected is summarized in Table 4.1.

Table 4.1.

Environmental factors that are likely to be influenced

| Description of environmental factors that have been affected | Sources of influence | Qualitative indicators of impacts | Quantitative indicators by options of technical alternatives | |
|---|---|---|---|---|
| | | | 1 | 2 |
| **Stage of preparatory and construction works** | | | | |
| Atmospheric air - pollution by emissions (without greenhouse gases), determination of quantitative and qualitative indicators in the section of each type of work (processes) - subsection 1.5.1, table. 1.5.1.2., Appendices 5,7 | welding works | emissions: substances in the form of suspended solid particles, nitrogen oxides, ammonia, sulfur dioxide, carbon monoxide, non-methane volatile organic compounds, methane, benz(a)pyrene, iron and its compounds, chromium and its compounds, manganese and its compounds, fluorine and its compounds | 5,10956 t | 4,81900 t |
| | insulation works | | | |
| | earthworks | | | |
| | painting works | | | |
| | mobile sources (motor vehicles, construction machinery and hydraulic engineering) | | 47,95187 t | 47,89033 t |
| Aquatic environment (surface waters), determination of quantitative and qualitative indicators - subsection 1.5.1, Appendices 6,7 | pouring and storage of bulk construction materials | sedimentation of dust emissions on surface waters (Suspended solids ) | 0,57017 t | 0,54637 t |
| | loss of soil during dredging operations | transition of the finely dispersed subsoil component into a suspended state | 281,344 t | |
| | water intake for pulp transporting | volume of water consumption | 530000 $m^3$ | |
| Soils and geological environment, determination of quantitative and qualitative indicators - subsection 1.5.1, table. 1.5.1.1 Appendix 3 | technological processes and productions in which waste is generated: welding and painting works, life activities of employees | generation of industrial waste of the IV hazard class: pile waste, electrode cinders, paint containers | 5,424 t | 5,352 t |
| | | household waste | 2,760 t | |
| | territory planning | transporting of soil masses in the volume | 79633,405 $m^3$ | |

| | | | | |
|---|---|---|---|---|
| | dredging works | | 112 000m$^3$ | |
| Flora and fauna, deterioration of the living conditions of animals, determination of quantitative and qualitative characteristics - subsections 1.3.2, 1.5.1, appendix 8 | destruction of habitats of terrestrial representatives of the fauna - during territory planning | area of damage | 19,0 hectares | |
| | during the organization of coastal dumping of bottom soils | | 1,24 hectares | |
| | trees removal | self-seeding, faut, dead and emergency trees | 841 trees and 740 bushes | |
| | noise of mechanisms | scaring away representatives of the animal world | 42,76 dBA | 41,76 dBA |
| | deterioration of living conditions of ichthyofauna and aquatic biocenoses (loss of fish products) as a result of dredging works | zone of increased water turbidity | 2481,2 m$^3$ | |
| | | destruction of the forage base (zoobenthos), the area of bottom damage is 23,200 m2 | 0,00265 t | |
| | | destruction of the forage base (phytoplankton, zooplankton) in a water volume of 530,000 m$^3$ | 0,002722 t | |
| | | the loss of hard roe and juvenile fish in a water volume of 531840 m$^3$ | 0,2395701 t | |
| Climatic factors, determination of quantitative and qualitative characteristics - subsections 1.5.1, appendix 5 | diesel generators, mobile sources (vehicles, construction machinery and hydraulic engineering) | emissions of greenhouse gases: carbon dioxide, methane, nitrogen (1) oxide (N2O) | 1615,23405 t | 1614,17569 t |
| | | thermal pollution is absent | - | |
| Socio-economic conditions - health of the population, determination of quantitative and qualitative characteristics - subsection 1.5.1, appendix 9 | atmospheric air pollution | the impact is insignificant, local in place and time | - | |
| | noise of mechanisms | sound level at the border of residential buildings | 42,76 dBA | 41,76 dBA |
| | surface source contamination during dredging operations | local in place and time:<br>- maximum length of turbidity plume<br>- the maximum time for the return of the aquatic environment to the normative state | 69,23 m,<br>1, 0 h | |

| | | | | |
|---|---|---|---|---|
| | change of climatic factors | within acceptable limits | - | |
| **Implementation of planned activities** | | | | |
| Atmospheric air - pollution by emissions (without greenhouse gases), quantitative and qualitative indicators in the section of each type of work (processes) - subsection 1.5.2, appendix 10 | transshipment operations and warehouse storage of grain cargoes | emissions: substances in the form of suspended solid particles, nitrogen oxides, ammonia, sulfur dioxide, carbon monoxide, non-methane volatile organic compounds, benz(a)pyrene, iron and its compounds in terms of iron, manganese and its compounds, metallic mercury, lead and its compounds, hydrogen chloride | 70,53554 t/year | |
| | metal processing equipment operation | | | |
| | painting works | | | |
| | combustion of organic fuel in a grain dryer, solid fuel boilers | | | |
| | mobile sources (road transport, water transport) | | | |
| Aquatic environment (surface waters of the Danube River), determination of quantitative and qualitative characteristics - subsections 1.4, 1.5.2, table. 1.4.1, 1.5.2.7, 1.5.2.8, appendices 4, 11, 12 | water intake from the Danube River | volumes of water consumption, $m^3$/year | 20501,394 | 14450,000 $m^3$/year |
| | water intake from the Izmail underground water deposit | volumes of water consumption, $m^3$/year | - | 5316, 713 |
| | discharge of treated surface runoff into the surface waters of the Danube River, collected from the port territory | pollutants in the volume of discharged return water: suspended substances, biochemical oxygen demand (BOD5), chemical oxygen demand (COD), oil products, ammonium nitrogen, nitrates, total iron, sulfates, nitrates, chlorides, phosphates | 48,69464 t/year | |
| | transshipment works and storage of grain cargoes in an open manner | settling of suspended substances | 15,93939 t/year | |
| Soils and geological environment, determination of quantitative and qualitative characteristics - | technological processes and productions in which waste is generated: grain cleaning, lighting of premises, office work, | industrial waste of hazard class 2-4: grain waste, LED lamps, oiled rags, scrap metal, paint containers, filter material of dust-cleaning equipment, discarded office equipment, shavings and metal shavings, electrode cinders, spent | 1875,763 t/year | |

| | | | |
|---|---|---|---|
| subsection 1.5.2, table. 1.5.2.3 | metal processing, painting and welding work, maintenance of transport and special equipment, storage of petroleum products, wastewater treatment, operation of an incinerator, life activities of employees | batteries, technical oils (motor, hydraulic ), filters (oil, fuel, air), worn tires, bilge water, cleaning of oil storage tanks, oiled sand, sludge (from lubricants and sewage), ash, kitchen waste | |
| | | household waste: | 247,500 t/year |
| Climatic factors – atmospheric air pollution by greenhouse gases, given in p. 1.5.2, appendix 10 | combustion of organic fuel in a grain dryer, solid fuel boilers | emissions of greenhouse gases: carbon dioxide, methane, nitrogen (1) oxide (N2O) | 1175,89291 t/year |
| | operation of internal combustion engines of mobile sources | thermal pollution is absent | - |
| Socio-economic living conditions of the population (health), determination of quantitative and qualitative characteristics - subsections 1.5.2., 5.3., 5.4. appendix 12, 14, 16 | atmospheric air pollution at the border of residential buildings | the maximum contribution to pollution by summation group 31 (sulfur dioxide and nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]), | 0,6543ПДК |
| | | risk of non-carcinogenic effects | 4,54E-04 |
| | | the risk of developing individual carcinogenic effects | 8,39E-09 |
| | | the noise effect of the mechanisms (sound level at the border of residential buildings) does not exceed the established standards for the night time (45 dBA) | 41,93 dBA |
| | pollution of surface waters of sources of cultural and domestic purpose | concentration of pollutants in the control structure 500 m below the outlet: suspended substances, BOD5, COD, petroleum products, ammonium nitrogen, nitrites, total iron, sulfates, nitrates, chlorides, phosphates | quantitative indicators do not exceed the established standards (table 1.5.2.9) |
| | soil pollution | no direct impact due to the creation of environmentally friendly conditions for waste | - |

| | | | |
|---|---|---|---|
| | | management | |
| | change of climatic factors | within acceptable limits | - |

# V. DESCRIPTION AND ASSESSMENT OF THE POSSIBLE IMPACT ON THE ENVIRONMENT OF THE PLANNED ACTIVITY, PARTICULARLY THE SIZE AND SCALE OF SUCH IMPACT

## *5.1 The impact caused by the implementation of preparatory and construction works and the implementation of planned activities*

During performing preparatory and construction works, the atmospheric air, water environment (surface water), soils, flora and fauna, climatic factors are affected, which can have a negative impact on the socio-economic conditions of life of the population, in particular on their health.

**- atmospheric air:** the sources of influence are emissions of pollutants into the atmospheric air during construction works: welding, insulation, earthworks, painting works, mobile sources (vehicles, construction machinery and hydraulic engineering). The estimated amount of pollutants emitted into the atmosphere by stationary sources during the construction works according to technical alternative 2, which is accepted as ecologically justified - 4.81900 tons, by mobile sources - 47.89033 tons, the maximum total equivalent sound level under technical alternative 2 is 41, 76 dBA and does not exceed the permissible sound level at the border of the residential area at night (45 dBA). Calculations of emissions in terms of technological processes are given in Appendix 5 and summarized in the table. 1.5.1.2. with a breakdown by substances. Parameters of pollutant emission sources of the planned activity during preparatory and construction works are given in Appendix 5. Noise calculation – Appendix 9.

The planned activity involves the implementation during construction of measures that minimize the impact on atmospheric air:

sheltering loose building materials during transportation and storage, moistening during use (if possible);

compliance with the rules of operation of construction machinery and motor vehicles, control of their technical condition;

the use of fuel in engines that meets the requirements of the Technical Regulation on requirements for automobile gasoline, diesel, marine and boiler fuels, approved by the Resolution of the Cabinet of Ministers of Ukraine No. 927 dated August 1, 2013;

**- water environment:** the sources of impact are the processes of pouring and storage of loose construction materials and soil loss during dredging operations. The estimated amount of suspended solids settling on the surface waters of the Danube during construction works, according to technical alternative 2, is 0.54637 tons. The calculation is given in subsection 1.5.1 of this report. The impact is minimal due to the planned measures for sheltering loose construction materials during transportation and storage, moistening during use (if possible).

When performing dredging operations, the finely dispersed component of the bottom soil is transferred to a suspended state, the estimated volume of solid particles discharged from the coastal dump as part of clarified water is 281,344 tons, while the impact does not go beyond the port water area: the maximum length of the turbidity plume is 69,23m, the maximum time for the water environment to return to the standard state is 1.0 hours. Calculation of indicators of the effects of dredging operations on the state of surface waters - Appendix 6 to this report.

The minimal level of impact of dredging works on the surface waters of the Danube River is ensured by the adopted technological solutions:

– the coastal dump is located relatively close to the dredging site, the soil capacity of the coastal dump corresponds to the design volume of soil excavation;

– the construction of the coastal dump provides protection against soil erosion under the action of waves, clarification of water and its organized drainage from the alluvial maps;

– modern hydrotechnical means are used in the dredging works, which ensure minimal loss of soil into the water and, as a result, a slight increase in its turbidity;

– application for carrying out work on modern vessels of the technical fleet that meet the requirements of the International Convention on the Prevention of Pollution from Ships of 1973. MARPOL 73/78[20] and has the Certificate "On Prevention of Oil, Waste Water, Garbage and Atmosphere Pollution" (Appendix 2), issued by the Register of Shipping of Ukraine;

– **soils and geological environment:** the sources of influence are production and domestic waste generation, territory planning and dredging works.

As a result of construction and assembly works, waste of IV hazard class is generated, the estimated amount of waste generated under technical alternative 2 is: industrial - 5,352 tons, domestic - 2,760 tons. Calculation of the amount of waste and their quality characteristics are given in subsection 1.5, table 1.5.1.1.

There is no direct impact of waste on environmental factors due to the creation of ecologically safe conditions for waste management: metal containers are provided for their collection and temporary storage at the construction site, which meets the conditions for storing waste of the IV hazard class in a solid aggregate state. Waste generated as a result of construction and preparatory works, as it accumulates, is transferred to specialized enterprises under signed contracts for disposal or disposal. Damages to the surrounding natural environment during the placement of waste are compensated by appropriate payments.

During the engineering preparation of the construction site and planning of the territory with an area of 19.0 hectares, the soil in the volume of 79,633.405 $m^3$ is to be moved, during the dredging works on the area - 112.0 $m^3$ of bottom soil on the area with its transfer to the coastal map of the alluvium with an area of 1,24 ha.

Samples of bottom soil and local soils in the area of the coastal dump were checked for the content of man-made organic and inorganic pollutants. According to the results of the conducted research, the soils are ecologically safe and do not contain significant amounts of man-made pollutants.

The planned activity includes a set of measures to minimize soil pollution in case of emergency situations:

– arrangement of special places for assembly of building materials and parking of construction equipment;

– compliance with the rules of transportation and storage of materials, localization of areas where spills and channels are inevitable;

– compliance with the rules of operation of construction machinery and motor vehicles, control of their technical condition;

– for the temporary storage of waste, conditions have been created that ensure their ecologically safe storage in accordance with the class of danger, their type and aggregate state;

- **flora and fauna:** the sources of influence are the processes of territory planning, dredging works, the noise effect of mechanisms and the demolition of green spaces, and it can also manifest itself through the pollution of atmospheric air, water and soils.

During construction, the impact on the atmospheric air, water environment and soils is limited to the place and time of construction work and is minimized by the implementation of protective measures, the assessment and description of which are presented in the relevant parts of this subsection. Taking into account the industrial saturation of the area of the planned activity, it can be predicted that the area is not favorable for the development of flora and fauna and the life of their representatives, there are no objects of the nature reserve fund.

The planning of the territory on the area of 19.0 hectares and the organization of the coastal dumping of dredging soils on the area of 1.23 hectares leads to the deterioration of the living conditions of terrestrial representatives of the animal world adapted to live in the production environment, as their habitats are destroyed.

Dredging works on an area of 2.32 hectares cause a deterioration of the living conditions of ichthyofauna and aquatic biocenoses (losses of fish products) due to the spread of turbidity in the water volume of 2481.2 $m^3$, the destruction of the feed base (zoobenthos, plankton) in the amount of 0.005372 tons, losses caviar and young fish 0.240044 tons. For losses to the fishery as a result of hydrotechnical works - UAH 23662.67 without VAT. Assessment of the impact of hydrotechnical works on the state of ichthyofauna and aquatic biocenoses and calculation of damages - appendix 8.

The main measure to minimize the impact of hydrotechnical works is to carry out hydrotechnical works in the non-spawning period and to direct compensatory funds for their further use in carrying out measures to restore fish stocks of the Danube River.

The removal of 841 trees and 740 bushes and the noise of the mechanisms are positive factors of influence, since the green areas are faulty, dry and emergency (Act No. 54 dated 20.04.2022 - appendix 1), and the noise of the mechanisms has the effect of scaring away representatives of the animal world. Instead of the demolished green areas on the territory of the planned activity, it is planned to plant green areas on an area of 7.2 hectares (38 % of the total area). More details are given in subsections 1.3, 1.5.1;

- **climatic factors:** the sources of influence are emissions of greenhouse gases released during the operation of diesel generators, mobile sources (vehicles, construction equipment and hydraulic engineering). The estimated amount of greenhouse gases emitted into the atmosphere by mobile sources is 1614.17569 tons. There is no thermal effect.

- Calculation of the volumes of greenhouse gas emissions in terms of technological processes are given in Appendix 10 and summarized in the table. 1.5.1.2. with a breakdown by substances. Parameters of pollutant emission sources of the planned activity during preparatory and construction works, taking into account the options of accepted technical alternatives 1,2 are given in section 1.5.1 and appendix 7;

- **vibration, radiation, light and heat pollution and electromagnetic radiation** – there are no sources of influence.

Atmospheric air, water environment (surface water), soils, flora and fauna, and climatic factors **are affected by the planned activity.**

- **atmospheric air:** the sources of influence are emissions of pollutants into the atmospheric air during operations on transshipment and processing of grain, oil and leguminous crops; water and road transport refueling operations; combustion of organic

fuel in a grain dryer, solid fuel boilers and an incinerator; welding, gas cutting, painting processes; engines of automobile, railway and water transport.

The estimated amount of pollutants emitted into the atmosphere by stationary sources is - 27.422607 g/sec; 70.53554 t/year; mobile sources - 4.786027 g/sec, 19.28627 t/year. Calculations of emissions in terms of technological processes are given in Appendix 10 and summarized in the table. 1.5.2.5. and 1.5.2.6. with a breakdown by substances. The parameters of pollutant emission sources of the planned activity during preparatory and construction works are given in Appendix 10.

The main measures for the localization and minimization of dust emissions into the atmosphere are the use of closed technology for the transportation and processing of grain cargoes, which ensures the localization of dust emissions, and the equipping of transfer units with high-efficiency filter-type dust cleaning equipment in the amount of 39 units. With the planned volume of overloads (3100 thousand tons/year of agricultural crops), the amount of dust captured by these filters is calculated to be 1140.28870 tons/year, which is 96.52% of the total amount of dust generation.

The maximum calculated sound level is 41.93 dBA, the calculation is given in Appendix 14. Measures are planned to minimize the noise impact on the environment

- installation of mechanisms on vibration-isolating supports, use of flexible inserts between fans and air ducts of aspiration systems;
- use of sound-insulating building materials, installation of a hard concrete surface under the truck parking lot and car parking lot, under driveways and passages.
- **water environment:** the sources of influence are the intake of water from the Danube River, the discharge of pollutants in the composition of purified surface runoff into the surface water of the Danube River, collected from the port territory, the processes of transshipment and open storage of grain cargoes.

The needs of household and industrial water consumption and drainage are provided by connection to municipal water supply and sewerage networks. The technical needs of the object of the planned activity (watering of green areas, washing of roads and sidewalks with a hard surface and dust suppression) are provided by water intake from the Danube River with a volume of 234,500 $m^3$/day, 14,450,000 $m^3$/year. Calculation of water consumption for watering green areas, sidewalks and driveways - Appendix 4.

Only surface runoff in the volume of 51,602.01 $m^3$/year is diverted to the surface waters of the Danube River, which is collected from the territory of the object of the planned activity and before discharge is treated in local treatment facilities of the storm sewer system, while the estimated amount of pollutants, discharged into the surface waters of the Danube River, is 48.69464 t/year. Normative calculation of volumes and consumption of surface runoff, as well as selection of the productivity of treatment facilities - appendix 4, calculation of the amount of pollutants discharged into surface water - table. 1.5.2.8 subsection 1.5.2.

When using this scheme for the removal of economic and domestic waste, the impact on the environment is minimal, only in emergency situations. Considering the above, the proposed water supply and drainage system is optimal, the negative impact on the environment is minimal.

The planned activity involves the implementation of measures to minimize pollution of the Danube waters by:

cleaning of the entire volume of surface runoff in local treatment facilities, which ensure the efficiency of cleaning from suspended substances at the level of 97.5 %, from oil products - 99.9 %;

reducing the volume of treated surface runoff to the Danube River due to the use of treated surface runoff for technical needs of the port: watering of green areas, washing of roads and sidewalks, dust suppression. For this, two concrete storage tanks with a volume of 200m$^3$ and 60m$^3$are provided as part of the storm sewerage system of the port;

organizations in the coastal zone of the port of facilities for receiving ship waste (economic and fecal sewage, sewage and household waste) with their subsequent transfer to specialized organizations under concluded contracts;

the use of a tug fleet for the transportation of goods equipped with closed systems for the accumulation of sewage - fecal and liquid water with an installed warning alarm system (WPS).

All the company's vessels meet the requirements of the International Convention on the Prevention of Pollution from Ships of 1973 MARPOL 73/78 [20] and have the Certificate "On Prevention of Oil, Waste Water, Garbage and Atmosphere Pollution" (Appendix 2), issued by the Register of Shipping of Ukraine.

During transshipment operations and open storage of grain, emissions of suspended particles, undifferentiated in composition after dispersion in the atmosphere, are deposited on the water surface of the Danube River. The estimated amount of suspended substances deposited on the surface waters of the Danube River during the planned activity is 15.93939 t/year. The calculation is given in subsection 1.5.2 of this report.

In order to minimize the negative impact on the environment (atmospheric air and surface water) of transshipment operations using a grab, a set of measures has been developed:

- closing the gaps between the sides of the ships with tarpaulin covers in the places where the grab is carried, which prevents the cargo from falling into the water;
- opening the grab with the load at a height of no more than 1 m from the pile or previously loaded layer of the load, which minimizes dust generation;
- cleaning the ship's deck from possible cargo spills at the end of the shift (and if necessary - during the shift), dumping (sweeping) cargo spills from the ship into the water is PROHIBITED;
- transshipment operations are PROHIBITED in case of waves with a wave height of 3 % of safety up to 1.5 m and a wind force of up to 20 m/ s, as well as during precipitation (rain, snow, hail), the holds of ships must be closed during atmospheric precipitation;
- removal of the grapple from the hold only after its jaws are fully engaged and the load has completely stopped pouring out of it.

Thus, thanks to the planned measures, the impact of the planned activity is estimated to be minimal and compensated by appropriate payments to the local budget.

- **soils and geological environment:** sources of influence are industrial and household waste, as well as transport.

Technological processes during the implementation of the planned activity are associated with the formation of 23 types of waste of II - IV hazard classes with a total estimated volume of 2123.263 t/year, of which industrial waste - 1875.763 t/year, household waste - 247.500 t/year.

The planned activity involves the creation of conditions for environmentally safe storage of waste according to its type, aggregate state and hazard class: II class (highly hazardous) - closed metal barrels that prevent the spread of harmful substances (ingredients); Class III (moderately dangerous) - metal barrels and polypropylene bags,

which ensures localized storage, allows carrying out loading and unloading and transport operations and excludes the spread of harmful substances in the environment; Class IV (less dangerous) – metal containers, on an industrial site or in a warehouse.

As the waste accumulates, it is transferred to specialized enterprises under concluded contracts for disposal or disposal. The calculation of the quantitative characteristics of waste, as well as their qualitative characteristics and ways of handling them, are given in subsection 1.5.2 and table 1.5.2.3.

The operation of the object of the planned activity does not involve a direct intensive impact on the soil, provided that a set of measures is implemented to minimize the occurrence of soil pollution in the event of possible emergency situations related to oil spills:

- arrangement of special places with a concrete surface: temporary parking for cargo vehicles for 40 car spaces, temporary parking for passenger vehicles for 23 car spaces;

–arrangement of intra-site roads with concrete surface;

–compliance with the rules of transportation and storage of petroleum products, arrangement of hard covering of areas where their ducts are inevitable;

–compliance with the rules of operation of the motor vehicle, control of its technical condition;

–organization of posts for localization and liquidation of emergency oil spills with appropriate equipment and a constant supply of sorbents;

–creation of conditions for environmentally safe waste storage and handling.

Thanks to the planned measures, the impact of the planned activity is assessed as not exceeding the regulatory limits and minimized due to the implementation of measures, including for environmentally safe waste management.

- **flora and fauna** of the area is not favorable for the development of flora and fauna and the life of their representatives.

The impact on representatives of flora and fauna adapted to live in the production environment is caused by the deterioration of their living conditions, which is manifested by pollution of the atmospheric air, water environment and soils. According to subsection 1.5.2 of this report, the specified types of impacts do not exceed regulatory limits and are minimized due to the implementation of measures aimed at reducing emissions, discharges and ensuring their regulatory cleaning, as well as measures to reduce noise impact on the environment and greening the territory.

- **climatic factors:** the sources of influence are emissions of greenhouse gases released during the operation of grain dryers, solid fuel boilers, incinerators, mobile sources. Volumes of greenhouse gas emissions from stationary sources - 676.926116 g/sec; 592.02063 t/year, from mobile sources - 144.039248 g/sec; 583.87228 t/year. There is no thermal effect.

Since the total thermal capacity of equipment and mechanisms that are sources of greenhouse gas emissions is < 20 MW (equipment with thermal capacity < 3.0 MW is not taken into account), the planned activity is not subject to monitoring, reporting and verification.

Calculation of the volumes of greenhouse gas emissions in terms of technological processes are given in Appendix 10 and summarized in the table. 1.5.2.5. and 1.5.2.6. with a breakdown by substances. More detailed information on the impact of the planned activity on the climate is provided in section 5.6. The parameters of sources of emissions of pollutants during the implementation of the planned activity are given in appendix 10.

**- vibration pollution** – sources of vibration are technological and ventilation equipment. According to sanitary and hygienic regulations, the level of vibration at the border of the nearest residential building is defined as "absent".

**- electromagnetic radiation** – there are no sources of electromagnetic radiation that have a negative impact on the environment;

**- radiation pollution** – the planned activity does not involve the use of equipment that is a source of ionizing radiation, there is no impact related to radiation pollution of the environment;

**- light and heat pollution**- there are no sources of potential light and heat pollution.

***5.2. The impact is due to the use of natural resources in the process of carrying out the planned activity, in particular land, soil, water and biodiversity***

The implementation of the planned activity involves the use of natural resources for the long term:

land resources (during the existence of the enterprise):

- land plots for the construction and operation of a transport infrastructure object - a river port (terminal) with an area of 19.7 hectares;
- a plot of land from the lands of the water fund for the construction of an operational water area with a water approach with an area of 10.4357 hectares;

water resources (during the existence of the enterprise):

- surface waters of the Danube River for the needs of water transport without extracting water from water bodies;
- surface waters of the Danube River for the technical needs of the object of the planned activity, the estimated volume of water intake - 14450,000 $m^3$/year;
- underground water of the Izmail underground water deposit for household and industrial needs under the contract with KP "Izmail Industrial Water Supply and Sewerage Management", the estimated volume of water intake - 5316.713 $m^3$/year;
- surface waters of the Danube River for the removal of purified surface runoff from the port territory, the estimated volume of water removal - 51,602.01 $m^3$/year;

fossil fuel (during the existence of the enterprise)

- natural gas for fuel-using equipment, estimated volume – 218,700 $m^3$/year.

The planned activity involves the use of natural resources for a short term (term of preparatory work - 1 month, dredging - 52 days)

- soils within the leased area for vertical planning of the construction site without extraction, the volume of movement of soil masses - 79633.405 $m^3$;
- bottom soils within the area set aside for the construction of the water area and water approach, extraction volume - 112 $m^3$;
- surface water for transporting pulp, extraction volume – 530,000 $m^3$
- trees and bushes in the amount of 841 trees and 740 bushes, as elements of biodiversity, were demolished, the wood was transferred free of charge for the needs of the Izmail city;
- hydrobionites (benthos, plankton, roe and young fish), as elements of biodiversity, are subject to destruction during dredging operations on an area of 2.32 hectares, which, as a result, in its natural form amounts to 0.245416 tons.

The impact of the planned activity in connection with the use of natural resources is assessed as not exceeding regulatory limits due to the following:

- land resources are used as intended;
- water intake due to small volumes does not affect the water content of surface and underground sources of water supply: the average volume of the annual flow of the Danube River within the Odesa region is about 123,000 thousand $m^3$/year, the total flow rate of the underground water intake, consisting of 45 wells - 12,775 million $m^3$/year;
- discharge to the surface waters of the Danube is insignificant in terms of volume and is less than 0.1 % of the total annual volume of discharge back to the Danube within the Odesa region (according to the Regional Report on the State of the Environment in the Odesa Region in 2020, the average (the volume of flow into the Danube River is about 24,406 thousand $m^3$ per year), the quality indicators of the discharge do not exceed the background values;

the volume of gas used is insignificant compared to the reserves of gas-bearing fields, the minimization of its costs is achieved by implementing energy-saving measures: energy-saving burners, modern fuel-using equipment;

- the landscape of the territory of the planned activity belongs to the urban production environment, which is characterized by the lack of conditions for the development of valuable species of animals and plants, the elements of biodiversity that have been removed (trees, bushes), are not classified as valuable species, according to the results of the survey, are faulty, dry and emergency;
- all volumes of nature use are compensated by appropriate payments and measures.

### *5.3 Impact caused by emissions and discharges of pollutants, noise, vibration, light, heat and radiation pollution, radiation and other factors of influence, as well as carrying out operations in the field of waste management*

**The impact is caused by emissions.**

The planned activity is associated with emissions of pollutants from stationary and mobile sources, the quantitative and qualitative indicators of which are given in subsection 5.1 of this report.

The impact of emissions is manifested in the dispersion of pollutants in the atmospheric air. To assess this impact on computers, the calculation of the dispersion of pollutants was performed using the automated system for calculating atmospheric pollution "Eol-Plus" (version 5.3.8), developed by KBSP "Topaz" (Kyiv) and recommended for use by the Ministry of Health and Safety of Ukraine (letter issue No. 11 - 6 - 38 dated 25.01.2000).

The calculation site is represented by a square with a side of 2.0 km. The calculation is made with a step of 50 m, the coordinate axis "Y" is directed to the north. The "0" point of the coordinate system of the industrial site is the southwest corner of the administrative and household building with a laboratory and a canopy. This point is the starting point for determining the coordinates of emission sources and constructing isolines of pollutant concentrations and the influence zone.

For each of the polluting substances, the feasibility (necessity) of carrying out dispersion calculations in atmospheric air according to the formula is determined:

$$\frac{M}{MPC} > \Phi \qquad \Phi = 0{,}01 \cdot H \qquad at\ H > 10\ m$$

$$MPC > \Phi, \qquad \Phi = 0{,}1 \quad at\ H < 10\ m$$

where M – the total value of emissions from all sources of the enterprise, g/s;

MPC – the maximum single marginally permissible concentration, mg/ $m^3$;

H –enterprise-weighted average height of the emission source, m.

Information on the expediency of computer scattering calculations for each pollutant is given in Table 5.3.1.

Table 5.3.1.

| № i/o | The name of the pollutant substances | | Expediency of carrying out scattering calculations / yes or no/ M/MPC> Φ |
|---|---|---|---|
| 1 | 2 | | 3 |
| 1 | 01003/123 | Iron and its compounds (in terms of iron) | no |
| 2 | 01004/133 | Cadmium and its compounds (in terms of cadmium) | no |
| 3 | 01007/183 | Mercury and its compounds (in terms of mercury) | no |
| 4 | 01009/184 | Lead and its compounds (in terms of lead) | yes |
| 5 | 01104/143 | Manganese and its compounds (in terms of manganese) | no |
| 6 | 03000/2902 | Substances in the form of suspended solids (microparticles and fibers) | yes |
| 7 | 04001/301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | yes |
| 8 | 04002/11815 | Nitrogen(1) oxide(N2O) | no |
| 9 | 04003/303 | Ammonia | no |
| 10 | 05001/330 | Sulfur dioxide | yes |
| 11 | 05002/333 | Hydrogen sulfide(H2S) | no |
| 12 | 06000/337 | Carbon monoxide | yes |
| 13 | 07000/11812 | Carbon dioxide | no |
| 14 | 10002/1819 | Dimethylamine | no |
| 15 | 11000/2754 | Non-methane light organic compounds(NMLOC) | yes |
| 16 | 11004/1301 | Acrolein | no |
| 17 | 11006/1317 | Acetaldehyde | no |
| 18 | 11016/10509 | Dibenz(a,p)anthracene | no |
| 19 | 11028/1555 | Acetic acid | no |
| 20 | 11030/616 | Xylene | yes |
| 21 | 12000/410 | Methane | no |
| 22 | 13101/703 | Benz(a)pyrene | yes |
| 23 | 15003/316 | Hydrogen chloride (hydrochloric acid by molecule HCl) | yes |

According to the results of the calculations, it was determined that out of 23 substances emitted by the sources of the planned activity, it is advisable to calculate the dispersion for 9 pollutants and one summation group.

In the table 5.3.1 "substances in the form of suspended solid particles (microparticles and fibers)" is the sum of pollutants that are included in the list of solid substances by order of the Ministry of Ecology and Natural Resources of Ukraine dated March 14, 2002 No. 104 [37]: soot, abrasive dust, metal dust, aerosol paint, grain dust, sunflower seed dust, flour dust. In the scattering program, they are included as "dust undifferentiated by composition" (code 2902).

Scattering calculations were performed at dangerous wind speeds, taking into account the climatic characteristics and background concentration values issued by the Danube Hydrometeorological Observatory (issue letter No. 9915-04-14/323 dated 04.22.2022 - appendix 15).

The normative SZZ of the port is determined by an integrated combination of SZZ from all industries existing in the territory of the Port, taking into account their mutual location. The largest is a sanitary and protective zone measuring 300 m from the borders of the areas of overloading and open storage of dusty cargoes. The reasons for defining a sanitary protection zone are set out in subsection 1.4 of this report.

The minimum distance from the sources of emissions of polluting substances to residential buildings in the Izmail city is 555 m.

To control surface concentrations of pollutants in atmospheric air for compliance with hygienic standards, four control points are adopted:

- on the border of the recreation area (Luka Kapikrayana embankment) –к.t. No. 1;
- on the border of the sanitary protection zone (300 m) - к.t. number 2;
- on the border of the nearest residential building in Izmail (555 m) - c.t. number 3;
- on the state border with Romania - к.t. No. 4.

The standard sanitary protection zone and control points are marked on the Situation Map-diagram of the object of the planned activity (Drawing 1). The results of computer scattering calculation and scattering maps with isolines of atmospheric pollution in the regions of the MPC are given in Appendix 10.

The values of the maximum surface concentrations in the areas of the MPC, at the control points on the border of the sanitary protection zone and the nearest residential building, are summarized in Table 5.3.2.

Table 5.3.2.

| **Name pollutants** | Concentrations **(parts of MPC) at the border:** | | | |
|---|---|---|---|---|
| | recreation areas | **Normative sanitary protection zone** | **residential building Izmail** | **State border with Romania** |
| | **c.p. № 1** | **c.p. № 2** | **c.p. № 3** | **c.p. № 4** |
| Lead and its compounds (in terms of lead) | 0,5533 | 0,5567 | 0,5295 | 0,5531 |
| including background | *0,400* | *0,400* | *0,400* | *0,400* |
| including contribution | **0,1533** | **0,1567** | **0,1295** | **0,1531** |

| | | | | |
|---|---|---|---|---|
| Hydrogen chloride (hydrochloric acid by the HCl molecule)<br>including background<br>including contribution | 0,5061<br>*0,400*<br>**0,1061** | 0,5065<br>*0,400*<br>**0,1065** | 0,5034<br>*0,400*<br>**0,1034** | 0,5060<br>*0,400*<br>**0,1060** |
| Benz(a)pyrene<br>including background<br>including contribution | 0,5000<br>*0,400*<br>**0,1000** | 0,5000<br>*0,400*<br>**0,1000** | 0,5000<br>*0,400*<br>**0,1000** | 0,5000<br>*0,400*<br>**0,1000** |
| Xylene<br>including background<br>including contribution | 0,5410<br>*0,400*<br>**0,1410** | 0,5407<br>*0,400*<br>**0,1407** | 0,5203<br>*0,400*<br>**0,1203** | 0,5404<br>*0,400*<br>**0,1404** |
| Non-methane light organic compounds (NMLOCs)<br>including background<br>including contribution | 0,5000<br>*0,400*<br>**0,1000** | 0,5000<br>*0,400*<br>**0,1000** | 0,5000<br>*0,400*<br>**0,1000** | 0,5000<br>*0,400*<br>**0,1000** |
| Carbon monoxide<br>including background<br>including contribution | 0,2981<br>*0,2385*<br>**0,0596** | 0,2981<br>*0,2385*<br>**0,0596** | 0,2981<br>*0,2385*<br>**0,0596** | 0,2981<br>*0,2385*<br>**0,0596** |
| Sulfur dioxide<br>including background<br>including contribution | 0,0902<br>*0,07218*<br>**0,0180** | 0,0902<br>*0,07218*<br>**0,0180** | 0,0902<br>*0,07218*<br>**0,0180** | 0,0902<br>*0,07218*<br>**0,0180** |
| Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2])<br>including background<br>including contribution | 0,5640<br>*0,45125*<br>**0,1128** | 0,5640<br>*0,45125*<br>**0,1128** | 0,5640<br>*0,45125*<br>**0,1128** | 0,5640<br>*0,45125*<br>**0,1128** |
| Substances in the form of suspended solids (microparticles and fibers)<br>including background<br>including contribution | 0,2804<br>*0,2239*<br>**0,0565** | 0,2826<br>*0,2239*<br>**0,0587** | 0,2799<br>*0,2239*<br>**0,0560** | 0,2799<br>*0,2239*<br>**0,0560** |
| Summation group 31 (sulfur dioxide and nitrogen oxides (in terms of nitrogen dioxide [NO + NO2])<br>including background<br>including contribution | 0,6543<br>--<br>**0,6543** | 0,6543<br>--<br>**0,6543** | 0,6543<br>--<br>**0,6543** | 0,6543<br>--<br>**0,6543** |

According to the results of the dispersion calculations, it was determined that during the planned activity, the values of the maximum surface concentrations in the atmospheric air, taking into account the background at the border of the sanitary protection zone and the nearest residential building, do not exceed the established maximum permissible limit of pollutants in the atmospheric air of populated cities, which confirms the adequacy of the normative sanitary protective zone.

The obtained values of the surface concentrations of emitted pollutants confirm the insignificant intensity of the impact of the planned activity on the atmospheric air, the maximum contribution is observed in summation group 31 (sulfur dioxide and nitrogen

oxides (in terms of nitrogen dioxide [NO + NO2]), which is within the limits of the MPC is 0.6543.

**The impact is due to discharges.**

The planned activity is related to the discharge of pollutants into the surface waters of the Danube, the quantitative and qualitative indicators of which are given in subsections 1.5.2 and 5.1 of this report.

Purified surface runoff in the volume of 51,602.01 $m^3$/year, which is collected from the territory of the object of the planned activity and before discharge, is treated in local treatment facilities of the storm sewer system, is foreseen for the surface waters of the Danube River. The estimated amount of pollutants discharged into the surface waters of the Danube is 48.69464 t/year. Calculations - appendices, subsection 1.5.2.

The discharge of pollutants into surface waters is minimized due to the treatment of the entire volume of surface runoff in local treatment facilities, which ensure the efficiency of cleaning from suspended substances at the level of 97.5 %, from oil products - 99.9 %.

According to the results of the calculations of the dilution of the return water discharge of the object of the planned activity in the control body of the Danube River 500 m below the outlet, the concentration of pollutants does not exceed the established standards. The results of determining the estimated water quality of the watercourse (Danube River) in the control body are shown in Table 1.5.2.9, calculation - Appendix 12.

***Social and economic living conditions of the population (health of the population)***

Emissions and discharges of pollutants, noise, vibration, light, heat and radiation pollution, radiation, changes in climatic factors and waste generation are potential sources of influence on the socio-economic living conditions of the population, and pose a threat to the deterioration of their health.

According to subsection 5.1, the specified types of impact are characterized as those that do not exceed regulatory limits and are minimized due to the implementation of measures aimed at reducing emissions, discharges and ensuring their regulatory cleaning, as well as measures to reduce the noise impact on the environment.

During construction, all types of impacts are characterized as insignificant, limited by the place and time of construction and installation work, which for each stage of construction does not exceed 3 months, for dredging works - 52 days (not including downtime).

According to the results of dispersion calculations, it was determined that during the planned activity, the values of the maximum surface concentrations in the atmospheric air, taking into account the background at the control points on the border of the sanitary protection zone and the nearest residential building, do not exceed the established MPC of pollutants in the atmospheric air of populated cities, the sound level in the control at a point on the border of residential buildings according to calculations is 41.93 dBA and does not exceed the permissible sound level at night (45 dBA).

The obtained values of the surface concentrations of emitted pollutants confirm the insignificant intensity of the impact of the planned activity on the atmospheric air, the maximum contribution is observed in summation group 31 (sulfur dioxide and nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]), which is within the limits of the MPC is 0.6543 (data in Table 5.3.2).

According to the results of the calculations of the risk of the impact of the planned activity on the public's health from atmospheric air pollution, it was established that: the risk of harmful effects is extremely small, the risk of the development of individual carcinogenic effects is acceptable (calculation of risks - Appendix 16 to this report)

According to the results of calculations, the concentration of pollutants in the control structure, located 500 m downstream from the discharge of return water of the object of the planned activity, do not exceed the established standards in connection with the discharge of return water (Appendix 12, table. 1.5.2.9).

According to sanitary and hygienic standards, there is no vibration level at the border of the nearest residential building, there are no sources of electromagnetic, ionizing, light and heat radiation that have a negative impact on the environment.

In the territory of the planned activity, it is envisaged to create conditions for environmentally safe storage of waste in accordance with their type, aggregate state and hazard class. Information on waste and ways of handling it is given in subsections 1.5.2 and 5.1, as well as table 1.5.2.1.

The minimum distance from the sources of emissions of polluting substances to the residential buildings of the Izmail city is 555 m. According to the given characteristics of the effects on environmental factors and taking into account the remoteness, the population of the Izmail city will not experience a deterioration in the quality of atmospheric air, water and climate changes in connection with the implementation of the planned activity.

Meanwhile, the planned activity has a positive social effect - the construction of a modern enterprise will ensure the sustainable development of the local community due to stable tax deductions to local budgets of all levels, the creation of 100 additional jobs and the improvement of working conditions, the development of agricultural production and the region, the revival of shipping, etc.

In particular, the amount of the environmental tax during construction is UAH 37,057.37 (paid once), when the planned activity is carried out, it is UAH 196,138.56 per year. Calculations of the tax liability from the environmental tax, which is paid for environmental pollution during the construction and implementation of the planned activity - appendix 13.

### *5.4. The impact is caused by risks to human health, cultural heritage sites and the environment, including the possibility of emergency situations*

The assessment of the risk of the impact of the planned activity on the health of the population from atmospheric air pollution is related to the calculations of the risk of the development of non-carcinogenic and carcinogenic effects.

The calculation was made using the methodological recommendations of MR 2.2.12-142-2007 "Assessment of the risk to the health of the population from atmospheric air pollution", approved by the order of the Ministry of Health of Ukraine dated 04.13.07 No. 184[44], Hygienic regulations on the permissible content of chemical and biological substances in the atmospheric air of populated areas" [43] and the directory "Harmful substances. Handbook for chemists, engineers and doctors. In three volumes" Publishing House "Khimiya", 1976. [58]

When performing the calculation, the following factors are taken into account:

–the location of the planned activity in relation to the residential building and objects equated to it;

–potential danger posed by the planned activity;

–current state of the environment.

***The territory of the zone of influence of the planned activity on atmospheric air quality***

In accordance with the Methodology for calculating concentrations in atmospheric air of harmful substances contained in emissions of enterprises [57] and based on the results of computer scattering calculations (Appendix 10), the zone of influence of the planned activity on atmospheric air quality is determined - the area around point "0" of the coordinate system industrial site, within which the contribution to atmospheric air pollution of the planned activity exceeds 0.05 MPC.

The "0" point of the coordinate system of the industrial site is the southwest corner of the administrative and household building with a laboratory and a shed. This point is the starting point for determining the coordinates of emission sources and constructing isolines of pollutant concentrations and the influence zone.

For each of the priority polluting substances, the radius of the zone of influence of the planned activity on atmospheric air quality with the center at point "0" of the coordinate system of the industrial site is established:

–carbon dioxide - 216 m;

–sulfur dioxide - 140 m;

–nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) – 650 m.

–substances in the form of suspended solid particles (microparticles and fibers) - 204 m;

–summation group 31 (sulfur dioxide and nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) – 673 m.

For the rest of the pollutants (lead and its compounds, hydrogen chloride, benz (a) sirene, xylene, non-methane light organic compounds) emitted by the emission sources of the planned activity, the influence zone is not calculated, since the contribution of these substances according to the results of dispersion calculations does not exceed 0,25 MPC.

Based on the calculations, it was determined that the zone of influence of the planned activity on atmospheric air quality is the territory within a radius of 673 m around the point "0" of the coordinate system of the industrial site, which corresponds to the scattering area of summation group 31 (sulfur dioxide and nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]). The area of the influence zone is 142.23 ha.

The results of computer scattering calculations and scattering maps with air pollution isolines in the MPC sections are given in Appendix 10. The values of the maximum surface concentrations in the MPC sections, at control points on the border of the sanitary protection zone and the nearest residential building, are summarized in Table 5.3.2.

The specified area of influence of the planned activity on atmospheric air quality (within a radius of 673 m from point "0" of the coordinate system of the industrial site) is characterized by the absence of residential buildings, objects of the nature reserve fund, monuments of architecture, history, culture and other similar objects. objects equated to building objects:

the nearest residential building in the Izmail city is located in the north, northeast and northwest directions from the new construction site, the minimum distance from point "0" of the coordinate system of the industrial site to the residential building in the Izmail city is 675 m, to the village of Plauru (Romania) - 993m;

the nearest objects of the nature reserve fund according to cartographic materials are the objects, the minimum distance of which from the "0" point of the coordinate system of the industrial site is:

- RLP "Izmail Islands": Malyi Tataru - 9.7 km, Malyi Damer - 16.5 km, Velikiy Damer - 18.6 km;
- the system of Danube lakes (the area of 1068.67 km2 is located in the Danube delta of the Odesa region) - the distance to the nearest water body in the system is 7.2 km;
- The Danube Biosphere Reserve (area 1068.47526507 km2, located on the territory of Kiliya and Tatarbunarskyi districts of Odesa region) – 58.43 km;
- it is not a migratory eco-corridor for rare bird species, does not belong to the territories of the Emerald Network project and Natura 2000.

the closest monuments of architecture, history, and culture according to cartographic materials are the key objects of the cultural heritage of the Izmail city, located at a considerable distance from the point "0" of the coordinate system of the industrial site:

– Turkish mosque (XVI century) – 3090 m;
– Holy Intercession Cathedral (1st floor. XI X century) - 1838m;
– Royal Customs Building (1 Bilhorod-Dnistrovska St.) - 1800m;
– The building of Izmail city administration - 1454 m.

A part of the Luka Kapikrayana embankment with a length of 135 m - a place of recreation for citizens, located in the western direction from the planned activity - falls into the zone of influence of the planned activity on atmospheric air quality.

The risk calculation of the impact of the planned activity on public health from atmospheric air pollution is given in Appendix 16.

Based on the results of the calculations, it was determined:

–the risk of non-carcinogenic effects is 4.54E-04, which is considered negligible;

–the risk of developing individual carcinogenic effects is 8.39E-09, which is acceptable.

Risks of the impact of the planned activity on objects of cultural heritage and the environment, including due to the possibility of emergency situations, are absent due to the significant distance of these objects from the planned activity and the zone of its influence on atmospheric air quality (radius 673m from the "0" point of the system coordinates of the industrial site).

### *5.5. Cumulative impact of other existing objects, planned activities and objects, in respect of which a decision has been received to carry out the planned activity, taking into account all existing environmental problems related to territories of special nature conservation importance, to which the impact may spread or on which natural resources can be used*

Cumulative impact means the set of impacts from the implementation of the planned activity and other types of anthropogenic activity that exist or are planned in the near future and may lead to significant negative or positive impacts on the environment or socio-economic conditions. Cumulative effects can arise from factors that are insignificant in their individual actions, which can cause significant consequences, acting simultaneously over a long period, gradually accumulating and summing up.

The planned activity is carried out in the southern part of the Izmail city, within the boundaries of Portova, Luki Kapikrayana Embankment and Dunayska streets. The place of implementation of the planned activity is located in the technologically developed, industrial zone of the Izmail city with saturated coastal infrastructure and intensive shipping.

Situational map-diagram of the object of the planned activity with the drawing of the sanitary protection zone and the zone of its influence - Drawing 1.

The territory of the zone of influence of the planned activity is marked by the density of the location of industrial enterprises: SE "Danube Blaz" LLC, SE "Izmail Sea Trade Port", LLC "Danube Fish Canning Plant", PJSC "Ukrainian Danube Shipping", SE "Sea Ports Administration of Ukraine", sorting Ukrzaliznytsia station "Izmail-Port Novy"; 35 kW substation, Izmail industrial solar power plant with a capacity of 1 MW, the activities of which affect the current state of environmental objects by emissions of pollutants into the atmospheric air, discharges of pollutants with return water, volumes of generated waste, etc.

Dispersion calculations made taking into account the background pollution of atmospheric air, i.e. taking into account the contribution of other air pollutants, showed the absence of excesses of normative maximum permissible concentrations in atmospheric air at the border of the sanitary protection zone and the nearest residential buildings.

The obtained values of the surface concentrations of pollutants emitted by the sources of emissions of the planned activity confirm the insignificant intensity of the influence of the planned activity on atmospheric air, the maximum contribution is observed in summation group 31 (sulfur dioxide and nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]), which in fractions of MPC is 0.6543.

The results of the scattering calculation are presented in subsection 5.3 and table. 5.3.2 of this report, computer scattering maps with isolines of atmospheric pollution in the regions of the MPC are given in Appendix 10 of this report.

The estimated total equivalent sound level created by the mechanisms of the planned activity at the border of the nearest residential building (control point #3) is 41.93 dBA and does not exceed the permissible sound level at the border of the residential zone at night - 45 dBA. Noise calculations are given in Annex 14 to this report.

The results of the calculations of the dispersion of pollutants in the atmospheric air and the noise characteristics of the object correspond to the simultaneous operation of all sources of emissions and noise action, which, in comparison with the actual situation, is the worst of the operating conditions of the object of the planned activity.

According to subsection 5.1, all types of impact are characterized as those that do not exceed regulatory limits and are minimized due to the implementation of measures aimed at reducing emissions, discharges and ensuring their regulatory cleaning, as well as measures to reduce the noise impact on the environment.

During construction, all types of impacts are characterized as insignificant, limited by the place and time of construction and installation work, which for each stage of construction does not exceed 3 months, for dredging works - 52 days (not including downtime).

According to the conclusions of subsections 5.2, all types of impacts associated with the use of natural resources are within regulatory limits: the volumes of water use do

not affect the water content of surface and underground sources of water supply and the deterioration of the quality characteristics of their waters.

The cumulative impact is manifested as a result of an increase in the load on the roadway of Tsentralna Street due to an increase in the intensity of freight and railway traffic. However, this impact is considered acceptable, since it is an industrial area of the city, where there is no residential construction and objects comparable to it.

It is positive that the object of the planned activity with the delivery of agricultural products by railway will in the future ensure the reorientation of cargo flows from highways to railways and inland waterways, minimize the congestion of highways, which will further lead to the improvement of their technical condition and the ecological situation in populated areas.

With the observance and implementation of all the provided complex protective and security measures that meet the current regulatory requirements, the occurrence of cumulative impact, which is accompanied by negative environmental consequences and excessive emissions of polluting substances into the atmospheric air, is not expected.

### *5.6. The impact of the planned activity on the climate, including the nature and scale of greenhouse gas emissions, and the sensitivity of the activity to climate change*

The main factors affecting the climate are: chemical pollution of the atmosphere, thermal pollution of the air pool, change of the water regime of the district.

The planned activity is not related to the formation of sources of thermal pollution and changes in the water regime of the district. The planned production processes are not factors in the heating of the atmospheric air, return water discharged into the water body, and the increase in the temperature of groundwater, does not lead to changes in the microclimate, such as artificial fogging or an increase in air humidity.

There are also no features of climatic conditions that contribute to the increase in the intensity of the effects of the planned activity on the environment.

Climate change is influenced by combustion processes and technological costs of natural gas, which are accompanied by greenhouse gas emissions:

- at the stage of preparatory and construction works, a stationary source is a diesel generator;
- at the stage of implementation of the planned activity by stationary sources: grain dryer (fuel - natural gas), boilers (fuel - briquettes), cabinet distribution point (SHRP) (technological losses of natural gas), incinerator;
- during the construction and operation of the Port, mobile sources are motor vehicles and specialized equipment, the engines of which run on gasoline, diesel fuel, and liquefied gas.

The planned activity is not subject to the Law of Ukraine "On Principles of Monitoring, Reporting and Verification of Greenhouse Gas Emissions" [12] and Resolution of the Cabinet of Ministers No. 880 of September 23, 2020 "On Approval of the List of Activities, the Emissions of Greenhouse Gases as a Result of Which Are Subject to Monitoring, reporting and verification" [32], since the total thermal power of equipment and mechanisms that are sources of greenhouse gas emissions of the planned activity is < 20MW, while equipment with a thermal power of < 3.0 MW is not taken into account.

During the preparatory and construction works, the amount of greenhouse gas emissions by stationary and mobile sources according to the calculations (Appendix 5 to the report, tons) is 1614.17569 tons, including by substances:

–methane – 0.14239 t;

–carbon dioxide – 1613.97561 t;

–nitrous oxide – 0.05769 t.

During the implementation of the planned activity, subject to the planned implementation of the production program established by the project (data from subsection 1.4. of this report), the volume of greenhouse gas emissions by stationary and mobile sources is 1175.89291 t/year, including by substances:

• methane – 4.23331 t/year;

• carbon dioxide – 1171.59373 t/year;

• nitrous oxide – 0.06587 t/year.

In summary, the above-mentioned influence of chemical factors of atmospheric pollution is considered insignificant and acceptable.

### *5.7. The impact is determined by the technology and substances used*

The planned activity is the new construction of a transport infrastructure facility - a river port (terminal) in the Izmail city of the Izmail district of the Odesa region with a railway access track - adjacency to the Izmail station of the Odesa Railway regional branch.

The planned activity includes the construction and operation of hydraulic facilities of the port (cargo berths, operational water area with an approach channel), an access railway track, a production transshipment complex for grain, leguminous and oil crops (railway and road reception facilities, dryer, storage containers, shipping devices for water and road transport), a fueling station (drainage railway overpass, two underground tanks, fueling stations for motor vehicles and watercraft).

The construction of the operational water area with an approach channel involves dredging to a depth of 7.32 m, in the future - 8.23 m from the "0" of the Izmail sea port with the excavation of bottom soil in the volume of 112.0 thousand m3 and its storage in the coastal heap.

This subsection provides a description of the adopted technological decisions at various stages of implementation of the planned activity and a description of measures to minimize the impact on environmental factors. Based on the assessment of the adopted technology and measures, the impact on environmental factors is considered acceptable and does not exceed regulatory limits.

#### *Technology and substances used in the operation of the transshipment complex for grain, leguminous and oil crops*

The transshipment complex for grain, leguminous and oil crops, the construction and operation of which is provided for in the territory of the planned activity, includes technological equipment and structures connected by a multi-variant scheme for the movement of grain, leguminous and oil crops when they are received from rail, road and water transport, storage with bringing to marketable conditions (cleaning, drying) and shipment by water and road transport.

Cereal crops include: cereals (wheat, corn, barley, rye, millet, oats and sorghum), legumes (soy, peas, lentils, beans) and oilseeds (sunflower and rapeseed). When moving across the state border of Ukraine, grain cargoes are subjected to fumigation in the holds of ships moored at port berths.

Operation of the transshipment complex includes the following technological operations: laboratory quality control of grain, leguminous and oil crops; weighing

loaded and empty road transport; reception of grain cargoes from road, rail and water transport; transportation of grain cargoes from landfill pits by conveyors (belt, chain) and norias for their further storage or processing (cleaning, drying); moving grain loads to containers of wet grain for further drying; storage of conditioned grain in granaries according to the types of grain crops and the content of waste impurities; cleaning of grain and oil crops using a scalper and a separator; drying of grain and oil crops in a grain dryer; suction of dusty air from technological equipment units (aspiration) followed by its cleaning on dust-cleaning equipment; weighing of grain cargoes before shipment to water transport; shipment of grain and oil crops by water and road transport.

All technological operations related to the transshipment of grain and oil crops will be mechanized and automated upon completion of construction, the operation of the technological equipment will be controlled from the operating room. The technological scheme of the complex provides the possibility of:

simultaneous reception of grain cargoes from three types of transport - road, rail and water;

simultaneous conduct of reception and shipment operations;

simultaneous acceptance of three types of grain crops through vehicle unloading points;

simultaneous execution of internal operations (bringing them to marketable conditions (cleaning, drying) and moving grain from silo to silo for airing or forming a batch of shipment) and external operations (reception and shipment).

A closed technology for the transportation and processing of grain cargo has been implemented at the grain transshipment complex, which ensures the localization of dust emissions:

- conveyors and norias are placed in covered galleries, conveyor belts are covered with boxes along their entire length, and the processes of pouring grain are accompanied by aspiration of dusty air with its purification before release into the atmosphere;
- grain receiving posts from road and railway transport are equipped with sectional gates and powerful dust cleaning equipment;
- grain drying processes are localized - the grain dryer is closed around the perimeter;
- grain and grain waste shipment posts for road transport are equipped with Moduflex telescopic devices.

Technological processes with grain loads are equipped with highly efficient filter-type dust collectors in the amount of 39 units. Dust-contaminated air is removed from overload nodes through duct systems and is cleaned by dust cleaning equipment before being released into the atmosphere. These systems, which are called aspiration systems, are automatically locked with the technological equipment and are turned on before the start of the technological process. According to calculations, the amount of dust captured by these filters at the planned volume of overloads is 1140.28870 t/year, which is 96.52% of the total amount of dust generation. The technological scheme does not provide for the extraction of grain (aspiration) dust from the technological process, the dust caught in the dust cleaning equipment is returned to the product, so the waste is not taken into account.

In order to minimize the negative impact of transshipment operations with grain cargoes on the environment (atmospheric air and surface water), a set of measures has been developed:

- losing the gaps between the sides of the ships in places where the grab is carried, which prevents the cargo from falling into the water;

- opening with a grapple at a height of no more than 1 m from the pile or previously loaded layer of cargo, which minimizes dust generation;

- cleaning the ship's deck from possible cargo spills at the end of the shift (and, if necessary, throughout the shift), dumping (sweeping) cargo spills from the ship into the water is PROHIBITED;

- up to 1.5 m and wind strength up to 20 m/s, as well as during precipitation (rain, snow, hail), the holds of ships must be closed during atmospheric precipitation;

- taking the grapple out of the hold only after its jaws have fully engaged and the load from it has stopped.

The annual productivity of the transshipment complex for grain, leguminous and oil crops is 3,100 thousand tons/year. The amount of grain waste generation: 1250 t/year - a by-product with a grain content > 2% (beaten, crushed, thin grain that has passed through the meshes of the sieve), is formed as a result of cleaning grain crops in the separator, is collected in the waste hopper provided for in the technological process, followed by use in the production of compound feed.

Hydraulic oils are used for routine maintenance of technological equipment. The storage of new and used hydraulic oils is carried out in the warehouse of the mechanical workshop, as the used hydraulic oils accumulate, they are transferred to a specialized organization for disposal. The estimated amount of hydraulic oils used for technological equipment is 5,184 t/year.

The operation of a gas station in the territory of the Port involves the use of diesel fuel. Estimated amount of diesel fuel for refueling motor vehicles and watercraft - 1950 t/year.

When vessels are parked in the port, their maintenance is carried out (if necessary): power supply from shore columns, replenishment of fuel for the operation of the ship's power plant, refueling with drinking water, removal of solid household waste and sewage and fecal water. Estimated volumes of water supply to watercraft - 825 m3/year, drainage - 655 m3/year. Fecal wastewater from watercraft is discharged into the port's domestic sewage system.

***Technology and substances used in execution dredging works.***

At various stages of dredging operations, the dredger can operate in excavator mode using a bucket and in suction mode using a soil pump with a loosening cutter attachment and a slurry pipeline through which the bottom soil is transported to the coastal dump using water.

The operation of the dredger in the excavator mode is provided in the coastal zone of the water area.

A site with an area of 1.24 hectares is used for the bottom soil dump, which is surrounded by an enclosing dam made of local soils, its base is planned with the formation of washout maps and a settling area with a discharge pipe for discharging clarified water. A drainage ditch with a constant slope in the direction of the river is provided along the enclosing dam to discharge the water that has filtered through the embankment dam.

Maneuvering in the water area, the dredger goes to the required point of work, is fixed in place and begins to deepen the cutter to the required depth with gradual cutting of the soil layer. The soil developed by the milling machine is sucked up by the soil

pump and transported by the pulp pipeline in the form of pulp (a mixture of soil and water) to the site of the coastal dump.

The necessary volume of water required for transporting the soil through the slurry pipeline in the volume of 112.0 thousand m3 is calculated to be 530.0 thousand $m^3$. No chemicals are used during dredging.

### *5.8 Assessment of possible transboundary impact*

The planned activity occupies land plots with an area of 19.7 hectares in the southern part of the Izmail city, within the boundaries of Portova, Luki Kapikrayana Embankment and Dunayska streets, and an area of 10.4357 hectares in the water area of the Danube River from 91.09 to 91.55 km. Registration address, Luki Kapikrayana embankment, 14.

The geographic coordinates of the centroid of the industrial site according to the WGS 84 system are 45°19'23.8" 28°50'39.0'. A situational map-diagram of the object of the planned activity with the drawing of the centroid of the industrial site, the sanitary protection zone and the zone of its influence is attached (Drawing 1).

Territorially closest to the planned activity are:

Romania, the territory of which, relative to the object of the planned activity, is located upstream and downstream of the Danube River, the minimum distance from the centroid of the industrial site of the planned activity to the border of Romania is 586 m in the southwest direction;

the Republic of Moldova, the territory of which in relation to the object of the planned activity is located upstream of the Danube River, the minimum distance from the centroid of the industrial site of the planned activity of the planned activity to the border of the Republic of Moldova is 32.5 km in the north-western direction.

Subsection 5.4 of this report defines the zone of influence of the planned activity on the quality of atmospheric air - the territory of a radius of 673 m around the point "0" of the coordinate system of the industrial site, within which the contribution to atmospheric air pollution of the planned activity exceeds 0.05 GDK. Point "0" of the coordinate system of the industrial site - the starting point for determining the coordinates of emission sources and constructing isolines of concentrations of pollutants and the zone of influence of the planned activity on atmospheric air quality.

The possibility of cross-border impact of the planned activity on the environment of the above-mentioned states is considered according to two factors of influence:

on atmospheric air quality, the zone of influence of the planned activity is the territory around point "0" of the coordinate system of the industrial site with a radius of 673 m, within which the contribution to atmospheric air pollution of the planned activity exceeds 0.05 MPC (subsection 5.4., appendix 10 to this report);

on the state of surface waters of the Danube River, the zone of influence is the territory of the Danube Basin countries located downstream of the Danube River relative to the object of the planned activity.

In terms of territorial affiliation, there is no cross-border impact of the planned activity on the environment of the Republic of Moldova, since the territory of Moldova is located upstream of the Danube River and outside the zone of influence of the planned activity on atmospheric air quality (radius 673m) - the minimum distance from the border of the Republic of Moldova to the "0" point of the system coordinates of the industrial site of the planned activity 32.5 km.

***Assessment of the transboundary impact of the planned activity on atmospheric air of Romania***

The closest to the planned activity is the village of Plauru, commune of Čeatal - county of Tulcea (Romania), which is located in the southwest direction from the planned activity. The minimum distance of the residential buildings of the village from the "0" point of the coordinate system of the industrial site of the planned activity is 993 m.

Taking into account the above-mentioned residential buildings in Romania, objects that are equated with residential buildings are outside the zone of influence of the planned activity on the state of the atmospheric air (radius 673 m from the point "0" of the coordinate system of the industrial site), accordingly, on the territory of Romania, the contribution of the planned activity to atmospheric pollution air does not exceed 0.05 MPC.

Based on the above analysis, the cross-border impact of the planned activity on the state of the atmospheric air in Romania is estimated to be absent.

***Assessment of the transboundary impact of the planned activity on the state of surface waters of the Danube River***

The Law of Ukraine dated January 17, 2002 No. 2997-III ratified on the territory of Ukraine the Convention on Cooperation for the Protection and Sustainable Use of the Danube River [19] (Convention on the Protection of the Danube River [19]), which was adopted on June 29, 1994 with the aim of preventing pollution of the river. The Danube and the organization of a balanced management system of the Danube basin, which territorially belongs to 10 countries.

Within the framework of the implementation of the Convention on the Protection of the Danube River [19] (hereinafter referred to as the Convention), the main tasks are:

conservation, improvement and rational use of surface waters;

reduction of pollution of the waters of the Danube, in particular, by hazardous and organic substances;

strengthening of control and prevention of possible dangers arising as a result of emergency situations and harmful effects of water;

implementation of the "polluter pays" principle.

Within the framework of the Convention, Romania is an affected state, the transboundary impact of the planned activity on the state of surface waters of the Danube River is possible, since, relative to the object of the planned activity, part of its territory is located downstream of the Danube River.

The place of implementation of the planned activity is the coast of the left bank of the Danube River with part of the water area of the Danube River from 91.09 to 91.55 km, which imposes relevant obligations within the framework of the Convention on the Protection of the Danube River [19] and the tasks assigned by it.

The planned activity is characterized by an impact on the aquatic environment, which can be manifested both during the construction and operation of the newly built river port (terminal), in particular:

during construction - deposition of dust emissions, undifferentiated by composition, on the surface waters of the Danube during the pouring and storage of bulk construction materials, increase in the turbidity of surface waters in the dredging zone due to the transition of the finely dispersed component of the bottom soil to a suspended state and its losses (chapter 1.5.1., appendix 6);

during operation - deposition of dust emissions, undifferentiated by composition, on the surface waters of the Danube during the transshipment of grain cargoes, volumes of water intake and drainage of treated surface runoff from the port territory, possible emergency situations during operations with petroleum products or petroleum wastes, which are associated with their entry into water (sections 1.5.2., appendix 10.4).

The analysis of the adopted project decisions was carried out in view of the main tasks set by the Convention:

**- preservation, improvement and rational use of surface waters**. The planned activity involves two sources of water supply:

- from the water supply networks of the city of Izmail, which exploits the Izmail deposit of underground fresh water, in the amount of 41,757 $m^3$/day, 5316,713 $m^3$/year, for household and production needs (subsection 1.4, table. 1.4.1);–
- surface water intake from the Danube River in the amount of 234,500 $m^3$/day and 14,450.0 $m^3$/year for technical needs (improvement and dust suppression) (section 1.4, appendix 4);

Also, during dredging operations, the surface water of the Danube River in the volume of 530,000 m3 is used to transport bottom soil in the form of pulp through the pulp pipeline (subsection 1.3.2). A part of the used surface water is returned to the river through organized diversion from the alluvial maps

The implementation of the adopted decisions is not expected to affect the water quality and water content of the Danube River, since the volumes of water intake are insignificant. The pumping equipment is equipped with a cassette-type fish-protective stop.

**- reduction of pollution of the waters of the Danube River, in particular, by hazardous and organic substances.**

1) Return water as a potential source of pollution.

Return waters of the object of the planned activity consist of:

- economic and domestic waste water, which through the economic and domestic sewage system in the volume of 24,357 $m^3$/day; 4,256.313 $m^3$/year are diverted to the sewage network of the Izmail city, which is operated by KP "Izmail VUVKG" (subsection 1.4.);
- surface wastewater (rainwater, meltwater, and irrigation-washing water), which is collected by the rainwater sewerage system in the volume of 51,602 thousand m3 and undergoes treatment in the local treatment facilities of the rainwater sewerage system (chapter 1.4., appendix 4).

The entire volume of surface runoff from the territory of Porto before being discharged into the Danube is cleaned in local treatment facilities from possible impurities of oil products and suspended substances. The efficiency of treatment facilities ensures quality indicators of return water at the output at the level of established standards and MPC of substances determined for areas of surface water bodies located within the boundaries of populated areas.

The storm sewer system includes two local treatment facilities:

- with a capacity of 150 l/s, which ensures the treatment of surface runoff from the territory of the main production site with an area of 17.13 hectares (the area of the roofs of buildings and structures, areas with a hard surface and lawns) with the discharge of purified wastewater into the Danube River through one organized release and the possibility of accumulating purified wastewater in a tank with a volume of 200 $m^3$ for further use for irrigation and washing needs of the port;

- with a capacity of 25 l/s, which ensures the cleaning of surface runoff from the territory of the temporary parking lot of cargo vehicles and the temporary parking lot of passenger cars with a total area of 0.97 ha, with the removal of purified wastewater into a tank with a volume of 60 $m^3$ for further use for irrigation and washing needs of the port.

Calculation of volumes of surface runoff collected by the storm sewer system. Calculation of the costs of rainwater runoff, selection of equipment of local treatment facilities - Appendix 4.

The planned activity involves the implementation of measures to minimize pollution of the Danube waters by:

- cleaning of the entire volume of surface runoff before discharge in local treatment facilities, which ensure the efficiency of cleaning from suspended substances at the level of 97.5%, from oil products - 99.9% (Table 1.5.2.7), Appendix 11;
- reduction of the volume of treated surface runoff to the Danube River due to the use of treated surface runoff for technical needs of the port: watering of green areas, washing of roads and sidewalks, dust suppression. For this, two concrete storage tanks with a volume of 200 $m^3$ and 60 $m^3$ are provided as part of the storm sewer system of the port;
- organizations in the coastal zone of the port of facilities for receiving ship waste (economic and fecal waste water, drinking water and household waste) with their subsequent transfer to specialized organizations under concluded contracts;
- the use of a tugboat fleet for the transportation of goods equipped with closed systems for the accumulation of wastewater - fecal and liquid water with an installed warning alarm system (WAS).

All of the company's vessels, including hydraulic vessels, meet the requirements of the International Convention on the Prevention of Pollution from Ships of 1973 MARPOL 73/78 [20] and have the Certificate "On Prevention of Oil, Waste Water, Garbage and Atmosphere Pollution" (Appendix 2), issued by the Register of Shipping of Ukraine.

Thus, thanks to the implemented measures, the impact on the state of the water area of the Danube River as a result of the discharge of surface runoff from the port territory will be minimal, and according to water quality indicators, it will be absent.

2) Sedimentation of undifferentiated dust as a source of pollution.

Dust emissions of undifferentiated composition are deposited on the water surface of the Danube River in volumes that, according to calculations, are:

- during construction – 0.54637 t (subsection 1.5.1.);
- during operation - 15.93939 t/year (subsection 1.5.2.).

Dust undifferentiated by composition (code 2902) is the sum of pollutants included in the list of solid substances by order of the Ministry of Ecology and Natural Resources of Ukraine dated March 14, 2002 N 104 [37]. During the construction and operation of the port, substances related to dust, undifferentiated by composition, are emitted: inorganic dust with a silicon dioxide content of 70-20 % (fireclay, cement, etc.), inorganic dust with a silicon dioxide content of more than 70 % (dynas etc.), soot, abrasive dust, metal dust, paint aerosol, shale ash, grain dust and sunflower seed dust, soybean seed dust and flour dust.

The main measures for the localization and minimization of dust emissions into the atmosphere and, as a result, the reduction of its deposition on the surface waters of the Danube include the following measures:

during preparatory and construction works: sheltering loose construction materials during transportation and storage, moistening during use (if possible) and regular cleaning of the construction site with moistening of roads where freight transport and construction equipment move;
in the course of the planned activity: the use of closed technology for the transportation and processing of grain cargoes and the equipping of transshipment nodes with high-efficiency filter-type dust-cleaning equipment in the amount of 39 units, which ensure the capture of 96.52 % of the total amount of dust generated (with the planned volume of overloads of 1140.28870 t/ year). A more detailed description of the planned activities and conditions for conducting the planned activity is presented in section 7. of this Report.

Also, in order to minimize the negative impact on the environment (atmospheric air and surface water) during transshipment operations using a grab, a set of measures has been developed:

- closing the gaps between the sides of the vessels with tarpaulin sheets in the places where the grab is carried, which excludes the entry of cargo;
- opening the grab with the load at a height of no more than 1 m from the pile or previously loaded layer of the load, which minimizes dust generation;
- cleaning the ship's deck from possible cargo spills at the end of the shift (and, if necessary, during the shift), dumping (sweeping) cargo spills from the ship into the water is PROHIBITED;
- transshipment operations are PROHIBITED in case of waves with a wave height of 3 % of safety up to 1.5 m and a wind force of up to 20 m/s, as well as in precipitation (rain, snow, hail), ship holds must be closed during precipitation;
- taking the grapple out of the hold only after its jaws have fully engaged and the load from it has stopped. More details about the technology - subsection 5.7.

3) Dredging works as a source of pollution. Potential sources of impact are technological processes that can lead to an increase in the turbidity of surface waters in the dredging zone due to the possible transition of the finely dispersed bottom soil component to a suspended state and its loss during the development of the bottom soil, its hydraulic transportation and washing to the places of coastal dumps.

Thanks to the technology used for dredging, the impact on surface water during subsoil development is minimal, as water turbidity increases in the area of the suction pump, but does not spread due to the simultaneous suction of the pulp into the pulp pipe. Also, the process of hydraulic transportation of soil to the site of coastal dumps is not a source of surface water pollution, since modern, high-tech hydraulic engineering with hermetic connections of slurry pipeline sections is involved in the work.

Thus, with the adopted dredging technology, the main source of surface water pollution is the process of washing soil in places of coastal dumps, as a result of which the discharge of pulp water into the Danube River can cause a significant increase in the turbidity of its surface waters. Drainage is carried out through discharge pipes and a drainage ditch, the estimated volume of suspended particles in the composition of water returned from the washout maps is 281,344 tons (subsection 1.5.1., appendix 6).

The bottom soil dump site was chosen taking into account the criteria of economy, efficiency and environmental friendliness, namely:

- to be located in relative proximity to the dredging site;
- not to affect the drift of dredging objects;

- the soil that is formed should not be washed away by waves and currents, which is ensured by the construction of the coastal dump;

- the soil capacity of the coastal dump should correspond to the design volume of soil excavation.

Under the conditions of the adopted measures regarding the organization of the coastal dump of the bottom soil with sedimentation zones, discharge pipes and embankment dams, the removal of clarified water from the pulp to the Danube through an organized release, the increase in the turbidity of the surface water of the water body during dredging works does not exceed the regulatory limits and is minimal Taking into account the speed of the current, the distance of carrying suspended particles will be 69.23 m, which will not allow the turbidity spreading zone to go beyond the water area of the port. The deposition time of the turbidity plume is 1 hour, the inflow of activity is characterized as local in place and time and does not go beyond the water area of the planned activity (chapter 1.5.1., appendix 6).

Limiting conditions for minimizing the impact on the aquatic environment are established for hydraulic engineering that carries out dredging works:

- use of technically serviceable mechanisms and watercraft equipped with closed systems for the accumulation of sub-saline waters;

- use of water-based lubricants in the bearings of weight drives, special ropes that do not require lubrication;

- transfer to specialized organizations of spent oil products, oil-containing and fecal wastewater, household waste of the technical fleet;

- availability of a permanent supply of sorbents on board: sand, biodestructor of the "Econadine" type;

- organization of fuel bunkering operations with the involvement of specialized refuelers, use of integral certified oil product supply sleeves.

- tightness of pipelines for the hydraulic transport of pulp, density and ease of overlapping of valves and other locking devices;

- termination of work in the water area in case of disturbance with a wave height of 3% guaranteed up to 1.0 m; wind force up to 20 m/s; ambient temperature up to -50 C.

***- strengthening of control and prevention of possible dangers arising as a result of emergency situations and harmful effects of water.***

The planned activity is related to the operation of the fuel filling station: reception from the railway, storage and refueling of motor vehicles and watercraft. Operations with fuel and oil-containing waste are potential sources of surface pollution, since it is impossible to completely exclude the possibility of an accidental oil spill. Therefore, oil operations are accompanied by measures to localize and eliminate the consequences of an accident:

- the work site is equipped with a fire station with fire extinguishing equipment and an oil spill containment and liquidation station with the appropriate equipment: a supply of sand and other special adsorbents (biopreparation "Econadine"), a container for collecting oil-contaminated sand and other absorbents, a shovel, a broom, etc.;

- availability of means of fire extinguishing, localization and liquidation of oil spills;

- it is PROHIBITED to use dispersants (chemical sorbents) in the water area, to remove thin layers of oil, iridescent films on the water surface, to use the biological preparation "Ekonadine" or similar adsorbents;

- installation of pallets under receiving nozzles, air nozzle openings and hose connection points, which, when filled, are emptied into a specialized container;

- the use of exclusively certified hoses with an indication of the purpose, date of manufacture, value of bursting pressure, working pressure and during exams, date of the last exam, date of the next exam (expiry date), prohibition of using damaged fuel hoses and connections;

- installation of a boom barrier around the watercraft;

- closing of rain grates and technological openings on the berth at the place of work, as well as spigots of the vessel receiving fuel;

- grounding the tank truck to the grounding circuit, disconnecting the watercraft from the shore power supply;

- ensuring reliable parking of the vessel on the moorings, which excludes its excessive movement relative to the berth, fixing of fuel hoses to the structures of the vessel to avoid their twisting or kinks;

- disconnection of fuel hoses after completion of work should be carried out above the pallets, and their cleaning - with blocked flanges.

The company's fleet is young, the year of registration - starting from 2010. All vessels comply with international requirements for pollution prevention, which is confirmed by a full set of valid ship documents reviewed and approved by the Register of Shipping of Ukraine. The company's vessels are equipped with an emergency warning system (APS) with level indicators located in the following locations and tanks of the vessel:

– fuel overflow tank 75% full;
– overflow of fuel through the overflow pipe;
– fuel and oil leakage collection tank 80% full;
– fuel tank of the emergency diesel generator;
– separator sludge tank;
– cistern for collection of blige water 80% full;
– sewage wells of the engine room;
– sewage tanks 80% full.

Before the vessel enters the territorial waters of Ukraine, all shut-off devices through which the oil-water mixture and other polluting substances may be discharged must be closed and sealed by the vessel's administration.

The port must develop a plan for the elimination of emergency oil spills (Emergency Oil Spill Plan), the main purpose of which is to prevent pollution of the surface waters of the Danube River in the Port area, as well as to carry out the necessary agreed actions aimed at reducing misunderstandings, errors and loss of time, which may lead to the deterioration of the situation, and accordingly to the increase of damage to the environment.

Taking into account that all measures are aimed at eliminating emergency situations and ensuring safe operation of the river port (terminal), the probability of an accident is minimal, and the activity is recognized as having no significant impact on the state of the water body.

More details about possible emergency situations, including on a ship, related to oil fuel spillage and its entry into the surface waters of the Danube River, as well as emergency measures, are given in chapter 8 of this report.

- **implementation of the "polluter pays" principle**. The planned activity involves the implementation of compensatory measures:

- payment of environmental tax for emissions of polluting substances into atmospheric air, with planned indicators, the tax amount is UAH 29,033.66/year (appendix 13);

- payment of an environmental tax for the discharge of polluting substances into a water body with return water, with planned indicators, the amount of the tax is UAH 12,651.76/year (appendix 13);

- payment of environmental tax for the discharge of polluting substances into a water body during dredging (one-time), with planned indicators of dredging, the tax amount is UAH 31,189.80 (Appendix 13);

- payment of rent for the special use of surface water;

- payment of the replacement cost of green spaces to be removed, with planned indicators in the amount of UAH 10,542.36 (Appendix 2);

- rent for land;

- implementation of compensatory measures for the fishing industry in the amount of UAH 23,709.48. (Appendix 8);

- beautification and landscaping of the territory.

Analyzing the given data, it can be concluded that during the implementation of the planned activities, NIBULON LLC complies with the provisions of the Convention on the Protection of the Danube River [19] and organizes the operation of the river port (terminal) in the Izmail city, focusing on modern technologies and production models focused on minimization negative impact on the environment.

On the basis of the conducted analysis, the cross-border impact of the planned activity on the state of surface waters of the Danube River is assessed as normative.

## *6.* DESCRIPTION OF FORECASTING METHODS WHICH WERE USED FOR ENVIROMENTAL IMPACTS ASSESSMENT AND USED ENVIRONMENTAL DATA TOO

This Environmental Impact Assessment Report was prepared taking into account the General methodological recommendations regarding the content and procedure for compiling an environmental impact assessment report approved by the order of the Ministry of Environmental Protection and Natural Resources of Ukraine dated 15.03.2021 No. 193 [39] and based on the current legislative norms and rules in Ukraine in the field of environmental protection and nature management.

In order to determine the degree of impact of planned activities on the environment, a forecast calculation of changes in the components of this environment was performed: atmospheric air, surface water, soil, flora and fauna, and the social environment.

The forecast of changes in the environment as a result of the implementation of the planned activities is determined by the calculation and analytical method, using approved methods, in particular, the forecast is made according to the factors of impact:

on the quality of the atmospheric air, which is expressed in the determination of the sources of impact on the atmospheric air, the calculations of the amount of emissions of pollutants into the atmospheric air with the construction of maps of the dispersion of pollutants in the atmospheric air, the determination of the amount of economic damage to the atmospheric air and the size of the sanitary protection zone (SPZ) of the industries existing on the industrial site, taking into account their mutual placement;

assessment of adopted technology and development of measures to minimize impacts;

cumulative impact assessment;

on the water environment, which is expressed in the determination of the volumes of water consumption and drainage, sources of impact on the water environment, calculation of the volumes of pollutant discharges into the water body and assessment of qualitative characteristics of water environment including centralized water intakes;

on the soil, which is expressed in the definition of the sources of impact on the soil, the volume of industrial and household waste generation and the conditions of their handling;

on the social environment, which is expressed in the assessment of the consequences of the effects of the planned activities on the atmospheric air, water environment, soils, the determination of the territorial zone of impact of the planned activities with the study of cartographic materials for the presence of residential buildings and objects equated to it in this zone, the calculation of risks of impact on the health of the population and other buildings, including in connection with the accident, as well as the calculation of compensatory measures.

References to the methods, made assumptions and output data which are the basis for each calculation are given in the appropriate appendixes to this report.

Estimated period of forecast:

- at the construction stage - duration of construction and assembly works for each stage of construction does not exceed three months, dredging works - 52 days (excluding downtime due to the finishing of construction stage, preparatory works, adverse weather conditions, planned and unplanned repairs etc.);
- at the stage of operation - the planned period of operation of the enterprise.

## 7. DESCRIPTION OF PLANNED MEASURES AIMED AT PREVENTION, DIVERSION, AVOIDANCE, REDUCTION, ELIMINATION OF SIGNIFICANT NEGATIVE IMPACT ON THE ENVIRONMENT, INCLUDING (IF POSSIBLE) COMPENSATORY MEASURES

In order to protect the environment from pollution, planned activities provide for a set of measures aimed at prevention, diversion, avoidance, reduction, elimination the significant impact on the components of this environment, the main of which are: atmospheric air, water environment and soils.

In case the measures provided for by the planned activities are implemented, the probability of an accident occurring is minimal, and the activity of the object of the planned activities is considered permissible.

***- measures during preparatory, construction and dredging works***:

– fencing and lighting of the construction site;

– the arrangement of special places for the assembly of construction materials and fuel and lubricants, parking of construction equipment;

– arrangement of access roads, places for temporary storage of building materials and equipment;

– compliance with the rules of transportation and storage of materials, localization of areas where spreading and spills are inevitable;

– sheltering building materials in bulk during transportation and storage, moisturizing during using (if possible);

– compliance with the rules of operation of construction machinery and motor vehicles, control of their technical condition;

– cleaning of the construction site with moisturizing of roads where freight transport and construction equipment move;

– use of modern building materials and technologies in construction;

– grounding of metal parts of machines and mechanisms;

– storage of equipment on pallets (temporary, for the construction period);

– use of construction waste (if necessary);

– the use of modern technically efficient mechanisms and hydrotechnical means, equipped with closed systems for the accumulation of blige waters, and highly effective resource-saving technologies during dredging operations;

– the use of water-based lubricants in the bearings of weight drives, special ropes that do not require lubrication;

– transfer to specialized organizations of waste of oil products, oil-containing and sanitary wastewater, household waste of the technical fleet;

– presence on board of a constant supply of sorbents: sand, biodestructor type "Econadine";

– organization of fuel bunkering operations with the involvement of specialized refuelers, use of integral certified oil product supply hoses;

– tightness of pipelines for pulp hydrotransport, density and ease of closing of gate valves and other locking devices;

– termination of work in the water area in case of disturbance with a wave height of 3% probability up to 1,0 m; wind force up to 20 m/s; atmospheric temperature up to $-5^0$ C;

– the construction of the coastal dump of the dredging soil provides protection against soil erosion under the action of waves and the organized drainage of clarified water from the alluvium maps;

– carrying out dredging works beyond the spawning period;

***- protective measures***:

– the use of closed technology for moving and processing grain cargo: conveyor belts along their entire length are covered with boxes;

– organization of an extensive system of aspiration of dusty air from process equipment and its purification in highly efficient dust-cleaning equipment before being released into the atmosphere;

– localization of burst release of dust during road and rail receiving with the equipment of sectional gates and powerful dust cleaning equipment;

– localization of dust emissions during grain drying and reduction of noise impact by sheltering the grain dryer around the perimeter;

– equipping stations for the shipment of grain and grain waste to road transport with Moduflex telescopic devices;

– organization of loading on the river transport with adjustable drop height of grain cargo and dust suppression system;

– automatic blocking of aspiration systems with technological equipment;

– reinforced waterproofing of underground utilities of sewage systems, sewerage of outhouses;

– organization of collection, treatment and drainage of surface runoff from the territory, periodic cleaning of the storm sewerage;

– equipping the surface water intake with a fish protection device;

– reducing the volumes of discharge into the surface water body due to the use of treated surface runoff for the technical needs of the port;

– organization of production control of surface and recycled water, efficiency of local treatment facilities;

– PROHIBITED transshipment operations during rough seas with a wave height of 3% probability up to 1.5 m and wind speed up to 20 m/s, as well as during precipitation (rain, snow, hail), ship holds must be closed during precipitation;

– installation of mechanisms on vibration-isolating supports, use of flexible inserts between fans and air ducts of aspiration systems;

– using of sound absorbing building materials, assembling of a solid concrete surface under the parking of trucks and passenger vehicles parking, under driveways and passages;

– organization of reception of sewage and sanitary waters from watercraft and ship waste;

– organization of conditions for separate storage of waste and their handling in accordance with their hazard class and aggregate state;

– setting conditions for reloading grain cargoes with a grab:

- closing the gaps between the sides of the ships with tarpaulin covers in the places where the grab is carried, which prevents the cargo from falling into the water;
- opening the grab with the cargo at a height of no more than 1 m from the blige ceiling or previously loaded layer of the cargo, which minimizes dust generation;
- removal of the grab from the hold only after the complete engagement of its jaws and the complete cessation of spillage of cargo from it.

– cleaning the ship's deck from possible cargo spills at the end of the shift (and, if necessary, during the shift), dumping (sweeping) loose cargo from the ship into the water is PROHIBITED;

– establishing conditions for operations with oil products and oil waste:

- installation of pallets under the intake pipes, air nozzle openings and hose connections, which, when filled, are emptied into a specialized container;
- the use of exclusively certified hoses indicating the purpose, date of manufacture, burst pressure, working pressure, pressure during examinations, date of the last examination, date of the next examination (expiration date), prohibition of the use of damaged fuel hoses and connections;
- installation of a boom fence around the watercraft;
- closing drain grates and technological openings on the berth at the place of work, as well as scuppers of the vessel receiving fuel;
- grounding the road tanker to the grounding circuit, disconnecting the watercraft from the shore power supply;
- It is FORBIDDEN to use dispersants (chemical sorbents) in the water area, to remove thin layers of oil, iridescent films on the water surface, to use the biological product "Ekonadine" or similar adsorbents;
- ensuring reliable parking of the vessel on the moorings, which excludes its excessive movement relative to the berth, fixing fuel hoses to the structures of the vessel to avoid their twisting or kinks;
- disconnection of fuel hoses after completion of work should be carried out above the pallets, and their cleaning should be done when the flanges are blocked;

– compliance of watercraft with international requirements for pollution prevention, which is confirmed by a full set of valid ship documents reviewed and approved by the Shipping Register of Ukraine;

– equipping the company's watercraft with an emergency alarm and warning system (AWS) with level indicators in oil and liquid waste tanks;

- ***measures regarding explosion and fire hazards:***

– ensuring the object's explosion and fire safety in accordance with its categorization and requirements of the Building code: implementation of the fire protection system: fire tanks, fire water pipeline with fire hydrants, primary firefighting means, fire stations with appropriate equipment during construction and operation;

– organization of stations for the localization and liquidation of oil pollution, equipped with appropriate tools and a stock of sorption materials during construction and operation;

– automatic shutdown of ventilation systems interlocked with automatic fire alarm;

– equipping tanks, heads of bucket elevators and aspiration networks with explosion relief devices, installing thermometric sensors in the tanks;

– prohibition of smoking outside designated areas and performing work using open flames;

– equipping buildings and structures with means of protection against lightning and static electricity, grounding of the neutral wire and grounding of electrical equipment;

– use of fire-resistant materials, sealing of openings with non-combustible materials when air ducts cross ceilings, walls and partitions;

– persons who have passed the relevant technical minimum rules of fire safety, occupational health and safety regulations are allowed to service the equipment.

***- resource-saving measures:***

– use of light-emitting diode (LED) lamps for illumination of premises, technological constructions and the territory;

– control of the rational use of natural resources: water, gas through their accounting by counters;

– preparation of hot water using solar energy (application of solar systems);

– thermal insulation of walls and roofs with effective insulating materials, arrangement of vestibules at building entrances;

– automatic adjustment of the temperature of the heat carrier in heating systems depending on the outside air temperature;

– switching the heating system to economical mode (temperature in the premises $+10^0$C) during non-working hours;

– equipping the grain dryer with energy-saving burners;

– use of treated surface runoff for the technical needs of the port: watering green spaces, washing roads and sidewalks, dust suppression;

– connection of life support systems of ships to shore electric bollards while moored at the berth;

– heating of building premises using solid fuel boilers, briquettes as fuel;

***- compensatory measures:***

– payment of environmental tax for emissions of pollutants into atmospheric air and discharges of pollutants directly into water bodies;

– payment of rent for the special use of surface water;

– payment for land lease;

– payment of the replacement cost of green spaces to be removed;

– referral of funds for the implementation of compensatory measures for the fishing industry;

– improvement and landscaping of the territory.

## *8. DESCRIPTION OF THE EXPECTED SIGNIFICANT NEGATIVE IMPACT OF THE ACTIVITIES ON THE ENVIRONMENT, CAUSED BY THE VULNERABILITY OF THE PROJECT TO THE RISKS OF EMERGENCY SITUATIONS, MEASURES TO PREVENT OR MITIGATE THE IMPACT OF EMERGENCY SITUATIONS ON THE ENVIRONMENT AND EMERGENCY RESPONSE MEASURES*

In the zone of impact of the planned activities (673 m from the "0" point of the coordinate system of the industrial site) there are no residential buildings, monuments of architecture, history, culture and other similar objects, which are equated to objects of construction. The territory is characterized by a rich industrial infrastructure, which creates a man-made environment. The object of the planned activities affects the man-made environment and is itself influenced by man-made objects located nearby.

The object of the planned activities according to the results of the identification carried out by the self-employed entrepreneur Tokarchuk O.S. (Qualification certificate: series AP No. 017922, issued by the architectural and construction attestation commission of the All-Ukrainian public organization "Guild of Designers in Construction" dated November 22, 2021) recognized as a potentially dangerous object that does not belong to objects of increased danger and to objects of the civil defense category.

A negative impact on the technogenic environment may occur as a result of a possible emergency situation. Possible types of danger include: fire; explosion (inside equipment, in buildings or the environment); equipment destruction; emission of harmful substances; spill of oil products; a combination of these factors.

In this chapter, scenarios of accidents at the object of the planned activities were considered, scenarios are related to:

a fire in a grain dryer caused by an explosion of a dust-air mixture;

sinking of the tugboat and spillage of oil products.

Also, the chapter contains a description of emergency measures provided for the structures under consideration. A complete set of measures aimed at preventing, diverting, avoiding, reducing, eliminating the significant impact on the environment of the planned activities as a whole is given in chapter 7 of this report.

### *Grain dryer «Methews 3180 BEM-NC» as a potential source of emergency (fire, explosion). Description of emergency measures.*

At the object of the planned activities, it is planned to install a grain dryer "Methews 3180 BEM-NC" of American production, with a capacity of 100 tons/hour. The grain dryer contains seven separate sections, each of which is equipped with a separate fan and an adjustable

Venturi burner, thanks to which it is provided with independent combustion and ventilation processes. The fuel is natural gas.

According to design features, when drying grain in the "Methews" type grain dryer, gentle regulation of grain moisture content is ensured and thus its high quality (without cracking) is achieved while saving fuel per 1 ton of drying.

The wet grain moved by the conveyor is poured into the receiving funnel of the grain dryer, distributed equally in the receiving section by a horizontal auger, and moves down under the force of gravity. In each of the sections, fans pump air into the combustion chamber, by which the dilution of combustion products with atmospheric air is achieved. The drying agent formed in this way enters the drying chamber and, passing through the column of grain, removes moisture, partly dust and shells from it. The temperature of the drying agent decreases as the grain moves. Depending on the moisture level of the grain supplied for drying, its ventilation in the lower sections of the dryer is usually carried out without combustion products, exclusively with atmospheric air. Grain moisture control is carried out by a moisture indicator installed inside the grain column of the grain dryer. Grain is unloaded from the grain dryer using the discharge screw installed along the entire length of the dryer. Equal supply of grain to the screw is ensured by rolls installed above the screw.

The "Methews 3180 BEM-NG" grain dryer is the most modern equipment equipped with an automation and alarm system that provides protection and prevention of the development of an emergency situation. The control panel of the grain dryer is located in the operator's room. To constantly control the temperature of the drying agent, each section of the grain dryer is equipped with 24 temperature sensors - 12 on each side. When the set temperature values are exceeded, an alarm is triggered indicating on the grain dryer control monitor the area where the emergency is occurring. The operator of the dryer stops its operation, examines the area where the emergency situation occurred and, if necessary, unloads the grain from the area where the fire occurred through a special emergency hatch to prevent the fire from spreading to other areas. The grain unloaded from the emergency zone is extinguished with the help of primary fire extinguishing means.

To prevent an emergency situation, the technological process of drying agricultural crops involves the implementation of a set of measures:

- preliminary cleaning of agricultural raw materials before drying in a separator and scalperator;
- compliance with requirements of the working process chart;
- equipping grain dryers with an automation and alarm system that provides protection and prevention of an emergency situation;
- training of personnel in drying technology, fire-fighting measures, methods of prevention and liquidation of the consequences of an accident;
- regular carrying out of preventive maintenance works at grain dryers;
- localization of dust and suppression of noise due to covering the grain dryers with a metal profile on three sides along the perimeter;
- cleaning of drying waste (dust, shells) every shift, their temporary storage in specially organized places with subsequent removal to the landfill;
- ensuring explosion and fire safety and explosion prevention in accordance with the category of the object and the requirements of Building norms and regulations;

- grounding of the neutral wire and grounding of grain dryers;
- equipping the object with primary fire extinguishing means in accordance with the "Fire Safety Rules of Ukraine";
- equipping buildings with means of protection against lightning and static electricity;
- use of fire-resistant structures;
- constant control of the condition of the eduction gears in order to prevent their clogging.

***The scenario of the accident in the grain dryer and economic losses***

The danger of emergency situations occurance in the grain dryer can be caused by following factors:

- gas leaks due to damage to fuel burners;
- depressurization of the gas pipeline that supplies gas to the burners;
- violations of grain drying technology: uncleansed grain, excessive temperature of the drying agent; irregular cleaning of stagnant zones from dust deposits, garbage impurities and defective grain.

In each of the above cases, an explosive mixture and sources of its ignition may occur in the free volumes of the grain dryer. The destructive effect of a dust-air mixture explosion is due to: excess pressure in the explosion zone and adjacent zones; directed gas flows.

The calculation of the gross emissions of pollutants in case of a fire in a grain dryer was carried out according to the "Combustion of organic fuel" method, which is given in the "Collection of indicators of emissions (specific emissions) of pollutants into the atmospheric air by various industries" (approved by the letter of the Ministry of Environmental Protection No. 10990/20/ 1-10 dated November 8, 2004), since there is no certified methodology for calculating emissions of combustion products in case of an explosion or fire.

Emissions into the atmospheric air in the event of an emergency situation are above the norm, therefore economic losses from them are calculated in accordance with the "Methodology for calculating the amount of compensation for damages caused to the state as a result of above-normative emissions of pollutants into the atmosphere".

Several assumptions were made during the calculation:

- characteristics of the fuel are taken from the sunflower husks;
- combustion mode -in a stationary layer;
- the amount of grain burned during the fire is 5 tons (the approximate amount of grain in one section of the grain dryer at the time of the emergency).

According to the results of the calculation, it was established that in case of an emergency situation associated with the occurrence of a fire in the grain dryer "Methews 3180 BEM-NG" and the destruction of the equipment, the above-standard volume of pollutant emissions into the atmospheric air is calculated to be 0.19259 tons, including dioxide carbon - 0.01197 t, the amount of the caused damages is 35 923,56 UAH.

The calculation of gross pollutant emissions in case of a fire in a grain dryer and the calculation of economic damage in case of an emergency pollutant release are given in Appendix 17.

***The ship as a potential source of an accident (sinking, oil spill).***

***Description of emergency measures***

The shipping company of NIBULON LLC has a Document of Conformity issued by the Shipping Register of Ukraine and certifies that the safety management system (SMS) of the Company has passed an audit and meets the requirements of the order of the Ministry of Transport of Ukraine No. 904 dated 20.11.2003. The document on compliance, certificate No. I 041-18, is valid until April 18, 2023. - appendix 2. This document should be accepted as proof that the company is able to comply with the requirements of the Code (Resolution A.741(18), adopted on November 4, 1993, International Code for the Management of the Safe Operation of Ships and Prevention of Pollution (Inter International Safety Management Code (ISMC). The recognized Administration periodically checks the proper functioning of the approved ship's SMS. All the Company's vessels have approved documents that confirm the safety of navigation.

The company's fleet is young, the year of registration - starting from 2010, all vessels are mainly built at the NIBULON shipbuilding and ship repair yard and meet international requirements for pollution prevention, which is confirmed by a full set of valid ship documents, reviewed and approved by the national classification society (Shipping Register of Ukraine).

The structure of the vessel, its equipment with means of fighting for the survivability of the vessel, rescue, emergency and fire-fighting means in accordance with the Rules of the Shipping Register of Ukraine ensures a sufficient level of their protection against sinking under conditions of normal operation and management.

Hydrotechnical structures (cargo berth, operational water area and water approach), the new construction of which is provided by the planned activities, are designed to ensure safe approach, maneuvering and parking of vessels in the water area of the object of the planned activities.

Under the conditions listed above, emergency situations on the Company's vessels, related to their sinking, are not predicted, under the condition that the crews of the vessels strictly observe technological and labor discipline.

However, when carrying out operations with oil (refueling, removal of oil waste ashore, in-vessel operations with the movement of oil), it is impossible to completely exclude the possibility of its accidental spillage.

The company's vessels are equipped with an alarm and warning system (AWS) which include:

- central board with an operator terminal in the machine room;
- panel of the generalized AWS with a siren of a generalized acoustic alarm and flashing signal lamps in the engine compartment;
- light columns of group generalized light signaling in the engine room with emergency warning signals;
- a video panel with a group generalized signaling panel in the navigation cabin;
- generalized signaling panels in the mechanics' dining room and cabins for calling them to the engine room.

In addition, the AWS system is equipped with a subsystem for signaling the call of mechanics to the engine room and a system for monitoring the working condition of shift personnel in the engine room.

Also, vessels of company are equipped with level alarm in the following places and tanks:

- fuel overflow tank 75% filling;

- overflow of fuel through the overflow pipe;
- fuel and oil leak collection tank 80% filling;
- fuel consumption tank of the emergency diesel generator;
- sludge tank separators;
- collection tank for blige water 80% filling;
- sewage wells of the engine room.

It is envisaged that the object of the planned activities and the Company's vessels will be provided with a sufficient number of technical means and resource materials for the liquidation of emergency consequences:

- biological preparation "Ekonadine" for removing thin layers of oil, iridescent films;
- sand, sawdust, cleaning cloth;
- buckets, metal containers, scoop shovels, bags;
- the use of dispersants (chemical sorbents) is PROHIBITED.
- a set of boom barriers for installation around the vessel during its bunkering with fuel from the tanker.

Therefore, under the conditions of the implementation of the above measures, the development of an accident related to the leakage of oil and oil waste is unlikely.

- biological product "Ekonadine" for removing thin layers of oil, iridescent films;
- sand, sawdust, wiping materials;
- buckets, metal containers, scoops, bags;
- the use of dispersants (chemical sorbents) is PROHIBITED.
- a set of boom barriers for installation around the vessel during its bunkering with fuel from the tanker.

Therefore, under the conditions of the implementation of the abovementioned measures, the development of an accident related to the leakage of oil and oil waste is unlikely.

***Scenario of an accident on a tugboat (oil spill)***

***and economic losses***

The flooding of the tug "NIBULON" in the water area of the object of the planned activities, accompanied by the spill of oil products and their spread in the surface waters of the Danube River, was chosen as the emergency scenario. In connection with the lack of a certified methodology for the spread of water contaminated with oil products, the basis for modeling is the article of the Candidate of technical Sciences, vice-principal of National University of Civil Defense of Ukraine – Popov V.M., candidates of technical science – Romin A.V., Fesenko H.V. «Features of prognostic calculations of the spread of highly polluted water zones taking into account the condition of the ice and the number of days after ice formation» [67].

Prognostic calculations were made based on the result of modeling the spread of oil-contaminated waters with the following assumptions:

- the distribution of oil product concentration values in the highly polluted zone has approximately the same form across the entire width of the watercourse;
- cross-sectional contours are close to a rectangle;
- vertical mixing of water occurs almost instantaneously.

According to the results of calculations, the spread of oil products in the surface waters of the Danube River has the following characteristics:

- time after emergency discharge of oil products when the front part of zone of oil-contaminated waters will achieve the predetermined cross-section of water body (500 m downstream from emergency site) is $\tau_{x,front}$ = 2776,06 sec, or 46 min;

- time after emergency leakage of oil products when the maximum concentration of oil products will be observed at the control cross-section is $\tau_{C,max}$ = 3890,61 sec, or 1 hour 05 mi;

- maximum concentration of oil products at the control cross-section (500 m downstream from emergency site) is 1,17470 mg/dm$^3$;

- the amount of damage caused to the environment as a result of an accidental spill of oil products is 97490,46 UAH.

Prognostic calculations of the spread of waters polluted by oil products. Modeling of the emergency situation are given in Appendix 17.

## 9. DETERMINATION OF ALL DIFFICULTIES (TECHNICAL DEFECTS, LACK OF SUFFICIENT TECHNICAL MEANS OR KNOWLEDGE) DISCOVERED IN THE PROCESS OF PREPARATION OF THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT

During the preparation of the report, certain difficulties were encountered due to the lack of some methods for comprehensive forecasting of the impact on the environment and assessment by types of environmental impacts, or the available methods are already outdated and do not correspond to modern technologies and equipment.

Difficulties were also caused by a lack of knowledge when preparing answers to questions from the Romanian side, in particular regarding the Program *Interreg VI-A NEXT Romania-Ukraine.*

## *10. ALL PUBLIC COMMENTS AND SUGGESTIONS REGARDING PLANNED ACTIVITIES, SCOPE OF RESEARCH AND LEVEL OF DETAILING INFORMATION TO BE INCLUDED IN THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT*

According to Art. 4 of the Law of Ukraine "On environmental impact assessment" [1] Notification of planned activities subject to environmental impact assessment No. 20225199566 (Appendix 18) is made public in the following way:

- the printed version was submitted to the Ministry of Environmental Protection and Natural Resources of Ukraine for inclusion in the Unified Register of Environmental Impact Assessment, letter 3143/3-22/50 dated May 12, 2022 (appendix 18);
- published in two local newspapers: “Kuryer” No. 21 (1807) dd. 28.05.2022, “Prydanayski Visti” No. 18 (13246) dd. 27.05.2022 (appendix 19);
- the printed version was submitted to the Izmail City Council for posting on notice boards, letter No. 3255/3-22/50 dated May 31, 2022 (appendix 20).

No comments and suggestions from the public regarding the scope of research and the level of detailing information to be included in the environmental impact assessment report were received to the address of "NIBULON" LLC.

As part of Ukraine's compliance with the obligations under the Convention on environmental impact assessment in a transboundary context (ratified by Law of Ukraine N 534-XIV dd. 19.03.99 [16]) and the procedure for transboundary environmental impact assessment of the planned activities of "NIBULON" LLC, the Ministry of Environmental Protection and Natural Resources of Ukraine notified "NIBULON" LLC about the transboundary impact (ref. No. 25/4-21/7202-22 dd. 07.06.2022 and order No. 218 dd. 06.06.2022 regarding the decision to carry out a transboundary impact assessment on environment according to the procedure of the country of origin (appendix 21).

Also, the Ministry of Environmental Protection and Natural Resources of Ukraine, through the Embassy of Ukraine in Romania, presented to the Ministry of Environment, Water Resources and Forests of Romania the Notification on the planned activities of LLC "NIBULON" (ref. No. 25/4-21/7156-22 dd. 07.06.2022, registered under entry No. 2/R/1363/15/06/2022).

In response, the Ministry of Environment, Water Resources and Forests of Romania in a letter ref. No. DGEICPSC/1363/04/08/2022 sent the Ministry of Environmental Protection and

Natural Resources of Ukraine its proposals and comments regarding the scope of research and the level of detailing of information to be included in the environmental impact assessment report (appendix 21).

NIBULON LLC informs about taking into account in the EIA Report the provisions of the letter of the Ministry of Environment, Water Resources and Forests of Romania according to the ref. No. DGEICPSC/1363/04/08/2022:

| Comments and suggestions of the Romanian side | Answers and links to the EIA Report |
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| **I. General comments and suggestions regarding the composition and content of the EIA Report** | |
| *The location of the project works is on the left bank of the Danube River, industrial enterprises are downstream. Regarding the location of the work, the nearest Romanian settlement to Izmail is Plauru village, Ceatal comuna - the county of Tulcea, and the nearest surface water stream is the Danube River. Transboundary impact on the environment can significantly affect the nearest surroundings, the minimum distance from the sources of pollutant emissions during work is 570 m - Plauru village in Romania.* | Comments and suggestions are taken into account. |
| *As part of the project, the planned activities include the construction and operation of hydrotechnical structures of the port (cargo berth, etc.), railway access track, an industrial transshipment complex for grain, leguminous and oil crops (railway and road receiving facilities, a grain dryer, warehouse capacity, shipment devices for water and road transport), as well as dredging to a depth of 8.23 m from the "0" of the Sea Port of Izmail with the excavation of bottom soil in the amount of 112.0 thousand m3 and its storage in the coastal dump.* | Partially corresponds to the Notification.<br>In the Report, the project decisions regarding the construction of buildings and structures correspond to the intentions published in the Notification of Planned Activities. The list of buildings and structures with their in turn construction is given in subsection 1.3 of the Report.<br>The exception is the cargo berth, which has been replaced by two floating berths on which shipment floating complexes are installed. The description of the floating berth is given in subsection 1.4 of the Report. |
| *After analyzing the notification, the alternative that is considered possible and proposed by the project is alternative 1, which is the best option for the selection of objects/institutions and technical characteristics of equipment to ensure the integration of a complex of technologies.* | Not responding. Based on the comparison of technical alternatives 1 and 2, technical alternative 2 is recognized as environmentally sound. A description of justified alternatives and their comparative analysis is provided in subsections 1.3.1., 1.4. and in chapter 2. |

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| *Thus, the environmental impact assessment documentation (EIA documentation) that will be developed for this planned activities must contain, as a minimum, in accordance with the provisions of the Espoo Convention, the following:* | Proposals are accepted and taken into account. |
| - *Detailed information about the project itself, including the location of the project works, a description of these proposed works (please include sectional, cross-sectional profiles and longitudinal profiles of objects related to the proposed activity), a site plan and a map of the location of the project with along the state border between Romania and Ukraine;* | Detailed information about the project is contained in subsection 1 of the Report "Description of planned activities", in particular in its subsections 1.1., 1.2., 1.3., including 1.3.2. "Dredging works", and 1.4. "Description of the main characteristics of the planned activities", as well as in Graphic materials: - Drawings 1-5 as part of the Report. |
| - *A description of justified alternatives to the proposed types of activities, as well as an option of refusal of the activity;* | A description of technical alternatives is provided in subsection 1.3.1. and 1.4. report |
| - *A description of the environment/factors that may be significantly affected by the proposed actions and their alternatives;* | A description of the current state of the environment is given in chapter 3 of the Report of the same name, a description of environmental factors likely to be affected by the planned activity and its alternative options is in chapter 4. |
| - *A description of the potential impact of the proposed activity and its alternatives on the environment and an assessment of their significance;* | An assessment of the potential impact of the planned activity as a result of preparatory and construction works is provided in subsection 1.5.1. of the report, in the course of the planned activity - in subsection 1.5.2. report |
| - *Description of prevention and mitigation measures to minimize adverse environmental impact. It is necessary to assess the transboundary impact on environmental factors and take measures to prevent, reduce, supervise and monitor any negative impact on the environment during the execution/construction phase or during operation in accordance with the relevant legislation. All these measures to prevent, limit and reduce any impact on the environment are also applicable to the protection of the surface waters of the Danube River both during the execution of works and during the operation of the river port (terminal) of Izmail. We consider it necessary to take measures to reduce or prevent adverse consequences and protective measures, which must be planned and implemented in accordance with international law at all stages of the planned activity (implementation, operation, in* | A description of planned measures aimed at prevention, diversion, avoidance, reduction, elimination of significant negative impact on the environment, including (if possible) compensatory measures are provided in chapter 7 of the Report.<br><br>The assessment of possible transboundary impact is provided in subsection 5.8 of the Report. |

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| *case of an accident, etc.) and to ensure a high degree of environmental protection, adaptation to climate change and ensuring sustainable development.* | |
| *- A clear indication of the forecasting methods used, including mathematical modeling methods and the assumptions underlying them, as well as relevant environmental data;* | A general description of the forecasting methods is given in chapter 6 of this report, references to the methods, assumptions adopted and outgoing data underlying each of the calculations are given in the relevant appendixes to this report where these calculations are given. |
| *- Assessment of likely consequences of changes in the environment/intervention in environmental change;* | An assessment of the likely consequences of changes in the environment is given in chapters 4 and 5 of the Report. |
| *- Assessment of the duration, length and scope of the proposed works;* | The calculation period of the forecast is given in section 6 of this report, the length and scope of the planned works - in the corresponding calculations given in the appendixes to this report. |
| *- Description of impacts on key species and organisms, including sediment disturbance impacts on marine organisms;* | A description of the impact on flora, fauna and biodiversity is given in subsections 1.5.1 and 1.5.2. of this report. The assessment of the impact of hydrotechnical works on the state of ichthyofauna and aquatic biocenoses of the Danube River was carried out by the Institute of Fisheries and Marine Ecology of the State Agency of Land Reclamation and Fisheries of Ukraine (Appendix 8 to this report). |
| *- Use of natural resources;* | The description of impacts from the use of natural resources is given in subsection 5.1 of the Report. |
| *- Monitoring and management plans;* | The post-project monitoring program is listed in Table 11.1 of Chapter 11 of this report. |
| *- A description of measures to prevent and respond to accidents, including accidents to vessels that may lead to flooding;* | Scenarios of probable accidents, including on the ship, with a description of their prevention measures are given in chapter 8 of this report, |
| *- Identification of gaps in knowledge and uncertainties that arose during the preparation of environmental impact assessment documentation.* | A description of the difficulties that arose during the preparation of the report is given in chapter 9. |

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| *In addition, we would also like to emphasize that a significant negative transboundary impact of the project on the activities that will be financed under the Interreg VI-A NEXT Romania-Ukraine Program can be expected, given that the Odesa region, including the Izmail district, is part of the relevant territory of this Program. The program offers funding opportunities for three priorities and five specific goals, among which we mention those activities which are financed under the Romania-Ukraine Program, thus, in our opinion, the mentioned project can affect them: infrastructure (construction/restoration/modernization of infrastructure related to systems/structures to fight against fires, floods, strengthening of riverbanks, channels, condition of dams, afforestation of riverbanks, conservation, regeneration and re-naturalization of water bodies and ecosystems, conservation and restoration of small rivers); equipment (means for extinguishing fires, eliminating floods, etc.); general strategies and tools for hazard management and risk prevention, including joint action plans, hydrological monitoring of rivers, water temperature, measurement of precipitation and ice regime; joint projects on the creation/expansion of nature reserves in a transboundary context; assistance: improvement of human and technical potential and modernization of equipment for monitoring nature conservation areas; assessment, protection and improvement of existing ecosystems (research activities, resource inventory, protection of endangered species, eradication of invasive species, afforestation, etc.).* | <u>Suggestions are not accepted.</u><br>The planned activity has a very local character:<br>- the zone of impact of the planned activity on the quality of the atmospheric air, according to the estimates of subsection 5.8, is the territory with a radius of 673 m around the point "0" of the coordinate system of the industrial site;<br>- the impact of dredging does not go beyond the water area of the object of the planned activity (the assessment is given in subsection 1.3.2);<br>- during the discharge of recycled water of the object of the planned activity, the quality indicators of surface water in the control cross-section at 500 m downstream of the recycled water release do not exceed the established standards (the assessment is given in subsection 1.5.2);<br>- transboundary impact on the state of the atmospheric air in Romania is assessed as absent, on the state of the surface waters of the Danube River as normative (the assessment is given in subsection 5.8.). |
| **II. Comments and suggestions regarding surface and underground water bodies/ water elements** | |
| *From the point of view of the naval transport sector, with the help of the planned measures, the Ukrainian side intends to build a depth of 8.23 m in the future port/terminal in Izmail in the operational area, which involves dredging in the following area: Sulina Strait, Sulina Channel, Tulcea Strait, Izmail Ceatal, further following the Kiliya estuary to Izmail so that a depth of 8.23 m was provided from a depth of 7.32 m.*<br>*In this regard, I would like to note the fact that the depths of the Sulina shoal and the Sulina estuary are directly dependent on the sedimentation of the Danube River. The higher the water in the Danube River, the more intense the processes of sediment deposition, which affects the decrease in depth. The more* | <u>Comments are not accepted.</u><br>The planned activity does not include dredging in the following areas: Sulina Strait, Sulina Channel, Tulcea Strait, Izmail Ceatal, further following the Kiliya estuary to Izmail. "NIBULON" does not intend to transfer to itself the functions of the state regarding the deepening of navigable waterways for public use. The implementation of the planned activity is foreseen at the expense of private investments and has a very local character - a new construction of a river port (terminal) on an area of 19.7 hectares with hydrotechnical structures (operational water area with an |

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| *intensive the dredging works in the shoal, the greater the depth in the shoal and vice versa, so that dredging is carried out during the year with a delay in time compared to the regime of the Danube River sediments.* | approach channel) located along the Vylkove - Izmail Ceatal shipping channel from 91.09 to 91.55 km wide from the channel border to the left bank (area 10.4357 hectares).<br>The design depth of hydrotechnical structures is 8.23 m from "0" of the Izmail Sea Port, which corresponds to the design depth of the shipping channel "Vylkove - Izmail Ceatal" (approved by the Resolution of the Cabinet of Ministers of Ukraine dated February 9, 2022 N 136 with the clarification "the depth has not been reached in "due to non-completion of construction works under the project"). A more detailed description of the dredging technology is provided in subsection 1.3.1 of this Report and Drawing 3. |
| *In view of the above, it is necessary to analyze the project/activity according to the following aspects:*<br>*- hydromorphological - fluctuations in the speed of water flow in several areas of the Sulina sector, the Sulina channel, the Tulcea estuary, the Izmail Ceatal, then the Kiliya estuary to Izmail and their impact on the existing hydrotechnical works in this sector, in the case of dredging works from 7.32 m to 8, 23 m;*<br>*- correlation with the new hydromorphological process, which is related to the issue of the development of the secondary delta of Kiliya to the south, which refers to the formation of the coastal border by the coarse alluvial outflows of the Istanbul Vichy, which is closed in the Black Sea by the Musura Bay, which represents a danger for shipping in the mouth of Sulina; it is necessary to analyze the increase of speed of sediment accumulation at the mouth of the Sulina Channel;*<br>*- the completion of dredging works from 7.32 m to 8.23 m and, subsequently, the operation of this waterway will have an important impact on the distribution of water flows and flows of the Danube River alluvium between the Kiliya and Tulcea mouths;*<br>*- large volumes of dredging operations will negatively affect the flow of water on the secondary branches of the Kiliya, which supply water to the territory of the Danube Delta, and may significantly affect the Danube Delta Biosphere Reserve.* | Suggestions are not accepted.<br>Clarification in the resolution of the Cabinet of Ministers of Ukraine dated February 9, 2022 No. 136 regarding the design depth of 8.23 m of the Vylkove - Izmail Ceatal shipping channel "the depth has not been reached due to the non-completion of construction works according to the project" provides for the existence of another, larger-scale construction project with studies and assessments of the impact of these works on environmental factors.<br>Meanwhile, dredging works as part of the planned activity are characterized by very modest results: excavation of bottom soil in the volume of 112.0 thousand m3 on an area of 2.32 hectares (in the case of bringing depths to 8.23m). In the rest of the water area, the natural depths correspond to the declared design depths (Drawing 3).<br>Execution of dredging works is planned in several stages, which is related to the sequence of construction of the object of the planned activity. The last step - reaching depths from 7.32m to 8.23m from "0" of the Izmail seaport will be implemented in case Ukraine initiates dredging works on the shipping channel "Vylkove - Izmail Ceatal" and downstream sections of the shipping route and water areas.<br>More detailed information on the issue of dredging works, conducted studies and environmental impact assessment is given in subsections of this report: 1.3, 1.5.1, appendixes 5, 6, 8. |

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| *It is also necessary to include aspects regarding the status of the water body and the possible impact, in accordance with the requirements of the Water Framework Directive (2006/60/EC), taking into account the reference from the notification, in the context of the likely transboundary impact (page 6), the Convention on the Protection and sustainable use of the Danube River in the context of possible transboundary impacts and the Convention on the Protection and Sustainable Use of the Danube River (1994, ratified by Ukraine in 2002).* | Suggestions are accepted.<br><br>The current state of the water body is given in chapter 3 of the Report, the assessment of the transboundary impact of the planned activity within the framework of the Convention on the Protection of the Danube River is given in subsection 5.8. report |
| *From the point of view of the safety of navigation, for the normal development of maritime traffic, the implementation of water transportation, the physical integrity of navigation personnel, passengers and cargo, we inform you that the depth of 8.23 meters, planned for carrying out dredging works according to the project, significantly exceeds the draft of 23 feet ( 7.01 meters), allowed at the mouth of the Sulina in accordance with Art. 3.05* chapter *3 second part of the Danube Navigation Regulations in the Romanian sector. In summary, vessels that will be loaded at the port of Izmail will not be able to load at full capacity in the future due to restrictions at the Sulina estuary.*<br><br>*The Ukrainian Party will have to comply with the provisions of international and bilateral regulatory acts regarding navigation on the Danube and the drainage regime of border waters, such as: Convention on the regime of navigation on the Danube, signed in Belgrade on August 18, 1948; (ratified by Decree No. 298/1948) further Belgrade Convention, Agreement between Romania and Ukraine on State Border Regime (2003), Agreement between the Government of Romania and the Government of Ukraine on Cooperation in the Field of Border Water Management, signed on September 30, 1997 in Galata , as well as other bilateral documents signed by Romania and Ukraine. The Ukrainian side needs to take all possible measures to limit and manage the environmental consequences for the Danube Delta ecosystem.* | Remarks are taken into consideration.<br><br>Execution of dredging works is planned in several stages, which are related to the sequence of construction of the object of the planned activity. The last step - reaching depths from 7.32 m to 8.23 m from "0" of the Izmail sea port will be implemented in case Ukraine initiates dredging works on the shipping channel "Vylkove - Izmail Ceatal" and downstream sections of the shipping route and water areas. More details about the sequence of dredging works are given in subsections 1.3. and 1.4<br><br>Shipping company "NIBULON" works in the legislative field and has experienced specialists in this field. Therefore, it is the duty of everyone at their workplace to unquestionably comply with the requirements of current legislation and the provisions of all international acts, including national and international regulatory acts regarding shipping on the Danube River.<br>The planned activity envisages the implementation of measures aimed at preventing, diverting, avoiding a significant negative impact on the environment, including limiting the ecological consequences for the ecosystem of the Danube River. Description of measures - chapter 7 of the Report. |

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| *Taking into account the pressures listed in the European Commission Directive EU 2017/845 of 17 May 2017 that the proposed activity has on the aquatic environment, there is a possibility that the marine environment may be affected differently. Thus, the works carried out in the project implementation area may lead to the resuspension of some priority substances from sediments in the water column. In addition, equipment and transport activities can be additional sources of pollution, generating atmospheric emissions of priority hazardous substances (heavy metals, hydrocarbons, etc.), which can then be released into the aquatic environment, introducing pollutants into the marine area. Together with other burdens from the same activity, the cumulative impact can pose a threat to the marine ecosystem.*<br>*Thus, we believe that the monitoring program of the Black Sea ecosystem in front of the mouths of the Danube is mandatory, both during the project implementation period and after the completion of work on the concentration of pollutants in all matrices: water, sediment, and flora and fauna.* | Suggestions are accepted.<br>During the impact assessment, a study of subsoil samples was conducted in the area of its planned development, information is provided in subsection 3.3., measurement protocols - appendix 3 to this Report.<br>A study of surface water samples of the Danube River was also conducted, measurement protocol - Appendix 3.<br>The post-project monitoring program provides for conducting studies of soils (bottom sediments), as well as the state of surface waters (section 11, table 11.1) |
| **III. Comments and suggestions regarding air quality and noise level** | |
| *Air quality should be monitored by measurements determined by fuel combustion at the level of machinery and equipment and vehicles or by circulation of materials (emissions of CO, CO2, NOx, SO2, VOCs, dust, etc.) and monitoring of parameters to ensure that the maximum permissible concentrations according to the relevant legislation are not exceeded.*<br>*Ensuring measurement of the noise level on the site and on the boundaries adjacent to the territory adjacent to the port during the implementation period (temporary) or during the operation period from noise generated by construction/operational machinery and vehicles.* | Suggestions are accepted.<br>The post-project monitoring program specified in subsection 11 of this Report (table 11.1) contains information on conducting direct instrumental measurements directly at organized and mobile sources of emissions, as well as monitoring the quality of atmospheric air at the border of the sanitary protection zone and residential buildings, which includes determining the content of pollutants and the level of noise during construction and operation.<br>The list of sources of emissions, their characteristics, nomenclature and estimated volumes of pollutants emitted into the air during preparatory and construction works are given in subsection 1.5.1, during the implementation of planned activities - in subsection 1.5.2. |
| **IV. Comments and suggestions on waste management** | |
| *Waste management regarding the collection through companies specialized in this field and the application of hazardous and safe waste management measures. We also mention the need to manage any emergency spills/discharges of hazardous substances, especially in the fuel category (petroleum, diesel, mineral oils, used* | Suggestions are accepted.<br>Information on waste, which is expected to be generated as a result of the implementation of the planned activity, and ways of handling it during preparatory and construction works - are given in subsection 1.5.1 of the Report; |

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| *motor oils, etc.) on surface or underground bodies of water. At the same time, the waste generated during the ongoing activities of the dredging vessels, as well as other activities, will be treated, selectively collected in the storage areas/containers designated for this purpose and accepted by specialized companies on site.* | during the implementation of the planned activity - in 1.5.2.<br>The planned activity also provides for the implementation of a set of emergency measures, including those related to the spillage of oil fuel from the ship, which led to the pollution of surface waters. The ship emergency scenario and emergency measures are given in Chapter 8. |

**Comments and suggestions regarding the appropriate impact assessment on the "Natura 2000" territory**

*As you already know, the Danube Delta is an integral part of the European Ecological Network "Natura 2000" in Romania and overlaps at the level of the Danube Delta with such Special Protection Areas (SPAs) and Sites of Community Importance and Interest (SCI) created according to the Habitats Directive (92/43/CE) and the Birds Directive (79/409/CE):*

| *№* | *Name SCI* | *Code* | *SCI surface (ha)* | *Biogeographic region* |
|---|---|---|---|---|
| *1.* | *Danube Delta* | *ROSCIOO 65* | *453.645,5* | *49.8% of the Steppe and 50.2% of Seaside* |
| *2.* | *Danube Delta* | *ROSCIOO 66* | *336.200,2* | *100% maritime area of the Black Sea* |

| *№* | *Name SCI* | *Code* | *SCI surface (ha)* | *Biogeographic region* |
|---|---|---|---|---|
| *3.* | *The Danube Delta and the Razim-Sinoye Complex* | *ROSCIOO 63* | *508.302,3* | *44.74% of the Steppe and 55.26% of Seaside* |

*Detailed maps of these places can be found on the Internet Natura 2000 Network Viewer (europa.eu). Information about the sites is available on the website of the Romanian Administration of the Danube Delta Biosphere Reserve: https://ddbra.ro/rezervatia/delta-dunarii/biodiversitate/situri-natura-2000-administrate-de-a-r-b-d-d-a921. This link also contains the Natura 2000 standard form for which each Natura 2000 site has been prepared.*

*1. "Danube Delta ROSCI0065" was intended for the conservation of species/habitats of interest to the Community:*
*- 29 types of biotopes of public interest, of which 7 are priority (71.24% of the surface of ROSCI0065 is occupied by "Natura 2000" habitats);*
*- species listed in Appendix II of Directive 92/43/CEE: 5 species of plants, 9 species of invertebrates, 15 species of fish, 2 species of amphibians and 3 species of reptiles, 7 species of mammals.*
*2. The "Danube Delta ROSCI0066" marine zone is intended for the preservation of species/habitats of interest to the Community:*
*- 4 types of biotopes that are of interest to the community;*
*- species listed in Appendix II of Directive 92/43/CEE: 2 species of fish, 2 species of mammals.*
*3. "Danube Delta and Complex "Razim-Sinoye" ROSPA0031" was designated for the conservation of birds of interest to the Community: 221 bird species listed in Appendix 1 of Directive 2009/147/CE, of which 13 are permanent species, 95 - for reproduction, 38 are wintering, 137 are within this territory during migration.*

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| *The Romanian side is particularly concerned about the proposed dredging works and considers that all interventions aimed at changing the cross-sections and longitudinal sections of the branches are likely to affect most components of the Natura 2000 areas.*<br>*In summary, it is necessary to carry out thorough evaluation studies of the above-mentioned nature conservation areas in accordance with the provisions of the above-mentioned directives. The methodology adopted for the identification and assessment of negative impacts should be simple and consistent with the Danube Delta Biosphere Reserve Management Plan. The conclusions of thorough evaluation studies should be considered in the environmental impact assessment documentation.*<br>*Works in the waters of the Danube, during the construction phase of the port or dredging facilities, will be able to affect the aquatic ecosystem of the Danube in the close proximity and to a limited extent downstream. The works will also affect the presence of ichthyofauna and the presence of birds that belong to the aquatic ecosystem. It is expected that the activity and increased presence of people in the territory of the port complex during the works will have a negative impact on the fauna in the area.* | The suggestion is partially accepted.<br>On the territory of the implementation of the planned activity and in the zone of its territorial impact on atmospheric air quality (within a radius of 673 m from the "0" point of the coordinate system of the industrial site) there are no objects of the nature reserve fund and reserved territories for the creation of NRF objects. Also, this territory is not a migratory eco-corridor for rare species of birds, does not belong to the territories of the "Emerald Network" project and Natura 2000.<br>Meanwhile, the dredging works carried out within the framework of the planned activity affect the hydrobionts of the Danube River. The assessment of the impact of hydrotechnical works on the state of fish stocks of the Danube River is given in Appendix 8. More detailed information about the impact of the planned activities on fauna and flora is given in subsections of this Report: 1.5.1, 1.5.2, 4, 5.1, 5.3, 5.4. |
| **V. Comments and suggestions regarding the monitoring program** | |
| *We consider it necessary to monitor environmental factors that can be significantly affected. The developer must implement established environmental monitoring measures in accordance with current international environmental legislation.* | The suggestion has been taken into account.<br>The program after project monitoring is given in chapter 11 of this Report. |

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| *Summarizing and taking into account the notification of the planned activity - the new construction of the river port (terminal) of the transport infrastructure facility in Izmail, Izmail district, Odesa region, with a railway access track adjacent to the Izmail station of the Odesa Railway regional branch, provides:* | |
| *"Construction of an operational water area with an approach channel with dredging to a depth of 8.23 m from "0" of the Izmail Sea Port with excavation of the bottom soil in the volume of 112.0 thousand m³ and its storage at the coastal dump";* | Corresponds to the characteristics stated in the Notification.<br>However, the Report provides clarifications regarding the design depth of 8.23 m from "0" of the Izmail seaport - the last stage of dredging works - reaching depths from 7.32 m to 8.23 m will be realized in case if Ukraine initiates dredging works on the shipping channel "Vylkove - Izmail Ceatal" and downstream sections of the shipping route and water areas. |
| *"The total area of the site planned for the construction and operation of the river port (terminal) transport infrastructure facility is 19.0 hectares from reserve lands and 5.29 hectares from water fund lands"; "Operational water area with an approach channel on the Danube River from 91.09 to 91.55 km: length - 460 m, from -115 m, area - 5.29 ha, estimated depth - 8.23 m from "0" of the Izmail seaport;* | Partially corresponds to the characteristics stated in the Notification.<br>In the course of work on the project, the area of land plots was specified:<br>- 19.0 ha - from reserve lands;<br>-10.4357 ha - from the lands of the water fund;<br>- 0.7 ha with the category "land of transport", acquisition from PJSC "UKRAINIAN DANUBE SHIPPING COMPANY". |
| *"ecological restrictions (...)" of the planned activity according to technical alternative 1" — "for pollution of the aquatic environment, the MPC value of pollutants in the surface waters of the water body, the background content of pollutants in the surface waters of the water body", and for " impact on the animal world" - prohibition of dredging during spawning";* | Detailed information about land plots in subsections 1.1, 1.3., including 1.3.2. "Dredging works", as well as in cartographic materials - Drawings 1-5. |
| *That the notification submitted requires additional information on the planned activities in terms of berths, roadsides, aquariums, silos, external defenses of the port, the current capacity of the port and to what level expansion is made, if there are facilities for 8 million tons/year, if the total area of the port is 1,074,712 m², i.e. 107.47 hectares, as stated in the "Handbook of Danube Ports, December 2021edition." Danube_Ports_Handbook_Edition_2021_final.pdf (danubeports.eu);* | Description of the main characteristics of the planned activity - subsection 1.4 |
| *The notification does not establish any possible impact on the environment, but only mentions* | Comments are not accepted |

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| *some aspects of the impact on water during the period of operation due to the deposition of dust as a result of transshipment works on the surface of the water and does not mention any possible transboundary impact, for example, due to the modification of the hydrological parameters of the Kiliya Estuary with the consequence of the redistribution of flows between the Kiliya estuary and the Sulina estuary in favor of the former;*<br>*probable transboundary impact, in particular due to hydrological changes of the Danube (in terms of morphological conditions: depth and width of the river bed, structure and substrate of the river bed, hydrological regime: amount of runoff, disruption of the continuity of sediment transportation, water velocity, etc.) through the implementation of planned measures (... )", should be considered in the context of the implementation of another project: "Development of the deepwater Danube-Black Sea shipping channel from the Ukrainian side of the Danube Delta; (Bystre estuary), as planning works for the Izmail harbor with 8.23 m deep berths also require at least similar access depths for the entire Kiliya arm and the Bystre channel; in a broader context, these two interrelated projects belong to the "Development of the Danube Corridor"; a project of which the LOGMOS Master Plan - Appendix 6, Part II, TRACECA Inland Waterways - Danube Case Study is a part, October 2013, ENPI 2011/264 459, "Logistics processes and sea lanes II in Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Turkmenistan, Ukraine, Uzbekistan" refers to the construction of an external port at the entrance to the Ukrainian section of the Danube waterway for transshipment operations to increase the volume of cargo transported to the ports of Reni and Izmail and the reconstruction of the port of Reni;* | The notification of the planned activity contains the types of possible impacts expected from the planned activity. In the Report, all types of impacts correspond to the scope of the planned works, their qualitative and quantitative assessment, as well as possible consequences are provided in the relevant subsections of the Report: 1.5.1, 1.5.2, 5.1, 5.3.<br>However, the planned activity does not include dredging in the following areas: Sulina strait, Sulina Channel, Tulcea strait, Izmail Ceatal, further following the Kiliya estuary to Izmail.<br>Implementation of the planned activity is foreseen at the expense of private investments, has a very local character and does not belong to the General Plan of LOGMOS.<br>An assessment of the possible transboundary impact of the planned activity is provided in subsection 5.8 of the Report. |
| *The research report "Analysis of the impact on the environment in the Danube Delta as a result of the already completed works related to the project of the Danube-Black Sea deep-water route on the Ukrainian side of the delta", carried out as a result of the implementation of both Phase 1 of the project and the Full Development Phase (which also covers the development of compensatory and mitigation measures, probably based on the 2004-2017 integrated environmental monitoring materials and the results of field monitoring observations,* | <u>The comment is not accepted.</u><br>The planned activity is not related to the project of the Danube-Black Sea deep water route on the Ukrainian side of the delta and is not responsible for its content. |

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| *at least in a transboundary context), states that hydraulic works (without specifying what these works consisted of) did not cause a transboundary impact on the hydrological regime of the Danube Delta and, thus:*<br>*- did not cause any changes in the distribution of runoff from the top of the delta where the Danube divides into the Kiliya and Tulcea mouths, but no data were provided to confirm this;*<br>*- the current trends in the development of water flow in the Kiliya estuary have not changed;*<br>*- no significant impact on migratory fish populations was established.* | |
| *The Romanian side expresses the following point of view regarding the implementation of the works:*<br>*Since the Ukrainian Party intends to create depths of 8.23 m at the operating berths in the port of Izmail, we consider that it is not opportune to create these depths because the ships that are going to operate in the port of Izmail, if they enter the Sulina Channel, Tulcea Arm, Izmail Ceatal, then Kiliya Arm up to Izmail, will need to ensure this depth throughout the entire sector crossed. This situation is in contradiction with what is*<br>*currently going on in this segment between Bara Sulina - Sulina Channel - Tulcea Arm - Ceatal Izmail, since, in compliance with the Danube Commission Recommendations, it provides depths of 7.32 m for the navigation of maritime vessels with draughts of 7.01 m.*<br>*Currently the navigation depths provided by the Lower Danube River Administration Galati are in accordance with the navigation gauges for which the Sulina Canal was designed, the present situation being directly proportional to the existing geomorphological conditions, the infrastructure of the banks and the port on this segment, between Bara Sulina and Ceatal Izmail. In the situation desired by this project, to ensure depths of 8.23 m in the berths of the port of Izmail, we consider that this cannot be achieved on the above-mentioned segment, namely from Bara Sulina to Ceatal Izmail, both from the geomorphological point of view, financial resources, existing equipment, as well as the fact that it is not necessary from the point of view of the Administration, which must ensure a depth of 7.32 m, according to the Recommendations of the Danube Commission. At the same time, It must be taken into account the current situation regarding high temperature and drought, as well as the high traffic flow on* | Comments are taken into consideration.<br><br>The design depth of the hydrotechnical structures of the planned activity is 8.23m from the "0" of the Izmail sea port, which corresponds to the design depth of the shipping channel "Vylkove - Izmail Ceatal" (approved by the resolution of the Cabinet of Ministers of Ukraine dated February 9, 2022 N 136 with the clarification "the depth has not been reached due to non-completion of construction works under the project").<br><br>Dredging works are planned to be carried out in stages, which is coordinated with the implementation of the construction phase.<br><br>The last stage of dredging works to achieve depths from 7.32 m to the design depth of 8.23 m will be implemented in case if Ukraine initiates dredging works on the Vylkove - Izmail Ceatal shipping channel and downstream sections of the shipping route and water areas. A detailed description of dredging works and their impact on the environment is given in subsections of this report: 1.3, 1.5.1, appendixes 5, 6, 8. |

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| *the Danube River compared to previous years, which led to the decrease of the Danube river flow by 50%, being necessary to ensure recommended and accepted navigability conditions in the sector concerned.* | |
| *The area to be dredged additionally for the 8.23 m depth is between Bara Sulina and Ceatal Izmail (Mm43) at the critical points Bara Sulina, ym31, Mm36, Mm40 and the dredged material must be dumped at sea. From the measurements carried out, for a covering depth of -9.00 m, it results the necessity of dredging a volume of about 1,500,000 m3, with annual periodical maintenance, with adverse effects on the Sulina Canal, both for the bank defences and on the bed, with enormous costs, unjustified by the Romania and without having additional equipment to carry out the above mentioned works. In this regard, the Romanian authorities does not agree with the realization of the Izmail port for depths of 8.23 m and recommends to take into account that the future sea berths should provide depths for ships with draughts in close correlation with the existing situation in the Sulina Channel, i.e. depths for the navigation of sea vessels with draughts of 7.01 m.*<br>[4]htt/ / vyvvw. mmedi\i.ro app /webroot / uploads/ files /Annex 2 Analys!s of the i mpact of the I fi om the already worh ENG RO. pdf<br>[5]https / /www. danubecomm ssion.org/uploads/doc/ publication/Gabaritov farvatera / pdf | The comment is not accepted.<br>The planned activity involves dredging works with the extraction of bottom soils in the volume of 112.0 thousand m3, the area of the bottom damage is 2.32 hectares, the storage of the soil is provided for in a coastal dump, which is organized on the territory leased for the construction and operation of the object of the planned activity.<br>More information on the issue of dredging works and their impact on the environment is given in subsections of this report: 1.3, 1.5.1, appendices 5, 6, 8. |
| *At the same time, in the case of dredging for the construction of the depths at the berths of the Izmail seaport, we recommend that the dumping areas be established as close as possible to the Ukrainian shore, that they be checked periodically to monitor the quantity of alluvium dumped, and that the dumping area be respected in order to prevent their migration into the navigable channel, towards the Romanian side, avoiding the clogging of the navigable channel maintained by the Romanian Party.* | The suggestion is accepted.<br>The planned activity involves the arrangement of a coastal dump of dredged soils on the territory leased for the construction and operation of the object of the planned activity.<br>The construction of the coastal dump prevents the soil from being eroded by waves and currents, as it has embankments, sedimentation areas and discharge pipes. Detailed information on dredging works and arrangement of alluvium maps is provided in subsection 1.3.2. |
| *Please note that the Romanian Party, through Lower Danube River Administration Galati, ensures for the Kiliya Arm, on the segment from Ceatal Izmail to Periprava navigation conditions for river vessels for the transport of goods and passengers, only for the area between the border line and the Romanian shore, is not* | The comment is taken into consideration.<br>The planned activity involves shipping on the inland waterways of Ukraine. |

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| *open to navigation of maritime vessels with third flags according to international legislation under the Romanian- Ukrainian Border Treaty, art. 9, para. 1.* | |
| *The Romanian side expresses its concern regarding the following:*<br>*regarding Decision IS/1f on compliance by Ukraine with its obligations under the Convention on the Danube-Black Sea Deep Sea Navigation Channel in the Ukrainian part of the Danube Delta (ECE/MP. EIA/27/Add.1—ECE/MP.EIA/SEA/11/Add.1)[6] adopted at the interim sessions of the meetings of the Parties to the Espoo Convention and the SEA Protocol, Geneva, February 5-7, 2019, published on the website of the United Nations Economic Commission for Europe (UNECE), Meeting of the Parties:*<br>*"6. Regrets that only limited steps have been taken to bring the Bystre Canal Project into full compliance with the Convention pursuant to paragraph 24 of decision VI/2;*<br>*7. Confirms that (...) Ukraine has not yet fulfilled its obligations (...) to bring the project itself into full compliance with the Convention*<br>*8. Also confirms that the continuation of dredging works by the Government of Ukraine is a further violation of its obligations under the Convention;*<br>*13. Takes note of Ukraine's intention to develop a new project for the "Bystre route" and to carry out the procedure for assessing the transboundary impact on the environment of the new project in accordance with the Convention."* | The comment is not accepted<br>This issue belongs to the competence of the state and relevant authorities and does not relate to the planned activity. NIBULON company does not intend to assume the functions of the state, but acts exclusively as an investor and customer of the project of the planned activity, which is considered in this report and does not include work on the deep-sea navigation channel. Description of the characteristics of the planned activity - subsection 1.3., dredging works - subsection 1.3.2.<br>The fulfillment of Ukraine's obligations regarding the Convention on the Danube-Black Sea Deep Sea Navigation Channel in the Ukrainian part of the Danube Delta is the exclusive function of the state (ECE/MP.EIA/27/Add.1—ECE/MP.EIA/SEA/11/Add.1)[6] |
| *for the lack of relevant information on both the status of the complex hydrotechnical works carried out so far and the projects that are planned to be implemented, such as the Izmail terminal, which may have a transboundary impact on the Romanian territory;*<br>*that the projects already implemented for the "Development of the Danube Corridor" are very extensive and require a lot of complex hydrotechnical works on the Kiliya arm, on the Bystre arm and in the ports of Reni and Izmail which will determine the redistribution of flows on the Danube between the K1liya arm and the Sulina arm, in clear favor of the former and which will cause a significant transboundary impact on the Romanian territory, affecting the sites of the Danube Delta Biosphere Reserve, having a strong negative social and economic effect on the local communities of the Delta and* | The comment is not accepted.<br>The planned activity does not involve carrying out large-scale dredging works in the following areas: Kiliya arm, Bystre arm, Reni port.<br>Dredging works as part of the planned activity are characterized by very modest results: excavation of bottom soil in the volume of 112.0 thousand m3, development area - 2.32 ha (in case of bringing depths to 8.23 m). This amount of work is not capable of redistributing flows between the Kiliya and Sulina branches. The works envisaged by the planned activity will only allow to achieve the design values determined by the resolution of the The Cabinet of Ministers of Ukraine of February 9, 2022 No. 136.<br>A detailed description of the characteristics of the planned activity is given in subsection 1.3 |

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| *determining unfavorable conditions for navigation on the Danube in the Romanian sector* | of this Report and Drawings 1.3; assessment of possible transboundary impact is provided in subsection 5.8 of the Report. |
| ^https//unece.org/ftleadmin/DAC/env/eia/documents/WG 2.8 Nov201 9/officiat docs/GJ 9J 058s ENG. pdf<br>*- that the impact of these works is not assessed in an integrated, synergistic, direct, indirect and cumulative context and no information was provided on the possible transboundary impact, in particular due to the hydrological changes of the Danube river (in terms of morphological conditions: depth and width of the course, of the fairway, bed structure and substrate, hydrological regime: quantity of flow, disturbance of sediment transport continuity, water velocity, etc.);*<br>*- that the impact studies presented by the Ukrainian Party do not present data and information that can be compared with those obtained by the Romanian Party but only statements unsupported by numbers, i.e. without a scientific basis; e.g. "Updated information on the current depth and width of the Bystre Channel is not available because recently carried out hydrographic measurement numbers cannot be obtained. It is not known whether hydrographic measurements are carried out regularly (at least annually), or only occasionally." - Study on current situation and likely development of the Bystre channel and Kiliya arm, TRACECA IDEA II, Transport Dialogue and, Networks Interoperability II, January 2016;*<br>*- that the Ukrainian approach regarding the impacts does not take into account very sensitive areas that may be significant such as affecting sturgeon migration, this in the context that "rare reef species such as sturgeons are more common on the Bystre than elsewhere." (Documentation on the likely significant transboundary impact of the Ukrainian Deep-Water Navigation Canal Danube-Black Sea in the context of Espoo Convention, Danube Delta National Institute Tulcea, Romania, February 2005) and "regarding ultrasound-tagged individuals, records showed that in spring 2012 and 2014, 53% of the individuals that migrated to the Black Sea used the Kiliya arm" Methods, techniques and monitoring results regarding the sturgeon migration on Lower Danube, INCDPM Bucharest, Strasbourg 2015/ Bern Convention*<br>*- that the estimates of the amount of 112,000 m3 of material that needs to be excavated for the Izmail port access channel are very optimistic, from the data presented this amount that would* | The comment is not accepted.<br>The accusations of the Romanian side do not in any way relate to the planned activities considered in this report.<br>The planned activity does not involve conducting dredging works that may cause hydrological changes of the Danube River (from the point of view of morphological conditions: depth and width of the channel, fairway, structure of the bottom and substrate, hydrological regime: amount of flow, disruption of the continuity of sediment transportation, speed of water movement, etc.<br>Development of the Bystre Channel and Kiliya Arm do not concern a planned activity. |

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| *result for an excavation on an area of 5.29 ha to a depth of 8.23 m from "0" would be according to a simple calculation about 435,367 m3;*<br>*that the conditions for temporary or final storage of excavated, dredged material that could also have a transboundary impact on Romanian territory are not presented;*<br>*that the bifurcation in the Izmail Ceatal area requires special scientific attention due to the intensity and complexity of hydromorphological processes acting on the riverbed, hydromorphological changes in this sector of the Danube are significant, as they create relevant risks, affecting the ecological balance of the Danube Delta biosphere reserve, therefore monitoring and the assessment of morphological changes in the river bed are important - Assessment of the morphology of the Danube bed in response to natural and anthropogenic conditions using GIS: a case study of the Izmail Ceatal branching zone, National Research Institute of Marine Geology and Geoecology - Geoecomar, Romania, December 2021;*<br>*- that the total area of land affected by erosion in the Izmail Ceatal bifurcation area is 21.5 ha, while the total area occupied by sediment accumulation is 27.4 ha for the period 1980-2020, erosion and sedimentation act differently on the three bifurcation branches - Evaluation of the morphology of the Danube channel in response to natural and anthropogenic conditions using GIS: a case study of the Izmail Ceatal branching zone, National Research Institute of Marine Geology and Geoecology - Geoecomar, Romania, December 2021*<br>https://mtu. gov.ua/files/31110551 dod.pdf<br>^ https://unece.org/DAM/env/eia/documents/inquiry/Rom.1.pdf<br>"https://www.afdj. ro/sites/default/files/prezentari/presentation_incdpm_deakbern convention 0.pdf<br>'O https: / /www.research•ate. net/ publication/ 359387451 ASSESSING DANUBE RIVERBED AS A TO NATURAL AN0 CONOITIONS USING GIS A CASE OF THE L IZMAIL BRANCHING AREA<br><br>*- that three-dimensional mathematical modeling of the hydrodynamic and hydromorphological effects of sediment transport was not carried out, the results of modeling the solutions of the mentioned projects and the analysis of scenarios after the calibration and verification of three-dimensional hydrodynamic models, as well as three-dimensional morphodynamic models, in which the effects and transboundary impact on* | The comment is not accepted.<br>The report contains the characteristics of the planned activity, in particular, dredging works (subsection 1.3.2), as well as the provided Plan of control measurement of depths (Drawing 3), which makes it possible to check the reliability of the presented data regarding the amount of subsoil extraction.<br><br>The comment is not accepted.<br>Dredging works have very limited characteristics and, accordingly, impact on the state of the Danube River, which, according to calculations, does not go beyond the water area of the object of the planned activity: the maximum length of the turbidity plume reaches 69.23 m; the maximum time for the water environment to return to the standard state is 1.0 hours.<br>The calculation of indicators of the effects of dredging works on the state of surface waters is given in Appendix 6.<br>Therefore, the claims of the Romanian side that the planned activity creates risks, affecting the ecological balance of the Danube Delta biosphere reserve, are greatly exaggerated, and the demand for large-scale research and the creation of three-dimensional hydrodynamic and morphodynamic models is not justified. |

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| *water bodies in the territory of Ukraine and Romania can be shown (as an example of the dynamics of the Romanian coast during the cold and warm seasons, analyzed using a numerical model, 2017, National Institute of Marine Geology and Geoecology, Geoecomar).* | |

Announcement on the start of public discussion of the environmental impact assessment report No. 20225199566 (appendix 23):

- organization and holding of public discussion on environmental impact assessment paid under contract No. 172/22-OVD dated September 5, 2022, payment order No. 108 dated September 15, 2022.(appendix 25)

## *11. BRIEF CONTENT OF MONITORING AND CONTROL PROGRAM REGARDING THE IMPACT ON THE ENVIRONMENT DURING THE IMPLEMENTATION OF THE PLANNED ACTIVITIES, POST-PROJECT MONITORING PLANS (IF NECESSARY)*

According to the carried out environmental impact assessment, it was determined that during the implementation of the planned activities, an acceptable impact on the environment is expected due to emissions of pollutants into the atmospheric air, discharges of pollutants into the water body, generated waste and operations with them.

The actual qualitative and quantitative characteristics of the impacts are determined during the monitoring of environmental objects in the area of impact of the enterprise, as well as control of the sources of impact for compliance of their characteristics with the established standards and passport data.

Monitoring of environmental objects in the area of impact of the activities of the River port (terminal) involves conducting monitoring studies with the involvement of the chemical and technological laboratory of NIBULON LLC (Certificate of recognition of capacity No. PH-018/2021 dated 04.14.21 - appendix 3), and (or) other measuring laboratories with the relevant field of certification.

The monitoring program is given in table 11.1.

Table 11.1

| № | Objects of monitoring | Control periodicity | Sampling location and list of pollutants or physical factors to be monitored |
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| ***Construction period*** | | | |
| 1. | Soils,<br>bottom sediments | 1 time at the beginning of each stage of dredging works | Site of soil development |
| 2. | The state of surface water at the site of soil development by the content of suspended substances | 1 time during each stage of dredging works | 2 samples:<br>No. 1 - at a distance of 150 m from the place of soil development;<br>No. 2 (background): on the windward side at a distance of at least 500 m from the site of soil development. |
| 3. | Phytoplankton,<br>zooplankton,<br>zoobenthos,<br>ichthyoplankton,<br>ichthyofauna | Constantly during dredging operations | The dredging area |
| ***Period of operation*** | | | |
| 1. | Sources of emissions of pollutants into atmospheric air. | Once a year | Organized sources of emission – exhaust hoods of gas-cleaning unit (37 units): No. 1 - 21, 76 - 80, 99 - 109), substances in the form of suspended solid particles (microparticles, fibers) |

| | | | |
|---|---|---|---|
| | | | and substances established by the Emissions Permit are subject to control |
| 2. | The state of atmospheric air at the border of residential buildings and the sanitary protection zone | Once a year | Control points on the border of the sanitary protection zone and the nearest residential buildings, the main pollutants are subject to control: dust, sulfur dioxide, nitrogen dioxide, carbon monoxide in accordance with controlling documents 52.04.186-89 "Guide on the control of atmospheric pollution". |
| 3. | Mobile sources | Once a year | The exhaust hood of the car engine, exhaust gases are subject to control on:<br>- opacity in accordance with DSTU 4276:2004;<br>- the content of carbon monoxide and hydrocarbons according to DSTU 4277:2004. |
| 4. | The state of surface water in the area of the enterprise operation | quarterly | Control cross-sections installed at a distance of 500 m above and below the point of recycled water discharge, substances which are established by the Special Water Use Permit are subject to control. |
| 5. | Recycled water (rainwater, meltwater, and irrigation-washing water) discharged into the Danube River | quarterly | Control well which is the last before the outlet of the rainwater sewerage system substances which are established by the Special Water Use Permit are subject to control. |
| 6. | Recycled water that is drained to the city sewer system | quarterly | A control well, in accordance with the technical conditions of connection, substances which are established by the Treaty on Water drainage are subject to control. |
| 7. | Noise level | quarterly | Control points at the border of residential buildings, the total equivalent sound level is subject to control in accordance with National Building Code B.1.1-31:2013 "Protection of territories, buildings and structures from noise". |

## *12. SUMMARY OF THE NON-TECHNICAL CHARACTER OF THE INFORMATION SPECIFIED IN SUBCLAUSES 1-11 OF THIS SECTION, INTENDED FOR A GENERAL AUDIENCE.*

The planned activity - the new construction of a transport infrastructure object - a river port (terminal) with a railway access track - adjacency to the Izmail station of the "Odesa Railway" regional branch is the development of the investment program of «NIBULON» LLC, which includes the construction of elevators and river terminals, the creation of its own fleet, the development of water transport infrastructure, in particular, dredging and the construction of hydraulic structures.

The planned new construction is strategically important for ensuring the food security of the state in wartime conditions and is aimed at the development of agricultural production and the region as a whole.

The land plot for the construction and operation of the object of the planned activities is located in the southern part of Izmail, within the boundaries of Portova street, Luki Kapikrayana Embankment and Dunayska street. Land acquisition area is 19.7 ha, lease for 49 (forty-nine) years for the construction and operation of a transport infrastructure facility - a river port (terminal), land category is transport lands.

The geographic coordinates of the centroid of the industrial site, determined according to the WGS 84 system, are 45°19'23.8" 28°50'39.0'.

The land plot has adjacent boundaries:

- from the north - the land of the Izmail City Council (roadway on Dunayska St.);
- from the east - the lands of the Izmail City Council and PJSC "UKRAINIAN DANUBE SHIPPING COMPANY"(cadastral number is not determined)
- from the south - the Danube river;
- from the west - the lands of SE "IZMAIL SEA TRADING PORT"; (5110600000:01:047:0179), Izmail City Council (Luka Kapikrayan Embankment), SE "ADMINISTRATION OF SEA PORTS OF UKRAINE"; (5110600000:01:047:0175).

Also, the planned activity involves the allocation of a plot of land with an area of 10.4357 hectares from the lands of the water fund for the construction of hydrotechnical structures: the operational water area of the berth structure and the approach channel to it, which is a developed part of the water area of the Danube River and is located along the Vylkove - Izmail Ceatal shipping channel from 91.09 to 91.55 km from the left bank to the outer border of the channel. Assigned to the water area of the Izmail sea port (CMU resolution No. 1208 of October 7, 2009 "Boundaries of the water area of the Izmail sea port" [29]).

Territorial alternatives for carrying out the planned activity were not considered. The planned activity is related to the construction and operation of a transport infrastructure object - a river port (terminal), therefore the land plot on the Danube River coast in the industrial zone of Izmail is the most promising for joining the existing transport and energy infrastructure, and also corresponds to requirements provided for the construction and operation of the transshipment complex for grain, leguminous and oil crops, which is planned to be built on the territory of the port.

The territory of the planned activity does not belong to the objects of the nature reserve fund and the territories reserved for the creation of NRF objects. Also, this territory is not a

migratory eco-corridor for rare species of birds, and does not belong to the territories of the "Emerald Network" project and Natura 2000.

As part of the river port (terminal), the construction and operation of the industrial transshipment complex with a multivariate scheme for the movement of grain, leguminous, and oilseed crops during their receiving from the railway, road, and water transport, storage, and bringing to market standards (cleaning, drying) and shipment to water and road transport are provided.

The technical and economic characteristics of the technological complex for the transshipment of grain cargoes are:

- throughput capacity – 3 100 thousand tons per year of grain products, including reception from railways – 1 000 thousand tons, from vehicles – 2 000 thousand tons, from water transport – 100 thousand tons;
- the volume of simultaneous storage of grain products – 118.5 thousand tons;
- work schedule – three shifts, 365 days a year;
- number of employees – 100 full-time staff, including engineering and technical personnel – 31 workplaces;

The transshipment complex combines into a single technological scheme of construction and equipment, the construction of which is planned as part of various launch complexes:

- unloading point from railway cars (two tracks with two cars each), a closed hangar with shutter gates, and an aspiration system for complete localization of dust emissions generated during the unloading of railway cars;
- two mechanized warehouses with floor grain storage with a capacity of 9,0 thousand tons each with equipping of each one with road transport unloading point with a canopy, shutter gates, and an aspiration system for complete localization of dust emissions generated during the unloading of road transport;
- two transshipment floating complexes with a loading machine with a capacity of 500 t/h on each one;
- two loading posts of ships under the scheme «road transport – shipment station - FUCHS hydraulic loader-ship»;
- working grain cleaning tower with 5 hoppers for waste;
- unloading point for road transport for 2 intake pits connected with working tower, a canopy, shutter gates and aspiration system for complete localization of dust emissions generated during vehicle unloading;
- 18 metal tanks (silos) with a capacity of 5.5 thousand tons each;
- electronic railway and automobile scales;
- three metal tanks (silos) for wet grain with a capacity of 500 tons each;
- grain dryer with a capacity of 100 t/h;
- closed conveyor galleries, overpasses and elevator towers;
- floating crane for transshipment of cargo according to the “ship-to-ship” option.

All technological processes with grain cargoes are equipped with highly efficient filter-type dust collectors in the amount of 39 units. According to calculations, the amount of dust captured by these filters at the planned volume of overloads (3100 thousand tons/year of agricultural crops) is 1140.28870 tons/year, which is 96.52% of the total amount of dust generation.

Loading of vessels is planned at floating berths that are held relative to the shore by two

rods, one end of which is fixed in the coastal zone, the hinged fastening of the rod ensures vertical movement of the floating platform, which is important when the water level in the river fluctuates. Mooring of the transport vessel to the floating platform is carried out using mooring devices installed in the coastal zone of the Port.

For the maintenance of ships during their calls into the port, the coastal area of the Port provides for the laying of engineering networks with the arrangement of:

- a well for receiving household sewage from ships with its connection to the port sewage system;
- a well with a hydrant for bunkering ships with potable water with its connection to the water supply system of the port;
- station for receiving blige water from ships, which includes: a pumping station connected by a pipeline to a hermetic storage tank. Sewage received from ships is diverted through the pipeline to a container, as it fills up, sewage as hazardous waste will be transferred for disposal to an organization with an appropriate license;
- station for localization and liquidation of possible emergency fuel spills during bunkering of ships, equipped with appropriate tools and consumables;
- electric devices with their connection to the port`s electrical networks;
- fire-fighting water mains with hydrants and fire-fighting posts of normative equipment.

The construction of the object of the planned activities is planned to be carried out by start-up complexes with alternate (5 stages) construction of buildings and structures and equipping them with technological equipment. In wartime, the planned activity involves the implementation of a simplified technological scheme for the shipment of grain cargoes by water transport according to three options:

- with accumulation in mechanized warehouse of floor storage – grain cargoes are conveyed by chain conveyors and bucket elevators from the point of unloading from railway cars or from the point of unloading of road transport to the mechanized floor storage warehouse, where the transport batch is formed, then through the bunker, the truck is loaded, which delivers the cargoes to the shipment site, located in the coastal zone of Port, from where, with the help of a TEREX FUCHS hydraulic loader installed on a transshipment floating complex (floating berth), agricultural products are transshipped into the holds of water transport;.
- direct option with shipment from road transport directly to the ship – grain cargoes are transported by the road transport to the shipment area organized in the coastal area of Port, from which are reloaded in holds of the water transport by a TEREX FUCHS hydraulic loader installed on a transshipment floating complex (floating berth);
- direct option with shipment from railway cars directly to the ship – by chain conveyors and bucket elevators, grain cargoes from the point of unloading from railway wagons are conveyed to loading hoppers of the road transport and are poured to the road transport. Grain cargoes are transported by the road transport to shipment area organized in the coastal area of Port, from which are reloaded in holds of the water transport by a TEREX FUCHS hydraulic loader installed on a transshipment floating complex (floating berth).

Upon completion of construction, all technological operations related to the transshipment of grain and oilseed crops are mechanized and automated, and the operation of technological equipment is controlled from the control room. The technological scheme of the complex provides the ability to:

- simultaneous reception of grain cargoes from three types of transport – road, rail, and water;

- simultaneous execution of receiving and shipping operations;
- simultaneous acceptance of three types of grain crops through the points of unloading vehicles;
- simultaneous execution of internal operations (bringing to market standards (cleaning, drying) and moving grain from silo to silo for ventilation or formation of a shipment batch) and external operations (reception and shipment).

As part of the planned activities on the territory of the river port (terminal), it is planned to build a fuel-filling station with a maximum annual capacity of 1950 t/year, which includes:

- drain railway overpass for 2 tank wagons;
- two underground storage tanks V=75 $m^3$;
- control room;
- the place of filling diesel fuel into vehicles;
- watercraft filling station.

The planned activity involves the construction of the following buildings and structures: an administrative and household building with a laboratory and a canopy, a transformer substation with a distribution point and an operator's office, an operator's weighing station, a cafe for staff and agricultural producers, a mechanical workshop with a garage, a warehouse, a post office, three toilets, home for business travelers, as well as improvement of the territory with the formation of green zones on an area of 7.2 hectares and recreation areas with the installation of 4 gazebos and a fountain.

The object of the planned activity - the river port (terminal) is classified as a III-class object with a normative sanitary protection zone size of 300 m from the borders of the areas of transshipment and open storage of dusty cargoes.

The planned activity involves consideration of two technical alternatives related to the water supply of the river port:

***technical alternative 1*** – water intake from the surface water intake from the Danube River (object of new construction) to meet all the needs of the river port (economic and domestic, production, fire protection, improvement needs);

***technical alternative 2*** – mixed water consumption: from the municipal water supply network of Izmail – household and domestic, industrial and fire-fighting needs of the port, from the surface water intake from the Danube River (object of new construction) - improvement needs.

According to the results of the comparative analysis, technical alternative 2, taking into account the ecological impact criteria chosen for comparison, is characterized as ecologically justified, which will ensure the fulfillment of a set of norms, rules, requirements for environmental protection, use of natural resources and ecological safety, as well as state sanitary norms and rules.

Estimated volumes of water consumption and drainage of the object of the planned activity under technical alternative 2:

Total volume of water consumption - 276,257 $m^3$/day, 19766,713 $m^3$/year, including:
from municipal networks – 41,757 $m^3$/day, 5316,713 $м^3$/year to ensure:

- household needs – 6,030 $м^3$/day, 2131,785 $m^3$/year:
- production needs - 35,727 $m^3$/day; 3184,928 $^3$/year.

from the Danube River - 234,500 $m^3$/day, 14450,000 $^3$/year to meet technical needs:

- watering green areas and lawns – 180,0 $m^3$/day, 9000,0 $m^3$/year;
- washing of roads and paved pavements and dust suppression – 54,5 $m^3$/day, 5450,0 $m^3$/year.

Recycled waters of the river port consist of:

- domestic sewage, which is diverted by the system of domestic sewerage from the sewerage facilities of the port on a contractual basis to the sewerage network of Izmail, which is operated by ME "Izmail VUVKG";
- surface runoff (rain, snowmelt and watering and washing), collected by the storm sewer system, is treated at local rainwater treatment plants and discharged to the Danube waters through the coastal outlet.

Total volume of recycled water drainage:
to municipal sewerage networks - 24,357 $m^3$/day; 4256,313 $m^3$/year, including:

- household wastewater - 6,030 $m^3$/day; 2131,785 $m^3$/year;
- industrial wastewater – 18,327 $m^3$/day; 2124,528 $m^3$/year.

to the surface waters of the Danube River - 51 602,01 $m^3$/year, including:

- rainwater runoff – 21621,93 $m^3$/year
- snow (melted) water runoff – 27115,08 $m^3$/year
- irrigation and washing water runoff – 2865,0 $m^3$/year

The entire volume of surface runoff collected from the territory of Port is treated in the local wastewater treatment facilities of Port before being discharged into the Danube River - an oil separator, which ensures standard cleaning of surface wastewater from possible impurities of oil products and suspended substances.

The construction of hydrotechnical structures (water area and approach channel) is connected with dredging works in the volume of bottom soil development - 112.0 $m^3$ on an area of 2.32 hectares with storage of the extracted soil in a coastal dump with an area of 1.24 hectares, which is organized on the land the area allocated for the construction of the Port. Execution of dredging works is foreseen in several stages in order to achieve depths: up to 4.0 m; from 4.0 m to 7.32 m; the last, from 7.32 m to the design depth of 8.23 m from the "0" of the Izmail sea port, will be implemented in the case if Ukraine initiates dredging works on the shipping channel "Vylkove - Izmail Ceatal" and downstream sections of the shipping route and water areas. As a result of the dredging works, a safe approach and maneuvering of the calculated type of vessel will be ensured within the operational water area of the cargo berth of the Port.

Planned activities have a potential impact on environmental factors: atmospheric air, water environment, soil and geological environment, population health, climatic factors, state of fauna, flora, biodiversity, land, which is characterized by scale, intensity, dynamics and duration of action.

*Atmospheric air, water environment (surface water), soil, flora and fauna, climatic factors are affected* ***during preparatory and construction works:***

- ***atmospheric air:*** *the* sources of impact are pollutant emissions during welding, insulation, earthmoving and painting works, mobile sources (vehicles, construction equipment and hydraulic engineering). The estimated volume of emissions by stationary sources - 4.81900 tons, by mobile sources - 47.89033 tons;

- ***water environment:*** the sources of impact are the processes of pouring and storage of loose

construction materials and soil loss during dredging operations. The estimated amount of suspended substances which deposit on the surface waters of the Danube during construction works is 0.54637 tons; discharged as part of clarified water from alluvium maps - 281,344 tons. The length of the spreading of turbidity plume - 69.23 m, deposition time - 1.20 h, the impact does not go beyond the port water area;

***soils and geological environment:*** the sources of impact are production and household waste, land planning and dredging. As a result of construction and assembly works, waste of IV hazard class is generated, the estimated amount of waste generated under technical alternative 2 is: industrial - 5,352 tons, domestic - 2,760 tons. There is no direct impact of waste on environmental factors due to the creation of environmentally safe waste management conditions;

- ***flora and fauna:*** the sources of impact are the processes of territory planning, dredging works, the noise effect of mechanisms and the demolition of green spaces, and it can also manifest itself through the pollution of atmospheric air, water and soils. The planning of the territory on the area of 19.0 hectares and the organization of the coastal dump of dredging soils on the area of 1.23 hectares leads to the deterioration of the living conditions of land representatives of the fauna adapted to live in the production environment, as their habitats are destroyed.
Dredging works in area of 2,32 ha cause deterioration of living conditions of ichthyofauna and aquatic biocenoses (loss of fish products) due to the spread of turbidity in the water volume of 2481.2 $m^3$, destruction of the forage base (zoobenthos, plankton) in the amount of 0.005372 tons, loss of eggs and young fish 0.240044 tons. Removal of 841 trees and 740 bushes and the noise of the mechanisms are positive factors of impact, since the green spaces are defective, dry and in danger, and the noise of the mechanisms has the effect of scaring away representatives of fauna.

- ***climatic factors:*** the sources of impact are emissions of greenhouse gases released during the operation of diesel generators, mobile sources (vehicles, construction equipment and hydraulic engineering). The estimated amount of greenhouse gases emitted into the atmosphere by mobile sources is 1614.17569 tons. There is no thermal effect.

- ***vibration, radiation, light and heat pollution and electromagnetic radiation*** - there are no sources of impact.

Atmospheric air, water environment (surface water), soils, flora and fauna, and climatic factors are affected by ***the realization of planned activity:***

- ***Atmospheric air:*** the sources of impact are emissions of polluting substances into the atmospheric air during operations on transshipment and processing of grain, oil and leguminous crops; water and road transport refueling operations; combustion of organic fuel in a grain dryer, solid fuel boilers and in an incinerator; welding, gas cutting, painting processes; engines of automobile, railway and water transport. The estimated amount of pollutants emitted into the atmosphere by stationary sources is 70.53554 t/year; mobile sources - 19.28627 t/year;

- ***water environment:*** the sources of impact are the intake of water from the Danube River, the discharge of pollutants in the composition of treated surface runoff into the surface water of the Danube River, collected from the port territory, the processes of transshipment and open storage of grain cargoes. The needs of household and industrial water consumption and drainage are provided by connection to municipal water supply and sewerage networks. The technical needs of the object of the planned activity (watering of green areas, washing of roads and sidewalks with a hard surface and dust suppression) are provided by water intake from the Danube River

with a volume of 234,500 $m^3$/day, 14,450,000 $m^3$/year. Only surface runoff in the volume of 51,602.01 $m^3$/year is diverted to the surface waters of the Danube River, which is collected from the territory of the object of the planned activity and before discharge is treated in local treatment facilities of the storm sewer system, while the estimated amount of pollutants, discharged into the surface waters of the Danube River, is 48.69464 t/year. During transshipment operations and open storage of grain, emissions of suspended particles, undifferentiated in composition after dispersion in the atmosphere, are deposited on the water surface of the Danube River. The estimated amount of suspended substances settling on the surface waters of the Danube River during the planned activity is 15.93939 t/year;

- ***soils and geological environment:*** sources of influence are industrial and household waste, as well as transport. Technological processes during the implementation of the planned activity are associated with the formation of 23 types of waste of II - IV hazard classes with a total estimated volume of 2123.263 t/year, of which industrial waste - 1875.763 t/year, household waste - 247.500 t/year. The planned activity involves the creation of conditions for environmentally safe storage of waste in accordance with its type, aggregate state and hazard class, as the waste accumulates, it is transferred to specialized enterprises under signed contracts for disposal or disposal;

- ***flora and fauna*** the area is not favorable for the development of flora and fauna and the life activities of their representatives. The impact on representatives of flora and fauna adapted to live in the production environment is caused by the deterioration of their living conditions, which is manifested by pollution of the atmospheric air, water environment and soils. The specified types of impacts do not go beyond the regulatory limits and are minimized due to the implementation of measures aimed at reducing emissions, discharges and ensuring their regulatory cleaning, as well as measures to reduce the noise impact on the environment and greening the territory;

- ***climatic factors:*** the sources of influence are emissions of greenhouse gases released during the operation of grain dryers, solid fuel boilers, incinerators, mobile sources. Volumes of greenhouse gas emissions from stationary sources - 676.926116 g/sec; 592.02063 t/year, from mobile sources - 144.039248 g/sec; 583.87228 t/year. There is no thermal effect.

- ***vibration pollution*** – sources of vibration are technological and ventilation equipment. According to sanitary and hygienic regulations, the level of vibration at the border of the nearest residential building is defined as "absent".

- ***electromagnetic radiation*** – there are no sources of electromagnetic radiation that have a negative impact on the environment;

- ***radiation pollution*** – the planned activity does not involve the use of equipment that is a source of ionizing radiation, there is no impact related to radiation pollution of the environment;

- ***light and heat pollution.*** - there are no sources of potential light and heat pollution.

Emissions and discharges of pollutants, noise, vibration, light, heat and radiation pollution, radiation, changes in climatic factors and waste generation are potential sources of influence on the socio-economic living conditions of the population, and pose a threat to the deterioration of their health. The specified types of impact of the planned activity are characterized as those that do not exceed regulatory limits and are minimized due to the implementation of measures aimed at reducing emissions, discharges and ensuring their regulatory cleaning, as well as measures to reduce the noise impact on the environment.

During construction, all types of impacts are characterized as insignificant, limited by the place and time of construction and installation work, which for each stage of construction does not exceed 3 months, for dredging works - 52 days (not including downtime).

According to the results of dispersion calculations, it was determined that during the planned activity, the values of the maximum surface concentrations in the atmospheric air, taking into account the background at the control points on the border of the sanitary protection zone and the nearest residential building, do not exceed the established maximum permissible concentration (MPC) of pollutants in the atmospheric air of populated cities, the sound level in the control at a point on the border of residential buildings according to calculations is 41.93 dBA and does not exceed the permissible sound level at night (45 dBA).

The obtained values of the surface concentrations of emitted pollutants confirm the insignificant intensity of the impact of the planned activity on the atmospheric air, the maximum contribution is observed in summation group 31 (sulfur dioxide and nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]), which is within the limits of the MPC is 0.6543.

According to the results of the calculations of the risk of the impact of the planned activity on the health of the population from atmospheric air pollution, it was established that the risk of harmful effects is extremely small, the risk of the development of individual carcinogenic effects is acceptable.

According to the results of the calculations, the concentration of pollutants in the control structure, located 500m downstream from the return water discharge of the object of the planned activity, does not exceed the established standards in connection with the discharge of replaced water.

According to sanitary and hygienic standards, there is no vibration level at the border of the nearest residential building, there are no sources of electromagnetic, ionizing, light and heat radiation that have a negative impact on the environment.

Residential buildings in the city of Izmail are located in the north, north-east and north-west directions from the site of the new construction. The minimum distance from the sources of emissions of polluting substances to the residential buildings of the city of Izmail is 555 m. The regulatory sanitary and protective zone is maintained. According to the given characteristics of the effects on environmental factors and taking into account the remoteness, the population of the city of Izmail will not experience deterioration of the quality of atmospheric air, water and climatic changes in connection with the implementation of the planned activity.

Meanwhile, the planned activity has a positive social effect - the construction of a modern enterprise will ensure the sustainable development of the local community due to stable tax deductions to local budgets of all levels, the creation of 100 additional jobs and the improvement of working conditions, the development of agricultural production and the region, the revival of shipping, etc. In particular, the amount of the environmental tax during construction is UAH 37,057.37 (paid once), during the planned activity it is UAH 196,138.56/year. software.

Risks of the impact of the planned activity on objects of cultural heritage and the environment, including due to the possibility of emergency situations, are absent due to the significant distance of these objects from the planned activity and the zone of its influence (radius 673m from the point "0" of the coordinate system of the industrial site).

The territory of Romania relative to the object of the planned activity is located upstream and downstream of the Danube River, the minimum distance from the centroid of the industrial site of the planned activity to the border of Romania is 586 m. The closest to the planned activity

is the village of Plauru of the commune of Ceatal - Tulcea county (Romania), which is located in the southwest direction from the planned activity, the minimum distance of the residential building of the village from the point "0" of the coordinate system of the industrial site of the planned activity is 993 m. Accordingly, the residential building of Romania is outside the zone of influence of the planned activity on the state of the atmospheric air (radius 673 m from the point "0" of the coordinate system of the industrial site), where the contribution of the planned activity to atmospheric air pollution does not exceed 0.05 MPC, the transboundary impact of the planned activity on the state of the atmospheric air in Romania is assessed as absent.

The planned activity is a potential factor of transboundary impact on the state of the surface waters of the Danube River, the zone of influence is the territory of the countries of the Danube Basin located downstream of the Danube River relative to the object of the planned activity. The analysis of the adopted design decisions was carried out in view of the main tasks set by the Convention on cooperation in the protection and sustainable use of the Danube River (Convention on the Protection of the Danube River [19]).

In order to protect the environment from pollution, planned activities provide for a set of measures aimed at prevention, diversion, avoidance, reduction, elimination of the significant impact on the components of this environment, the main of which are: atmospheric air, water environment and soils. Provided that the measures provided for by the planned activity are implemented, the probability of an accident occurring is minimal, and the activity of the object of the planned activity is considered permissible.

***- measures during preparatory, construction and dredging works:***

– fencing and lighting of the construction site;

– the arrangement of special places for the assembly of construction materials and fuel and lubricants, parking of construction equipment;

– arrangement of access roads, places for temporary storage of building materials and equipment;

– compliance with the rules of transportation and storage of materials, localization of areas where spreading and spills are inevitable;

– sheltering building materials in bulk during transportation and storage, moisturizing during using (if possible);

– compliance with the rules of operation of construction machinery and motor vehicles, control of their technical condition;

– cleaning of the construction site with moisturizing of roads where freight transport and construction equipment move;

– use of modern building materials and technologies in construction;

– grounding of metal parts of machines and mechanisms;

– storage of equipment on pallets (temporary, for the construction period);

– use of construction waste (if necessary);

– the use of modern technically efficient mechanisms and hydrotechnical means, equipped with closed systems for the accumulation of blige waters, and highly effective resource-saving technologies during dredging operations;

– the use of water-based lubricants in the bearings of weight drives, special ropes that do not require lubrication;

– transfer to specialized organizations of waste of oil products, oil-containing and sanitary wastewater, household waste of the technical fleet;

– presence on board of a constant supply of sorbents: sand, biodestructor type "Econadine";

– organization of fuel bunkering operations with the involvement of specialized refuelers, use of integral certified oil product supply hoses;

– tightness of pipelines for pulp hydrotransport, density and ease of closing of gate valves and other locking devices;

– termination of work in the water area in case of disturbance with a wave height of 3%

– probability up to 1,0 m; wind force up to 20 m/s; atmospheric temperature up to -5 0 C;

– the construction of the coastal dump of the dredging soil provides protection against soil erosion under the action of waves and the organized drainage of clarified water from the alluvium maps;

– carrying out dredging works in the non-spawning period;

***- protective measures:***

– the use of closed technology for moving and processing grain cargo: conveyor belts along their entire length are covered with boxes;

– organization of an extensive system of aspiration of dusty air from process equipment and its purification in highly efficient dust-cleaning equipment before being released into the atmosphere;

– localization of burst release of dust during road and rail receiving with the equipment of sectional gates and powerful dust cleaning equipment;

– localization of dust emissions during grain drying and reduction of noise impact by sheltering the grain dryer around the perimeter;

– equipping stations for the shipment of grain and grain waste to road transport with Moduflex telescopic devices;

– organization of loading on the river transport with adjustable drop height of grain cargo and dust suppression system;

– automatic blocking of aspiration systems with technological equipment;

– reinforced waterproofing of underground utilities of sewage systems, sewerage of outhouses;

– organization of collection, treatment and drainage of surface runoff from the territory, periodic cleaning of the storm sewerage;

– equipping the surface water intake with a fish protection device;

– reducing the volumes of discharge into the surface water body due to the use of treated surface runoff for the technical needs of the port;

– organization of production control of surface and recycled water, efficiency of local treatment facilities;

– PROHIBITED transshipment operations during rough seas with a wave height of 3% probability up to 1.5 m and wind speed up to 20 m/s, as well as during precipitation (rain, snow, hail), ship holds must be closed during precipitation;

– installation of mechanisms on vibration-isolating supports, use of flexible inserts between fans and air ducts of aspiration systems;

– using of sound absorbing building materials, assembling of a solid concrete surface under the parking of trucks, passenger and technological vehicles, under driveways and passages;

– organization of reception of sewage and sanitary waters from watercraft and ship waste; organization of conditions for separate storage of waste and their handling in accordance with their hazard class and aggregate state;

- setting conditions for reloading grain cargoes with a grab:
  - closing the gaps between the sides of the ships with tarpaulin covers in the places where the grab is carried, which prevents the cargo from falling into the water;
  - opening the grab with the cargo at a height of no more than 1 m from the blige ceiling or previously loaded layer of the cargo, which minimizes dust generation;
  - removal of the grab from the hold only after the complete engagement of its jaws and the complete cessation of spillage of cargo from it.

- cleaning the ship`s deck from possible cargo spills at the end of the shift (and, if necessary, during the shift), dumping (sweeping) loose cargo from the ship into the water is PROHIBITED;
- establishing conditions for operations with oil products and oil waste:
  - installation of pallets under the intake pipes, air nozzle openings and hose connections, which, when filled, are emptied into a specialized container;
  - the use of exclusively certified hoses indicating the purpose, date of manufacture, burst pressure, working pressure, pressure during examinations, date of the last examination, date of the next examination (expiration date), prohibition of the use of damaged fuel hoses and connections;
  - installation of a boom fence around the watercraft;
  - closing drain grates and technological openings on the berth at the place of work, as well as scuppers of the vessel receiving fuel;
  - grounding the road tanker to the grounding circuit, disconnecting the watercraft from the shore power supply;
  - It is FORBIDDEN to use dispersants (chemical sorbents) in the water area, to remove thin layers of oil, iridescent films on the water surface, to use the biological product "Ekonadine"; or similar adsorbents;
  - ensuring reliable parking of the vessel on the moorings, which excludes its excessive movement relative to the berth, fixing fuel hoses to the structures of the vessel to avoid their twisting or kinks;
  - disconnection of fuel hoses after completion of work should be carried out above the pallets, and their cleaning should be done when the flanges are blocked;
- compliance of watercraft with international requirements for pollution prevention, which is confirmed by a full set of valid ship documents reviewed and approved by the Shipping Register of Ukraine;
- equipping the company`s watercraft with an emergency alarm and warning system (AWS) with level indicators in oil and liquid waste tanks;

***- measures regarding explosion and fire hazards:***

- ensuring the object`s explosion and fire safety in accordance with its categorization and requirements of the Building code: implementation of the fire protection system: fire tanks, fire water pipeline with fire hydrants, primary firefighting means, fire stations with appropriate equipment during construction and operation;
- organization of stations for the localization and liquidation of oil pollution, equipped with appropriate tools and a stock of sorption materials during construction and operation;
- automatic shutdown of ventilation systems interlocked with automatic fire alarm;

– equipping tanks, heads of bucket elevators and aspiration networks with explosion relief devices, installing thermometric sensors in the tanks;

– prohibition of smoking outside designated areas and performing work using open flames;

– equipping buildings and structures with means of protection against lightning and static electricity, grounding of the neutral wire and grounding of electrical equipment;

– use of fire-resistant materials, sealing of openings with non-combustible materials when air ducts cross ceilings, walls and partitions;

– persons who have passed the relevant technical minimum rules of fire safety, occupational health and safety regulations are allowed to service the equipment.

***- resource-saving measures:***

– use of light-emitting diode (LED) lamps for illumination of premises, technological constructions and the territory;

– control of the rational use of natural resources: water, gas through their accounting by counters;

– preparation of hot water using solar energy (application of solar systems);

– thermal insulation of walls and roofs with effective insulating materials, arrangement of vestibules at building entrances;

– automatic adjustment of the temperature of the heat carrier in heating systems depending on the outside air temperature;

– switching the heating system to economical mode (temperature in the premises +10 0 C) during non-working hours;

– equipping the grain dryer with energy-saving burners;

– use of treated surface runoff for the technical needs of the port: watering green spaces, washing roads and sidewalks, dust suppression;

– connection of life support systems of ships to shore electric bollards while moored at the berth;

– heating of building premises using solid fuel boilers, briquettes as fuel;

The planned measures are aimed at minimizing the impacts of the planned activity and ensuring accident-free operation of the facility, the probability of an accident occurring is minimal, the impact on the state of the water area of the Danube River as a result of water intake and discharge of surface runoff from the port territory is minimal, and according to water quality indicators, it is absent.

The planned activity involves the implementation of compensation measures, which corresponds to the principle of the Convention on the Protection of the Danube River [19] "the polluter pays":

payment of environmental tax for emissions of pollutants into atmospheric air, with planned indicators, the tax amount is UAH 29,033.66/year;

payment of an environmental tax for the discharge of polluting substances into a water body with replaced water, with planned indicators, the amount of the tax is UAH 12,651.76/year;

payment of environmental tax for the discharge of polluting substances into a water body during dredging (one-time), with planned indicators of dredging, the amount of the tax is UAH 31,189.80;

payment of rent for the special use of surface water;

payment of the replacement cost of green spaces to be removed, with planned indicators in the amount of UAH 10,542.36;

rent for land;

implementation of compensatory measures for fisheries in the amount of UAH 23,709.48;

beautification and landscaping of the territory.

Analyzing the given data, it can be concluded that during the implementation of the planned activities, "NIBULON" LLC complies with the provisions of the Convention on the Protection of the Danube River [19] and organizes the operation of the river port (terminal) in the city of Izmail, focusing on modern technologies and production models focused on minimization negative impact on the environment.

The actual qualitative and quantitative characteristics of the impacts are determined during the monitoring of environmental objects in the area of influence of the enterprise, as well as control of the sources of impact for compliance of their characteristics with the established standards and passport data. Monitoring of environmental objects in the area of influence of the activity of the River Port (terminal) involves conducting monitoring studies with the involvement of measuring laboratories with the appropriate certification branch.

# 13. BIBLIOGRAPHY WITH THE MENTION OF REFERENCES WHICH ARE USED FOR DESCRIPTIONS AND ASSESSMENTS INCLUDED IN ENVIRONMENTAL IMPACT ASSESSMENT REPORT.

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**3.** Law of Ukraine «On Waste».

**4.** Law of Ukraine «On Air Protection».

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**6.** Law of Ukraine «On Protection of Population and Territories from Man-Caused and Natural Emergencies».

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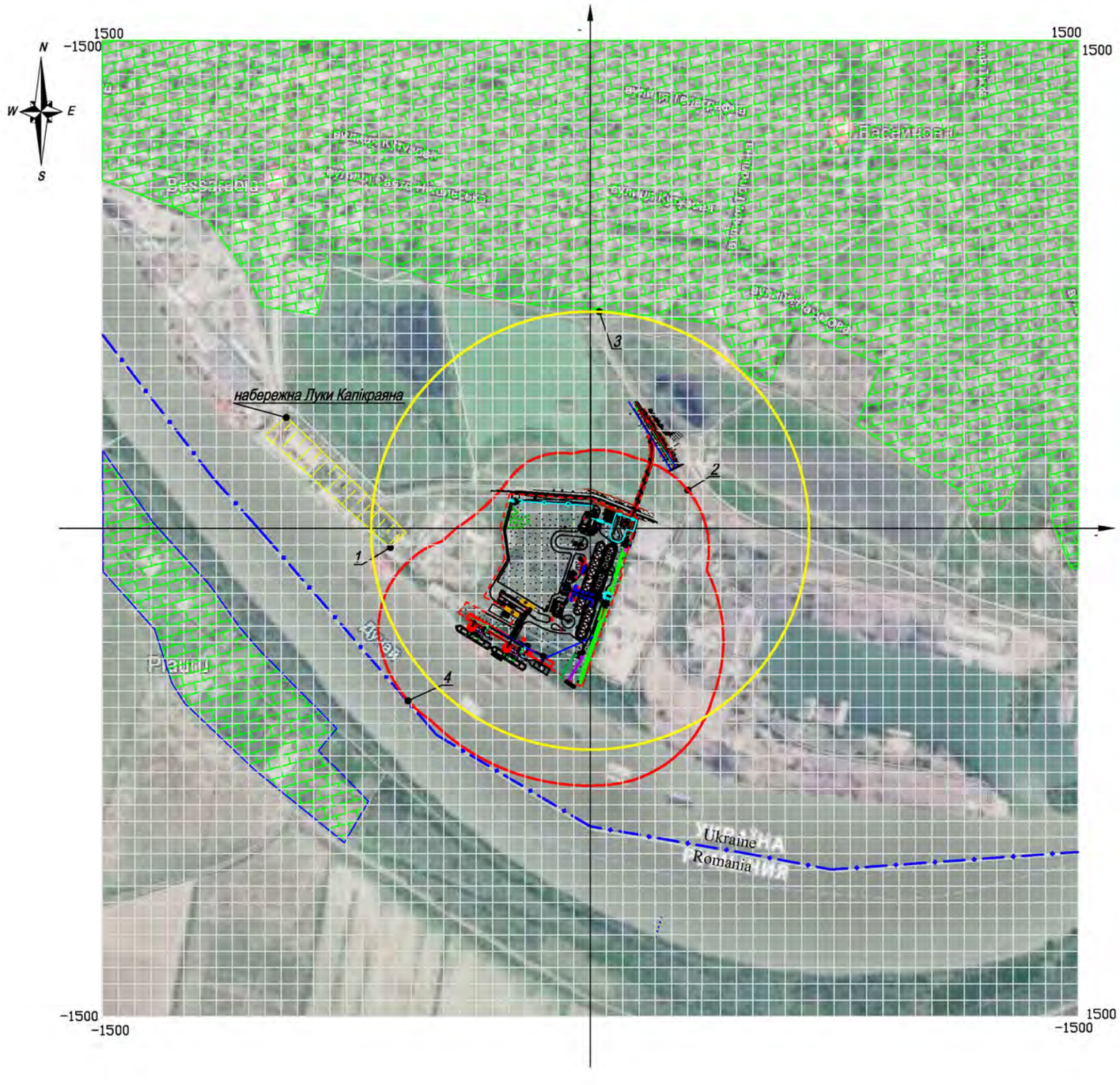
(підпис)

# GRAPHIC MATERIALS

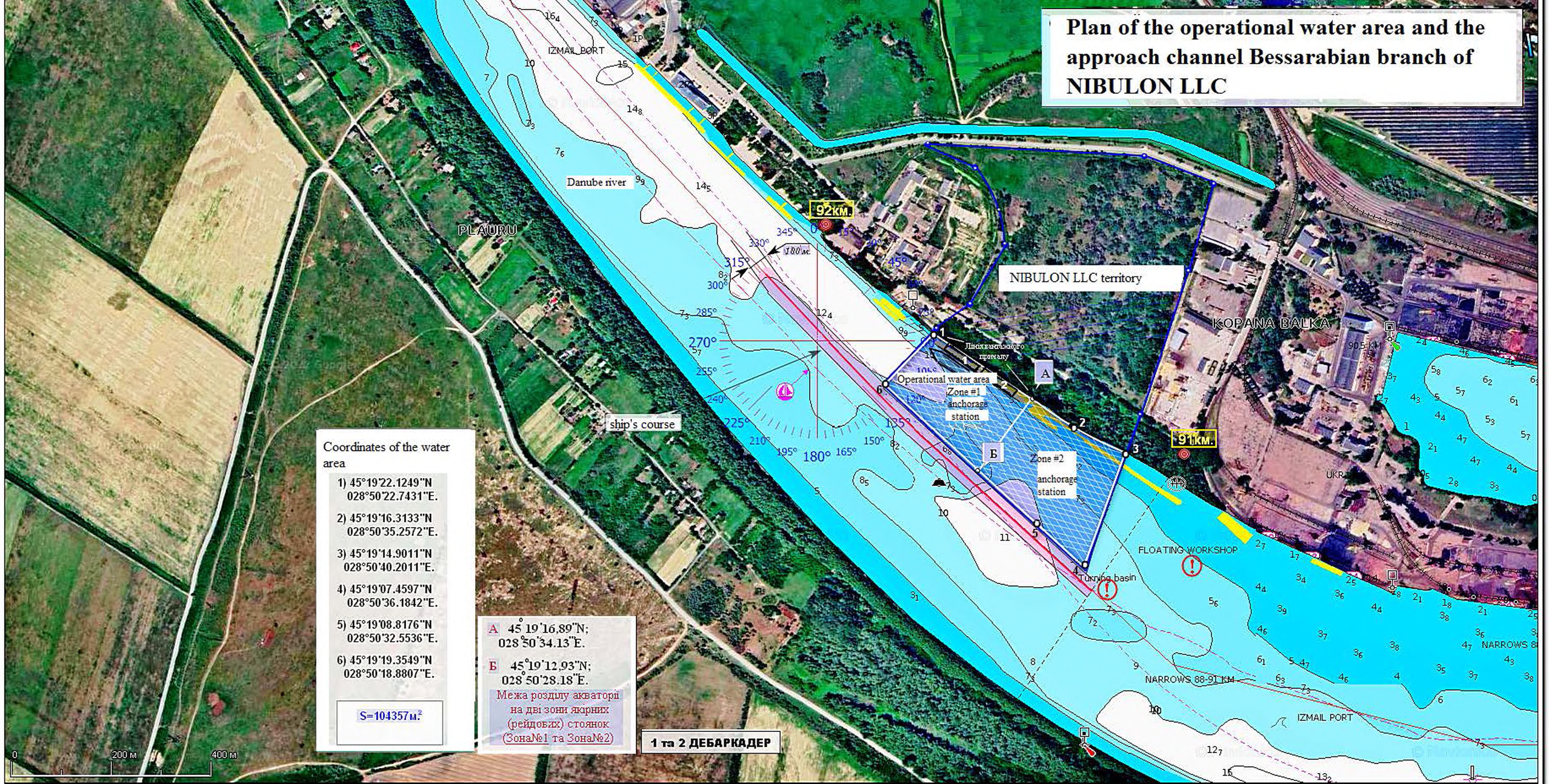
Situational map-scheme of the object of the planned activities with
the centroid of the industrial site, the sanitary protection zone,
zone of impact on the ambient air quality
M 1 : 10 000




Legend

- NIBULON LLC territory
- regulatory sanitary protection zone
- zone of impact on the ambient air quality
1 - 4 - control points
- the state border of Romania;
the minimum distance from the centroid of the industrial site (45°19'23,8" 28°50'39,0') to the state border- 586 m.
- the residential building :
  - the minimum distance from the residential building of Izmail:
    - to the point "0" of coordinate system of the industrial site - 675 m;
    - to the nearest emission source - 555 m;
  - the minimum distance from the residential building the comuna Plauru, Romania:
    - to the point "0" of coordinate system of the industrial site - 993 m.
- recreation zone

# Plan of the operational water area and the approach channel Bessarabian branch of NIBULON LLC




Coordinates of the water area

1) 45°19'22.1249"N 028°50'22.7431"E.

2) 45°19'16.3133"N 028°50'35.2572"E.

3) 45°19'14.9011"N 028°50'40.2011"E.

4) 45°19'07.4597"N 028°50'36.1842"E.

5) 45°19'08.8176"N 028°50'32.5536"E.

6) 45°19'19.3549"N 028°50'18.8807"E.

S=104357м.²

А 45°19'16,89"N; 028°50'34.13"E.

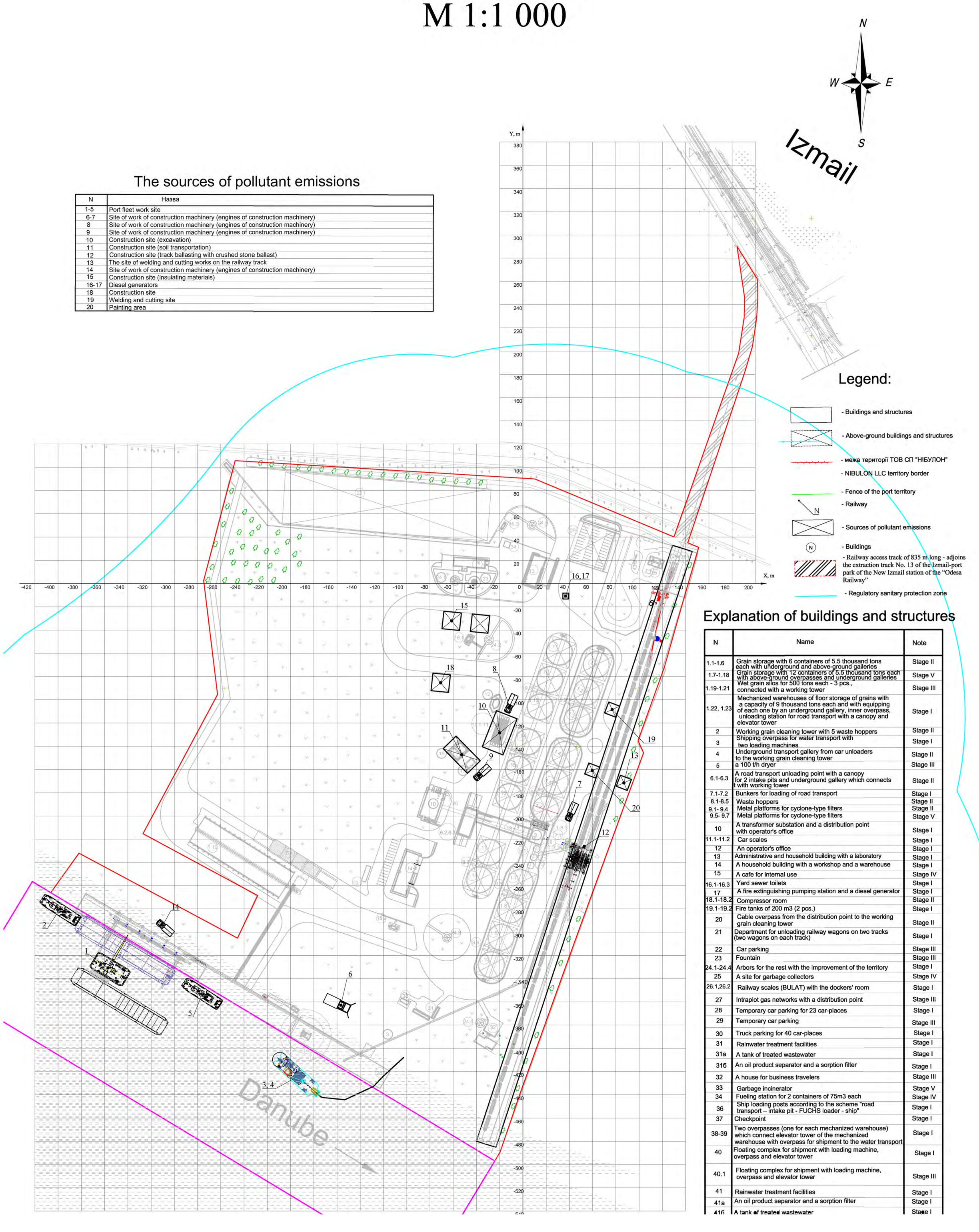
Б 45°19'12,93"N; 028°50'28.18"E.

Межа розділу акваторії на дві зони якірних (рейдових) стоянок (Зона№1 та Зона№2)

# General plan of the River port (terminal) with the drawing of the sources of pollutant emissions of the planned activities (construction)
M 1:1 000

## The sources of pollutant emissions

| N | Назва |
|---|---|
| 1-5 | Port fleet work site |
| 6-7 | Site of work of construction machinery (engines of construction machinery) |
| 8 | Site of work of construction machinery (engines of construction machinery) |
| 9 | Site of work of construction machinery (engines of construction machinery) |
| 10 | Construction site (excavation) |
| 11 | Construction site (soil transportation) |
| 12 | Construction site (track ballasting with crushed stone ballast) |
| 13 | The site of welding and cutting works on the railway track |
| 14 | Site of work of construction machinery (engines of construction machinery) |
| 15 | Construction site (insulating materials) |
| 16-17 | Diesel generators |
| 18 | Construction site |
| 19 | Welding and cutting site |
| 20 | Painting area |



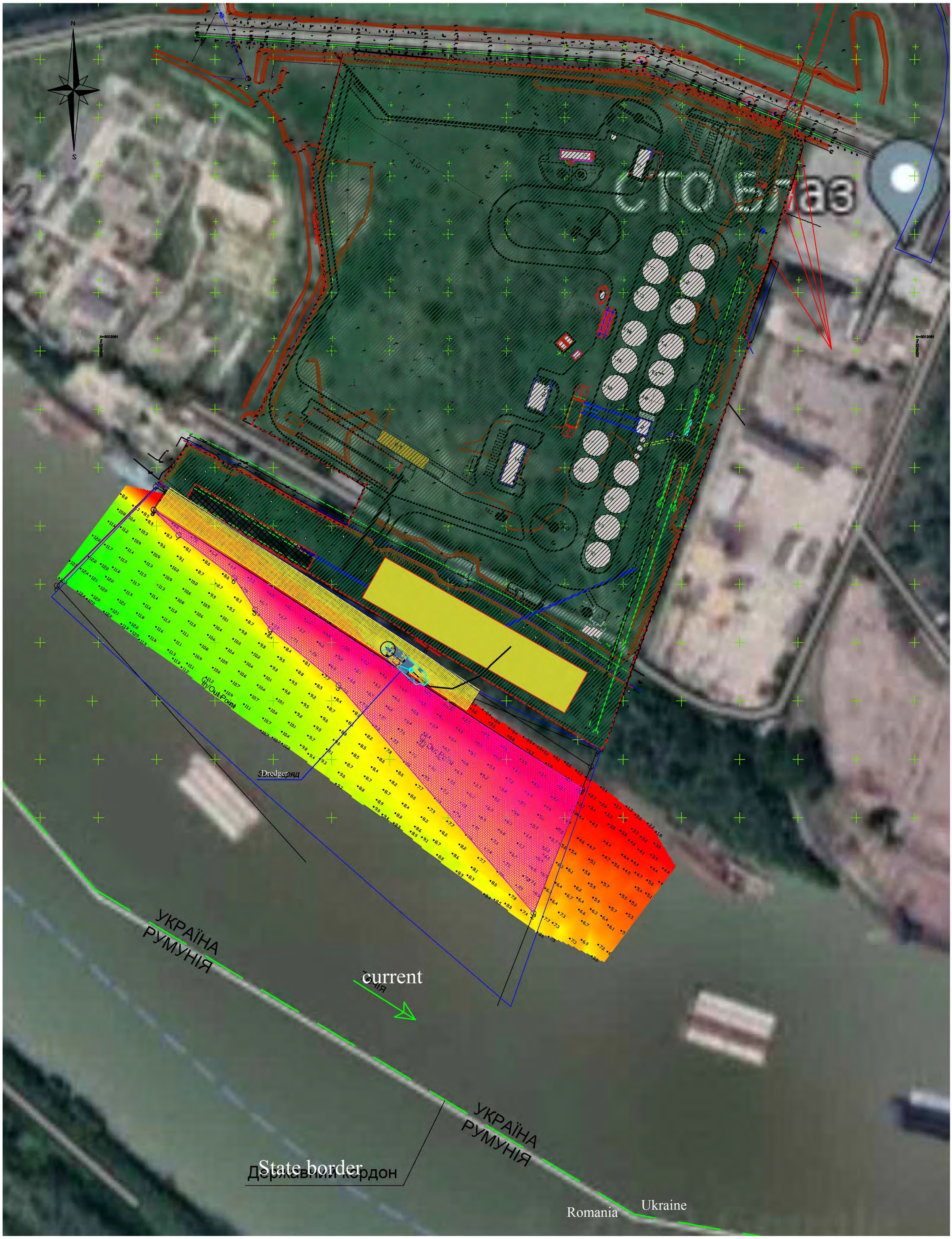

## Legend:

- Buildings and structures
- Above-ground buildings and structures
- межа території ТОВ СП "НІБУЛОН"
- NIBULON LLC territory border
- Fence of the port territory
- Railway
- Sources of pollutant emissions
- Buildings
- Railway access track of 835 m long - adjoins the extraction track No. 13 of the Izmail-port park of the New Izmail station of the "Odesa Railway"
- Regulatory sanitary protection zone

## Explanation of buildings and structures

| N | Name | Note |
|---|---|---|
| 1.1-1.6 | Grain storage with 6 containers of 5.5 thousand tons each with underground and above-ground galleries | Stage II |
| 1.7-1.18 | Grain storage with 12 containers of 5.5 thousand tons each with above-ground overpasses and underground galleries | Stage V |
| 1.19-1.21 | Wet grain silos for 500 tons each - 3 pcs., connected with a working tower | Stage III |
| 1.22, 1.23 | Mechanized warehouses of floor storage of grains with a capacity of 9 thousand tons each and with equipping of each one by an underground gallery, inner overpass, unloading station for road transport with a canopy and elevator tower | Stage I |
| 2 | Working grain cleaning tower with 5 waste hoppers | Stage II |
| 3 | Shipping overpass for water transport with two loading machines | Stage I |
| 4 | Underground transport gallery from car unloaders to the working grain cleaning tower | Stage II |
| 5 | a 100 t/h dryer | Stage III |
| 6.1-6.3 | A road transport unloading point with a canopy for 2 intake pits and underground gallery which connects t with working tower | Stage II |
| 7.1-7.2 | Bunkers for loading of road transport | Stage I |
| 8.1-8.5 | Waste hoppers | Stage II |
| 9.1- 9.4 | Metal platforms for cyclone-type filters | Stage II |
| 9.5- 9.7 | Metal platforms for cyclone-type filters | Stage V |
| 10 | A transformer substation and a distribution point with operator's office | Stage I |
| 11.1-11.2 | Car scales | Stage I |
| 12 | An operator's office | Stage I |
| 13 | Administrative and household building with a laboratory | Stage I |
| 14 | A household building with a workshop and a warehouse | Stage I |
| 15 | A cafe for internal use | Stage IV |
| 16.1-16.3 | Yard sewer toilets | Stage I |
| 17 | A fire extinguishing pumping station and a diesel generator | Stage I |
| 18.1-18.2 | Compressor room | Stage II |
| 19.1-19.2 | Fire tanks of 200 m3 (2 pcs.) | Stage I |
| 20 | Cable overpass from the distribution point to the working grain cleaning tower | Stage II |
| 21 | Department for unloading railway wagons on two tracks (two wagons on each track) | Stage I |
| 22 | Car parking | Stage III |
| 23 | Fountain | Stage III |
| 24.1-24.4 | Arbors for the rest with the improvement of the territory | Stage I |
| 25 | A site for garbage collectors | Stage IV |
| 26.1,26.2 | Railway scales (BULAT) with the dockers' room | Stage I |
| 27 | Intraplot gas networks with a distribution point | Stage III |
| 28 | Temporary car parking for 23 car-places | Stage I |
| 29 | Temporary car parking | Stage III |
| 30 | Truck parking for 40 car-places | Stage I |
| 31 | Rainwater treatment facilities | Stage I |
| 31a | A tank of treated wastewater | Stage I |
| 31б | An oil product separator and a sorption filter | Stage I |
| 32 | A house for business travelers | Stage III |
| 33 | Garbage incinerator | Stage V |
| 34 | Fueling station for 2 containers of 75m3 each | Stage IV |
| 36 | Ship loading posts according to the scheme "road transport – intake pit - FUCHS loader - ship" | Stage I |
| 37 | Checkpoint | Stage I |
| 38-39 | Two overpasses (one for each mechanized warehouse) which connect elevator tower of the mechanized warehouse with overpass for shipment to the water transport | Stage I |
| 40 | Floating complex for shipment with loading machine, overpass and elevator tower | Stage I |
| 40.1 | Floating complex for shipment with loading machine, overpass and elevator tower | Stage III |
| 41 | Rainwater treatment facilities | Stage I |
| 41a | An oil product separator and a sorption filter | Stage I |
| 41б | A tank of treated wastewater | Stage I |

# PLAN
## of the control measurement of depths with the drawing of the operational water area with the approach channel and the place of the coastal soil dump




Notation (start)

- boundaries of the land plot
- operational water area with an approach channel
- hydraulic construction

Notation (end)

- coastal dump of bottom gunts
- the boundaries of the dredging site to the depth mark of 4.0 m
- the boundaries of the dredging site to the depth mark of 7.32 m

# New construction of a transport infrastructure object – a river port (terminal) in Izmail city, Izmail district, Odesa region

1.1 1.6 Grain storage with 6 containers of 5.5 thousand tons each with underground and above-ground galleries

1.7 1.18 Grain storage with 12 containers of 5.5 thousand tons each with above-ground overpasses and underground galleries

1.19 1.21 Wet grain silos for 500 tons each - 3 pcs., connected with a working tower

1.22 Mechanized warehouses of floor storage of grains with unloading overpass

2 Working grain cleaning tower with 5 waste hoppers

3 Shipping overpass for water transport with two loading machines

4 Unerground transport gallery from car unloaders to the working grain cleaning tower

5 A 100 t/h dryer

6.1 6.3 A road transport unloading point with a canopy for 2 intake pits

7.1 7.2 Bunkers for loading of road transport

8.1 8.5 Waste hoppers

9.1 9.2 Metal platforms for cyclone-type filters

9.3 9.4 Metal platforms for cyclone-type filters

10 A transformer substation and a distribution point with operator's office

11.1 11.2 Car scales

12 An operator's office

13 Administrative and household building with a laboratory and canopy (a temporary building – 4 trailers);

14 A household building with a workshop and a warehouse

15 A cafe for internal use

16 Yard sewer toilets

17 A fire extinguishing pumping station and a diesel generator

18 Compressor room

19 Fire tanks of 200 m3 (2 pcs.)

20 Cable overpass from the distribution point to the working grain cleaning tower

21 Department for unloading railway wagons on two tracks (two wagons on each track)

22 Car parking

23 Fountain

24 Arbors for the rest with the improvement of the territory

25 A site for garbage collectors

26.1 26.2 Railway scales (BULAT) with the dockers' room

27 Intraplot gas networks with a distribution point

28 Temporary car parking for 23 car-places

29 Temporary car parking

31 Rainwater treatment facilities

31a A tank of treated wastewater

31б An oil product separator and a sorption filter

32 A house for business travelers

33 Garbage incinerator

35 Gas distribution point

36 Gas distribution point (located outside the territory of enterprise)

37 Elevator tower of the mechanized warehouse

38 Overpass for shipment to the water transport

39 The dock overpass

40 Elevator tower of the department for unloading railway wagons

41.1 41.2 Checkpoint

42 Truck parking for 40 car-places

42a Rainwater treatment facilities

42б A tank of treated wastewater

43 Unerground transport gallery from car unloaders to the mechanized warehouse

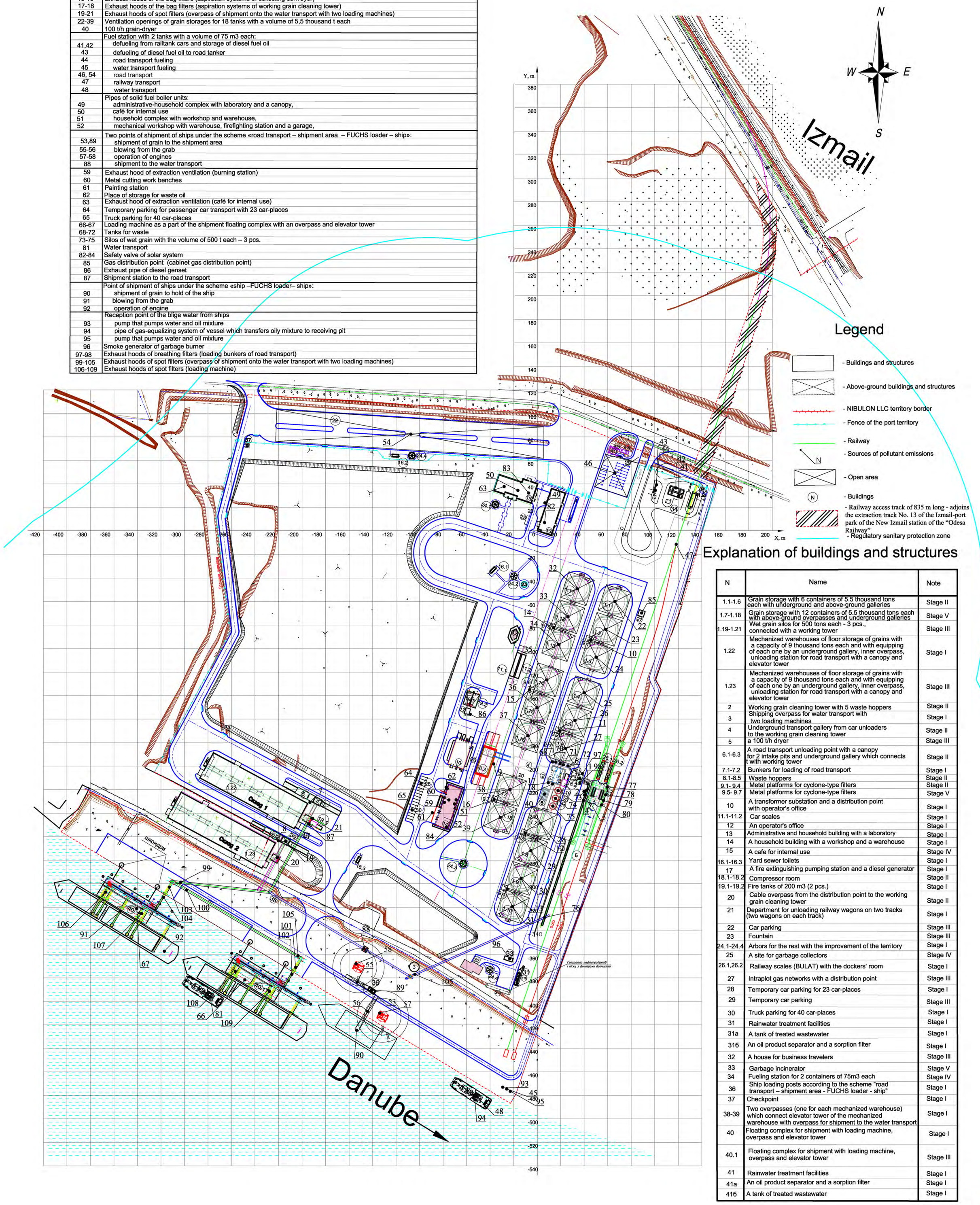
НІБУЛОН NIBULON

# General plan of the River port (terminal) with the drawing of the sources of pollutant emissions of the planned activities (operation)

## The sources of pollutant emissions

| N | Name |
|---|---|
| 1-5;76-80 | Exhaust hoods of the bag filters (unloading points for railway wagons on two tracks) |
| 6 | Exhaust hoods of the bag filters (loading bunkers for road transport) |
| 7-9 | Exhaust hoods of intake pit filters (aspiration systems of unloading points for road transport) |
| 10-16 | Exhaust hoods of the bag filters (aspiration systems of collecting conveyor) |
| 17-18 | Exhaust hoods of the bag filters (aspiration systems of working grain cleaning tower) |
| 19-21 | Exhaust hoods of spot filters (overpass of shipment onto the water transport with two loading machines) |
| 22-39 | Ventilation openings of grain storages for 18 tanks with a volume of 5,5 thousand t each |
| 40 | 100 t/h grain-dryer |
| | Fuel station with 2 tanks with a volume of 75 m3 each: |
| 41,42 | defueling from railtank cars and storage of diesel fuel oil |
| 43 | defueling of diesel fuel oil to road tanker |
| 44 | road transport fueling |
| 45 | water transport fueling |
| 46, 54 | road transport |
| 47 | railway transport |
| 48 | water transport |
| | Pipes of solid fuel boiler units: |
| 49 | administrative-household complex with laboratory and a canopy, |
| 50 | café for internal use |
| 51 | household complex with workshop and warehouse, |
| 52 | mechanical workshop with warehouse, firefighting station and a garage, |
| | Two points of shipment of ships under the scheme «road transport – shipment area – FUCHS loader – ship»: |
| 53,89 | shipment of grain to the shipment area |
| 55-56 | blowing from the grab |
| 57-58 | operation of engines |
| 88 | shipment to the water transport |
| 59 | Exhaust hood of extraction ventilation (burning station) |
| 60 | Metal cutting work benches |
| 61 | Painting station |
| 62 | Place of storage for waste oil |
| 63 | Exhaust hood of extraction ventilation (café for internal use) |
| 64 | Temporary parking for passenger car transport with 23 car-places |
| 65 | Truck parking for 40 car-places |
| 66-67 | Loading machine as a part of the shipment floating complex with an overpass and elevator tower |
| 68-72 | Tanks for waste |
| 73-75 | Silos of wet grain with the volume of 500 t each – 3 pcs. |
| 81 | Water transport |
| 82-84 | Safety valve of solar system |
| 85 | Gas distribution point (cabinet gas distribution point) |
| 86 | Exhaust pipe of diesel genset |
| 87 | Shipment station to the road transport |
| | Point of shipment of ships under the scheme «ship –FUCHS loader– ship»: |
| 90 | shipment of grain to hold of the ship |
| 91 | blowing from the grab |
| 92 | operation of engine |
| | Reception point of the bilge water from ships |
| 93 | pump that pumps water and oil mixture |
| 94 | pipe of gas-equalizing system of vessel which transfers oily mixture to receiving pit |
| 95 | pump that pumps water and oil mixture |
| 96 | Smoke generator of garbage burner |
| 97-98 | Exhaust hoods of breathing filters (loading bunkers of road transport) |
| 99-105 | Exhaust hoods of spot filters (overpass of shipment onto the water transport with two loading machines) |
| 106-109 | Exhaust hoods of spot filters (loading machine) |

## M 1:1 000




## Legend

- Buildings and structures
- Above-ground buildings and structures
- NIBULON LLC territory border
- Fence of the port territory
- Railway
- Sources of pollutant emissions
- Open area
- Buildings
- Railway access track of 835 m long - adjoins the extraction track No. 13 of the Izmail-port park of the New Izmail station of the "Odesa Railway"
- Regulatory sanitary protection zone

## Explanation of buildings and structures

| N | Name | Note |
|---|---|---|
| 1.1-1.6 | Grain storage with 6 containers of 5.5 thousand tons each with underground and above-ground galleries | Stage II |
| 1.7-1.18 | Grain storage with 12 containers of 5.5 thousand tons each with above-ground overpasses and underground galleries | Stage V |
| 1.19-1.21 | Wet grain silos for 500 tons each - 3 pcs., connected with a working tower | Stage III |
| 1.22 | Mechanized warehouses of floor storage of grains with a capacity of 9 thousand tons each and with equipping of each one by an underground gallery, inner overpass, unloading station for road transport with a canopy and elevator tower | Stage I |
| 1.23 | Mechanized warehouses of floor storage of grains with a capacity of 9 thousand tons each and with equipping of each one by an underground gallery, inner overpass, unloading station for road transport with a canopy and elevator tower | Stage III |
| 2 | Working grain cleaning tower with 5 waste hoppers | Stage II |
| 3 | Shipping overpass for water transport with two loading machines | Stage I |
| 4 | Underground transport gallery from car unloaders to the working grain cleaning tower | Stage II |
| 5 | a 100 t/h dryer | Stage III |
| 6.1-6.3 | A road transport unloading point with a canopy for 2 intake pits and underground gallery which connects t with working tower | Stage II |
| 7.1-7.2 | Bunkers for loading of road transport | Stage I |
| 8.1-8.5 | Waste hoppers | Stage II |
| 9.1- 9.4 | Metal platforms for cyclone-type filters | Stage II |
| 9.5- 9.7 | Metal platforms for cyclone-type filters | Stage V |
| 10 | A transformer substation and a distribution point with operator's office | Stage I |
| 11.1-11.2 | Car scales | Stage I |
| 12 | An operator's office | Stage I |
| 13 | Administrative and household building with a laboratory | Stage I |
| 14 | A household building with a workshop and a warehouse | Stage I |
| 15 | A cafe for internal use | Stage IV |
| 16.1-16.3 | Yard sewer toilets | Stage I |
| 17 | A fire extinguishing pumping station and a diesel generator | Stage I |
| 18.1-18.2 | Compressor room | Stage II |
| 19.1-19.2 | Fire tanks of 200 m3 (2 pcs.) | Stage I |
| 20 | Cable overpass from the distribution point to the working grain cleaning tower | Stage II |
| 21 | Department for unloading railway wagons on two tracks (two wagons on each track) | Stage I |
| 22 | Car parking | Stage III |
| 23 | Fountain | Stage III |
| 24.1-24.4 | Arbors for the rest with the improvement of the territory | Stage I |
| 25 | A site for garbage collectors | Stage IV |
| 26.1,26.2 | Railway scales (BULAT) with the dockers' room | Stage I |
| 27 | Intraplot gas networks with a distribution point | Stage III |
| 28 | Temporary car parking for 23 car-places | Stage I |
| 29 | Temporary car parking | Stage III |
| 30 | Truck parking for 40 car-places | Stage I |
| 31 | Rainwater treatment facilities | Stage I |
| 31a | A tank of treated wastewater | Stage I |
| 31б | An oil product separator and a sorption filter | Stage I |
| 32 | A house for business travelers | Stage III |
| 33 | Garbage incinerator | Stage V |
| 34 | Fueling station for 2 containers of 75m3 each | Stage IV |
| 36 | Ship loading posts according to the scheme "road transport – shipment area - FUCHS loader - ship" | Stage I |
| 37 | Checkpoint | Stage I |
| 38-39 | Two overpasses (one for each mechanized warehouse) which connect elevator tower of the mechanized warehouse with overpass for shipment to the water transport | Stage I |
| 40 | Floating complex for shipment with loading machine, overpass and elevator tower | Stage I |
| 40.1 | Floating complex for shipment with loading machine, overpass and elevator tower | Stage III |
| 41 | Rainwater treatment facilities | Stage I |
| 41a | An oil product separator and a sorption filter | Stage I |
| 41б | A tank of treated wastewater | Stage I |

# APPENDIXES

УКРАЇНА
ІЗМАЇЛЬСЬКА МІСЬКА РАДА
ІЗМАЇЛЬСЬКОГО РАЙОНУ ОДЕСЬКОЇ ОБЛАСТІ

# Р І Ш Е Н Н Я

24 сесія VIII скликання «15» квітня 2022 р. № 2045-VIII

**Про надання ТОВАРИСТВУ З ОБМЕЖЕНОЮ ВІДПОВІДАЛЬНІСТЮ СІЛЬСЬКОГОСПОДАРСЬКОМУ ПІДПРИЄМСТВУ «НІБУЛОН» дозволу на розробку проекту землеустрою щодо відведення земельної ділянки, що розташована у м. Ізмаїл Ізмаїльського району Одеської області в межах вулиць Портова, Набережна Лукі Капікраяна та Дунайська, в оренду терміном на 49 (сорок дев'ять) років для будівництва та експлуатації об'єкта транспортної інфраструктури – річкового порту (терміналу)**

Відповідно до ст. 26 Закону України «Про місцеве самоврядування в Україні» № 280/97-ВР від 21.05.1997, ст. ст. 12, 67, 70, 83, 93, 122, 134 Земельного кодексу України № 2768-III від 25.10.2001, п.п. 3, 6 Прикінцевих та перехідних положень Закону України «Про внесення змін до деяких законодавчих актів України щодо розмежування земель державної та комунальної власності» № 5245-VI від 06.09.2012, ст.ст. 4, 28 Закону України «Про державну реєстрацію речових прав на нерухоме майно та їх обтяжень» № 1952-IV від 01.07.2004, з метою задоволення потреб населення і суспільного виробництва в перевезеннях, Ізмаїльська міська рада Ізмаїльського району Одеської області

**ВИРІШИЛА:**

1. Надати ТОВАРИСТВУ З ОБМЕЖЕНОЮ ВІДПОВІДАЛЬНІСТЮ СІЛЬСЬКОГОСПОДАРСЬКОМУ ПІДПРИЄМСТВУ «НІБУЛОН» дозвіл на розробку проекту землеустрою щодо відведення земельної ділянки орієнтованою площею 20,00 га, що розташована у м. Ізмаїл Ізмаїльського району Одеської області в межах вулиць Портова, Набережна Лукі Капікраяна та Дунайська, в оренду терміном на 49 (сорок дев'ять) років для будівництва та експлуатації об'єкта транспортної інфраструктури – річкового порту (терміналу).
2. Віднести земельну ділянку до категорії земель: Секція J - «Землі промисловості, транспорту, зв'язку, енергетики, оборони та іншого призначення», розділ 12 - «Землі транспорту». Цільове призначення земельної ділянки визначити на підставі проекту землеустрою щодо відведення земельної ділянки.
3. Контроль за виконанням цього рішення покласти на постійну комісію Ізмаїльської міської ради Ізмаїльського району Одеської області з питань землекористування.

**Ізмаїльський міський голова**
**Ізмаїльського району Одеської області** **А.В.Абрамченко**

ІЗМАЇЛЬСЬКА РАДА ІЗМАЇЛЬСЬКОГО РАЙОНУ ОДЕСЬКОЇ ОБЛАСТІ
ВІДДІЛ ДІЛОВОДСТВА, КОНТРОЛЮ ТА ОРГАНІЗАЦІЙНОЇ РОБОТИ

Згідно з оригіналом
Начальник
відділу діловодства, контролю
та організаційної роботи
«15» 04 2022 р.

# ВИТЯГ

## з Державного реєстру речових прав на нерухоме майно про реєстрацію іншого речового права

| | |
|---|---|
| Індексний номер витягу: | 310917146 |
| Дата, час формування: | 27.09.2022 12:22:21 |
| Витяг сформовано: | Жеков Юрій Миколайович, Виконавчий комітет Ізмаїльської міської ради Ізмаїльського району Одеської області, Одеська обл. |
| Підстава формування витягу: | заява з реєстраційним номером: 52495076, дата і час реєстрації заяви: 22.09.2022 16:58:47, заявник: Шевченко Тарас Григорович (уповноважена особа) |

### Актуальна інформація про об'єкт нерухомого майна

| | |
|---|---|
| Реєстраційний номер об'єкта нерухомого майна: | 2638851951080 |
| Об'єкт нерухомого майна: | земельна ділянка |
| Кадастровий номер: | 5110600000:01:047:0206 |
| Опис об'єкта: | Площа (га): 19 |

### Актуальна інформація про державну реєстрацію іншого речового права

**Номер запису про інше речове право: 47977065**

| | |
|---|---|
| Дата, час державної реєстрації: | 22.09.2022 16:58:47 |
| Державний реєстратор: | Жеков Юрій Миколайович, Виконавчий комітет Ізмаїльської міської ради Ізмаїльського району Одеської області, Одеська обл. |
| Підстава для державної реєстрації: | договір оренди землі, серія та номер: б/н, виданий 20.09.2022, видавник: Ізмаїльська міська рада Ізмаїльського району Одеської області, ТОВАРИСТВО З ОБМЕЖЕНОЮ ВІДПОВІДАЛЬНІСТЮ СІЛЬСЬКОГОСПОДАРСЬКЕ ПІДПРИЄМСТВО "НІБУЛОН" |
| Підстава внесення запису: | Рішення про державну реєстрацію прав та їх обтяжень (з відкриттям розділу), індексний номер: 64943159 від 27.09.2022 11:55:19, Жеков Юрій Миколайович, Виконавчий комітет Ізмаїльської міської ради Ізмаїльського району Одеської області, Одеська обл. |
| Вид іншого речового права: | право оренди земельної ділянки |
| Зміст, характеристика іншого речового права: | орендна плата в розмірі - 4,30 % від нормативної грошової оцінки земельної ділянки,<br>Дата укладання договору (після 2013р.) / Дата державної реєстрації (до 2013р.): 20.09.2022, Строк: 49р., Дата закінчення дії: 20.09.2071, з правом пролонгації |
| Відомості про суб'єкта іншого речового права: | Орендар: ТОВАРИСТВО З ОБМЕЖЕНОЮ ВІДПОВІДАЛЬНІСТЮ СІЛЬСЬКОГОСПОДАРСЬКЕ ПІДПРИЄМСТВО "НІБУЛОН", код ЄДРПОУ: 14291113, країна реєстрації: Україна<br>Орендодавець: ІЗМАЇЛЬСЬКА МІСЬКА РАДА ІЗМАЇЛЬСЬКОГО РАЙОНУ ОДЕСЬКОЇ ОБЛАСТІ, код ЄДРПОУ: 26569223, країна реєстрації: Україна |

RRP-4HJQU8U5G

| | |
|---|---|
| Опис об'єкта іншого речового права: | строкове платне користування (оренда) земельної ділянки несільськогосподарського призначення площею 19 га |
| Витяг сформував: | Жеков Ю.М. |

Підпис: _____

МП



RRP-4HJQU8U5G

Додаток 1
до Методики визначення
відновної вартості в
зелених насаджень

**Акт № 54**
обстеження зелених насаджень,
що підлягають видаленню

м. Ізмаїл "20" 04 2022 року
(назва населеного пункту)

Комісію призначено **УЖКГ ІМР** Ізмаїльського району Одеської області

**Наказ № 22 від 13 квітня 2022 року** «Про затвердження складу комісії щодо видалення зелених насаджень в м. Ізмаїл»

Голова комісії – Парамонова Олена Вікторівна - начальник Управління житлово-комунального господарства Ізмаїльської міської ради Ізмаїльського району Одеської області.
Секретар комісії Шадчина Ульяна Павлівна - головний спеціаліст Управління житлово-комунального господарства Ізмаїльської міської ради Ізмаїльського району Одеської області.
Члени комісії: 1. Грибінюк Сергій Борисович – в. о. начальника служби з благоустрою КП Ізмаїльської міської ради «Житсервіс»;
2. Мінков Іван Петрович - державний інспектор з охорони навколишнього природного середовища;
3. Острякова Лариса Іларіонівна - голова ІГЕО «Людина і природа».

Представник заявника **заступник генерального директора ТОВ СП «НІБУЛОН» Беседін С. В.**

Комісія оглянула зелені насадження за адресою: **м. Ізмаїл Ізмаїльського району Одеської області, земельна ділянка в межах вулиць Портова, Дунайська, Набережна Лукі Капікраяна, орієнтовною площею 20,00 га.**

Обстеження зелених насаджень пов'язане **з підготовкою території для будівництва та експлуатації обєкта транспортної інфраструктури – річкового порту (терміналу) ТОВ СП «НІБУЛОН» та проведення інженерно – геологічних вишукувань: дерева самосійні, аварійні, фаутні, перейшли віковий поріг, мають розколи, дупла, уражені хворобами – шкідниками, трухлявість, коренева система нестійка, ступінь усихання 50-80%.**

Зелені насадження, що підлягають видаленню:

| № з/п | Вид зелених насаджень | Вік (років) | Висота (м) | Діаметр стовбура на висоті 1,3 метра від землі (см) | Кількість (од.) | Якісний стан (хороший, задовільний, незадовільний) | Підлягає, не підлягає |
|---|---|---|---|---|---|---|---|
| 1. | н/п | 25-45 | 2-4 | 24-56 | 172 | не задовільний | підлягає |
| 2. | тополя | 15-55 | 3-6 | 78-146 | 11 | не задовільний | підлягає |
| 3. | тополя | 5-10 | 2-4 | 18-34 | 38 | задовільний | підлягає |
| 4. | тополя | 5-10 | 2 | 2-5 | 478 | задовільний | підлягає |
| 5. | іва | 15-35 | 3-6 | 34-160 | 67 | не задовільний | підлягає |
| 6. | іва | 15-35 | 3-6 | 34-38 | 36 | задовільний | підлягає |
| 7. | марабеля | 10-15 | 2-4 | 18-24 | 15 | задовільний | підлягає |
| 8. | клен | 15-35 | 3-6 | 24-36 | 8 | задовільний | підлягає |
| 9. | вишня | 10-15 | 2-4 | 18-24 | 16 | задовільний | підлягає |
| 10. | кущі н/п | 10-25 | 1 | - | 740 | не задовільний | підлягає |

Разом підлягає зрізуванню _____дерев _____кущів
Всього видаляється:

1. Дерев вісімсот сорок одне одиниць
2. Кущів сімсот сорок одиниць
3. Газонів _____ га

4. Квітників _____ кв.м

2. Відновна вартість зелених насаджень, що підлягають видаленню:
1. Дерев 10 542,36 гривень
2. Кущів _____ гривень
3. Газонів _____ гривень
4. Квітників _____ гривень
Разом до сплати 10 542,36 гривень

3. Зелені насадження, що залишаються на місці в межах відведеної під забудову ділянки:

| № з/п | Вид зелених насаджень | Вік (років) | Висота (м) | Діаметр стовбура на висоті 1,3 метра від землі (см) | Кіль-кість (од.) | Якісний стан зелених насаджень (хороший, задовільний, незадовільний) |
|---|---|---|---|---|---|---|
| 1. | | | | | | |
| 2. | | | | | | |
| 3. | | | | | | |
| 4. | | | | | | |

Усього залишається на місці:

1. Дерев _____ одниць

2. Кущів _____ одиниць

3. Газонів _____ га

4. Квітників _____ кв.м
4. Визначення відновної вартості зелених насаджень відповідно до проектної документації:
Сума, передбачена в проектній документації на озеленення території, 1 000 000,00 грн (один мільйон гривень 00 коп.)

Сума відновної вартості зелених насаджень, що підлягає сплаті, визначається за формулою:

**Сдс = Вв - Со,**

де Сдс - сума відновної вартості зелених насаджень, що підлягає сплаті;

Вв - сума відновної вартості зелених насаджень, зазначена у позиції "Разом" пункту 2 цього акта;

Со - сума, передбачена в проектній документації на озеленення території.

**Висновок комісії:**

Відповідно до п.7, Постанови КМУ «Про затвердження Порядку видалення дерев, кущів, газонів і квітників у населених пунктах» заявнику **дозволяється видалення вісімсот сорок одного дерева та сімсот сорок кущів породи, (н/п- 172 од., тополя - 11 од., тополя - 38 од., тополя - 478 од., іва - 67 од., іва - 36 од., марабеля - 15 од., клен - 8 од., вишня - 16 од., кущі н/п - 740 од.)** на **земельній ділянці орієнтовною площею 20,00 га як розміщена в межах вулиць Портова, Набережна Лукі Капікраяна та Дунайська у м. Ізмаїл Ізмаїльського району Одеської області.**
Відповідно до п.5, Постанови КМУ «Про затвердження Порядку видалення дерев, кущів, газонів і квітників у населених пунктах» відновна вартість зелених насаджень, що підлягають видаленню, замовником не сплачується, оскільки запланована в проектній документації витрата на озеленення території перевищує відновну вартість зелених насаджень, що підлягають видаленню.

Видалені зелені насадження передаються на потреби міста Ізмаїл Ізмаїльського району Одеської області.

Зелені насадження, що залишаються на місці передаються на збереження УЖКГ ІМР Ізмаїльського району Одеської області (Парамонова Олена Вікторівна, начальник УЖКГ ІМР Ізмаїльського району Одеської області).

Голова комісії О. В. Парамонова

Секретар комісії У. П. Шадчина

Члени комісії: _____

С. Б. Грибінюк

І. П. Мінков

Л. І. Острякова

Заявник С. В. Беседін

**РЕГІСТР СУДНОПЛАВСТВА УКРАЇНИ**
SHIPPING REGISTER OF UKRAINE

# СВІДОЦТВО ПРО ВИЗНАННЯ
## RECOGNITION CERTIFICATE

**Цим посвідчується, що**
This is to certify that

**ТОВАРИСТВО З ОБМЕЖЕНОЮ ВІДПОВІДАЛЬНІСТЮ**
**СІЛЬСКОГОСПОДАРСЬКЕ ПІДПРИЄМСТВО**
**«НІБУЛОН»**
**ЄДРПОУ - 14291113**

**54002, Миколаївська обл., м. Миколаїв,**
**вул. Каботажний спуск, 1**
**тел. (0512) 352344**

**визнається Регістром судноплавства України як підприємство, яке виконує зазначені в Додатку до цього Свідоцтва роботи згідно з вимогами Регістра судноплавства України.**
is recognized by the Shipping Register of Ukraine as an enterprise performing the works listed in the Annex to this Certificate in accordance with the requirements of the Shipping Register of Ukraine.

**В документах підприємства за результатами виконання зазначених робіт повинно бути записано:**
The enterprise documents on the results of the performance of the mentioned works should contain the following:

**«Роботи виконані згідно з вимогами Регістра судноплавства України**
«The works are carried out in accordance with the requirements of the Shipping Register of Ukraine

**Свідоцтво про визнання №** 25-4-13-22 **дата видачі** 24.06.2022р. »
Recognition Certificate No. date of issue

**Акт огляду** **№** 105-4-74-22 **від** 21.06.2022р.
Survey Report of

**Свідоцтво з Додатком дійсне до** **23.06.2023р.**
This Certificate with the Annex is valid until
(дата / date)

**Це Свідоцтво з Додатком втрачає дію у випадках, встановлених правилами та процедурами Регістра судноплавства України.**
This Certificate with the Annex becomes invalid in cases stipulated in Rules and Procedures of the Shipping Register of Ukraine.

**Дата видачі:** 24.06.2022р. **№** 25-4-13-22
Date of issue: (дата / date)

**РЕГІСТР УКРАЇНИ**
REGISTER OF UKRAINE

**В.Гордієнко**

**Печатка або штамп уповноваженої установи**
Seal or stamp of the authorized organization

**П.І.Б., підпис уповноваженої особи, яка видала Свідоцтво**
Name and signature of authorized official issued the Certificate

(до форми 4.1.8
to form 4.1.8)

# ДОДАТОК
# ANNEX

до Свідоцтва про визнання № 25-4-13--22
to the Recognition Certificate No.

| Найменування робіт, які виконуються підприємством<br>Names of works performed by the enterprise |
|---|
| - Днопоглиблювальні роботи. |

РЕГІСТР УКРАЇНИ
REGISTER OF UKRAINE

Печатка або штамп уповноваженої установи
Seal or stamp of the authorized organization

В.Гордієнко

П.І.Б., підпис уповноваженої особи, яка видала Додаток
Name and signature of authorized official issuing the Annex

РЕГІСТР СУДНОПЛАВСТВА УКРАЇНИ

# СВІДОЦТВО № 311-10656-17
# ПРО ЗАПОБІГАННЯ ЗАБРУДНЕННЯ НАФТОЮ, СТІЧНИМИ ВОДАМИ, СМІТТЯМ ТА АТМОСФЕРИ

ДЛЯ СУДЕН, ЩО НЕ ЗДІЙСНЮЮТЬ МІЖНАРОДНІ РЕЙСИ

**Видане Регістром судноплавства України згідно з вимогами Правил щодо запобігання забруднення з суден, (ППЗС) ~~/ Правил класифікації та побудови суден внутрішнього плавання, частина XIV, РУ, 2005 (ПСВП)~~****

| | | | |
|---|---|---|---|
| Назва судна | **МИКОЛАЇВЕЦЬ** | Регістровий номер | **SRU013298** |
| Порт приписки | **Миколаїв** | Клас судна | **КМ + Ice1 R3-IN AUT3 Земснаряд** |
| Рік і місце побудови | **2017 р., м. Миколаїв** | Дата поставки | **2017 р.** |
| Валова місткість | **483** Дедвейт* **-** т. | Кількість людей | **10 чол.** |
| Тип | **не є нафтоналивне** (нафтоналивне, не є нафтоналивне) | Місткість вантажних приміщень, призначених для перевезення нафти | **-** м³ |

**Цим посвідчується, що на судні є такі системи, обладнання і пристрої:**

## А. ДЛЯ ЗАПОБІГАННЯ ЗАБРУДНЕННЯ НАФТОЮ

1. Сепараційне/фільтруюче** обладнання, що забезпечує скидання із вмістом нафти менше15 млн$^{-1}$ — [—]
   Тип _____ Виготовлювач _____
   Максимальна пропускна спроможність _____ м³/год.
   Свідоцтво про типове випробування (схвалення) № _____ «___» _____
   Сертифікат _____ № _____ «___» _____
2.** Попереджувальний сигналізатор на 15 млн$^{-1}$ — [—]
   Тип _____ Виготовлювач _____
   Свідоцтво про типове випробування (схвалення) № _____ «___» _____
   Сертифікат _____ № _____ «___» _____
3.** Прилад для виміру вмісту нафти, призначений для сигналізаторів про вміст нафти в скиданні (15 млн$^{-1}$) — [—]
   Тип _____ Виготовлювач _____
   Свідоцтво про типове випробування (схвалення) № _____ «___» _____
   Сертифікат _____ № _____ «___» _____
4.** Автоматичний пристрій, що припиняє скидання — [—]
   Тип _____ Виготовлювач _____
   Свідоцтво про типове випробування (схвалення) № _____ «___» _____
   Сертифікат _____ № _____ «___» _____
5. Збірний танк (танки, цистерни) загальною місткістю **6,89** м³, розташований /і/ на **10-14,18-20** шп., для збереження на борту всієї лляльної води, забрудненої нафтою. — [☒]
6. Танк/и/ для збору нафтових залишків (осадків) загальною місткістю **-** м³, розташований/і/ на **-** шп. — [—]
7. Система перекачування, здавання та скидання нафтовміщуючих вод — [☒]
   Трубопровід обладнаний стандартним зливним з'єднанням.
8. Пристосування для пломбування зливних з'єднань в кількості **-** на **-** шп. — [—]
   Зливні пристрої опломбовані в закритому положенні згідно з схемою, крес. **-**
9. Журнал нафтових операцій — [—]
10. Судновий план надзвичайних заходів щодо боротьби з забрудненням нафтою — [—]

☒ – є в наявності чи так [—] – нема в наявності чи ні [Н/З] – не застосовується

* Тільки для нафтоналивних суден

** Непотрібне закреслити

**Тільки на нафтоналивному судні в додаток до частини А:**

11. Танк /и/ ізольованого баласту загальною місткістю _____ м³ Н/З

12. Система миття сирою нафтою Н/З

13. Керівництво по обладнанню і експлуатації системи миття сирою нафтою Н/З

14.** Система автоматичного заміру, регістрації та управління скиданням нафти, баластної та промивочної води згідно з Резолюцією А.496(XII) або А.586(14)** Н/З

Тип _____ Виготовлювач _____

Свідоцтво про типове випробування (схвалення) № _____ «____» _____

Сертифікат _____ № _____ «____» _____

Ця система відповідає вимогам, котрі пред'являються до системи контролю категорії А,Б

Прилад для виміру вмісту нафти, призначений для контролю за скиданням забруднених нафтою вод з району вантажних танків Н/З

Тип _____ Виготовлювач _____

Свідоцтво про типове випробування (схвалення) № _____ «____» _____

Сертифікат _____ № _____ «____» _____

15.** Керівництво по експлуатації системи автоматичного заміру, реєстрації та управління скиданням нафти, баластної та промивочної води Н/З

16.** Прилад визначення межі розділу «нафта—вода» Н/З

Тип _____ Виготовлювач _____

Свідоцтво про типове випробування (схвалення) № _____ «____» _____

Сертифікат _____ № _____ «____» _____

17.** Відстійний танк /и/ місткістю _____ м³ Н/З

18.** Вантажний танк /танки/, що призначений /призначені/ як відстійний /відстійні/ Н/З

19. Комплект для локалізації аварійного розливу нафти Н/З

20. Конструкція корпусу відповідно до ППЗС та Додатку I МК МАРПОЛ 73/78/04 (обов'язково для суден із знаком «ОРП» у символі класу)

20.1 Судно повинне бути побудоване відповідно до глави 3.1.3 частини I ППЗС (правила 19 Додатку I МК МАРПОЛ 73/78/04) та задовольняти вимогам:

.1 пунктів 1-6 правила 3.1.3.3 частини I ППЗС (пункту 3 правила 19 Додатку I МК МАРПОЛ 73/78/04) (конструкція подвійного корпусу) Н/З

.2 пунктів 1-3 правила 3.1.3.4 частини I ППЗС (пункту 4 правила 19 Додатку I МК МАРПОЛ 73/78/04) (танкери з проміжною палубою та подвійними бортами) Н/З

.3 пункту 7 Правила 3.1.3.3 частини I ППЗС (пункту 5 правила 19 Додатку I МК МАРПОЛ 73/78/04) (альтернативний метод, схвалений Комітетом по захисту морського середовища (КЗМС)) Н/З

20.2 Судно повинне бути побудоване відповідно до правила 3.1.3.5 частини I ППЗС (правила 19.6 Додатку I МК МАРПОЛ 73/78/04) та задовольняє його вимогам (вимоги подвійного дна) Н/З

20.3 Не вимагається, щоб судно задовольняло вимогам глави 3.1.3 частини I ППЗС (правила 19 Додатку I МК МАРПОЛ 73/78/04) Н/З

20.4 Судно підпадає під вимоги глави 3.1.4 частини I ППЗС (правила 20 Додатку I МК МАРПОЛ 73/78/04) та:

.1 повинне відповідати правилам 3.1.3.2, 3.1.3.3, 3.1.3.4, 3.1.3.7, 3.1.3.8 глави 3.1.3 частини I ППЗС (пунктам 2-5, 7 і 8 правила 19 Додатку I МК МАРПОЛ 73/78/04) і главі 3.1.12 у відношенні правила 3.1.12.6 частини I ППЗС (правилу 28 у відношенні пункту 28.6 Додатку I МК МАРПОЛ 73/78/04) не пізніше ніж _____ Н/З

.2 улаштоване таким чином, що такі танки або відсіки не використовуються для перевезення нафти _____ Н/З

.3 йому дозволено продовження експлуатації згідно з правилом 3.1.4.3 частини I ППЗС (правилом 20.5 Додатку I МК МАРПОЛ 73/78/04) до _____ Н/З

.4 йому дозволено продовження експлуатації згідно з правилом 3.1.4.5 частини I ППЗС (правилом 20.7 Додатку I МК МАРПОЛ 73/78/04) до _____ Н/З

20.5 Судно не підпадає під вимоги глави 3.1.4 частини I ППЗС (правила 20 Додатку I МК МАРПОЛ 73/78/04) Н/З

20.6 Судно підпадає під вимоги глави 3.1.5 частини I ППЗС (правила 21 Додатку I МК МАРПОЛ 73/78/04) та:

.1 має відповідати правилам 3.1.5.2, 3.1.5.3 частини I ППЗС (правила 21.4 Додатку I МК МАРПОЛ 73/78/04) не пізніше _____ Н/З

.2 йому дозволено продовження експлуатації згідно з правилом 3.1.5.4 частини I ППЗС (правила 21.5 Додатку I МК МАРПОЛ 73/78/04) до _____ Н/З

☒ – є в наявності чи так — – нема в наявності чи ні Н/З – не застосовується

** непотрібне закреслити

.3 йому дозволено продовження експлуатації згідно з правилом 3.1.5.5 частини I ППЗС (правилом 21.6.1 Додатку I МК МАРПОЛ 73/78/04) до _____ Н/З

.4 йому дозволено продовження експлуатації згідно з правилом 3.1.5.6 частини I ППЗС (правилом 21.6.2 Додатку I МК МАРПОЛ 73/78/04) до _____ Н/З

.5 воно звільнено від застосування положень глави 3.1.5 частини I ППЗС (правила 21 Додатку I МК МАРПОЛ 73/78/04) згідно з пунктом 1 правила 3.1.5.7 частини I ППЗС (правилом 21.7.1 Додатку I МК МАРПОЛ 73/78/04) Н/З

20.7 Судно не підпадає під вимоги глави 3.1.5 частини I ППЗС (правила 21 Додатку I МК МАРПОЛ 73/78/04) Н/З

## Б. ДЛЯ ЗАПОБІГАННЯ ЗАБРУДНЕННЯ СТІЧНИМИ ВОДАМИ

1.** Установка для обробки стічних вод ☒
Тип ACO Clarimar MF 1 Виготовлювач ACO Marine s.r.o.
Свідоцтво про типове випробування (схвалення) № 39395/AO BV « 26 » 02 2015
Сертифікат SRU № C-224-3-399-17 « 27 » 10 2017

2. Збірний танк(танки, цистерни)** для збору стічних вод загальною місткістю 25,2 м$^3$ на 14-20 шп. ☒

3. Система перекачування, здавання та скидання стічних вод з стандартним зливним з'єднанням ☒

4. Пристосування для пломбування зливних з'єднань в кількості 2 на 25 шп. ☒

5. Зливні пристрої опломбовані в закритому положенні згідно з схемою, крес. СДС15.360065.030 ☒

## В. ДЛЯ ЗАПОБІГАННЯ ЗАБРУДНЕННЯ СМІТТЯМ

1.** Установка (інсинератор) для спалювання сміття/нафтових залишків/шлама стічних вод** —
Тип _____ Виготовлювач _____
Свідоцтво про типове випробування (схвалення) № _____ « ___ » _____
Сертифікат _____ № _____ « ___ » _____

2.** Установка для обробки сміття (подрібнення, пресування)** —
Тип _____ Виготовлювач _____
Свідоцтво про типове випробування (схвалення) № _____ « ___ » _____
Сертифікат _____ № _____ « ___ » _____

3. Пристрій (пристрої) для збирання сміття загальною місткістю 0,25 м$^3$ розташовані на ВП ☒

4. Пристрій для скидання сміття в море розташований на - шп. —

## Г. ДЛЯ ЗАПОБІГАННЯ ЗАБРУДНЕННЯ АТМОСФЕРИ

**1. Обладнання, системи, пристрої та матеріали відповідно до застосованих вимог частини V Правил щодо запобігання забруднення з суден (ППЗС)**

**1.1 Контроль викидів з суден**

1.1.1 **Озоноруйнівні речовини глава 2.3 частини V ППЗС**

1.1.1.1 Може бути продовжена експлуатація наступних систем пожежегасіння і обладнання, що містять галони: —

| Система/обладнання | Розташування на судні |
|---|---|
| - | - |

1.1.1.2 Може бути продовжена експлуатація наступних систем та обладнання, що містять хлорфторвуглеці (ХФВ): —

| Система/обладнання | Розташування на судні |
|---|---|
| - | - |

1.1.1.3 Може бути продовжена експлуатація наступних систем, що містять гідрохлорфторвуглеці (ГХФВ), котрі встановлені, до 1 січня 2020 р.: —

| Система/обладнання | Розташування на судні |
|---|---|
| - | - |

☒ – є в наявності чи так — – нема в наявності чи ні Н/З – не застосовується

** Непотрібне закреслити

**1.1.2 Оксид азоту ($NO_x$) правило 3.1.2 та глави 3.2, 3.5, 3.6 частини V ППЗС, щодо виконання вимог розділів 5 і 6 частини XIV ПСВП**

1.1.2.1 Наступні дизелі з вихідною потужністю більше 130 кВт, встановлені на судні, що побудоване 1 січня 2000 року або після цієї дати, відповідають стандартам викидів глави 3.5 частини V ППЗС: ☒

| Завод-виготовлювач і модель | Серійний номер | Використання | Вихідна потужність (кВт) | Номінальна частота обертання (об/хв.) |
|---|---|---|---|---|
| **Skania DI09 070M** | **7018673** | **ГД** | **257** | **1800** |
| **Skania DI09 070M** | **7020736** | **ГД** | **257** | **1800** |
| **Deutz BF 6M 1013 MC** | **12029276** | **ВДГ** | **139** | **1500** |
| **Deutz BF 6M 1013 MC** | **12029277** | **ВДГ** | **139** | **1500** |

1.1.2.2 Наступні дизелі з вихідною потужністю більше 130 кВт, котрі зазнали значного переобладнання відповідно до правила 3.1.3 частини V ППЗС 1 січня 2000 року або після цієї дати, відповідають стандартам викидів глави 3.5 частини V ППЗС: —

| Завод-виготовлювач і модель | Серійний номер | Використання | Вихідна потужність (кВт) | Номінальна частота обертання (об/хв.) |
|---|---|---|---|---|
| - | - | - | - | - |

1.1.2.3 Наступні дизелі з вихідною потужністю більше 130 кВт, встановлені на судні, що побудоване 1 січня 2000 року або після цієї дати, або дизелі з вихідною потужністю більше 130 кВт, котрі зазнали значного переобладнання відповідно до правила 3.1.3 частини V ППЗС 1 січня 2000 року або після цієї дати, обладнані системою очищення випускних газів чи іншими еквівалентними пристроями відповідно до глави 3.5 частини V ППЗС: —

| Завод-виготовлювач і модель | Серійний номер | Використання | Вихідна потужність (кВт) | Номінальна частота обертання (об/хв.) |
|---|---|---|---|---|
| - | - | - | - | - |

1.1.2.4 Наступні дизелі, що вказані в пунктах 1.1.2.1, 1.1.2.2 і 1.1.2.3 вище, обладнані пристроями моніторингу і реєстрації викидів $NO_x$ відповідно до розділу 3 частини V ППЗС: —

| Завод-виготовлювач і модель | Серійний номер | Використання | Вихідна потужність (кВт) | Номінальна частота обертання (об/хв.) |
|---|---|---|---|---|
| - | - | - | - | - |

1.1.2.5 Відбір проб вихлопних газів —

**1.1.3 Оксиди сірки ($SO_x$) розділ 4 частини V ППЗС**

1.1.3.1 Якість рідкого палива на судні відповідно до 4.2.1 частини V ППЗС:

.1 вміст сірки в будь-якому паливі, що застосовується на судні, не повинен перевищувати 3.5 % по вазі ☒

.2 на судні маються накладні на паливо, забезпечена можливість відбору зразків палива та їх зберігання і маркування ☒

1.1.3.2 Коли судно експлуатується в Районі Контролю Викидів $SO_x$, указаних в главі 4.1 частини V ППЗС, на ньому використовується:

.1 рідке паливо з місткістю сірки, не більше 1,5% має, як документально оформлене накладними на поставку бункерного палива; або —

☒ – є в наявності чи так — – нема в наявності чи ні Н/З – не застосовується

.2 схвалена система очищення випускних газів для зменшення викидів $SO_x$ до величини менше 6.0 г $SO_x$/кВт.г.; або —

.3 інша схвалена технологія для зменшення викидів $SO_x$ до величини менше 6.0 г $SO_x$/кВт.г. —

**1.1.4 Леткі органічні сполуки (ЛОС) розділ 5 частини V ППЗС**

1.1.4.1 Танкер має систему збирання парів, яка встановлена та схвалена у відповідності до MSC/Circ.585 —

**1.1.5 На судні є інсинератор розділ 6 частини V ППЗС:**

.1 котрий відповідає резолюції МЕРС.76(40) з поправками —

.2 котрий встановлений до 1 січня 2000 року і котрий не відповідає резолюції МЕРС.76(40) з поправками —

**2. Первісним сертифікаційним оглядом встановлено, що двигун, його компоненти, регульовані характеристики, технічна документація з монтажу двигуна, та його експлуатації цілком відповідає розділу 3 частини V ППЗС.** ☒

**Свідоцтво двигуна про запобігання забруднення атмосфери додається** ☒

**Судно оглянуте згідно з вимогами Правил щодо запобігання забруднення з суден, (ППЗС) / ~~Правил класифікації та побудови суден внутрішнього плавання, частина XIV, РУ, 2005 (ПСВП)~~****

**Технічний стан перелічених систем, обладнання, пристроїв і приладів придатний, і судно відповідає вимогам вищезгаданих Правил.**

**АВТОНОМНІСТЬ ПЛАВАННЯ СУДНА ЩОДО ВИМОГ ЕКОЛОГІЧНОЇ БЕЗПЕКИ НА ВНУТРІШНІХ ВОДНИХ ШЛЯХАХ ВИЗНАЧЕНА, ЗГІДНО З ДОДАТКОМ І ДО ЧАСТИНИ XIV ПСВП І СКЛАДАЄ 7 ДІБ**

**РАЙОН ЕКСПЛУАТАЦІЇ:**

**Чорне море: - 5-мильна прибережна зона уздовж північно-західного узбережжя від п. Одеса до Старостамбульского гирла р.Дунай – березень-жовтень.**

**- 5-мильна прибережна зона уздовж північного узбережжя від п. Одеса до п. Скадовськ - березень-жовтень.**

**Внутрішні водні шляхи - р. Дніпро, р. Південний Буг.**

**ЗАУВАЖЕННЯ:** **немає**

Це Свідоцтво дійсне до **27.10.2022** при умові проведення щорічних оглядів (крім запобігання забруднення стічними водами)

Видане в **п. Миколаїв** (місце видачі Свідоцтва) **27.10.2017** (дата видачі)

М.П. **РЕГІСТР УКРАЇНИ**

**РИНДІН В.Є.**
(підпис уповноваженої особи, прізвище, І.,Б.)

☒ – є в наявності чи так — – нема в наявності чи ні Н/З – не застосовується

** Непотрібне закреслити

## ПІДТВЕРДЖЕННЯ ЩОРІЧНИХ ОГЛЯДІВ

**Цим посвідчується,** що при щорічних оглядах згідно з вимогами Правил по запобіганню забруднення із суден* та Правил класифікації та побудови суден внутрішнього плавання,* встановлено, що судно задовольняє вимогам вищезгаданих Правил.

**Щорічний огляд**

Видане в м. Кременчуг (місце видачі Свідоцтва) 09.10.2018 (дата видачі)

Печатка або штамп організації.

**РЕГІСТР УКРАЇНИ**

(підпис уповноваженої особи, прізвище, І.,Б.) Дуденко М.Г.

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**Щорічний огляд**

Видане в по Кам'янка-Дніпровська (місце видачі Свідоцтва) 16.01.2020 (дата видачі)

Печатка або штамп організації.

**РЕГІСТР УКРАЇНИ**

(підпис уповноваженої особи, прізвище, І.,Б.) Шапков Ю.М.

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**Щорічний огляд**

Видане в м. Миколаїв (місце видачі Свідоцтва) 18.01.2021. (дата видачі)

Печатка або штамп організації.

**РЕГІСТР УКРАЇНИ**

(підпис уповноваженої особи, прізвище, І.,Б.)

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**Щорічний огляд**

Видане в Очаків (місце видачі Свідоцтва) 19.01.2022 (дата видачі)

Печатка або штамп організації.

**РЕГІСТР УКРАЇНИ**

(підпис уповноваженої особи, прізвище, І.,Б.) Черніков Є.О.

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**Щорічний огляд**

Видане в

(місце видачі Свідоцтва) (дата видачі)

Печатка або штамп організації.

**РЕГІСТР УКРАЇНИ**

(підпис уповноваженої особи, прізвище, І.,Б.)

* Непотрібне закреслити

1.5.2

РЕГІСТР СУДНОПЛАВСТВА УКРАЇНИ

# СВІДОЦТВО
# ПРО ЗАПОБІГАННЯ ЗАБРУДНЕННЯ НАФТОЮ,СТІЧНИМИ ВОДАМИ І СМІТТЯМ

**Видане згідно з п. 1.1.5 Правил екологічної безпеки суден внутрішнього і змішаного плавання**

Назва судна **НІБУЛОН-7** Регістровий номер **SRU203323**

Порт приписки **Миколаїв** Клас судна **(КМ) ✠ В1 земснаряд**

Рік і місце побудови **2011р., Фінляндія** Судно з ДПП (Так або Ні) **ні**

Валова місткість **7** Довжина **10,10** м Кількість людей на судні **2**

Тип **не є нафтоналивне** Сумарна потужність ДВС **168** кВт

( нафтоналивне, не є нафтоналивне)

Судновласник **ТОВ СП «НІБУЛОН»** Дедвейт (для нафтоналивних суден) **-**

**Цим посвідчується,** що на судні є такі системи, обладнання і пристрої:

## А. ДЛЯ ЗАПОБІГАННЯ ЗАБРУДНЕННЯ НАФТОЮ

1. Збірний танк (танки,цистерни) загальною місткістю **лляла МП** м$^3$, розташований /і/ на _____ шп — X
2. Трубопровід для перекачки і здачі води, що містить нафту, в приймальні споруди. Трубопровід обладнаний стандартним зливним з'єднанням. — --
3. Пристосування для пломбування зливних з'єднань в кількості _____ на _____ шп. — --

   Зливні пристрої опломбовані в закритому положенні згідно з схемою, крес. _____ --

## Б. ДЛЯ ЗАПОБІГАННЯ ЗАБРУДНЕННЯ СТІЧНИМИ ВОДАМИ

1. Збірний танк (танки,цистерни) загальною місткістю _____ м$^3$, розташований /і/ на _____ шп. — --
2. Трубопровід, обладнаний зливним стандартним з'єднанням, для перекачки і здачі стічних вод у приймальні споруди — --
3. Пристосування для пломбування зливних з'єднань в кількості _____ на _____ шп. — --

   Зливні пристрої опломбовані в закритому положенні згідно з схемою, крес. _____ --

## В. ДЛЯ ЗАПОБІГАННЯ ЗАБРУДНЕННЯ СМІТТЯМ

1. Знімні (умонтовані) пристрої для збирання сміття загальною місткістю **0,01** м$^3$ розташовані на **ВП корма** шп.

Судно оглянуте згідно з вимогами Правил екологічної безпеки суден внутрішнього і змішаного плавання. Технічний стан перелічених систем, обладнання і пристроїв придатний, і судно відповідає вимогам Правил.

Автономність плавання щодо вимог екологічної безпеки **1** діб

**РАЙОН ЕКСПЛУАТАЦІЇ : див. Класифікаційне свідоцтво № 311-05483-19 від 04.07.2019р.**

Це Свідоцтво дійсне до **15. 07. 2024** при умові проведення щорічних оглядів

Видане в порту **п. Запоріжжя** дата **04. 07. 2019**

М.П. **РЕГІСТР УКРАЇНИ** **ДУЧЕНКО М.Г.**

(підпис уповноваженої особи,яка видала Свідоцтво,прізвище, І.,Б.)

№ **311-05484-19**

☒ - є в наявності ☐ - нема в наявності

## ПІДТВЕРДЖЕННЯ ЩОРІЧНИХ ОГЛЯДІВ

**Цим посвідчується,** що при щорічних оглядах згідно з вимогами п. 1.5 Правил щодо екологічної безпеки суден внутрішнього і змішаного плавання, встановлено, що судно задовольняє вимогам вищезгаданих Правил

**Щорічний огляд**

Місце Вознесенське Дата 13.10.2020

М.П. РЕГІСТР УКРАЇНИ Медведєв М.М.

(підпис уповноваженої особи,прізвище, І.,Б.)

**Щорічний огляд**

Місце м. Вознесенськ Дата 06.10.2021

М.П. РЕГІСТР УКРАЇНИ Дмитрієв М.В.

(підпис уповноваженої особи,прізвище, І.,Б.)

**Щорічний огляд**

Місце Дата

М.П. РЕГІСТР УКРАЇНИ

(підпис уповноваженої особи,прізвище, І.,Б.)

**Щорічний огляд**

Місце Дата

М.П. РЕГІСТР УКРАЇНИ

(підпис уповноваженої особи,прізвище, І.,Б.)

**Щорічний огляд**

Місце Дата

М.П. РЕГІСТР УКРАЇНИ

(підпис уповноваженої особи,прізвище, І.,Б.)

*ДОДАТОК 24*
***до наказу Міністерства транспорту та зв'язку України***
***13.12.2006 №1151***
*(у редакції наказу Міністерства інфраструктури України 26.07.2013 №520)*

# АКТ № 103-03979-22
## технічного нагляду судна для здійснення його державної реєстрації
## Technical survey report

~~Власник-судновласник~~ та його адреса/Ship-owner, address:
Заявник – **ТОВ СП «НІБУЛОН»; 54002, м. Миколаїв, Каботажний спуск, 1**

Ідентифікаційні ознаки судна/Ship's identification: ---
(заповнюється за наявністю/if any)

Назва судна або державний реєстраційний номер
Ship's name or state register number:
**ІП-01, (кол. GORKEM) [від заявника]**

Ідентифікаційний номер IMO
IMO identification number: ---

Номер корпусу або заводський номер ---
Hull number or building number: ---

Позивний сигнал ---
Call sign: ---

Модель або проект: **FCM-2037**
Model or project:

Регістровий номер ---
Class register number: ---

Характеристика судна/Ship's characteristics:

Тип та призначення/Type and purpose: **Плавучий причал, стоянкове**

Рік та місце побудови **2016р., Стамбул,Туреччина**
Year and place of build: **2016., Istanbul, Turkey**

Матеріал корпусу **сталь**
Hull material:

Довжина/Length: **48,00** м

Ширина/Breadth: **18,56** м

**Осадка** **2,482**
Draft: м

Висота борту **3,15**
Molded depth: м

Валова місткість/gross tonnage: ---
(для річкових суден/for river vessels)

Валова місткість/gross tonnage: **744,00**
(для морських суден та суден змішаного плавання / for sea-going ships and combined navigation vessels)

Пасажиромісткість -- осіб
Number of passengers: persons

Екіпаж -- осіб
Crew: persons

Тип, кількість та потужність головних двигунів
Type, number and power of main engines: ---

Заводський номер двигуна(ів)
Engine(s) building number: ---

Загальна площа вітрил/Windage area: --- $м^2$

Район та умови плавання, що заявляються:
Navigation area and conditions: **Внутрішні водні шляхи України., р. Дунай., стоянкове судно.**

Висновок щодо технічного стану судна/Technical condition conclusion:
**судно знаходиться на плаву, пошкоджень та водотічності не виявлено**

Вимоги/Requirements:

Місце огляду/Place of survey : **м. Ізмаїл**

Дата огляду/Date of survey: **05.09.2022**
дд/мм/рррр / dd/mm/yyyy

Термін придатності судна до плавання
Seaworthiness period: **передбачуваний - вересень 2028р.**

Найменування класифікаційного товариства, що проводило технічний огляд/
Name of the surveyor company: **Регістр Судноплавства України**

Посада, прізвище, ім'я, по батькові особи що проводила технічний огляд
Position, name of the surveyor person: **інженер-інспектор Дмитрієв М.В.**

Підпис уповноваженої особи/ Signature of authorized official

Печатка або штамп організації, яка видала акт
Seal/stamp of the issuing authority

Акт отримав/Report is received by:

Дата/Date _____ Підпис/Signature____

2.8.15

# SHIPPING REGISTER OF UKRAINE
# РЕГІСТР СУДНОПЛАВСТВА УКРАЇНИ

## DOCUMENT OF COMPLIANCE
## ДОКУМЕНТ ПРО ВІДПОВІДНІСТЬ

**Certificate** **№ I 041-18** **Ukraine**
**Свідоцтво** **Україна**

**Issued under the provisions of the**
**Видане на підставі положень**

**ORDER OF THE MINISTRY OF TRANSPORT OF UKRAINE**
**DATED 20.11.2003 № 904**
**НАКАЗУ МІНІСТЕРСТВА ТРАНСПОРТУ УКРАЇНИ**
**ВІД 20.11.2003 № 904**

**Under the authority of the Government of UKRAINE by the Shipping Register of Ukraine**
**За уповноваженням Уряду УКРАЇНИ Регістром судноплавства України**

| | |
|---|---|
| **Name and address of the Company**<br>**Назва та адреса Компанії** | **NIBULON LLC**<br>**63, Velyka Morska St., 54030 Mykolayiv, Ukraine**<br>**ТОВ "СП "НІБУЛОН"**<br>**вул. Велика морська, 63, Миколаїв, Україна** |
| **Company identification number**<br>**Ідентифікаційний номер Компанії** | |

**THIS IS TO CERTIFY THAT** the safety management system of the Company has been audited and that it complies with the requirements of the Order of the Ministry of Transport of Ukraine dated 20.11.2003 № 904 for the type(s) of ships listed below (delete as appropriate):

**ЦИМ ПОСВІДЧУЄТЬСЯ**, що система управління безпекою Компанії пройшла аудиторську перевірку та що вона відповідає вимогам наказу Міністерства транспорту України від 20.11.2003 № 904 стосовно типу(ів) суден, перелічених нижче (непотрібне закреслити):

| | |
|---|---|
| ~~Passenger ship~~ | ~~Пасажирське судно~~ |
| Passenger high-speed craft | Пасажирське високошвидкісне судно |
| ~~Cargo high-speed craft~~ | ~~Вантажне високошвидкісне судно~~ |
| ~~Bulk carrier~~ | ~~Навалювальне судно~~ |
| ~~Oil tanker~~ | ~~Нафтовий танкер~~ |
| ~~Chemical tanker~~ | ~~Танкер хімовоз~~ |
| ~~Gas carrier~~ | ~~Газовоз~~ |
| ~~Mobile offshore drilling unit~~ | ~~Морська пересувна бурова установка~~ |
| Other cargo ship | Інше вантажне судно |
| ~~Ro-ro passenger ferry~~ | ~~Ро-ро пасажирський пором~~ |

**This Document of Compliance is valid until** **18.04.2023**
**Цей Документ про відповідність дійсний до**
subject to periodical verifications
при умові проведення періодичних перевірок

**Completion date of verification on which this certificate is based** **19.04.2018**
**Дата завершення перевірки, на котрій цей документ заснований**

**Issued at Kyiv**
**Виданий в Києві**
(place of issue of the document)
(місце видачі)

**Date of issue** **24.04.2018**
**Дата видачі**

(Seal or stamp of issuing authority, as appropriate)
(Печатка або штамп організації, що видала Свідоцтво)

(Signature of the duly authorized official issuing the Certificate)
(Підпис належним чином уповноваженої особи, яка видала Свідоцтво)

Certificate № I 041-18
Свідоцтво

Ukraine
Україна

## ENDORSEMENT FOR ANNUAL VERIFICATION
## ПІДТВЕРДЖЕННЯ ЩОРІЧНОЇ ПЕРЕВІРКИ

**THIS IS TO CERTIFY THAT**, at the periodical verification in accordance with regulation 11.5 Annex 1 to p. 5.3.3 of the Order of the Ministry of Transport of Ukraine dated 20.11.2003 № 904, the safety management system was found to comply with the requirements of the Administration.

**ЦИМ ПОСВІДЧУЄТЬСЯ**, що за результатами періодичної перевірки, згідно з правилом 11.5 Додатку 1 до п. 5.3.3 наказу Міністерства транспорту України від 20.11.2003 № 904 система управління безпекою визнана такою, що відповідає вимогам Адміністрації.

**1st annual verification**
**1-а щорічна перевірка**

(Seal or stamp of issuing authority, as appropriate)
(Печатка або штамп організації, що видала Свідоцтво)

**Signed**
**Підписано** _____
(Signature of authorized official)
(Підпис уповноваженої особи)

**Place**
**Місце** м. Миколаїв

**Data**
**Дата** 03.04.2019

**2nd annual verification**
**2-а щорічна перевірка**

(Seal or stamp of issuing authority, as appropriate)
(Печатка або штамп організації, що видала Свідоцтво)

**Signed**
**Підписано** _____
(Signature of authorized official)
(Підпис уповноваженої особи)

**Place**
**Місце** м. Миколаїв

**Data**
**Дата** 27.03.2020

**3rd annual verification**
**3-а щорічна перевірка**

(Seal or stamp of issuing authority, as appropriate)
(Печатка або штамп організації, що видала Свідоцтво)

**Signed**
**Підписано** _____
(Signature of authorized official)
(Підпис уповноваженої особи)

**Place**
**Місце** Миколаїв

**Data**
**Дата** 26.03.~~2020~~* 2021

**4th annual verification**
**4-а щорічна перевірка**

(Seal or stamp of issuing authority, as appropriate)
(Печатка або штамп організації, що видала Свідоцтво)

**Signed**
**Підписано** _____
(Signature of authorized official)
(Підпис уповноваженої особи)

**Place**
**Місце** Миколаїв

**Data**
**Дата** 14.03.2022

* Виправленому відповідно 26.03.2021

**ДЕРЖАВНА СЛУЖБА МОРСЬКОГО І ВНУТРІШНЬОГО ВОДНОГО ТРАНСПОРТУ ТА СУДНОПЛАВСТВА УКРАЇНИ**
**THE STATE SERVICE FOR MARITIME, INLAND WATERWAY TRANSPORT AND SHIPPING OF UKRAINE**

# СВІДОЦТВО ПРО ПРАВО ВЛАСНОСТІ НА СУДНО
# CERTIFICATE OF OWNERSHIP

**АВ № 001754**

Цим засвідчується, що відповідно до записів, унесених до Державного суднового реєстру України
Hereby confirms that according to the data added to the State Register of Ships of Ukraine

**Державної служби морського і внутрішнього водного транспорту та судноплавства України**

під № **АРС-280** від **28** числа **09** місяця **2022** року
under of date month year

судновласником судна **«ПП-01»**
The shipowner

є **ТОВ СП «НІБУЛОН»**
is

місцезнаходження (місце проживання) судновласника **Каботажний спуск, 1, м. Миколаїв, 54002**
Location (primary residence) of the shipowner

Відносно зазначеного судна в Державному судновому реєстрі України записано таке:
The State Register of Ships of Ukraine has recorded the following characteristics of the above-mentioned ship

1. Призначення та тип — **плавучий причал, стоянкове**
   Purpose and type
2. Позивний сигнал — **---**
   Signal letters
3. Ідентифікаційний номер IMO — **----**
   IMO Identification Number
4. Рік та місце побудови — **2016, м. Стамбул, Туреччина**
   Year and place of construction
5. Основний матеріал — **сталь**
   Hull Material
6. Головні розміри за обмірним свідоцтвом, що видане **Регістром судноплавства України**
   Basic dimensions according to the Tonnage certificate issued by

**Акт технічного нагляду судна для здійснення його державної реєстрації**

**05** числа **09** місяця **2022** року під № **103-03979-22**
date month year with №

АВ №001754

| | | | | | |
|---|---|---|---|---|---|
| довжина<br>length | 48,00 | м;<br>m; | валова місткість<br>gross tonnage | 744 | од.;<br>units; |
| ширина<br>breadth | 18,56 | м;<br>m; | чиста місткість<br>net tonnage | - | од.;<br>units. |
| осадка<br>draught | 2,482 | м;<br>m; | | | |

7. Тип, кількість та потужність головних двигунів
Type, quantity and power capacity of the main engines ----------

8. Попередня назва судна, якщо раніше воно плавало під іноземним прапором, та попередній порт його реєстрації
Previous name of ship if sailed under foreign flag and its previous port of registry

**GORKEM**

Відповідно до Кодексу торговельного мореплавства України та даних, заявлених при державній реєстрації,
According to the Merchant Shipping Code of Ukraine and the data declared in state registration,

власником судна
The shipowner **ПП-01**

є
is **ТОВ СП «НІБУЛОН»**

Це Свідоцтво зберігається на борту судна в оригіналі або нотаріально засвідченій копії.
The Certificate is to be kept on shipboard in the original or the copy certified by a notary officer.

У разі втрати судном права плавання під Державним Прапором України або в інших випадках, зазначених у Кодексі торговельного мореплавства України, це Свідоцтво повертається до органу державної реєстрації, що його видав.
In case the ship has lost the right to sail under the State Flag of Ukraine or in any other cases mentioned in the Merchant Shipping Code of Ukraine, this Certificate is to be returned to the issuing office.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Видано під №<br>Issued with № | 001754 | від<br>from | 28 | числа<br>date | 09 | місяця<br>month | 2022 | року<br>year |

**Голова**

М. П.
Seal

**В. Кіндратів**

Посадова особа органу державної реєстрації
Official of the State Ships registration Authority

ПК «Україна». Зам. 16-3458. 2016 р. III кв.

МІНЕКОНОМІКИ

ДЕРЖАВНЕ ПІДПРИЄМСТВО
"МИКОЛАЇВСЬКИЙ НАУКОВО-ВИРОБНИЧИЙ ЦЕНТР
СТАНДАРТИЗАЦІЇ, МЕТРОЛОГІЇ ТА СЕРТИФІКАЦІЇ"
(ДП "Миколаївстандартметрологія")

# СЕРТИФІКАТ

## визнання спроможності проведення вимірювань

№ РН-018/2021
від 14.04.2021

Видано Товариству з обмеженою відповідальністю сільськогосподарського підприємства "НІБУЛОН"
Місцезнаходження: вул. Каботажний спуск, 1, м. Миколаїв, Миколаївська обл., 54002, Україна

та засвідчує, що за результатами оцінювання ДП "Миколаївстандартметрологія" визнано спроможність проведення вимірювань хіміко-технологічною лабораторією ТОВ СП "НІБУЛОН", яка розташована за адресою: вул. Каботажний спуск, 1, м. Миколаїв, Миколаївська обл., 54002, Україна

Галузь проведення вимірювань наведена в додатку до цього Сертифіката і є його невід'ємною частиною.

В.о. заступника директора з питань стандартизації, якості та наукової діяльності ДП "Миколаївстандартметрологія" Олена КРЕМЕНЕЦЬКА

МП

Додаткова інформація

Вимоги вн. СТП 74.9-02568259-001:2021 Порядок оцінювання та визнання спроможності проведення вимірювань суб'єктами господарювання на добровільних засадах:

"6.5 ДП "Миколаївстандартметрологія" не несе відповідальність за недотримання суб'єктом господарювання відповідності критеріям оцінювання та обстеження під час провадження діяльності з проведення вимірювань.

6.6 Замовникам, що пройшли процедуру визнання спроможності проведення вимірювань, ДП "Миколаївстандартметрологія" пропонує проходження підтвердження спроможності проведення вимірювань щорічно та (або) в разі виникнення обставин, що можуть негативно вплинути на умови проведення вимірювань та поставити під сумнів достовірність отриманих результатів вимірювань, зокрема:

зміна організаційної структури, підпорядкованості;
зміна розташування суб'єкта господарювання (структурного підрозділу), що здійснює вимірювання та умов в приміщеннях;
зміна методу вимірювання;
зміна фахівців;
незабезпеченість необхідними нормативними документами;
незабезпеченість необхідними технічними засобами з відповідними технічними і метрологічними характеристиками;
відсутність метрологічного підтвердження засобів вимірювальної техніки та випробувального обладнання;
інші."

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www.nibulon.com

# Chemical and Technological Laboratory Nibulon Ltd.

Certificate of recognition of the capacity No. RN-018/2021 dd. 14.04.2021

## Test report № 38 dated 25.05.2022

**Sample description** - surface water

**Sampling location** – Izmail, Odesa Region near cargo berth

| № | Item name | |
|---|---|---|
| 1 | Hydrogen indicator, units. pH | 7,26 |
| 2 | Suspended substances | 10,0 |
| 3 | Dry residue, mg/dm$^3$ | 246,0 |
| 4 | Sulfates, mg/dm$^3$ | 31,66 |
| 5 | Ammonium nitrogen, mg/dm$^3$ | 0,20 |
| 6 | Nitrite, mg/dm$^3$ | 0,074 |
| 7 | Nitrates, mg/dm$^3$ | 3,29 |
| 8 | Biochemical oxygen demand 5, mg$O_2$/dm$^3$ | 3,5 |
| 9 | Dissolved oxygen, mg$O_2$/dm$^3$ | 7,47 |
| 10 | COD, mg/dm$^3$ | 20,76 |
| 11 | Oil products, mg/dm$^3$ | 0,010 |
| 12 | Chlorides, mg/dm$^3$ | 25,42 |
| 13 | Iron, mg/dm$^3$ | 0,65 |
| 14 | Phosphates, mg/dm$^3$ | 0,077 |

Responsible for compiling a test report :
Chemical Research Engineer

ТОВ СП "НІБУЛОН" ХІМІКО-ТЕХНОЛОГІЧНА ЛАБОРАТОРІЯ ТОВ СП "НІБУЛОН"

Serhii GAYDAY

*Note:*
*1. The test report applies only to the sample, which is presented for analysis.*

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# Chemical and Technological Laboratory Nibulon Ltd.

Certificate of recognition of the capacity No. RN-018/2021 dd. 14.04.2021

## Test report № 3 dated 31.05.2022

**Sample description** - bottom soil

**Basis for measurements** - act of sampling 21.05.2022

**Sample mass** – 2000 g

**Sampling location** – Izmail, Odesa Region

**Test results:**

| Item name | Test method | Test results |
|---|---|---|
| Hydrogen indicator, units. pH | DSTU 8646:2015. Soil quality. Methods of determining the specific electrical conductivity, pH and dense residue of the aqueous extract. | 7,32 |
| Exchangeable ammonium in terms of ammonium nitrogen, mg/kg | DSTU 4729:2007. Soil quality. Determination of nitrate and ammonium nitrogen in the modification of the NSC IHA named after O.N. Sokolovsky | 3,8 |
| Nitrates, in terms of nitrate nitrogen, mg/kg | DSTU 4729:2007. Soil quality. Determination of nitrate and ammonium nitrogen in the modification of the NNC IHA named after O.N. Sokolovsky | 2,15 |
| Phosphorus, mg/kg | DSTU 4114:2002. Soils. Determination of mobile compounds of phosphorus and potassium according to the modified Machigin method. | 80,3 |
| Sulfates, mg/kg | DSTU 4289:2004. Soil quality. Determination of sulfate ion in aqueous extract | 0,013 |
| Petroleum products, mg/kg; | MVV No. 081/12-0116-03. Soils. The technique of measuring the mass fraction of petroleum products by the gravimetric method. | 113,0 |
| Mass fraction of organic matter, % | DSTU 4289:2004. Soil quality. Methodology for the determination of organic matter. Gravimetric method | 0,22 |

Responsible for compiling a test report :
Chemical Research Engineer

ТОВ СП "НІБУЛОН" ХІМІКО-ТЕХНОЛОГІЧНА ЛАБОРАТОРІЯ ТОВ СП "НІБУЛОН"

Serhii GAYDAY

*Note:*
*1. The test report applies only to the sample, which is presented for analysis.*

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Gafta

201082
ДСТУ ISO/IEC 17025

ilac-MRA

# Production and Technological Laboratory Nibulon Ltd.

Testing laboratory accredited by the National Accreditation Agency of Ukraine for competence according to the requirements of DSTU ISO/IEC 17025:2019 (ISO/IEC 17025:2017) accreditation certificate number 201082 of 02 August 2019

## Test report № 3 dated 30.05.2022

**1. Sample description**- bottom soil

**2. Test requested** - determination of the content of toxic elements

**3. Registration number** - №3

**4. Date of sample received** – 21.05.2022

**5. Date of testing** - 21.05.2022 – 30.05.2022

**6. Sampling** - according to ДСТУ 4287:2004 Soil quality. Sampling

**7. Sampling location** – Izmail, Odesa Region

**8. Test results**

| Item name | Content | Test method |
|---|---|---|
| | Bottom soil located in the area of dredging works | |
| Toxic elements, mg/kg | | |
| Lead* | 14,59 | МВВ 081/12-0009-01 |
| Cadmium* | 0,17 | МВВ 081/12-0010-01 |
| Copper* | 21,47 | МВВ 081/12-0002-01 |
| Zinc* | 41,24 | МВВ 081/12-0013-01 |
| Manganese* | 214,10 | МВВ 081/12-0011-01 |
| Mercury* | <0.03 | МВВ 081/12-0291-06 |
| Iron (mobile forms)* | 429,78 | ДСТУ 4770.4:2007 |

Responsible for compiling a test report :
Chemical Research Engineer — Svitlana TARAN

**Approved by:**
Deputy Head of Production and Technological Laboratory, chemical and biological research — Ganna KARA

ВТЛ ТОВ СП "НІБУЛОН" ЛАБОРАТОРІЯ ВТЛ ТОВ СП "НІБУЛОН"

*Note:*
*1. The test report applies only to the sample, which is presented for analysis.*
*2. The test report shall not be reproduced exept in full, without the written approval of the laboratory*
*3, * - test items that make up the scope of accreditati*

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# Chemical and Technological Laboratory Nibulon Ltd.

Certificate of recognition of the capacity No. RN-018/2021 dd. 14.04.2021

## Test report № 4 dated 31.05.2022

**Sample description** - bottom soil

**Basis for measurements** - act of sampling 21.05.2022

**Sample mass** – 2000 g

**Sampling location** – Izmail, Odesa Region

**Test results:**

| Item name | Test method | Test results |
|---|---|---|
| Hydrogen indicator, units. pH | DSTU 8646:2015. Soil quality. Methods of determining the specific electrical conductivity, pH and dense residue of the aqueous extract. | 7,40 |
| Exchangeable ammonium in terms of ammonium nitrogen, mg/kg | DSTU 4729:2007. Soil quality. Determination of nitrate and ammonium nitrogen in the modification of the NSC IHA named after O.N. Sokolovsky | 3,60 |
| Nitrates, in terms of nitrate nitrogen, mg/kg | DSTU 4729:2007. Soil quality. Determination of nitrate and ammonium nitrogen in the modification of the NNC IHA named after O.N. Sokolovsky | 4,55 |
| Phosphorus, mg/kg | DSTU 4114:2002. Soils. Determination of mobile compounds of phosphorus and potassium according to the modified Machigin method. | 85,2 |
| Sulfates, mg/kg | DSTU 4289:2004. Soil quality. Determination of sulfate ion in aqueous extract | 0,020 |
| Petroleum products, mg/kg; | MVV No. 081/12-0116-03. Soils. The technique of measuring the mass fraction of petroleum products by the gravimetric method. | 90,0 |
| Mass fraction of organic matter, % | DSTU 4289:2004. Soil quality. Methodology for the determination of organic matter. Gravimetric method | 3,76 |

*Note: 1. Sampling was carried out according to DSTU 4287:2004. Soil quality. Selection of samples.*
*2. The test report applies only to the sample, which is presented for analysis.*

Responsible for compiling a test report :
Chemical Research Engineer

ТОВ СП "НІБУЛОН" ХІМІКО-ТЕХНОЛОГІЧНА ЛАБОРАТОРІЯ ТОВ СП "НІБУЛОН"

Serhii GAYDAY

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Gafta

201082
ДСТУ ISO/IEC 17025

ilac-MRA

# Production and Technological Laboratory Nibulon Ltd.

Testing laboratory accredited by the National Accreditation Agency of Ukraine for competence according to the requirements of DSTU ISO/IEC 17025:2019 (ISO/IEC 17025:2017) accreditation certificate number 201082 of 02 August 2019

## Test report № 4 dated 30.05.2022

**1. Sample description**- bottom soil

**2. Test requested** - determination of the content of toxic elements

**3. Registration number** - №4

**4. Date of sample received** – 21.05.2022

**5. Date of testing** - 21.05.2022 – 30.05.2022

**6. Sampling** - according to ДСТУ 4287:2004 Soil quality. Sampling

**7. Sampling location** – Izmail, Odesa Region

**8. Test results**

| Item name | Content | Test method |
|---|---|---|
| | Bottom soil located in the area of dredging works | |
| Toxic elements, mg/kg | | |
| Lead* | 9,42 | MBB 081/12-0009-01 |
| Cadmium* | 0,30 | MBB 081/12-0010-01 |
| Copper* | 20,60 | MBB 081/12-0002-01 |
| Zinc* | 53,89 | MBB 081/12-0013-01 |
| Manganese* | 163,58 | MBB 081/12-0011-01 |
| Mercury* | <0,03 | MBB 081/12-0291-06 |
| Iron (mobile forms)* | 691,59 | ДСТУ 4770.4:2007 |

Responsible for compiling a test report :
Chemical Research Engineer — Svitlana TARAN

Deputy Head of Production and Technological Laboratory, chemical and biological research — Ganna KARA

ВТЛ ТОВ СП "НІБУЛОН" ЛАБОРАТОРІЯ ВТЛ ТОВ СП "НІБУЛОН"

*Note:*
*1. The test report applies only to the sample, which is presented for analysis.*
*2. The test report shall not be reproduced exept in full, without the written approval of the laboratory*
*3, * - test items that make up the scope of accreditati*

Appendix 4

CALCULATION OF WATER CONSUMPTION FOR WATERING GREEN SPACES, SIDEWALKS AND DRIVEWAYS

Water consumption for watering green spaces:

$$Q_{gs} = q_{gs} * F_{gs} / 1\,000, \text{ m}^3/\text{day};$$

$$Q_{gs} = q_{gs} * F_{gs} * n_{gs} / 1\,000, \text{ m}^3/\text{year};$$

де, $q_{gs}$ – water consumption for watering $1\text{m}^2$ of green spaces (according to ДБН В.2.5-64:2012),

$q_{gs} = 3{,}0 \text{ l/m}^2$,

$F_{gs}$ – the total area of green spaces that are irrigated , $F_{gs} = 60\,000{,}0 \text{ m}^2$;

$n_{зи}$ – frequency of watering green spaces per year, $n_{gs} = 50$ times;

$$Q_{gs} = 3{,}0 * 60\,000{,}0 / 1000 = 180{,}0 \text{ m}^3/\text{day};$$

$$Q_{gs} = 3{,}0 * 60\,000{,}0 * 50 / 1000 = 9\,000{,}0 \text{ m}^3/\text{year};$$

Water consumption for watering (washing) sidewalks of driveways (watering and washing):

$$Q_w = q_w * F_w / 1\,000, \text{ m}^3/\text{day};$$

$$Q_w = q_w * F_w * n_w / 1\,000, \text{ m}^3/\text{ year};$$

where, $q_w$ – water consumption for watering (washing) 1 $\text{m}^2$ of sidewalks and driveways at one time, (according to ДБН В.2.5-64:2012), $q_w = 0{,}5 \text{ l/m}^2$,

$F_w$ – the total area of sidewalks and driveways that are watered (washed), $F_w = 10\,9000{,}0 \text{ m}^2$;

$n_w$ – frequency of watering (washing) green spaces per year, $n_w = 100$ times;

$$Q_w = 0{,}5 * 10\,9000{,}0 / 1\,000 = 54{,}5 \text{ m}^3/\text{day};$$

$$Q_w = 0{,}5 * 10\,9000{,}0 * 100 / 1\,000 = 5\,450{,}0 \text{ m}^3/\text{ year}.$$

**Calculation of volumes of surface runoff collected by the storm sewer system.**

The land plot for the construction and operation of the object of the planned activities is located in the south part of Izmail within streets Portova, the embankment of Luka Kapikrayan and Dunayska. The land allotment area – 19,7 ha from which Fsolidsurf. = 10,9 ha - asphalt-concrete surfacing, roofs of buildings and structures, Fcr.st.surf. = 1,6 ha – crushed stone, Flawn = 7,2 ha - lawns and green plantings.

According to point 5.8 of the Building code «Sewerage, external networks and buildings. Basic provisions of design», the initial data for calculating the capacity of surface runoff treatment facilities are accepted:

- the volume of the most polluted part of the surface runoff is 100% of the annual volume of rainwater (melted) wastewater, and 100% of the annual flow of irrigation and washing water collected from the territory of the River Port (terminal), as well as drainage from the fountain;
- the amount of precipitation according to observation data (Climatic characteristics, provided by the letter of the Danube Hydrometerogical Observatory dated April 22, 2022, ref. No. 9915-04-14/323 (appendix 15).

The average annual volume of surface runoff generated as a result of precipitation, snowmelt, and the implementation of irrigation and washing works is determined by the formula:

$$O_{year} = O_R + O_S + O_{IW}$$

where $O_{year}$ – average annual volume of surface runoff, $m^3$/year;

$O_R$ – average annual volume of rainwater, $m^3$/year;

$O_S$ – average annual volume of snowmelt water, $m^3$/year;

$O_{IW}$ – average annual volume of irrigation and washing water, $m^3$/year.

The average annual volume of rainwater, $O_R$, is determined by formula

$$O_R = 10 \cdot h_R \cdot \kappa_R \cdot F_R = 10 \cdot 238,6 \cdot 0,46 \cdot 19,7 = 21621,93 m^3/year,$$

where $h_R = 238,6$ mm – the amount of precipitation in the warm season (April-October);

$\kappa_R = (0,7 \cdot 10,9 + 0,1 \cdot 7,2 + 0,5 \cdot 1,6)/19,7 = 0,46$ the total coefficient of rainwater runoff, calculated as a weighted average value from individual values of the coefficient of runoff given in the table, for runoff areas with different types of surface (data from table. 1.5.2.7);

$F_r = 19,7$ ha – total area of rainwater runoff. Table 1.

| Type of surface or the area of runoff | The total coefficient of runoff, $\kappa_R$ |
|---|---|
| 1. Settlements with a population of more than 250 thousand people, as well as | |

| | |
|---|---|
| industrial enterprises and factories located on the territory of all settlements: | |
| roofs of buildings and structures, asphalt concrete coverings | 0,7 |
| Causeways with paving stone or crushed stone | 0,5 |
| Areas of the settlement without road surfaces, parks, boulevards | 0,25 |
| Lawns | 0,1 |
| areas of high-rise buildings | 0,45 |
| 2. Settlements with a population from 50 thousand to 250 thousand people | 0,45 |
| 3. Settlements with a population of up to 50 thousand people | 0,35 |

The average annual volume snowmelt water, $O_S$, is determined by formula

$$O_S = 10 \cdot h_S \cdot \kappa_S \cdot F_S = 10 \cdot 229{,}4 \cdot 0{,}60 \cdot 19{,}7 = 27115{,}08 \text{ m}^3\text{/year},$$

where $h_S = 229{,}4$ mm - the amount of precipitation in the cold season (November-March);

$\kappa_S = 0{,}6$ - total coefficient of snow water flow, taking into account snow removal and water losses due to partial absorption by water-permeable surfaces during the thaw period;

$F_S = 19{,}7$ ha - total area of snow water runoff from the territory of enterprise.

The average annual volume of irrigation and washing water, $O_{IW}$ is determined by formula:

$$O_{IW} = 10 \cdot m \cdot p \cdot F_{IW} \cdot \kappa_{IW} + V_F \cdot \kappa_F = 10 \cdot 0{,}5 \cdot 100 \cdot 10{,}9 \cdot 0{,}5 + 14 \cdot 10 = 2865 \text{ m}^3\text{/year}.$$

where $m = 0{,}5$ l/m$^2$- the amount of water required for washing per 1 m$^2$ of driveways and sidewalks at one time, taken according to the Building code B.2.5-64:2012;

$p = 100$ times per year - average number of irrigation and washing operations per year;

$F_{IW} = 109000$m$^2$- the area of hard surfaces on which washing is carried out;

$\kappa_{IW} = 0{,}5$ – coefficient of runoff for the irrigation and washing water;

$V_F$=14 m$^3$ – the volume of water in fountain;

$K_F$= 10 times per year – the number of water changes in a fountain per year.

Thus, the average annual volume of runoff collected by the storm sewer system during precipitation, snowmelt, irrigation and washing operations, and from fountain is:

$$O_{year} = 21621.93 + 27115.08 + 2865 = 51602.01 \text{ m}^3\text{/year}.$$

**Calculation of flow of rainwater runoff, selection of equipment for local treatment facilities.**

Calculation was made according to the Building code B.2.5-75:2013 «Sewerage,

external networks and buildings. Basic provisions of design».

Surface runoff enters the flow-through local treatment facilities in two separate streams: from the territory of the main production site (17.13 ha) - through the gravity network of storm sewers to the local treatment facilities with subsequent accumulation for irrigation and washing works, and the excess is discharged into the Danube and from the territory of the parking lots (0.97 ha) - through the gravity network of storm sewers to local treatment facilities with further accumulation for irrigation and washing works.

**Results of calculation (main area)**

The estimated flow of the rainwater runoff from the territory of main production area is:

$$g = \frac{z_{mid} \cdot A^{1,2} \cdot F}{t_r^{1,2n-0,1}} \cdot \eta \cdot m \text{ ; l/s.}$$

where $z_{mid}$ – the average value of the coverage coefficient characterizing the surface of the runoff basin,

$F$ = 17,13 ha – estimated runoff area, of which 9.93 ha are asphalt concrete surfaces, roofs of buildings and structures (without parking lots), 7.2 ha are lawns and green spaces;

$n$ = 0,75 – according to table. A1 of the Building code B.2.5-75:2013;

$t_r$ – estimated duration of rain runoff flow on the surface and pipes, approximately, min;

$\acute{\eta}$ = 1 – the coefficient that takes into account the undulation of rainfall on the drainage area, according to the table. A5 of the Building code B.2.5-75:2013

$m$ – the coefficient that takes into account the duration of the rain is taken when the duration of the rain is from 2 min to 10 min is determined by the formula $m = 0.457 \cdot t_r^{0.34}$.

$$A = q_{20} \cdot 20^n \cdot (1 + \frac{\lg P}{\lg m_r})^{\gamma}$$

where $q_{20}$ = 103 l/s per 1 ha – intensity of rain lasting 20 minutes, for the period of a single exceedance of P = 1 year;

$m_r$ – average amount of rain per year, $m_r$ = 60 (accepted according to table. A1 of the Building code B.2.5-75:2013);

$P$ – the period of one-time exceeding of the estimated rain intensity, $P$ = 1,0;

$\gamma = 1{,}54$ - indicator of degree (accepted according to table. A1 of the Building code B.2.5-75:2013);

$$A = 103 \cdot 20^{0.75} \cdot (1 + \frac{\lg 1{,}0}{\lg 60})^{1,54} = 974.07$$

During calculation of $z_{mid}$ indicator the following data was used from the tables A. 6, A. 7 of the Building code B.2.5-75:2013:

Table 1.5.2.8

| Surface | Area | $z_{mid}$ |
|---|---|---|
| Waterproof surfaces (roofs of buildings and structures, asphalt concrete road surfaces, etc.) at A=974,07 | 9,93 | 0,244 |
| Lawns | 7,2 | 0,038 |

$$z_{mid} = (9{,}93 \cdot 0{,}244 + 7{,}20 \cdot 0{,}038)/17{,}13 = 0{,}157$$

The estimated duration of rain runoff flow on the surface and pipes is determined by formula:

$$t_r = t_{con} + t_{can} + t_p$$

where $t_{con}$ = 3 min – time of surface concentration of rain runoff;

$t_{can}$ – the time of flow through the street rain gutters to the catch basin;

$$t_{can} = 0{,}021 \cdot \sum (l_{can} \div V_{can}) = 0{,}021 \cdot (0 \div 0) = 0 \,\text{min}.$$

$l_{can}$ = 0 m – the length of the gutters` areas to the catch basins;

$V_{can}$ = 0 – estimated flow rate at the site;

$t_p$ – duration of flow through pipelines to the calculated section.

$$t_p = 0{,}017 \cdot \sum (l_{mp} \div V_{mp}) = 0{,}017 \cdot (430 \div 1.15) = 6.36 \,\text{min}.$$

$l_p$ = 430 м – the length of the gutters` areas to the catch basins;

$V_p$ = 1,15– estimated flow rate at the site;

$$t_r = 3 + 0 + 6.36 = 9.36 \,\text{min}.$$

$$\text{m} = 0.457 \cdot 9.36^{0.34} = 0.977$$

$$g = \frac{0{,}157 \cdot 974.07^{1,2} \cdot 17.13}{9.36^{1,2 \cdot 0,75 - 0,1}} \cdot 1 \cdot 0.977 = 950.67 \text{ l/s};$$

The maximum estimated flow of rainwater in a separate sewerage system which is going to the treatment is determined by formula:

$$g_m = g \cdot k_1 \cdot k_2$$

where $k_1$, $k_2$ – coefficients that take into account the change in flow parameters, according to the tables 3, 4 of the Building code B.2.5-75:2013;

$$g_m = 950.67 \cdot 0{,}15 \cdot 1{,}0 = 142{,}6 \text{ l/s}$$

Taking into account that to the local treatment facilities of storm sewer the rainwater runoff is going with the maximum estimated flow of 142.6 l/s, the standard treatment will be provided by the local treatment facilities of storm sewer with a capacity 150 l/s which include: separator of oil products and sorption filter.

**Results of calculation (parking area)**

The estimated flow of the rainwater runoff from the territory of main production area is:

$$g = \frac{z_{mid} \cdot A^{1,2} \cdot F}{t_r^{1,2n-0,1}} \cdot \eta \cdot m \text{; l/s.}$$

where $z_{mid}$ – the average value of the coverage coefficient characterizing the surface of the runoff basin,

$F$ = 0.97 – ha estimated runoff area – asphalt concrete surfaces;

$n$ = 0,70 – according to table. A1 of the Building code B.2.5-75:2013;

$t_r$ – estimated duration of rain runoff flow on the surface and pipes, approximately, min;

$\acute{\eta}$ = 1 – the coefficient that takes into account the undulation of rainfall on the drainage area, according to the table. A5 of the Building code B.2.5-75:2013

$m$ – the coefficient that takes into account the duration of the rain is taken when the duration of the rain is from 2 min to 10 min is determined by the formula $m = 0.457 \cdot t_r^{0.34}$.

$$A = q_{20} \cdot 20^n \cdot (1 + \frac{\lg P}{\lg m_r})^\gamma$$

where $q_{20}$ = 103 l/s per 1 ha – intensity of rain lasting 20 minutes, for the period of a single exceedance of P = 1 year;

$m_r$ – average amount of rain per year, $m_r$ = 60 (accepted according to table. A1 of the Building code B.2.5-75:2013);

$P$ – the period of one-time exceeding of the estimated rain intensity, $P$ = 1,0;

$\gamma = 1{,}54$ - indicator of degree (accepted according to table. A1 of the Building code B.2.5-75:2013);

$$A = 103 \cdot 20^{0.75} \cdot (1 + \frac{\lg 1{,}0}{\lg 60})^{1,54} = 974.07$$

During calculation of $z_{mid}$ indicator the following data was used from the tables A. 6, A. 7 of the Building code B.2.5-75:2013:

Table 1.5.2.8

| Surface | area | $z_{mid}$ |
|---|---|---|
| Waterproof surfaces (roofs of buildings and structures, asphalt concrete road surfaces, etc.) at A=974,07 | 0.97 | 0,244 |

$$z_{mid} = 0.97 \cdot 0{,}244 \,/ 0.97 = 0{,}244$$

The estimated duration of rain runoff flow on the surface and pipes is determined by formula:

$$t_r = t_{con} + t_{can} + t_p$$

where $t_{con} = 3$ min – time of surface concentration of rain runoff;

$t_{can}$ – the time of flow through the street rain gutters to the catch basin;

$$t_{can} = 0{,}021 \cdot \sum (l_{can} \div V_{can}) = 0{,}021 \cdot (0 \div 0) = 0 \,\text{min}$$

$l_{can} = 0$ m – the length of the gutters` areas to the catch basins;

$V_{can} = 0$ – estimated flow rate at the site;

$t_p$ – duration of flow through pipelines to the calculated section.

$$t_p = 0{,}017 \cdot \sum (l_{mp} \div V_{mp}) = 0{,}017 \cdot (300 \div 1.15) = 4.43 \,\text{min.}$$

$l_p = 330$ m – the length of the gutters` areas to the catch basin;

$V_p = 1{,}15$– estimated flow rate at the site;

$$t_r = 3 + 0 + 4.43 = 7.43 \,\text{min.}$$

$$\text{m} = 0.457 \cdot 7.43^{0.34} = 0.903$$

$$g = \frac{0{,}244 \cdot 974.07^{1,2} \cdot 0.97}{4.43^{1,2 \cdot 0,75 - 0,1}} \cdot 1 \cdot 0.903 = 158.44 \text{ l/s;}$$

The maximum estimated flow of rainwater in a separate sewerage system which is going to the treatment is determined by formula:

$$g_m = g \cdot k_1 \cdot k_2$$

where $k_1$, $k_2$ – coefficients that take into account the change in flow parameters, according to the tables 3, 4 of the Building code B.2.5-75:2013;

$$g_m = 158.44 \cdot 0{,}15 \cdot 1{,}0 = 23.77 \text{ l/s}$$

Taking into account that to the local treatment facilities of storm sewer the rainwater runoff is going with the maximum estimated flow of 23.77 l/s, the standard treatment will be provided by the local treatment facilities of storm sewer with a capacity 25 l/s which include: separator of oil products and sorption filter.

**Calculation of pollutant emissions during the operation of construction equipment on the site**

When performing construction works on the construction site, a negative impact on the atmospheric air is expected due to emissions of pollutants from the operation of the engines of automobile construction equipment (trucks, cranes, tractors, bulldozers, rollers, excavators, car lifts, etc.)

The amounts of emissions of pollutants into the air are determined by the calculation and balance method in accordance with the "Methodology for the calculation of emissions of pollutants and greenhouse gases into the air from vehicles", approved by by order of the State Statistics Committee of Ukraine No. 452 of 13.11.08

Determination of the gross emission of pollutants into the atmospheric air during the period of work from motor vehicles is carried out according to the formula:

$$B_{ij} = \frac{M_i \cdot \grave{A}_{ij}}{1000}, \text{ t/year}$$

where, $M_i$ – the amount of fuel consumed by i-th transport, t;

$A_{ij}$ – averaged specific emissions of the j-th pollutant and greenhouse gas by the i-th type of transport.

The maximum one-time emissions of pollutants from the operation of automotive engines are determined by the formula:

$$Ð_{ij} = \frac{M_i \cdot \grave{A}_{ij}}{3{,}6 \cdot \grave{O}_{ð}}, \text{ g/sec.}$$

where, $T_p$ – time of operation of road transport, h/year.

The initial data are shown in the tables.

| Name of the emission source | Type of fuel | The amount of fuel consumed,t | Machine operation time, machine hours |
|---|---|---|---|
| Building machinery | Gasoline | 34,46 | 7760,90 |
| | Diesel | 319,44 | 40005,97 |

| Pollutant | Building machinery | |
|---|---|---|
| | Gasoline | Diesel |
| Carbon monoxide | 197,8 | 36,2 |
| Nitrogen oxides in terms of nitrogen dioxide (nitrogen dioxide) | 21,6 | 31,4 |
| Sulfur dioxide | 1,0 | 4,3 |
| Non-methane volatile organic compounds | 28,5 | 8,16 |
| Methane | 0,64 | 0,25 |
| Nitrogen (1) oxide (N2O) | 0,035 | 0,12 |
| Ammonia | 0,004 | - |

| | | |
|---|---|---|
| Substances in the form of suspended solid particles (soot) | 0,0 | 3,85 |
| Carbon dioxide | 3183 | 3138 |
| Benz(a)pyrene | 0,03 | 0,03 |

The results of calculations are summarized in table:

| Pollutant | Gasoline | | Diesel | |
|---|---|---|---|---|
| | g/sec | t/year | g/sec | t/year |
| Carbon monoxide | 0,243965 | 6,81619 | 0,077931 | 11,22381 |
| Nitrogen oxides in terms of nitrogen dioxide (nitrogen dioxide) | 0,026641 | 0,74434 | 0,067598 | 9,73557 |
| Sulfur dioxide | 0,001233 | 0,03446 | 0,009257 | 1,33322 |
| Non-methane volatile organic compounds | 0,035152 | 0,98211 | 0,017567 | 2,53001 |
| Methane | 0,000789 | 0,02205 | 0,000538 | 0,07751 |
| Nitrogen (1) oxide (N2O) | 0,000043 | 0,00121 | 0,000258 | 0,03721 |
| Ammonia | 0,000005 | 0,00014 | 0,000000 | 0,00000 |
| Substances in the form of suspended solid particles (soot) | 0,000000 | 0,00000 | 0,008288 | 1,19369 |
| Carbon dioxide | 3,925883 | 109,68618 | 6,755498 | 972,93690 |
| Benz(a)pyrene | 0,000037 | 0,00103 | 0,000065 | 0,00930 |

Gross emission from the operation of all building machinery:

| Pollutant | |
|---|---|
| | t/year |
| Carbon monoxide | 18,04000 |
| Nitrogen oxides in terms of nitrogen dioxide (nitrogen dioxide) | 10,47991 |
| Sulfur dioxide | 1,36768 |
| Non-methane volatile organic compounds | 3,51212 |
| Methane | 0,09956 |
| Nitrogen (1) oxide (N2O) | 0,03842 |
| Ammonia | 0,00014 |
| Substances in the form of suspended solid particles (soot) | 1,19369 |
| Carbon dioxide | 1082,62308 |
| Benz(a)pyrene | 0,01033 |

At the construction site, the following equipment is simultaneously working: a truck (gasoline – 0.50 l/mash-hour), an excavator (diesel – 3.5 l/ machine hours), a crane (diesel – 4.7 l/ machine hours).

Then the maximum one-time emissions of pollutants from the operation of automobile engines are determined by the formula:

$$Ð_{ij} = \frac{N_i \cdot \rho \cdot À_{ij}}{3600}, \text{ g/sec}$$

where, $N_i$ – fuel consumption by the i-th machinery l/ machine hours;

$\rho$ – density of the fuel (gasoline – 0,74 kg/l; diesel – 0,85 kg/l).

The maximum one-time emissions taken into account in the dispersion calculation:

| Pollutant | g/sec |
|---|---|
| Carbon monoxide | 0,090417 |
| Nitrogen oxides in terms of nitrogen dioxide (nitrogen dioxide) | 0,063014 |
| Sulfur dioxide | 0,008428 |
| Non-methane volatile organic compounds | 0,018728 |
| Methane | 0,000550 |
| Nitrogen (1) oxide (N2O) | 0,000236 |
| Ammonia | 4,11E-07 |
| Substances in the form of suspended solid particles (soot) | 0,007454 |
| Carbon dioxide | 6,402658 |
| Benz(a)pyrene | 0,000061 |

## Calculation of hydrocarbon emissions when using materials that include bitumen

The calculation was carried out in accordance with the handbook "Road Construction", Moscow, Transport, 1980.

In the production of insulation works, materials containing bitumen are used (oil construction bitumen, oil roofing bitumen, road oil bitumen, bitumen-rubber roofing mastic, shale sealing mastic).

The amount of harmful substances (hydrocarbons) released into the atmosphere when using compounds that include bitumen is 0.2% of the amount of material used.

Gross emissions of non-methane volatile organic compounds (hydrocarbons) (t/year) are determined by the formula:

$$\mathbf{M^{gross} = 0,002 * B,}$$

where B – the amount of bitumen-containing materials used, t.

Amount of insulating materials containing bitumen - **B = 27,4 t**.

$$\mathbf{M^{gross}} = 0,002 * 32,50 = \mathbf{0,05480\ t.}$$

## Calculation of gross emissions of pollutants during the operation of diesel generators

The calculations were made on the basis of the methodology "Combustion of organic fuel" of "Digest of emission indicators (specific emissions) of pollutants into the atmospheric air by various industries", Donetsk, 2004, using the methodology "Emissions of pollutants into the atmosphere from power plants", Industry Guidance Document 43.02.305 - 2002, Kyiv, Ministry of Ecology and Natural Resources of Ukraine, 2002.

**Output data for calculation:**

Diesel generator G-POWER KIPOR KDE 6500 T

**B** = 2.50 t/h; 1.16 kg/h; 0.322 g/sec - fuel consumption.

$A^r$ = 0,01 % - ash content of fuel;

$S^r$ = 0.2 % - sulfur content in fuel;

$Q^r$ = 42.62 MJ/kg - lower heat of combustion of natural fuel;

Gross emission of *j-th* pollutant $E_j$, (t), which enters the atmosphere with the flue gases of the power plant over a period of time $P$, is defined as the sum of the gross emissions of this substance during the burning of various types of fuel (including during their simultaneous joint burning):

$$E_j = \sum_i E_{ji} = 10^{-6} \sum_i k_{ji} B_i \left(Q_i^r\right)_i, \qquad (1)$$

where $E_{ji}$ gross emission of *j-th* pollutant during combustion of *i-th* fuel for the period of time $P$, t;

$k_{ji}$ – emission indicator of *j-th* pollutant for *i-th* fuel, g/GJ;

$B_i$ – consumption of *i-th* fuel for the period of time $P$, t;

$(Q^r{}_i)_i$ – lower working heat of combustion of the *i-th* natural fuel, MJ/kg.

## 1. Calculation of nitrogen oxide emissions in terms of nitrogen dioxide (nitrogen oxide) (t):

The generalized index of nitrogen oxide emissions in terms of nitrogen dioxide (nitrogen oxide) is calculated using the formula:

$$k_{NOx} = (k_{NOx})_0 f_n (1 - \eta_I)(1 - \eta_{II}\beta), \quad \text{g/GJ};$$

where $(k_{NOx})_0$ = 1000.0 g/GJ – indicator of nitrogen oxide emissions in terms of nitrogen dioxide (nitrogen oxide) without taking into account emission reduction measures (Table D. 8 of Appendix D);

$f_n$ – degree of emission reduction of $NO_x$ when working at low load, is determined by the formula: $f_n = (Q_a/Q_n)^z$,

where $Q_a$ – the actual thermal capacity of the power plant;

$Q_n$ – nominal thermal power of the power plant;

$z$ = 1.25 – an empirical coefficient that depends on the type of power plant, its capacity, type of fuel, etc. (Table D. 9 of Appendix D);

$\eta_I$ = 0 – the effectiveness of primary (regime and technological) emission reduction measures (Table D. 10 of Appendix D);

$\eta_{II}$ = 0 – efficiency of the gas treatment plant (absent);

β = 0 – coefficient of operation of the gas treatment plant.

$$k_{NOx} = 1000 * 0.81^{1.25} * (1 - 0) = 771.40 \text{ g/GJ}$$

Then, according to formula (1), the gross emission of nitrogen oxide in terms of nitrogen dioxide (nitrogen oxide) will be:

$$E_{NOx} = 10^{-6} k_{NOx} Q^r B = 10^{-6} * 771.40 * 42.62 * 2.5 = 0.08219 \text{ t}$$

Maximum one-time release:

$$E_{NOx} = 10^{-6} k_{NOx} Q^r B = 10^{-6} * 771.40 * 42.62 * 0.322 = 0.010586 \text{ g/s}.$$

## 2. Calculation of carbon oxide emissions (t):

The carbon oxide emission index $k_{CO}$ is determined by the formula:

$$k_{CO} = (k_{CO})_0 * (1 - q_4 / 100), \quad \text{g/GJ}$$

where $(k_{CO})_0$ = 40 g/GJ, generalized emission index of CO in the absence of mechanical fuel combustion incompleteness (table D. 19, appendix D);

$q_4$ = 0,5 %, fuel heat loss due to mechanical incomplete combustion of fuel in %. depending on the characteristics of furnaces (Table D. 4, Appendix D; adopted by fuel oil).

$$k_{CO} = 40 * (1 - 0.5/ 100) = 39.8 \text{ g/GJ};$$

According to formula (1), the gross carbon dioxide emission of $E_{CO}$ will be:

$E_{CO}$ = $10^{-6}$ $k_{CO}$ $Q^r$ B = $10^{-6}$ * 39.8 * 42,62 * 2.5 = 0.00424 t.

Maximum one-time release:

$E_{CO}$ = $10^{-6}$ $k_{CO}$ $Q^r$ B = $10^{-6}$ * 39.8 * 42.62 * 0.322 = 0.000546 g/s.

### 3. Calculation of sulfur dioxide emissions (t):

The sulfur dioxide emission indicator is calculated using the formula:

$$k_{SO_2} = \frac{10^6}{Q_i^r} \cdot \frac{2S^r}{100}(1-\eta_I)(1-\eta_{II}\beta), \text{ g/GJ}$$

where $S^r$ = 0,2 % – sulfur content in fuel per working mass;

$\eta_I$ = 0 – efficiency of sulfur binding by carbon black or sorbent;

$\eta_{II}$ = 0 – efficiency of cleaning flue gases from sulfur oxides;

$\beta$ = 0 – efficiency of work of the desulfurization plant (absent).

$$k_{SO2} = \frac{10^6}{42.62} \cdot \frac{2 \cdot 0.2}{100}(1-0) = 93.8527 \text{ g/GJ}$$

Therefore, according to formula (1), the gross emission will be:

$E_{SO2}$ = $10^{-6}$ $k_{SO2}$ $Q^r$ B = $10^{-6}$ * 93.8527 * 42.62 * 2.5 = 0.01000 t

Maximum one-time release:

$E_{SO2}$ = $10^{-6}$ $k_{SO2}$ $Q^r$ B = $10^{-6}$ * 93.8527 * 42.62 * 0.322 = 0.000546 g/s.

### 4. Calculation of emissions of substances in the form of suspended solid particles (soot) (t):

The indicator of emission of substances in the form of suspended solid particles (soot) is determined by the formula:

$$ksolid = \frac{10^6}{Q_i^r}\left(a_{rel}\frac{A^r}{100} + \frac{q_4}{100}\cdot\frac{Q_i^r}{Q_c}\right)(1-\eta_{ash}) + k_{solidS\cdot}, \quad \text{g/GJ}$$

where $\eta_{ash}$ = 0 – efficiency of cleaning flue gases from solid particles (no ash catcher);

$A^r$ = 0.01% – mass content of soot in fuel per operating weight;

$a_{rel}$ = 1,0 – part of the zone that is released in the form of fly ash, (Table D. 1, Appendix D; accepted for fuel oil);

$Q_c$ – heat of combustion of carbon to $CO_2$, which is 32.657 MJ/kg;

$q_4$= 0.5 - heat losses associated with mechanical incomplete combustion of fuel, % (accepted for fuel oil);

$k_{solid}$=0 – indicator of the emission of solid products of the interaction of the sorbent and sulfur oxides and solid particles of the sorbent, g/GJ.

There is no sulfur treatment plant, therefore there is no emission of solid particles of the sorbent and products of the interaction of the sorbent and sulfur oxides.

The indicator of the emission of substances in the form of suspended solid particles (soot):

$$ksolid = \frac{10^6}{42.62} \cdot \left(1.0\frac{0.01}{100} + \frac{0.5}{100} \cdot \frac{42.62}{32.657}\right)(1-0) = 155.4528 \text{ g/GJ}$$

The gross emission of substances in the form of suspended solid particles (soot):

$$E_{solid} = 10^{-6}\, k_{\text{solid}}\, Q^r\, B = 10^{-6} * 155.4528 * 42.62 * 2.5 = 0.01656 \text{ t}$$

Maximum one-time release:

$$E_{solid} = 10^{-6}\, k_{solid}\, Q^r\, B = 10^{-6} * 155.4528 * 42.62 * 0.322 = 0.002133 \text{ g/s}.$$

**5. Calculation of emissions of non-methane volatile organic compounds (hydrocarbons) (t):**

Generalized indicator of hydrocarbon emissions $k_{CH}$ =50.0 g/GJ (table D. 23, appendix D; adopted for fuel oil).

The gross emission of non-methane volatile organic compounds (hydrocarbons):

$$E_{CH} = 10^{-6}\, k_{CH}\, Q^r\, B = 10^{-6} * 50 * 4.62 * 2.5 = 0.00533 \text{ t}$$

Maximum one-time release:

$$E_{CH} = 10^{-6}\, k_{CH}\, Q^r\, B = 10^{-6} * 50 * 42.62 * 0.322 = 0.000686 \text{ g/s}.$$

**6. Greenhouse gases**

**Calculation of carbon dioxide emissions (t):**

The generalized indicator of emission $k_{CO2}$ =20200 g/GJ (table D. 20-a, appendix D).

The carbon dioxide emission indicator is determined by the formula:

$$k_{CO2} = 3.67 * k_C * \xi_c = 3.67 \cdot 20200 \cdot 0.99 = 73392.66 \text{ g/GJ}$$

According to the formula (1), the gross emission of carbon dioxide $E_{CO2}$ will be:

$$E_{CO2} = 10^{-6}\, k_{CO2}\, Q^r\, B = 10^{-6} * 73392.66 * 42.62 * 2.5 = 7.81999 \text{ t}$$

Maximum one-time release:

$$E_{CO2} = 10^{-6}\, k_{CO2}\, Q^r\, B = 10^{-6} * 73392.66 * 42.62 * 0.322 = 1.007205 \text{ g/s}.$$

**Calculation of emissions of nitrogen (1) oxide ($N_2O$) (nitrogen oxide) (t):**

According to the formula (1), the gross emission of nitrogen (1) oxide ($N_2O$) (nitrogen oxide) $E_{N2O}$ will be:

$$E_{N2O} = 10^{-6}\, k_{N2O}\, Q^r\, B = 10^{-6} * 2.5 * 42.62 * 2.5 = 0.00027 \text{ t}$$

Maximum one-time release:

$$E_{N2O} = 10^{-6}\ k_{N2O}\ Q^r\ B = 10^{-6} * 2.5 * 42.62 * 0.322 = 0.000034 \text{ g/s.}$$

**Calculation of methane emissions (t):**

According to the formula (1), the gross methane emission of $E_{CH4}$ will be:

$$E_{CH4} = 10^{-6}\ k_{CH4}\ Q^r\ B = 10^{-6} * 3.0 * 42.62 * 2.5 = 0.00032 \text{ t}$$

Maximum one-time release:

$$E_{CH4} = 10^{-6}\ k_{CH4}\ Q^r\ B = 10^{-6} * 3.0 * 42.62 * 0.322 = 0.000041 \text{ g/s.}$$

The calculation is similar to the previous one.

**Output data for calculation:**

Diesel generator Aksa of type AJD 132 kWA (2 pcs.)

**B** = 23.16 t/h; 21.45 kg/h; 5,96 g/sec - fuel consumption for one diesel generator.

**1. Calculation of nitrogen oxide emissions in terms of nitrogen dioxide (nitrogen oxide) (t):**

The generalized emission indicator of the gross emission of nitrogen oxide in terms of nitrogen dioxide (nitrogen oxide) is calculated according to the formula:

$$k_{NOx} = (k_{NOx})_0 f_n (1-\eta_I)(1-\eta_{II}\beta), \text{ g/GJ;}$$

where $(k_{NOx})_0$ = 1000.0 g/GJ – indicator of nitrogen oxide emissions in terms of nitrogen dioxide (nitrogen oxide) without taking into account emission reduction measures (Table D. 8 of Appendix D);

$f_n$ – degree of emission reduction of $NO_X$ when working at a low load, determined by the formula: $f_n = (Q_a/Q_n)^z$,

where $Q_a$ – the actual thermal capacity of the power plant;

$Q_n$ – nominal thermal power of the power plant;

$z$ = 1.25 – an empirical coefficient that depends on the type of power plant, its capacity, type of fuel, etc., (Table D. 9 of Appendix D);

$\eta_I$ = 0 – the effectiveness of primary (regime and technological) emission reduction measures (Table D. 10 of Appendix D);

$\eta_{II}$ = 0 – efficiency of the gas treatment plant (absent);

$\beta$ = 0 – coefficient of operation of the gas treatment plant.

$$k_{NOx} = 1000 * 0.81^{1,25} * (1 - 0) = 771.40 \text{ g/GJ}$$

Then, according to the formula (1), the gross emission of nitrogen oxide in terms of nitrogen dioxide (nitrogen oxide) will be:

$$E_{NOx} = 10^{-6} k_{NOx} Q^r B = 10^{-6} * 771.40 * 42.62 * 23.16 = 0.76143 \text{ t}$$

Maximum one-time release:

$$E_{NOx} = 10^{-6} k_{NOx} Q^r B = 10^{-6} * 771.40 * 42.62 * 5.96 = 0.195947 \text{ g/s.}$$

**2. Calculation of carbon oxide emissions (t):**

The carbon oxide emission indicator $k_{CO}$ is determined by the formula:

$$k_{CO} = (k_{CO})_0 * (1 - q_4 / 100), \quad \text{g/GJ}$$

where $(k_{CO})_0$ = 40 g/GJ, the generalized emission indicator of CO in the absence of mechanical fuel combustion incompleteness (table D. 19, appendix D);

$q_4$ = 0.5 %, fuel heat loss due to mechanical incomplete combustion of fuel in % depending on the characteristics of furnaces (Table D. 4, Appendix D; adopted by fuel oil).

$$k_{CO} = 40 * (1 - 0.5/ 100) = 39.8 \text{ g/GJ};$$

According to the formula (1), the gross emission of carbon monoxide $E_{CO}$ will be:

$$E_{CO} = 10^{-6} k_{CO} Q^r B = 10^{-6} * 39.8 * 42.62 * 23.16 = 0.03929 \text{ t}$$

Maximum one-time release:

$$E_{CO} = 10^{-6} k_{CO} Q^r B = 10^{-6} * 39.8 * 42.62 * 5.96 = 0.101098 \text{ g/s}.$$

### 3. Calculation of sulfur dioxide emissions (t):

The sulfur dioxide emission indicator is calculated using the formula:

$$k_{SO_2} = \frac{10^6}{Q_i^r} \cdot \frac{2S^r}{100}(1 - \eta_I)(1 - \eta_{II}\beta), \text{ g/GJ};$$

where $S^r$ = 0.2 % – sulfur content in fuel per working mass;

$\eta_I$ = 0 – efficiency of sulfur binding by carbon black or sorbent;

$\eta_{II}$ = 0 – efficiency of cleaning flue gases from sulfur oxides;

$\beta$ = 0 – efficiency of the desulfurization plant (absent).

$$k_{SO2} = \frac{10^6}{42.62} \cdot \frac{2 \cdot 0.2}{100}(1 - 0) = 93.8527 \text{ g/GJ}$$

Thus, according to the formula (1) the gross emission will be:

$$E_{SO2} = 10^{-6} k_{SO2} Q^r B = 10^{-6} * 93.8527 * 42.62 * 23.16 = 0.09264 \text{ t}$$

Maximum one-time release:

$$E_{SO2} = 10^{-6} k_{SO2} Q^r B = 10^{-6} * 93.8527 * 42.62 * 5.96 = 0.023840 \text{ g/s}.$$

### 4. Calculation of emissions of substances in the form of suspended solid particles (soot) (t):

The indicator of emission of substances in the form of suspended solid particles (soot) is determined by the formula:

$$ksolid = \frac{10^6}{Q_i^r}\left(a_{rel}\frac{A^r}{100} + \frac{q_4}{100} \cdot \frac{Q_i^r}{Q_c}\right)(1 - \eta_{cl}) + k_{solidS}, \quad \text{g/GJ},$$

where $\eta_{cl}$ = 0 – efficiency of cleaning flue gases from solid particles (no ash catcher);

$A^r$ = 0.01% – mass content of soot in fuel per operating weight;

$a_{rel}$ = 1.0 – a part of the zone that is released in the form of fly ash (Table D. 1, Appendix D; taken for fuel oil);

$Q_c$ – heat of combustion of carbon to $CO_2$, which is 32.657MJ/kg;

$q_4$= 0.5 - heat losses connected with mechanical incomplete combustion of fuel, % (accepted for fuel oil);

$k_{solid}$=0 – indicator of the emission of solid products of the interaction of the sorbent with sulfur oxides and solid particles of the sorbent, g/GJ.

There is no sulfur treatment plant, therefore there is no emission of solid particles of the sorbent and products of the interaction of the sorbent and sulfur oxides.

The indicator of the emission of substances in the form of suspended solid particles (soot):

$$ksolid = \frac{10^6}{42.62} \cdot \left(1.0\frac{0.01}{100} + \frac{0.5}{100} \cdot \frac{42.62}{32.657}\right)(1-0) = 155.4528 \text{ g/GJ}$$

The gross emission of substances in the form of suspended solid particles (soot):

$$E_{solid} = 10^{-6}\, k_{\text{solid}}\, Q^r\, B = 10^{-6} * 155.4528 * 42.62 * 23.16 = 0.15344 \text{ t}$$

Maximum one-time release:

$$E_{solid} = 10^{-6}\, k_{\text{solid}}\, Q^r\, B = 10^{-6} * 155.4528 * 42.62 * 5.96 = 0.394874 \text{ g/s.}$$

**5. Calculation of emissions of non-methane volatile organic compounds (hydrocarbons) (t):**

Generalized indicator of hydrocarbon emissions $k_{CH}$ =50.0 g/ (table D. 23, appendix D; adopted for fuel oil).

Gross emission of non-methane volatile organic compounds (hydrocarbons):

$$E_{CH} = 10^{-6}\, k_{CH}\, Q^r\, B = 10^{-6} * 50 * 42.62 * 23.16 = 0.04935 \text{ t}$$

Maximum one-time release:

$$E_{CH} = 10^{-6}\, k_{CH}\, Q^r\, B = 10^{-6} * 50 * 42.62 * 5.96 = 0.012701 \text{ g/s}$$

**6. Greenhouse gases**

**Calculation of carbon dioxide emissions (t):**

Generalized emission indicator of $k_{CO2}$ =20200 g/GJ (table D. 20-a, appendix D).

The carbon dioxide emission indicator is determined by the formula:

$$k_{CO_2} = 3{,}67 * k_C * \xi_c = 3{,}67 \cdot 20200 \cdot 0{,}99 = 73392{,}66 \text{ g/J}$$

According to the formula (1) the gross emission of carbon dioxide $E_{CO2}$ will be:

$$E_{CO2} = 10^{-6}\, k_{CO2}\, Q^r\, B = 10^{-6} * 73392.66 * 42.62 * 23.16 = 72.44437 \text{ t}$$

Maximum one-time release:

$$E_{CO2} = 10^{-6}\, k_{CO2}\, Q^r\, B = 10^{-6} * 73392.66 * 42.62 * 5.96 = 18.642851 \text{ g/s.}$$

**Calculation of emissions of nitrogen (1) oxide ($N_2O$) (nitrous oxide) (t):**

According to the formula (1) nitrogen (1) oxide ($N_2O$) $E_{N2O}$ will be:

$$E_{N2O} = 10^{-6} k_{N2O} Q^r B = 10^{-6} * 2.5 * 42.62 * 23.16 = 0.00247 \text{ t}$$

Maximum one-time release:

$$E_{N2O} = 10^{-6} k_{N2O} Q^r B = 10^{-6} * 2.5 * 42.62 * 5.96 = 0.000635 \text{ g/s.}$$

**Calculation of methane emissions (t):**

According to the formula (1) the gross methane emission $E_{CH4}$ will be:

$$E_{CH4} = 10^{-6} k_{CH4} Q^r B = 10^{-6} * 3.0 * 42.62 * 23.16 = 0.00296 \text{ t}$$

Maximum one-time release:

$$E_{CH4} = 10^{-6} k_{CH4} Q^r B = 10^{-6} * 3.0 * 42.62 * 5.96 = 0.000762 \text{ g/s.}$$

## Calculation of emissions of painting pollutants

The calculation was made according to the "Compendium of emission indicators (specific emissions) of pollutants into the atmospheric air by various industries", Donetsk, 2004.

Painting of surfaces is carried out by the pneumatic spraying method when using:

- enamels PF-115 (consumption – 1150 kg);
- primers GF-021 (consumption – 1850 kg);
- white spirit solvent (consumption – 45 kg).

The amount of solvent vapors released during painting and drying by pneumatic spraying is determined by the formula:

$$R_{gross} = B * П * 10^{-3}, \text{ t/gross}$$

where, **П** – the content of the solvent in the coloring material, taking into account the amount of solvent used to bring the paint to the working viscosity, %;

**$R_{gross}$** – the amount of i-th organic solvent vapor released into the atmosphere, t/gross;

**B** – paint consumption, t/gross.

The amount of paint aerosol is calculated according to the formula:

$$P_{aer} = 5,5 \cdot 10^{-5} \cdot Q \cdot p \cdot T \cdot 0,0036$$

The amount of solvent vapors released during painting and drying by pneumatic spraying is determined by the formula:

$$P_{paint} = 2,2 \cdot 10^{-6} \cdot Q \cdot p \cdot П \cdot A$$

$$P_{dry} = 1,7 \cdot 10^{-6} \cdot Q \cdot p \cdot П \cdot (1 - A)$$

$$P_{year} = B \cdot П / 100$$

where:

**$P_{paint}$, $P_{dry}$** - accordingly, the amount of vapors of the i-th organic solvent released into the atmosphere during painting and drying, g/sec;

**$P_{year}$** - the amount of i-th organic solvent vapor released into the atmosphere, t/year;

**У** - paint consumption, t/year;

**Q** - productivity of painting equipment; Q = 10,7 $m^2$/hour;

**p** – the specific consumption rate of the coloring material on the area;

- application of PF-115 enamel, p = 150 g/m2;
- application of GF-021 primer, p = 100 g/m2.

**T** – the time of applying the paint coating, hour:

- 1153 h - application of PF-115 enamel;
- 1075 h - application of GF-021 prime.

The results of calculations are presented in tabular form:

**Painting:**

| **Composition of volatile substances** | PF **-115** **P,%** | **P,** g/sec | **P, t** |
|---|---|---|---|
| Maximum content, % including: | 46,31 | | |
| Xylene | 22,5 | 0,077576 | 0,41633 |
| Non-methane volatile organic compounds (white spirit) | 22,5 | 0,676670 | 0,46124 |
| Substances in the form of suspended solid particles (paint aerosol) | – | 0,090000 | 0,60221 |

**Primer:**

| **Composition of volatile substances** | **GF-021** **P,%** | **P,** g/sec | **P, t** |
|---|---|---|---|
| Maximum content, % including: | 46 | | |
| Xylene | 43,3 | 0,101928 | 0,49795 |
| Non-methane volatile organic compounds (white spirit) | 2,7 | 0,068325 | 0,03105 |
| Substances in the form of suspended solid particles (paint aerosol) | – | 0,058850 | 0,24364 |

The final amounts of emissions are given in tabular form:

| **Substance** | **P,** g/sec | **Pgross; t** |
|---|---|---|
| Xylene | 0,101928 | 0,91428 |
| White spirit | 0,676670 | 0,49229 |
| Aerosol paint | 0,090000 | 0,84585 |

## Calculation of emissions of pollutants from posts of manual electric welding of metal

The calculations were made on the basis of the "Compendium of emission indicators (specific emissions) of pollutants into the atmospheric air by various industries", UkrNTSTE, Donetsk, 2004.

Electric welding is performed with ANO-4 and UONY-13/45 brand electrodes.

Specific emissions of pollutants during welding with electrodes are as follows:

| Pollutants | АНО-4 | УОНИ-13/45 |
|---|---|---|
| Iron and its compounds in terms of iron (iron oxide) | 5,41 g/kg | 10,69 g/kg |
| Manganese and its compounds | 0,59 g/kg | 0,51 g/kg |
| Substances in the form of suspended solid particles (silicon oxide) | - | 1,40 g/kg |
| Fluorine and its compounds (fluorides are well soluble) | - | 4,40 g/kg |
| Fluorine and its compounds (fluorides are poorly soluble) | - | 2,20 g/kg |
| Hydrogen fluoride | - | 1,00 g/kg |

Gross emissions of pollutants (t) are determined by the formula:

$$M^{gross}_{i} = (G_i * P_{total})/10^{-6}$$

where, $P_{total}$ – the total mass of electrodes burning during the construction period of the facility,

$P_{total}$ (АНО-4) = 2500 kg, $P_{total}$ (УОНИ-13/45) = 2300 kg;

**Gi** - specific emissions of the i-th pollutant, g/kg;

**Calculations are made in tabular form:**

| Pollutants | АНО-4 | | УОНИ-13/45 | | Total, t | |
|---|---|---|---|---|---|---|
| | $M^{max}$, g/sec | $M^{gross}$, t | $M^{max}$, g/sec | $M^{gross}$, t | $M^{max}$, g/sec | $M^{gross}$, t |
| Iron and its compounds in terms of iron (iron oxide) | 0,01353 | 0,01353 | 0,008040 | 0,02459 | 0,008040 | 0,03812 |
| Manganese and its compounds in terms of manganese dioxide (manganese and its compounds) | 0,00148 | 0,00148 | 0,000383 | 0,00117 | 0,000445 | 0,00265 |
| Substances in the form of suspended solid particles (silicon oxide) | -- | -- | 0,001053 | 0,00322 | 0,001053 | 0,00322 |
| Fluorine and its compounds (fluorides are well soluble) | -- | -- | 0,003309 | 0,01012 | 0,003309 | 0,01012 |
| Fluorine and its compounds (fluorides are poorly soluble) | -- | -- | 0,001654 | 0,00506 | 0,001654 | 0,00506 |
| Hydrogen fluoride | -- | -- | 0,000752 | 0,00230 | 0,000752 | 0,00230 |

**Calculation of emissions of pollutants**

**from places where dusty materials are spilled**

The calculation was made on the basis of the "Temporary Methodological Manual for the Calculation of Emissions from Unorganized Sources in the Industry of Building Materials" Novorossiysk, 1982.

Volume of dust removal during unloading and spilling of spraying materials, t

$$M^{year}_{pouring} = k_1 * k_2 * k_3 * k_4 * k_5 * k_7 * B * G * T$$

where $k_1$ - the share of the dust fraction (from the total mass of dust) in the material;

$k_2$ - the share of the dust fraction (from the total mass of dust) that passes into the aerosol;

$k_3$ – a coefficient that takes into account local meteorological conditions (dependence on wind speed);

$k_4$ – a coefficient that takes into account local conditions: the degree of protection from external influences;

$k_5$ – a coefficient that takes into account the moisture content of the material;

$k_7$ – a coefficient that takes into account the size of the material;

B - a coefficient that takes into account the height of overflow;

G - productivity of the transfer unit, t/h;

T - pouring time, hours.

The results of the calculations are given in tabular form:

| **Calculation of emissions of substances in the form of suspended solid particles (dust containing $SiO_2$ > 70%)** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Material | Volume, t | $k_1$ | $k_2$ | $k_3$ | $k_4$ | $k_5$ | $k_7$ | **B** | **G** | **T** | $M^{max}$ | $M^{year}$ |
| Sand | 31800 | 0.05 | 0.03 | 1.4 | 1 | 0.01 | 0.8 | 0.5 | 60 | 530.0 | **0.140000** | **0.26712** |
| **Calculation of emissions of substances in the form of suspended solid particles (dust containing $SiO_2$ 70-20%)** | | | | | | | | | | | | |
| Material | Volume, t | $k_1$ | $k_2$ | $k_3$ | $k_4$ | $k_5$ | $k_7$ | **B** | **G** | **T** | $M^{max}$ | $M^{year}$ |
| Brocken stone | 4600 | 0.01 | 0.01 | 1.4 | 1 | 0.1 | 0.4 | 0.5 | 60 | 76.7 | **0.046683** | **0.01289** |

# Construction of cargo berth

## Calculation of emissions of polluting substances during the operation of power plants of the port fleet and technical vessels.

The amounts of emissions of pollutants into the atmospheric air are determined by the calculation and balance method based on the "Methodology for calculating the emissions of pollutants and greenhouse gases into the air from vehicles", approved by the order of the State Statistics Committee of Ukraine No. 452 of 13.11.08.

Determination of the gross emission of polluting substances into the atmospheric air from the engines of the fleet during the period of work (as construction equipment) is carried out according to the formula:

$$B_{ij} = \frac{M_i \cdot A_{ij}}{1000}, \text{ t}$$

where Mi – the amount of fuel consumed by i-th of equipment, t;

Ai – average specific emissions of j-th pollutant and greenhouse gas of i-th types of equipment;

The maximum single emissions of polluting substances from the operation of the fleet's engines are determined by the formula:

$$P_{ij} = \frac{M_i \cdot A_{ij}}{3{,}6 \cdot T_p}, \text{ g/sec}$$

where $T_p$ – working time of i-th types of equipment h/year.

The initial data are given in the tables

| Equipment | Type of fuel | The amount of fuel consumed, t | Operating time of river transport in the water area, h/year |
|---|---|---|---|
| Floating crane KPL 16-30 | diesel | 7,2 | 630 |
| Dredger SDS-15 | diesel | 56,92 | 1302 |
| Dredger Watermaster | diesel | 4,35 | 714 |
| Tug 121-M | diesel | 36,95 | 1323 |
| Boat motor | gasoline | 1,75 | 231 |

| Pollutant | $A_i$ | |
|---|---|---|
| | gasoline | diesel |
| Carbon monoxide | 19,8 | 36,2 |
| Nitrogen oxides (nitrogen oxide and dioxide) in terms of nitrogen dioxide | 21,6 | 31,4 |
| Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | 1,0 | 4,3 |

| | | |
|---|---|---|
| Non-methane volatile organic compounds/ Saturated C12-C19 hydrocarbons (solvent RPK-26611, etc.) in terms of total organic carbon) | 28,5 | 8,16 |
| Methane | 0,64 | 0,25 |
| Nitrogen(1) oxide (N2O) | 0,035 | 0,12 |
| Ammonia | 0,004 | - |
| Soot | 0,0 | 3,85 |
| Carbon dioxide | 3183 | 3138 |
| Benz(a)pyrene | - | 0,03 |

The results of the calculations are summarized in the table:

| Pollutant | Floating crane KPL 16-30 | | C-15 | |
|---|---|---|---|---|
| | *g/sec* | *t/year* | *g/sec* | *t /year* |
| Carbon monoxide | 0.114921 | 0,26064 | 0.439602 | 2,06050 |
| Nitrogen oxides (nitrogen oxide and dioxide) in terms of nitrogen dioxide | 0.099683 | 0,22608 | 0.381313 | 1,78729 |
| Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | 0.013651 | 0,03096 | 0.052218 | 0,24476 |
| Non-methane volatile organic compounds/ Saturated C12-C19 hydrocarbons (solvent RPK-26611, etc.) in terms of total organic carbon) | 0.025905 | 0,05875 | 0.099093 | 0,46447 |
| Methane | 0.000794 | 0,00180 | 0.003036 | 0,01423 |
| Nitrogen(1) oxide (N2O) | 0.000381 | 0,00086 | 0.001457 | 0,00683 |
| Ammonia | 0,000000 | 0,00000 | 0,000000 | 0,00000 |
| Soot | 0.012222 | 0,02772 | 0.046753 | 0,21914 |
| Carbon dioxide | 9.961905 | 22,59360 | 38,106964 | 178,61496 |
| Benz(a)pyrene | 0,000095 | 0,00022 | 0,000364 | 0,00171 |

| Pollutant | Dredger Watermaster | | M | |
|---|---|---|---|---|
| | *g/sec* | *t/year* | *g/sec* | *t/year* |
| Carbon monoxide | 0,061263 | 0,15747 | 0,280841 | 1,33759 |
| Nitrogen oxides (nitrogen oxide and dioxide) in terms of nitrogen dioxide | 0,053140 | 0,13659 | 0,243603 | 1,16023 |
| Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | 0,007277 | 0,01871 | 0,033360 | 0,15889 |
| Non-methane volatile organic compounds/ Saturated C12-C19 hydrocarbons (solvent RPK-26611, etc.) in terms of total organic carbon) | 0,013810 | 0,03550 | 0,063306 | 0,30151 |

| | | | | |
|---|---|---|---|---|
| Methane | 0,000423 | 0,00109 | 0,001940 | 0,00924 |
| Nitrogen(1) oxide (N2O) | 0,000203 | 0,00052 | 0,000931 | 0,00443 |
| Ammonia | 0,000000 | 0,00000 | 0,000000 | 0,00000 |
| Soot | 0,006516 | 0,01675 | 0,029868 | 0,14226 |
| Carbon dioxide | 5,310574 | 13,65030 | 24,344734 | 115,94910 |
| Benz(a)pyrene | 0,000051 | 0,00013 | 0,000233 | 0,00111 |

| Pollutant | Boat motor | | M | |
|---|---|---|---|---|
| | *g/sec* | *t/year* | *g/sec* | *t/year* |
| Carbon monoxide | 0,041667 | 0,03465 | 0,938294 | 3,85085 |
| Nitrogen oxides (nitrogen oxide and dioxide) in terms of nitrogen dioxide | 0,045455 | 0,03780 | 0,823194 | 3,34799 |
| Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | 0,002104 | 0,00175 | 0,108610 | 0,45507 |
| Non-methane volatile organic compounds/ Saturated C12-C19 hydrocarbons (solvent RPK-26611, etc.) in terms of total organic carbon) | 0,059975 | 0,04988 | 0,262089 | 0,91011 |
| Methane | 0,001347 | 0,00112 | 0,007540 | 0,02748 |
| Nitrogen(1) oxide (N2O) | 0,000074 | 0,00006 | 0,003046 | 0,01270 |
| Ammonia | 0,000008 | 0,00001 | 0,000008 | 0,00001 |
| Soot | 0,000000 | 0,00000 | 0,095359 | 0,40587 |
| Carbon dioxide | 6,698232 | 5,57025 | 84,422409 | 336,37821 |
| Benz(a)pyrene | 0,000000 | 0,00000 | 0,000743 | 0,00317 |

**Calculation of emissions of pollutants during the operation of construction equipment.**

The amounts of emissions of pollutants into the atmospheric air are determined by the calculation and balance method based on the "Methodology for calculating the emissions of pollutants and greenhouse gases into the air from vehicles", approved by the order of the State Statistics Committee of Ukraine No. 452 of 11.13.08.

Determination of the gross emission of pollutants into atmospheric air from engines of construction equipment during the period of work is carried out according to the formula:

$$B_{ij} = \frac{M_i \cdot A_{ij}}{1000}, \text{ t}$$

where Mi – the amount of fuel consumed by i-th types of equipment, t.

**Aij** – averaged specific emissions of j-th pollutants and greenhouse gases by i-th types of equipment;

The maximum single emission of pollutants from the operation of construction machinery engines is determined by the formula:

$$P_{ij} = \frac{M_i \cdot A_{ij}}{3{,}6 \cdot T_p}, \text{ g/sec}$$

where $T_p$ – working time of the building equipment, h

The initial data are given in the tables

T

| Name of the emission source | Type of fuel | The amount of fuel consumed, t | Working time of construction machinery, h |
|---|---|---|---|
| Construction machinery | diesel | 41,4 | 1760 |
| Construction machinery | gasoline | 6,8 | 290 |

| Pollutant | Construction machinery | |
|---|---|---|
| | $A_{ij}$ diesel | $A_{ij}$ gasoline |
| Carbon monoxide | 36,2 | 197,8 |
| Non-methane volatile organic compounds/ Saturated C12-C19 hydrocarbons (solvent RPK-26611, etc.) in terms of total organic carbon) | 8,16 | 28,5 |
| Methane | 0,25 | 0,64 |
| Nitrogen oxides (nitrogen oxide and dioxide) in terms of nitrogen dioxide | 31,4 | 21,6 |
| Soot | 3,85 | 0,0 |
| Nitrogen(1) oxide (N2O) | 0,12 | 0,035 |
| Ammonia | - | 0,004 |
| Carbon dioxide | 3138,0 | 3183 |
| Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | 4,3 | 1,0 |
| Benz(a)pyrene | 0,03 | - |

The results of the calculations are summarized in the table:

| Pollutant | Construction machinery (diesel) | | | | $Total_{Разм}$ | |
|---|---|---|---|---|---|---|
| | *g/sec* | *t* | *g/sec* | *t* | *g/sec* | *t* |
| Carbon monoxide | 0,236534 | 1,49868 | 1,288352 | 1,34504 | 1,524886 | 2,84372 |
| Non-methane volatile organic compounds/ Saturated C12-C19 hydrocarbons (solvent RPK-26611, etc.) in terms of total organic carbon) | 0,053318 | 0,33782 | 0,185632 | 0,19380 | 0,238950 | 0,53162 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Methane | 0,001634 | 0,01035 | 0,004169 | 0,00435 | 0,005803 | 0,01470 |
| Nitrogen oxides (nitrogen oxide and dioxide) in terms of nitrogen dioxide | 0,205170 | 1,29996 | 0,140690 | 0,14688 | 0,345860 | 1,44684 |
| Soot | 0,025156 | 0,15939 | 0,000000 | 0,00000 | 0,025156 | 0,15939 |
| Nitrogen(1) oxide (N2O) | 0,000784 | 0,00497 | 0,000228 | 0,00024 | 0,001012 | 0,00521 |
| Ammonia | - | - | 0,000026 | 0,00003 | 0,000026 | 0,00003 |
| Carbon dioxide | 20,503977 | 129,91320 | 20,732184 | 21,64440 | 41,236161 | 151,557 60 |
| Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | 0,028097 | 0,17802 | 0,006513 | 0,00680 | 0,034610 | 0,18482 |
| Benz(a)pyrene | 0,000196 | 0,00124 | - | - | 0,000196 | 0,00124 |

**Calculation of pollutant emission volumes**

**1. During welding works.** The calculations were made on the basis of the "Compendium of emission indicators (specific emissions) of pollutants into the atmospheric air by various industries", UkrNTSTE, Donetsk, 2004.

The maximum single emissions of pollutants (g/sec) are determined by the formula:

$$B^{maxi} = (G_i \cdot P) / T$$

where **Gi** - specific release of i-th pollutant, g/kg;
**P** - electrode weight in kg;
**T** - electrode burning time, sec.

The gross (annual) emission of pollutants (t) is determined by the formula:

$$B^{gross}_i = (G_i * P_{total})/10^{-6}$$

where $P_{total}$ – the total mass of burning electrodes during the construction period of the object;
**Gi** - specific emissions of i-th pollutants, g/kg; the initial data for the calculation is summarized in the table:

| Output data for calculation | | Brand of electrodes | |
|---|---|---|---|
| | | ANO-4 | УОНІ-13/45 |
| Specific emissions of pollutants Gi, g/kg | Iron and its compounds in terms of iron (iron oxide) | 5,41 | 10,69 |
| | Manganese and its compounds in terms of manganese dioxide (manganese and its compounds) | 0,59 | 0,51 |

| | | | |
|---|---|---|---|
| | Substances in the form of suspended solid particles (silicon oxide) | - | 1,40 |
| | Fluorine and its compounds (fluorides are well soluble) | - | 4,40 |
| | Fluorine and its compounds (fluorides are poorly soluble) | - | 2,20 |
| | Hydrogen fluoride | - | 1,00 |
| Weight of one electrode, kg | | 0,135 | 0,137 |
| Electrode burning time, sec | | 75 | 75 |
| Weigh of spent electrodes $P_{total}$, kg | | 1248 kg | 85 |

The results of the calculations are summarized in the table:

| Pollutant | $B^{gross}$, t | | Total $B^{gross}$,t | Total $P^{max}$, g/s |
|---|---|---|---|---|
| | ANO-4 | UONI-13/45 | | |
| Iron and its compounds in terms of iron (iron oxide) | 0,00189 | 0,00267 | 0,00456 | 0,029265 |
| Manganese and its compounds in terms of manganese dioxide (manganese and its compounds) | 0,00021 | 0,00013 | 0,00034 | 0,001994 |
| Substances in the form of suspended solid particles (silicon oxide) | 0,00000 | 0,00035 | 0,00035 | 0,002557 |
| Fluorine and its compounds (fluorides are well soluble) | 0,00000 | 0,00110 | 0,00110 | 0,008037 |
| Fluorine and its compounds (fluorides are poorly soluble) | 0,00000 | 0,00055 | 0,00055 | 0,004019 |
| Hydrogen fluoride | 0,00000 | 0,00025 | 0,00025 | 0,001827 |

**2. Gas cutting.** The calculation was made on the basis of the "Compendium of emission indicators (specific emissions) of pollutants into the atmospheric air by various industries", UkrNTSTE, Donetsk, 2004.

The gross (annual) emission is determined by the formula: $B^{gross} = G_i \cdot T_{year} \cdot 10^{-6}$, t
The initial data are given in the tables:

| Output data for calculation | | Specific emissions of pollutants $G_i$ | |
|---|---|---|---|
| | | g/running meter | g/h |
| The name of the emitted pollutant | Iron and its compounds in terms of iron (iron oxide) | 4,37 | 78,66 |
| | Manganese and its compounds in terms of manganese dioxide (manganese and its compounds) | 0,13 | 2,34 |
| | Carbon monoxide | 2,18 | 39,24 |

| | | | |
|---|---|---|---|
| | Nitrogen oxides (nitrogen oxide and dioxide) in terms of nitrogen dioxide | 2,20 | 39,60 |
| Metal thickness, mm | | ≤ 10 | |
| Cutting speed, running meter/h | | 18,0 | |

The results of the calculations are summarized in the table:

| Working time, h | $P^{max}$, g/sec | | | | $B^{gross}$, t | | | |
|---|---|---|---|---|---|---|---|---|
| | $Fe_2O_3$ | Mn | CO | $NO_x$ | $Fe_2O_3$ | Mn | CO | $NO_x$ |
| 1800 | 0,021850 | 0,000650 | 0,010900 | 0,011000 | 0,14159 | 0,00421 | 0,07063 | 0,07128 |

Total emissions of pollutants during welding and cutting:

| Pollutant | $\Sigma B^{gross}$, т | $\Sigma P^{max}$, g/sec |
|---|---|---|
| Iron and its compounds in terms of iron (iron oxide) | 0,14615 | 0,051115 |
| Manganese and its compounds in terms of manganese dioxide (manganese and its compounds) | 0,00455 | 0,002644 |
| Substances in the form of suspended solid particles (silicon oxide) | 0,00035 | 0,002557 |
| Fluorine and its compounds (fluorides are well soluble) | 0,00110 | 0,008037 |
| Fluorine and its compounds (fluorides are poorly soluble) | 0,00055 | 0,004019 |
| Hydrogen fluoride | 0,00025 | 0,001827 |
| Carbon monoxide | 0,07063 | 0,010900 |
| Nitrogen oxides (nitrogen oxide and dioxide) in terms of nitrogen dioxide | 0,07128 | 0,011000 |

**Calculation of emissions of pollutants during the performance of painting works**

The calculation was made on the basis of the "Compendium of emission indicators (specific emissions) of polluting substances into the atmospheric air by various industries", Donetsk, 2004, and "Additions to the methodological instructions for the quantitative determination of industrial emissions into the atmosphere at the enterprises of the industry", Kyiv, 1990.

Painting of surfaces is carried out by the method of pneumatic spraying. The amount of solvent vapors released during painting and drying is determined by the formulas:

$$P_{paint} = 2{,}2 \cdot 10^{-6} \cdot Q \cdot r \cdot П \cdot A$$

$$P_{dry} = 1{,}7 \cdot 10^{-6} \cdot Q \cdot r \cdot П \cdot (1 - A)$$

$$P = B \cdot P / 100$$

where: $P_{paint}$, $P_{dry}$ - the amount of vapors of the i-th organic solvent released into the atmosphere during painting and drying, respectively, g/sec;

$P^{gross}$ – gross emission of vapors of the i-th organic solvent, t;

**B** - paint consumption: PF-115 enamel = 554 kg; primer GF-021= 332 kg;

**Q** - productivity of painting equipment, Q = 10.7 m2/hour;

**p** – specific rate of consumption of coloring material per unit. area, p = 150 g/m2;

**П** – the content of the solvent in the coloring material, taking into account the amount of solvent used to bring the paint to the working viscosity, %; consumption of white spirit – 475 kg.

**A** - coefficient characterizing the relative part of the total amount of solvent contained in the paint.

The amount of paint aerosol is calculated according to the formula:

$$P_{aer} = 5{,}5 \cdot 10^{-5} \cdot Q \cdot p \text{ , g/sec}$$

$$B_{aer} = 5{,}5 \cdot 10^{-5} \cdot Q \cdot p \cdot T \cdot 0{,}0036, \text{ t}$$

The results of the calculations are summarized in the table:

| Composition of volatile compounds | P | A | $P_{paint}$, g/sec | $P_{dry}$, g/sec | $B^{grosss}$, t |
|---|---|---|---|---|---|
| | | **PF-115** | | | |
| Maximum content, % including: | | | | | |
| Xylene | 22,5 | 0,39 | 0,030985 | 0,000052 | 0,69750 |
| Non-methane volatile organic compounds (white spirit) | 22,5 | 0,30 | 0,023834 | 0,000046 | 0,69750 |
| Substances in the form of suspended solid particles (paint aerosol) | - | - | 0,088275 | - | 0,06133 |
| **GF-021** | | | | | |
| Maximum content, % including: | | | | | |
| Xylene | 43,3 | 0,39 | 0,059628 | 0,000099 | 0,77940 |
| Non-methane volatile organic compounds (white spirit) | 2,70 | 0,30 | 0,002860 | 0,000005 | 0,04860 |
| Substances in the form of suspended solid particles (paint aerosol) | - | - | 0,088275 | - | 0,04860 |
| **White spirit** | | | | | |
| Maximum content, % including: | | | | | |
| Non-methane volatile organic compounds (white spirit) | 100,0 | 0,30 | 0,105930 | 0,000202 | 0,21000 |

Due to the fact that the dyeing and drying processes do not take place at the same time, maximum one-time emissions of polluting substances by source are taken as maximum, and annual - as total.

| **Pollutant** | $P^{max}$, g/sec | $B^{gross}$, t |
|---|---|---|
| Xylene | 0,059628 | 1,47690 |
| Non-methane volatile organic compounds (white spirit) | 0,105930 | 0,95610 |
| Substances in the form of suspended solid particles (paint aerosol) | 0,088275 | 0,09692 |

**Calculation of hydrocarbon emissions when using materials that include bitumen**

The calculation was carried out on the basis of the directory "Road Construction", Moscow, Transport, 1980.

In the production of insulation works, materials containing bitumen are used (oil construction bitumen, road oil bitumen, bitumen-rubber roofing mastic).

The amount of harmful substances (hydrocarbons) released into the atmosphere when using compounds that include bitumen is 0.2% of the amount of material used.

Gross emissions of non-methane volatile organic compounds (t/year) are determined by the formula:

$$B^{gross} = 0{,}002 \cdot B,$$

where **B** – the amount of used insulating materials containing bitumen, **B = 0,774 t**.

$$B^{gross} = 0{,}002 \cdot 0{,}774 = \mathbf{0{,}00155\ t.}$$

**Calculation of emissions of polluting substances from places where dusty materials are spilled**

The calculation was made on the basis of the "Temporary Methodological Manual for the Calculation of Emissions from Unorganized Sources in the Construction Materials Industry", Novorossiysk, 1982.

The volume of dust released during the unloading and pouring of the spraying materials is determined by the formula

$$P^{MP}_{pouring} = (10 \cdot k_1 \cdot k_2 \cdot k_3 \cdot k_4 \cdot k_5 \cdot k_7 \cdot B \cdot G) / 3600, \quad g/sec$$

$$B^{grosspour.} = k_1 \cdot k_2 \cdot k_3 \cdot k_4 \cdot k_5 \cdot k_7 \cdot B \cdot G \cdot T, t$$

where $k_1$ - the share of the dust fraction (from the total mass of dust) in the material;

$k_2$ - the share of the dust fraction (from the total mass of dust) that passes into the aerosol;

$k_3$ - coefficient that takes into account local meteorological conditions (dependence on wind speed);

$k_4$ - coefficient that takes into account local conditions: the degree of protection from external influences;

k5 - coefficient that takes into account the moisture content of the material;

$k_7$ - coefficient that takes into account the size of the material;

B - the coefficient that takes into account the height of overflow; G - productivity of the overflow unit, t/h;

T - pouring time, hours

The results of the calculations are given in tabular form:

| **Calculation of substance emissions in the form of suspended solid particles (dust containing $SiO_2$ > 70%)** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Material | **Volume t** | $k_1$ | $k_2$ | $k_3$ | $k_4$ | $k_5$ | $k_7$ | **B** | **G** | **T** | $B^{gross}$ |
| Sand | 41272 | 0,0 | 0,03 | 1,4 | 1 | 0,01 | 0,8 | 0,5 | 60 | 688 | **0,34675** |
| **Calculation of substance emissions in the form of suspended solid particle (dust containing $SiO_2$ 70-20%)** | | | | | | | | | | | |
| Material | **Volume, t** | $k_1$ | $k_2$ | $k_3$ | $k_4$ | $k_5$ | $k_7$ | **B** | **G** | **T** | $B^{gross}$ |
| Rubble | 2500 | 0,01 | 0,01 | 1,4 | 1 | 0,1 | 0,4 | 0,5 | 60 | 42 | **0,00706** |

Thus, during the construction of a cargo berth with shore fortification, the source of emissions is 4 unorganized stationary sources: welding and painting stations, the place of transfer of construction materials and the performance of insulation works. The volume of emissions from stationary sources is 0.566414 g/sec and 3.18059 t, including by substances:

| | | | | |
|---|---|---|---|---|
| Iron and its compounds in terms of iron | 0,051115 | g/sec | 0,14615 | t/year |
| Xylene | 0,059628 | g/sec | 1,47690 | t/year |
| Manganese and its compounds in terms of manganese dioxide (manganese and its compounds) | 0,002644 | g/sec | 0,00455 | t/year |
| NMVOC (Non-methane volatile organic compounds/ Saturated C12-C19 hydrocarbons (solvent RPK-26611, etc.) in terms of total organic carbon) | 0,139735 | g/sec | 0,95810 | t/year |
| Carbon monoxide | 0,010900 | g/sec | 0,07063 | t/year |
| Nitrogen oxides (nitrogen oxide and dioxide) in terms of nitrogen dioxide | 0,011000 | g/sec | 0,07128 | t/year |
| Substances in the form of suspended solid particles | 0,277499 | g/sec | 0,45108 | t/year |
| Fluorine and its compounds | 0,012056 | g/sec | 0,00165 | t/year |
| Hydrogen fluoride | 0,001837 | g/sec | 0,00025 | t/year |

Mobile sources: power plants of the port fleet and hydraulic engineering, motor vehicles and construction equipment - emit fuel combustion products into the atmosphere. The volume of emissions from mobile sources is 502.136630 tons, including by substances:

| | | | | |
|---|---|---|---|---|
| Nitrogen(1) oxide (N2O) | 0,004058 | g/sec | 0,017910 | t/year |
| Ammonia | 0,000034 | g/sec | 0,000040 | t/year |
| Benz(a)pyrene | 0,000939 | g/sec | 0,004410 | t/year |
| Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | 0,143220 | g/sec | 0,639890 | t/year |
| Methane | 0,013343 | g/sec | 0,042180 | t/year |
| Non-methane volatile organic compounds/ Saturated C12-C19 hydrocarbons (solvent RPK-26611, etc.) in terms of total organic carbon) | 0,501039 | g/sec | 1,441730 | t/year |
| Carbon dioxide | 2,463180 | g/sec | 6,694570 | t/year |
| Nitrogen oxides (nitrogen oxide and dioxide) in terms of nitrogen dioxide | 1,169054 | g/sec | 4,794830 | t/year |
| Substances in the form of suspended solid particles | 0,120515 | g/sec | 0,565260 | t/year |
| Carbon dioxide | 125,658570 | g/sec | 487,935810 | t/year |

Taking into account that the impact on atmospheric air during the construction of hydrotechnical structures has a local character, which is limited to the time and place of work, it can be stated that the impact on the air environment is acceptable and does not exceed permissible limits.

**Construction of railway access track**

***Calculation of emissions of pollutants during the operation of internal combustion engines of construction equipment and special vehicles***

In the process of track construction and reconstruction, the following construction machines and mechanisms will be used:

| № | The name of the machine, mechanism | Operating term, machine-hour |
|---|---|---|
| 1 | Medium motor graders | 49,257 |
| 2 | Lorry with sides, 5 | 33,948 |
| 3 | Dump trucks, 7 t | 2,26 |
| 4 | Bulldozers 108 h.p. | 64,233 |
| 5 | Bulldozers 30 h.p. | 87,37 |
| 6 | Diesel engine single-bucket crawler excavators | 89,693 |
| 7 | Mobile compressors | 58,123 |
| 8 | Mobile cranes, 10 t | 20,562 |
| 9 | Railroad cranes, 16 t | 92,868 |
| 10 | Motorized platforms for track-laying machine | 16,263 |
| 11 | Broad gauge switcher locomotive | 57,778 |
| 12 | Tracked tractors | 21,784 |
| 13 | Pneumatic Tire Rollers | 14,536 |
| | Total | 609 |

Fuel consumption: gasoline - 530 kg, diesel fuel - 545 kg.

Emissions of pollutants will be carried out during the operation of internal combustion engines of special equipment and mechanisms on the territory of the site.

According to the "Methodology for calculating emissions of pollutants and greenhouse gases into the air from vehicles" [15] internal combustion engines (ICE) mainly emit carbon oxide, a mixture of saturated hydrocarbons, nitrogen dioxide, nitrogen oxide, sulfur dioxide, soot, benz(a) pyrene, ammonia, methane. Determining the volume of emissions of pollutants from the operation of internal combustion engines of industrial, construction and other machinery is carried out based on the primary data of enterprises on fuel consumption, according to the formula:

$$B_{ij} = M_i * A_{ij}, \text{ where}$$

$B_{ij}$ – emissions of the j-th pollutant and greenhouse gas by the i-th group of equipment, kg / year;

$M_i$ – volumes of fuel consumed by the i-th group of equipment, tons/ year ;

$A_{ij}$ – averaged emission factor of the j-th pollutant and greenhouse gas by the i-th group of equipment (kg/t of fuel), [15, table 6 ];

Diesel internal combustion engine:

*Carbon oxide*

$M^{year}_{CO} = 0,545 * 36,2 * 10^{-3} = 0,02$ t / year

$M^{sec} = 0,02 / 609 / 3600 * 10^6 = 0,009$ g / s

*Nitrogen dioxide*

$M^{year}_{Nox} = 0,545 * 31,4 * 10^{-3} = 0,017$ t / year

$M_{sec} = 0,017 / 609 / 3600 * 10^6 = 0,008$ g / s

*Sulfur dioxide*

$M^{year}_{CH} = 0,545 * 4,3 * 10^{-3} = 0,002$ t / year

$M_{sec} = 0,002 / 609 / 3600 * 10^6 = 0,0009$ g / s

*Non-methane volatile organic compound*

$M^{year}_{CH} = 0,545 * 8,16 * 10^{-3} = 0,004$ t / year

$M_{sec} = 0,004 / 609 / 3600 * 10^6 = 0,0018$ g / s

*Methane*

$M^{year}_{CH} = 0,545 * 0,25 * 10^{-3} = 0,00014$ t / year

$M_{sec} = 0,00014 / 609 / 3600 * 10^6 = 0,00006$ g / s

Nitrogen dioxide

$M^{year}_{Nox} = 0,545 * 0,12 * 10^{-3} = 0,000065$ t / year

$M_{sec} = 0,000065 / 609 / 3600 * 10^6 = 0,00002$ g / s

Soot

$M^{year}_{CH} = 0,545 * 3,85 * 10^{-3} = 0,002$ t / year

$M_{sec} = 0,002 / 609 / 3600 * 10^6 = 0,0009$ g / s

*Carbon dioxide*

$M^{year}_{Nox} = 0,545 * 3138 * 10^{-3} = 1,71$ t / year

$M_{sec} = 1,71 / 609 / 3600 * 10^6 = 0,78$ g / s

*Benz(a) pyrene*

$M^{year}_{Nox} = 0,545 * 0,03 * 10^{-3} = 0,000016$ t / year

$M_{sec} = 0,000016 / 609 / 3600 * 10^6 = 0,000007$ g / s

Gasoline internal combustion engines:

*Carbon oxide*

$M^{year}_{CO} = 0,53 * 197,8 * 10^{-3} = 0,105$ t / year

$M_{sec} = 0,105 / 609 / 3600 * 10^6 = 0,048$ g / s

*Nitrogen dioxide*

$M^{year}_{Nox} = 0,53 * 21,6 * 10^{-3} = 0,011$ t / year

$M_{sec} = 0,011 / 609 / 3600 * 10^6 = 5,017$ g / s

*Sulfur dioxide*

$M^{year}_{CH} = 0,53 * 1,0 * 10^{-3} = 0,0005$ t / year

$M_{sec} = 0,0005 / 609 / 3600 * 10^6 = 0,0002$ g / s

*Non-methane volatile organic compound*

$M^{year}_{CH} = 0,53 * 28,5 * 10^{-3} = 0,015$ t / year

$M_{sec} = 0,015 / 609 / 3600 * 10^6 = 0,007$ g / s

*Methane*

$M^{year}_{CH} = 0,53 * 0,64 * 10^{-3} = 0,0003$ т / year

$M_{sec} = 0,0003 / 609 / 3600 * 10^6 = 0,00013$ g / s

*Nitrogen dioxide*

$M^{year}_{Nox} = 0,53 * 0,035 * 10^{-3} = 0,00002$ t / year

$M_{sec} = 0,00002 / 609 / 3600 * 10^6 = 0,000009$ g / s

*Ammonia*

$M^{year}_{CH} = 0,53 * 0,004 * 10^{-3} = 0,000002$ t / year

$M_{sec} = 0,000002 / 609 / 3600 * 10^6 = 0,0000009$ g / s

*Carbon dioxide*

$M^{year}_{Nox} = 0,53 * 3183 * 10^{-3} = 1,687$ t / year

$M_{sec} = 1,687 / 609 / 3600 * 10^6 = 0,769$ g / s

**Calculation of dust emissions during getting-loading work**

**(conducting earthworks)**

Determining the amount of pollutant emissions into the atmospheric air is carried out when the top layer of the soil and plant cover is removed, conducted according to the "Collection of methods for calculating the content of pollutants in emissions from unorganized sources of atmospheric pollution", Donetsk, 2000 [14]

The amount of dust emissions is calculated using the formula:

$M = P_1 * P_2 * P_3 * P_4 * P_5 * P_6 * G * B * 10^6 / 3600$, where

$P_1$ - the weight fraction of dust, $P_1 = 0,05$;

$P_2$ – the fraction of dust that becomes an aerosol, $P_2 = 0,03$;

$P_3$ – coefficient that takes into account wind speed, $P_3 = 1,6$;

$P_4$ – coefficient that takes into account the moisture content of the material, $P_4 = 0,1$;

$P_5$ – coefficient that takes into account the size of the pieces of material, $P_5 = 0,4$;

$P_6$ – coefficient that takes into account local conditions, $P_6 = 1,0$;

G – excavator productivity, G = 50 t / hour; 2412,8 t/year

B – unloading height coefficient, B = 0,7

*Inorganic dust with silicon dioxide content in %::-70-20*

$$M^{sec} = 0,05 * 0,03 * 1,6 * 0,1 * 0,4 * 1,0 * 50 * 0,7 * 10^6 / 3600 = 0,93 \text{ g / s}$$

$$M^{year} = 0,93 * 3600 * 256 * 10^{-6} = 0,856 \text{ t / year}$$

**Calculation of dust emissions from motor transport operations**

Soil is transported with the help of dump trucks with a capacity of 5 and 7 tons for a distance of up to 1 km.

Determination of the volume of pollutant emissions into atmospheric air is carried out according to the "Collection of methods for calculating the content of pollutants in emissions from unorganized sources of atmospheric pollution", Donetsk, 2000 [14].

Dust emission occurs as a result of the interaction of the wheels of dump trucks with the road surface and the blowing of dust from the surface of the material loaded into the body of the machine.

The total amount of dust emitted within the construction site is calculated by the formula:

$$G = C_1 * C_2 * C_3 * N * L * q_1 * C_6 * C_7 * / 3600 + C_4 * C_5 * C_6 * F_0 * n * q_2 ,$$

$C_1$ – coefficient that takes into account the average carrying capacity, $C_1 = 1,0$;

$C_2$ – coefficient that takes into account the average speed of motor vehicles, $C_2 = 1$;

$C_3$ – coefficient that takes into account the condition of road surface, $C_3 = 1$;

N – number of moves (to and from) of all transport per hour, N = 11;

L – average length of one walk within the site, km, L =1;

$C_4$ – a factor that takes into account the surface profile of the material on the platform, $C_4 = 1,3$;

$C_5$ – coefficient taking into account the blowing speed of the material, $C_5 = 1,5$;

$q_1$ – dust emission into the atmosphere per 1 km run is assumed equal to 1450 g;

$C_6$ – coefficient that takes into account the moisture content of the material, $C_6 = 0,1$;

$C_7$ – coefficient that takes into account the proportion of dust released into the atmosphere, $C_7 = 0,01$;

$F_0$ – platform area, $m^2$, $F_0 = 12$;

n – the number of machines working on the site, n = 4;

$q_2$ – dust emission from a unit of the actual surface of the rock on the platform, $g/ m^2$, $q_2 = 0,002$,

*Inorganic dust with silicon dioxide content in %:-70-20*

$$G^{sec} = 1 * 1 * 1 * 11 * 1 * 1450 * 0,1 * 0,01 / 3600 + 1,3 * 1,5 * 0,1 * 12 * 4 * 0,002 = 0,023 \text{ g/s}$$

$$G^{year} = 0,023 * 3600 * 36 * 10^{-6} = 0,003 \text{ t / year}$$

**Calculation of dust emissions when ballasting the track with crushed stone ballast**

When ballasting the track with crushed stone ballast of a fraction of 25-40 mm, inorganic dust with a content of silicon dioxide in % enters the atmospheric air: 70-20. The calculation of inorganic dust emitted into the atmosphere during unloading is carried out according to the "Compendium of methods for calculating the content of pollutants in emissions from unorganized sources of atmospheric pollution", Donetsk, 2000 [14] according to the formula:

$$M_1 = K_1 * K_2 * K_3 * K_4 * K_5 * K_7 * G * B * 10^6 / 3600, \text{ where}$$

$K_1$ – mass fraction of dust in crushed stone – 0,04;

$K_2$ – the fraction of dust that becomes an aerosol – 0,02;

$K_3$ – takes into account local meteorological conditions -1,6;

$K_4$ – takes into account the degree of protection from external influences – 1;

$K_5$ – takes into account the moisture content of the material – 0,1;

$K_7$ – takes into account the size of the material – 0,5;

G – amount of unloaded crushed stone – 30 t/hour, 2127,5 t/year;

B – takes into account the unloading height – 0,7.

*Inorganic dust with silicon dioxide content from 20 to 70%*

$$M^{sec} = 0,04 * 0,02 * 1,6 * 1 * 0,1 * 0,5 * 30 * 0,7 * 10^6 / 3600 = 0,373 \text{ g/s.}$$

$$M^{year} = 0,04 * 0,02 * 1,6 * 1 * 0,1 * 0,5 * 2127,5 * 0,7 = 0,095 \text{ t/ year}$$

**Calculation of pollutant emissions during welding operations**

For welding work during the construction of the track, electric arc welding with electrodes of the E42 type, cutting with a propane-butane mixture will be performed. Pollutant emissions are calculated according to tables V-1-V-3 of the "Compendium of emission indicators (specific emissions) of pollutants into atmospheric air by various industries, UNTSTE, Donetsk, 2004 [13 vol. I]. The initial data for the calculation are given in the table.

***Welding with electrodes***

| Characteristic | The unit of measurement | Data |
|---|---|---|
| Emission factor:<br>Iron oxide<br>Manganese oxide<br>Chromium oxide<br>Poorly soluble fluorides<br>Hydrogen fluoride | g / kg | <br>8,57<br>1,0<br>1,43<br>1,5<br>0,001 |
| Fund of work | hour/ year | 50 |
| Annual use | kg/ year | 50 |
| Maximum consumption | kg/hour | 1 |

*Iron oxid*

$M^{sec} = 8,57 * 1 / 3600 = 0,002$ g / s

$M^{year} = 8,57 * 50 * 10^{-6} = 0,0004$ t/ year

*Manganese oxide*

$M^{sec} = 1,0 * 1 / 3600 = 0,00027$ g / s

$M^{year} = 1,0 * 50 * 10^{-6} = 0,00005$ t / year

*Chromium oxide*

$M^{sec} = 1,43 * 1 / 3600 = 0,0004$ g / s

$M^{year} = 1,43 * 50 * 10^{-6} = 0,00007$ t/ year

*Poorly soluble fluorides*

$M^{sec} = 1,5 * 1 / 3600 = 0,0004$ g / s

$M^{year} = 1,5 * 50 * 10^{-6} = 0,00008$ t / year

*Hydrogen fluoride*

$M^{sec} = 0,001 * 1 / 3600 = 0,0000003$ g / s

$M^{year} = 0,001 * 50 * 10^{-6} = 0,00000005$ t / year

***Propane-butane cutter***

| Characteristic | The unit of measurement | Data |
|---|---|---|
| Emission factor:<br>Iron oxide | g / running meter | 2,18 |

| | | |
|---|---|---|
| Nitrogen dioxide<br>Carbon monoxide<br>Manganese oxide | | 0,07<br>1,18<br>1,5 |
| Fund of work | hour/ year | 50 |
| Cutting length propane-butane mixture | Running meter/year | 250 |
| | Running meter/hour | 5 |

*Iron oxid*

$M^{sec} = 2,18 * 5 / 3600 = 0,003$ g / s

$M^{year} = 2,18 * 250 * 10^{-6} = 0,0005$ t / year

*Nitrogen dioxide*

$M^{sec} = 1,18 * 5 / 3600 = 0,0016$ g / s

$M^{year} = 1,18 * 250 * 10^{-6} = 0,0003$ t / year

*Carbon monoxide*

$M^{sec} = 1,50 * 5 / 3600 = 0,002$ g / s

$M^{year} = 1,50 * 250 * 10^{-6} = 0,0004$ t / year

*Manganese oxide*

$M^{sec} = 0,07 * 2 / 3600 = 0,0001$ g / s

$M^{year} = 0,07 * 250 * 10^{-6} = 0,00002$ t / year

*General emissions during welding operations:*

| | | |
|---|---|---|
| Iron oxid | 0,005 g/s | 0,0009 t/ year |
| Manganese oxide | 0,00037 g/s | 0,00007 t/ year |
| Nitrogen dioxide | 0,0016 g/s | 0,0003 t/ year |
| Carbon monoxide | 0,002 g/s | 0,0004 t/ year |
| Chromium oxide | 0,0004 g/s | 0,00007 t/ year |
| Poorly soluble fluorides | 0,0004 g/s | 0,00008 t/ year |
| Hydrogen fluoride | 0,0000003 g/s | 0,00000005 t/ year |

PARAMETERS OF THE SOURCES OF POLLUTANTS EMISSIONS INTO THE ATMOSPHERIC AIR DURING THE CONSTRUCTION OF THE RIVER PORT (TERMINAL) AND DREDGING WORKS PERFORMED

| Number of the source of emission | The name of the source of emission | The number of hours of operation of the equipment | Emission source parameters | | Coordinates of pollutant emission sources on map diagram | | | | Parameters of the gas and dust flow at the outlet | | | Pollutant code | The name of the pollutant | Maximum mass concentration of the pollutant, mg/m3 | Emission power | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Height, m | Diameter of outlet, m | Dotted or the beginning of linear; the center of symmetry of the plane | | Second end of the linear; width and depth of surface | | flow, m3/s | speed m/s | temperature, 0C | | | | g/s | t/year |
| | | CII | CII | CII | $X_1$ | $Y_1$ | $X_2$ | $Y_2$ | CII | CII | CII | | | CII | CII | CII |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 1 | Port fleet work site (floating crane power plant) | 180 | 2,0 | 0,02 | -353,3 | -327,3 | 460,0 | 108,0 | 0,35 | - | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | - | 0,012222 | 0,02772 |
| | | | | | | | | | | | | 04001 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | - | 0,099683 | 0,22608 |
| | | | | | | | | | | | | 04002 | Nitrogen(1)oxide(N2O) | - | 0,000381 | 0,00086 |
| | | | | | | | | | | | | 05001 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | - | 0,013651 | 0,03096 |
| | | | | | | | | | | | | 06000 | Carbon monoxide | - | 0,114921 | 0,26064 |
| | | | | | | | | | | | | 07000 | Carbon dioxide | - | 9,961905 | 22,59360 |
| | | | | | | | | | | | | 11000 | Nonmethane volatile organic compounds | - | 0,025905 | 0,05875 |
| | | | | | | | | | | | | 12000 | Methane | - | 0,000794 | 0,00180 |
| | | | | | | | | | | | | 13101 | Benz(a)pyrene | - | 0,000095 | 0,00022 |
| 2 | Port fleet work site (tug power plant) | 368 | 2,0 | 0,02 | -394,3 | 277,2 | 460,0 | 108,0 | 0,166 | - | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | - | 0,029868 | 0,14226 |
| | | | | | | | | | | | | 04001 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | - | 0,243603 | 1,16023 |
| | | | | | | | | | | | | 04002 | Nitrogen(1)oxide(N2O) | - | 0,000931 | 0,00443 |
| | | | | | | | | | | | | 05001 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | - | 0,058379 | 0,15889 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 06000 | Carbon monoxide | - | 0,280741 | 1,33759 |
| | | | | | | | | | | | | 07000 | Carbon dioxide | - | 24,344734 | 115,94910 |
| | | | | | | | | | | | | 11000 | Nonmethane volatile organic compounds | - | 0,063306 | 0,30151 |
| | | | | | | | | | | | | 12000 | Methane | - | 0,001940 | 0,00924 |
| | | | | | | | | | | | | 13101 | Benz(a)pyrene | - | 0,000233 | 0,00111 |
| 3 | Port fleet work site (dredger power plant) | 372 | 2,0 | 0,02 | -191,4 | -419,6 | 460,0 | 108,0 | 0,166 | - | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | - | 0,046753 | 0,17186 |
| | | | | | | | | | | | | 04001 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | - | 0,381313 | 1,40170 |
| | | | | | | | | | | | | 04002 | Nitrogen(1)oxide(N2O) | - | 0,001457 | 0,00536 |
| | | | | | | | | | | | | 05001 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | - | 0,052218 | 0,19195 |
| | | | | | | | | | | | | 06000 | Carbon monoxide | - | 0,439602 | 1,61597 |
| | | | | | | | | | | | | 07000 | Carbon dioxide | - | 38,106964 | 140,08032 |
| | | | | | | | | | | | | 11000 | Nonmethane volatile organic compounds | - | 0,099093 | 0,36426 |
| | | | | | | | | | | | | 12000 | Methane | - | 0,003036 | 0,01116 |
| | | | | | | | | | | | | 13101 | Benz(a)pyrene | - | 0,000364 | 0,00134 |
| 4 | Port fleet work site (dredger power plant) | 66 | 2,0 | 0,02 | -191,4 | -419,6 | 460,0 | 108,0 | 0,166 | - | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | - | 0,006516 | 0,01675 |
| | | | | | | | | | | | | 04001 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | - | 0,053140 | 0,13659 |
| | | | | | | | | | | | | 04002 | Nitrogen(1)oxide(N2O) | - | 0,000203 | 0,00052 |
| | | | | | | | | | | | | 05001 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | - | 0,007277 | 0,01871 |
| | | | | | | | | | | | | 06000 | Carbon monoxide | - | 0,061263 | 0,15747 |
| | | | | | | | | | | | | 07000 | Carbon dioxide | - | 5,310574 | 13,65030 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 11000 | Nonmethane volatile organic compounds | - | 0,013810 | 0,03550 |
| | | | | | | | | | | | | 12000 | Methane | - | 0,000423 | 0,00109 |
| | | | | | | | | | | | | 13101 | Benz(a)pyrene | - | 0,000051 | 0,00013 |
| 5 | Port fleet work site (power plant of a motor boat) | 584 | 2,0 | 0,02 | -273,0 | -349,3 | 460,0 | 108,0 | 0,166 | - | 35,9 | 04001 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | - | 0,045455 | 0,03780 |
| | | | | | | | | | | | | 04002 | Nitrogen(1)oxide(N2O) | - | 0,000074 | 0,00006 |
| | | | | | | | | | | | | 04003 | Ammonia | - | 0,000008 | 0,00001 |
| | | | | | | | | | | | | 05001 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | - | 0,002104 | 0,00175 |
| | | | | | | | | | | | | 06000 | Carbon monoxide | - | 0,041667 | 0,03465 |
| | | | | | | | | | | | | 07000 | Carbon dioxide | - | 6,698232 | 5,57025 |
| | | | | | | | | | | | | 11000 | Nonmethane volatile organic compounds | - | 0,059975 | 0,04988 |
| | | | | | | | | | | | | 12000 | Methane | - | 0,001347 | 0,00112 |
| 6 | Site of work of construction machinery (engines of construction machinery) | 584 | 2,0 | 0,02 | -155,0 | -369,0 | 200,0 | 62,0 | 0,166 | - | 35,9 | 03004 | Substances in form of suspended solid particles (microparticles, fibers) | - | 0,025156 | 0,15939 |
| | | | | | | | | | | | | 04001 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | - | 0,205170 | 1,29996 |
| | | | | | | | | | | | | 04002 | Nitrogen(1)oxide(N2O) | - | 0,000784 | 0,00497 |
| | | | | | | | | | | | | 05001 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | - | 0,028097 | 0,17802 |
| | | | | | | | | | | | | 06000 | Carbon monoxide | - | 0,236534 | 1,49868 |
| | | | | | | | | | | | | 07000 | Carbon dioxide | - | 20,503977 | 129,91320 |
| | | | | | | | | | | | | 11000 | Nonmethane volatile organic compounds | - | 0,053318 | 0,33782 |
| | | | | | | | | | | | | 12000 | Methane | - | 0,001634 | 0,01035 |
| | | | | | | | | | | | | 13101 | Benz(a)pyrene | - | 0,000196 | 0,00124 |
| | | | | | | | | | | | | | | | | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | Site of work of construction machinery (engines of construction machinery) | 290 | 2,0 | 0,02 | 40,2 | -196,8 | 10,0 | 35,0 | 0,166 | - | 35,9 | 04001 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | - | 0,140690 | 0,14688 |
| | | | | | | | | | | | | 04002 | Nitrogen(1)oxide(N2O) | - | 0,000228 | 0,00024 |
| | | | | | | | | | | | | 04003 | Ammonia | - | 0,000026 | 0,00003 |
| | | | | | | | | | | | | 05001 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | - | 0,006513 | 0,00680 |
| | | | | | | | | | | | | 06000 | Carbon monoxide | - | 1,288352 | 1,34504 |
| | | | | | | | | | | | | 07000 | Carbon dioxide | - | 20,732184 | 21,64440 |
| | | | | | | | | | | | | 11000 | Nonmethane volatile organic compounds | - | 0,185632 | 0,19380 |
| | | | | | | | | | | | | 12000 | Methane | - | 0,004169 | 0,00435 |
| 8 | Site of work of construction machinery (engines of construction machinery) | 290 | 2,0 | 0,02 | -11,4 | -104,7 | 20,0 | 70,0 | 0,166 | - | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | - | 0,000900 | 0,00200 |
| | | | | | | | | | | | | 04001 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | - | 0,008000 | 0,01700 |
| | | | | | | | | | | | | 04002 | Nitrogen(1)oxide(N2O) | - | 0,000020 | 0,00007 |
| | | | | | | | | | | | | 05001 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | - | 0,000900 | 0,00200 |
| | | | | | | | | | | | | 06000 | Carbon monoxide | - | 0,009000 | 0,02000 |
| | | | | | | | | | | | | 07000 | Carbon dioxide | - | | |
| | | | | | | | | | | | | 11000 | Nonmethane volatile organic compounds | - | 0,001800 | 0,00400 |
| | | | | | | | | | | | | 12000 | Methane | - | 0,000060 | 0,00014 |
| | | | | | | | | | | | | 13101 | Benz(a)pyrene | - | 0,000007 | 0,00002 |
| 9 | Site of work of construction machinery (engines of construction machinery) | 290 | 2,0 | 0,02 | -36,8 | -162,9 | 20,0 | 80,0 | 0,166 | - | 35,9 | 04001 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | - | 5,017000 | 0,01100 |
| | | | | | | | | | | | | 04002 | Nitrogen(1)oxide(N2O) | - | 0,000009 | 0,00002 |
| | | | | | | | | | | | | 04003 | Ammonia | - | 9,0E-07 | 2,0E-06 |
| | | | | | | | | | | | | 05001 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | - | 0,000200 | 0,00050 |
| | | | | | | | | | | | | 06000 | Carbon monoxide | - | 0,048000 | 0,10500 |
| | | | | | | | | | | | | 07000 | Carbon dioxide | - | 0,769000 | 1,68700 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 11000 | Nonmethane volatile organic compounds | - | 0,007000 | 0,01500 |
| | | | | | | | | | | | | 12000 | Methane | - | 0,000130 | 0,00030 |
| 10 | Construction site (excavation) | 730 | 2,0 | - | -19,8 | -127,0 | 35,0 | 20,0 | - | - | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers)( Inorganic dust, with the content of silicon dioxide in %: - 70-20 (fireclay, cement, etc.) | - | 0,930000 | 0,85600 |
| 11 | Construction site (soil transportation) | 730 | 2,0 | - | -52,1 | -145,7 | 30,0 | 15,0 | - | - | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers)( Inorganic dust, with the content of silicon dioxide in %: - 70-20 (fireclay, cement, etc.) | - | 0,023000 | 0,00300 |
| 12 | Construction site (track ballasting with crushed stone ballast) | 730 | 2,0 | - | 52,3 | -223,8 | 18,0 | 540,0 | - | - | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers)( Inorganic dust, with the content of silicon dioxide in %: - 70-20 (fireclay, cement, etc.) | - | 0,373000 | 0,09500 |
| 13 | The site of welding and cutting works on the railway track | 1982 | 2,0 | - | 85,9 | -169,7 | 7,5 | 7,5 | – | – | 35,9 | 01003 | Iron and its compounds (in terms of iron) | - | 0,005000 | 0,00090 |
| | | | | | | | | | | | | 01010 | Chromium and its compounds (in terms of chromium trioxide) | - | 0,000400 | 0,00008 |
| | | | | | | | | | | | | 01104 | Manganese and its compounds in terms of manganese dioxide | - | 0,000370 | 0,00007 |
| | | | | | | | | | | | | 04001 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | - | 0,001600 | 0,00030 |
| | | | | | | | | | | | | 06000 | Carbon monoxide | - | 0,002000 | 0,00040 |
| | | | | | | | | | | | | 16000 | Fluorine and its compounds (fluorides are poorly soluble) | - | 0,000400 | 0,00008 |
| | | | | | | | | | | | | 16001 | Hydrogen fluoride | - | 3,0E-07 | 5,0E-08 |
| 14 | Site of work of construction machinery (engines of construction machinery) | 584 | 2,0 | 0,02 | -306,8 | -291,3 | 20,0 | 100,0 | 0,166 | - | 35,9 | 03004 | Substances in form of suspended solid particles (microparticles, fibers) | - | 0,007454 | 1,19369 |
| | | | | | | | | | | | | 04001 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | - | 0,063014 | 10,47991 |
| | | | | | | | | | | | | 04002 | Nitrogen(1)oxide(N2O) | - | 0,000236 | 0,03842 |
| | | | | | | | | | | | | 04003 | Ammonia | | 4,11E-07 | 0,00014 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 05001 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | - | 0,008428 | 1,36768 |
| | | | | | | | | | | | | 06000 | Carbon monoxide | - | 0,090417 | 18,04000 |
| | | | | | | | | | | | | 07000 | Carbon dioxide | - | 6,402658 | 1082,62308 |
| | | | | | | | | | | | | 11000 | Nonmethane volatile organic compounds | - | 0,018728 | 3,51212 |
| | | | | | | | | | | | | 12000 | Methane | - | 0,000550 | 0,09956 |
| | | | | | | | | | | | | 13101 | Benz(a)pyrene | - | 0,000061 | 0,01033 |
| 15 | Construction site (insulating materials) | 150 | 2,0 | - | -60,6 | -31,7 | 15,0 | 15,0 | - | - | 35,9 | 11000 | Nonmethane volatile organic compounds | - | 0,026199 | 0,05480 |
| 16 | Diesel generators | 1080 | 2,0 | - | 36,4 | -10,6 | 2,0 | 1,5 | - | - | 90,0 | 06000 | Carbon monoxide | | 0,000546 | 0,00424 |
| | | | | | | | | | | | | 07000 | Carbon dioxide | | 1,007205 | 7,81999 |
| | | | | | | | | | | | | 12000 | Methane | | 0,000041 | 0,00032 |
| | | | | | | | | | | | | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | | 0,002133 | 0,01656 |
| | | | | | | | | | | | | 04001 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | | 0,010586 | 0,08219 |
| | | | | | | | | | | | | 04002 | Nitrogen(1)oxide(N2O) | | 0,000034 | 0,00027 |
| | | | | | | | | | | | | 05001 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | | 0,000546 | 0,01000 |
| | | | | | | | | | | | | 11000 | Nonmethane volatile organic compounds | | 0,000686 | 0,00533 |
| 17 | Diesel generators | 1080 | 2,0 | - | 36,4 | -10,6 | 2,0 | 1,5 | - | - | 90,0 | 06000 | Carbon monoxide | | 0,101098 | 0,03929 |
| | | | | | | | | | | | | 07000 | Carbon dioxide | | 18,642851 | 72,44437 |
| | | | | | | | | | | | | 12000 | Methane | | 0,000762 | 0,00296 |
| | | | | | | | | | | | | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | | 0,394874 | 0,15344 |
| | | | | | | | | | | | | 04001 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | | 0,195947 | 0,76143 |
| | | | | | | | | | | | | 04002 | Nitrogen(1)oxide(N2O) | | 0,000635 | 0,00247 |
| | | | | | | | | | | | | 05001 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | | 0,023840 | 0,09264 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 11000 | Nonmethane volatile organic compounds | | 0,012701 | 0,04935 |
| 18 | Construction site | 730 | 2,0 | - | -70,0 | -84,5 | 20,0 | 20,0 | - | - | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers)( Inorganic dust, with silicon dioxide content in %: - above 70 (dynas, etc.) | - | 0,140000 | 0,26712 |
| | | | | | | | | | | | | 03000 | Substances in form of suspended solid particles (microparticles, fibers)( Inorganic dust, with the content of silicon dioxide in %: - 70-20 (fireclay, cement, etc.) | | 0,046683 | 0,01289 |
| 19 | Site of welding and cutting works | 1982 | 2,0 | - | 76,0 | -107,3 | 2,0 | 2,0 | – | – | 35,9 | 01003 | Iron and its compounds (in terms of iron) | - | 0,008040 | 0,03812 |
| | | | | | | | | | | | | 01104 | Manganese and its compounds in terms of manganese dioxide | - | 0,000445 | 0,00265 |
| | | | | | | | | | | | | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | - | 0,001053 | 0,00322 |
| | | | | | | | | | | | | 16000 | Fluorine and its compounds (fluorides are poorly soluble) | - | 0,001654 | 0,00506 |
| | | | | | | | | | | | | 16000 | Fluorine and its compounds (fluorides are well soluble) | - | 0,003309 | 0,01012 |
| | | | | | | | | | | | | 16001 | Hydrogen fluoride | - | 0,000752 | 0,00230 |
| 20 | Painting area | 187 | 2,0 | - | 59,0 | -153,2 | 5,0 | 5,0 | - | - | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | - | 0,090000 | 0,84585 |
| | | | | | | | | | | | | 11000 | Nonmethane volatile organic compounds | - | 0,676670 | 0,49229 |
| | | | | | | | | | | | | 11030 | Xylene | - | 0,101928 | 0,91428 |
| Additional sources of emissions generated during the implementation of technical alternative I | | | | | | | | | | | | | | | | |
| 1[1] | Site of work of construction machinery (engines of construction machinery) | 62 | 2,0 | – | -72,5 | -432,1 | 25,0 | 10 | – | - | 35,9 | 03004 | Substances in form of suspended solid particles (microparticles, fibers) | - | 0,00878 | 0,00051 |
| | | | | | | | | | | | | 04001 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | - | 0,09803 | 0,00850 |
| | | | | | | | | | | | | 04002 | Nitrogen(1)oxide(N2O) | - | 0,00033 | 0,00003 |
| | | | | | | | | | | | | 04003 | Ammonia | - | 4,90E-06 | 8,12E-07 |
| | | | | | | | | | | | | 05001 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | - | 0,01101 | 0,00076 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 06000 | Carbon monoxide | - | 0,32497 | 0,04490 |
| | | | | | | | | | | | | 07000 | Carbon dioxide | - | 11,05499 | 1,05817 |
| | | | | | | | | | | | | 11000 | Nonmethane volatile organic compounds | - | 0,05357 | 0,00686 |
| | | | | | | | | | | | | 12000 | Methane | - | 0,00136 | 0,00016 |
| | | | | | | | | | | | | 13101 | Benz(a)pyrene | - | 0,00013 | 0,00001 |
| 2[1] | Construction site (soil transportation) | 1 | 2,0 | - | -53,2 | -451,9 | 15 | 15 | - | - | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers)( Inorganic dust, with the content of silicon dioxide in %: - 70-20 (fireclay, cement, etc.) | - | 0,047222 | 0,00017 |
| 3[1] | Site of welding and cutting works | 375 | 2,0 | - | -53,2 | -451,9 | 15 | 15 | - | - | 35,9 | 01003 | Iron and its compounds (in terms of iron) | - | 0,105889 | 0,03812 |
| | | | | | | | | | | | | 01104 | Manganese and its compounds in terms of manganese dioxide | - | 0,007361 | 0,00265 |
| | | | | | | | | | | | | 04001 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | - | 0,028111 | 0,01012 |
| | | | | | | | | | | | | 06000 | Carbon monoxide | - | 0,008944 | 0,00322 |
| 4[1] | Construction site (insulating materials) | 1 | 2,0 | - | -53,2 | -451,9 | 15 | 15 | - | - | 35,9 | 11000 | Nonmethane volatile organic compounds | - | 0,016667 | 0,00006 |
| 5[1] | Painting area | 187 | 2,0 | - | -53,2 | -451,9 | 15 | 15 | - | - | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | - | 0,340914 | 0,09798 |
| | | | | | | | | | | | | 11000 | Nonmethane volatile organic compounds | - | 0,100575 | 0,06300 |
| | | | | | | | | | | | | 11007 | Acetone | - | 0,030051 | 0,00119 |
| | | | | | | | | | | | | 11009 | Butyl acetate | - | 0,013889 | 0,00055 |
| | | | | | | | | | | | | 11041 | Toluene | - | 0,071970 | 0,00285 |
| | | | | | | | | | | | | 11030 | Xylene | - | 0,233388 | 0,07065 |

## Calculation of the amount of discharges during dredging

Development, transportation and alluvium of bottom soil to the site of the coastal dump:

- soil development – the specified technological process is not taken into account as a source of impact, the turbidity of the water in the area of operation of the soil vacuum increases, but does not spread, due to the simultaneous suction of the pulp into the pulp pipeline;

- hydraulic transportation of soil to the site of coastal dumps - the specified technological process is not taken into account as a source of impact, the project envisages the use of a hermetic slurry pipeline;

- alluvium of the soil in the place of the coastal dump, as a result - drainage of clarified water from the settling area and filtration discharge of the soil from the dump embankment dam.

**Calculation of soil losses to water during soil alluvium on the alluvium map.**

The volume of suspended substances entering the water during the removal of soil from washed-up coastal dumps is determined by the formula:

$$V_{suspend.} = V_{soil}\ \rho\ (N_2 + N_3)\ 10^{-2} \cdot N4,\ m^3$$

The coefficients used in the formulas are taken into account:

– $V_{soil} = 112000\ m^3$ - total volume of alluvium of soil;

– $\rho = 1{,}57\ t/m^3$ – density of the bottom soil (Characteristics of soils of EGE);

– $N_2$ = 3% from the total volume of soil (DSTU B D.2.2-1:2012) - loss of soil during discharge together with water through drainage facilities;

– $N_3$ = 1 % from the total volume of soil (DSTU B D.2.2-1:2012) – loss of soil during discharge by filtration of water from the body of embankments washed ashore,

– $N_4$ = 0,04 - reducing coefficient reflecting the level of application of anti-erosion measures (Methodological guidelines for calculating fees for unorganized dumping).

Thus, when washing the soil in the places of coastal dumps, the amount of solid particles that will go into a suspended state and cause an increase in the turbidity of the water in the river is:

$$K_{suspend1} = 112000\ 1{,}57\ (3+1) \cdot 10^{-2}\ 0{,}04 = 281{,}344\ t.$$

The distance of removal of suspended solids or the distance at which suspended solids will sink to the bottom (the length of the turbidity plume) is determined by the formula:

$$L_{plume} = \frac{h_{max} \cdot V_{average}}{\omega_{average}},\ m$$

where: $h_{max}$ - 8,23м – depth of dredging;

$V_{average}$ = 0,50 m/sec – the average speed of the Danube River;

$\omega_{average}$ – 0,02889 m/sec - the average hydraulic coarseness of suspended substances, which is determined on the basis of Building code B.2.4 - 1-99 (Appendix P)

$$L_{plume} = \frac{4.0 \cdot 0.5}{0.02889} = 69.23 \ \ m$$

Thus, the length of the turbidity plume is 69.23 m.

The time of sedimentation of suspended substances is determined according to the dependence:

$$T = \frac{L_{plume}}{\omega_{average} \cdot 3600}, \text{ hour}$$

where: $L_{plume}$ -142,44 m - the length of the turbidity plume from the point of discharge of waste water;

$\omega_{average}$ – 0,02889 m/s – the average hydraulic coarseness of suspended substances.

$$T = \frac{142.44}{0.02889 \cdot 3600} = 1.hour$$

Thus, the deposition time of the turbidity plume is 1 h.

When working in the water area, a suction pump and floating vehicles can be sources of surface water pollution, however, taking into account the measures taken to prevent surface water pollution with oil, sewage, and garbage, such an impact is unlikely.

Taking into account the local nature of the construction works in terms of volume, place and time of execution, as well as the complex of preventive and compensatory measures, it can be stated that the impact on the aquatic environment is insignificant, limited to the place and time of the works. The aquatic environment will be affected, but after completion of the works will return to its natural state, there are no residual negative impacts.

Appendix 7

**Calculation**

of tax liability on environmental tax levied for environmental pollution during construction, installation and dredging works

| № | Names of pollutants | Actual volumes of emissions/ discharges, tons | Tax rates in the current year, UAH | The amount of accrued tax liability, UAH |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| Emissions into atmospheric air of polluting substances by stationary sources of pollution | | | | |
| 1. | Manganese and its compounds in terms of manganese dioxide | 0,00272 | 20376,22 | 55,42 |
| 2. | Solid particles | 1,44625 | 96,99 | 140,27 |
| 3. | Carbon monoxide | 0,04393 | 96,99 | 4,26 |
| 4. | Nitrogen oxides | 0,84666 | 2574,43 | 2179,67 |
| 5. | Sulfur dioxide | 0,10264 | 2574,43 | 264,24 |
| 6. | Hydrocarbons | 2,36518 | 145,5 | 344,13 |
| | *saturated hydrocarbons* | *0,10948* | | |
| | *methane* | *0,00328* | | |
| | *xylene* | *0,91428* | | |
| | *aerosol paint* | *0,84585* | | |
| | *white spirit* | *0,49229* | | |
| 7. | Chrome and its compounds (in terms of chromium trioxide) | 0,00008 | 69113,38 | 5,53 |
| 8. | Hydrogen chloride (hydrochloric acid as HCl molecule) | 0,0023 | 96,99 | 0,22 |
| 9. | Fluorides are well soluble (2 cl) | 0,01012 | 4216,92 | 42,68 |
| 10. | Fluorides are poorly soluble (2 cl) | 0,00514 | 4216,92 | 21,67 |
| 11. | Carbon dioxide | 80,26436 | 30,00 | 2407,93 |
| | **Total** | **85,089380** | | **5466,03** |
| Discharges of pollutants directly into water bodies | | | | |
| 1. | Suspended solids | 281,344 | 110,86 | 31189,80 |
| | **Total** | **281,344** | | **31189,80** |
| Placement of waste in specially designated places or facilities* | | | | |

| | | Actual volumes of waste disposal, tons (units) | ax rates in the current year, UAH | Coefficients | | Amount of accrued tax liability, Amount of accrued tax liability, UAH |
|---|---|---|---|---|---|---|
| | IV class | 8,112 | 5,50 | 3 | 3 | 401,54 |
| 1. | *Waste obtained in welding processes (electrode cinders)* | *0,618* | | | | |
| 2. | *Used metal containers, incl. small, with the exception of waste generated during transportation (paint containers)* | *0,389* | | | | |
| 3. | *Reinforced concrete and metal structures and iron and steel parts are spoiled (damaged) or not identified (waste piles)* | *4,345* | | | | |
| 4. | *Municipal (city) mixed waste, incl. garbage from the bin* | *2,760* | | | | |
| | **Total** | | | | | **401,54** |

| | | | |
|---|---|---|---|
| | **Total environmental tax liabilities** | | **37057,37**** |

*Payments for environmental obligations, regarding the placement of waste in specially designated places or facilities are carried out by enterprises that carry out work on the collection and placement of waste.

** In accordance with the Budget Code of Ukraine, environmental tax payers transfer the amounts of the tax paid for emissions, except for carbon dioxide emissions, discharges of pollutants and disposal of waste, in one payment order to the accounts opened in the bodies that carry out the treasury service of budget funds, which ensure distribution of these funds in the ratio determined by the Budget Code of Ukraine:

- 45 percent of the environmental tax - to the general fund of the State Budget of Ukraine (except for the environmental tax paid for carbon dioxide emissions, which is credited to the general fund of the state budget in full; the environmental tax paid for the generation of radioactive waste (including already accumulated) and /or temporary storage of radioactive waste by their producers beyond the period established by the special conditions of the license, which is credited to the special fund of the state budget in full);
- 55 percent - to a special fund of local budgets (except for the environmental tax paid for carbon dioxide emissions and for the generation of radioactive waste), including:
- to rural, settlement, city budgets, budgets of united territorial communities - 25 percent;
- regional budgets and the budget of the Autonomous Republic of Crimea - 30 percent;
- budgets of the cities of Kyiv and Sevastopol - 55 percent.

Appendix 8

**ДЕРЖАВНЕ АГЕНТСТВО МЕЛІОРАЦІЇ ТА РИБНОГО ГОСПОДАРСТВА УКРАЇНИ**
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_____ 2022 р.

# НАУКОВО-БІОЛОГІЧНЕ ОБҐРУНТУВАННЯ

## *ОЦІНКА ВПЛИВУ ГІДРОТЕХНІЧНИХ РОБІТ НА СТАН РИБНИХ ЗАПАСІВ Р. ДУНАЙ ПІД ЧАС БУДІВНИЦТВА ВАНТАЖНОГО ПРИЧАЛУ З ОПЕРАЦІЙНОЮ АКВАТОРІЄЮ РІЧКОВОГО ПОРТУ В М. ІЗМАЇЛ ОДЕСЬКОЇ ОБЛАСТІ*

***Відповідальний виконавець:***
***Зав. лабораторією гідробіологічних та еколого-токсикологічних досліджень*** ***В.О. Гетманенко***

Результати роботи розглянуто Вченою радою ІРЕМ,
Протокол від 17.05.2022р. № 1

**2022**

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2022

# SCIENTIFIC AND BIOLOGICAL SUBSTANTIATION

## *Assessment of the impact of hydrotechnical works on the state of fish stocks of the Danube River during the construction of a cargo berth with the operational water area of the river port in Izmail, Odesa Region*

***Responsible executor:***
***Head of the hydrobiological and ecological-toxicological research laboratory*** ***V.O. Hetmanenko***

The results of the work were reviewed
by the scientific council of IFME,
protocol No. 1 dated 17/05/2022

**2022**

# LIST OF AUTHORS

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| *Acting Head of the Laboratory of Antarctic Marine Resources* | *R.O. Solod (1; 2.5; 3.2; 3.3)* |

# REPORT

Report on scientific and biological substantiation: 52 pages, 1 figure, 5 tables, 17 sources, 4 appendices.

The object of research is the aquatic environment, phytoplankton, zooplankton, zoobenthos, ichthyoplankton, ichthyofauna.

DANUBE RIVER, HYDROTECHNICAL WORKS, DREDGER, FLOATING CRANE, PHYTOPLANKTON, ZOOPLANKTON, ZOOBENTOS, ICHTHYOPLANKTON, ICHTHYOFAUNA, DAMAGE.

The purpose of the work is to develop a scientific and biological substantiation with an assessment of the impact of hydrotechnical works on the state of fish stocks of the Danube River during the construction of the cargo berth of the River Port (terminal) of NIBULON LLC within the water area of the Izmail Sea Port of Odesa Region.

Research method - assessment of the state of benthic and pelagic communities, determination of the degree of influence of hydrotechnical works, calculation of the cost of compensatory measures for fisheries with the possibility of works during the period of the ban during spawning.

The works were performed in accordance with the Agreement and the "Technical task" to the Agreement (Appendix A).

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# INTRODUCTION

The main document, which is taken as a basis in the nature protection legislative base of Ukraine, is the Bucharest Convention on the Protection of the Black Sea against Pollution (the Convention was ratified by Resolution of Ukrainian Parliament N 3939-XII (3939-12 ) dated 04.02.94. It entered into force for Ukraine on 14.04.1994. The Protocol on the Preservation of Biodiversity and Landscapes of the Black Sea to the Convention on the Protection of the Black Sea against Pollution (newsletter the Vidomosti of the Verkhovna Rada of Ukraine (VVR), 2007, N 50). The Protocol was ratified by Law N 685-V (685-16) dated 22.02.2007, and the presence of other international agreements, which provide for the creation of an ecological security system in the Black Sea basin, which should become a mandatory condition for the social and economic development of the country and the region as a whole.

Among the types of economic activities subject to mandatory regulation, considerable attention is paid to the control of hydrotechnical works. Hydrotecnical dredging works have certain negative impact on the aquatic environment and aquatic biocoenosis, since it is accompanied by the destruction of benthic groups of hydrobionts in the work areas and the death of pelagic and benthic organisms not only in the places of direct work, but also at some distance from the place of dredging (soil dumping, and, or due to siltation of adjacent water areas).

The development of scientific and biological substantiation is aimed at assessing the scale of hydrotechnical works (dredging) in the operational water area of the river port in Izmail, Odesa region.

Place of work: Izmail, Odesa region, Danube river from 91.09 to 91.55 km.

The place of storage of the extracted bottom soil: a coastal dump, the organization of which is provided for on the plot of land set aside for the construction of the River Port (terminal).

The following issues will be considered during the development of the scientific and biological substantiation:

- provided biological characteristics of the work performance area;
- calculation of the cost of compensatory measures for fisheries;
- provision of recommendations on minimizing the impact of dredging operations on the living conditions of ichthyofauna during the spawning period in the operational water area of the river port of Izmail, Odesa region.

For scientific and biological substantiation, the following will be used:

- the volume of bottom soil removed from the operational water area during the construction of the cargo berth of the River Port (terminal) of NIBULON LLC within the water area of the Izmail Sea Port, which is planned for 2022 - 112,000 $m^3$;

-information regarding the involvement of equipment that will perform dredging works (all mechanisms are gradually engaged): the Watermaster Classic IV dredger carries out work with a

cutter up to 6 m; a self-propelled dredger carries out work from 6 m to 8.3 m, and a floating grab crane (soil cleaning in the area of work);

-previous and current results of IFME research in the framework of scientific research works (2021), as well as data from list of references.

Works on the development of scientific and biological substantiation are carried out within the framework of the contract with the NIBULON Agricultural Limited Liability Company (NIBULON LLC). Contract No. NB-770-22 dated 07.05.2022.

Address on behalf of the "Customer": Kabotazhnyy spusk, 1, Mykolaiv, 54002, Ukraine.

Address of the "Perfomer": Konsulska street, 8, Berdiansk, Zaporizhzhya region, 71103, Ukraine.

# 1 SUBSTANTIATION FOR THE NEED TO PERFORM DEVELOPMENT

For the possibility of performing hydrotechnical works (dredging) in the water area of the SEA port of Izmail in order to build a cargo berth of the River Port (terminal) of NIBULON LLC on the Danube River, Odesa Region (Fig. 1.1).

The total volume of bottom soil, which is removed as a result of hydrotechnical (dredging) works from the operational water area of the river port (terminal) of NIBULON LLC, Izmail - 112,000 m³, Appendix A.

The term of performance of works (excluding the period of preparatory works and possible repair works) is 52 days with the possibility of works during the period of the ban during spawning until 05.06.2022.

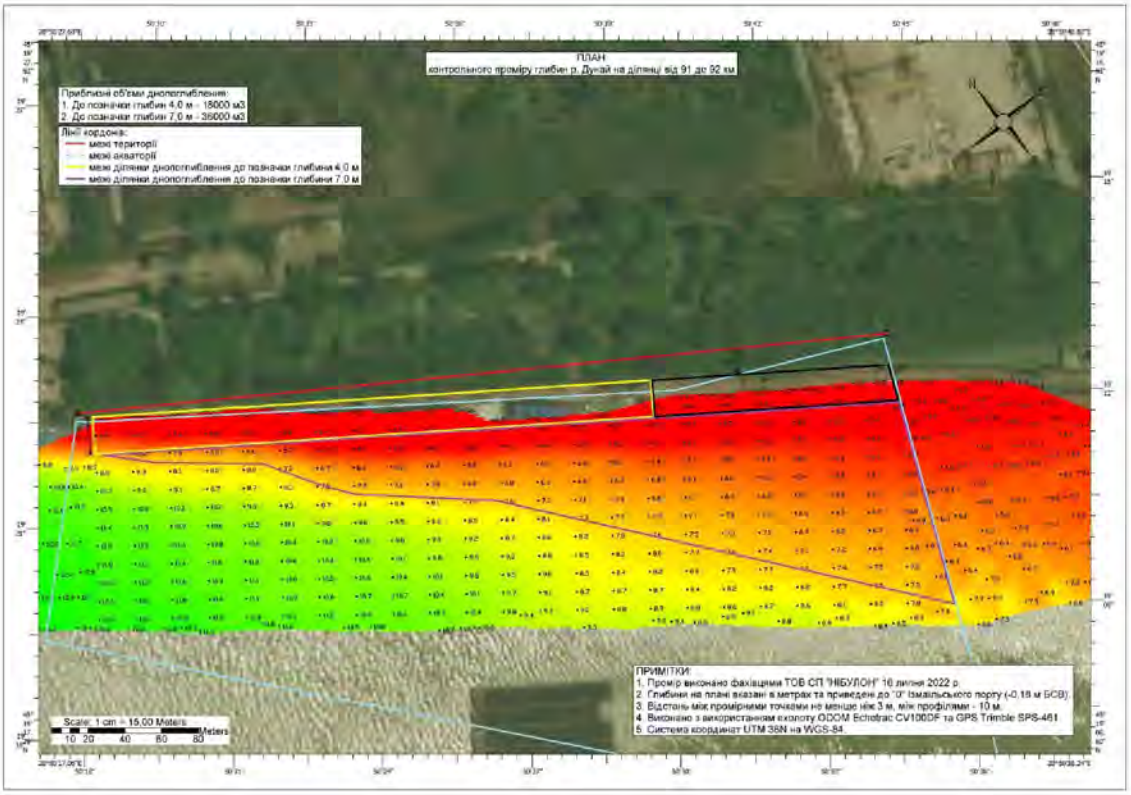


Figure 1.1 – Situational map-diagram of the river port of NIBULON LLC Izmail, Odesa Region

Design characteristics of the operational water area with an approach channel: length – 460 m, width – 115 m, area 5.29 ha, design depth – 8.23 m from "0" of Izmail seaport.

Project characteristics of dredging works in the operational water area: area 1.62 ha (16200.0 m²), project depth - 8.23 m from "0" of the Izmail Sea Port.

| Construction stage | Project characteristics | Dredger and working body involved | Volume of works, m3 |
|---|---|---|---|

| | | | |
|---|---|---|---|
| I | Execution of works on an area of 1.0 ha up to the mark of 4.0 m | Watermaster Classic IV, ladle | 22000 |
| | Cleaning the bottom on an area of 1.0 ha up to the mark of 4.0 m | Watermaster Classic IV, cutter, vacuum cleaner | 10000 |
| III | Dredging on an area of 2.2 hectares to mark 7.32 m | Самохідне судно проекту СДС 15, cutter, vacuum cleaner | 53000 |
| V | Dredging on an area of 2.32 hectares to the mark of 8.23 m (if necessary) | Самохідне судно проекту СДС 15, cutter, vacuum cleaner | 27000 |

Dimensions of the work area: the largest length is 460.0 m (91.55 km - 91.06 km), the largest width is 30 m.

The dredging works are planned to be carried out by machinery in turn with the involvement of the following hydraulic engineering:

- **Watermaster Classic IV.** The pulp is pumped using a suction pump, through a pipeline with a diameter of 200 mm, with a pulp productivity of 600 m³/h. The soil: water ratio is 1:5;

- **self-propelled dredging vessel (dredge)**. The pulp is pumped using a suction pump, through a pipeline with a diameter of 450 mm, with a productivity of pulp 2400 m³/h. The soil:water ratio is 1:6;

- **floating grab crane** with a bucket volume of 1 m³ (soil cleaning in the area of work).

The extracted soil (pulp) is transported through the pipeline and stored in a 1.24 ha coastal dump. The perimeter is surrounded by a dam with 2.5 m high, within its boundaries are formed alluvium maps with a discharge pipe Ø 200 m for the discharge of clarified water and a drainage ditch along the barrier dam with a depth of 0.5 m and a bottom width of 1.0 m for the discharge of water that filtered through the embankment dam (Appendix B).

Taking into account the location of planned activities, as well as being guided by the provision of the Resolution of the Cabinet of Ministers of Ukraine dated May 22, 1996 No 552 “On approval of the List of industrial sites of fishery water bodies (their parts)”, this territory, as a hydrotechnical structure and a place of intensive shipping (ports, shipping way) are not an industrial part of the Danube basin.

According to the Order of the State Agency of Melioration and Fisheries of Ukraine (Black Sea Fisheries Patrol) No. 132 dated April 14, 2022, industrial and amateur fishing is prohibited for the period of mass spawning in the Danube River from April 22 to June 05 (the ban does not apply on the directed fishing of herring), appendix C.

Taking into account the duration of the works (52 days) and the total volume of dredging of the operational water area of the River Port (terminal) of NIBULON LLC (112,000 m³), the estimated amount of extracted soil will be equal to 2154 m³ per day.

The dredging of the Danube river section will not have a negative impact on adult fish, as

they are able to avoid dangerous areas. The negative impact (at the level of complete destruction) will be felt by eggs and young fish that get to the place of the production process, so the purpose of the work is to assess the degree of impact of the works on fish resources, due to the loss of fish products from eggs and early young fish. If dredging works will be carried out during the ban on specialized fishing, which will be associated with the period of their mass spawning, assessments and compensation must be obtained in accordance with the procedure established by the legislation of Ukraine.

## 2 PHYSICAL AND GEOGRAPHICAL CHARACTERISTICS OF THE REGION

The river port (terminal) of NIBULON LLC of the Izmail Sea Port is located in the Danube Delta and is located in the southwestern part of Ukraine and Eastern Romania, from the bifurcation of the Danube above Izmail to its flowing into the Black Sea. The Danube Delta occupies an area of 5,640 km², of which 1,200 km² is within the Odesa region [1]. The Danube delta zone is divided into two arms (mouths) - the left Kiliia (on the border with Romania) and Tulcea, the right one. Tulcea arm, in its turn, is divided on George and Sulina branches (both on the territory of Romania). The Kiliia arm is the most full-water, its length is 117 km. It is shipping to Izmail, ports: Izmail, Kiliia, Vylkove. Near Vylkove town, it splits into a series of waterways that form the young delta of the Kiliia mouth (area 1958 km²), which is in a state of dynamic development. On average, the area of the delta increases by 1.1 km² annually. There are numerous lakes and river branches in the Danube Delta. More than 85 % of its area is occupied by floodplains - marshy areas that are flooded for a long time or constantly. About 70% of the territory of the floodplains is covered by groups of southern reeds. In their composition, a large number of sedge, cattail, bulrush, as well as weeds grow in the most elevated areas of ridges near the riverbed. Among the flood plains are lakes connected by channels and often covered with thickets. Large, unvegetated channels have folded loamy levees.

The Danube delta ends with the front, seaward edge of the lower face of this river delta, which includes bays and mouths of arms, and the avandelta (in front of the delta), which is not part of the delta, is the water area from the coast of the sea to the zone of sea water overrepresentation; its length from the shore in the sea can be several kilometers. The river-sea geochemical border with the average values of the Danube flow is characterized by an isohaline of 6 ‰.

The Danube Delta is the largest in Europe and one of the largest in the world by area.

The river port (terminal) of NIBULON LLC is located in the water area of the Kiliia mouth of the Danube River, 93 km from the Black Sea. The water area of the SEA port of Izmail port includes the water space of the river from 81 km to 97 km, directly from the left bank to the conditional line of the state border of Ukraine, which passes along the fairway of the Danube, the river port (terminal) of NIBULON LLC occupies the river part of the port from km 91.09 to km 91.55.

The port can accept ships the length of which does not exceed 150 m, width - 30 m, draft - 7 m.

The draft of ships entering the port is limited by the passing depths of the Sulina Channel and the Bystre Channel on the Ukrainian section of the Danube River.

In 2022, NIBULON LLC is building a cargo berth with the operational water area of a river port in Izmail, Odesa region, under the project "New construction of a transport infrastructure object - a river port (terminal) in Izmail, Izmail district, Odesa region". The working project envisages the execution of dredging works with the subsequent transportation of pulp through the pulp pipeline on the coastal bottom soil dump (see Appendix C).

Over 30 years of activity, NIBULON has created a modern, unique grain logistics infrastructure in Ukraine, which consists of transshipment terminals and complexes for receiving, storing and shipping grain and oil crops, powerful fleet and production units throughout Ukraine. Today, the company is represented in most regions of our country. [2].

## 2.1 Climate

The climate of the temperate zone is characterized by relatively mild and wet winter and hot, dry summer [3]. In winter, due to the spread of the branch of the Asian anticyclone in the east of Europe, persistent and strong winds from north-east to east arise on the Black Sea, which bring cold and relatively dry continental air of moderate latitudes. The weakening from the horn of the Asian anticyclone leads to the development of cyclonic activity in the Black Sea, which leads to an increase in air temperature and abundant precipitation. In summer, the northwestern part of the Black Sea is under the influence of a subtropical anticyclone. Individual areas of this anticyclone often produce long periods of weather with little wind activity and a large number of dry, clear days. During the arrival of the polar front, cyclones are formed, which contribute to precipitation. The following types of weather can be distinguished in the northwestern part of the Black Sea.

The anticyclonic type of weather is distinguished by its breeze-type winds with a speed of no more than 7 m/s, and in the spring also by fogs.

Cyclonic type of weather, which is characterized by winds with a speed of 7 - 15 m/s from the south, west and north-west directions. In winter, this type of weather contributes to gloom and prolonged precipitation. Cloudiness prevails in summer.

The type of weather characterized by strong cyclonic winds with a speed of 19 - 23 m/s, stormy and heavy precipitation. Thunderstorms are observed in summer and autumn, according to a similar type of weather, and in winter, a sharp cooling is possible.

The north-eastern type of weather is different, there is a significant drop in temperature and "hovering" is noted. In the summer, the air temperature is high, insignificant humidity and clear skies.

The western type of weather is characterized by strong westerly winds, significant or

complete cloud cover, and prolonged precipitation. On the northwestern coast of the sea, for example, the average monthly temperature in the coldest months of the year (January and February) is - 1 - 4 °C. The absolute minimum air temperature in winter in the north west reaches - 30 °C. In March, the average temperature slightly changes to 2 - 3 °C, in May it is 14 - 17 °C. In summer, the air temperature is approximately equal. In the warmest months of the year (July and August), the average temperature on the coast is 22- 24 °C. The absolute maximum temperature reaches 40 - 41 °C. Autumn is warmer than spring. In mid-autumn - in October, the air temperature in the northwest is 13-14 °C.

The average annual number of days with frosts in the research area is approximately 100. It should be noted that frosts do not last long and are usually associated with strong winds from the northeast to north. The relative humidity of the air during the year in the described area varies on average from 60-70 to 80-88%, and in summer and early autumn it is lower than in other seasons.

In the greater northwestern part of the Black Sea, winds from the northwest, north, and northeast prevail in winter, the total recurrence of which reaches 50%; in certain points, winds from the east are also quite often observed. In the spring, winds from the northeast and northwest may prevail, but along with them, winds from the south, southeast and southwest receive a noticeable development. In summer, in most points, winds from the northwest (repeatability up to 20 - 35%); of the winds from other directions, the most likely winds are from the west and southwest, and in some points also from the north. In autumn, winds from the north, northeast and east are more often noted, and in some areas - winds from the northwest.

The average annual number of days with storms (wind speed ~> 15 m/s) can reach 112 days. Most often, they occur from October or from November 15 to March, when on average there are 4 - 7 days or more with storms per month. From April or from May to September, the average monthly number of days with them rarely exceeds 2.

Visibility of 5-10 miles or more prevails in the area. The best visibility conditions are noted from April to October - November. During the day, the highest visibility is observed in the afternoon, the lowest in the morning. When there is a repeat invasion of cold air masses, which is most likely from October to May, exceptional visibility is noted - at this time visibility can reach - 110 - 160 miles.

Thunderstorm activity is most developed from April - May to September, on a larger scale part of the area, when on average there are from 1 to 8 days with thunderstorms per month. From October to March thunderstorms are rare.

Hail, most likely from April to June. The number of days with it is small - 5: on average, it does not exceed 1 - 2 per year.

Clear ice is possible in the cold season, but the average number of days with it is no more than once a month. Blizzards occur only from December - January to March. The average number of days with them varies from 1 to 3 per month.

A moderately cold climate is observed in the work area with a large (as for the southern part of Ukraine) amount of precipitation, even in the driest month. It falls about 452 mm of precipitation per year.

The average annual air temperature is 9.9 °C. The largest amount of precipitation is in October, with an average of 24 mm. The highest amount of precipitation falls in July, with an average of 54 mm.

The hottest month of the year is July, the average temperature is 22.7 °C. The lowest average temperature of the year is recorded in January, when it is about - 3.3 °C.

Between the dry and rainy months, the difference in precipitation is 30 mm. The temperature change throughout the year is 26.0 ° C.

## 2.2 Hydrological conditions of the Danube River

The place of work is located in the Danube Delta. The speed of surface currents of the Danube from Reni to the seacoast increases in the section from Reni to Kiliia - Velyke Stolitti, where the maximum speed of 175 cm/s is registered [1]. The speed of water flow from the entrance to each arm and exit from it to the sea decreases.

The Novostambulsky arm is characterized by the most powerful removal on the coast, the speed in which reaches 55 cm/s. Divergence of surface and bottom currents was repeatedly recorded. In 55% of the cases of observations of individual arms of the delta, the difference in current directions is vertical. These features of the flow regime in the arms of the Danube delta affect the spatial distribution of hydrochemical characteristics and the processes of accumulation of suspended and polluting substances.

The characteristic connection of the river flow regime with the change in turbidity is expressed in the low transparency of the water and the high content of suspended substance. The minimum transparency (0.3 m) was noted in the Kiliia Delta, slightly higher in the lower current of the Danube River (0.6 m) and in the avandelta (0.7 m). Along the course of the river from Reni to Kiliia, the content of suspended substance increases. On average, the content of suspended substance in the delta is twice as high as in the river. The general mineralization of water naturally increases from the river to the sea.

The temperature value was distributed relatively evenly, both by area and vertically. Despite the high dynamics of waters and their intensive aeration, the content of dissolvable oxygen in water is almost everywhere below the saturation level, in the Kiliia delta it is slightly higher than in the river.

In general, the waters of the region are characterized by relatively low pH values. The reason for this phenomenon can be considered the presence of an excess of easily oxidizing organic substance, which is illustrated by high $BOD_5$ values (in 82% of cases they exceed the MPC by 2.5

times), as well as the MPC and the level of suspended organic carbon content. This, in turn, is due to the removal by the river from the upper and middle reaches a large amount of allochthonous (dead organic) matter, as well as the high trophic status of the region. $BOD_5$ values can be equal to 9.6 mg/l [4].

The Danube can carry an average of 205 $km^3$ of water to its estuary annually. Approximately 7.3% of this volume of flow (i.e. 15 $km^3$) is formed on the territory of Ukraine (Uzh, Tisza, Siret, Prut). The increase in flow in the river delta is insignificant - about 1.5 $km^3$. Irreversible water consumption directly within the estuary region of the Danube currently does not exceed 0.5 $km^3$/year, which is less than a quarter of a percent of the total flow of the river. Due to the protrusion of the estuarine sections of the waterways of the Kiliia delta in the sea, as well as due to the artificial direction and deepening of the Sulina arm and the construction of a guide dam at the bifurcation node of these arms, the flow of the Kiliia arm has slightly decreased. Recently, the redistribution of flow in favor of the Tulcea branch has slowed down.

In the annual course of the water level in the Danube in modern conditions, the spring flood, autumn and winter floods, summer-autumn low and winter low baseflows are distinguished. The spring flood occurs, as a rule, in two waves: the first - from the melting of snow on the flat parts of the basins; the second - from the melting of snow in the mountains and the rains that fall during this period. The maximum level of the spring flood is usually the highest of the year. From September to the beginning of ice formation in the Danube, water level rises caused by autumn floods are observed. As a rule, they are not high, although in some cases they can exceed maximum spring flood levels. A large rise in the water level can also be caused by winter floods, which are accompanied by ice jams. In about 20% of cases, these rises become the highest for the year. The minimum annual water level is observed in the summer-autumn period, but in some years (20% of cases) it can also be in winter. The amplitude of water level fluctuations in the Danube decreases downstream and amounts to 620 cm in Reni, Kiliia - 305 cm and Vylkove - 261 cm.

The water temperature in the Danube River, averaged on an annual scale, is 12.7 °C. The warmest river waters are usually in July - August (up to 24.1 °C in general); during this period, the maximum temperature is observed - 27.6 ° C. The duration of the period with a water temperature exceeding 5 ° C is 265 days on average (16.03 - 6.12). The temperature is above 10°C, it is maintained from 10.04 to 9.11 (213 days), above 15°C - from 4.05 to 13.10 (162 days) and above 20° C - from 31.05 to 16.09 (108 days). Certain regularities in the distribution of water temperature along the length of the estuarine section of the river were not found.

An analysis of the wind regime of the Danube delta over a long period (1945-2000) showed that all hydrometeorological stations and posts in the delta are characterized by the dominance of winds from the north and south. The period of winds from the north-west, west, and north-east directions in total accounts for 40.75% every year, but the share of south, north, and north-west winds is 32.09%. The northerly wind is characterized by especially significant repeatability -

17.51%. A very high percentage of calms - 14.85%.

Ice phenomena on the Danube are not observed every year. Winters here are relatively mild - the average monthly air temperature of the coldest month (January) is -2° C. In colder winters, ice appears at the top of the river delta (on average 4 - 9.01), then spreads for 2 - 3 days in the entire estuarine region. The duration of the autumn ice movement, which is accompanied, most often, by the formation of ice jams, can be from one to 20 - 25 days. Ice formation lasting more than 5 days is formed only in 50% of cases. The ice thickness on the main branches of the delta does not exceed 25-35 cm. The destruction of the ice cover begins in February, at the beginning of March the river is cleared of ice. In recent years, in order to continue navigation and reduce traffic jams, the ice cover on the Danube and in the arms of the delta has been destroyed artificially, which leaves a noticeable mark on the ice regime of the river [3].

## 2.3 Hydrochemical mode

The hydrochemical regime of the Ukrainian section of the Danube is formed under the impact of its internal water flow, the vital activity of aquatic organisms and wastewater from industrial enterprises, agriculture and settlements. Many ingredients of the hydrochemical regime are inversely related to the amount of river flow.

The main factor in the formation of seasonal dynamics of water mineralization is the water flow of the river. According to the dominance of ions, the water of the Ukrainian section of the Danube belongs to the hydrocarbonate class of the calcium group. In the arms of the delta, the concentration of calcium fluctuates no more than 28 - 60 mg/l. The largest amount of magnesium is found in the mouth of the Prut, up to 23 mg/l, in the middle part of the river - 13 - 16, in the arms of the delta - 8 - 26 mg/l. Seasonal dynamics is characterized by a minimum content in spring and an increase towards winter.

Concentrations of carbonate ion are small: 3 - 24 mg/l. It occurs at pH 7.6 - 7.8 and is accompanied by a decrease in the amount of hydrocarbons to 160 - 180 mg/l [4].

The sulfate ion concentration also varies widely in the area with maximum values at the mouth of the Prut (up to 120 mg/l). Its content fluctuates significantly throughout the year within the limits of one point of observation. So, in the Vylkove area it was distributed as follows: in March – 92.2 mg/l, May – 55.2, June – 70.1, August – 46.4, October – 48.5 mg/l. Its maintenance is influenced, in addition to the water flow of the river, by the influx of phenomena from the Black Sea.

In the distribution of chlorides, there is an increasing trend from the Reni to the mouth of the river is observed, which is mainly due to the impact of the sea. Because of this, their seasonal dynamics are unstable.

The oxygen saturation of the water flow varies greatly down the river from the Reni to the

Black Sea. Calculations of oxygen flows in the Reni, Izmail and Vylkove reservoirs showed that despite some qualitative differences caused by their transformation downstream, they directly depend on the change in the volume of the river flow.

Ecological observations of Ukrainian scientific center of Ecology of Sea (UkrSCES) in 2020 allow us to state that the content of total nitrogen in the water area ranged from 0.486 mg/dm³ to 1.6280 mg/dm³, total organic phosphorus – from 0.0141 mg/dm³ to 0.0595 mg/dm³ (Table 2.1).

Table. 2.1. Hydrochemical indicators in the water of the Danube estuary area [5]

| Ingredient-indicator, mg/ dm³ | Approach channel, fluctuations (average) |
|---|---|
| $PO_4^{3-}$ | 0.0 – 0.0526 (0.0173) |
| Porg | 0.0141 – 0.0595 (0.0290) |
| $NH_4^+$ | 0.0 – 0.0142 (0.0042) |
| $NO_2^-$ | 0.0017 – 0.0242 (0.0099) |
| $NO_3^-$ | 0.0485 – 1.2110 (0.4579) |
| Norg | 0.4860 – 1.6280 (1.0811) |
| $SiO_3^{2-}$ | 0.1520 – 2.7920 (1.1415) |
| Salinity, ‰ | 0.0 - 2.6 |
| Oxygen mg/dm³ | 6.20 – 9.30 |
| Biochemical oxygen demand5, mg O/ dm³ | 2.73 – 3.29 |
| pH | 8.19 |
| Suspended substances | 93 - 242 |

The materials of the Danube Hydrometeorological Observatory for a 20-year period show that the turbidity of water in the branches of the Kiliia delta is characterized by lower values: in the Kiliia arm in Vylkove it is 158 g/m³, in the Starostambulske arm — 161, in the Prorva arm - 172 g/m³. The average turbidity of the Danube water in the Vylkove area can vary from 93 to 242 g/m³; the highest monthly average value of turbidity in this body can reach 800 g/m³ (October), the lowest – 16.6 g/m² (November). The range of fluctuations in daily values of water turbidity in the Danube Delta is exceptionally wide - from a few grams to 2-3 kg/m of water.

The main hydrochemical parameters of water masses are given in table 2.1.

The analysis of the spatial distribution of hydrochemical parameters shows that the research water area can be classified as anthropogenic-eutrophic and characterized by a high content of biogenic substances with a predominance of their organic forms.

## 2.4. Hydrobiological conditions of the Danube River

**Phytoplankton**. In the waters of the Danube River, diatoms have the greatest species diversity, accounting for 64% of the floristic composition [6]. Among the most common diatoms

with a duration of 48-78% are freshwater *Cyclolella kuetzingiana Thw., C. meneghniana Kutz.,* Melosira granulata (Ehr.) Ralfs., *M varians Ag., Synedra acus Kutz., S. acus van radians* (Kutz) Hust. The representatives of marine flora *Sceletonema costatum (Grev.) CI., Cerataulina pelagica Perag* are much less common.

Green algae are represented by widespread *Scenedesmus quadricauda* (Turp.) Brebsl., *Ankistrodesmus arcuatus* Korch., *Kirchneriella lunaris* (SchmicUe) Bohl., in terms of the number of species they rank second after diatoms. In total, up to 67 taxons were found in the Danube and its arms, and up to 48 intraspecific taxons of algae in the Danubian water bodies. In the Danube, the floristic spectrum of diatoms is up to 62%, in the Danubian water bodies - up to 58.3%, green algae - 29% and 25%, respectively, blue-green algae - 7.5% and 6.2%. The species diversity of the phytoplankton of the delta and the avandelta differ. *Fragillaria crotonensis Kitt., Fr. virescens Ralfs., Nitzschia lorenziana Gran, M. varians Ag* were found only in the delta.

Indicators of the quantitative development of phytoplankton in the Danube, in the Yalpug and Kugurluy lakes varied widely: the number - from 3.0 million cells/m³ to 11.0 billion cells/m³, biomass - from 4.2 to 3687.6 mg/m³. The maximum number was achieved due to small cells of blue-green algae. In the upper part of the river at the Reni river crossing, as well as in the Yalpuh and Kuhurlui Danubian water bodies near the Romanian shore, the number (10.0 million cells/m³) of phytoplankton was an order of magnitude lower, and the biomass was 4.5 times smaller than in other areas of the section. The average values of the number and biomass of diatoms (respectively, 92.6 and 93.3%) in the lakes were close and grew on the rush of the river.

An increase in the number of phytoplankton with the dominance of diatoms (98.7% of the number and 98.0% of the biomass) was noted on the Izmail crosspiece. Downstream of the Danube and in the estuaries of the Kiliia region, the number reached 410.0 million cells/m$^3$, biomass - 158.7 - 1055.8 mg/m³. These values can vary widely. The increased amount of phytoplankton in these areas is associated with the intensive development of freshwater diatoms *Stephanodiscus hantzeshii Gran* (93.6 million cells/m$^3$ - number and 65.6 mg/m³ - biomass) and brackish water *Diatoma elongatum* (Lyngb.) Ag. (86.4 million cells/m³ and 121.0 mg/m³, respectively).

In the greater part of the Kiliia section of the delta, where phytoplankton was distributed almost uniformly, the role of algae belonging to different systematic divisions is not the same. The spatial distribution of the number and biomass of diatoms and greens often acquired an inverse relationship.

In recent years, a decrease in the number of phytoplankton has been observed in the Danube Delta, which could be a consequence of a change in the hydrochemical regime of the Danube Delta and avandelta, which is associated with a significant decrease in the concentration of mineral forms of nitrogen [6].

According to research results, in 2000 [6] the average number of phytoplankton in the area

of Izmail was 447.0 million cells/m³, biomass - 524.4 mg/m³.

The intensity of phytoplankton development is also directly dependent on the amount of water turbidity, since finely dispersed mineral suspension prevents penetration of solar energy to the water column. In addition, the suspension, having a mechanical effect on the pelagic cells, contributes to their sedimentation in the bottom layers. Degree of turbidity of Danube waters increases in the spring, during the flood period. In April, an extremely high content of suspended substance in river water is observed not only in connection with hydrodynamic factors, but also due to the removal of a large amount of allochthonous organic substance. In addition to this factor, the decrease in the number and biomass of phytoplankton, compared to previous years, can be explained by the high level of pollution. The high content of metals and allochthonous organic substance in the water can be attributed to the factors of suppression of phytoplankton, especially in the delta.

***Zooplankton***. Zooplankton of the Danube within Ukraine is characterized by significant diversity of species. Its structure can include more than 82 taxons [7]. The basis of structure of plankton group is represented by rotifers and cyclopedias. There are such species of calanoida as *Eurytemora vefox* Lilleborg and *Diaptomus gracilis* Sars. Harpacticoida are also available. Representatives of the epibiotic Ponto-Caspian fauna *Heterocope caspia* G.O. Sars and *Calanipeda aquae-dulcis* Kritshagiii are absent in this part.

Zooplankton of the Danube usually has copepodit character. The total number of zooplankton of the riverbed part in average is 44.3 ths. specimen/m³, biomass – 241.52 mg/m³, at the delta: number – 35.4 ths. specimen/m³, biomass– 193.2 mg/m³. Both in the riverbed part and in the delta, the rotifers prevail in number. At the riverbed part their share is 72.7%, at the delta – 70.0%. In both parts, the copepods prevail by biomass: riverbed part - 65.7%, delta – 66.2%. The average number of zooplankton of riverbed part and delta in average is 39.8 ths. specimen/m³, biomass – 217.36 mg/m³ [8]. Analysis of the development of zooplankton shows that the formation of river zooplankton is mainly influenced by water content. In years of abundant water, the development of zooplankton increases. However, despite the fact that in some years (spring 2000) high water content is observed, such a trend in the development of zooplankton was not noted. In the spring period in the early 1980s, both in terms of number and biomass, rotifers prevailed. From the dominant species of zooplankton the rotifers were mentioned such as *Brachionis calyciflorus* Pallas and *Asplanchna priodonta* Gosse, from the copepods - *Acanthocyclops robustus* (Sars). At the high development of *Br. calyciflorus* the dominant place was taken by rotifers of Keratella genus: *K. quadrata* (Muller), *K. q. dispersa* and *K. cochlearis* (Gosse). With a high diversity of rotifers in the structure of the river community in certain years (2000), the main role belonged to a few species: *Br. Calyciflorus* Pallas, *Br. canuroeiformis* Brehm, *A. priodonta* Gosse, *A. herricki de Guerne, K. quadrata* (Muller), *K q. dispersa*. Among the diplostraca the *Daphnia lonqispina* O.F.Muller, *Simocephalus vet*ulus O.F. Muller, *Chydorus*

*sphaericu* O.F. Muller, *Bosmina longirostris* O.F. Muller dominated.

Together with the representatives of zooplankton syrton organisms are registered in the river: larvae of insects and molluscs, nematode etc. The total numbers and biomass of this group of hydrobionts are not very significant. They averaged no more than 1%.

The fact that the number of larvae of the Dreissena mollusk in plankton significantly decreased, which in abundant water period could be up to 13% of the total number is noteworthy, the presence in the plankton of the dead larvae of Ostracoda increased. They are found already dead with open valves. Thus, in the Izmail area, in some years, up to 100% of dead larvae were found.

Molluscs at an earlier stage of development (veliger) are found in small quantities and have a "non-viable" appearance.

The development of zooplankton in different parts of the river is not uniform. In the Izmail area, as a rule, indicators of numbers and biomass are at an average level. The development of zooplankton in the Danube can vary significantly. As for example, on May of low-water 1998, in the channel area the total amount of zooplankton was 4.5 ths. specimen/$m^3$, biomass – 70.24 mg/$m^3$ [8]. In that area in all cases, the tendency of dominance in the community of rotifers and copepods remains.

Therefore, taking into account the above, it should be assumed that the zooplankton of the Danube within the borders of Ukraine is characterized by a large species diversity, the increase in biomass occurs due to the development, mainly, of the copepodite complex.

Average number of zooplankton of riverbed part is 39.8 ths. specimen/$m^3$, biomass – 217.36 mg/$m^3$. A group change was noted in the development of the zooplankton of the river. In all areas of the riverbed part of the river and the delta, rotifers dominate in number, and copepods dominate in biomass.

***Zoobenthos.*** Individual areas of the Danube River within Ukraine differ from each other in terms of flow speed, mineralization, depth, nature of bottom sediments, which are related to the sedimentation of suspended material, the level of pollution and other factors. As a result, the benthic fauna population differs in its qualitative composition, the ratio of numbers and biomass of the main systematic, ecological and trophic groups, the degree of dominance of the main species, the size composition of populations of dominant species of bivalve molluscs, and the spatial distribution of the quantitative characteristics of benthic invertebrates.

Up to 14 species of benthic invertebrates have been noted along the Izmail-Reni dam – one of worms and one of arachnids, molluscs – 4, crustacean - 2, insects (larvae and imago) - 6 The average number of benthos reaches 5000.0 specimen/$m^2$, biomass – 11.94 g/$m^2$. On the areas of river where the gastropods are found, the biomass can reach 20.08 g/$m^2$. Among the main systematic groups by the number of taxons (6) and density (65.6%) insects dominate, by the biomass (74.7%) – molluscs [9].

The amount of taxons of protoaquatic and secondary animals is almost the same, by number (65.6%) secondary organisms prevailed, by biomass (84.4%) – protoaquatic ones. The representatives of infauna in many times prevail over the animals of the epifauna, accounting for 75.0% of the number of species, 99.1% of the number and 83.6% of the biomass. The most wide-spread are mosquito larvae - 59.6% of the density of the entire benthos. At the same time, their biomass is only 9.7%, since the average mass of a specimen is small - about 0.0004 g. The highest biomass (64.3%) is noted in the gastropod molluscs *Bithynia tentaculata* L.

The number of taxons (85.7%) and biomass (88.6%) is dominated by representatives of the epifauna, and by the number (63.6%) - invertebrate of infauna.

Among the trophic groups detritivores dominate by density (64.4%), by biomass (78.7%) – plant-detritus forms.

The biomass of benthos significantly varies by years, seasons and areas of the river. In the recent years extreme decrease of number indicators of benthos is determined in the Kiliia area of the Danube more than of an order. If in the 80s the number of benthos reached 11.7 ths. specimen/m², biomass 36.7 g/m², then in 2000s these values decreased to 205.0 specimen/m² and 1.43 g/m² respectively [9]. The number of oligochaetes and molluscs reduced significantly, which have created the main biomass of the benthos and have determined high food capacity of river at the Kiliia area of the Danube.

Thus, the quality composition of the benthic fauna of the Danube river in the area of Izmail port is poor and is represented mainly by larvae of insects (chironomidaes), oligochaetes and benthic crustacean (gammaridaes, mysida and others) [10].

The average biomass of forage organisms living in the Danube River in the area of dredging works is shown in Table 2.2.

Table 2.2 – The average biomass of forage organisms in the Danube River in the area of dredging works

| The name of water body | Biomass of forage organisms | | |
|---|---|---|---|
| | Phytoplankton, g/m³ | Zooplankton, g/m³ | Zoobenthos, g/m² |
| Danube river | 0.524 | 0.217 | 1.43 |

## 2.5 Ichthyofauna and fishery significance of the works area

One of the main factors that determine the conditions for fish reproduction is the river level regime. In connection with the construction of dams, not only a part of spawning grounds in the Danube was lost, but also the flood decreased, which led to the deterioration of spawning conditions. Currently, the spawning of ordinary fish mainly takes place in the Kiliia mouth of

the delta. Shrubs of soft aquatic vegetation are concentrated here, which is a spawning substrate of phytophilous fish species [11]. Along the entire length of the Ukrainian section of the Danube River, there are small meadows flooded with water where carp, crucian carp, bream, zander and others spawn.

In addition to anthropogenic eutrophication and pollution of the Danube waters, the state of fishing in the delta was significantly affected by the regulation of the river's flow and the arrangement of the banks with dams, which significantly worsened the natural spawning conditions of many fish species.

The terms of fish spawning in the Danube River are similar to those in the Danubian water bodies. Their change occurs depending on the hydrometeorological conditions of the year. The success of spawning largely depends on the water content of the year. The biology of species living in the Danube River is described in the handbook [12]. Usually on February-March the northern pike *Esox luceus* (Linnaeus, 1758) already spawns. On the third decade of March - second decade of April at the temperature of water 10 – 11 °C, the highest intensity of spawning of European perch *Perca fluviatilis* (Linnaeus, 1758) is observed. Later the reproduction of common roach *Rutilus rutilus* (Linnaeus, 1758) and zander *Sander licioperca* (Linnaeus, 1758) occurs. Common bream *Abramis brama* (Linnaeus, 1758) spawns at the higher indicators of temperature of water – from 14 to 17 °C. After its heating to the 16 - 17 °C the spawning of crucian carp, golden or silver crucian carp *Carassius carassius* (Linnaeus, 1758), *C. gibelio* (Bloch, 1782) and European carp *Cyprinus carpio* (Linnaeus, 1758) begins. These species have a very extended, portioned spawning, which often continues throughout the summer.

In the aboriginal fauna of the Danube River, there are three main groups of fish with different types of reproduction:

- pelagophils (Black Sea and Azov Sea herring, sabrefish);
- litophils (sturgeon, starry sturgeon, sterlet, vimba, aspius etc.);
- phytophils (roach, bream, carp, crucian carp etc.).

In response to the change in reproduction conditions due to the construction of dams, many populations of phytophils fish showed ecological flexibility and adapted to spawning in the river bed on new substrates.

Spawning grounds of crucian carp usually is situated on areas or river with slow current and in the backwater with a ditch water. For spawning, it chooses shallow coastal areas with a depth of about 0.5 m, with a more or less muddy bottom and shrubs of aquatic vegetation - arrowhead, typha, pondweed etc., or flooded areas with ground vegetation of reedbed.

Spawning of common bream largely depends on the spring flood, spawning duration and size depend on it. In conditions of significant fluctuation of the river level, the *bream* has mastered new spawning areas at the greatest depths of the river. At the same time, a small part of the spawning herd of common bream spawns in the riverbed part of the Danube delta, and a

significant part - in the reedbed system.

For European carp, spawning sites are usually shallow, well-warmed areas of water bodies, characterized by a weak current, with a hard or slightly muddy bottom, which is covered with soft or hard aquatic vegetation, or flooded with meadow vegetation. At the lower part of the Danube river spawning grounds for European carp are flooded with meltwater areas of reedbed with well-developed vegetation namely grass, sedge, pondweed etc.

Sabrefish Pelecus cultratus (Linnaeus, 1758) spawns at the temperature of water 11 - 12°C. The spawning conditions of sabrefish are very peculiar. It can spawn both in the riverbed part and in the reedbed, laying eggs on vegetation. This species uses the so-called spawning grounds of the first and second type. Spawning sites of the first type are used with a high water level, when there are available flooded areas of reedbed at a depth of 20 - 50 cm. The second type - spawning in the riverbed of the river at a depth of up to 3 - 4 m - takes place at a low water level.

Zander spawns near the shores, in shallow water places where there are tree roots, flooded fragments of branches, dead but not rotted vegetation.

Spawning of the perch occurs in places with a weak current, or, in the absence of a current, in those places where there are hard aquatic vegetation, roots, branches of flooded bushes. Vegetation is not only a substrate for spawning, but also contributes to the spawning process of *perch*.

The northern pike spawns in shallow water and in flooded sections of reedbed, spaces with meadow vegetation. Northern pike eggs is laid into the bottom layer, on river and flooded meadow vegetation.

White bream *Blicca bjoerkna* (Linnaeus, 1758) spawns on May – the beginning of June. The spawning grounds of white bream - small bays with flooded or soft underwater vegetation.

Rudd spawns in late May and in June in bays, lakes or areas with a weak current. Spawning takes place in reed bushes.

Common roach spawns from early April to early May. Spawning takes place near the shore. Substrates for spawning can be different - aquatic vegetation, roots, flooded trees, in the absence of plant substrates - stones.

There is a fairly strong current in the dredging area, and most of the ordinary fish spawn in quiet areas, backwaters, and creeks. Therefore, spawning practically does not take place there.

Spawning of migratory fish (herrings and sturgeon species of fish) occurs far away from the Danube mouth area. For reproduction, fish overcome distances of about 600 km.

Gobiidae (round goby – *Neogobius melanostomus*, monkey goby – *N. fluviatilis*). The biggest length of body 25 cm, usually up to 20 cm, weight 140 g, usually 90 - 100 g; monkey goby - 20 cm, usually up to 15 cm, weight 70 g, usually up to 40 - 50 g, duration of life 5 - 6 years. During reproduction, the color of the males round goby turns black, and the fins also darken, which have a light border on the edges.

Adheres to areas with muddy shelly, sandy, or pebbly soil, but generally avoids clean rocky or muddy soils and thickets of underwater vegetation. Lives at depths from 1 - 2 m to 10 - 15 (17) m, sometimes up to 30 m; usually migrates to greater depths after spawning and in the cold season. Spawning is portioned, begins at a water temperature of 9-10°C, its peak falls on a water temperature of 15-16°C.

Youngstock feed on plankton with a gradual transition to consumption of benthos (worms, crustaceans, insect larvae, small molluscs, etc.). Large individuals feed mainly on molluscs, which make up 90% of their diet, other benthic invertebrates and young fish. In the area, the works are not of industrial importance.

Roach - *Rutilus heckelii* (Linnaeus, 1758). Spawns from early April to early May. Spawning takes place near the shore. Substrates for spawning can be different - aquatic vegetation, roots, flooded trees, in the absence of plant substrates - stones.

Herring. Danube river herring *Alosa caspia nordmanni* Antipa, 1904. A pelagic schooling migratory fish that lives in the sea and enters fresh water to reproduce. Spring migration from March, at a water temperature of 6° C, most intensively at 13-17° C, until the end of April, when it enters the estuaries of rivers. It reaches sexual maturity at the age of one year with a length of 11-13 cm and a weight of 25-30 g. Spawning is from the end of April - the beginning of May to the end of June, at a water temperature of 13 - 22° C, on the area with weak flowing or ditch water, but clear water and sandy, or sandy and muddy soil. Egg is spawned on the surface layers of water.

Spawning of migratory fish (herrings and sturgeon types of fish) occurs not less than 600 km from the Danube mouth area.

# 3 ASSESSMENT OF THE ACTUAL IMPACT OF HYDROTECHNICAL WORKS

## 3.1.Impact on aquatic biological resources

When conducting dredging works in the operational water area of the river port (terminal) of NIBULON LLC within the water area of the Izmail sea port, the impact on the biotic and abiotic environment of the Danube River will be temporary.

The impact of dredging operations on mature individuals of fish is insignificant, as they can avoid areas with increased turbidity, chemical pollution, noise disturbances, etc. The planned works can have the most significant negative effect on hydrobionts, which serve as food objects for fish. The temporary effect of dredging will be manifested directly in the process of exavation soil during the operation of hydrotechnical means (Watermaster Classic IV and the self-propelled dredging vessel (dredge), the formation of suspension in the water column during the operation of the grab floating crane (cleaning of the soil near the berth). Increased man-made turbidity can lead to changes in thermal conductivity, optical properties of water, deterioration of the breathing conditions of hydrobionts, mechanical damage to their coverings, and can lead to the complete or partial death of pelagic and benthic forms of invertebrates. The damage caused to living water resources during the works will be due to the death of forage organisms for fish. As a result of complete destruction of benthic biocenoses in the area of dredging, partial silting of benthic communities in adjacent water areas, death of zooplankton in the zone of increased man-made turbidity, which is formed in the process of soil development.

An analysis of the mode of operational dredging of the Danube River in recent years has shown that the benthic communities affected areas remain sufficiently high. Previous studies have shown that dredging does not have a negative effect on bottom biocenoses of adjacent areas and their plankton complexes. The negative effect is expressed in the removal of benthic organisms together with the soil, but the species composition and partly the biomass of the zoobenthos in the areas, after the completion of the works, are restored after some time. The registered recovery rate of benthos communities after dredging works, according to foreign researchers [13], is: riverbed muddy soil – 6 months; lagoon muddy soil – up to 11 months; muddy soil-sand – 18 months; sand-gravel – 2 - 3 years. In the area with high variability of bottom precipitation, the effect of dredging operations was observed for a relatively short period of time. For example, full recovery of benthic communities in the channel and delta of the Wadden Sea near the coast of Holland occurred within one year of removal of bottom sediments in this movable sand area [14]. One of the indicators that has a direct impact on the state of fish stocks in the Danube section (within the river port (terminal) in Izmail) is dredging in the operational water area of the water body.

Carrying out dredging works with a further assessment of the impact on the state of fish stocks in the Danube River during the construction of a cargo berth will be considered from the destruction of forage organisms (plankton and benthos), as well as eggs and young fish in areas of the operational water area and areas of the spread of mud flow in the zone of increased turbidity.

### 3.1.1 Methodology for calculating damage due to the death of forage organisms

Dredging works are carried out according to the planned procedure, after obtaining appropriate permits and in compliance with the requirements of environmental protection legislation. In our case, dredging works are being considered with the possibility of working during the period of special ban during spawning on fishing in the Danube River (until June 5, 2022).

The "Temporary damage assessment method" will be used to assess fishery damage [15]. In connection with the fact that during the works the object of negative action is the forage base of fish, the amount of damage in natural value is calculated according to the formula:

$$N = n_o \times P/B \times 1/K_2 \times K_3/100 \times F \times 10^{-6}, \quad (3.1)$$

where: N – value of damage due to the death of forage organisms, t;

F - volume, affected area, $m^2$, $m^3$;

P/B - coefficient for the conversion of the biomass of forage organisms into the products of forage organisms;

$n_o$ – average concentration of forage organisms, $g/m^3$ of water;

$K_2$ - forage coefficient for the conversion of products of forage organisms into fish products;

$K_3$ – indicator of limited use of forage base by fish, %;

$10^{-6}$ - multiplier for converting grams to tons.

According to the point 4 of the «Temporary damage assessment method» [15] cost value of damage at capital construction can be determined using calculation of capital investment on implementation of measures compensating for damage to fish stocks. The amount of the compensation payment for the damage is determined by the formula:

$$Ki = \sum_{i=1}^{n} (Mi \times Ki) \times En \times ti,), \quad (3.2)$$

where: Ki – specific capital investment to the objects of this type, ths. UAH;

Mi – capacity of its industrial return, in tons;

En – normative coefficient of economic efficiency of capital investments; the value of the normative coefficient of economic efficiency of capital investments for this object, determined volumes of necessary capital investments.

i – type of measure or object;

$t_i$ – time of negative action on fish stocks.

*Calculation of damage caused to aquatic biological resources.*

Soil development in the water area of the river port (terminal) of NIBULON LLC on the Danube River is planned to be carried out using initially the dredging vessel Watermaster Classic IV self-propelled dredging vessel (dredge) and with the transportation of excavated soil (pulp) using slurry pipelines to the coastal dump (see Appendix B).

During the dredging works, 112 000.00 m³ of soil will be removed at the operating water area of the river port of the NIBULON LLC on the Danube River for the construction of a cargo berth.

Work is carried out on an area of 1 ha up to the 4.0 m mark using a Watermaster Classic IV dredger with a pulp productivity of 600 m³/h. The ratio of soil: water is 1:5, so the amount of water that will be used for pulp formation is 50,000 m3. When performing work with a self-propelled vessel of the SDS 15 project with a pulp productivity of 2400 m³/h, the ratio of soil: water is 1: 6 on an area of 2.2 ha up to the mark 7.32, the amount of water that will go to the formation of pulp is 318,000 m3, and on an area of 2.32 ha up to the mark 8.23 is 162,000 m3.

Thus, the total amount of water that will be used to form the pulp is equal to:

50000 m³ + 318000 m³ + 162000 m³ = 530000 m3

Dredging of the operational water area near the transshipment floating complex of the port will be carried out using a Watermaster Classic dredger with a bucket volume of 1 m³. The rise of the soil to the surface will cause increased turbidity in the water volume of 1840.0 m³ (shoreline length - 460 m, bottom mark - 4.0 m, bucket width - 1 m). In this volume of water, 100% death of planktonic food organisms will occur.

During soil removal (dredging), work is performed on areas with an area of 23,200 m² (until the design depth of 8.23 m is reached). During the development of the soil on the area of 23200.0 m², 100% death of zoobenthos will occur.

The duration of the works (not including the period of preparatory works and possible repair works) is 52 days, with the possibility of works during the ban during spawning until 05.06.2022 (estimated 18 days).

For creating calculation of damage, we use data from table 3.1.

Setting numerical values to the formula, we will get the value of the damage in natural value (52 days).

1. In water and oil mixture and on dredging area (operation of dredges).

Table 3.1 – Parameters of damage calculation, which affects the aquatic biological resources (fishery) by the development of soil of operational water area of river port (terminal) of NIBULON LLC, the Danube river, 2022

| Groups of forage organisms | Average biomass, $g/m^3$ , $g/m^2$ | P/B | $K_3$, % | $K_2$ | Volume, affected area, $m^2$ , $m^3$ |
|---|---|---|---|---|---|
| phytoplankton; 100% damage | 0.524 | 2.0 | 30 | 30 | 530000.0 |
| zooplankton; 100% damage | 0.217 | 2.0 | 30 | 10 | 530000.0 |
| zoobenthos; 100% damage | 1.430 | 4.0 | 45 | 10 | 23200.0 |

$N_1$ (phytoplankton) =0.524 x 2.0 x 1/30 x 30/100 x 530000,0 x 52/240 x 10-6 = 0.0012 t;

$N_1$ (zooplankton) = 0.217 x 2.0 x 1/10 x 30/100 x 530000.0 x 52/240 x 10-6 = 0.00150 t;

$N_1$ (benthos) = 1.430 x 4.0 x 1/10 x 45/100 x 1 x 23200.0 x 52/240 x 10-6 = 0.00129 t;

2. Turbidity near the berths (operation of grab floating crane).

$N_1$ (phytoplankton) = 0.524 x 2.0 x 1/30 x 30/100 x 1840.0 x 52/240 x 10-6 = 0.000004 t;$N_1$ (zooplankton) = 0.217 x 2.0 x 1/10 x 30/100 x 1840.0 x 52/240 x 10-6 = 0.000005;

The damage in natural value, taking into account the period of restoration of planktonic and benthic communities, will be:

$N_1$ plankton =(0.0012 т + 0.00150 т + 0.000004 т + 0.000005 т) x 1.0 = 0.002709 t.

$N_1$ benthos = 0.00129 т x 2.0 = 0.00258 t.

Total $N_1$ development = 0.002709 т + 0.00258 т = 0.005289 t

At the *spawning period* (18 days). The estimated volume of extracted soil is 232632.0 $m^3$ (takin into account 2154 $m^3$/day and ratio of soil and water 1:6). Setting numerical values to the formula, we will get the value of the damage in natural value:

$N_1$ (phytoplankton) = 0.524 x2.0x1/30x 30/100 x 232632.0 x18/240x10-6 = 0.00018 t;

$N_1$ (zooplankton) = 0.217 x 2.0 x 1/10 x 30/100 x 232632.0 x 18/240 x $10^{-6}$ = 0.00023 t;

$N_1$ (benthos) = 1.430 x 4.0 x 1/10 x 45/100 x 1 x 16200.0 x 18/240 x $10^{-6}$ = 0.00031 t;

2. Turbidity near the berths (operation of grab floating crane).

$N_1$ (phytoplankton) = 0.524 x 2.0 x 1/30 x 30/100 x 3786.0 x 18/240 x $10^{-6}$ = 0.000003 t;

$N_1$ (zooplankton) = 0.217 x 2.0 x 1/10 x 30/100 x 3786.0 x 18/240 x $10^{-6}$ = 0.000004 t;

The damage in natural value, taking into account the period of restoration of planktonic and benthic communities, will be:

$N_1$ plankton = (0.00018 t + 0.00023 t + 0.000003 t + 0.000004 t) x 1.0 = 0.000417 t.

$N_1$ benthos = 0.00031 t x 2.0 = 0.00062 t.

Total $N_1$ development = 0.000417 t + 0.00062 t = 0.001037 t

During the operation of the grab floating crane, which is involved in erasure works near the berths, the integrity of the river soil is disturbed, the amount of which will enter a suspended state and will begin to spread downstream and deposit to the adjacent areas of the bottom of the water body.

As a result of the deposition of small particles, siltation will appear - an unfavorable factor for the life of forage organisms, which leads to the death of phytoplankton, zooplankton and zoobenthos.

The siltation area is calculated based on the size of the particles up to 0.05 mm, because their removal during the work will be maximum.

The distance of removal of suspended substance or the distance at which suspended solids will deposit to the bottom (the length of the turbidity plume) is determined by the formula:

$$L_p = \frac{h_{\max} \cdot V_{av}}{\omega_{av}}, \text{ m}$$

where: $h_{max}$ – 8.23m – the depth of dredging;

$V_{av}$ = 0.50 m/s – average speed of current of the Danube river;

$\omega_{av}$ – 0.02889 m / s – the average hydraulic size of suspended substances that is determined according to the Building code B.2.4 - 1-99 (Appendix P recommended).

$$L_p = \frac{4.0 * 0.5}{0.02889} = 69.23\ m$$

Thus, the length of the turbidity plume is 142.44 m

The time of deposition of suspended substances is determined by relation:

$$T = \frac{L_p}{\omega_{av} * 3600}, hours$$

where: $L_p$ -142.44 m – the length of the turbidity plume from the place of discharge of wastewater

$\omega_{av}$ – 0.02889 m/s – the average hydraulic size of suspended substances.

$$T = \frac{69.23}{0.02889 * 3600} = 1\ h$$

Thus, the time of deposition of the turbidity plume is 1.37 h

Calculation of the siltation area is carried out by formula:

$$F = \frac{B1 + B2}{2} * L\ (1)$$

(Typical technological scheme of extraction of sand, gravel, sand and gravel mixtures of the shipping rivers and other water bodies, M, Transport, 1980)

where: $B_1$ - initial flow width equal to the length of the initial mixing zone;

$B_2$ - the width of the water flow at a distance from the zone of initial mixing downstream to the calculated cross section;

L - the distance over which the particles will move.

The width of flow $B_1$ in the area of works is 1.0 m (bucket width). The estimated width of the flow $B_2$ is:

$B_2 = B_1 + 2 \text{ x } L \text{ x } tg13\ ° = 1.0 + 2 \text{ x } 69.23 \text{ x } 0.23 = 32.84$ m

Actually, the width of flow $B_2$ will be smaller because from the left side the water flow with increased turbidity is limited by left bank curtailment. The siltation area is an isosceles trapezoid with height of 69.23 m. The width of upper (smaller) base of the trapezoid is 1.0 m, lower one – 32.84 m. While the length of reduction of flow $B_2$ will be:

$B_{reduction}$ = (32.84 m - 1.0 m) : 2 = 15.92 m

Thus, from the total area of siltation it is necessary to subtract area that is:

S = 15.92 m x 69.23 m : 2 = 551.07 m²

By substituting numerous values into formula 1, we will get the estimated siltation area:

F = (1.0 m + 32.84 m) : 2 x 69.23 m = 1171.37 m².

From the obtained value we need to subtract area which is limited by water curtailment and we will get the actual siltation area:

$F_2$ = 1171.37 m² – 551.07 m²= 620.3 m²

At the average depth of 8.23 m, the area of increased turbidity is 2481.2 m³(620.3 m² x 4.0 m).

$N_2$ (phytoplankton) = 0.524 x 2.0 x 1/30 x 0.3 x 2481.2 м³ x 52/240 x 10-6 = 0.000006t

$N_2$ (zooplankton) = 0.217 x 2.0 x 1/10 x 0.3 x 2481.2 м³ x 52/240 x 10-6 = 0.00000 t

$Nb_2$ (benthos) = 1.43г/м² x 4.0 x 1/10 x 45/100 x 620.3 м² x 52/240 x 10-6 = 0.000035 t

$N_2$ plankton = (0.000006 т + 0.000007 т) x 1.0 = 0.000013 t.

$N_2$ benthos = 0.000035 т x 2.0 = 0.00007 t.

Total $N_2$ siltation = 0.000013 т + 0.00007 т = 0.000083 t

*During spawning period* (18 days):

$N_2$ (phytoplankton) = 0.524 x 2.0 x 1/30 x 0.3 x 20374.2 m³ x 18/240 x $10^{-6}$ = 0.00002t

$N_2$ (zooplankton) = 0.217 x 2.0 x 1/10 x 0.3 x 20374.2 m³ x 18/240 x $10^{-6}$ = 0.00002 t

$Nb_2$ (benthos) = 1.43г/м² x 4.0 x 1/10 x 45/100 x 620.3 м² x 18/240 x 10-6 = 0.000012

t$N_2$ plankton = (0.00002 t + 0.00002 t) x 1.0 = 0.00004 t.

$N_2$ benthos = 0.000012 т x 2.0 = 0.000024 t.

Total $N_2$ siltation = 0.000004 т + 0.000024 т = 0.000028 t

The total damage on the death of forage organisms during dredging works will be:

$\sum_N$ 52 days (benthos + plankton): 0.005289 т + 0.000083 т = 0.005372 t

$\sum_N$ 18 days (benthos + plankton): 0.001037 т + 0.000028 т = 0.001065 t

It is necessary to mention that this damage will be temporary.

3.1.2 Calculation of capital investments for the implementation of measures to prevent damage as a result of the death of forage organisms

According to point 4.2. [15], the adverse impact on fish stocks is not permanent, and its duration is shorter than the regulatory term for the total of capital investments. In this case, the amount of capital investments (K) is determined by formula:

$$K = \sum_{i=1}^{n} (M_i \times K_i) \times E_n \times t_i, \text{ where:}$$

$M_i$ – capacity of industrial return, tones;

$K_i$ – specific capital investments to the objects of this type (UAH per ton of industrial

return);

$E_n$ – normative coefficient of economic effectiveness of capital investments;

$t_i$ – time of the negative impact on fish stocks (year).

The final damage assessment will be based on the death of forage organisms: 0.005372 t (total) and 0.001065 t (in the spawning period).

According to point 4 [15], the cost value of damage can be determined using calculation of capital investments for the implementation of measures that compensate the damage to fish stocks.

According to the calculations of the State institute of Ukraine for design of fisheries enterprises and industry Ukrrybproekt (point 6) the specific capital investments on 1 ton of raw fish reproduction of industrial returns at fish-farming objects-analogs are taken as "Fish farm of herbivorous fish of fish factory the 3-d determinative" of the VI zone of fishing – 548.73 ths. UAH. The coefficient of economic effectiveness – 0.18. As of 2022, specific capital investments per 1 ton of raw fish remained at the level of 2018. (Appendix D).

The expected amounts of compensation payments for the death of forage organisms in terms of cost value will amount to:

$K_1$ = 548.73 ths. UAH/t x 0.005372 т x 0.18 = 530.59 UAH. (total period of work).

$K_2$ = 548.73 ths. UAH/t x 0 0.001065 т x 0.18 = 105.19 UAH. (during the spawning period of work).

Thus, during the implementation of hydrotechnical works (dredging) in the operational water area of the river port in Izmail, Odesa Region, on the Danube River in 2022 the compensation payments will be equal to:

- At the general period of work (52 days) – 530.59UAH;
- At the spawning period of work (18 days - until 05.06.2022) – 105.19 UAH.

3.2 Deterioration of fish reproduction conditions

The operational water area of the river port (terminal) of NIBULON LLC in Izmail, where dredging works will be carried out according to the plan, is a section of the Danube River with a fast current, busy shipping and depths of 8.0 m and more. The aboriginal ichthyofauna of the Danube in its majority, according to the type of reproduction, consists of phytophilous (roach, bream, carp, crucian carp, etc.) and lithophilous (sturgeon, starry sturgeon, sterlet, vimba, aspius, etc.) species. These groups of fish use the warmed shallow waters of backwaters and creeks for spawning, and lay their eggs on aquatic vegetation, roots and stones.

According to the hydrological conditions that are formed in the areas of hydrotechnical works, they are not favorable for the reproduction of the ichthyofauna of the Danube River and are not considered as spawning grounds.

3.2.1 Damage calculation method

According to the plan, the estimated volume of hydrotechnical works (dredging) on the Danube river will be 112000.0 $m^3$.

According to the point 3.b of the «Temporary methods...»[15] the calculation of damage from the local deterioration of spawning, fish-growing or wintering conditions of fish is carried out according to the area method, by equating the affected areas to the area of complete loss of fish productivity according to the formula:

$N = n_o \times W_o \times (100 - K_o)/100 \times K_1/100 \times p \times 10^{-3}$ [15], where:

$n_o$ – the average for the period in which this stage or weight category of the concentration of pelagic eggs, larvae, or early young fish occurs in the area affected by the works, in specimens per cubic meter;

$W_o$ – volume of water affected by the negative impact during this period, $m^3$;

$K_o$ – coefficient (percentage of death of the organisms), %;

$K_1$ – coefficient of industrial return, %;

p – average weight of specimen in the industrial takes, kg;

$10^{-3}$ – multiplier for conversion kilograms into tones.

Based on the peculiarities of the hydrological and hydrochemical conditions of the southern part of the Danube in the water area of the river port of Izmail, Odesa region, the basis of ichthyoplankton is carp and herbivorous fish species, as well as herring [11, 18].

In the zone of influence of dredging works, the death rate of fish fry will be 100%, both for eggs and for early juveniles, in the area of increased turbidity, the death rate of fish eggs and fry will be 25%.

The following data were used when calculating the losses caused to the fishery from the death of ichthyoplankton organisms:

Coefficient of industrial return from eggs, %: carp and herbivorous – 0.01; the Black Sea migratory herring (Danube) – 0.001.

Coefficient of industrial return from larvae, %: carp and the Black Sea migratory herring (Danube) – 0.05; herbivorous – 0.01.

Coefficient of industrial return from juveniles, %: carp and herbivorous – 10.0; the Black Sea migratory herring (Danube) – 3.0.

Estimated volume – 675786.0 $m^3$ (water and soil mixture - 672000.0 $m^3$ and volume of turbidity - 3786 $m^3$), where death of 100% of eggs and larvae will occur.

The daily production capacity of dredges will be about 2154 $m^3$, during the spawning period (18 days) - 38772 $m^3$. The total volume of the pulp will be equal to 232632$m^3$ (1:6), the volume of turbidity - 1840.0 $m^3$, the estimated volume - 234472 $m^3$, where 100% death of fish

eggs and larvae will occur.

The zone of increased turbidity is 2481.2 m³. In this volume, 25% of fish eggs and larvae will die.

By substituting the numerical values into the modified formula, we will get the value of the damage from the work carried out in natural calculation in terms of adult fish individuals (tables 3.2 and 3.3).

Table 3.2 – Expected losses of eggs and juveniles of fish during the general dredging of river port (terminal) of NIBULON LLC, Danube river, 2022

| Fish species | Stage of development | Dead, % | Density, specimen /m$^3$ | Industrial return, % | Volume of affection, m$^3$ | N of dead fish, specimen | P Adult individuals, kg | Losses of fish products,t |
|---|---|---|---|---|---|---|---|---|
| Adding sand | | | | | | | | |
| Carp | Larvae | 100 | 0.01 | 0.0005 | 530000 | 0.027 | 4.000 | 0.00011 |
| Bream | Larvae | 100 | 0.1 | 0.002 | 530000 | 1.06 | 1.330 | 0.00141 |
| Crucian carp | Larvae | 100 | 23.0 | 0.004 | 530000 | 487.6 | 0.480 | 0.23405 |
| Other | Larvae | 100 | 0.3 | 0.0076 | 530000 | 12.084 | 0.300 | 0.00363 |
| Perch | Larvae | 100 | 0.01 | 0.001 | 530000 | 0.053 | 1.400 | 0.00007 |
| Herring | egg | 100 | 0.02 | 0.001 | 530000 | 0.106 | 0.200 | 0.00002 |
| | | | | | | | Total | 0.23929 |
| Turbidity zone | | | | | | | | |
| Carp | Larvae | 25 | 0.01 | 0.0005 | 2481.2 | 0.00003 | 4.000 | 0.00000012 |
| Bream | Larvae | 25 | 0.1 | 0.002 | 2481.2 | 0.0012 | 1.330 | 0.00000160 |
| Crucian carp | Larvae | 25 | 23.0 | 0.004 | 2481.2 | 0.5707 | 0.480 | 0.00027394 |
| Other | Larvae | 25 | 0.3 | 0.0076 | 2481.2 | 0.0141 | 0.300 | 0.00000423 |
| Perch | Larvae | 25 | 0.01 | 0.001 | 2481.2 | 0.0001 | 1.400 | 0.00000014 |
| Herring | egg | 25 | 0.02 | 0.001 | 2481.2 | 0.0001 | 0.200 | 0.00000002 |
| | | | | | | | Total | 0.0002801 |
| Total | | | | | | | | 0.2395701 |

Table 3.3 – Expected losses of eggs and juveniles of fish at the spawning period with dredging of river port (terminal) of NIBULON LLC, Danube river, 2022.

| Fish species | Stage of development | Dead, % | Density, specimen /m$^3$ | Industrial return, % | Volume of affection, m$^3$ | N of dead fish, specimen | P Adult individuals, kg | Losses of fish products,t |
|---|---|---|---|---|---|---|---|---|
| Adding sand | | | | | | | | |
| Carp | Larvae | 100 | 0.01 | 0.0005 | 232632 | 0.012 | 4.000 | 0.00005 |
| Bream | Larvae | 100 | 0.1 | 0.002 | 232632 | 0.465 | 1.330 | 0.00062 |
| Crucian carp | Larvae | 100 | 23.0 | 0.004 | 232632 | 214.021 | 0.480 | 0.10273 |
| Other | Larvae | 100 | 0.3 | 0.0076 | 232632 | 5.304 | 0.300 | 0.00159 |
| Perch | Larvae | 100 | 0.01 | 0.001 | 232632 | 0.023 | 1.400 | 0.00003 |
| Herring | egg | 100 | 0.02 | 0.001 | 232632 | 0.047 | 0.200 | 0.00001 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Total | 0.10503 |
| Turbidity zone | | | | | | | | |
| Carp | larvae | 25 | 0.01 | 0.0005 | 2481.2 | 0.0003 | 4.000 | 0.00000012 |
| Bream | larvae | 25 | 0.1 | 0.002 | 2481.2 | 0.0102 | 1.330 | 0.0000016 |
| Crucian carp | larvae | 25 | 23.0 | 0.004 | 2481.2 | 4.6861 | 0.480 | 0.0002739 |
| Other | larvae | 25 | 0.3 | 0.0076 | 2481.2 | 0.1161 | 0.300 | 0.00000423 |
| Perch | larvae | 25 | 0.01 | 0.001 | 2481.2 | 0.0005 | 1.400 | 0.00000014 |
| Herring | egg | 25 | 0.02 | 0.001 | 2481.2 | 0.001 | 0.200 | 0.00000002 |
| | | | | | | | Total | 0.0002801 |
| Total | | | | | | | | 0.10531 |

### 3.2.2 Calculation of capital investments for the implementation of measures to prevent damage

According to point 4.2. [15], the adverse impact on fish stocks is not permanent, and its duration is less than the regulatory payback period for capital investments. In this case, the amount of capital investments (K) is determined by formula:

$$K = \sum_{i=1}^{n} (M_i \times K_i) \times E_n \times t_i, \text{ where:}$$

$M_i$ – capacity of industrial return, tones;

$K_i$ – specific capital investments to the objects of this type (UAH per ton of industrial return);

$E_n$ – normative coefficient of economic effectiveness of capital investments;

$t_i$ – time of the negative impact on fish stocks (year).

The final assessment of damage from the death of young fish is in the sum:

$\Sigma_1$ damage from deterioration of reproduction conditions during the *period of work* - 0.2395701 t

$\Sigma_2$ damage from deterioration of reproduction conditions during the *period of ban during spawning* - 0.10531 t

According to the calculations of the State institute of Ukraine for design of fisheries enterprises and industry Ukrrybproekt, the specific capital investments on 1 ton of raw fish reproduction of industrial returns at fish-farming objects-analogs are taken as "Fish farm of herbivorous fish of fish factory the 3-d determinative" of the VI zone of fishing – 548.73 ths. UAH at prices in 2022. The coefficient of economic effectiveness – 0.18.

Expected values of compensatory payments for the deterioration of reproduction conditions during the period of works in the form of cost value will be:

- at the general period $K_1$ = 548.73 ths. UAH/t x 0.2395701 т x 0.18 = 23662.67 UAH;

- At the spawning period $K_1$ = 548.73 ths. UAH/t x 0.10531 т x 0.18 = 10401.62UAH

When hydrotechnical works are performed in the operational water area of the river port

(terminal) of NIBULON LLC in Izmail on the Danube River in the spawning period of 2022 (until June 5, 2022), the compensation payment will be equal to UAH **105.19.** (due to the death of the forage base) and UAH **10401.62** (from the death of eggs and young fish), which will amount to UAH **10506.81**.

During the dredging operations, which are carried out *outside the ban during spawning period*, the final assessment of the loss is accepted according to the maximum amount from the estimated value [15] and will be carried out from the death of eggs and young fish -0.2395701 t (death of forage organisms - 0.00564 t) and will be **23662.67** UAH.

Thus, if the works take over the period of the ban during spawning (until 05.06.2022), the amount of the compensation payment will consist of the loss from the death of eggs, larvae and forage organisms:

30363.32 UAH + 116.55 UAH = **23767.86**UAH.

## 3.3 Assessment of the noise impact during hydrotechnical works

Calculations of the noise impact for the dredging period in the operational water area in the river port in Izmail on the Danube river are made based on «Guidelines for the calculation and design of protection populated areas from noise» and State sanitary rules № 173.

The main source of noise during the hydrotechnical works (dredging) in the operational water area of the Danube river are diesel units of the dredger and floating crane.

Noise characteristics of sources of diesel units of the dredger are taken from table 1.12. of «Handbook on noise and vibration protection of residential and public buildings», Kyiv, 1989.

The equivalent noise level created by a dredger at a distance of 25 m from the plane of the board is: LA eq. = 59 dBA.

The decrease in noise level with increasing distance from the source is determined by the formula:

$$\Delta LA = 10 \lg / ro, \text{ dBA}$$

where r - the smallest distance between the calculation point and the acoustic center of the sound flow from technical means, m; ro – 25 m distance, where equivalent noise level is 59 dBA.

At the coastal zone: $\Delta LA = 10\lg 50/25 = 10 \times 0.301 = 3$ (dBA).

At the residential area: $\Delta LA = 10\lg 1000/25 = 10 \times 1.602 = 16$ (dBA).

The reduction of the noise level due to its absorption by a layer of atmospheric air is determined by the formula:

$$\Delta L_B = 5r / 1000, \text{ dBA}$$

At the coastal zone: $\Delta L_B = 5 \times 50/1000 = 0.25$ dBA.

At the residential area: $\Delta L_B = 5 \times 1000/1000 = 5.0$ dBA.

The total noise reduction is:

- At the coastal zone – 3.25 dBA;

- At the residential area - 16 + 5 = 21.0 dBA.

The level of the noise pressure on the coast taking into account reduction will be:

- At the coastal zone: 59 – 3.25 = 55.75 dBA;

- At the residential area: 59 – 21.0 = 38.0 dBA

Given the fact that in the calculations the distance to the shore is taken from the minimum (50 m), and in fact it is from 50 to 100 m, it can be assumed that the sound pressure level in the residential part corresponds to the normative indicator for residential areas of settlements during the day (55 dBA), and at night it will be much lower. In addition, the existing vegetation strips along the waterway are 5 ... 200 m wide and include: reed, narrow-leaved cattail, lake reed, slim sedge, white willow, snap willow and almond-leaved willow. Reed plays the main role in noise insulation.

# 4 RECOMMENDATIONS ON MINIMIZING WORK ACTIONS

The analysis of man-made impact on biological resources during the implementation of hydrotechnical works (dredging) in the operational water area of the river port in Izmail, Odesa region, on the Danube river and putting the soil to the coastal dump with the help of a suction pump through the pipeline shows the presence negative of effects on the water ecosystems of the Danube delta. The development of dredging soils, of course, have an impact on water ecosystems. First of all, the quality of river water is changed, albeit short-term, as a result of an increase in the content of suspended substances in the water, transferred from the bottom sediments into the water environment in the process of soil excavation. Therefore, the main parameters for the state of the changing water environment during dredging are the hydrochemical regime,conditions of living of aquatic organisms and redistribution of bottom sediments. The effect of dredging on the hydrochemical regime is determined by the chemical composition of the soils, the soil volume, which is developed. As a result of these processes, there can be secondary pollution of water masses with toxic pollutants, leading to a deterioration in water quality. Analysis of soil pollution level of dredging has shown that deterioration of water quality in the process of hydrotechnical works (dredging of water area during the construction of cargo berth), as a result of the introduction of toxicants into the river environment (heavy metals, oil products, chlor-organic compounds) will not be significant, in particular because the soils that are excavated, according to the Azov-Black Sea basin dredging soil classification, belong mainly to classes A - II.

Excessive slurry entering the water as a result of dredging is one of the main factors of negative impact on hydrobionts and the condition of recreational areas. The influence of slurry on hydrobionts is caused by purely mechanical reasons - clogging of fish gills, destruction of benthic animals and by other causes that lead to changes in the natural normal living conditions of biocenoses. The decrease transparency of water as a result of the turbidity of water leads to a decrease in the level of primary products. The introduction of suspensions into water objects at insignificant distances from recreational areas can lead to a decrease in water quality and natural bottom sediments (silting of sandy beaches). The shape of the suspension cloud, its size and the period of viability mainly depend on the hydrological regime of the researched water body.

Hydrodynamic conditions, in turn, depend on wind activity, shoreline ruggedness and bottom topography. Rapid change of synoptic situations, can several times change the speed of the current during the period of dredging. Therefore, the spread of the suspension cloud from working suction pumps is probable at any distance.

The impact of operational dredging on biological resources occurs both directly through the destruction of the biocenosis in the dredged area and indirectly through an increase in the turbidity of bottom sediments in the area adjacent to the dredged territory in the water area. As a

result, there is a siltation of benthic organisms, simultaneously with decrease of transparency and increase of content of suspended substances in the water environment, there is death of forage organisms for fish, and also for a short period of time, the development of phytoplankton in the area of carrying out works is stopped. Certainly, the effects of dredging on benthic organisms can be felt for more than a year.

For benthos and plankton in the siltation area, the negative impact is limited to the timing of the works. Studies have shown that during the observance of technological regulations of dredging, intensive restoration processes of the benthic community are taking place within a year.

Thus, realization of dredging leads to change of place of existence of hydrobionts, violation of conditions of reproduction of ichthyofauna, occurrence of barriers on ways of migration of organisms, elimination or restriction of their forage base. A set of measures to ensure the regulatory state of the environment during the process of development of dredging of water areas should include preparatory, protective, compensation and security measures.

Preparatory measures:

– the optimal choice of technical means for carrying out dredging;

– It is recommended to carry out works in water areas where soils belong mainly to the first, second or third group of soil development difficulty, involving the shore dump for the collection of extracted soil, which reduces the siltation of the water area and undoubtedly reduces the pressure on the ecosystem of the water body;

The protective measures include the following organizational and technical measures provided for at the design stage:

– conducting of dredging works in strict accordance with safety rules in construction. Rules of safety and industrial sanitation during the implementation of dredging works performed by the technical fleet;

– before the implementation of dredging works, carrying out of trawling or diving examination of the deep areas, with the purpose of revealing explosive objects, interference, which can cause damage of technical means and as a result, threat to life and health of personnel;

– during detection of explosive objects on the site of dredging works, the emission from the soil of harmful gases to the human body, works are immediately stopped to eliminate sources of danger and obtain permission of the relevant bodies;

– the strict implementation of measures on environmental protection, to prevent pollution of the water surface with fuel and oil materials;

– to reduce soil erosion and expansion of the area of spreading suspension, the dredging work are immediately stopped in the period of adverse weather conditions.

Compensatory measures include monetary compensation for the environmental damage

caused to aquatic living resources, as a result of the deterioration of the conditions of fish-growing period and reproduction.

Security measures.

In order to reduce the negative impact of dredging works on the state of biological resources on the operational water area of the river port in Izmail, the Danube, and taking into account the biology of the main industrial objects, ways and terms of their migration to places of spawning, in order to minimize the negative impact of economic activity on the state of the biological resources of the Danube basin - to limit the performance of hydrotechnical works during the period of mass spawning of the main industrial fish to the necessary minimum.

In case of urgent need to carry out hydrotechnical works during prohibited spawning periods the works are carried out in accordance with the Scientific and Biological Substantiation "Assessment of the impact of hydrotechnical works on the state of fish stocks of the Danube River during construction of the cargo berth with operational water area of the river port in Izmail, Odesa region (during spawning)" after agreement with the State Agency of Meliorations and Fisheries of Ukraine. Final impact of the dredging action on the ecosystem state is determined by the implementation of the integrated monitoring of the hydrotechnical works.

# CONCLUSIONS

The cargo berth of the River port (terminal) of NIBULON LLC is building within the water area of the SEAPORT of Izmail.

Considering the location of the planned activities and following the provisions of Resolution № 552 of the Cabinet of Ministers of Ukraine dated 22 May 1996 "On Approval of the List of Industrial Areas of Fishery water objects (their parts)", this territory, as a hydrotechnical facility and a place of intensive navigation (ports, navigable waterway) is not an industrial area of the Danube basin.

Scientific and biological substantiation for the solving the issue regarding implementation of hydrotechnical (dredging) works in the operational water area of the river port (terminal) of NIBULON LLC in Izmail on the Danube River with the possibility to work during the ban during spawning up to 05.06.2022 is developing under the Contract № 243-V-FDL-21 dated 17.09.2021 by order of NIBULON LLC. The estimated dredging volume to a depth of 8.23 m in 2022 will be 112000.00 $m^3$.

The removed soil will be transported by slurry pumping using suction pump through pipelines to the coastal dump. The coastal dump area is 1.24 ha, the perimeter is surrounded by a dam with 2.5 m high, within its boundaries are formed alluvium maps with a discharge pipe Ø 200 m for the discharge of clarified water and a drainage ditch along the barrier dam with a depth of 0.5 m and a bottom width of 1.0 m for the discharge of water that was filtered through the embankment dam. The soil dumping technology excludes the negative impact on the biological resources of the Danube river.

The total term of the dredging is 52 days, the possible period of work in the period of ban during spawning until 05.06.2022 is about 18 days.

The expected dredging volumes during the state ban on fishing in the Danube during the spawning season of 2022 will be about 2154.00 $m^3$ per day (works of suction pumps and the floating grab crane which will be used for soil cleaning).

There are bans on industrial and amateur fishing of water bioresources in connection with spawning in the Danube from 22 April to 05 June (the ban does not apply to the special herring fishery).

The purpose of this development is to assess the impact of hydrotechnical works on the state of fishery stocks in the Danube during the construction of a cargo berth with a river port operational water area in Izmail, Odesa region and with calculation the cost of compensatory measures to the fishing industry.

The impact of hydrotechnical works (dredging) on the water environment can be seen in the direct destruction of the biocoenosis in the deep waters. In nearby (silted) water areas expected to partially death of zoobenthos from siltation, decrease of biomass of phytoplankton

and zooplankton from increased turbidity of water and decrease of transparency of water. Probability of getting in the water environment of polluting substances as a result of desorption of them from the surface layer of bottom sediments being developed.

The damage caused to the living water resources of the Danube River during the works (with the possibility of works during the period of the ban during spawning until 05.06.2022) will be caused by death of forage organisms as a result of complete destruction of bottom biocoenosis in the dredged area; partial siltation of benthic communities on adjacent water areas; death of phyto- and zooplankton in the zone of increased technogenic turbidity, which is formed in the process of soil development and deterioration of reproduction conditions for some spawning fish populations.

Research conducted earlier showed that along with the dredging works (on adjacent and neighboring areas) benthic and pelagic biocenoses do not have a negative impact. The death of the bottom invertebrates occurs on the areas of deepening from their damage as a result of mechanical influence. However, after completion of dredging works, benthic biocenoses are restored depending on the quality formation of biocenoses at the sites.

The damage affecting the aquatic living resources during operational dredging was calculated according to the "Temporary damage assessment method.... [15], which is recommended for use by the Ministry of Environmental Protection and Natural Resources of Ukraine.

Preliminary calculation value of compensation payment for influence on the aquatic biological resources of the Danube river at carrying out of hydrotechnical works (dredging works) during construction of cargo berth on the river port water area in Izmail of Odesa region will be **23662.67** UAH (outside of ban during spawning – after 05.06.2022).

If dredging works are carried out during the period of ban during spawning (until 05.06.2022), the cost of the compensation payment will be **23767.86** UAH (deterioration of fish reproduction and fish-growing conditions).

Hydrotechnical works (dredging) can be carried out only in accordance with the requirements envisaged by measures for preservation of the normative state of the environment.

Carrying out of hydrotechnical works (dredging) leads to change of living conditions of hydrobionts, violation of conditions of reproduction of ichthyofauna, occurrence of interference on ways of migration of organisms, elimination or restriction of their forage base and conditions of reproduction. In order to preserve the normative state of the environment, in particular the plant and animal world, it is envisaged a set of measures, which are listed above.

The sound pressure level during operation of the self-propelled dredging vessel and or a floating crane at the dredging section of the river port in Izmail on the Danube river meets the standard for settlement zones in the daytime (38.0 dBA), and in the evening - much lower.

Thus, in compliance with the requirements provided by this scientific-biological

substantiation, the planned activities, considering the expected impacts on the water biological resources, are designed with an acceptable level of environmental risk, taking into account a set of measures respecting the normative state of the natural environment and fishery protection measures.

To assess the actual impact and determine the residual effect of the work it is advisable to accompany with specialized scientific ecological monitoring with compensation of the corrected losses in accordance with the current legislation of Ukraine.

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Appendix A

Додаток до додаткової угоди № 1
до Договору надання послуг № NB-770-22 від 07.05. 2022 р.

**ТЕХНІЧНЕ ЗАВДАННЯ**
**На виконання робіт за проектом «Нове будівництво об'єкту транспортної інфраструктури - річковий порт (термінал) у м. Ізмаїл Ізмаїльського району Одеської області»**

| Перелік основних вимог та відомостей | Зміст основних вимог та відомостей |
|---|---|
| Назва робіт | Оцінка впливу гідротехнічних робіт на стан рибних запасів р. Дунай під час будівництва вантажного причалу з операційною акваторією річкового порту в м. Ізмаїл Одеської області |
| Місце проведення робіт | м. Ізмаїл Одеської області, р. Дунай від 91,09 до 91,55 км |
| Проектні характеристики операційної акваторії з підходним каналом | - довжина - 460 м,<br>- ширина - 115м;<br>- площа - 5,29 га;<br>- проектна глибина - 8,23 м від «0» Ізмаїльського морського порту. |
| Проектні характеристики днопоглиблювальних робіт | - площа - 1,62 га;<br>- відмітка дна – 8,23 м від «0» Ізмаїльського морського порту,<br>- об'єм донного грунту, що вилучається – 112 000 м$^3$;<br>- складування донного грунту в береговий відвал, організація якого передбачена на земельній ділянці, що відведена під будівництво Порту.<br>- береговий відвал площею 1,24 га по периметру оконтурюється огороджувальною дамбою висотою 2,5м, у його межах формуються карти намиву з водоскидною трубою О200м для скиду освітленої води та дренажна канава вздовж загороджувальної дамби глибиною 0,5м та шириною підошви 1,0 м для скиду води, яка профільтрувалася через дамбу обвалування.<br>- термін виконання (без врахування періоду підготовчих робіт та можливих ремонтних робіт) – 52доб з можливістю робіт в період нерестової заборони до 05.06.2022р. |
| Гідротехніка, що задіяна при виконанні робіт | Watermaster Classic IV з діаметром пульпопроводу – 200 мм, продуктивність по пульпі 600 м$^3$/год, співвідношення грунт/вода - 1:5<br>Самохідне днопоглиблювальне судно (землесос) самохідне судно (земснаряд), продуктивність по пульпі 2400 м$^3$ / год, співвідношення грунт/вода -1:6<br>Грейферний плавучий кран з об'ємом ковша 1м$^3$ |
| Вимоги до проектних матеріалів | Надання біологічної характеристика району виконання робіт. Розрахунок вартості компенсаційних заходів рибному господарству. Надання рекомендацій щодо мінімізації впливу дноповглиблювальних робіт на умови життєдіяльності іхтіофауни в період нересту.<br>Захист прийнятих рішень при погодженні розділу проекту в Держрибагентстві України |

Додатки:

1. Ситуаційна карта-схема місця проведення дноповглиблювальних робіт.
2. Карта-схема території виконання дноповглиблювальних робіт

Начальник відділу ОНС
ТОВ СП «НІБУЛОН» А.О. Ізместьєва

Appendix B

Причал
Операційна акваторія
Земснаряд
Береговий відвал
донних грунтів

Appendix C

**ДЕРЖАВНЕ АГЕНТСТВО
МЕЛІОРАЦІЇ ТА РИБНОГО ГОСПОДАРСТВА УКРАЇНИ**

**ЧОРНОМОРСЬКЕ БАСЕЙНОВЕ УПРАВЛІННЯ ДЕРЖАВНОГО АГЕНТСТВА МЕЛІОРАЦІЇ ТА РИБНОГО ГОСПОДАРСТВА (ЧОРНОМОРСЬКИЙ РИБООХОРОННИЙ ПАТРУЛЬ)**

**НАКАЗ**

від 14.04.2022р. Одеса № 132

Про встановлення заборони вилову
водних біоресурсів у зв'язку з їх нерестом
на водних об'єктах підконтрольних
Чорноморському рибоохоронному патрулю
у 2022 році

На підставі статті 10 Закону України «Про рибне господарство, промислове рибальство та охорону водних біоресурсів», статті 38 Закону України «Про тваринний світ», відповідно до пунктів 8.1, 11.1.6, 11.2.3, 11.2.5, 11.2.6, 11.5, 14.7.6 та 14.7.8 Правил промислового рибальства в басейні Чорного моря, пунктів 3.14, 4.4, 4.14.1 Правил любительського і спортивного рибальства, Положення про Чорноморське басейнове управління Державного агентства меліорації та рибного господарства, затвердженого наказом Державного агентства рибного господарства України від 15.07.2016 №229 (зі змінами), враховуючи рекомендації ДП «ОдЦ ПівденНІРО» від 30.03.2022 №20/3 та від 05.04.2022 №23/3, з метою створення оптимальних умов відтворення водних біоресурсів,

**НАКАЗУЮ:**

1. Встановити заборону на промисловий та любительський вилов водних біоресурсів у зв'язку з їх нерестом на водних об'єктах підконтрольних Чорноморському басейновому управлінню Державного агентства меліорації та рибного господарства (далі - Чорноморський рибоохоронний патруль) в наступні терміни:

- у Дністровському лимані - **з 15 квітня по 31 липня** (заборона не поширюється на спеціалізований промисел оселедця);
- у Шаболатському лимані (відносно срібного карася, який мігрує з Дністровського лиману) – **з 15 квітня по 15 червня;**
- у Кучурганському водосховищі - **з 15 квітня по 15 червня**;

- у р. Дунай - з **22 квітня по 05 червня** (заборона не поширюється на спеціалізований промисел оселедця);

- у придунайських озерах: оз. Ялпуг - Кугурлуй, оз. Кагул та озері Сасик - з **15 квітня по 15 червня**;

- у Хаджибейському лимані - **з 15 квітня по 15 червня;**

- у верхній частині Каланчацького лиману відносно прісноводних видів риб з 15 квітня по 14 липня.

2. На період нересту риби заборонити:

- пересування будь-яких плавзасобів у заборонених для рибальства зонах (за винятком установлених судових ходів), а на ділянках, які оголошені нерестовищами - усіх плавзасобів, крім суден спеціально уповноважених органів, які здійснюють охорону водних біоресурсів;

- проводити у рибогосподарських водних об'єктах та в прибережних захисних смугах днопоглиблювальні, вибухові, бурові, сейсмологічні роботи, видобуток гравію та піщано - ракушкової суміші, проводити забір води без ефективних рибозахисних пристроїв.

- організацію змагань з рибальства та підводного полювання.

3. В нерестовий заборонений період, дозволити любительське рибальство з берега однією поплавковою або донною вудкою з одним гачком і спінінгом, на ділянках водойм зазначених у Переліку місць, визначених для любительського рибальства у період заборони вилову водних біоресурсів у зв'язку з їх нерестом на водних об'єктах підконтрольних Чорноморському рибоохоронному патрулю у 2022 році (додаток 1).

4. Користувачам водних біоресурсів, які здійснюють промисловий вилов водних біоресурсів в зоні контролю Чорноморського рибоохоронного патруля зняти з промислу знаряддя лову, заборонені для використання в місцях та у терміни, визначені пунктом 1 цього наказу.

5. Відділу іхтіології та регулювання рибальства Чорноморського рибоохоронного патруля:

- надавати щомісячну інформацію до 1 числа місяця наступного за звітним до Держрибагентства про хід нересту водних біоресурсів;

- довести зазначений наказ до відома користувачів водних біоресурсів, населення, підприємства, установи, організації, а також місцеві адміністрації про встановлення заборони на вилов водних біоресурсів шляхом розміщення інформації в засобах масової інформації та на офіційному сайті Чорноморського рибоохоронного патруля.

6. Керівникам відділів рибоохоронних патрулів №1,2,3,4 посилити охорону ділянок нерестовищ та контроль за ходом нересту риби шляхом проведення спільних рибоохоронних рейдів із залученням контролюючих органів, згідно планів спільних заходів.

7. Контроль за виконанням цього наказу залишаю за собою.

Т.в.о. начальника Чорноморського
рибоохоронного патруля Сергій ЧЕРНЯВСЬКИЙ

Додаток 1
до наказу Чорноморського рибоохоронного патруля
від «19» 04 2022 № 152

Перелік
місць, визначених для любительського рибальства у період заборони вилову водних біоресурсів у зв'язку з їх нерестом на водних об'єктах підконтрольних Чорноморському басейновому управлінню Державного агентства меліорації та рибного господарства у 2022 році

| № з/п | Назва водойми | Місце розташування ділянки |
|---|---|---|
| 1 | Дністровський лиман | Ділянка в межах м. Овідіополь – від пасажирського причалу в сторону с. Роксолани протяжністю 1,5 км |
| 2 | | Ділянка в м. Білгород-Дністровський – розташована на правому березі Дністровського лиману з 1-го міського причалу в сторону с. Заливне довжиною 4 км по берегу |
| 3 | Річка Дунай | Затон Базарчук |
| 4 | | Піщаний канал (ПМК-овський канал) |
| 5 | | Білгородський канал в межах міста Вилкове |
| 6 | | 30-метрова прибережна смуга річки Дунай в межах м. Вилкове |
| 7 | | 75-77 км |
| 8 | | 96-97 км |
| 9 | | 103-105 км |
| 10 | Хаджибейський лиман | Від трамвайної зупинки в сторону очисних споруд протяжністю 200 м (для пільгової категорії громадян) |
| 11 | | По лівій стороні лиману від північного краю с. Черняховське на протязі 1 км в сторону с. Маринівка |

Appendix D

**ДЕРЖАВНЕ АГЕНТСТВО РИБНОГО ГОСПОДАРСТВА УКРАЇНИ**
**УКРАЇНСЬКИЙ ДЕРЖАВНИЙ ІНСТИТУТ**
**ПО ПРОЕКТУВАННЮ ПІДПРИЄМСТВ РИБНОГО ГОСПОДАРСТВА ТА ПРОМИСЛОВОСТІ**
**«УКРРИБПРОЕКТ»**

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Україна, 04050, м. Київ,
вул. Тургенєвська, 82а,

р/с 26003312112
в АТ «Фортуна-банк»,
в АТ «Фортуна-банк»,
МФО 300904, ЄДРПОУ 00468177.

18.12.2018 № 01/232

Голові Державного Агентства рибного господарства України (Держрибагентство України)

**Бєлову Я.С.**

Вул. Артема, 45 а, м. Київ, 04053
Тел./факс: (044) 272 20 32

Щодо надання інформації

Повідомляємо, що питомі капіталовкладення на 1 т риби-сирцю промповернення в цінах станом на 01.10.2018 року (без ПДВ) за проектами-аналогами становлять:

1. «Выростное хозяйство по выращиванию молоди частиковых рыб в Голопристанском районе Херсонской области» VI зона рибництва становлять – 467,30 тис. грн.;

2. «Рыбопитомник озерно-товарного хазяйства на водохранилище Днепро-Брагинском в Лоевском районе Гомельской области» III зона рибництва становлять – 636,30 тис. грн. Коефіцієнт економічної ефективності капіталовкладень – 0,06;

3. «Каневский рыбопитомник Черкасской области» IV зона рибництва становлять – 310,88 тис. грн. Коефіцієнт економічної ефективності капіталовкладень – 0,12;

4. «Рыбопитомник для зарыбления водохранилища им. Ленина в Новомосковском районе» V зона рибництва становлять – 806,39 тис. грн. Коефіцієнт економічної ефективності капіталовкладень – 0,12;

5. «Рыбопитомник для зарыбления Каховского водохранилища» VI зона рибництва становлять – 879,76 тис. грн. Коефіцієнт економічної ефективності капіталовкладень – 0,2;

6. «Рыбопитомник растительноядных риб рыбозавода «3й Решающий» VI зона рибництва становлять – 548,73 тис. грн. Коефіцієнт економічної ефективності

Держрибагентство
16/23639
18 12 2018 р.
вих.

5575

капіталовкладень – 0,48 (0,18 з обліком благозасвоєння);

7. «Рыбопитомник по воспроизводству растительнроядных рыб и карпа в Очаковском районе Николаевской области» VI зона рибництва становлять – 644,02 тис. грн. Коефіцієнт економічної ефективності капіталовкладень – 0,22;

8. «Морской нефтеперевалочный комплекс в районе г. Одессы» V зона рибництва становлять – 938,18 тис. грн. Коефіцієнт економічної ефективності – 0,16;

9. «Рыбоводный комплекс по выращиванию кефали-пелегаса» V зона рибництва становлять – 550,51 тис. грн. Коефіцієнт економічної ефективності – 0,18.

Питомі капіталовкладення на 1 т риби-сирцю промповернення станом на 01.10.2018 р. визначені з урахуванням додатку до листа Мінрегіонбуду України від 17.10.2018 № 7/15.3/10900-18 (відповідно до збірника "Ціноутворення в будівництві" Інституту "Інпроект, Київ, 2018, випуск 11).

Директор М. Д. Левченко

***Calculation of noise at the border of residential buildings during construction river port (terminal) LLC «NIBULON»***

The noise calculation was performed in accordance with Building code B.1.1-31:2013 "Protection of territories, buildings and structures from noise". The calculation is based on the assumption of simultaneous operation of all sources of noise, which, in comparison with the actual situation, is the worst of the construction work conditions.

To assess the noise impact during the construction of the River Port, a control point to the north of the facility was adopted at the border of the residential development.

The total equivalent sound level is determined by the formula:

$$Ltotal = 10 * Lg \sum_{i=1}^{n} 10^{0,1*Li}$$

where $L_i$ – the sound pressure level in dBA at the calculation points, taking into account the reduction of the sound pressure level by screens and strips of green spaces.

$$L_i = L - \Delta L_s - L_g$$

where $L$ – the sound pressure level in dBA at the calculated points, without taking into account the reduction of the difference in sound pressure by screens and strips of green spaces;

$\Delta L_s$ – reduction of sound level by screens in dBA;

$\Delta L_g$ – reduction of the sound level in dBA by strips of green spaces.

The octave sound pressure level in dBA at the calculated points from the noise source, without taking into account the reduction of the sound pressure level by screens and strips of green spaces, is determined by the formula:

$$L = L_p - 15\lg r + 10\lg \Phi - \frac{\beta_a r}{1000} - 10\lg \Omega,$$

where $L_p$ – the sound power level in dBA of the noise source is taken according to the passport data of the equipment;

$\Phi$ – the direction factor of the noise source, dimensionless, is determined according to experimental data. For noise sources with diffuse sound emission $\Phi = 1$;

$r$ – distance from the noise source to the calculation point, m;

$\Omega$ - spatial angle of sound radiation, for noise sources located in space - $\Omega = 4\pi$; on the surface of the territory or structure enclosing buildings and structures – $\Omega = 2\pi$; in a dihedral angle, structures enclosing buildings and structures – $\Omega = \pi$;

$\beta_a$ – Attenuation of sound in the atmosphere in dBA/km in accordance with GOST 31295.2-2005 (ISO 9613-2:1996) as a general estimate of attenuation, attenuation in an octave band with a geometric mean frequency of 500 Hz is accepted.

The fence of the construction area, green areas and temporary construction structures act as protective screens on the construction site of the River Port, during the passage of sound waves from the noise source to the control point. The decrease in the sound level of screens in dBA is determined according to table 1.

**Table 1**

| The difference in the lengths of the sound beam paths | Reducing the sound level of the screen | The difference in the lengths of the sound beam paths | Reducing the sound level of the screen |
|---|---|---|---|

| $\delta$ in m | $\Delta L_s$ in dBA | $\delta$ in m | $\Delta L_s$ in dBA |
|---|---|---|---|
| 0,005 | 6 | 0,48 | 16 |
| 0,02 | 8 | 0,83 | 18 |
| 0,06 | 10 | 1,4 | 20 |
| 0,14 | 12 | 2,4 | 22 |
| 0,28 | 14 | 6 | 24 |

The difference in the lengths of the paths of the sound beam in accordance with the schemes of the screens is determined by the formula: $\delta = (a+b)-c$,

where $a$ – the shortest distance between the geometric center of the noise source and the upper edge of the screen, m;

$b$ – the shortest distance between the calculation point and the upper edge of the screen, m;

$c$ – the shortest distance between the geometric center of the noise source and the calculation point, m.

The initial data for the calculation are presented in Table 2.

**Table 2.**

| № | Noise source | Octave level of sound power Lp, dBA | The distance from the noise source to calculation point r, m | Directionality factor of the noise source $\Phi$ | Attenuation of sound in the atmosphere β | Spatial angle of sound radiation Ω |
|---|---|---|---|---|---|---|
| 1. | Cargo vehicles | 110 | 789 | 1 | 3,000 | 4π |
| 2. | Construction cranes and towers | 100 | 866 | 1 | 3,000 | 4π |
| 3. | Bulldozers, excavators and motor graders | 110 | 952 | 1 | 3,000 | 4π |
| 4. | Diesel hammers | 120 | 1000 | 1 | 3,000 | 4π |
| 5. | Building equipment (compressors, diesel generators, jackhammers) | 120 | 778 | 1 | 3,000 | 4π |

The results of calculations of sound power level from each noise source are shown in Table 3.

**Table 3**

| № | Noise source | The level of sound power $L$, dBA | The difference in the lengths of the sound beam paths $\delta$, m | Reducing the sound level of the screen $\Delta L_s$ in dBA | Lowering the sound level $\Delta L_g$, dBA | The level of sound power $L_i$, dBA |
|---|---|---|---|---|---|---|
| 1 | Cargo vehicles | 53,18 | 526,51 | 24,00 | 0 | 29,18 |
| 2 | Construction cranes and towers | 42,35 | 577,57 | 24,00 | 0 | 18,35 |
| 3 | Bulldozers, excavators and motor graders | 51,47 | 882,95 | 24,00 | 0 | 27,47 |
| 4 | Diesel hammers | 61,01 | 927,10 | 24,00 | 0 | 37,01 |
| 5 | Building equipment (compressors, diesel generators, jackhammers) | 63,31 | 32,39 | 24,00 | 0 | 39,31 |

The results of calculations of the total equivalent sound level at the control point are given in table 4.

Table 4

| Permissible sound level according to Building code B.1.1-31:2013, dBA | Calculated equivalent sound level, dBA |
|---|---|
| 45 | 41,76 |

**Calculation of emissions of pollutants**

**from grain processing equipment equipped with dust cleaning equipment**

**Sources № 1 – 21, 76 – 80, 97 - 109**

The calculations were made on the basis of the "Compendium of emission indicators (intensity rate of emissions) of polluting substances into the ambient air by various industries", Donetsk, 2004.

The maximum one-time emission of grain dust (sunflower seed dust) emitted into the atmosphere is determined by the formula:

$$M^{max} = \sum_{i=1}^{n} Q_i C_i (1 - \eta)$$

where Q – the volume of the dust-gas-air mixture discharged from the equipment, $m^3/s$ (is determined based on the normative consumption of aspiration air)

C – concentration of dust in the air discharged from the equipment, $g/m^3$ (concentration values are determined according to table XL-5 of the abovementioned method);

η – efficiency of aspiration air cleaning in dust collectors.

For bag filters, the concentration at the outlet of the dust cleaning equipment is assumed to be 50 $mg/m^3$ (according to the technical documentation of the manufacturing plant)

Gross emissions are determined by the formula:

$$\mathbf{M^{year} = M^{max} \cdot T \cdot 3600 \cdot 10^{-6}, \ t/year}$$

where T – duration of the process, hours/year.

Calculations are presented in tabular form:

| № | Mark of the dust collector | The name of the source of emission | V, $m^3$/sec | C, $g/m^3$ | The name of the pollutant | T, h/year | The amount of dust released during the pouring | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | emitted in atmosphere | | Collected by dust cleaning equipment, t/year |
| | | | | at the inlet / at the outlet | | | $M^{max}$, g/sec | $M^{year}$ t/year | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1 | Intake pit filter, bag | Unloading from the railway wagons | 2,778 | 1,300 / 0,050 | Grain dust | 3200 | 0,138889 | 1,60000 | 40,00000 |
| | | | | | Sunflower seed dust | 400 | 0,138889 | 0,20000 | 5,00000 |
| | | | | | Soybean seed dust | 400 | 0,138889 | 0,20000 | 5,00000 |
| 2 | Intake pit filter, bag | Unloading from the railway wagons | 2,778 | 1,300 / 0,050 | Grain dust | 3200 | 0,138889 | 1,60000 | 40,00000 |
| | | | | | Sunflower seed dust | 400 | 0,138889 | 0,20000 | 5,00000 |
| | | | | | Soybean seed dust | 400 | 0,138889 | 0,20000 | 5,00000 |
| 3 | Intake pit filter, bag | Unloading from the railway wagons | 2,778 | 1,300 / 0,050 | Grain dust | 3200 | 0,138889 | 1,60000 | 40,00000 |
| | | | | | Sunflower seed dust | 400 | 0,138889 | 0,20000 | 5,00000 |
| | | | | | Soybean seed dust | 400 | 0,138889 | 0,20000 | 5,00000 |
| 4 | Intake pit filter, bag | Unloading from the railway wagons | 2,778 | 1,300 / 0,050 | Grain dust | 3200 | 0,138889 | 1,60000 | 40,00000 |
| | | | | | Sunflower seed dust | 400 | 0,138889 | 0,20000 | 5,00000 |
| | | | | | Soybean seed dust | 400 | 0,138889 | 0,20000 | 5,00000 |
| 5 | Spot filter, bag | Chain conveyor, unloading from the railway wagons | 0,833 | 0,800 / 0,05 | Grain dust | 3200 | 0,041667 | 0,48000 | 7,20000 |
| | | | | | Sunflower seed dust | 400 | 0,041667 | 0,06000 | 0,90000 |
| | | | | | Soybean seed dust | 400 | 0,041667 | 0,06000 | 0,90000 |
| 6 | Cyclone-type filter, bag | Hoppers for unloading of grain to the road transport | 0,694 | 0,80 / 0,05 | Grain dust | 3200 | 0,034722 | 0,40000 | 6,00000 |
| | | | | | Sunflower seed dust | 400 | 0,034722 | 0,05000 | 0,75000 |
| | | | | | Soybean seed dust | 400 | 0,034722 | 0,05000 | 0,75000 |
| 7 | Intake pit filter, bag | Truck unloader | 8,333 | 1,300 / 0,05 | Grain dust | 2133 | 0,416667 | 3,20000 | 79,99999 |
| | | | | | Sunflower seed dust | 267 | 0,416667 | 0,40000 | 10,00000 |
| | | | | | Soybean seed dust | 267 | 0,416667 | 0,40000 | 10,00000 |
| 8 | Intake pit filter, bag | Truck unloader | 8,333 | 1,300 / 0,05 | Grain dust | 2133 | 0,416667 | 3,20000 | 79,99999 |
| | | | | | Sunflower seed dust | 267 | 0,416667 | 0,40000 | 10,00000 |
| | | | | | Soybean seed dust | 267 | 0,416667 | 0,40000 | 10,00000 |
| 9 | Intake pit filter, bag | Truck unloader | 8,333 | 1,300 / 0,05 | Grain dust | 2133 | 0,416667 | 3,20000 | 79,99999 |
| | | | | | Sunflower seed dust | 267 | 0,416667 | 0,40000 | 10,00000 |
| | | | | | Soybean seed dust | 267 | 0,416667 | 0,40000 | 10,00000 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 10 | Cyclone-type filter, bag | Collecting conveyors | 1,667 | 0,60 / 0,05 | Grain dust | 267 | 0,083333 | 0,08000 | 0,88000 |
| | | | | | Sunflower seed dust | 33 | 0,083333 | 0,01000 | 0,11000 |
| | | | | | Soybean seed dust | 33 | 0,083333 | 0,01000 | 0,11000 |
| 11 | Cyclone-type filter, bag | Collecting conveyors | 1,667 | 0,60 / 0,05 | Grain dust | 267 | 0,083333 | 0,08000 | 0,88000 |
| | | | | | Sunflower seed dust | 33 | 0,083333 | 0,01000 | 0,11000 |
| | | | | | Soybean seed dust | 33 | 0,083333 | 0,01000 | 0,11000 |
| 12 | Cyclone-type filter, bag | Collecting conveyors | 1,389 | 0,60 / 0,05 | Grain dust | 267 | 0,069444 | 0,06667 | 0,73333 |
| | | | | | Sunflower seed dust | 33 | 0,069444 | 0,00833 | 0,09167 |
| | | | | | Soybean seed dust | 33 | 0,069444 | 0,00833 | 0,09167 |
| 13 | Cyclone-type filter, bag | Collecting conveyors | 1,389 | 0,60 / 0,05 | Grain dust | 267 | 0,069444 | 0,06667 | 0,73333 |
| | | | | | Sunflower seed dust | 33 | 0,069444 | 0,00833 | 0,09167 |
| | | | | | Soybean seed dust | 33 | 0,069444 | 0,00833 | 0,09167 |
| 14 | Cyclone-type filter, bag | Collecting conveyors | 1,667 | 0,60 / 0,05 | Grain dust | 267 | 0,083333 | 0,08000 | 0,88000 |
| | | | | | Sunflower seed dust | 33 | 0,083333 | 0,01000 | 0,11000 |
| | | | | | Soybean seed dust | 33 | 0,083333 | 0,01000 | 0,11000 |
| 15 | Cyclone-type filter, bag | Collecting conveyors | 1,667 | 0,60 / 0,05 | Grain dust | 267 | 0,083333 | 0,08000 | 0,88000 |
| | | | | | Sunflower seed dust | 33 | 0,083333 | 0,01000 | 0,11000 |
| | | | | | Soybean seed dust | 33 | 0,083333 | 0,01000 | 0,11000 |
| 16 | Cyclone-type filter, bag | Collecting conveyors | 1,389 | 0,60 / 0,05 | Grain dust | 267 | 0,069500 | 0,08340 | 0,73333 |
| | | | | | Sunflower seed dust | 33 | 0,069500 | 0,00834 | 0,09167 |
| | | | | | Soybean seed dust | 33 | 0,069500 | 0,00834 | 0,09167 |
| 17 | Cyclone-type filter, bag | Equipment of the working tower | 5,556 | 2,00 / 0,05 | Grain dust | 4800 | 0,277778 | 4,80000 | 187,20000 |
| | | | | | Sunflower seed dust | 600 | 0,277778 | 0,60000 | 23,40000 |
| | | | | | Soybean seed dust | 600 | 0,277778 | 0,60000 | 23,40000 |
| 18 | Spot filter, bag | Separator | 5,556 | 10,0 / 0,05 | Grain dust | 160 | 0,277778 | 0,16000 | 31,84000 |
| | | | | | Sunflower seed dust | 20 | 0,277778 | 0,02000 | 3,98000 |
| | | | | | Soybean seed dust | 20 | 0,277778 | 0,02000 | 3,98000 |
| 19 | Spot filter, bag | Chain conveyor | 0,972 | 0,80 / 0,05 | Grain dust | 800 | 0,048611 | 0,14000 | 2,10000 |
| | | | | | Sunflower seed dust | 100 | 0,048611 | 0,01750 | 0,26250 |
| | | | | | Soybean seed dust | 100 | 0,048611 | 0,01750 | 0,26250 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 20 | Spot filter, bag | Belt conveyor | 0,972 | 1,50 / 0,05 | Grain dust | 800 | 0,048611 | 0,14000 | 4,06000 |
| | | | | | Sunflower seed dust | 100 | 0,048611 | 0,01750 | 0,50750 |
| | | | | | Soybean seed dust | 100 | 0,048611 | 0,01750 | 0,50750 |
| 21 | Spot filter, bag | Belt conveyor | 0,972 | 1,50 / 0,05 | Grain dust | 800 | 0,048611 | 0,14000 | 4,06000 |
| | | | | | Sunflower seed dust | 100 | 0,048611 | 0,01750 | 0,50750 |
| | | | | | Soybean seed dust | 100 | 0,048611 | 0,01750 | 0,50750 |
| 76 | Intake pit filter, bag | Unloading from the railway wagons | 2,778 | 1,300 / 0,050 | Grain dust | 3200 | 0,138889 | 1,60000 | 40,00000 |
| | | | | | Sunflower seed dust | 400 | 0,138889 | 0,20000 | 5,00000 |
| | | | | | Soybean seed dust | 400 | 0,138889 | 0,20000 | 5,00000 |
| 77 | Intake pit filter, bag | Unloading from the railway wagons | 2,778 | 1,300 / 0,050 | Grain dust | 3200 | 0,138889 | 1,60000 | 40,00000 |
| | | | | | Sunflower seed dust | 400 | 0,138889 | 0,20000 | 5,00000 |
| | | | | | Soybean seed dust | 400 | 0,138889 | 0,20000 | 5,00000 |
| 78 | Intake pit filter, bag | Unloading from the railway wagons | 2,778 | 1,300 / 0,050 | Grain dust | 3200 | 0,138889 | 1,60000 | 40,00000 |
| | | | | | Sunflower seed dust | 400 | 0,138889 | 0,20000 | 5,00000 |
| | | | | | Soybean seed dust | 400 | 0,138889 | 0,20000 | 5,00000 |
| 79 | Intake pit filter, bag | Unloading from the railway wagons | 2,778 | 1,300 / 0,050 | Grain dust | 3200 | 0,138889 | 1,60000 | 40,00000 |
| | | | | | Sunflower seed dust | 400 | 0,138889 | 0,20000 | 5,00000 |
| | | | | | Soybean seed dust | 400 | 0,138889 | 0,20000 | 5,00000 |
| 80 | Spot filter, bag | Chain conveyor, unloading from the railway wagons | 0,833 | 0,800 / 0,05 | Grain dust | 3200 | 0,041667 | 0,48000 | 7,20000 |
| | | | | | Sunflower seed dust | 400 | 0,041667 | 0,06000 | 0,90000 |
| | | | | | Soybean seed dust | 400 | 0,041667 | 0,06000 | 0,90000 |
| 97 | Breathing filter, bag | Hoppers of autoloading section | 0,139 | 1,200 / 0,05 | Grain dust | 1334 | 0,006944 | 0,03334 | 0,76676 |
| | | | | | Sunflower seed dust | 167 | 0,006944 | 0,00417 | 0,09585 |
| | | | | | Soybean seed dust | 167 | 0,006944 | 0,00417 | 0,09585 |
| 98 | Breathing filter, bag | Hoppers of autoloading section | 0,139 | 1,200 / 0,05 | Grain dust | 1334 | 0,006944 | 0,03334 | 0,76676 |
| | | | | | Sunflower seed dust | 167 | 0,006944 | 0,00417 | 0,09585 |
| | | | | | Soybean seed dust | 167 | 0,006944 | 0,00417 | 0,09585 |
| 99 | Spot filter, bag | Inlet chute of the belt conveyor | 0,694 | 0,600 / 0,05 | Grain dust | 1600 | 0,034722 | 0,20000 | 2,20000 |
| | | | | | Sunflower seed dust | 200 | 0,034722 | 0,02500 | 0,27500 |
| | | | | | Soybean seed dust | 200 | 0,034722 | 0,02500 | 0,27500 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 100 | Spot filter, bag | Inlet chute of the belt conveyor | 0,694 | 0,600 / 0,05 | Grain dust | 1600 | 0,034722 | 0,20000 | 2,20000 |
| | | | | | Sunflower seed dust | 200 | 0,034722 | 0,02500 | 0,27500 |
| | | | | | Soybean seed dust | 200 | 0,034722 | 0,02500 | 0,27500 |
| 101 | Spot filter, bag | Belt conveyor tripper unit | 0,694 | 2,000 / 0,05 | Grain dust | 3200 | 0,034722 | 0,40000 | 15,60000 |
| | | | | | Sunflower seed dust | 400 | 0,034722 | 0,05000 | 1,95000 |
| | | | | | Soybean seed dust | 400 | 0,034722 | 0,05000 | 1,95000 |
| 102 | Spot filter, bag | Inlet chute of the belt conveyor | 0,694 | 0,600 / 0,05 | Grain dust | 1600 | 0,034722 | 0,20000 | 2,20000 |
| | | | | | Sunflower seed dust | 200 | 0,034722 | 0,02500 | 0,27500 |
| | | | | | Soybean seed dust | 200 | 0,034722 | 0,02500 | 0,27500 |
| 103 | Spot filter, bag | Belt conveyor tripper unit | 0,694 | 2,000 / 0,05 | Grain dust | 3200 | 0,034722 | 0,40000 | 15,60000 |
| | | | | | Sunflower seed dust | 400 | 0,034722 | 0,05000 | 1,95000 |
| | | | | | Soybean seed dust | 400 | 0,034722 | 0,05000 | 1,95000 |
| 104 | Spot filter, bag | Inlet chute of the belt conveyor | 0,694 | 0,600 / 0,05 | Grain dust | 1600 | 0,034722 | 0,20000 | 2,20000 |
| | | | | | Sunflower seed dust | 200 | 0,034722 | 0,02500 | 0,27500 |
| | | | | | Soybean seed dust | 200 | 0,034722 | 0,02500 | 0,27500 |
| 105 | Spot filter, bag | Belt conveyor tripper unit | 0,694 | 2,000 / 0,05 | Grain dust | 3200 | 0,034722 | 0,40000 | 15,60000 |
| | | | | | Sunflower seed dust | 400 | 0,034722 | 0,05000 | 1,95000 |
| | | | | | Soybean seed dust | 400 | 0,034722 | 0,05000 | 1,95000 |
| 106 | Spot filter, bag | Inlet chute of the belt conveyor of shiploader | 0,972 | 1,500 / 0,05 | Grain dust | 1600 | 0,048611 | 0,28000 | 8,12000 |
| | | | | | Sunflower seed dust | 286 | 0,048611 | 0,05005 | 1,45145 |
| | | | | | Soybean seed dust | 200 | 0,048611 | 0,03500 | 1,01500 |
| 107 | Spot filter, bag | Belt conveyor tripper unit of shiploader | 0,972 | 2,000 / 0,05 | Grain dust | 1600 | 0,048611 | 0,28000 | 10,92000 |
| | | | | | Sunflower seed dust | 286 | 0,048611 | 0,05005 | 1,95195 |
| | | | | | Soybean seed dust | 200 | 0,048611 | 0,03500 | 1,36500 |
| 108 | Spot filter, bag | Inlet chute of the belt conveyor of shiploader | 0,972 | 1,500 / 0,05 | Grain dust | 1600 | 0,048611 | 0,28000 | 8,12000 |
| | | | | | Sunflower seed dust | 286 | 0,048611 | 0,05005 | 1,45145 |
| | | | | | Soybean seed dust | 200 | 0,048611 | 0,03500 | 1,01500 |
| 109 | Spot filter, bag | Belt conveyor tripper unit of shiploader | 0,972 | 2,000 / 0,05 | Grain dust | 1600 | 0,048611 | 0,28000 | 10,92000 |
| | | | | | Sunflower seed dust | 286 | 0,048611 | 0,05005 | 1,95195 |
| | | | | | Soybean seed dust | 200 | 0,048611 | 0,03500 | 1,36500 |

**Calculation of emissions of pollutants from places of pouring grain and oilseeds**
**Sources No. 22 – 30**

The calculation is carried out according to the «Compendium of indicators of emissions (specific emissions) of pollutants into the atmospheric air by various industries», Donetsk, 2004 with the use of «Temporary methodical assistance for the calculation of emissions from unorganized sources in the construction materials industry», Novorossiysk, 1982.

The volume of dust emissions into the atmospheric air is determined by the formula:

maximum single $\mathbf{M^{max} = C \cdot V \cdot k,}$ **g/sec;**

annual $\mathbf{M^{year} = (M^{max} \cdot 3600 \cdot T) / 10^6,}$ **t/year**

where

V = G: ρ: 3600 – the volume of the dust-air mixture formed during unloading, $m^3$/ sec;

G - the productivity of the equipment, taken from the productivity of the transporting equipment (equipment specification, RP NB - 1648 - 16 - TX), t/h;

ρ – average volumetric weight for grain crops - 0.75 t/ $m^3$ according to State Standard of Ukraine (DSTU) 3768:2004; for oilseeds 0.30...0.55 t/$m^3$ according to the «Design of elevators and bakery enterprises». - M.: Kolos, 1982 - 239 p. page 28.;

C – the value of the concentration of dust in the air when pouring grain according to table XI-5, p. 7 «Compendium of indicators of emission (specific emissions) of pollutants into the atmospheric air by different industries», Donetsk, 2004. volume III, g/$m^3$;

K – the coefficient that takes into account local conditions: the degree of protection from external influences according to table 3 p. 4 «Methodical manual for calculation of non-organized sources in the industry of construction materials», Novorossiysk, 1985.

T = B: G - duration of the pouring process, h/year:

B – the amount of overloaded grain was accepted based on the capacity of the complex - 3,000 thousand tons per year (2,400 thousand tons of grain crops and 300 thousand tons of oilseeds and leguminous crops).

The initial data and calculation results are summarized in the table.

**1. Calculation of pollutant emissions from silos for the temporary storage of grain and oilseeds**

| № Src. | V, $m^3$/sec | C, g/$m^3$ | ρ, t/$m^3$ | k | G, t/h | Amount of grain,t/ year | T, h/year | $M^{max}$ | $M^{year}$ |
|---|---|---|---|---|---|---|---|---|---|
| *Substances in the form of suspended solid particles (grain dust)* | | | | | | | | | |
| 22 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 133333 | 533 | **0,000605** | **0,00116** |
| 23 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 133333 | 533 | **0,000605** | **0,00116** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 24 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 133333 | 533 | **0,000605** | **0,00116** |
| 25 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 133333 | 533 | **0,000605** | **0,00116** |
| 26 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 133333 | 533 | **0,000605** | **0,00116** |
| 27 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 133333 | 533 | **0,000605** | **0,00116** |
| 28 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 133333 | 533 | **0,000605** | **0,00116** |
| 29 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 133333 | 533 | **0,000605** | **0,00116** |
| 30 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 133333 | 533 | **0,000605** | **0,00116** |
| 31 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 133333 | 533 | **0,000605** | **0,00116** |
| 32 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 133333 | 533 | **0,000605** | **0,00116** |
| 33 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 133333 | 533 | **0,000605** | **0,00116** |
| 34 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 133333 | 533 | **0,000605** | **0,00116** |
| 35 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 133333 | 533 | **0,000605** | **0,00116** |
| 36 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 133333 | 533 | **0,000605** | **0,00116** |
| 37 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 133333 | 533 | **0,000605** | **0,00116** |
| 38 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 133333 | 533 | **0,000605** | **0,00116** |
| 39 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 133333 | 533 | **0,000605** | **0,00116** |
| 73 | 0,093 | 1,3 | 0,75 | 0,005 | 50 | 26667 | 533 | **0,000605** | **0,00116** |
| 74 | 0,093 | 1,3 | 0,75 | 0,005 | 50 | 26667 | 533 | **0,000605** | **0,00116** |
| 75 | 0,093 | 1,3 | 0,75 | 0,005 | 50 | 26667 | 533 | **0,000605** | **0,00116** |
| *Substances in the form of suspended solid particles (sunflower seed dust)* | | | | | | | | | |
| 22 | 0,093 | 1,3 | 0,75 | 0,005 | 143 | 16667 | 117 | **0,000605** | **0,00025** |
| 23 | 0,093 | 1,3 | 0,75 | 0,005 | 143 | 16667 | 117 | **0,000605** | **0,00025** |
| 24 | 0,093 | 1,3 | 0,75 | 0,005 | 143 | 16667 | 117 | **0,000605** | **0,00025** |
| 25 | 0,093 | 1,3 | 0,75 | 0,005 | 143 | 16667 | 117 | **0,000605** | **0,00025** |
| 26 | 0,093 | 1,3 | 0,75 | 0,005 | 143 | 16667 | 117 | **0,000605** | **0,00025** |
| 27 | 0,093 | 1,3 | 0,75 | 0,005 | 143 | 16667 | 117 | **0,000605** | **0,00025** |
| 28 | 0,093 | 1,3 | 0,75 | 0,005 | 143 | 16667 | 117 | **0,000605** | **0,00025** |
| 29 | 0,093 | 1,3 | 0,75 | 0,005 | 143 | 16667 | 117 | **0,000605** | **0,00025** |
| 30 | 0,093 | 1,3 | 0,75 | 0,005 | 143 | 16667 | 117 | **0,000605** | **0,00025** |
| 31 | 0,093 | 1,3 | 0,75 | 0,005 | 143 | 16667 | 117 | **0,000605** | **0,00025** |
| 32 | 0,093 | 1,3 | 0,75 | 0,005 | 143 | 16667 | 117 | **0,000605** | **0,00025** |
| 33 | 0,093 | 1,3 | 0,75 | 0,005 | 143 | 16667 | 117 | **0,000605** | **0,00025** |
| 34 | 0,093 | 1,3 | 0,75 | 0,005 | 143 | 16667 | 117 | **0,000605** | **0,00025** |
| 35 | 0,093 | 1,3 | 0,75 | 0,005 | 143 | 16667 | 117 | **0,000605** | **0,00025** |
| 36 | 0,093 | 1,3 | 0,75 | 0,005 | 143 | 16667 | 117 | **0,000605** | **0,00025** |
| 37 | 0,093 | 1,3 | 0,75 | 0,005 | 143 | 16667 | 117 | **0,000605** | **0,00025** |
| 38 | 0,093 | 1,3 | 0,75 | 0,005 | 143 | 16667 | 117 | **0,000605** | **0,00025** |
| 39 | 0,093 | 1,3 | 0,75 | 0,005 | 143 | 16667 | 117 | **0,000605** | **0,00025** |
| 73 | 0,093 | 1,3 | 0,75 | 0,005 | 35 | 3333 | 95 | **0,000605** | **0,00021** |
| 74 | 0,093 | 1,3 | 0,75 | 0,005 | 35 | 3333 | 95 | **0,000605** | **0,00021** |
| 75 | 0,093 | 1,3 | 0,75 | 0,005 | 35 | 3333 | 95 | **0,000605** | **0,00021** |
| *Substances in the form of suspended solid particles (soybean seed dust)* | | | | | | | | | |
| 22 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 16667 | 67 | **0,000605** | **0,00015** |
| 23 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 16667 | 67 | **0,000605** | **0,00015** |
| 24 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 16667 | 67 | **0,000605** | **0,00015** |
| 25 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 16667 | 67 | **0,000605** | **0,00015** |
| 26 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 16667 | 67 | **0,000605** | **0,00015** |
| 27 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 16667 | 67 | **0,000605** | **0,00015** |
| 28 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 16667 | 67 | **0,000605** | **0,00015** |
| 29 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 16667 | 67 | **0,000605** | **0,00015** |
| 30 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 16667 | 67 | **0,000605** | **0,00015** |
| 31 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 16667 | 67 | **0,000605** | **0,00015** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 32 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 16667 | 67 | **0,000605** | **0,00015** |
| 33 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 16667 | 67 | **0,000605** | **0,00015** |
| 34 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 16667 | 67 | **0,000605** | **0,00015** |
| 35 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 16667 | 67 | **0,000605** | **0,00015** |
| 36 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 16667 | 67 | **0,000605** | **0,00015** |
| 37 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 16667 | 67 | **0,000605** | **0,00015** |
| 38 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 16667 | 67 | **0,000605** | **0,00015** |
| 39 | 0,093 | 1,3 | 0,75 | 0,005 | 250 | 16667 | 67 | **0,000605** | **0,00015** |
| 73 | 0,093 | 1,3 | 0,75 | 0,005 | 50 | 3333 | 67 | **0,000605** | **0,00015** |
| 74 | 0,093 | 1,3 | 0,75 | 0,005 | 50 | 3333 | 67 | **0,000605** | **0,00015** |
| 75 | 0,093 | 1,3 | 0,75 | 0,005 | 50 | 3333 | 67 | **0,000605** | **0,00015** |

**2. Calculation of pollutant emissions from grain and oilseeds shipment posts for water and road transport**

The calculation is similar to the previous one:

| **№ Src.** | **V, $m^3$/sec** | **C, $g/m^3$** | **ρ, $t/m^3$** | **k** | **G, t/h** | **B, t/year** | **T, h/year** | **$M^{max}$** | **$M^{year}$** |
|---|---|---|---|---|---|---|---|---|---|
| *Substances in the form of suspended solid particles (grain dust)* | | | | | | | | | |
| 66 | 0,093 | 1,3 | 0,75 | 0,01 | 500 | 800000 | 1600 | **0,001209** | **0,00696** |
| 67 | 0,093 | 1,3 | 0,75 | 0,01 | 500 | 800000 | 1600 | **0,001209** | **0,00696** |
| 87 | 0,093 | 1,3 | 0,75 | 0,01 | 300 | 800000 | 2667 | **0,001209** | **0,01161** |
| Substances in the form of suspended solid particles (*sunflower seed dust*) | | | | | | | | | |
| 66 | 0,093 | 1,3 | 0,75 | 0,01 | 350 | 100000 | 286 | **0,001209** | **0,00124** |
| 67 | 0,093 | 1,3 | 0,75 | 0,01 | 350 | 100000 | 286 | **0,001209** | **0,00124** |
| 87 | 0,093 | 1,3 | 0,75 | 0,01 | 210 | 100000 | 476 | **0,001209** | **0,00207** |
| *Substances in the form of suspended solid particles (soybean seed dust)* | | | | | | | | | |
| 66 | 0,093 | 1,3 | 0,75 | 0,01 | 500 | 100000 | 200 | **0,001209** | **0,00087** |
| 67 | 0,093 | 1,3 | 0,75 | 0,01 | 500 | 100000 | 200 | **0,001209** | **0,00087** |
| 87 | 0,093 | 1,3 | 0,75 | 0,01 | 300 | 100000 | 333 | **0,001209** | **0,00145** |

**3. Calculation of emissions of pollutants during unloading of waste grains and oilseeds from grain bin**

| **№ Src.** | **V, $m^3$/sec** | **C, $g/m^3$** | **ρ, $t/m^3$** | **k** | **G, t/h** | **B, t/year** | **T, h/year** | **$M^{max}$** | **$M^{year}$** |
|---|---|---|---|---|---|---|---|---|---|
| *Substances in the form of suspended solid particles (grain dust)* | | | | | | | | | |
| 68 | 0,008 | 1,3 | 1,7 | 0,5 | 50 | 1600 | 32 | **0,005200** | **0,00060** |
| 69 | 0,008 | 1,3 | 1,7 | 0,5 | 50 | 48 | 10 | **0,005200** | **0,00019** |
| 70 | 0,008 | 1,3 | 1,7 | 0,5 | 50 | 48 | 10 | **0,005200** | **0,00019** |
| 71 | 0,008 | 1,3 | 1,7 | 0,5 | 50 | 48 | 10 | **0,005200** | **0,00019** |
| 72 | 0,008 | 1,3 | 1,7 | 0,5 | 50 | 48 | 10 | **0,005200** | **0,00019** |
| *Substances in the form of suspended solid particles (sunflower seed dust)* | | | | | | | | | |
| 68 | 0,008 | 1,3 | 1,7 | 0,5 | 35 | 200 | 5 | **0,005200** | **0,00009** |
| 69 | 0,008 | 1,3 | 1,7 | 0,5 | 35 | 6 | 5 | **0,005200** | **0,00009** |
| 70 | 0,008 | 1,3 | 1,7 | 0,5 | 35 | 6 | 5 | **0,005200** | **0,00009** |
| 71 | 0,008 | 1,3 | 1,7 | 0,5 | 35 | 6 | 5 | **0,005200** | **0,00009** |
| 72 | 0,008 | 1,3 | 1,7 | 0,5 | 35 | 6 | 5 | **0,005200** | **0,00009** |
| *Substances in the form of suspended solid particles (soybean seed dust)* | | | | | | | | | |
| 68 | 0,008 | 1,3 | 1,7 | 0,5 | 50 | 200 | 5 | **0,005200** | **0,00009** |
| 69 | 0,008 | 1,3 | 1,7 | 0,5 | 50 | 6 | 5 | **0,005200** | **0,00009** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 70 | 0,008 | 1,3 | 1,7 | 0,5 | 50 | 6 | 5 | **0,005200** | **0,00009** |
| 71 | 0,008 | 1,3 | 1,7 | 0,5 | 50 | 6 | 5 | **0,005200** | **0,00009** |
| 72 | 0,008 | 1,3 | 1,7 | 0,5 | 50 | 6 | 5 | **0,005200** | **0,00009** |

**Calculation of emissions of pollutants during the operation of grain dryer**

**Source №40**

The calculations were made on the basis of the "Consumption of fossil fuel", "Compendium of emission indicators (intensity rate of emissions) of polluting substances into the ambient air by various industries", Donetsk, 2004.

**Output data for calculation:**

Grain dryers «Methews 3180 BEM-NC» - 2 pcs.

Type of fuel – natural gas.

B = 218,7 thousand $m^3$/year; 164 $m^3$/h; 0319 $m^3$/sec – fuel consumption for one grain dryer.

$Q^r$ = 33,6 MJ/$m^3$ – volumetric lower heating value of combustion of gas.

$P_n$ = 0,73 kg/$m^3$ – gas density under normal conditions.

Gross emission of j-th pollutant $E_j$, (t), which enters the atmosphere with the flue gases of the power plant over a period of time $P$, is calculated by formula:

$$E_j = 10^{-6} k_j B_i Q_i{}^r, \qquad (1)$$

where $E_j$ – gross emission of j-th pollutant during the gas combustion over a period of time $P$, t;

$k_j$ – indicator of emission of j-th pollutant, g/gigajoule;

$B_i$ – consumption of i-th fuel over a period of time $P$, t;

$Q^r_i$ – lower heating value of i-th natural fuel combustion, MJ/kg.

**Recalculation of natural gas characteristics**

1. **Mass elemental composition of dry gaseous fuel:**

Carbon - $C^r = C^{daf} = 73,67$ Oxygen – $O^r = O^{daf} = 0,12$

Hydrogen - $H^r = H^{daf} = 24,65$ Nitrogen – $N^r = NO^{daf} = 1,56$

2. **Mass lower heating value**

$Q^r_i = Q^r_{iv} / p_n = 33,6/0,73 = 46,03$ MJ/kg

3. **Mass consumption of natural gas**

$B_{year} = B_v \cdot p_n = 218,7 \cdot 0,73 = 159,65$ t/year

$B_{sec} = 0,319 \cdot 0,73 \cdot 10^3 = 232,87$ g/sec

## ***Emissions during combustion of natural gas***

### 1.1. Calculation of emissions of nitrogen oxides

Indicator of emission of nitrogen oxides $k_{NOx}$ is calculated by formula:

$$k_{NOx} = (k_{NOx})_0 f_n (1 - \eta_I)(1 - \eta_{II}\beta), \quad \text{g/GJ};$$

where $(k_{NOx})_0 = 90{,}0$ g/GJ – Indicator of emission of nitrogen oxide excluding primary emission reduction measures NO$x$, (table. D.8 of appendix D);

$f_n$ – degree of emission reduction of $NO_x$ when working at low load, determined by the formula: $f_n = (Q_a/Q_n)^z$,

where $Q_n$ –nominal thermal power of power plant, MW;

$Q_a$ – the actual thermal power of the power plant, MW;

$z = 1{,}25$ – an empirical coefficient that depends on the type of power plant, its capacity, type of fuel, etc., (table. D.9 of appendix D);

$\eta_I = 0$ – effectiveness of primary (regime-technological) emission reduction measures, (table. D.10 of appendix D);

$\eta_{II} = 0$ – efficiency of the nitrogen treatment plant (absent);

( = 0 ( the coefficient of operation of the nitrogen treatment plant.

$$\boldsymbol{k_{NOx}} = 90{,}0 \cdot 0{,}8^{1{,}25} \cdot (1 - 0) \cdot (1 - 0) = 90{,}0 \cdot 0{,}7566 = 68{,}094 \text{ g/GJ}$$

Thus, according to the formula (1) the gross emission of nitrogen oxides will be:

$$E_{NO_x} = 10^{-6} \cdot k_{NO_x} \cdot Q^r \cdot B = 10^{-6} \cdot 68{,}094 \cdot 46{,}03 \cdot 159{,}65 = 0{,}50040 \text{ t/year}$$

Similarly, maximum one-time emission:

$$E_{NOx} = 10^{-6} \cdot 68{,}094 \cdot 46{,}03 \cdot 232{,}87 = 0{,}729900 \text{ g/sec.}$$

### 1.2. Calculation of emissions of carbon oxide

Indicator of emission of carbon oxides $k_{CO}$ is calculated by formula:

$$k_{CO} = (k_{CO})_0 \cdot (1 - q_4 / 100), \quad \text{g/GJ}$$

where $(k_{CO})_0 = 250$ g/GJ, generalized emission indicator of other pollutant at absence of physical incompleteness of combustion of fuel (table. D.19 of appendix D);

$q_4 = 0{,}5\%$, losses of heating value of fuel due to physical incompleteness of combustion of fuel in % depending on the characteristics of the combustion chamber of the power plant (tables. D3 and D4 of appendix D).

$$k_{CO} = 250 \cdot (1 - 0{,}5/100) = 248{,}75 \text{ g/GJ}$$

According to formula (1) the gross emission of carbon oxide $E_{CO}$ will be:

$$E_{CO} = 10^{-6} k_{CO} Q_i^r B = 10^{-6} \cdot 248{,}75 \cdot 46{,}03 \cdot 159{,}65 = 1{,}82799 \text{ t/year}$$

Maximum one-time emission: $E_{CO} = 10^{-6} \cdot 248{,}75 \cdot 46{,}03 \cdot 232{,}87 = 2{,}666353$ g/sec.

# 2. Heavy metals

## 2.1. Calculation of emission of mercury

Indicator of emission of heavy metal – mercury $k_{Hg}$ is calculated by formula:

$$k_{Hg} = (k_{Hg})_0 (1 - \eta_{ash}), \text{ g/GJ}$$

where $(k_{Hg})_0$ = 0,0001 g/GJ, indicator of emission of mercury without using of ash trapping unit (table. D.17 of appendix D);

$\eta_{ash}$ = 0%, effectiveness of mercury trapping in ash trapping unit (table. D.14 of appendix D).

$$k_{Hg} = 0{,}0001 \cdot (1 - 0) = 0{,}0001 \text{ g/GJ}$$

According to formula (1) gross emission of mercury $E_{Hg}$ will be:

$$E_{\text{Hg}} = 10^{-6} k_{Hg} Q_i^r B = 10^{-6} \cdot 0{,}0001 \cdot 46{,}03 \cdot 159{,}65 = 7{,}34 \cdot 10^{-7} \text{ t/year}$$

Maximum one-time emission: $E_{Hg} = 10^{-6} \cdot 0{,}0001 \cdot 46{,}03 \cdot 232{,}87 = 1{,}1 \cdot 10^{-6}$ g/sec.

# 3. Greenhouse gases

## 3.1. Calculation of emission of carbon dioxide

Indicator of emission of carbon dioxide $k_{CO2}$ during combustion of natural gas is determined by formula (20):

$$k_{\text{CO}_2} = \frac{44}{12} \cdot \frac{C^r}{100} \cdot \frac{10^6}{Q_i^r} \varepsilon_C = 3{,}67 \, k_c \varepsilon_c, \quad \text{g/GJ;}$$

where $C^r$ = 73,67 %;– weight fraction of carbon in gas at the workplace;

$\varepsilon_c$ = 0,995 – the degree of carbon oxidation of the fuel (appendix A);

$k_c = \frac{C^r}{100} \cdot \frac{10^6}{Q_i^r}$ – carbon emission indicator of the fuel, g/GJ.

$$k_{CO2} = 44/12 \cdot 73{,}67/100 \cdot 10^6/46{,}03 \cdot 0{,}995 = 58390{,}77 \text{ g/GJ}$$

Gross emission of carbon dioxode $E_{CO2}$ will be:

$$E_{\text{CO2}} = 10^{-6} k_{\text{CO2}} Q_i^r B = 10^{-6} \cdot 58390{,}77 \cdot 46{,}03 \cdot 159{,}65 = 429{,}09564 \text{ t/year}$$

Similarly, maximum one-time emission:

$$E_{\text{CO2}} = 10^{-6} k_{\text{CO2}} Q_i^r B = 10^{-6} \cdot 58390{,}77 \cdot 46{,}03 \cdot 232{,}87 = 625{,}891020 \text{ g/sec}$$

## 3.2. Calculation of emission of dinitrogen oxide

Emission indicator of dinitrogen oxide $k_{N2O}$ is 0,1 g/GJ (table. D.21 of appendix D).

According to formula (1) the gross emission of dinitrogen oxide $E_{N2O}$ will be:

$$E_{N2O} = 10^{-6} k_{N2O} Q_i^r B = 10^{-6} \cdot 0{,}1 \cdot 46{,}03 \cdot 159{,}65 = 0{,}00073 \text{ t/year}$$

Similarly, maximum one-time emission:

$$E_{N2O} = 10^{-6} k_{N2O} Q_i^r B = 10^{-6} \cdot 0{,}1 \cdot 46{,}03 \cdot 232{,}87 = 0{,}001072 \text{ g/sec}$$

### 3.3. Calculation of emission of methane

Emission indicator of methane $k_{CH4}$ is 1,0 g/GJ (table. D.22 of appendix D).

According to formula (1) the gross emission of methane $E_{CH4}$ will be:

$$E_{CH4} = 10^{-6} k_{CH4} Q_i^r B = 10^{-6} \cdot 1{,}0 \cdot 46{,}03 \cdot 159{,}65 = 0{,}00735 \text{ t/year}$$

Similarly, maximum one-time emission:

$$E_{CH4} = 10^{-6} k_{CH4} Q_i^r B = 10^{-6} \cdot 1{,}0 \cdot 46{,}03 \cdot 232{,}87 = 0{,}010719 \text{ g/sec}$$

## 5. Dust

**Output data for calculation:**

The amount of grain that is drained in grain dryer - 100000 t: of them grain crops – 80000 t, oil crops - 10000 t, leguminous crops – 10000 t.

Annual dust emissions are determined according to table XI-2 "Specific emissions of dust emitted into the atmosphere from technological and transport equipment at grain processing enterprises and elevators, and is taken as equal to 1.2% of the mass of grain undergoing drying in grain dryers.

Thus, the amount of grain dust from grain dryer will be:

$$E_{grain} = 80000 \cdot 0{,}012 \cdot 0{,}05 \cdot 0{,}1 = 4{,}800 \text{ t/year},$$

The amount of dust of sunflower seed will be:

$$E_{sun.} = 10000 \cdot 0{,}012 \cdot 0{,}05 \cdot 0{,}1 = 0{,}6 \text{ t/year}$$

The amount of dust of soybean seed will be:

$$E_{soy.} = 10000 \cdot 0{,}012 \cdot 0{,}05 \cdot 0{,}1 = 0{,}6 \text{ t/year}$$

where 0,05 - share of suspended particles not collected by aspiration system.

Due to the fact that the dryer is closed on three sides, we use the coefficient for the value of emissions, which takes into account the conditions: the degree of protection from external influences according to «The methodological guide for calculating from non-organized sources in the building materials industry», Novorossiysk, 1985 k = 0,1.

Taking into account the decisions made in the project regarding the complete closure of the dryer, a significant part of the dust emitted during drying will remain within the shelter and will be emitted

Maximum one-time emissions from each section will be:

$E_{grain} = (4{,}80000 \cdot 10^6)/(1067 \cdot 3600) = 1{,}250000$ g/sec;

$E_{sun.} = (0{,}60000 \cdot 10^6)/(400 \cdot 3600) = 1{,}250000$ g/sec

$E_{soy} = (0{,}60000 \cdot 10^6)/(400 \cdot 3600) = 1{,}250000$ g/sec.

where 1067 – time of drying of grain crops, h/year;

133 – time of drying of oil crops, h/year;

133 – time of drying of leguminous crops, h/year.

The results of calculations for each grain dryer are shown in the table:

| The name of the pollutant | Emissions | |
|---|---|---|
| | g/sec | t/year |
| Nitrogen oxides | 0,729900 | 0,50040 |
| Carbon oxides | 2,666353 | 1,82799 |
| Metallic mercury | $1{,}1 \cdot 10^{-6}$ | $7{,}34 \cdot 10^{-7}$ |
| Carbon dioxide | 625,891020 | 429,09564 |
| Dinitrogen oxide | 0,001072 | 0,00073 |
| Methane | 0,010719 | 0,00735 |
| Grain dust | 1,250000 | 4,80000 |
| Sunflower seed dust | 1,250000 | 0,60000 |
| Soybean seed dust | 1,250000 | 0,60000 |

**Calculation of emissions of harmful substances during discharging from railtank cars and storing of diesel fuel Sources №41, 42**

The calculation was made according to the "Compendium of methods for calculating the content of pollutants in emissions from non-organized sources of air pollution", Donetsk,1994.

During discharging from railtank cars the vapors of oil products are emitted in the ambient air.

**The initial data for calculations are given in the table.**

**Table I.**

| Place of storage | Type of oil products | The volume of tank, $m^3$ | Turnover | Annual volume, $m^3$ |
|---|---|---|---|---|
| Tank capacity 75 $m^3$ | Diesel fuel | 75 | 13 | 975,0 |
| Tank capacity 75 $m^3$ | Diesel fuel | 75 | 13 | 975,0 |
| Total capacity 150 $m^3$ | | | | 1950 |

***Calculation of emissions during discharging from railtank cars.***

During discharging of oil products from railtank cars to tanks, the calculation of emissions in the atmosphere is carried out by formula:

$$\Pi_{filling}=2,52*V_{lq}^{tank}*P_{s(38)}*M_M*(K_{5c}+K_{5h})K_8(1-\eta)*10^{-9}\ kg/h;$$

where $V_{lq}^{tank}$ - annual volume of liquid discharging to tank, $m^3$/year;

$\eta$ - the efficiency coefficient of the gas-handling device of the tank;

$P_{S(38)}$ - pressure of saturated liquid vapors at temperature $38^0$C(hPa);

$K_8$ - a coefficient that depends on the pressure of saturated vapors and the climatic zone;

$M_M$ - molecular weight of fuel vapors (table 5.2[9]);

$K_{5c}$, $K_{5h}$ - correction coefficient, which depends on the pressure of saturated vapors $P_{S(38)}$ and the temperature of the gas space $t_g^{tank}$ respectively in the cold and warm seasons.

***Calculation of emissions due to evaporation from the tank during fuel storage.***

The amount of emissions of pollutants (kg/hour) from tanks due to evaporation during storage of oil products is calculated by the formula:

$$\Pi_{evaporation}=2,52*V_{lq}^{tank}*P_{s(38)}*M_M*(K_{5c}+K_{5h})K_6K_7(1-\eta)*10^{-9};$$

where $V_{lq}^{tank}$ - annual volume of liquid stored in the tank, $m^3$/year;

$\eta$ - the efficiency coefficient of the gas-handling device of the tank;

$K_{5c}$, $K_{5h}$ - correction coefficients, which depend on the pressure of saturated vapors $P_{S(38)}$ and the temperature of the gas space $t_g^{tank}$ respectively in the cold and warm seasons (table П1.4-1.7[9]);

$K_6$ – correction coefficient, which depends on the pressure of saturated vapors and annual turnover of tanks;

$K_7$ – correction coefficient, which depends on the technical equipment and mode of operation of the tanks;

$P_{S(38)}$ - pressure of saturated liquid vapors at temperature 38 $^0$C(hPa);

The indication of saturated vapor pressure for multicomponent liquids (oil products) is taken depending on the values of the equivalent temperature of the beginning of boiling of the liquid ($t_{eq}$ $^0$C), which is determined by the formula:

$$t_{eq} = t_{bb} + \frac{t_{eb} + t_{bb}}{8,8}, ^0C$$

where $t_{eb}$ – temperature of the end of boiling of oil products;

$t_{bb}$ – temperature of the beginning of boiling of oil products.

Beginning and end boiling temperatures of oil products are adopted in accordance with the standards (DSTU 7688:2015).

For diesel duel $t_{eq} = 180 + \frac{360 + 180}{8,8} = 200^0$C.

We find for calculated $t_{eq}$: for diesel fuel $P_{s(38)}$=1,3

The molecular mass of vapors of oil products $M_M$ depends on the temperature of the beginning of boiling: for diesel fuel $M_M$=146,0 g/mole.

Correction coefficients $K_{5c}$ and $K_{5h}$ depend on the pressure of saturated vapors $P_{s(38)}$ and the temperature of the gas space $t_g^{tank}$ respectively in the cold and warm seasons.

For tanks, the temperature for the six coldest months is determined by the formula:

$$t_{gc}^{tank} = K_{1c} + K_{2c} * t_{ac} + K_{3c} * t_{lqc}^{tank}$$

For the six warmest months is determined by the formula:

$$t_{gh}^{tank} = K_4 (K_{1h} + K_{2h} * t_{ah} + K_{3h} * t_{lqh}^{tank},$$

where $t_{ac}$, $t_{ah}$- average arithmetic values of ambient air temperature for the six coldest and six warmest months of the year, $^0$C.

Average monthly temperatures are taken from the data DSTU-N B V.1.1-27:2010 «Building climatology» for Izmail and are given in the table.

Table.

| I | II | III | IV | V | VI | VII | VIII | IX | X | XI | XII |
|---|---|---|---|---|---|---|---|---|---|---|---|
| -1,3 | 0,2 | 4,3 | 10,6 | 16,3 | 20,3 | 22,3 | 21,7 | 17,0 | 11,2 | 5,7 | 0,7 |

$K_{1h}$, $K_{2h}$, $K_{3h}$, $K_{1c}$ , $K_{2c}$, $K_{3c}$ – correction coefficients for the six coldest and six warmest months.

$K_4$ – coefficient which depends on the type of storage, $K_4$=1.

$t_{ac}$= 3,37;

$t_{ah}$= 18,3.

When discharging of oil products from tanks, the average temperature of the gas space of these tanks is taken equal to the average temperature of the atmospheric air for the corresponding period.

$T_{gc}^{tank} = t_{ac}$;

$T_{gh}^{tank} = t_{ah}$;

For the six coldest months $K_{1c}$=1,62; $K_{2c}$=0,19; $K_{3c}$=0,74.

For the six warmest months $K_{1h}$=6,1; $K_{2h}$=0,17; $K_{3h}$=0,36.

The temperature of the gas space of the tank for the six coldest months:

$$T_{gc}^{tank}=1,62+0,19 \cdot 3,37 + 0,74 \cdot 3,37 = 4,75\ ^0C$$

The temperature of the gas space of the tank for the six warmest months:

$$T_{gh}^{tank}=1,0 \cdot (6,1+0,17 \cdot 18,13 + 0,36 \cdot 18,13)=15,71\ ^0C$$

We accept the value of the $K_5$ coefficients as:

- For diesel fuel $K_{5c}=0,073$; $K_{5h}=0,182$.

The values of the $K_6$ coefficients are taken depending on the climatic zone of the location of the fuel filling station, the pressure of saturated vapors $P_{s(38)}$ and the annual turnover of the tanks, and are given in the table.

Coefficient $K_7$ is accepted depending on the equipment of the tanks with technical means of reducing losses and the mode of operation of the tanks, $K_7=0,6$.

Coefficient $K_8$ is accepted depending on the pressure of saturated vapors and the climatic zone, for diesel fuel $K_8=0,5$.

| **Type of oil products** | **turnover** | **$K_6$** |
|---|---|---|
| Diesel fuel | 13 | 1,37 |
| Diesel fuel | 13 | 1,37 |

The results of the calculations are given in the table:

| Type of fuel | Time of storage/ discharge, hours | Emissions during storage | | | Emission during discharge | | |
|---|---|---|---|---|---|---|---|
| | | kg/h | g/s | t/year | kg/h | g/s | t/year |
| Diesel fuel | 4320/59 | 0,00020 | 0,000054 | 0,00083 | 0,00012 | 0,000033 | 0,00050 |
| Diesel fuel | 4320/59 | 0,00020 | 0,000054 | 0,00083 | 0,00012 | 0,000033 | 0,00050 |

Due to the fact that simultaneous storage and discharge of fuel is possible, therefore, we accept the maximum single and annual emissions as the total for each source:

**0,000087 g/s and 0,00133 t/year**

The mass fraction of specific components of hydrocarbon emissions is:

Saturated hydrocarbon - 0,9957

Aromatic hydrocarbon - 0,0015

including: - xylene - 0,0015

hydrogen sulfide - 0,0028

Thus emissions from every source of emission is:

$$M^{year}_{sh} = 0,9957 \cdot 0,00133 = 0,00132 \text{ t/year}$$

$$M^{year}_{x} = 0,0015 \cdot 0,00133 = 2,00 \cdot 10^{-6} \text{ t/year}$$

$$M^{year}_{hs} = 0,0028 \cdot 0,00133 = 3,72 \cdot 10^{-6} \text{ t/year}$$

The emission for second is:

$$M^{sec}_{sh} = 0,9957 \cdot 0,000087 = 0,000087 \text{ g/sec;}$$

$M^{sec}_{x} = 0{,}0015 \cdot 0{,}000087 = 1{,}31 \cdot 10^{-7}$ g/sec;

$M^{sec}_{hs} = 0{,}0028 \cdot 0{,}000087 = 2{,}44 \cdot 10^{-7}$ g/sec.

## Calculation of emissions of harmful substances during discharge of diesel fuel into a road tanker

The calculation was made according to the "Compendium of methods for calculating the content of pollutants in emissions from non-organized sources of air pollution", Donetsk,1994.

**The initial data for calculations are given in table Pa.**

**Table Pa.**

| Place of storage | Type of oil products | The volume of tank, $m^3$ | Turnover | Annual volume, $m^3$ |
|---|---|---|---|---|
| Truck with a tank with capacity 30 $m^3$ | Diesel fuel | 30 | 15 | 450,0 |

During discharging of oil products to road tankers, the calculation of emissions in the atmosphere is carried out by formula:

During discharging of oil products from railtank cars to tanks, the calculation of emissions in the atmosphere is carried out by formula:

$$П_{filling}=2,52*V_{lq}^{tank}* P_{s(38)}*M_M*(K_{5c}+K_{5h})K_8(1-\eta)*10^{-9}\ kg/h;$$

where $V_{lq}^{tank}$ - annual volume of liquid discharging to tank, $m^3$/year;

$\eta$ - the efficiency coefficient of the gas-handling device of the tank;

$P_{S(38)}$ - pressure of saturated liquid vapors at temperature $38^0$C(hPa);

$K_8$ - a coefficient that depends on the pressure of saturated vapors and the climatic zone;

$M_M$ - molecular weight of fuel vapors (table 5.2[9]);

$K_{5c}$, $K_{5h}$ - correction coefficient, which depends on the pressure of saturated vapors $P_{S(38)}$ and the temperature of the gas space $t_g^{tank}$ respectively in the cold and warm seasons.

The indication of saturated vapor pressure $P_{S(38)}$for multicomponent liquids (oil products) is taken depending on the values of the equivalent temperature of the beginning of boiling of the liquid ($t_{eq}{}^0$C), which is determined by the formula:

$$t_{eq} = t_{bb} + \frac{t_{eb} + t_{bb}}{8,8}\ ^0\text{C}$$

where $t_{eb}$ – temperature of the end of boiling of oil products;

$t_{bb}$ – temperature of the beginning of boiling of oil products.

Beginning and end boiling temperatures of oil products are adopted in accordance with the standards (DSTU 7688:2015).

For diesel fuel $t_{eq} = 180 + \frac{360 + 180}{8,8}$ =200$^0$C.

We find for calculated $t_{eq}$: for diesel fuel $P_{s(38)}$=1,3

The molecular mass of vapors of oil products $M_M$ depends on the temperature of the beginning of boiling: for diesel fuel $M_M$=146,0 g/mole.

Correction coefficients $K_{5c}$ and $K_{5h}$ depend on the pressure of saturated vapors $P_{s(38)}$ and the temperature of the gas space $t_g^{tank}$ respectively in the cold and warm seasons.

For tanks, the temperature for the six coldest months is determined by the formula:

$$t_{gc}^{tank} = K_{1c}+K_{2c}*t_{ac}+ K_{3c}*t_{lqc}^{tank},$$

For the six warmest months is determined by formula:

$$t_{gh}^{tank} = K_4 (K_{1h}+K_{2h}*t_{ah}+ K_{3h}*t_{lqh}^{tank},$$

where $t_{ac}$, $t_{ah}$- average arithmetic values of ambient air temperature for the six coldest and six warmest months of the year, $^0$C.

Average monthly temperatures are taken from the data DSTU-N B V.1.1-27:2010 «Building climatology» for Izmail and are given in the table.

Table.

| I | II | III | IV | V | VI | VII | VIII | IX | X | XI | XII |
|---|---|---|---|---|---|---|---|---|---|---|---|
| -1,3 | 0,2 | 4,3 | 10,6 | 16,3 | 20,3 | 22,3 | 21,7 | 17,0 | 11,2 | 5,7 | 0,7 |

$K_{1h}$, $K_{2h}$, $K_{3h}$, $K_{1c}$ , $K_{2c}$, $K_{3c}$ – correction coefficients for the six coldest and six warmest months.

$K_4$ – coefficient which depends on the type of storage, $K_4$=1.

$t_{ac}$= 3,37;

$t_{ah}$= 18,3.

When discharging oil products from tanks, the average temperature of the gas space of these tanks is taken equal to the average temperature of the atmospheric air for the corresponding period.

$T_{gc}^{tank} = t_{ac}$;

$T_{gh}^{tank} = t_{ah}$;

For the six coldest months $K_{1c}$=1,62; $K_{2c}$=0,19; $K_{3c}$=0,74.

For the six warmest months $K_{1h}$=6,1; $K_{2h}$=0,17; $K_{3h}$=0,36.

The temperature of the gas space of the tank for the six coldest months:

$$T_{gc}^{tank}=1,62+0,19 \cdot 3,37 + 0,74 \cdot 3,37 = 4,75\ ^0C$$

The temperature of the gas space of the tank for the six warmest months:

$$T_{gh}^{tank}=1,0 \cdot (6,1+0,17 \cdot 18,13 + 0,36 \cdot 18,13)=15,71\ ^0C$$

The value of coefficients $K_5$ is accepted for the diesel fuel $K_{5c}$=0,073; $K_{5h}$=0,182.

Coefficient $K_8$ is accepted from table 4.1 depending on the pressure of the saturated vapors and climatic zone, for diesel fuel $K_8$=0,5.

The results of calculation are given in the table.

| Type of oil products | Time of storage/ discharge, hours | Emission during discharge | | |
|---|---|---|---|---|
| | | kg/h | g/s | t/year |
| Diesel fuel | 25 | 0,00003 | 0,00008 | $6,86 \cdot 10^{-7}$ |

The mass fraction of specific components of hydrocarbon emissions is:

| | |
|---|---|
| Saturated hydrocarbon | - 0,9957 |
| Aromatic hydrocarbon | - 0,0015 |
| Including: - xylene | - 0,0015 |
| Hydrogen sulfide | - 0,0028 |

Thus emissions from every source of emission is:

$$M^{year}_{sh} = 0,9957 \cdot 6,86 \cdot 10^{-7} = 6,83 \cdot 10^{-7} \text{ t/year}$$

$$M^{year}_{x} = 0,0015 \cdot 6,86 \cdot 10^{-7} = 1,03 \cdot 10^{-9} \text{ t/year}$$

$$M^{year}_{hs} = 0,0028 \cdot 6,86 \cdot 10^{-7} = 1,92 \cdot 10^{-9} \text{ t/year}$$

The emission for second is:

$$M^{sec}_{пу} = 0,9957 \cdot 0,000008 = 0,000008 \text{ g/sec;}$$

$$M^{sec}_{x} = 0,0015 \cdot 0,000008 = 1,14 \cdot 10^{-8} \text{ g/sec;}$$

$$M^{sec}_{hs} = 0,0028 \cdot 0,000008 = 2,13 \cdot 10^{-8} \text{ g/sec.}$$

**Calculation of emissions of harmful substances**
**during filling cars with oil products**
**Source № 44**

Calculations of emissions of hydrocarbon vapors into the atmosphere during filling cars with liquid oil products (diesel fuel) are performed in accordance with the "Compendium of emission indicators (intensity rate of emissions) of pollutants into the ambient air by various industries", volume I, Donetsk-2004 [8].

At the same time, it is possible to fill one road tanker with diesel fuel.

It is provided to install the fuel dispenser NOVA 1101.21SBH type, for one product, with one fuel nozzle with a capacity 80 l/min (4,8 $m^3$/h).

The estimated volume of diesel fuel for filling of own technological road transport - 148 $m^3$/year.

Emissions into the atmosphere are calculated according to the formula:

$$M = Q \cdot K \cdot g,$$

if M – the amount of emissions of pollutants, kg/h;

Q – capacity of fuel dispenser, $m^3$/h;

K – coefficient depending on the concentration of fuel vapors (for diesel fuel K=0,000036);

g – fuel density, kg/ $m^3$ of fuel (for diesel fuel g=845).

The initial data and calculation results are summarized in a table.

| The name of the technological process | «Net» time of fillings, h/year | Capacity of fuel dispenser, $m^3$/h | Emissions of oil products vapors in atmosphere | | |
|---|---|---|---|---|---|
| | | | kg/h | g/s | t/year |
| Filling with diesel fuel | 148/4,8=31 h | 4,8 | 0,146 | 0,0405 | 0,00453 |

The mass fraction of specific components of hydrocarbon emissions is:

Saturated hydrocarbon - 0,9957

Aromatic hydrocarbon - 0,0015

Including: - xylene - 0,0015

Hydrogen sulfide - 0,0028

Thus emissions from every source of emission is:

$M^{year}_{sh} = 0,9957 \cdot 0,00453 = 0,00451$ t/year

$M^{year}_{x} = 0,0015 \cdot 0,00453 = 6,80 \cdot 10^{-6}$ t/year

$M^{year}_{hs} = 0,0028 \cdot 0,00453 = 1,27 \cdot 10^{-5}$ t/year

The emission for second is:

$M^{sec}_{sh} = 0,9957 \cdot 0,040500 = 0,040326$ g/sec;

$M^{sec}_{x} = 0,0015 \cdot 0,040500 = 0,000061$ g/sec;

$M^{sec}_{hs} = 0,0028 \cdot 0,040500 = 0,000113$ g/sec.

## Calculation of emissions of harmful substances during discharge of diesel fuel into the tug`s tank Source № 45

The calculation was made according to the "Compendium of methods for calculating the content of pollutants in emissions from non-organized sources of air pollution", Donetsk,1994.

**The initial data for calculations are given in table.**

| Place of storage | Type of oil products | The volume of tank, m3 | Turnover | Annual volume, m3 |
|---|---|---|---|---|
| Tug with tank of 30 $m^3$ for diesel fuel | Diesel fuel | 30 | 50 | 1500 |

During discharge of oil products into the tug`s tank the calculation of emissions in the atmosphere is carried out by formula:

$$\Pi_{filling}=2,52*V_{lq}^{tank}* P_{s(38)}*M_M*(K_{5c}+K_{5h})K_8(1-\eta)*10^{-9}\ kg/h;$$

where $V_{lq}^{tank}$ - annual volume of liquid discharging to tank, $m^3$/year;

$\eta$ - the efficiency coefficient of the gas-handling device of the tank;

$P_{S(38)}$ - pressure of saturated liquid vapors at temperature $38^0$C(hPa);

$K_8$ - a coefficient that depends on the pressure of saturated vapors and the climatic zone;

$M_M$ - molecular weight of fuel vapors (table 5.2[9]);

$K_{5c}$, $K_{5h}$ - correction coefficient, which depends on the pressure of saturated vapors $P_{S(38)}$ and the temperature of the gas space $t_g^{tank}$ respectively in the cold and warm seasons.

The indication of saturated vapor pressure $P_{S(38)}$ for multicomponent liquids (oil products) is taken depending on the values of the equivalent temperature of the beginning of boiling of the liquid ($t_{eq}$ $^0$C), which is determined by the formula:

$$t_{eq} = t_{bb} + \frac{t_{eb} + t_{bb}}{8,8}\ ,^0C$$

where $t_{eb}$ – temperature of the end of boiling of oil products;

$t_{bb}$ – temperature of the beginning of boiling of oil products.

Beginning and end boiling temperatures of oil products are adopted in accordance with the standards (DSTU 7688:2015).

For diesel fuel $t_{eq} = 180 + \frac{360 + 180}{8,8}$ =200$^0$C.

For calculated $t_{eq}$: for diesel fuel $P_{s(38)}$=1,3

The molecular mass of vapors of oil products $M_M$ depends on the temperature of the beginning of boiling: for diesel fuel $M_M$=146,0 g/mole.

Correction coefficients $K_{5c}$ and $K_{5h}$ depend on the pressure of saturated vapors $P_{s(38)}$ and the temperature of the gas space $t_g^{tank}$ respectively in the cold and warm seasons.

For tanks, the temperature for the six coldest months is determined by the formula:

$$t_{gc}^{tank} = K_{1c}+K_{2c}*t_{ac}+ K_{3c}*t_{lqc}^{tank},$$

For the six warmest months is determined by formula:

$$t_{gh}^{tank} = K_4 (K_{1h} + K_{2h} * t_{ah} + K_{3h} * t_{lqh}^{tank)},$$

where $t_{ac}$, $t_{ah}$- average arithmetic values of ambient air temperature for the six coldest and six warmest months of the year, $^0$C.

Average monthly temperatures are taken from the data DSTU-N B V.1.1-27:2010 «Building climatology» for Izmail and are given in the table.

Table.

| I | II | III | IV | V | VI | VII | VIII | IX | X | XI | XII |
|---|---|---|---|---|---|---|---|---|---|---|---|
| -1,3 | 0,2 | 4,3 | 10,6 | 16,3 | 20,3 | 22,3 | 21,7 | 17,0 | 11,2 | 5,7 | 0,7 |

$K_{1h}$, $K_{2h}$, $K_{3h}$, $K_{1c}$, $K_{2c}$, $K_{3c}$ – correction coefficients for the six coldest and six warmest months.

$K_4$ – coefficient which depends on the type of storage, $K_4$=1.

$t_{ac}$= 3,37;

$t_{ah}$= 18,3.

When discharging oil products from tanks, the average temperature of the gas space of these tanks is taken equal to the average temperature of the atmospheric air for the corresponding period.

$T_{gc}^{tank} = t_{ac}$;

$T_{gh}^{tank} = t_{ah}$;

For the six coldest months $K_{1c}$=1,62; $K_{2c}$=0,19; $K_{3c}$=0,74.

For the six warmest months $K_{1h}$=6,1; $K_{2h}$=0,17; $K_{3h}$=0,36.

The temperature of the gas space of the tank for the six coldest months:

$$T_{gc}^{tank} = 1,62 + 0,19 \cdot 3,37 + 0,74 \cdot 3,37 = 4,75\ ^0C$$

The temperature of the gas space of the tank for the six warmest months:

$$T_{gh}^{tank} = 1,0 \cdot (6,1 + 0,17 \cdot 18,13 + 0,36 \cdot 18,13) = 15,71\ ^0C$$

The value of coefficients $K_5$ is accepted for the diesel fuel $K_{5c}$=0,073; $K_{5h}$=0,182.

Coefficient $K_8$ is accepted from table 4.1 depending on the pressure of the saturated vapors and climatic zone, for diesel fuel $K_8$=0,5.

Results of calculations are given in table

| Type of oil products | Time of storage/ discharge, hours | Emission during discharge | | |
|---|---|---|---|---|
| | | kg/h | g/s | t/year |
| Diesel fuel | 45 | 0,00009 | 0,000025 | $4,12 \cdot 10^{-6}$ |

The mass fraction of specific components of hydrocarbon emissions is:

| | |
|---|---|
| Saturated hydrocarbon | - 0,9957 |
| Aromatic hydrocarbon | - 0,0015 |
| Including: - xylene | - 0,0015 |
| Hydrogen sulfide | - 0,0028 |

Thus emissions from every source of emission is:

$$M^{year}_{sh} = 0,9957 \cdot 4,12 \cdot 10^{-6} = 4,10 \cdot 10^{-6} \text{ t/year}$$

$$M^{year}_{x} = 0,0015 \cdot 4,12 \cdot 10^{-6} = 6,17 \cdot 10^{-9} \text{ t/year}$$

$$M^{year}_{hs} = 0,0028 \cdot 4,12 \cdot 10^{-6} = 1,15 \cdot 10^{-7} \text{ t/year}$$

The emission for second is:

$$M^{sec}_{sh} = 0,9957 \cdot 0,000025 = 0,000025 \text{ g/sec;}$$

$$M^{sec}_{x} = 0,0015 \cdot 0,000025 = 3,81 \cdot 10^{-8} \text{ g/sec;}$$

$$M^{sec}_{hs} = 0,0028 \cdot 0,000025 = 7,11 \cdot 10^{-8} \text{ g/sec.}$$

**Calculation of emissions of harmful substances**
**from road transport**
**Source № 46**

During the movement of the road tanker on the site, polluting substances with the exhaust gases of the internal combustion engine of the motor vehicle are released into the ambient air.

Emissions of harmful substances from vehicles are determined in accordance with Order No. 452 of the State Statistics Committee of Ukraine dated November 13, 2008 "On approval of the Methodology for calculating emissions of pollutants and greenhouse gases into the air from vehicles."

Volumes of emissions of j-th polluting substances and greenhouse gases when using another type of fuel by motor vehicles are carried out according to the formula:

$$B_{ij} = П_{othf} \cdot K_{ja} \cdot K_{jirc}, \text{ kg/year},$$

where $П_{othf}$ – annual consumption of other types of fuel (gasoline, gas oil (diesel), compressed and liquefied natural gas) for the needs of vehicles which are the private property of population at the populated area;

$K_{ja}$ - average specific emission of the j-th pollutant and greenhouse gas for the vehicles of population from consumption another type of fuel;

$K_{jirc}$ – coefficients of influence of the technical condition of motor vehicles on emissions of the j-th polluting substance from the use of another type of fuel.

Standard fuel consumption is calculated according to the formula:

$$Q_S = 0{,}01 \cdot H_s \cdot S, \text{ l } (m^3),$$

where $H_s$ – basic linear rate of fuel consumption, l/100 km ($m^3$/100 km);

S – car mileage, km.

The initial data for the calculation of harmful emissions from cars and the results of the calculations are given in tabular form

| Type of vehicle | Estimated number, units | Mileage, km | Basic linear standard, l/100 km | Fuel consumption, l/year t/year | Name of the pollutant/greenhouse gas | Coefficients of influence of the technical condition | Specific emission, kg/t of fuel | Specific emission, g/km |
|---|---|---|---|---|---|---|---|---|
| Entry and exit of the vehicle for filling of fuel | | | | | | | | |
| Trucks on the diesel fuel | 1 | 0,05km x 2 x 4 x180 = 73 km | 38 | 27,75<br>0,0215 | Nitrogen dioxide | 0,95 | 31,4 | 9,34 |
| | | | | | Carbon monoxide | 1,5 | 36,2 | 10,77 |
| | | | | | Nonmethane volatile organic compounds | 1,0 | 8,16 | 2,43 |
| | | | | | Methane | 1,4 | 0,25 | 0,74 |
| | | | | | Soot | 1,8 | 3,85 | 1,145 |
| | | | | | Sulfur dioxide | 1,0 | 4,3 | 1,28 |
| | | | | | Nitrogen oxide | 1,0 | 0,12 | 0,035 |
| | | | | | Carbon dioxide | 1,0 | 3138 | 933,3 |
| | | | | | Benz(a)pyrene | 1,0 | 0,03 | 0,0089 |
| Entry and exit of the vehicle for discharging of fuel | | | | | | | | |
| Trucks on the diesel fuel | 1 | 0,05 km x 2 x1 x 45 = 4,5 km | 38 | 1,7<br>0,0013 | Nitrogen dioxide | 0,95 | 31,4 | 9,34 |
| | | | | | Carbon monoxide | 1,5 | 36,2 | 10,77 |
| | | | | | Nonmethane volatile organic compounds | 1,0 | 8,16 | 2,43 |
| | | | | | Methane | 1,4 | 0,25 | 0,74 |
| | | | | | Soot | 1,8 | 3,85 | 1,145 |
| | | | | | Sulfur dioxide | 1,0 | 4,3 | 1,28 |
| | | | | | Nitrogen oxide | 1,0 | 0,12 | 0,035 |
| | | | | | Carbon dioxide | 1,0 | 3138 | 933,3 |
| | | | | | Benz(a)pyrene | 1,0 | 0,03 | 0,0089 |

| Name of the pollutant/greenhouse gas | Entry and exit of the vehicle for filling of fuel | | Entry and exit of the vehicle for discharging of fuel | | Total | |
|---|---|---|---|---|---|---|
| | g/s | t/year | g/s | t/year | g/s | t/year |
| Nitrogen dioxide | 0,000010 | 0,00070 | 0,000010 | 0,00004 | 0,000020 | 0,00074 |
| Carbon monoxide | 0,000019 | 0,00120 | 0,000019 | 0,00008 | 0,000038 | 0,00128 |
| Nonmethane volatile organic compounds | 0,000003 | 0,00020 | 0,000003 | 0,00001 | 0,000006 | 0,00021 |
| Methane | 1,20E-07 | 0,00001 | 1,20E-07 | 4,80E-07 | 2,40E-07 | 0,00001 |
| Soot | 0,000002 | 0,00016 | 0,000002 | 0,00001 | 0,000005 | 0,00017 |
| Sulfur dioxide | 0,000002 | 0,00010 | 0,000002 | 0,00001 | 0,000003 | 0,00011 |
| Nitrogen oxide | 4,00E-08 | 2,80E-06 | 4,00E-08 | 1,70E-07 | 8,00E-08 | 3,00E-06 |
| Carbon dioxide | 0,001100 | 0,07300 | 0,001100 | 0,00440 | 0,002200 | 0,07740 |
| Benz(a)pyrene | 1,00E-08 | 7,00E-07 | 1,00E-08 | 4,20E-08 | 2,00E-08 | 7,40E-07 |

## Calculation of emissions of harmful substances from railway transport

### Source № 47

During movement of railtank cars with locomotive, pollutants with exhaust gases of engine are emitted in the ambient air.

Emissions of harmful substances from railway transport are determined in accordance with Order No. 452 of the State Statistics Committee of Ukraine dated November 13, 2008 "On approval of the Methodology for calculating emissions of pollutants and greenhouse gases into the air from vehicles."

Emissions of polluting substances and greenhouse gases from railway transport are calculated based on the primary data of enterprises on fuel consumption for the operation of locomotive engines, according to the formula:

$$B_{ij} = M_i \cdot A_{ji} \cdot K_i, \text{ kg/year},$$

where $B_{ij}$ – volumes of emissions of the j-th pollutant and greenhouse gas by other type of transport, kg;

$M_i$ – volumes of fuel consumed by other types of transport, t;

$A_{ji}$ – average specific emission of the j-th pollutant and greenhouse gas by other type of transport;

$K_i$ – coefficient of fuel use by another type of transport: railway 1,0.

The initial data for the calculation of harmful emissions from railway transport and the results of the calculations are given in tabular form.

| Standard, kg/1 h of switching work | Estimated number of hours of work | Fuel consumption, t/year | Name of the pollutant/greenhouse gas | Specific emission, kg/t of fuel | Switching of railway transport | |
|---|---|---|---|---|---|---|
| | | | | | g/s | t/year |
| 8 | 25 | 0,2 | Nitrogen dioxide | 66,5 | 0,012300 | 0,01300 |
| | | | Carbon monoxide | 45,00 | 0,008250 | 0,00900 |
| | | | Nonmethane volatile organic compounds | 4,65 | 0,000850 | 0,00093 |
| | | | Methane | 0,18 | 0,000033 | 0,00004 |
| | | | Soot | 4,58 | 0,000840 | 0,00092 |
| | | | Sulfur dioxide | 4,20 | 0,000770 | 0,00084 |
| | | | Nitrogen oxide | 1,24 | 0,000227 | 0,00025 |
| | | | Carbon dioxide | 3138 | 0,575000 | 0,62700 |
| | | | Ammonia | 0,007 | 0,000001 | 1,40E-06 |
| | | | Benz(a)pyrene | 0,03 | 0,000003 | 3,50E-06 |

**Calculation of emissions of harmful substances**
**from river transport**
**Source № 48**

During the movement of tugs, pollutants with exhaust gases of the engine are emitted into the atmospheric air.

Emissions of harmful substances from railway transport are determined in accordance with Order No. 452 of the State Statistics Committee of Ukraine dated November 13, 2008 "On approval of the Methodology for calculating emissions of pollutants and greenhouse gases into the air from vehicles."

Emissions of polluting substances and greenhouse gases from railway transport are calculated based on the primary data of enterprises on fuel consumption for the operation of river vessels engines, according to the formula:

$$B_{ij} = M_i \cdot A_{ji} \cdot K_i, \text{ kg/year,}$$

where $B_{ij}$ – volumes of emissions of the j-th pollutant and greenhouse gas by other type of transport, kg;

$M_i$ – volumes of fuel consumed by other types of transport, t;

$A_{ji}$ – average specific emission of the j-th pollutant and greenhouse gas by other type of transport;

$K_i$ – coefficient of fuel use by another type of transport: railway 1,0.

The initial data for the calculation of harmful emissions from tug`s engines and the results of the calculations are given in tabular form.

| Standard, kg/1 h of switching work | Estimated number of hours of work | Fuel consumption, t/year | Name of the pollutant/greenhouse gas | Specific emission, kg/t of fuel | Switching of river transport | |
|---|---|---|---|---|---|---|
| | | | | | g/s | t/year |
| 10 l = 8,45kg | 50 | 0,42 | Nitrogen dioxide | 66,2 | 0,013000 | 0,02800 |
| | | | Carbon monoxide | 23,4 | 0,004580 | 0,01000 |
| | | | Nonmethane volatile organic compounds | 4,72 | 0,000900 | 0,00200 |
| | | | Methane | 0,18 | 0,000035 | 0,00008 |
| | | | Soot | 7,50 | 0,001470 | 0,00315 |
| | | | Sulfur dioxide | 4,50 | 0,000880 | 0,00189 |
| | | | Nitrogen oxide | 1,29 | 0,000250 | 0,00054 |
| | | | Carbon dioxide | 3138 | 0,610000 | 1,32000 |
| | | | Ammonia | 0,007 | 0,000001 | 2,90E-06 |
| | | | Benz(a)pyrene | 0,03 | 0,000004 | 0,00001 |

**Calculation of emissions of polluting substances from the unloading of grain cargoes into the intake pit**

**Source No. 53**

The calculation was made according to the «Temporary method for calculation of planned indicators for the protection of atmospheric air at grain processing enterprises and elevators» Moscow, 1989 using the «Temporary guidelines for calculating emissions from fugitive sources in the building materials industry», Novorossiysk, 1982.

The volume of dust removal when loading grains, oilseeds, and legumes into the holds of ships, t

$$M^{max} = \frac{k_1 \cdot k_2 \cdot k_3 \cdot k_5 \cdot k_7 \cdot G \cdot 10^6 \cdot B'}{3600} + k_3 \cdot k_4 \cdot k_5 \cdot k_6 \cdot k_7 \cdot q' \cdot F, \text{ g/sec}$$

where $k_1$ - the share of the dust fraction (from the entire mass of the cargo) in the material;

$k_2$ - the share of the dust fraction (from the total mass of dust) that passes into the aerosol;

$k_3$ - a coefficient that takes into account local meteorological conditions (dependency on wind speed);

$k_4$ - a coefficient that takes into account local conditions: degree of protection from external influences;

$k_5$ - a coefficient taking that takes into account material moisture;

$k_7$ - a coefficient that takes into account the material size;

B - a coefficient that takes into account the height of pouring;

G - loading device performance, t/h;

q' - emission of dust from one square meter of the actual surface in conditions where k3 =1, k5 =1;

F - the actual surface of the material, taking into account the relief of its intersection (only the area on which loading and unloading operations are performed is taken into account), $m^2$;

T - time of the pouring process, h

Unloading of grain crops from vehicles into a grain intake pit

| Material | $k_1$ | $k_2$ | $k_3$ | $k_4$ | $k_5$ | $k_6$ | $k_7$ | G | T | B | q | F | Amount, t | $M^{max}$ | $M^{year}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grain | 0,01 | 0,015 | 1,2 | 0,2 | 0,7 | 1,3 | 1 | 300 | 2667 | 0,5 | 0,005 | 18 | 800 000 | 1,069656 | 10,26998 |
| Sunflower seeds | 0,01 | 0,02 | 1,2 | 0,2 | 0,7 | 1,3 | 1 | 210 | 476 | 0,5 | 0,005 | 18 | 100000 | 0,999656 | 1,71301 |
| Soybean seeds | 0,01 | 0,01 | 1,2 | 0,2 | 0,7 | 1,3 | 1 | 300 | 333 | 0,5 | 0,005 | 18 | 100000 | 0,719656 | 0,86272 |

**Calculation of pollutant emissions during grains and oilseeds overloading using a clamshell crane (blowing from a clamshell)**

**Source No. 55, 56**

The determination of emissions of polluting substances during the transshipment of grain and oilseeds cargoes with a clamshell crane was carried out according to «Methodology for calculating emissions of harmful substances into the atmosphere in seaports», RD 31.06. 06-86, L., Lenmorniiproekt, 1986; «Methods for determining dust emissions into the atmosphere during overloading of bulk cargoes», RD 31.06.05-85, LenmorNDIproekt; V.O. Chikanovsky monographs «Protection of atmospheric air from dust during handling of ships with loose and bulk cargoes», Odesa, «Astroprint», 2003.

The maximum single emissions (g/sec) were calculated according to the formula:

$$M_{\text{sec}} = \frac{q \cdot F \cdot k}{1000}$$

where **q** – emission of dust from one $m^2$;

**F** – dust emission area $m^2$;

**k** – coefficient that takes into account local conditions: the degree of protection from external influences, since a clamshell crane carries the load only after the jaws are tightly closed, **k = 0,005**;

$$q = 20e^{[(0,05\psi+0,81)v-0,67\psi^2-0,69\psi]}$$

where **ψ** – moisture content of the transported material, %;

**v** –velocity of airflow relative to the transported material, m/s;

$$q = 20 \cdot 2,7^{[(0,05\cdot4+0,81)15-0,67\cdot16-0,69\cdot4]} = 20 \cdot 2,7^{1,67}$$

$$q = 106,243$$

Annual emissions (t/year) are calculated according to the formula:

$$M^{year} = \frac{M^{max}T \cdot 3600}{10^6}$$

where **T** – duration of transshipment, h/year

The initial data for the calculation are given in the table:

TEREX FUCHS hydraulic loader with a capacity of 300 t/h

| Characteristic | Units | Value |
|---|---|---|
| The moisture content of the transported material | % | at least 4% |
| The speed of the airflow relative to the transported material | m/s | 15,0 |
| Dust emission area | $m^2$ | 1,8 |

The calculation results are given in the tabular form:

| Material | **T** | **Amount, t** | $\mathbf{M^{max}}$ | $\mathbf{M^{year}}$ |
|---|---|---|---|---|
| Grain | 1333 | 400 000 | 0,000956 | 0,00459 |
| Sunflower seeds | 233 | 100 000 | 0,000956 | 0,00080 |
| Soybean seeds | 333 | 100 000 | 0,000956 | 0,00115 |

**Calculation of emissions of pollutants and greenhouse gases in the air from the engine of a mobile hydraulic transfer machine**

**Sources No. 57, 58**

During the maneuvering of transport on the territory of the complex, a negative impact on the atmosphere is expected due to emissions of pollutants from the operation of the engine of the mobile hydraulic transfer machine.

The amounts of emissions of pollutants into the air are determined by the calculation and balance method in accordance with the «Methodology for calculating emissions of pollutants and greenhouse gases into the air from vehicles», approved by order of the State Statistics Committee of Ukraine No. 452 of 13.11.08

Determination of the gross emission of pollutants into the atmosphere during the period of work from the engine of the mobile hydraulic transshipment machine is carried out according to the formula:

$$B_{ij} = {}^{M_i \cdot K_{SEij} \cdot K_{TCij}}/_{1000}, \text{ t/year}$$

where $M_i$ – the volume of fuel consumed by the i-th type of transport, t;

$K_{SEij}$ – specific emissions of the j-th pollutant and greenhouse gas by the i-th type of transport;

$K_{TCij}$ – the coefficient of influence of the technical condition on the specific emissions of the j-th pollutant and greenhouse gas by the i-th type of transport.

The maximum single emissions of polluting substances from the operation of the engine of a mobile hydraulic transshipment machine are determined by the formula:

$$\mathrm{P}_{ij} = \frac{M_i \cdot \mathrm{K}_{SEij} \cdot K_{TCij}}{3{,}6 \cdot \mathrm{T}_o}, \text{ g/sec}$$

where $T_o$ – operating time of road transport, h/year.

The initial data are shown in the tables.

| Type of fuel | The volume of fuel consumed, t | Operating time of the mobile hydraulic transshipment machine, h/year |
|---|---|---|
| Diesel | 78,63 | 1900 |

| Pollutant | $K_{SEij}$ | $K_{TCij}$ |
|---|---|---|
| Carbon monoxide | 36,2 | 1,5 |
| Non-methane volatile organic compounds | 8,16 | 1,0 |
| Methane | 0,25 | 1,4 |
| Nitrogen dioxide | 31,4 | 0,95 |
| Soot | 3,85 | 1,8 |

| | | |
|---|---|---|
| Nitrous oxide | 0,12 | 1,0 |
| Carbon dioxide | 3138,0 | 1,0 |
| Sulfur dioxide | 4,3 | 1,0 |
| Benzo(a)pyrene | 0,03 | 1,0 |

The calculation results are summarized in the table:

| Pollutant | *g/sec* | *t/year* |
|---|---|---|
| Carbon monoxide | 0,624481 | 4,26961 |
| Non-methane volatile organic compounds | 0,093845 | 0,64162 |
| Methane | 0,004025 | 0,02752 |
| Nitrogen dioxide | 0,343062 | 2,34553 |
| Soot | 0,079699 | 0,54491 |
| Nitrous oxide | 0,001380 | 0,00944 |
| Carbon dioxide | 36,088807 | 246,74094 |
| Sulfur dioxide | 0,049452 | 0,33811 |
| Benzo(a)pyrene | 0,000345 | 0,00236 |

**Calculation of emissions of pollutants and greenhouse gases in the air from vehicles**

**Sources No. 64, No.65**

During maneuvering of vehicles on the territory of the complex, a negative impact on the atmosphere due to emissions of pollutants from the operation of automobile engines is expected.

The amounts of emissions of pollutants into the air are determined by the calculation and balance method according to the «Methodology for calculating emissions of pollutants and greenhouse gases into the air from vehicles», approved by order of the State Statistics Committee of Ukraine No. 452 of 13.11.08

Determination of the gross emission of pollutants into the atmosphere during the period of work from transport engines is made according to the formula:

$$B_{ij} = {M_i \cdot K_{SEij} \cdot K_{TCBij}}/{1000}, \text{ t/year}$$

where $M_i$ – the volume of fuel consumed by the i-th type of transport, t;

$K_{SEij}$ – specific emissions of the j-th pollutant and greenhouse gas by the i-th type of transport;

$K_{TCij}$ – the coefficient of influence of the technical condition on the specific emissions of the j-th pollutant and greenhouse gas by the i-th type of transport.

The maximum single emissions of pollutants from the operation of automotive engines are determined by the formula:

$$P_{ij} = \frac{M_i \cdot K_{SEij} \cdot K_{TCij}}{3{,}6 \cdot T_o}, g/sec$$

where $T_o$ – time of operation of transport, h/year.

The initial data are shown in the tables.

| Name of the emission source | Type of fuel | The volume of consumed fuel, t | Operating time of road transport, h/year |
|---|---|---|---|
| Car parking, src. No. 64 | Petrol | 0,28 | 506 |
| Truck parking, src. No. 65 | Diesel | 3,20 | 2990 |

| Pollutant | Car parking, src. No. 64 | | Truck parking, src. No. 65 | |
|---|---|---|---|---|
| | $K_{SEij}$ | $K_{TCij}$ | $K_{SEij}$ | $K_{TCij}$ |
| Carbon monoxide | 201,8 | 1,5 | 36,2 | 1,5 |
| Non-methane volatile organic compounds | 53,0 | 1,0 | 8,16 | 1,0 |
| Methane | 0,94 | 1,5 | 0,25 | 1,4 |
| Nitrogen dioxide | 21,0 | 0,9 | 31,4 | 0,95 |
| Soot | - | 1,0 | 3,85 | 1,8 |
| Nitrous oxide | 0,188 | 1,0 | 0,12 | 1,0 |

| | | | | |
|---|---|---|---|---|
| Ammonia | 0,004 | 1,0 | - | 1,0 |
| Carbon dioxide | 3183,0 | 1,0 | 3138,0 | 1,0 |
| Sulfur dioxide | 1,0 | 1,0 | 4,3 | 1,0 |
| Benzo(a)pyrene | - | 1,0 | 0,03 | 1,0 |

The results of the calculations are summarized in the table:

| Pollutant | Car parking, src. No. 64 | | Truck parking, src. No. 65 | |
|---|---|---|---|---|
| | g/sec | t/year | g/sec | t/year |
| Carbon monoxide | 0,046528 | 0,08476 | 0,016143 | 0,17376 |
| Non-methane volatile organic compounds | 0,008147 | 0,01484 | 0,002426 | 0,02611 |
| Methane | 0,000217 | 0,00039 | 0,000104 | 0,00112 |
| Nitrogen dioxide | 0,002905 | 0,00529 | 0,008868 | 0,09546 |
| Soot | - | - | 0,002060 | 0,02218 |
| Nitrous oxide | 0,000029 | 0,00005 | 0,000036 | 0,00038 |
| Ammonia | 0,000001 | 1,12E-06 | - | - |
| Carbon dioxide | 0,489262 | 0,89124 | 0,932887 | 10,04160 |
| Sulfur dioxide | 0,000154 | 0,00028 | 0,001278 | 0,01376 |
| Benzo(a)pyrene | - | - | 0,000009 | 0,00010 |

**Calculation of emissions of pollutants during work of the power plants of the port fleet.**

**Source No. 81**

Amounts of emissions of pollutants into the atmospheric air are determined by the calculation and balance method in accordance with the "Methodology for calculating emissions of pollutants and greenhouse gases into the air from vehicles", approved by the order of the State Statistics Committee of Ukraine No. 452 dated 13.11.08.

Determination of the gross emission of pollutants into the atmospheric air during the period of work from the port fleet engines is carried out according to the formula:

$$B_{ij} = {M_i \cdot \grave{A}_{ij} \cdot \hat{E}_i}/{1000}, \text{ t}$$

where, $M_i$ – the amount of fuel consumed by the i-th mode of transport, tons;

$A_i$ – averaged specific emissions of the j-th pollutant and greenhouse gas by the i-th mode of transport;

$K_i$ – coefficient of fuel use by the i-th mode of transport, for river transport - 1.0.

The maximum single emissions of polluting substances from the operation of the fleet's engines are determined by the formula:

$$\text{Ð}_{ij} = \frac{M_i \cdot \grave{A}_{ij} \cdot K_i}{3{,}6 \cdot \grave{O}_{\partial}}, \text{ g/sec}$$

where, $T_p$ – operation time of river transport in the water area, h/year.

The initial data are shown in the tables.

| Name of the emission source | Type of fuel | The amount of fuel consumed, t | Operating time of river transport in the water area, h/year |
|---|---|---|---|
| Engines of port fleet | Diesel | 6 | 160 |

The initial data and calculation results are summarized in the table:

| Pollutant | $A_i$ | Engines of port fleet | |
|---|---|---|---|
| | | g/sec | *t/year* |
| Carbon monoxide | 23,4 | 0,243750 | 0,14040 |
| Non-methane volatile organic compounds | 4,72 | 0,049167 | 0,02832 |
| Methane | 0,18 | 0,001875 | 0,00108 |
| Nitrogen dioxide | 66,2 | 0,689583 | 0,39720 |
| Soot | 7,5 | 0,078125 | 0,04500 |
| Nitrous oxide | 1,29 | 0,013438 | 0,00774 |
| Ammonia | 0,007 | 0,000073 | 0,00004 |
| Carbon dioxide | 3138 | 32,687500 | 18,82800 |
| Sulfur dioxide | 4,5 | 0,046875 | 0,02700 |
| Benz(a)pyrene | 0,03 | 0,000313 | 0,00018 |

The following values of the maximum one-time emission of polluting substances are used to calculate dispersion:

| Pollutant | Source № 81 |
|---|---|
| | g/sec |
| Carbon monoxide | 0,121875 |
| Non-methane volatile organic compounds | 0,024584 |
| Methane | 0,000938 |
| Nitrogen dioxide | 0,344792 |
| Soot | 0,039063 |
| Nitrous oxide | 0,006719 |
| Ammonia | 0,000037 |
| Carbon dioxide | 16,343750 |
| Sulfur dioxide | 0,023438 |
| Benz(a)pyrene | 0,000157 |

## Calculation of emissions of pollutants from the unloading of grain cargoes using grab crane

### Source No. 88, 89, 90

The calculation was carried out in accordance with the "Temporary methodology for calculating planned indicators for the protection of atmospheric air of grain processing enterprises and elevators" Moscow, 1989 with the use of "Temporary methodological recommendations for the calculation of emissions from unorganized sources in the building materials industry", Novorossiysk, 1982.

The volume of dust removal when loading grains, oilseeds and legumes into the holds of ships, t

$$M^{max} = \frac{k_1 \cdot k_2 \cdot k_3 \cdot k_5 \cdot k_7 \cdot G \cdot 10^6 \cdot B'}{3600} + k_3 \cdot k_4 \cdot k_5 \cdot k_6 \cdot k_7 \cdot q' \cdot F \text{, g/sec}$$

where,

$k_1$ - the share of the dust fraction (from the entire weight of the cargo) in the material;

$k_2$ - the share of the dust fraction (from the total mass of dust) that passes into the aerosol;

$k_3$ - coefficient that takes into account local meteorological conditions (dependence on wind speed);

$k_4$ - coefficient that takes into account local conditions: the degree of protection from external influences;

$k_5$ - coefficient that takes into account the moisture content of the material;

$k_7$ - coefficient that takes into account the size of the material;

B - coefficient that takes into account the height of overflow;

G - bootloader productivity, t/hour;

q' - removal of dust from one square meter of the actual surface in conditions, if $k_3$ =1, $k_5$ =1;

F - the actual surface of the material, taking into account the relief of its cross-section (only the area on which loading and unloading operations are performed is taken into account), $m^2$;

T - overflow time, hour.

Unloading of grain crops in the ship's hold, source No. 88

| agriculture material | $k_1$ | $k_2$ | $k_3$ | $k_4$ | $k_5$ | $k_6$ | $k_7$ | G | T | B | q | F | quantity, t | $M^{max}$ | $M^{year}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grain | 0,01 | 0,015 | 1,2 | 0,05 | 0,7 | 1,3 | 1 | 300 | 1333 | 0,5 | 0,005 | 150 | 400 000 | 0,303450 | 1,45620 |
| Sunflower seeds | 0,01 | 0,02 | 1,2 | 0,05 | 0,7 | 1,3 | 1 | 210 | 238 | 0,5 | 0,005 | 150 | 50000 | 0,285950 | 0,24500 |
| Soybean seeds | 0,01 | 0,01 | 1,2 | 0,05 | 0,7 | 1,3 | 1 | 300 | 167 | 0,5 | 0,005 | 150 | 50000 | 0,215950 | 0,12983 |
| Unloading of grain crops into the intake pit, source No. 89 | | | | | | | | | | | | | | | |
| Grain | 0,01 | 0,015 | 1,2 | 0,05 | 0,7 | 1,3 | 1 | 300 | 1333 | 0,5 | 0,005 | 150 | 400 000 | 0,303450 | 1,45620 |
| Sunflower seeds | 0,01 | 0,02 | 1,2 | 0,05 | 0,7 | 1,3 | 1 | 210 | 238 | 0,5 | 0,005 | 150 | 50000 | 0,285950 | 0,24500 |
| Soybean seeds | 0,01 | 0,01 | 1,2 | 0,05 | 0,7 | 1,3 | 1 | 300 | 167 | 0,5 | 0,005 | 150 | 50000 | 0,215950 | 0,12983 |
| Unloading of grain crops into the ship's hold from a barge, No. 90 | | | | | | | | | | | | | | | |
| Grain | 0,01 | 0,015 | 1,2 | 0,05 | 0,7 | 1,3 | 1 | 300 | 267 | 0,5 | 0,005 | 150 | 80 000 | 0,303450 | 0,29168 |
| Sunflower seeds | 0,01 | 0,02 | 1,2 | 0,05 | 0,7 | 1,3 | 1 | 210 | 38 | 0,5 | 0,005 | 150 | 10000 | 0,285950 | 0,04941 |
| Soybean seeds | 0,01 | 0,01 | 1,2 | 0,05 | 0,7 | 1,3 | 1 | 300 | 27 | 0,5 | 0,005 | 150 | 10000 | 0,215950 | 0,02565 |

**Calculation of emissions of pollutants when overloading grain and oil crops using a grab crane (blowing with a grapple)**
**Source No. 91**

Determining pollutant emissions during the transshipment of grain and oil cargoes with a grab was carried out in accordance with "Methods for calculating emissions of harmful substances into the atmosphere in sea ports, RD 31.06. 06-86, L., Lenimorniiproekt, 1986, "Methods for determining dust emissions into the atmosphere during transshipment of bulk cargo", RD 31.06.05-85, LenmorNDIproekt, monographs by V. O. Chikanovsky "Protection of atmospheric air from dust during handling of ships with bulk and bulk cargoes", Odesa, "Astroprint", 2003.

The maximum single emissions (g/sec) were calculated according to the formula:

$$M\,\text{sec} = \frac{K * q * F}{100}$$

where **q** – removal of dust from one $m^2$;

**F** – dust extraction area, $m^2$;

**k** – a coefficient that takes into account local conditions: the degree of protection against external influences, since the grab carries the load only after the jaws are tightly closed, k = 0.005;

$$q = 20e^{\left[(0{,}05\psi+0{,}81)v-0{,}67\psi^2-0{,}69\psi\right]}$$

where **ψ** – moisture content of the transported material, %;

**v** – the speed of the air flow relative to the transported material, m/s;

$$q = 20 \cdot 2{,}7^{[(0{,}05\cdot 4+0{,}81)15-0{,}67\cdot 16-0{,}69\cdot 4]} = 20 \cdot 2{,}7^{1{,}67}$$

$$q = 106{,}243$$

Annual emissions (t/year) are calculated according to the formula

$$M\,\text{year} = \frac{Mmax * T * 3600}{10^6}$$

where **T** – duration of overload, h/year

The initial data for the calculation are given in the table:
TEREX FUCHS hydraulic loader with a capacity of 300 t/h

| Characteristics | Dimensionality | Quantity |
|---|---|---|
| Moisture content of the transported material | % | At least 4% |
| The speed of movement of the air flow relative to the transported material | m/s | 15,0 |
| Dust emission area | $m^2$ | 1,8 |

The results of the calculations are given in tabular form:

| Material | T | Quantity, t | $M^{max}$ | $M^{year}$ |
|---|---|---|---|---|
| Grain | 267 | 80 000 | 0,000956 | 0,00092 |
| Sunflower seeds | 23 | 10 000 | 0,000956 | 0,00008 |
| Soybean seeds | 33 | 10 000 | 0,000956 | 0,00011 |

**Calculation of emissions of pollutants**
**and greenhouse gases in the air from the engine of the mobile hydraulic transfer machine**
**Sources No. 92**

During the maneuvering of transport on the territory of the complex, a negative impact on the atmospheric air is expected due to emissions of pollutants from the operation of the engine of the mobile hydraulic transfer machine.

The amounts of emissions of pollutants into the air are determined by the calculation and balance method in accordance with the "Methodology for calculating emissions of pollutants and greenhouse gases into the air from vehicles", approved by order of the State Statistics Committee of Ukraine No. 452 of 11.13.08.

Determination of the gross emission of pollutants into the atmospheric air during the period of work from the engine of the mobile hydraulic transshipment machine is carried out according to the formula:

$$\mathbf{B_{ij} = M_i \times K_{SEij} \times K_{TIij} / 1000,\ t/year}$$

where **Mi** – volume of fuel consumed by i-th modes of transport, tons;

$K_{SEij}$ – specific emissions of j-th pollutants and greenhouse gases by i-th modes of transport;

$K_{TIij}$ – the coefficient of influence of the technical condition on the specific emissions of j-th pollutant and greenhouse gas by i-th mode of transport.

The maximum single emissions of polluting substances from the operation of the engine of a mobile hydraulic transshipment machine are determined by the formula:

$$Pij \frac{Mi * Ksei\ j * Kti\ i\ j}{3{,}6 * Tp} \quad \text{g/sec}$$

where Tp – time of operation of road transport, h/year.

The initial data are given in the tables

| Type of fuel | The amount of fuel consumed, t | Operating time of the mobile hydraulic transshipment machine, h/year |
|---|---|---|
| Diesel | 78,63 | 1900 |

| Pollutant | $K_{SEij}$ | $K_{TIij}$ |
|---|---|---|
| Carbon monoxide | 36,2 | 1,5 |
| Non-methane volatile organic compounds | 8,16 | 1,0 |
| Methane | 0,25 | 1,4 |
| Nitrogen dioxide | 31,4 | 0,95 |
| Soot | 3,85 | 1,8 |
| Nitrous oxide | 0,12 | 1,0 |
| Carbon dioxide | 3138,0 | 1,0 |
| Sulfur dioxide | 4,3 | 1,0 |
| Benz(a)pyrene | 0,03 | 1,0 |

The results of the calculations are summarized in the table:

| Pollutant | *g/sec* | *t/year* |
|---|---|---|
| Carbon monoxide | 0,624481 | 4,26961 |
| Non-methane volatile organic compounds | 0,093845 | 0,64162 |
| Methane | 0,004025 | 0,02752 |
| Nitrogen dioxide | 0,343062 | 2,34553 |
| Soot | 0,079699 | 0,54491 |
| Nitrous oxide | 0,001380 | 0,00944 |
| Carbon dioxide | 36,088807 | 246,74094 |
| Sulfur dioxide | 0,049452 | 0,33811 |
| Benz(a)pyrene | 0,000345 | 0,00236 |

## Calculation of pollutant emissions during overloading of the oil-water mixture
## Sources No. 93-95

The calculation was made in accordance with the "Digest of methodologies for calculation of the content of pollutants in emissions from unorganized sources of atmospheric pollution", Donetsk, 1994.

When an oil-water mixture is transferred from a ship to a car (a tanker) or another ship, vapors of petroleum products are released into the atmosphere.

**Initial data for calculating second, annual emissions of hydrocarbons into the atmosphere**

| Technological process indicator | Indicator meaning |
|---|---|
| **1. Transfer of oil and water mixture** | |
| 1.2. Quantity of oil and water mixture that can be seen from the tanker of the vessel near the non-self propelled tanker, $m^3$/year : | 600 |
| 1.2. Productivity of delivery with the help of the ship's pump, $m^3$/year | 3,5 |
| 1.3. Delivery time throughout the year, h/year | 171 |
| **2. Formation (storage) of oil and water mixture in the tankers of ships and in the ground tanker, $m^3$/year** | |
| 2.1. Quantity of oil and water mixture that is formed (stored) in the ships till the moment of delivery | 1000 |
| 2.2. Storage time throughout the year, h/year | 8760 |

***Calculation of emissions when draining the oil and water mixture from ship containers.***

The average amount of gross emissions of pollutants into the atmosphere during the discharge of the oil-water mixture is determined by the formula kg/h:

$$П_{dr} = 0{,}2485 \cdot V_{lq}^{tank} \cdot P_{S(38)} \cdot M_M \cdot (K_{5C} + K_{5H}) \cdot 10^{-9};$$

where $V_{lq}^{tank}$ - annual volume of the oil and water mixture drained from the tanker (ship(s), $m^3$/year

$P_{S(38)}$ - pressure of saturated vapors of oil and water mixture at temperature $38^0$C;

$M_M$ - molecular mass of vapors of an oil and water mixture;

$K_{5C}, K_{5H}$ - correction coefficient , which depends on the pressure of saturated vapors

$P_{S(38)}$ and temperature of the gas space, respectively, in the cold and warm seasons.

The gross emission of polluting substances is determined by the formula, t/year:

$$П_{dr}^{year} = П_{dr} \; P_{yea} \cdot 10^{-3};$$

Where $P_{year}$ - draining time of the oil and water mixture, h/year.

The maximum single emission of pollutants is determined by the formula, g/s:

$$П_{dr}^{Max} = \frac{П_{dr} \cdot 10^{-3}}{3600}$$

***Calculation of emissions when pouring the oil and water mixture into containers.***

The average amount of the gross emissions of pollutants into the atmosphere during the pouring of the oil and water mixture is determined by the formula kg/year:

$$П_{pr} = 2{,}52 \cdot V_{lq}^{tank} \cdot P_{S(38)} \cdot M_M \cdot (K_{5C} + K_{5H}) \cdot K_8 \cdot (1-n) \cdot 10^{-9};$$

where $V_{lq}^{tank}$ - annual volume of the oil and water mixture poured into tankers, $m^3$/year;

$n$ – a coefficient of efficiency of gas trapping devices, fractions of a unit;

$K_8$ - a correction coefficient, which depends on the pressure of saturated vapors and climate zone

The gross emission of pollutants is determined by the formula, t/year:

$$П_{pr}^{year} = П_{pr} \; P_{year} \cdot 10^{-3};$$

where $P_{year}$ - the oil and water mixture pouring time, h/year.

The maximum single emission of pollutants is determined by the formula, g/sec:

$$П_{pr}^{Max} = \frac{П_{pr} \cdot 10^{-3}}{3600}.$$

***Calculation of emissions due to evaporation from the tanker during storage of the oil and water mixture.***

The average amount of the gross emissions of pollutants into the atmosphere during storage of the oil and water mixture is determined by the formula, kg/year:

$$П_{st} = 2.52 \cdot V_{lq}^{year} \cdot P_{S(38)} \cdot M_M \cdot (K_{5C} + K_{5H}) \cdot K_6 \cdot K_7 \cdot (1-n) \cdot 10^{-}$$

where $V_{lq}^{year}$ - annual volume of the oil and water mixture stored in tankers, $m^3$/year;

$K_6$ - a correction coefficient, which depends on the pressure of saturated vapors and annual turnover of the tanker;

$K_7$ - a correction coefficient, which depends on the technical support and operation mode.

The gross emission of pollutants is determined by the formula, t/year:

$$П_{st}^{year} = П_{st} \; P_{year} \cdot 10^{-3};$$

where $P_{year}$ - the storage time of the oil and water mixture, h/year.

The maximum single emission of pollutants is determined by the formula, g/sec:

$$П_{st}^{Max} = \frac{П_{st} \cdot 10^{-3}}{3600}.$$

***Calculation of emissions that enter the atmosphere due to the sealing of the centrifugal pump of the gas station.***

The amount of harmful substances released through the annular gap of the gland seal of the centrifugal pump is determined depending on the mode of outflow of harmful substances from the gap. There are laminar and turbulent flow modes. The turbulent flow regime is observed with a concentric annular gap at a Reynolds number Re > 1000, with an eccentric annular gap at a Reynolds number Re > 300. The Reynolds number is determined by the formula:

$$\mathrm{Re} = s \cdot v / V;$$

where $s$ - the width of the annular gap (or radial gap), cm, is taken based on the tolerances and fits of the rotating shafts of chemical devices, depending on the diameter of the shaft, $d_{sh.}$

| $d_{sh.}$, m | ≤ 0.01 | 0.01-0.03 | 0.03-0.12 | > 0.12 |
|---|---|---|---|---|
| S, cm | 0 | 0.001 | 0.002 | 0.005 |

$v$ - flow rate in the gap, cm/s;

$V$ - a coefficient of kinetic viscosity of the oil and water mixture, $cm^2$/s

With turbulent flow, the amount of harmful substances is determined by the formula, g/h:

$$G = 2617 \cdot 3{,}6 \cdot s^3 \; D_{av} \cdot {}^{P_{op}}\!/_{(z \cdot \mu)}$$

where $D_{av}$ – the average diameter of the annular gap, cm:

$$D_{av} = 100 \cdot d_{sh} + s$$

$P_{op}$ – excessive pressure in the pump, Pa;
z – length of guide sleeve, cm;
$\mu$ - coefficient of dynamic viscosity of the environment, Pa·s.

The amount of substances released through a concentric annular gap during laminar outflow movement is determined by the formula, g/s:

$$G = 9{,}24 \cdot \frac{P_{op} \quad s^3 \cdot D_{av} \cdot g \cdot \rho}{z \cdot \mu} \cdot 10^{-7}$$

where $\rho$ - density of the oil and water mixture, kg/m$^3$.

Emissions of substances into the atmosphere from tankers with multicomponent liquids are determined by the formula, kg/h

$$\Pi_i = \Pi_{year} \cdot \frac{P_{S(38)i} \cdot x_i \cdot M_i}{P_{S(38)i} \quad M_M},$$

where $\Pi_{year}$ - gross emissions, kg/h;

$P_{S(38)^3}$, $P_{S(38)}$ - the pressure of saturated vapors of the i-th substance, respectively, above the pure one and multicomponent liquids at temperature 38 $^0$C gPa;

$M_i$, $M_M$ - molecular mass of vapors of the *i-th* substance and multicomponent liquid

$x_i$ - molar fraction of the *i-th* substance and multicomponent liquid, (kg·mol)/(kg·mol)$_{mix}$

**Characteristics of the oil and water mixture, parameters included in the calculation of emissions**

| Name of the indicator, unit of measurement | Indicator meaning |
|---|---|
| Density of the oil and water mixture, t/m$^3$ | 0.85 |
| Temperature of the beginning of boiling, $^o$C, $t_{bb}$ | 195 |
| Temperature of the end of boiling, $^o$C, $t_{eb}$ | 340 |
| Equivalent temperature , $^o$C, $t_{eq}$ | 211.5 |
| Molecular mass of vapors of petroleum products, g/mol | 155.5 |
| The pressure of saturated vapors of petroleum products at t=38$^o$C, gPa | 0.904 |
| Coefficients:<br>- corrective one, which depends on the pressure of saturated vapors and the temperature of the gas space in:<br>• cold season, $K_{5c}$; | 0.0422 |
| • warm season, $K_{5h}$ | 0.3274 |
| - corrective one, which depends on the pressure of saturated vapors and the annual turnover of the tanker, $K_6$ | 1.37 |
| - corrective one, which depends on the technical support and mode of operation, $K_7$; | 1.0 |
| - corrective one, which is from the pressure of saturated vapors and the climatic zone, $K_8$ | 0.5 |

| | |
|---|---|
| Saturated vapor pressure at temperature 38 °C: | |
| - xylene | 21.7 |
| - hydrogen sulfide | 27920 |
| Mass fraction | |
| - xylene | 0.0015 |
| - hydrogen sulfide | 0.0028 |
| Molecular mass | |
| - xylene | 106.17 |
| - hydrogen sulfide | 34.08 |
| Molar fraction | |
| - xylene | 0.0022 |
| - hydrogen sulfide | 0.0126 |
| The width of the annular gap, cm | 0.002 |
| Shaft diameter, m<br>Coefficient of kinetic viscosity, $m^2/s$<br>Dynamic viscosity, Pa·s | 0.03<br>$4.37 \cdot 10^{-6}$<br>$3.71 \cdot 10^{-6}$ |
| Pressure delivered by the pump, Pa | 300000.00 |
| Quantity of vapors of the oil and water mixture released (in laminar mode), g/h<br>The volume of vapors of the oil and water mixture that seeps out, $cm^3/h$<br>The area of the gap, $cm^3$ | 2.986939<br>3.51<br>0.019 |
| Flow velocity in the gap, cm/s | 0.05 |
| Reynolds number | 23.685 |
| The amount of harmful substances seeping through the pump packing, g/h | 10.00 |

The results of calculations by sources are given in the tables:

**Source No. 93**

A pump that pumps the oil and water mixture

| Pollutant | Emissions | |
|---|---|---|
| | g/sec | t/year |
| Saturated hydrocarbons | 0.002737 | 0.00168 |
| Xylene | 0.000006 | 3.75E-06 |
| Hydrogen sulfide | 0.000035 | 0.00002 |

**Source No. 94**

The pipe of the ship's gas equalization system, which transfers the oil and water mixture to the receiving well

| Pollutant | Transmission of the oil and water mixture | | Storage of the oil and water mixture. | | Total | |
|---|---|---|---|---|---|---|
| | g/sec | t/year | g/sec | t/year | g/sec | t/year |
| Saturated hydrocarbons | 0.000016 | 0.00001 | 0.000055 | 0.00172 | 0.000071 | 0.00173 |
| Xylene | 0.000001 | 2.73E-08 | 1.22E-07 | 3.84E-06 | 0.000001 | 3.87E-06 |
| Hydrogen sulfide | 0.000003 | 1.57E-07 | 0.000001 | 0.00002 | 0.000004 | 0.00002 |

**Source No. 95**

Gas equalization system of the tanker when receiving the oil and water mixture from the ship's tanks and storage

| Pollutant | Pouring the oil and water mixture | | Storage of the oil and water mixture. | | Total | |
|---|---|---|---|---|---|---|
| | g/sec | t/year | g/sec | t/year | g/sec | t/year |
| Saturated hydrocarbons | 0.000004 | 2.42E-06 | 0.000055 | 0.00172 | 0.000059 | 0.00172 |
| Xylene | 8.76E-09 | 5.39E-09 | 1.22E-07 | 3.84E-06 | 1.31E-07 | 3.85E-06 |
| Hydrogen sulfide | 5.04E-08 | 3.11E-08 | 0.000001 | 0.00002 | 1.05E-06 | 0.00002 |

**Calculation of emissions of pollutants during the operation of the incinerator**
**Source No. 96**

The calculations were made on the basis of the "Combustion of organic fuel" methodology, "Collection of indicators of emissions (specific emissions) of pollutants into the atmospheric air by various industries", Donetsk, 2004.

**Input data for calculation:**
Garbage incinerator
The type of fuel is waste.

B = 25 t/year; 50 kg/h;

13,89 g/sec – fuel consumption. Qr = 7,5 MJ/kg – lower heat of fuel combustion.

The gross emission of j-th polluting substance Ej, (t), which enters the atmosphere with the flue gases of the installation during the time period P, is determined by the formula:

$$E_j = k_j B_i ,$$

where **Ej** – gross emission of j-th pollutant during waste incineration during the time period P, t;

**kj** – indicator of emission of j-th pollutant;
**Bi** – fuel consumption for a period of time P, t

| Characteristics of pollutant | Dimensionality | Quantity |
|---|---|---|
| Sulfuric anhydride | kg/t | 1,7 |
| Nitrogen dioxide | kg/t | 1,8 |
| NMVOC | kg/t | 0,02 |
| Carbon monoxide | kg/t | 0,7 |
| Nitrous oxide | kg/t | 0,1 |
| Ammonia | kg/t | 0 |
| Hydrogen chloride | kg/t | 2,3 |
| Solid particles | kg/t | 18,3 |
| Lead | g/t | 104,0 |
| Cadmium | g/t | 3,4 |
| Mercury | g/t | 2,8 |
| Dioxins | ng 1 TEQ /t | 25,0 |
| Polychlorinated biphenyls | mg/t | 5,8 |
| Polyaromatic hydrocarbons: | | |
| fluoranthene | mg/t | 145 |
| benz(a)anthracene | mg/t | 4,2 |
| benz(k)fluoranthene | mg/t | 6,3 |

| | | |
|---|---|---|
| benz(a)pyrene | mg/t | 0,7 |
| dibenz(ah)anthracene | mg/t | 3,5 |

The results of the calculations are given in tabular form:

| Characteristics of pollutant | $M^{max}$, g/sec | $M^{year}$, t/year |
|---|---|---|
| Sulfuric anhydride | 0,0236 | 0,0425 |
| Nitrogen dioxide | 0,0250 | 0,0450 |
| NMVOC | 0,0003 | 0,0005 |
| Carbon monoxide | 0,0097 | 0,0175 |
| Nitrous oxide | 0,0014 | 0,0025 |
| Ammonia | 0,0000 | 0,0000 |
| Hydrogen chloride | 0,0319 | 0,0575 |
| Solid particles | 0,2542 | 0,4575 |
| Lead | 0,0014 | 0,0026 |
| Cadmium | $4{,}723 \cdot 10^{-5}$ | $8{,}5 \cdot 10^{-5}$ |
| Mercury | $3{,}889 \cdot 10^{-5}$ | $7{,}0 \cdot 10^{-5}$ |
| Dioxins | $3{,}473 \cdot 10^{-13}$ | $6{,}3 \cdot 10^{-13}$ |
| Polychlorinated biphenyls | $8{,}056 \cdot 10^{-8}$ | $1{,}5 \cdot 10^{-7}$ |
| Polyaromatic hydrocarbons: | | |
| fluoranthene | $2{,}014 \cdot 10^{-6}$ | $3{,}6 \cdot 10^{-6}$ |
| benz(a)anthracene | $5{,}834 \cdot 10^{-8}$ | $1{,}1 \cdot 10^{-7}$ |
| benz(k)fluoranthene | $8{,}751 \cdot 10^{-8}$ | $1{,}6 \cdot 10^{-7}$ |
| benz(a)pyrene | $9{,}723 \cdot 10^{-9}$ | $1{,}8 \cdot 10^{-8}$ |
| dibenz(ah)anthracene | $4{,}862 \cdot 10^{-8}$ | $8{,}8 \cdot 10^{-8}$ |

Parameters of pollutant emission sources of planned activities during operation

| Production process, equipment | Number of the source of emission | The name of the source of emission | Parameters of pollutant emission sources | | Coordinates of pollutant emission sources on map diagram | | | | Place of sampling | Parameters of the gas and dust flow at the point of measurement | | | Pollutant code | The name of the pollutant | Maximum mass concentration of the pollutant, mg/m3 | Emission power | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Dotted or the beginning of linear; the center of symmetry of the plane | | Second end of the linear; width and depth of surface | | | flow, m3/s | speed m/s | temperature, $^0$C | | | | g/s | kg/h | t/year |
| | | | Height, m | Diameter of outlet, m | $X_1$, m | $Y_1$, m | $X_1$, m | $Y_2$, m | | | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| Processing of agricultural products | 1 | Exhaust hood of the filter | 6 | 0,500 | 43 | -212,6 | – | – | A straight section after filter | 2,78 | 14,17 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,138889 | 0,50000 | 2,00000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,138889 | 0,50000 | 1,60000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,138889 | 0,50000 | 0,20000 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,138889 | 0,50000 | 0,20000 |
| Processing of agricultural products | 2 | Exhaust hood of the filter | 6 | 0,500 | 41,6 | -218,1 | – | – | Exhaust hood of the filter | 2,78 | 14,17 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,138889 | 0,50000 | 2,00000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,138889 | 0,50000 | 1,60000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,138889 | 0,50000 | 0,20000 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,138889 | 0,50000 | 0,20000 |
| Processing of agricultural products | 3 | Exhaust hood of the filter | 6 | 0,500 | 39,8 | -222,0 | – | – | Exhaust hood of the filter | 2,78 | 14,17 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,138889 | 0,50000 | 2,00000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,138889 | 0,50000 | 1,60000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,138889 | 0,50000 | 0,20000 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,138889 | 0,50000 | 0,20000 |
| Processing of agricultural products | 4 | Exhaust hood of the filter | 6 | 0,500 | 41,9 | -238,5 | – | – | Exhaust hood of the filter | 2,78 | 14,17 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,138889 | 0,50000 | 2,00000 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,138889 | 0,50000 | 1,60000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,138889 | 0,50000 | 0,20000 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,138889 | 0,50000 | 0,20000 |
| Processing of agricultural products | 5 | Exhaust hood of the filter | 6 | 0,250 | 39,4 | -219,1 | – | – | Exhaust hood of the filter | 0,83 | 16,92 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,041667 | 0,15000 | 0,60000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,041667 | 0,15000 | 0,48000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,041667 | 0,15000 | 0,06000 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,041667 | 0,15000 | 0,06000 |
| Processing of agricultural products | 6 | Exhaust hood of the filter | 6 | 0,250 | 35,9 | -208,2 | – | – | Exhaust hood of the filter | 0,69 | 14,06 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,034722 | 0,12500 | 7,50000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,034722 | 0,12500 | 0,40000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,034722 | 0,12500 | 0,05000 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,034722 | 0,12500 | 0,05000 |
| Processing of agricultural products | 7 | Exhaust hood of the filter | 6 | 0,70 | -191,5 | -228,4 | – | – | Exhaust hood of the filter | 8,33 | 21,66 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,416667 | 1,50000 | 4,00000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,416667 | 1,50000 | 3,20000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,416667 | 1,50000 | 0,40000 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,416667 | 1,50000 | 0,40000 |
| Processing of agricultural products | 8 | Exhaust hood of the filter | 6 | 0,70 | -217,9 | -260-6 | – | – | Exhaust hood of the filter | 8,33 | 21,66 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,416667 | 1,50000 | 4,00000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,416667 | 1,50000 | 3,20000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,416667 | 1,50000 | 0,40000 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,416667 | 1,50000 | 0,40000 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Processing of agricultural products | 9 | Exhaust hood of the filter | 6 | 0,70 | -36,3 | -196,0 | – | – | Exhaust hood of the filter | 8,33 | 21,66 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,416667 | 1,50000 | 4,00000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,416667 | 1,50000 | 3,20000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,416667 | 1,50000 | 0,40000 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,416667 | 1,50000 | 0,40000 |
| Processing of agricultural products | 10 | Exhaust hood of the filter | 8 | 0,35 | 45,3 | -91,5 | – | – | Exhaust hood of the filter | 1,67 | 17,37 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,083333 | 0,30000 | 0,10000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,083333 | 0,30000 | 0,08000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,083333 | 0,30000 | 0,01000 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,083333 | 0,30000 | 0,01000 |
| Processing of agricultural products | 11 | Exhaust hood of the filter | 8 | 0,35 | 18,6 | -167,9 | – | – | Exhaust hood of the filter | 1,67 | 17,37 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,083333 | 0,30000 | 0,10000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,083333 | 0,30000 | 0,08000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,083333 | 0,30000 | 0,01000 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,083333 | 0,30000 | 0,01000 |
| Processing of agricultural products | 12 | Exhaust hood of the filter | 8 | 0,315 | -10,2 | -254,1 | – | – | Exhaust hood of the filter | 1,39 | 17,85 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,069444 | 0,25000 | 0,08333 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,069444 | 0,25000 | 0,06667 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,069444 | 0,25000 | 0,00833 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,069444 | 0,25000 | 0,00833 |
| Processing of agricultural products | 13 | Exhaust hood of the filter | 8 | 0,315 | -25,3 | -301,2 | – | – | Exhaust hood of the filter | 1,39 | 17,85 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,069444 | 0,25000 | 0,08333 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,069444 | 0,25000 | 0,06667 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,069444 | 0,25000 | 0,00833 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,069444 | 0,25000 | 0,00833 |
| Processing of agricultural products | 14 | Exhaust hood of the filter | 8 | 0,35 | 13,7 | -81,3 | – | – | Exhaust hood of the filter | 1,67 | 17,37 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,083333 | 0,30000 | 0,10000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,083333 | 0,30000 | 0,08000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,083333 | 0,30000 | 0,01000 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,083333 | 0,30000 | 0,01000 |
| Processing of agricultural products | 15 | Exhaust hood of the filter | 8 | 0,35 | -10,0 | -136,9 | – | – | Exhaust hood of the filter | 1,67 | 17,37 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,083333 | 0,30000 | 0,10000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,083333 | 0,30000 | 0,08000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,083333 | 0,30000 | 0,01000 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,083333 | 0,30000 | 0,01000 |
| Processing of agricultural products | 16 | Exhaust hood of the filter | 8 | 0,315 | -49,5 | -230,3 | – | – | Exhaust hood of the filter | 1,39 | 17,85 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,069444 | 0,25000 | 0,08333 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,069444 | 0,25000 | 0,06667 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,069444 | 0,25000 | 0,00833 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,069444 | 0,25000 | 0,00833 |
| Processing of agricultural products | 17 | Exhaust hood of the filter | 8 | 0,63 | 9,3 | -211,7 | – | – | Exhaust hood of the filter | 5,56 | 17,85 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,277778 | 1,00000 | 0,20000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,277778 | 1,00000 | 0,16000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,277778 | 1,00000 | 0,02000 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,277778 | 1,00000 | 0,02000 |
| Processing of agricultural products | 18 | Exhaust hood of the filter | 8 | 0,63 | 12,8 | -213,0 | – | – | Exhaust hood of the filter | 5,56 | 17,85 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,277778 | 1,00000 | 6,00000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,277778 | 1,00000 | 4,80000 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,277778 | 1,00000 | 0,60000 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,277778 | 1,00000 | 0,60000 |
| Processing of agricultural products | 19 | Exhaust hood of the filter | 6 | 0,250 | -211,4 | -261,2 | – | – | Exhaust hood of the filter | 0,97 | 19,77 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,048611 | 0,17500 | 0,17500 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,048611 | 0,17500 | 0,14000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,048611 | 0,17500 | 0,01750 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,048611 | 0,17500 | 0,01750 |
| Processing of agricultural products | 20 | Exhaust hood of the filter | 6 | 0,250 | -218,8 | -274,8 | – | – | Exhaust hood of the filter | 0,97 | 19,77 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,048611 | 0,17500 | 0,17500 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,048611 | 0,17500 | 0,14000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,048611 | 0,17500 | 0,01750 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,048611 | 0,17500 | 0,01750 |
| Processing of agricultural products | 21 | Exhaust hood of the filter | 6 | 0,250 | -188,8 | -242,0 | – | – | Exhaust hood of the filter | 0,97 | 19,77 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,048611 | 0,17500 | 0,17500 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,048611 | 0,17500 | 0,14000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,048611 | 0,17500 | 0,01750 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,048611 | 0,17500 | 0,01750 |
| Processing of agricultural products | 22 | Ventilation openings of grain storages | 30 | – | 65,5 | -59,3 | 22 | 22 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000605 | 0,00218 | 0,00156 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000605 | 0,00218 | 0,00116 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000605 | 0,00218 | 0,00025 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000605 | 0,00218 | 0,00015 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Processing of agricultural products | 23 | Ventilation openings of grain storages | 30 | – | 57,6 | -82,7 | 22 | 22 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000605 | 0,00218 | 0,00156 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000605 | 0,00218 | 0,00116 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000605 | 0,00218 | 0,00025 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000605 | 0,00218 | 0,00015 |
| Processing of agricultural products | 24 | Ventilation openings of grain storages | 30 | – | 49,7 | -106,2 | 22 | 22 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000605 | 0,00218 | 0,00156 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000605 | 0,00218 | 0,00116 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000605 | 0,00218 | 0,00025 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000605 | 0,00218 | 0,00015 |
| Processing of agricultural products | 25 | Ventilation openings of grain storages | 30 | – | 39,7 | -136,1 | 22 | 22 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000605 | 0,00218 | 0,00156 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000605 | 0,00218 | 0,00116 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000605 | 0,00218 | 0,00025 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000605 | 0,00218 | 0,00015 |
| Processing of agricultural products | 26 | Ventilation openings of grain storages | 30 | – | 31,7 | -159,3 | 22 | 22 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000605 | 0,00218 | 0,00156 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000605 | 0,00218 | 0,00116 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000605 | 0,00218 | 0,00025 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000605 | 0,00218 | 0,00015 |
| Processing of agricultural products | 27 | Ventilation openings of grain storages | 30 | – | 23,9 | -182,9 | 22 | 22 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000605 | 0,00218 | 0,00156 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000605 | 0,00218 | 0,00116 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000605 | 0,00218 | 0,00025 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000605 | 0,00218 | 0,00015 |
| Processing of agricultural products | 28 | Ventilation openings of grain storages | 30 | – | 2,9 | -245,8 | 22 | 22 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000605 | 0,00218 | 0,00156 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000605 | 0,00218 | 0,00116 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000605 | 0,00218 | 0,00025 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000605 | 0,00218 | 0,00015 |
| Processing of agricultural products | 29 | Ventilation openings of grain storages | 30 | – | -5,3 | -269,0 | 22 | 22 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000605 | 0,00218 | 0,00156 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000605 | 0,00218 | 0,00116 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000605 | 0,00218 | 0,00025 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000605 | 0,00218 | 0,00015 |
| Processing of agricultural products | 30 | Ventilation openings of grain storages | 30 | – | -13,5 | -292,3 | 22 | 22 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000605 | 0,00218 | 0,00156 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000605 | 0,00218 | 0,00116 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000605 | 0,00218 | 0,00025 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000605 | 0,00218 | 0,00015 |
| Processing of agricultural products | 31 | Ventilation openings of grain storages | 30 | – | -20,7 | -316,0 | 22 | 22 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000605 | 0,00218 | 0,00156 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000605 | 0,00218 | 0,00116 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000605 | 0,00218 | 0,00025 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000605 | 0,00218 | 0,00015 |
| Processing of agricultural products | 32 | Ventilation openings of grain storages | 30 | – | 33,9 | -48,6 | 22 | 22 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000605 | 0,00218 | 0,00156 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000605 | 0,00218 | 0,00116 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,0006053 | 0,00218 | 0,00025 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000605 | 0,00218 | 0,00015 |
| Processing of agricultural products | 33 | Ventilation openings of grain storages | 30 | – | 25,9 | -72,1 | 22 | 22 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000605 | 0,00218 | 0,00156 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000605 | 0,00218 | 0,00116 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000605 | 0,00218 | 0,00025 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000605 | 0,00218 | 0,00015 |
| Processing of agricultural products | 34 | Ventilation openings of grain storages | 30 | – | 18,0 | -95,5 | 22 | 22 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000605 | 0,00218 | 0,00156 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000605 | 0,00218 | 0,00116 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000605 | 0,00218 | 0,00025 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000605 | 0,00218 | 0,00015 |
| Processing of agricultural products | 35 | Ventilation openings of grain storages | 30 | – | 8,0 | -125,0 | 22 | 22 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000605 | 0,00218 | 0,00156 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000605 | 0,00218 | 0,00116 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000605 | 0,00218 | 0,00025 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000605 | 0,00218 | 0,00015 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Processing of agricultural products | 36 | Ventilation openings of grain storages | 30 | – | 0,0 | -148,6 | 22 | 22 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000605 | 0,00218 | 0,00156 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000605 | 0,00218 | 0,00116 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000605 | 0,00218 | 0,00025 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000605 | 0,00218 | 0,00015 |
| Processing of agricultural products | 37 | Ventilation openings of grain storages | 30 | – | -7,7 | -172,3 | 22 | 22 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000605 | 0,00218 | 0,00156 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000605 | 0,00218 | 0,00116 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000605 | 0,00218 | 0,00025 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000605 | 0,00218 | 0,00015 |
| Processing of agricultural products | 38 | Ventilation openings of grain storages | 30 | – | -22,9 | -217,5 | 22 | 22 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000605 | 0,00218 | 0,00156 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000605 | 0,00218 | 0,00116 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000605 | 0,00218 | 0,00025 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000605 | 0,00218 | 0,00015 |
| Processing of agricultural products | 39 | Ventilation openings of grain storages | 30 | – | -31,0 | -240,9 | 22 | 22 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000605 | 0,00218 | 0,00156 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000605 | 0,00218 | 0,00116 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000605 | 0,00218 | 0,00025 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000605 | 0,00218 | 0,00015 |
| Processing of agricultural products | 40 | Grain-dryer | 19,5 | 37,13 | 6,2 | -221,3 | 10,0 | 3,0 | – | 371,3 | – | 30,0 | 06000 337 | Carbon monoxide | – | 2,666353 | 9,59887 | 1,82799 |
| | | | | | | | | | | | | | 07000 11812 | Carbon dioxide | – | 625,891020 | 2253,20767 | 429,09564 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 12000 410 | Methane | – | 0,010719 | 0,03859 | 0,00735 |
| | | | | | | | | | | | | | 01007 183 | Metal mercury | – | 0,000001 | 0,00000 | $7{,}34 \cdot 10^{-7}$ |
| | | | | | | | | | | | | | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 1,250000 | 4,50000 | 6,00000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 1,250000 | 4,50000 | 4,80000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 1,250000 | 4,50000 | 0,60000 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 1,250000 | 4,50000 | 0,60000 |
| | | | | | | | | | | | | | 04001 301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | – | 0,729900 | 2,62764 | 0,50040 |
| | | | | | | | | | | | | | 04002 11815 | Nitrogen(1)oxide(N2O) | – | 0,001072 | 0,00386 | 0,00073 |
| Distribution of liquid fuel | 41 | Breathing valveан | 2,5 | 0,1 | 119,0 | 29,9 | – | – | – | – | – | 35,9 | 05002 333 | Hydrogen sulfide | – | 3,72E-08 | 1,34E-07 | 2,44E-07 |
| | | | | | | | | | | | | | 11000 2754 | Nonmethane volatile organic compounds | – | 0,000087 | 3,13E-04 | 0,00132 |
| | | | | | | | | | | | | | 11030 616 | Xylene | – | 1,31E-07 | 4,72E-07 | 2,00E-06 |
| Distribution of liquid fuel | 42 | Breathing valveан | 2,5 | 0,1 | 116,9 | 36,7 | – | – | – | – | – | 35,9 | 05002 333 | Hydrogen sulfide | – | 3,72E-08 | 1,34E-07 | 2,44E-07 |
| | | | | | | | | | | | | | 11000 2754 | Nonmethane volatile organic compounds | – | 0,000087 | 3,13E-04 | 0,00132 |
| | | | | | | | | | | | | | 11030 616 | Xylene | – | 1,31E-07 | 4,72E-07 | 2,00E-06 |
| Distribution of liquid fuel | 43 | Equipment leaks | 2 | 0,5 | 100,4 | 38,8 | – | – | – | – | – | 35,9 | 05002 333 | Hydrogen sulfide | – | 2,13E-08 | 7,67E-08 | 1,92E-09 |
| | | | | | | | | | | | | | 11000 2754 | Nonmethane volatile organic compounds | – | 0,000008 | 2,88E-05 | 6,83E-07 |
| | | | | | | | | | | | | | 11030 616 | Xylene | – | 1,14E-08 | 4,10E-08 | 1,03E-07 |
| Distribution of liquid fuel | 44 | Fuel dispenser, tank neck | 2 | 0,5 | 99,4 | 34,0 | – | – | – | – | – | 35,9 | 05002 333 | Hydrogen sulfide | – | 0,000113 | 4,07E-04 | 1,27E-05 |
| | | | | | | | | | | | | | 11000 2754 | Nonmethane volatile organic compounds | – | 0,040326 | 1,45E-01 | 0,00451 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 11030 616 | Xylene | – | 0,000061 | 2,20E-04 | 6,80E-06 |
| Distribution of liquid fuel | 45 | Equipment leaks | 2 | 0,5 | -25,5 | -469,5 | – | – | – | – | – | 35,9 | 05002 333 | Hydrogen sulfide | – | 7,11E-08 | 2,56E-07 | 1,15E-07 |
| | | | | | | | | | | | | | 11000 2754 | Nonmethane volatile organic compounds | – | 0,000025 | 9,00E-05 | 4,10E-06 |
| | | | | | | | | | | | | | 11030 616 | Xylene | – | 3,81E-08 | 1,37E-07 | 6,17E-09 |
| Transportation | 46 | Operation of engines of automobile transport | 1,5 | – | 65,5 | 48,8 | 32 | 35 | – | – | – | 35,9 | 04001/ 301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | | 0,000020 | 0,00007 | 0,00074 |
| | | | | | | | | | | | | | 03004/ 328 | Soot | | 0,000005 | 1,80E-05 | 0,00017 |
| | | | | | | | | | | | | | 05001/ 330 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | | 0,000003 | 1,08E-05 | 0,00011 |
| | | | | | | | | | | | | | 06000/ 337 | Carbon monoxide | | 0,000038 | 0,00014 | 0,00128 |
| | | | | | | | | | | | | | 12000/ 410 | Methane | | 2,40E-07 | 8,64E-07 | 0,00001 |
| | | | | | | | | | | | | | 13101/ 703 | Benz(a)pyrene | | 2,00E-08 | 7,20E-08 | 7,40E-07 |
| | | | | | | | | | | | | | 11000/ 2754 | Nonmethane volatile organic compounds | | 0,000006 | 2,16E-05 | 0,00021 |
| | | | | | | | | | | | | | 07000/ 11812 | Carbon dioxide | | 0,002200 | 0,00792 | 0,07740 |
| | | | | | | | | | | | | | 04002/ 11815 | Nitrogen(1)oxide(N2O) | | 8,00E-08 | 2,88E-07 | 3,00E-06 |
| Transportation | 47 | The operation of railway transport engines | 3 | – | 117,0 | -11,3 | 35 | 8 | – | – | – | 35,9 | 04001/ 301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | | 0,012300 | 0,04428 | 0,01300 |
| | | | | | | | | | | | | | 04003/ 303 | Ammonia | | 0,000001 | 3,60E-06 | 1,40E-06 |
| | | | | | | | | | | | | | 03004/ 328 | Soot | | 0,000840 | 0,00302 | 0,00092 |
| | | | | | | | | | | | | | 05001/ 330 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | | 0,000770 | 0,00277 | 0,00084 |
| | | | | | | | | | | | | | 06000/ 337 | Carbon monoxide | | 0,008250 | 0,02970 | 0,00900 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 12000/ 410 | Methane | | 0,000033 | 0,00012 | 0,00004 |
| | | | | | | | | | | | | | 13101/ 703 | Benz(a)pyrene | | 0,000003 | 1,08E-05 | 3,50E-06 |
| | | | | | | | | | | | | | 11000/ 2754 | Nonmethane volatile organic compounds | | 0,000850 | 0,00306 | 0,00093 |
| | | | | | | | | | | | | | 07000/ 11812 | Carbon dioxide | | 0,575000 | 2,07000 | 0,62700 |
| | | | | | | | | | | | | | 04002/ 11815 | Nitrogen(1)oxide(N2O) | | 0,000227 | 0,00082 | 0,00025 |
| Transportation | 48 | Operation of water transport engines | 1,5 | – | -50,4 | -476,3 | 35 | 8 | – | – | – | 35,9 | 04001/ 301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | | 0,013000 | 0,04680 | 0,02800 |
| | | | | | | | | | | | | | 04003/ 303 | Ammonia | | 0,000001 | 3,60E-06 | 2,90E-06 |
| | | | | | | | | | | | | | 03004/ 328 | Soot | | 0,001470 | 0,00529 | 0,00315 |
| | | | | | | | | | | | | | 05001/ 330 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | | 0,000880 | 0,00317 | 0,00189 |
| | | | | | | | | | | | | | 06000/ 337 | Carbon monoxide | | 0,004580 | 0,01649 | 0,01000 |
| | | | | | | | | | | | | | 12000/ 410 | Methane | | 0,000035 | 0,00013 | 0,00008 |
| | | | | | | | | | | | | | 13101/ 703 | Benz(a)pyrene | | 0,000004 | 1,44E-05 | 0,00001 |
| | | | | | | | | | | | | | 11000/ 2754 | Nonmethane volatile organic compounds | | 0,000900 | 0,00324 | 0,00200 |
| | | | | | | | | | | | | | 07000/ 11812 | Carbon dioxide | | 0,610000 | 2,19600 | 1,32000 |
| | | | | | | | | | | | | | 04002/ 11815 | Nitrogen(1)oxide(N2O) | | 0,000250 | 0,00090 | 0,00054 |
| Combustion plants >= 50 MW (boiler units) | 49 | Pipe of solid fuel boiler unit | 5 | 0,18 | 6,7 | 23,5 | – | – | Straight section of the chimney | 0,18 | 7,08 | 75,0 | 06000 337 | Carbon monoxide | – | 0,009073 | 0,03266 | 0,12542 |
| | | | | | | | | | | | | | 07000 11812 | Carbon dioxide | – | 1,714273 | 6,17138 | 23,69811 |
| | | | | | | | | | | | | | 12000 410 | Methane | – | 0,000694 | 0,00250 | 0,00960 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,022800 | 0,08208 | 0,31519 |
| | | | | | | | | | | | | | 04001 301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | – | 0,006789 | 0,02444 | 0,09385 |
| | | | | | | | | | | | | | 04002 11815 | Nitrogen(1)oxide(N2O) | – | 0,000386 | 0,00139 | 0,00533 |
| | | | | | | | | | | | | | 11000 2754 | Nonmethane volatile organic compounds | – | 0,003858 | 0,01389 | 0,05333 |
| Combustion plants >= 50 MW (boiler units) | 50 | Pipe of solid fuel boiler unit | 5 | 0,18 | -16,5 | 34,0 | – | – | Straight section of the chimney | 0,32 | 12,58 | 75,0 | 06000 337 | Carbon monoxide | – | 0,013609 | 0,04899 | 0,18813 |
| | | | | | | | | | | | | | 07000 11812 | Carbon dioxide | – | 2,571410 | 9,25708 | 35,54716 |
| | | | | | | | | | | | | | 12000 410 | Methane | – | 0,001042 | 0,00375 | 0,01440 |
| | | | | | | | | | | | | | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,034200 | 0,12312 | 0,47278 |
| | | | | | | | | | | | | | 04001 301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | – | 0,010184 | 0,03666 | 0,14078 |
| | | | | | | | | | | | | | 04002 11815 | Nitrogen(1)oxide(N2O) | – | 0,000579 | 0,00208 | 0,00800 |
| | | | | | | | | | | | | | 11000 2754 | Nonmethane volatile organic compounds | – | 0,005790 | 0,02080 | 0,08000 |
| Combustion plants >= 50 MW (boiler units) | 51 | Pipe of solid fuel boiler unit | 5 | 0,18 | -68,4 | -226,2 | – | – | Straight section of the chimney | 0,32 | 12,58 | 75,0 | 06000 337 | Carbon monoxide | – | 0,013609 | 0,04899 | 0,18813 |
| | | | | | | | | | | | | | 07000 11812 | Carbon dioxide | – | 2,571410 | 9,25708 | 35,54716 |
| | | | | | | | | | | | | | 12000 410 | Methane | – | 0,001042 | 0,00375 | 0,01440 |
| | | | | | | | | | | | | | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,034200 | 0,12312 | 0,47278 |
| | | | | | | | | | | | | | 04001 301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | – | 0,010184 | 0,03666 | 0,14078 |
| | | | | | | | | | | | | | 04002 11815 | Nitrogen(1)oxide(N2O) | – | 0,000579 | 0,00208 | 0,00800 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 11000 2754 | Nonmethane volatile organic compounds | – | 0,005790 | 0,02080 | 0,08000 |
| Combustion plants >= 50 MW (boiler units) | 52 | Pipe of solid fuel boiler unit | 5 | 0,18 | -69,5 | -229,6 | – | – | Straight section of the chimney | 0,32 | 12,58 | 75,0 | 06000 337 | Carbon monoxide | – | 0,018146 | 0,06533 | 0,25085 |
| | | | | | | | | | | | | | 07000 11812 | Carbon dioxide | – | 3,428546 | 12,34277 | 47,39622 |
| | | | | | | | | | | | | | 12000 410 | Methane | – | 0,001389 | 0,00500 | 0,01920 |
| | | | | | | | | | | | | | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,045600 | 0,16416 | 0,63038 |
| | | | | | | | | | | | | | 04001 301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | – | 0,013578 | 0,04888 | 0,18771 |
| | | | | | | | | | | | | | 04002 11815 | Nitrogen(1)oxide(N2O) | – | 0,000772 | 0,00278 | 0,01067 |
| | | | | | | | | | | | | | 11000 2754 | Nonmethane volatile organic compounds | – | 0,007715 | 0,02777 | 0,10665 |
| Processing of agricultural products | 53 | Shipment of grain to the dump pit | 6 | 0,35 | -139,4 | -386,5 | 3 | 6 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 1,069656 | 3,85076 | 12,84571 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 1,069656 | 3,85076 | 10,26998 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,999656 | 3,59876 | 1,71301 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,719656 | 2,59076 | 0,86272 |
| Transportation | 54 | Operation of engines of automobile transport | 1,5 | – | -106,3 | 81,4 | 175,0 | 45,0 | – | – | – | 35,9 | 04001/ 301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | | 0,008868 | 0,03192 | 0,09546 |
| | | | | | | | | | | | | | 03004/ 328 | Soot | | 0,002060 | 0,00742 | 0,02218 |
| | | | | | | | | | | | | | 05001/ 330 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | | 0,001278 | 0,00460 | 0,01376 |
| | | | | | | | | | | | | | 06000/ 337 | Carbon monoxide | | 0,016143 | 0,05811 | 0,17376 |
| | | | | | | | | | | | | | 12000/ 410 | Methane | | 0,000104 | 0,00037 | 0,00112 |
| | | | | | | | | | | | | | 13101/ 703 | Benz(a)pyrene | | 0,000009 | 0,00003 | 0,00010 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 11000/ 2754 | Nonmethane volatile organic compounds | | 0,002426 | 0,00873 | 0,02611 |
| | | | | | | | | | | | | | 07000/ 11812 | Carbon dioxide | | 0,932887 | 3,35839 | 10,04160 |
| | | | | | | | | | | | | | 04002/ 11815 | Nitrogen(1)oxide(N2O) | | 0,000036 | 0,00013 | 0,00038 |
| Processing of agricultural products | 55 | Blowing from the grab | 30 | 0,35 | -151,4 | -379,4 | 22 | 3 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000956 | 0,00344 | 0,00654 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000956 | 0,00344 | 0,00459 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000956 | 0,00344 | 0,00080 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000956 | 0,00344 | 0,00115 |
| Processing of agricultural products | 56 | Blowing from the grab | 30 | 0,35 | -142,6 | -404,2 | 22 | 3 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000956 | 0,00344 | 0,00654 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000956 | 0,00344 | 0,00459 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000956 | 0,00344 | 0,00080 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000956 | 0,00344 | 0,00115 |
| Transportation | 57 | Operation of the engines of the mobile hydraulic overloading machine | 1,5 | – | -132,5 | -406,7 | 6,3 | 7,0 | – | – | – | 35,9 | 04001/ 301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | | 0,343062 | 1,23502 | 2,34553 |
| | | | | | | | | | | | | | 03004/ 328 | Soot | | 0,079699 | 0,28692 | 0,54491 |
| | | | | | | | | | | | | | 05001/ 330 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | | 0,049452 | 0,17803 | 0,33811 |
| | | | | | | | | | | | | | 06000/ 337 | Carbon monoxide | | 0,624481 | 2,24813 | 4,26961 |
| | | | | | | | | | | | | | 12000/ 410 | Methane | | 0,004025 | 0,01449 | 0,02752 |
| | | | | | | | | | | | | | 13101/ 703 | Benz(a)pyrene | | 0,000345 | 0,00124 | 0,00236 |
| | | | | | | | | | | | | | 11000/ 2754 | Nonmethane volatile organic compounds | | 0,093845 | 0,33784 | 0,64162 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 07000/ 11812 | Carbon dioxide | | 36,088807 | 129,91971 | 246,74094 |
| | | | | | | | | | | | | | 04002/ 11815 | Nitrogen(1)oxide(N2O) | | 0,001380 | 0,00497 | 0,00944 |
| Transportation | 58 | Operation of the engines of the mobile hydraulic overloading machine | 1,5 | – | -152,5 | -364,1 | 6,3 | 7,0 | – | – | – | 35,9 | 04001/ 301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | | 0,343062 | 1,23502 | 2,34553 |
| | | | | | | | | | | | | | 03004/ 328 | Soot | | 0,079699 | 0,28692 | 0,54491 |
| | | | | | | | | | | | | | 05001/ 330 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | | 0,049452 | 0,17803 | 0,33811 |
| | | | | | | | | | | | | | 06000/ 337 | Carbon monoxide | | 0,624481 | 2,24813 | 4,26961 |
| | | | | | | | | | | | | | 12000/ 410 | Methane | | 0,004025 | 0,01449 | 0,02752 |
| | | | | | | | | | | | | | 13101/ 703 | Benz(a)pyrene | | 0,000345 | 0,00124 | 0,00236 |
| | | | | | | | | | | | | | 11000/ 2754 | Nonmethane volatile organic compounds | | 0,093845 | 0,33784 | 0,64162 |
| | | | | | | | | | | | | | 07000/ 11812 | Carbon dioxide | | 36,088807 | 129,91971 | 246,74094 |
| | | | | | | | | | | | | | 04002/ 11815 | Nitrogen(1)oxide(N2O) | | 0,001380 | 0,00497 | 0,00944 |
| Welding of metals | 59 | Exhaust hood of extraction ventilation | 11 | – | -77,6 | -228,1 | 0,14 | 0,27 | – | 0,31 | 8,200 | 35,9 | 06000 337 | Carbon monoxide | 35,48 | 0,011000 | 0,03960 | 0,00594 |
| | | | | | | | | | | | | | 01003 123 | Iron and its compounds (in terms of iron) | 70,48 | 0,021850 | 0,07866 | 0,01180 |
| | | | | | | | | | | | | | 01104 143 | Manganese and its compounds in terms of manganese dioxide | 2,10 | 0,000650 | 0,00234 | 0,00035 |
| | | | | | | | | | | | | | 04001 301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | 35,16 | 0,010900 | 0,03924 | 0,00589 |
| Mechanical engineering (mechanical processing of metals) | 60 | Metal cutting work benches | 2 | – | -73,8 | -226,1 | 1,0 | 3,0 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000010 | 0,00004 | 0,00396 |
| Construction and decoration of buildings | 61 | Painting station | 5 | – | -88,5 | -237,2 | 3 | 3 | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,035525 | 0,12789 | 0,03261 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 11000 2752 | Nonmethane volatile organic compounds | – | 0,082701 | 0,29772 | 0,17750 |
| | | | | | | | | | | | | | 11030 616 | Xylene | – | 0,027462 | 0,09886 | 0,06750 |
| Service stations (including car refueling) | 62 | Used oil storage area | 2 | – | -76,6 | -215,6 | 1,0 | 3,0 | – | – | – | 35,9 | 11000 2735 | Nonmethane volatile organic compounds | – | 0,000004 | 0,00001 | 0,00012 |
| Other branches of the food industry | 63 | Exhaust hood of extraction ventilation | 6,4 | 0,4 | -27,8 | 37,1 | – | – | A straight section of the duct | 1,043 | 8,30 | 40,0 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 0,130 | 0,000104 | 0,00037 | 0,00064 |
| | | | | | | | | | | | | | 04003 303 | Ammonia | 4,30E-05 | 4,50E-08 | 1,62E-07 | 1,21E-07 |
| | | | | | | | | | | | | | 10002 1819 | Диметиламін | 8,59E-05 | 9,00E-08 | 3,24E-07 | 4,42E-07 |
| | | | | | | | | | | | | | 11000 1061 1314 1519 | Nonmethane volatile organic compounds | – | 0,004028 | 0,01627 | 0,00900 |
| | | | | | | | | | | | | | 11004 1301 | Acrolein | 1,50E-06 | 1,47E-09 | 3,60E-09 | 3,38E-09 |
| | | | | | | | | | | | | | 11006 1317 | Acetaldehyde | 0,07 | 0,000071 | 0,00026 | 0,00016 |
| | | | | | | | | | | | | | 11028 1555 | Acetic acid | 0,40 | 0,000420 | 0,00151 | 0,00016 |
| Transportation | 64 | Temporary car parking for 23 cars | 1,5 | – | -97,6 | -212,2 | 6,3 | 7,0 | – | – | – | 35,9 | 04001/ 301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | | 0,002905 | 0,01046 | 0,00529 |
| | | | | | | | | | | | | | 04003/ 303 | Ammonia | | 0,000001 | 0,00000 | 1,12E-06 |
| | | | | | | | | | | | | | 05001/ 330 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | | 0,000154 | 0,00055 | 0,00028 |
| | | | | | | | | | | | | | 06000/ 337 | Carbon monoxide | | 0,046528 | 0,16750 | 0,08476 |
| | | | | | | | | | | | | | 12000/ 410 | Methane | | 0,000217 | 0,00078 | 0,00039 |
| | | | | | | | | | | | | | 11000/ 2754 | Nonmethane volatile organic compounds | | 0,008147 | 0,02933 | 0,01484 |
| | | | | | | | | | | | | | 07000/ 11812 | Carbon dioxide | | 0,489262 | 1,76134 | 0,89124 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 04002/ 11815 | Nitrogen(1)oxide(N2O) | | 0,000029 | 0,00010 | 0,00005 |
| Transportation | 65 | Truck parking for 40 cars | 1,5 | – | -105,1 | -234,8 | 6,3 | 7,0 | – | – | – | 35,9 | 04001/ 301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | | 0,008868 | 0,03192 | 0,09546 |
| | | | | | | | | | | | | | 03004/ 328 | Soot | | 0,002060 | 0,00742 | 0,02218 |
| | | | | | | | | | | | | | 05001/ 330 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | | 0,001278 | 0,00460 | 0,01376 |
| | | | | | | | | | | | | | 06000/ 337 | Carbon monoxide | | 0,016143 | 0,05811 | 0,17376 |
| | | | | | | | | | | | | | 12000/ 410 | Methane | | 0,000104 | 0,00037 | 0,00112 |
| | | | | | | | | | | | | | 13101/ 703 | Benz(a)pyrene | | 0,000009 | 0,00003 | 0,00010 |
| | | | | | | | | | | | | | 11000/ 2754 | Nonmethane volatile organic compounds | | 0,002426 | 0,00873 | 0,02611 |
| | | | | | | | | | | | | | 07000/ 11812 | Carbon dioxide | | 0,932887 | 3,35839 | 10,04160 |
| | | | | | | | | | | | | | 04002/ 11815 | Nitrogen(1)oxide(N2O) | | 0,000036 | 0,00013 | 0,00038 |
| Processing of agricultural products | 66 | Loading machine as a part of the shipment floating complex | 30 | 0,35 | -245,9 | -377,6 | – | – | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,001209 | 0,00435 | 0,00907 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,001209 | 0,00435 | 0,00696 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,001209 | 0,00435 | 0,00124 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,001209 | 0,00435 | 0,00087 |
| Processing of agricultural products | 67 | Loading machine as a part of the shipment floating complex | 30 | 0,35 | -337,0 | -317,6 | – | – | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,001209 | 0,00435 | 0,00907 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,001209 | 0,00435 | 0,00696 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,001209 | 0,00435 | 0,00124 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,001209 | 0,00435 | 0,00087 |
| Processing of agricultural products | 68 | Tanks for waste | 20 | 0,35 | 13,0 | -194,2 | – | – | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,005200 | 0,01872 | 0,00078 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,005200 | 0,01872 | 0,00060 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,005200 | 0,01872 | 0,00009 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,005200 | 0,01872 | 0,00009 |
| Processing of agricultural products | 69 | Tanks for waste | 20 | 0,35 | 15,7 | -194,5 | – | – | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,005200 | 0,01872 | 0,00037 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,005200 | 0,01872 | 0,00019 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,005200 | 0,01872 | 0,00009 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,005200 | 0,01872 | 0,00009 |
| Processing of agricultural products | 70 | Tanks for waste | 20 | 0,35 | 19,5 | -196,2 | – | – | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,005200 | 0,01872 | 0,00037 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,005200 | 0,01872 | 0,00019 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,005200 | 0,01872 | 0,00009 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,005200 | 0,01872 | 0,00009 |
| Processing of agricultural products | 71 | Tanks for waste | 20 | 0,35 | 22,3 | -197,0 | – | – | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,005200 | 0,01872 | 0,00037 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,005200 | 0,01872 | 0,00019 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,005200 | 0,01872 | 0,00009 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,005200 | 0,01872 | 0,00009 |
| Processing of agricultural products | 72 | Tanks for waste | 20 | 0,35 | 25,8 | -197,5 | – | – | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,005200 | 0,01872 | 0,00037 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,005200 | 0,01872 | 0,00019 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,005200 | 0,01872 | 0,00009 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,005200 | 0,01872 | 0,00009 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Processing of agricultural products | 73 | Silos of wet grain | 20 | 0,35 | 17,6 | -218,4 | – | – | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000605 | 0,00218 | 0,00152 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000605 | 0,00218 | 0,00116 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000605 | 0,00218 | 0,00021 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000605 | 0,00218 | 0,00015 |
| Processing of agricultural products | 74 | Silos of wet grain | 20 | 0,35 | 15,4 | -225,0 | – | – | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000605 | 0,00218 | 0,00152 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000605 | 0,00218 | 0,00116 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000605 | 0,00218 | 0,00021 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000605 | 0,00218 | 0,00015 |
| Processing of agricultural products | 75 | Silos of wet grain | 20 | 0,35 | 13,2 | -231,5 | – | – | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000605 | 0,00218 | 0,00152 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000605 | 0,00218 | 0,00116 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000605 | 0,00218 | 0,00021 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000605 | 0,00218 | 0,00015 |
| Processing of agricultural products | 76 | Exhaust hood of the filter | 6 | 0,5 | 6,3 | -325,0 | – | – | Exhaust hood of the filter | 2,78 | 14,17 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,138889 | 0,50000 | 2,00000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,138889 | 0,50000 | 1,60000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,138889 | 0,50000 | 0,20000 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,138889 | 0,50000 | 0,20000 |
| Processing of agricultural products | 77 | Exhaust hood of the filter | 6 | – | 58,8 | -215,5 | – | – | Exhaust hood of the filter | 2,78 | 14,17 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,138889 | 0,50000 | 2,00000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,138889 | 0,50000 | 1,60000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,138889 | 0,50000 | 0,20000 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,138889 | 0,50000 | 0,20000 |
| Processing of agricultural products | 78 | Exhaust hood of the filter | 6 | – | 57,6 | -222,0 | – | – | Exhaust hood of the filter | 2,78 | 14,17 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,138889 | 0,50000 | 2,00000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,138889 | 0,50000 | 1,60000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,138889 | 0,50000 | 0,20000 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,138889 | 0,50000 | 0,20000 |
| Processing of agricultural products | 79 | Exhaust hood of the filter | 6 | – | 55,9 | -226,7 | – | – | Exhaust hood of the filter | 2,78 | 14,17 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,138889 | 0,50000 | 2,00000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,138889 | 0,50000 | 1,60000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,138889 | 0,50000 | 0,20000 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,138889 | 0,50000 | 0,20000 |
| Processing of agricultural products | 80 | Exhaust hood of the filter | 6 | – | 54,3 | -230,5 | – | – | Exhaust hood of the filter | 0,83 | 16,92 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,041667 | 0,15000 | 0,60000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,041667 | 0,15000 | 0,48000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,041667 | 0,15000 | 0,06000 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,041667 | 0,15000 | 0,06000 |
| Transportation | 81 | Tug engine | 1,5 | – | -275,4 | -391,6 | 6,3 | 7,0 | – | – | – | 35,9 | 04001/ 301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | | 0,689583 | 2,48250 | 0,39720 |
| | | | | | | | | | | | | | 03004/ 328 | Soot | | 0,078125 | 0,28125 | 0,04500 |
| | | | | | | | | | | | | | 04003/ 303 | Ammonia | | 0,000073 | 0,00026 | 0,00004 |
| | | | | | | | | | | | | | 05001/ 330 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | | 0,046875 | 0,16875 | 0,02700 |
| | | | | | | | | | | | | | 06000/ 337 | Carbon monoxide | | 0,243750 | 0,87750 | 0,14040 |
| | | | | | | | | | | | | | 12000/ 410 | Methane | | 0,001875 | 0,00675 | 0,00108 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 13101/ 703 | Benz(a)pyrene | | 0,000313 | 0,00113 | 0,00018 |
| | | | | | | | | | | | | | 11000/ 2754 | Nonmethane volatile organic compounds | | 0,049167 | 0,17700 | 0,02832 |
| | | | | | | | | | | | | | 07000/ 11812 | Carbon dioxide | | 32,687500 | 117,67500 | 18,82800 |
| | | | | | | | | | | | | | 04002/ 11815 | Nitrogen(1)oxide(N2O) | | 0,013438 | 0,04838 | 0,00774 |
| Other stationary equipment | 82 | Safety valve of solar system | 2 | – | 6,2 | 6,9 | – | – | – | – | – | 35,9 | 11000 1034 | Nonmethane volatile organic compounds | – | 0,022379 | 0,08056 | 2,69E-06 |
| Other stationary equipment | 83 | Safety valve of solar system | 2 | – | -7,5 | 31,8 | – | – | – | – | – | 35,9 | 11000 1034 | Nonmethane volatile organic compounds | – | 0,022379 | 0,08056 | 2,69E-06 |
| Other stationary equipment | 84 | Safety valve of solar system | 2 | – | -76,3 | -249,3 | – | – | – | – | – | 35,9 | 11000 1034 | Nonmethane volatile organic compounds | – | 0,022379 | 0,08056 | 2,69E-06 |
| Gas distribution networks | 85 | Gas distribution point | 4 | 0,05 | 88,0 | -69,0 | – | – | – | 0,001 | 0,51 | 35,9 | 12000 410 | Methane | – | 0,130116 | 0,46842 | 4,10333 |
| Stationary engine | 86 | Exhaust pipe of diesel genset | 3 | 0,06 | -55,7 | -154,1 | – | – | Straight section of the chimney | 0,630 | 19,00 | 98,0 | 06000 337 | Carbon monoxide | – | 0,021750 | 0,07830 | 0,00848 |
| | | | | | | | | | | | | | 07000 11812 | Carbon dioxide | – | 40,107154 | 144,38575 | 15,63998 |
| | | | | | | | | | | | | | 12000 410 | Methane | – | 0,001639 | 0,00590 | 0,00064 |
| | | | | | | | | | | | | | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,084951 | 0,30582 | 0,03313 |
| | | | | | | | | | | | | | 04001 301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | – | 0,618532 | 2,22672 | 0,24120 |
| | | | | | | | | | | | | | 04002 11815 | Nitrogen(1)oxide(N2O) | – | 0,001366 | 0,00492 | 0,00053 |
| | | | | | | | | | | | | | 05001 330 | Діоксид сірки ( діоксид та триоксид) у перерахунку на діоксид сірки | – | 0,051288 | 0,18464 | 0,02000 |
| | | | | | | | | | | | | | 11000 2754 | Nonmethane volatile organic compounds | – | 0,027324 | 0,09837 | 0,01066 |
| Processing of agricultural products | 87 | Shipment station to the road transport | 4 | – | -192,3 | -246,5 | – | – | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,001209 | 0,00432 | 0,01513 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,001209 | 0,00432 | 0,01161 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,001209 | 0,00432 | 0,00207 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,001209 | 0,00432 | 0,00145 |
| Processing of agricultural products | 88 | Shipment to the water transport | 4 | – | -145,0 | -351,8 | – | – | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,303450 | 1,09242 | 1,83103 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,303450 | 1,09242 | 1,45620 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,285950 | 1,02942 | 0,24500 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,215950 | 0,77742 | 0,12983 |
| Processing of agricultural products | 89 | Shipment of grain to the intake pit | 6 | – | -139,2 | -386,5 | – | – | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,303450 | 1,09242 | 1,83103 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,303450 | 1,09242 | 1,45620 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,285950 | 1,02942 | 0,24500 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,215950 | 0,77742 | 0,12983 |
| Processing of agricultural products | 90 | Shipment of grain to hold of the ship | 3 | – | -152,2 | -420,0 | – | – | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,303450 | 1,09242 | 0,35179 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,303450 | 1,09242 | 0,29168 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,285950 | 1,02942 | 0,03912 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,215950 | 0,77742 | 0,02099 |
| Processing of agricultural products | 91 | Blowing from the grab | 6 | 0,35 | -350,6 | -320,0 | – | – | – | – | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,000956 | 0,00344 | 0,00111 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,000956 | 0,00344 | 0,00092 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,000956 | 0,00344 | 0,00008 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,000956 | 0,00344 | 0,00011 |
| Transportation | 92 | Operation of loader engines | 1,5 | – | -314,0 | -354,0 | 6,3 | 7,0 | – | – | – | 35,9 | 04001/ 301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | | 0,343062 | 1,23502 | 0,46923 |
| | | | | | | | | | | | | | 03004/ 328 | Soot | | 0,079699 | 0,28692 | 0,10901 |
| | | | | | | | | | | | | | 05001/ 330 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | | 0,049452 | 0,17803 | 0,06764 |
| | | | | | | | | | | | | | 06000/ 337 | Carbon monoxide | | 0,624481 | 2,24813 | 0,85414 |
| | | | | | | | | | | | | | 12000/ 410 | Methane | | 0,004025 | 0,01449 | 0,00551 |
| | | | | | | | | | | | | | 13101/ 703 | Benz(a)pyrene | | 0,000345 | 0,00124 | 0,00047 |
| | | | | | | | | | | | | | 11000/ 2754 | Nonmethane volatile organic compounds | | 0,093845 | 0,33784 | 0,12836 |
| | | | | | | | | | | | | | 07000/ 11812 | Carbon dioxide | | 36,088807 | 129,91971 | 49,36074 |
| | | | | | | | | | | | | | 04002/ 11815 | Nitrogen(1)oxide(N2O) | | 0,001380 | 0,00497 | 0,00189 |
| Distribution of liquid fuel | 93 | Pump that pumps water and oil mixture source | 2,5 | 0,1 | -29,1 | -468,1 | – | – | – | – | – | 35,9 | 05002 333 | Hydrogen sulfide | – | 0,000035 | 0,00013 | 0,00002 |
| | | | | | | | | | | | | | 11000 2754 | Nonmethane volatile organic compounds | – | 0,002737 | 0,00985 | 0,00168 |
| | | | | | | | | | | | | | 11030 616 | Xylene | – | 0,000006 | 0,00002 | 3,75E-06 |
| Distribution of liquid fuel | 94 | Pipe of gas-equalizing system of vessel which transfers oily mixture to receiving pit, source | 2,5 | 0,1 | -52,8 | -478,5 | – | – | – | – | – | 35,9 | 05002 333 | Hydrogen sulfide | – | 0,000004 | 1,44E-05 | 0,00002 |
| | | | | | | | | | | | | | 11000 2754 | Nonmethane volatile organic compounds | – | 0,000071 | 0,00026 | 0,00173 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 11030 616 | Xylene | – | 0,000001 | 3,60E-06 | 3,87E-06 |
| Distribution of liquid fuel | 95 | Pump that pumps water and oil mixture source | 2,5 | 0,1 | -22,7 | -471,2 | – | – | – | – | – | 35,9 | 05002 333 | Hydrogen sulfide | – | 1,05E-06 | 3,78E-06 | 0,00002 |
| | | | | | | | | | | | | | 11000 2754 | Nonmethane volatile organic compounds | – | 0,000059 | 0,00021 | 0,00172 |
| | | | | | | | | | | | | | 11030 616 | Xylene | – | 1,31E-07 | 4,72E-07 | 3,85E-06 |
| Other stationary equipment (stoves, fireplaces, cooking...) | 96 | Smoke generator of garbage burner | 10 | 0,15 | -23,0 | -359,9 | – | – | Stove chimney | 0,075 | 4,22 | 371,0 | 06000 337 | Carbon monoxide | – | 0,009700 | 0,03492 | 0,01750 |
| | | | | | | | | | | | | | 01004 133 | Cadmium and its compounds (in terms of cadmium) | – | 0,000047 | 0,00017 | 0,00009 |
| | | | | | | | | | | | | | 01007 183 | Metal mercury | – | 0,000039 | 0,00014 | 0,00007 |
| | | | | | | | | | | | | | 01009 184 | Lead and its compounds (in terms of lead) | – | 0,0014000 | 0,00504 | 0,00260 |
| | | | | | | | | | | | | | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,254200 | 0,91512 | 0,45750 |
| | | | | | | | | | | | | | 04001 301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | – | 0,025000 | 0,09000 | 0,04500 |
| | | | | | | | | | | | | | 04002 11815 | Nitrogen(1)oxide(N2O) | – | 0,001400 | 0,00504 | 0,00250 |
| | | | | | | | | | | | | | 04003 303 | Ammonia | – | 0,000000 | 0,00000 | 0,00000 |
| | | | | | | | | | | | | | 05001 330 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | – | 0,023600 | 0,08496 | 0,04250 |
| | | | | | | | | | | | | | 11000 | Nonmethane volatile organic compounds, including | – | 0,000302 | 0,00109 | 0,00050 |
| | | | | | | | | | | | | | 11000 2754 | Saturated hydrocarbons | – | 0,000300 | 0,00108 | 0,00050 |
| | | | | | | | | | | | | | -- | Dioxins | – | 3,47E-13 | 1,25E-12 | 6,30E-13 |
| | | | | | | | | | | | | | -- | Fluoranthene | – | 0,000002 | 0,00001 | 3,60E-06 |
| | | | | | | | | | | | | | -- | Benza(a)nthracene | – | 5,80E-08 | 2,09E-07 | 8,80E-08 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | -- | Polychlorinated biphenyls | – | 8,10E-08 | 2,92E-07 | 1,50E-07 |
| | | | | | | | | | | | | | -- | Benz(bk)fluoranthene | – | 8,70E-08 | 3,13E-07 | 1,60E-07 |
| | | | | | | | | | | | | | 11016 10509 | Dibenzo(a,j)anthracene | – | 4,90E-08 | 1,76E-07 | 8,80E-08 |
| | | | | | | | | | | | | | 13101 703 | Benz(a)pyrene | – | 1,00E-08 | 3,60E-08 | 1,80E-08 |
| | | | | | | | | | | | | | 15003 316 | Hydrogen chloride (hydrochloric acid as HCl molecule) | – | 0,031900 | 0,11484 | 0,05750 |
| Processing of agricultural products | 97 | Exhaust hood of the filter | 6 | – | 38,2 | -204,0 | – | – | – | 0,14 | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,006944 | 0,02500 | 0,04168 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,006944 | 0,02500 | 0,03334 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,006944 | 0,02500 | 0,00417 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,006944 | 0,02500 | 0,00417 |
| Processing of agricultural products | 98 | Exhaust hood of the filter | 6 | – | 36,0 | -211,8 | – | – | – | 0,14 | – | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | – | 0,006944 | 0,02500 | 0,04168 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,006944 | 0,02500 | 0,03334 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,006944 | 0,02500 | 0,00417 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,006944 | 0,02500 | 0,00417 |
| Processing of agricultural products | 99 | Exhaust hood of the filter | 6 | 0,25 | -300,0 | -295,6 | – | – | Exhaust hood of the filter | 0,69 | 14,06 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,034722 | 0,12500 | 0,25000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,034722 | 0,12500 | 0,20000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,034722 | 0,12500 | 0,02500 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,034722 | 0,12500 | 0,02500 |
| Processing of agricultural products | 100 | Exhaust hood of the filter | 6 | 0,25 | -295,0 | -302,3 | – | – | Exhaust hood of the filter | 0,69 | 14,06 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,034722 | 0,12500 | 0,25000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,034722 | 0,12500 | 0,20000 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,034722 | 0,12500 | 0,02500 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,034722 | 0,12500 | 0,02500 |
| Processing of agricultural products | 101 | Exhaust hood of the filter | 6 | 0,25 | -203,5 | -367,3 | – | – | Exhaust hood of the filter | 0,69 | 14,06 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,034722 | 0,12500 | 0,25000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,034722 | 0,12500 | 0,20000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,034722 | 0,12500 | 0,02500 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,034722 | 0,12500 | 0,02500 |
| Processing of agricultural products | 102 | Exhaust hood of the filter | 6 | 0,25 | -206,6 | -373,2 | – | – | Exhaust hood of the filter | 0,69 | 14,06 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,034722 | 0,12500 | 0,25000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,034722 | 0,12500 | 0,20000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,034722 | 0,12500 | 0,02500 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,034722 | 0,12500 | 0,02500 |
| Processing of agricultural products | 103 | Exhaust hood of the filter | 6 | 0,25 | -309,5 | -299,6 | – | – | Exhaust hood of the filter | 0,69 | 14,06 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,034722 | 0,12500 | 0,25000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,034722 | 0,12500 | 0,20000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,034722 | 0,12500 | 0,02500 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,034722 | 0,12500 | 0,02500 |
| Processing of agricultural products | 104 | Exhaust hood of the filter | 6 | 0,25 | -314,4 | -308,3 | – | – | Exhaust hood of the filter | 0,69 | 14,06 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,034722 | 0,12500 | 0,25000 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,034722 | 0,12500 | 0,20000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,034722 | 0,12500 | 0,02500 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,034722 | 0,12500 | 0,02500 |
| Processing of agricultural products | 105 | Exhaust hood of the filter | 6 | 0,25 | -201,2 | -357,5 | – | – | Exhaust hood of the filter | 0,69 | 14,06 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,034722 | 0,12500 | 0,25000 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,034722 | 0,12500 | 0,20000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,034722 | 0,12500 | 0,02500 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,034722 | 0,12500 | 0,02500 |
| Processing of agricultural products | 106 | Exhaust hood of the filter | 6 | 0,25 | -362,8 | -304,0 | – | – | Exhaust hood of the filter | 0,97 | 19,77 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,048611 | 0,17500 | 0,36505 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,048611 | 0,17500 | 0,28000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,048611 | 0,17500 | 0,05005 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,048611 | 0,17500 | 0,03500 |
| Processing of agricultural products | 107 | Exhaust hood of the filter | 6 | 0,25 | -332,7 | -322,0 | – | – | Exhaust hood of the filter | 0,97 | 19,77 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,048611 | 0,17500 | 0,36505 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,048611 | 0,17500 | 0,28000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,048611 | 0,17500 | 0,05005 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,048611 | 0,17500 | 0,03500 |
| Processing of agricultural products | 108 | Exhaust hood of the filter | 6 | 0,25 | -254,0 | -370,4 | – | – | Exhaust hood of the filter | 0,97 | 19,77 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,048611 | 0,17500 | 0,36505 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,048611 | 0,17500 | 0,28000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,048611 | 0,17500 | 0,05005 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,048611 | 0,17500 | 0,03500 |
| Processing of agricultural products | 109 | Exhaust hood of the filter | 6 | 0,25 | -225,2 | -387,3 | – | – | Exhaust hood of the filter | 0,97 | 19,77 | 35,9 | 03000 | Substances in form of suspended solid particles (microparticles, fibers) | 50,000 | 0,048611 | 0,17500 | 0,36505 |
| | | | | | | | | | | | | | 03000 10417 | Grain dust | – | 0,048611 | 0,17500 | 0,28000 |
| | | | | | | | | | | | | | 03000 11523 | Dust of sunflower seeds | – | 0,048611 | 0,17500 | 0,05005 |
| | | | | | | | | | | | | | 03000 11525 | Dust of soybean seeds | – | 0,048611 | 0,17500 | 0,03500 |

# CALCULATION OF POLLUTANTS DISPERSION INTO THE ATMOSPHERIC AIR DURING OPERATION OF THE PLANNED ACTIVITIES OBJECTS

TABLE 1. Description of meteorological conditions and geographical reference

| Area code | Name of the city | Average air temp | | Limit wind speed, m/s | Regional coefficient execution atmosphere | The angle between the northern direction and the OX axis, degrees. | Area cities, sq. km | Required level conc. at the point (in shares of MPC) |
|---|---|---|---|---|---|---|---|---|
| | | the hottest month,°.C | the coldest month,°.C | | | | | |
| 1 | Izmail | 35,9 | -11,5 | 9 | 200 | | | 1 |

TABLE 2. Description of industrial sites (geographic reference)

| Area code | Code of industrial site | Name of industrial site | Binding to the main coordinate system | | |
|---|---|---|---|---|---|
| | | | X start, m | Y start.,m | Angle of rotation, deg. |
| 1 | 1 | River port (terminal) in Izmail city | 0 | 0 | 0 |

TABLE 3. Description of sources of emission of harmful substances

| Area code | Code of industrial site | Source code | Source name | Model code or the angle between the OX axis and the length of the area sources | Coef. relief | Coord. point or beginning of a linear source or center of symmetry of a square | | Coord. the end of a linear or the length and width of a square or point from straight lines. mouth | | Source height, m | The diameter of a point or square 2nd type or the output speed of DGAM (Wo) for linear, (for area 1st type - 0) | DGAM consumption, (for areas of 1st type - 0) | DGAM temperature (degrees C) | Danger class |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | X1, m | Y1, m | X2, m | Y2, m | | | | | |
| 1 | 1 | 1 | Exhaust hood of the filter | 444 | 1 | 43 | -212,6 | | | 6 | 2 | 2,78 | 35,9 | |
| | | 2 | Exhaust hood of the filter | 444 | 1 | 41,6 | -218,1 | | | 6 | 0,5 | 2,78 | 35,9 | |
| | | 3 | Exhaust hood of the filter | 444 | 1 | 39,8 | -222,0 | | | 6 | 0,5 | 2,78 | 35,9 | |
| | | 4 | Exhaust hood of the filter | 444 | 1 | 41,9 | -238,5 | | | 6 | 0,5 | 2,78 | 35,9 | |
| | | 5 | Exhaust hood of the filter | 444 | 1 | 39,4 | -219,1 | | | 6 | 0,25 | 0,83 | 35,9 | |
| | | 6 | Exhaust hood of the filter | 444 | 1 | 35,9 | -208,2 | | | 6 | 0,25 | 0,69 | 35,9 | |
| | | 7 | Exhaust hood of the filter | 444 | 1 | -191,5 | -228,4 | | | 6 | 0,7 | 8,33 | 35,9 | |
| | | 8 | Exhaust hood of the filter | 444 | 1 | -217,9 | -260-6 | | | 6 | 0,7 | 8,33 | 35,9 | |
| | | 9 | Exhaust hood of the filter | 444 | 1 | -36,3 | -196,0 | | | 6 | 0,7 | 8,33 | 35,9 | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 10 | Exhaust hood of the filter | 444 | 1 | 45,3 | -91,5 | | | 8 | 0,35 | 1,67 | 35,9 | |
| | | 11 | Exhaust hood of the filter | 444 | 1 | 18,6 | -167,9 | | | 8 | 0,35 | 1,67 | 35,9 | |
| | | 12 | Exhaust hood of the filter | 444 | 1 | -10,2 | -254,1 | | | 8 | 0,315 | 1,39 | 35,9 | |
| | | 13 | Exhaust hood of the filter | 444 | 1 | -25,3 | -301,2 | | | 8 | 0,315 | 1,39 | 35,9 | |
| | | 14 | Exhaust hood of the filter | 444 | 1 | 13,7 | -81,3 | | | 8 | 0,35 | 1,67 | 35,9 | |
| | | 15 | Exhaust hood of the filter | 444 | 1 | -10,0 | -136,9 | | | 8 | 0,35 | 1,67 | 35,9 | |
| | | 16 | Exhaust hood of the filter | 444 | 1 | -49,5 | -230,3 | | | 8 | 0,315 | 1,39 | 35,9 | |
| | | 17 | Exhaust hood of the filter | 444 | 1 | 9,3 | -211,7 | | | 8 | 0,63 | 5,56 | 35,9 | |
| | | 18 | Exhaust hood of the filter | 444 | 1 | 12,8 | -213,0 | | | 8 | 0,63 | 5,56 | 35,9 | |
| | | 19 | Exhaust hood of the filter | 444 | 1 | -211,4 | -261,2 | | | 6 | 0,25 | 0,97 | 35,9 | |
| | | 20 | Exhaust hood of the filter | 444 | 1 | -218,8 | -274,8 | | | 6 | 0,25 | 0,97 | 35,9 | |
| | | 21 | Exhaust hood of the filter | 444 | 1 | -188,8 | -242,0 | | | 6 | 0,25 | 0,97 | 35,9 | |
| | | 22 | Ventilation openings of grain storages | 73 | 1 | 65,5 | -59,3 | 22 | 22 | 30 | | 0 | 35,9 | |
| | | 23 | Ventilation openings of grain storages | 73 | 1 | 57,6 | -82,7 | 22 | 22 | 30 | | 0 | 35,9 | |
| | | 24 | Ventilation openings of grain storages | 73 | 1 | 49,7 | -106,2 | 22 | 22 | 30 | | 0 | 35,9 | |
| | | 25 | Ventilation openings of grain storages | 73 | 1 | 39,7 | -136,1 | 22 | 22 | 30 | | 0 | 35,9 | |
| | | 26 | Ventilation openings of grain storages | 73 | 1 | 31,7 | -159,3 | 22 | 22 | 30 | | 0 | 35,9 | |
| | | 27 | Ventilation openings of grain storages | 73 | 1 | 23,9 | -182,9 | 22 | 22 | 30 | | 0 | 35,9 | |
| | | 28 | Ventilation openings of grain storages | 73 | 1 | 2,9 | -245,8 | 22 | 22 | 30 | | 0 | 35,9 | |
| | | 29 | Ventilation openings of grain storages | 73 | 1 | -5,3 | -269,0 | 22 | 22 | 30 | | 0 | 35,9 | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 30 | Ventilation openings of grain storages | 73 | 1 | -13,5 | -292,3 | 22 | 22 | 30 | | 0 | 35,9 | |
| | | 31 | Ventilation openings of grain storages | 73 | 1 | -20,7 | -316,0 | 22 | 22 | 30 | | 0 | 35,9 | |
| | | 32 | Ventilation openings of grain storages | 73 | 1 | 33,9 | -48,6 | 22 | 22 | 30 | | 0 | 35,9 | |
| | | 33 | Ventilation openings of grain storages | 73 | 1 | 25,9 | -72,1 | 22 | 22 | 30 | | 0 | 35,9 | |
| | | 34 | Ventilation openings of grain storages | 73 | 1 | 18,0 | -95,5 | 22 | 22 | 30 | | 0 | 35,9 | |
| | | 35 | Ventilation openings of grain storages | 73 | 1 | 8,0 | -125,0 | 22 | 22 | 30 | | 0 | 35,9 | |
| | | 36 | Ventilation openings of grain storages | 73 | 1 | 0,0 | -148,6 | 22 | 22 | 30 | | 0 | 35,9 | |
| | | 37 | Ventilation openings of grain storages | 73 | 1 | -7,7 | -172,3 | 22 | 22 | 30 | | 0 | 35,9 | |
| | | 38 | Ventilation openings of grain storages | 73 | 1 | -22,9 | -217,5 | 22 | 22 | 30 | | 0 | 35,9 | |
| | | 39 | Ventilation openings of grain storages | 73 | 1 | -31,0 | -240,9 | 22 | 22 | 30 | | 0 | 35,9 | |
| | | 40 | Grain-dryer | 73 | 1 | 6,2 | -221,3 | 10 | 3 | 19,5 | | 371,3 | 30 | |
| | | 41 | Breathing valveан | 73 | 1 | 119,0 | 29,9 | 0,1 | 0,1 | 2,5 | | 0 | 35,9 | |
| | | 42 | Breathing valveан | 73 | 1 | 116,9 | 36,7 | 0,1 | 0,1 | 2,5 | | 0 | 35,9 | |
| | | 43 | Equipment leaks | 73 | 1 | 100,4 | 38,8 | 0,1 | 0,1 | 2 | | 0 | 35,9 | |
| | | 44 | Fuel dispenser, tank neck | 73 | 1 | 99,4 | 34,0 | 0,1 | 0,1 | 2 | | 0 | 35,9 | |
| | | 45 | Equipment leaks | 73 | 1 | -25,5 | -469,5 | 0,1 | 0,1 | 2 | | 0 | 35,9 | |
| | | 46 | Operation of engines of automobile transport | 73 | 1 | 65,5 | 48,8 | 32 | 35 | 2 | | 0 | 35,9 | |
| | | 47 | The operation of railway transport engines | 73 | 1 | 117,0 | -11,3 | 35 | 8 | 2 | | 0 | 35,9 | |
| | | 48 | Operation of water transport engines | 73 | 1 | -50,4 | -476,3 | 35 | 8 | 2 | | 0 | 35,9 | |
| | | 49 | Pipe of solid fuel boiler unit | 444 | 1 | 6,7 | 23,5 | | | | 0,18 | 0,18 | 75 | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 50 | Pipe of solid fuel boiler unit | 444 | 1 | -16,5 | 34,0 | | | | 0,18 | 0,32 | 75 | |
| | | 51 | Pipe of solid fuel boiler unit | 444 | 1 | -68,4 | -226,2 | | | | 0,18 | 0,32 | 75 | |
| | | 52 | Pipe of solid fuel boiler unit | 444 | 1 | -69,5 | -229,6 | | | | 0,18 | 0,32 | 75 | |
| | | 53 | Shipment of grain to the dump pit | 73 | 1 | -139,4 | -386,5 | 3 | 6 | 6 | | | 35,9 | |
| | | 54 | Operation of engines of automobile transport | 73 | 1 | -106,3 | 81,4 | 175 | 45 | 6 | | 0 | 35,9 | |
| | | 55 | Blowing from the grab | 73 | 1 | -151,4 | -379,4 | 22 | 3 | 6 | | 0 | 35,9 | |
| | | 56 | Blowing from the grab | 73 | 1 | -142,6 | -404,2 | 22 | 3 | 6 | | 0 | 35,9 | |
| | | 57 | Operation of the engines of the mobile hydraulic overloading machine | 73 | 1 | -132,5 | -406,7 | 6,3 | 7 | 6 | | 0 | 35,9 | |
| | | 58 | Operation of the engines of the mobile hydraulic overloading machine | 73 | 1 | -152,5 | -364,1 | 6,3 | 7 | 6 | | 0 | 35,9 | |
| | | 59 | Exhaust hood of extraction ventilation | 666 | 1 | -77,6 | -228,1 | 0,14 | 0,27 | 11 | | 0 | 35,9 | |
| | | 60 | Metal cutting work benches | 73 | 1 | -73,8 | -226,1 | 1 | 3 | 2 | | 0 | 35,9 | |
| | | 61 | Painting station | 73 | 1 | -88,5 | -237,2 | 3 | 3 | 2 | | 0 | 35,9 | |
| | | 62 | Used oil storage area | 73 | 1 | -76,6 | -215,6 | 1 | 3 | 2 | | 0 | 35,9 | |
| | | 63 | Exhaust hood of extraction ventilation | 444 | 1 | -27,8 | 37,1 | | | 6,4 | 0,4 | 1,043 | 35,9 | |
| | | 64 | Temporary car parking for 23 cars | 73 | 1 | -97,6 | -212,2 | 6,3 | 7 | 2 | | 0 | 35,9 | |
| | | 65 | Truck parking for 40 cars | 73 | 1 | -105,1 | -234,8 | 6,3 | 7 | 2 | | 0 | 35,9 | |
| | | 66 | Loading machine as a part of the shipment floating complex | 73 | 1 | -245,9 | -377,6 | 2 | 3 | 2 | | 0 | 35,9 | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 67 | Loading machine as a part of the shipment floating complex | 73 | 1 | -337,0 | -317,6 | 2 | 3 | 2 | | 0 | 35,9 | |
| | | 68 | Tanks for waste | 73 | 1 | 13,0 | -194,2 | 2 | 3 | 2 | | 0 | 35,9 | |
| | | 69 | Tanks for waste | 73 | 1 | 15,7 | -194,5 | 2 | 3 | 2 | | 0 | 35,9 | |
| | | 70 | Tanks for waste | 73 | 1 | 19,5 | -196,2 | 2 | 3 | 2 | | 0 | 35,9 | |
| | | 71 | Tanks for waste | 73 | 1 | 22,3 | -197,0 | 2 | 3 | 2 | | 0 | 35,9 | |
| | | 72 | Tanks for waste | 73 | 1 | 25,8 | -197,5 | 2 | 3 | 2 | | 0 | 35,9 | |
| | | 73 | Silos of wet grain | 73 | 1 | 17,6 | -218,4 | 5 | 5 | 2 | | 0 | 35,9 | |
| | | 74 | Silos of wet grain | 73 | 1 | 15,4 | -225,0 | 5 | 5 | 2 | | 0 | 35,9 | |
| | | 75 | Silos of wet grain | 73 | 1 | 13,2 | -231,5 | 5 | 5 | 2 | | 0 | 35,9 | |
| | | 76 | Exhaust hood of the filter | 444 | 1 | 6,3 | -325,0 | | | 6 | 0,5 | 14,17 | 35,9 | |
| | | 77 | Exhaust hood of the filter | 444 | 1 | 58,8 | -215,5 | | | 6 | 0,5 | 14,17 | 35,9 | |
| | | 78 | Exhaust hood of the filter | 444 | 1 | 57,6 | -222,0 | | | 6 | 0,5 | 14,17 | 35,9 | |
| | | 79 | Exhaust hood of the filter | 444 | 1 | 55,9 | -226,7 | | | 6 | 0,5 | 14,17 | 35,9 | |
| | | 80 | Exhaust hood of the filter | 444 | 1 | 54,3 | -230,5 | | | 6 | 0,25 | 16,92 | 35,9 | |
| | | 81 | Tug engine | 73 | 1 | -275,4 | -391,6 | 6,3 | 7 | 1,5 | | 1,5 | 35,9 | |
| | | 82 | Safety valve of solar system | 444 | 1 | 6,2 | 6,9 | 6166 | | 2 | 0,005 | 0,5 | 35,9 | |
| | | 83 | Safety valve of solar system | 444 | 1 | -7,5 | 31,8 | 16 | | 2 | 0,005 | 0,5 | 35,9 | |
| | | 84 | Safety valve of solar system | 444 | 1 | -76,3 | -249,3 | | | 2 | 0,005 | 0,5 | 35,9 | |
| | | 85 | Gas distribution point | 444 | 1 | 88,0 | -69,0 | | | 2 | 0,05 | 0,5 | 35,9 | |
| | | 86 | Exhaust pipe of diesel genset | 444 | 1 | -55,7 | -154,1 | | | 3 | 0,06 | 0,63 | 35,9 | |
| | | 87 | Shipment station to the road transport | 73 | 1 | -192,3 | -246,5 | 3 | 2 | 4 | | 0 | 35,9 | |
| | | 88 | Shipment to the water transport | 73 | 1 | -145,0 | -351,8 | 3 | 2 | 4 | | 0 | 35,9 | |
| | | 89 | Shipment of grain to the intake pit | 73 | 1 | -139,2 | -386,5 | 3 | 2 | 4 | | 0 | 35,9 | |
| | | 90 | Shipment of grain to hold of the ship | 73 | 1 | -152,2 | -420,0 | 3 | 2 | 3 | | | 35,9 | |
| | | 91 | Blowing from the grab | 73 | 1 | -350,6 | -320,0 | 22 | 3 | 6 | | 0 | 35,9 | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 92 | Operation of loader engines | 73 | 1 | -314,0 | -354,0 | 6,3 | 7 | 1,5 | | 1,5 | 35,9 | |
| | | 93 | Pump that pumps water and oil mixture source | 73 | 1 | -29,1 | -468,1 | 0,2 | 0,2 | 2,5 | | 0 | 35,9 | |
| | | 94 | Pipe of gas-equalizing system of vessel which transfers oily mixture to receiving pit, source | 73 | 1 | -52,8 | -478,5 | 0,2 | 0,2 | 2,5 | | 0 | 35,9 | |
| | | 95 | Pump that pumps water and oil mixture source | 73 | 1 | -22,7 | -471,2 | 0,2 | 0,2 | 2,5 | | 0 | 35,9 | |
| * | | 96 | Smoke generator of garbage burner | 444 | 1 | -23,0 | -359,9 | | | 10 | 0,15 | 4,22 | 371 | |
| | | 97 | Exhaust hood of the filter | 444 | 1 | 38,2 | -204,0 | | | 6 | | 0,14 | 35,9 | |
| | | 98 | Exhaust hood of the filter | 444 | 1 | 36,0 | -211,8 | | | 6 | | 0,14 | 35,9 | |
| | | 99 | Exhaust hood of the filter | 444 | 1 | -300,0 | -295,6 | | | 6 | 0,25 | 0,69 | 35,9 | |
| | | 100 | Exhaust hood of the filter | 444 | 1 | -295,0 | -302,3 | | | 6 | 0,25 | 0,69 | 35,9 | |
| | | 101 | Exhaust hood of the filter | 444 | 1 | -203,5 | -367,3 | | | 6 | 0,25 | 0,69 | 35,9 | |
| | | 102 | Exhaust hood of the filter | 444 | 1 | -206,6 | -373,2 | | | 6 | 0,25 | 0,69 | 35,9 | |
| | | 103 | Exhaust hood of the filter | 444 | 1 | -309,5 | -299,6 | | | 6 | 0,25 | 0,69 | 35,9 | |
| | | 104 | Exhaust hood of the filter | 444 | 1 | -314,4 | -308,3 | | | 6 | 0,25 | 0,69 | 35,9 | |
| | | 105 | Exhaust hood of the filter | 444 | 1 | -201,2 | -357,5 | | | 6 | 0,25 | 0,69 | 35,9 | |
| | | 106 | Exhaust hood of the filter | 444 | 1 | -362,8 | -304,0 | | | 6 | 0,25 | 2,78 | 35,9 | |
| | | 107 | Exhaust hood of the filter | 444 | 1 | -332,7 | -322,0 | | | 6 | 0,25 | 2,78 | 35,9 | |
| | | 108 | Exhaust hood of the filter | 444 | 1 | -254,0 | -370,4 | | | 6 | 0,25 | 2,78 | 35,9 | |
| | | 109 | Exhaust hood of the filter | 444 | 1 | -225,2 | -387,3 | | | 6 | 0,25 | 2,78 | 35,9 | |

TABLE 4. Characteristics of the composition of the source emission

| Area code | Code of industrial site | Source code | Pollutant code | Total emission t/year | Coefficient of ordered settling substances | Maximum emission (g/s) at wind speeds | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 0.5 m/s | 1 m/s | 2 m/s | 4 m/s | 6 m/s | 8 m/s | 10 m/s | 12 m/s | 14 m/s | 16 m/sек |
| 1 | 1 | 1 | 03000/ 2902 | 2 | 1 | 0,138889 | | | | | | | | | |
| | | 2 | 03000/ 2902 | 2 | 1 | 0,138889 | | | | | | | | | |
| | | 3 | 03000/ 2902 | 2 | 1 | 0,138889 | | | | | | | | | |
| | | 4 | 03000/ 2902 | 2 | 1 | 0,138889 | | | | | | | | | |
| | | 5 | 03000/ 2902 | 0,6 | 1 | 0,041667 | | | | | | | | | |
| | | 6 | 03000/ 2902 | 7,5 | 1 | 0,034722 | | | | | | | | | |
| | | 7 | 03000/ 2902 | 4 | 1 | 0,416667 | | | | | | | | | |
| | | 8 | 03000/ 2902 | 4 | 1 | 0,416667 | | | | | | | | | |
| | | 9 | 03000/ 2902 | 4 | 1 | 0,416667 | | | | | | | | | |
| | | 10 | 03000/ 2902 | 0,1 | 1 | 0,083333 | | | | | | | | | |
| | | 11 | 03000/ 2902 | 0,1 | 1 | 0,083333 | | | | | | | | | |
| | | 12 | 03000/ 2902 | 0,08333 | 1 | 0,069444 | | | | | | | | | |
| | | 13 | 03000/ 2902 | 0,08333 | 1 | 0,069444 | | | | | | | | | |
| | | 14 | 03000/ 2902 | 0,1 | 1 | 0,083333 | | | | | | | | | |
| | | 15 | 03000/ 2902 | 0,1 | 1 | 0,083333 | | | | | | | | | |
| | | 16 | 03000/ 2902 | 0,08333 | 1 | 0,069444 | | | | | | | | | |
| | | 17 | 03000/ 2902 | 0,2 | 1 | 0,277778 | | | | | | | | | |
| | | 18 | 03000/ 2902 | 6 | 1 | 0,27778 | | | | | | | | | |
| | | 19 | 03000/ 2902 | 0,175 | 1 | 0,048611 | | | | | | | | | |
| | | 20 | 03000/ 2902 | 0,175 | 1 | 0,048611 | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 21 | 03000/2902 | 0,175 | 1 | 0,048611 | | | | | | | | | |
| | | 22 | 03000/2902 | 0,00156 | 1 | 0,000605 | | | | | | | | | |
| | | 23 | 03000/2902 | 0,00156 | 1 | 0,000605 | | | | | | | | | |
| | | 24 | 03000/2902 | 0,00156 | 1 | 0,000605 | | | | | | | | | |
| | | 25 | 03000/2902 | 0,00156 | 1 | 0,000605 | | | | | | | | | |
| | | 26 | 03000/2902 | 0,00156 | 1 | 0,000605 | | | | | | | | | |
| | | 27 | 03000/2902 | 0,00156 | 1 | 0,000605 | | | | | | | | | |
| | | 28 | 03000/2902 | 0,00156 | 1 | 0,000605 | | | | | | | | | |
| | | 29 | 03000/2902 | 0,00156 | 1 | 0,000605 | | | | | | | | | |
| | | 30 | 03000/2902 | 0,00156 | 1 | 0,000605 | | | | | | | | | |
| | | 31 | 03000/2902 | 0,00156 | 1 | 0,000605 | | | | | | | | | |
| | | 32 | 03000/2902 | 0,00156 | 1 | 0,000605 | | | | | | | | | |
| | | 33 | 03000/2902 | 0,00156 | 1 | 0,000605 | | | | | | | | | |
| | | 34 | 03000/2902 | 0,00156 | 1 | 0,000605 | | | | | | | | | |
| | | 35 | 03000/2902 | 0,00156 | 1 | 0,000605 | | | | | | | | | |
| | | 36 | 03000/2902 | 0,00156 | 1 | 0,000605 | | | | | | | | | |
| | | 37 | 03000/2902 | 0,00156 | 1 | 0,000605 | | | | | | | | | |
| | | 38 | 03000/2902 | 0,00156 | 1 | 0,000605 | | | | | | | | | |
| | | 40 | 01007/183 | 7,34E-7 | 1 | 1E-6 | | | | | | | | | |
| | | | 03000/2902 | 6 | 1 | 1,25 | | | | | | | | | |
| | | | 04001/301 | 0,5004 | 1 | 0,7299 | | | | | | | | | |
| | | | 04002/11815 | 0,00073 | 1 | 0,001072 | | | | | | | | | |
| | | | 06000/337 | 1,82799 | 1 | 2,666353 | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 07000/11812 | 9,09564 | 1 | 625,89102 | | | | | | | | | |
| | | | 12000/410 | 0,00735 | 1 | 0,010719 | | | | | | | | | |
| | | 41 | 05002/333 | 2,44E-7 | 1 | 3,72E-8 | | | | | | | | | |
| | | | 11000/2754 | 0,00132 | 1 | 8,7E-5 | | | | | | | | | |
| | | | 11030/616 | 2E-6 | 1 | 1,31E-7 | | | | | | | | | |
| | | 42 | 05002/333 | 2,44E-7 | 1 | 3,72E-8 | | | | | | | | | |
| | | | 11000/2754 | 0,00132 | 1 | 8,7E-5 | | | | | | | | | |
| | | | 11030/616 | 2E-6 | 1 | 1,31E-7 | | | | | | | | | |
| | | 43 | 05002/333 | 1,92E-9 | 1 | 2,13E-8 | | | | | | | | | |
| | | | 11000/2754 | 6,83E-7 | 1 | 8E-6 | | | | | | | | | |
| | | | 11030/616 | 1,03E-7 | 1 | 1,14E-8 | | | | | | | | | |
| | | 44 | 05002/333 | 1,27E-5 | 1 | 0,000113 | | | | | | | | | |
| | | | 11000/2754 | 0,00451 | 1 | 0,040326 | | | | | | | | | |
| | | | 11030/616 | 6,8E-6 | 1 | 6,1E-5 | | | | | | | | | |
| | | 45 | 05002/333 | 1,15E-7 | 1 | 7,11E-8 | | | | | | | | | |
| | | | 11000/2754 | 4,1E-6 | 1 | 2,5E-5 | | | | | | | | | |
| | | | 11030/616 | 6,17E-9 | 1 | 3,81E-8 | | | | | | | | | |
| | | 46 | 03004/328 | 0,00017 | 1 | 5E-6 | | | | | | | | | |
| | | | 04001/301 | 0,00074 | 1 | 2E-5 | | | | | | | | | |
| | | | 04002/11815 | 3E-6 | 1 | 8E-8 | | | | | | | | | |
| | | | 05001/330 | 0,00011 | 1 | 3E-6 | | | | | | | | | |
| | | | 06000/337 | 0,00128 | 1 | 3,8E-5 | | | | | | | | | |
| | | | 07000/11812 | 0,0774 | 1 | 0,0022 | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 11000/2754 | 0,00021 | 1 | 6E-6 | | | | | | | | | |
| | | | 12000/410 | 1E-5 | 1 | 2,4E-7 | | | | | | | | | |
| | | | 13101/703 | 7,4E-7 | 1 | 2E-8 | | | | | | | | | |
| | | 47 | 01007/227 | | 1 | | | | | | | | | | |
| | | | 03004/328 | 0,00092 | 1 | 0,00084 | | | | | | | | | |
| | | | 04001/301 | 0,013 | 1 | 0,0123 | | | | | | | | | |
| | | | 04002/11815 | 0,627 | 1 | 0,575 | | | | | | | | | |
| | | | 04003/303 | 1,4E-6 | 1 | 1E-7 | | | | | | | | | |
| | | | 05001/330 | 0,00084 | 1 | 0,00077 | | | | | | | | | |
| | | | 06000/337 | 0,009 | 1 | 0,00825 | | | | | | | | | |
| | | | 07000/11812 | 0,00025 | 1 | 0,000227 | | | | | | | | | |
| | | | 11000/2754 | 0,00093 | 1 | 0,00085 | | | | | | | | | |
| | | | 12000/410 | 4E-5 | 1 | 3,3E-5 | | | | | | | | | |
| | | | 13101/703 | 3,5E-6 | 1 | 3E-6 | | | | | | | | | |
| | | 48 | 03004/328 | 0,00315 | 1 | 0,00147 | | | | | | | | | |
| | | | 04001/301 | 0,028 | 1 | 0,013 | | | | | | | | | |
| | | | 04002/11815 | 0,00054 | 1 | 0,00025 | | | | | | | | | |
| | | | 04003/303 | 2,9E-6 | 1 | 1E-6 | | | | | | | | | |
| | | | 05001/330 | 0,00189 | 1 | 0,00088 | | | | | | | | | |
| | | | 06000/337 | 0,01 | 1 | 0,00458 | | | | | | | | | |
| | | | 07000/11812 | 1,32 | 1 | 0,61 | | | | | | | | | |
| | | | 11000/2754 | 0,002 | 1 | 0,0009 | | | | | | | | | |
| | | | 12000/410 | 8E-5 | 1 | 3,5E-5 | | | | | | | | | |
| | | | 13101/703 | 1E-5 | 1 | 4E-6 | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 49 | 03000/2902 | 0,31519 | 1 | 0,0228 | | | | | | | | | |
| | | | 04001/301 | 0,09385 | 1 | 0,006789 | | | | | | | | | |
| | | | 04002/11815 | 0,00533 | 1 | 0,000386 | | | | | | | | | |
| | | | 06000/337 | 0,12542 | 1 | 0,009073 | | | | | | | | | |
| | | | 07000/11812 | 23,69811 | 1 | 1,714273 | | | | | | | | | |
| | | | 11000/2754 | 0,05333 | 1 | 0,003858 | | | | | | | | | |
| | | | 12000/410 | 0,0096 | 1 | 0,000694 | | | | | | | | | |
| | | 50 | 03004/328 | 0,47278 | 1 | 0,0342 | | | | | | | | | |
| | | | 04001/301 | 0,14078 | 1 | 0,010184 | | | | | | | | | |
| | | | 04002/11815 | 0,008 | 1 | 0,000579 | | | | | | | | | |
| | | | 06000/337 | 0,18813 | 1 | 0,013609 | | | | | | | | | |
| | | | 07000/11812 | 35,54716 | 1 | 2,57141 | | | | | | | | | |
| | | | 11000/2754 | 0,08 | 1 | 0,00579 | | | | | | | | | |
| | | | 12000/410 | 0,0144 | 1 | 0,001042 | | | | | | | | | |
| | | 51 | 03000/2902 | 0,47278 | 1 | 0,0342 | | | | | | | | | |
| | | | 04001/301 | 0,14078 | 1 | 0,010184 | | | | | | | | | |
| | | | 04002/11815 | 0,008 | 1 | 0,000579 | | | | | | | | | |
| | | | 06000/337 | 0,18813 | 1 | 0,013609 | | | | | | | | | |
| | | | 07000/11812 | 35,54716 | 1 | 2,57141 | | | | | | | | | |
| | | | 11000/2754 | 0,08 | 1 | 0,00579 | | | | | | | | | |
| | | | 12000/410 | 0,0144 | 1 | 0,001042 | | | | | | | | | |
| | | 52 | 03000/2902 | 0,63038 | 1 | 0,0456 | | | | | | | | | |
| | | | 04001/301 | 0,18771 | 1 | 0,013578 | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 04002/ 11815 | 0,01067 | 1 | 0,000772 | | | | | | | | | |
| | | | 06000/ 337 | 0,25085 | 1 | 0,018146 | | | | | | | | | |
| | | | 07000/ 11812 | 47,39622 | 1 | 3,428546 | | | | | | | | | |
| | | | 11000/ 2754 | 0,10665 | 1 | 0,007715 | | | | | | | | | |
| | | | 12000/ 410 | 0,0192 | 1 | 0,001389 | | | | | | | | | |
| | | 53 | 03000/ 2902 | 12,84571 | 1 | 1,069656 | | | | | | | | | |
| | | 54 | 03000/ 2902 | 0,02218 | 1 | 0,00206 | | | | | | | | | |
| | | | 04001/ 301 | 0,09546 | 1 | 0,008868 | | | | | | | | | |
| | | | 04002/ 11815 | 0,00038 | 1 | 3,6E-5 | | | | | | | | | |
| | | | 05001/ 330 | 0,01376 | 1 | 0,001278 | | | | | | | | | |
| | | | 06000/ 337 | 0,17376 | 1 | 0,016143 | | | | | | | | | |
| | | | 07000/ 11812 | 10,0416 | 1 | 0,932887 | | | | | | | | | |
| | | | 11000/ 2754 | 0,02611 | 1 | 0,002426 | | | | | | | | | |
| | | | 12000/ 410 | 0,00112 | 1 | 0,000104 | | | | | | | | | |
| | | | 13101/ 703 | 0,0001 | 1 | 9E-6 | | | | | | | | | |
| | | 55 | 03000/ 2902 | 0,00654 | 1 | 0,000956 | | | | | | | | | |
| | | 56 | 03000/ 2902 | 0,00654 | 1 | 0,000956 | | | | | | | | | |
| | | 57 | 03000/ 2902 | 0,54491 | 1 | 0,079699 | | | | | | | | | |
| | | | 04001/ 301 | 2,34553 | 1 | 0,343062 | | | | | | | | | |
| | | | 04002/ 11815 | 0,00944 | 1 | 0,00138 | | | | | | | | | |
| | | | 05001/ 330 | 0,33811 | 1 | 0,049452 | | | | | | | | | |
| | | | 06000/ 337 | 4,26961 | 1 | 0,624481 | | | | | | | | | |
| | | | 07000/ 11812 | 246,74094 | 1 | 36,088807 | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 11000/2754 | 0,64162 | 1 | 0,093845 | | | | | | | | | |
| | | | 12000/410 | 0,02752 | 1 | 0,004025 | | | | | | | | | |
| | | | 13101/703 | 0,00236 | 1 | 0,000345 | | | | | | | | | |
| | | 58 | 03004/328 | 0,54491 | 1 | 0,079699 | | | | | | | | | |
| | | | 04001/301 | 2,34553 | 1 | 0,343062 | | | | | | | | | |
| | | | 04002/11815 | 0,00944 | 1 | 0,00138 | | | | | | | | | |
| | | | 05001/330 | 0,33811 | 1 | 0,049452 | | | | | | | | | |
| | | | 06000/337 | 4,26961 | 1 | 0,624481 | | | | | | | | | |
| | | | 07000/11812 | 246,74094 | 1 | 36,088807 | | | | | | | | | |
| | | | 11000/2754 | 0,64162 | 1 | 0,093845 | | | | | | | | | |
| | | | 12000/410 | 0,02752 | 1 | 0,004025 | | | | | | | | | |
| | | | 13101/703 | 0,00236 | 1 | 0,000345 | | | | | | | | | |
| | | 59 | 01003/123 | 0,0118 | 1 | 0,02185 | | | | | | | | | |
| | | | 01104/143 | 0,00035 | 1 | 0,00065 | | | | | | | | | |
| | | | 04001/301 | 0,00589 | 1 | 0,0109 | | | | | | | | | |
| | | | 06000/337 | 0,00594 | 1 | 0,011 | | | | | | | | | |
| | | 60 | 03000/2902 | 0,00396 | 1 | 1E-5 | | | | | | | | | |
| | | 61 | 03000/2902 | 0,03261 | 1 | 0,035525 | | | | | | | | | |
| | | | 11000/2754 | 0,1775 | 1 | 0,082701 | | | | | | | | | |
| | | | 11030/616 | 0,0675 | 1 | 0,027462 | | | | | | | | | |
| | | 62 | 11000/2754 | 0,00012 | 1 | 4E-6 | | | | | | | | | |
| | | 63 | 03000/2902 | 0,00064 | 1 | 0,000104 | | | | | | | | | |
| | | | 04003/303 | 1,21E-7 | 1 | 4,5E-8 | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 10002/1819 | 4,42E-7 | 1 | 9E-8 | | | | | | | | | |
| | | | 11000/2754 | 0,009 | 1 | 0,004028 | | | | | | | | | |
| | | | 11004/1301 | 3,38E-9 | 1 | 1,47E-9 | | | | | | | | | |
| | | | 11006/1317 | 0,00016 | 1 | 7,1E-5 | | | | | | | | | |
| | | | 11028/1555 | 0,00016 | 1 | 0,00042 | | | | | | | | | |
| | | 64 | 04001/301 | 0,00529 | 1 | 0,002905 | | | | | | | | | |
| | | | 04002/11815 | 5E-5 | 1 | 2,9E-5 | | | | | | | | | |
| | | | 04003/303 | 1,12E-6 | 1 | 1E-6 | | | | | | | | | |
| | | | 05001/330 | 0,00028 | 1 | 0,000154 | | | | | | | | | |
| | | | 06000/337 | 0,08476 | 1 | 0,046528 | | | | | | | | | |
| | | | 07000/11812 | 0,89124 | 1 | 0,489262 | | | | | | | | | |
| | | | 11000/2754 | 0,01484 | 1 | 0,008147 | | | | | | | | | |
| | | | 12000/410 | 0,00039 | 1 | 0,000217 | | | | | | | | | |
| | | 65 | 03004/328 | 0,02218 | 1 | 0,00206 | | | | | | | | | |
| | | | 04001/301 | 0,09546 | 1 | 0,008868 | | | | | | | | | |
| | | | 04002/11815 | 0,00038 | 1 | 3,6E-5 | | | | | | | | | |
| | | | 05001/330 | 0,01376 | 1 | 0,001278 | | | | | | | | | |
| | | | 06000/337 | 0,17376 | 1 | 0,016143 | | | | | | | | | |
| | | | 07000/11812 | 10,0416 | 1 | 0,932887 | | | | | | | | | |
| | | | 11000/2754 | 0,02611 | 1 | 0,002426 | | | | | | | | | |
| | | | 12000/410 | 0,00112 | 1 | 0,000104 | | | | | | | | | |
| | | | 13101/703 | 0,0001 | 1 | 9E-6 | | | | | | | | | |
| | | 66 | 03000/2902 | 0,00907 | 1 | 0,001209 | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 67 | 03000/2902 | 0,00907 | 1 | 0,001209 | | | | | | | | | |
| | | 68 | 03000/2902 | 0,00078 | 1 | 0,0052 | | | | | | | | | |
| | | 69 | 03000/2902 | 0,00037 | 1 | 0,0052 | | | | | | | | | |
| | | 70 | 03000/2902 | 0,00037 | 1 | 0,0052 | | | | | | | | | |
| | | 71 | 03000/2902 | 0,00037 | 1 | 0,0052 | | | | | | | | | |
| | | 72 | 03000/2902 | 0,00037 | 1 | 0,0052 | | | | | | | | | |
| | | 73 | 03000/2902 | 0,00152 | 1 | 0,000605 | | | | | | | | | |
| | | 74 | 03000/2902 | 0,00152 | 1 | 0,000605 | | | | | | | | | |
| | | 75 | 03000/2902 | 0,00152 | 1 | 0,000605 | | | | | | | | | |
| | | 76 | 03000/2902 | 2 | 1 | 0,138889 | | | | | | | | | |
| | | 77 | 03000/2902 | 2 | 1 | 0,138889 | | | | | | | | | |
| | | 78 | 03000/2902 | 2 | 1 | 0,138889 | | | | | | | | | |
| | | 79 | 03000/2902 | 2 | 1 | 0,138889 | | | | | | | | | |
| | | 80 | 03000/2902 | 0,6 | 1 | 0,041667 | | | | | | | | | |
| | | 81 | 03004/328 | 0,045 | 1 | 0,078125 | | | | | | | | | |
| | | | 04001/301 | 0,3972 | 1 | 0,689583 | | | | | | | | | |
| | | | 04002/11815 | 0,00774 | 1 | 0,013438 | | | | | | | | | |
| | | | 04003/303 | 4E-5 | 1 | 7,3E-5 | | | | | | | | | |
| | | | 05001/330 | 0,027 | 1 | 0,046875 | | | | | | | | | |
| | | | 06000/337 | 0,1404 | 1 | 0,24375 | | | | | | | | | |
| | | | 07000/11812 | 18,828 | 1 | 32,6875 | | | | | | | | | |
| | | | 11000/2754 | 0,02832 | 1 | 0,049167 | | | | | | | | | |
| | | | 12000/410 | 0,00108 | 1 | 0,001875 | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 13101/703 | 0,00018 | 1 | 0,000313 | | | | | | | | | |
| | | 82 | 11000/1034 | 2,69E-6 | 1 | 0,022379 | | | | | | | | | |
| | | 83 | 11000/1034 | 2,69E-6 | 1 | 0,022379 | | | | | | | | | |
| | | 84 | 11000/1034 | 2,69E-6 | 1 | 0,022379 | | | | | | | | | |
| | | 86 | 03000/2902 | 0,03313 | 1 | 0,084951 | | | | | | | | | |
| | | | 04001/301 | 0,2412 | 1 | 0,618532 | | | | | | | | | |
| | | | 04002/11815 | 0,00053 | 1 | 0,001366 | | | | | | | | | |
| | | | 05001/330 | 0,02 | 1 | 0,051288 | | | | | | | | | |
| | | | 06000/337 | 0,00848 | 1 | 0,02175 | | | | | | | | | |
| | | | 07000/11812 | 15,63998 | 1 | 40,107154 | | | | | | | | | |
| | | | 11000/2754 | 0,01066 | 1 | 0,027324 | | | | | | | | | |
| | | | 12000/410 | 0,00064 | 1 | 0,001639 | | | | | | | | | |
| | | 87 | 03000/2902 | 0,01513 | 1 | 0,001209 | | | | | | | | | |
| | | 88 | 03000/2902 | 1,83103 | 1 | 0,30345 | | | | | | | | | |
| | | 89 | 03000/2902 | 1,83103 | 1 | 0,30345 | | | | | | | | | |
| | | 90 | 03000/2902 | 0,35179 | 1 | 0,30345 | | | | | | | | | |
| | | 91 | 03000/2902 | 0,00111 | 1 | 0,000956 | | | | | | | | | |
| | | 92 | 03004/328 | 0,10901 | 1 | 0,079699 | | | | | | | | | |
| | | | 04001/301 | 0,46923 | 1 | 0,343062 | | | | | | | | | |
| | | | 04002/11815 | 0,00189 | 1 | 0,00138 | | | | | | | | | |
| | | | 05001/330 | 0,06764 | 1 | 0,049452 | | | | | | | | | |
| | | | 06000/337 | 0,85414 | 1 | 0,624481 | | | | | | | | | |
| | | | 07000/11812 | 49,36074 | 1 | 36,088807 | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 11000/2754 | 0,12836 | 1 | 0,093845 | | | | | | | | | |
| | | | 12000/410 | 0,00551 | 1 | 0,004025 | | | | | | | | | |
| | | | 13101/703 | 0,00047 | 1 | 0,000345 | | | | | | | | | |
| | | 93 | 05002/333 | 2E-5 | 1 | 3,5E-5 | | | | | | | | | |
| | | | 11000/2754 | 0,00168 | 1 | 0,002737 | | | | | | | | | |
| | | | 11030/616 | 3,75E-6 | 1 | 6E-6 | | | | | | | | | |
| | | 94 | 05002/333 | 2E-5 | 1 | 4E-6 | | | | | | | | | |
| | | | 11000/2754 | 0,00173 | 1 | 7,1E-5 | | | | | | | | | |
| | | | 11030/616 | 3,87E-6 | 1 | 1E-6 | | | | | | | | | |
| | | 95 | 05002/333 | 2E-6 | 1 | 1,05E-6 | | | | | | | | | |
| | | | 11000/2754 | 0,00172 | 1 | 5,9E-5 | | | | | | | | | |
| | | | 11030/616 | 3,85E-6 | 1 | 1,31E-7 | | | | | | | | | |
| | | 96 | 01004/133 | 9E-5 | 1 | 4,7E-5 | | | | | | | | | |
| | | | 01007/183 | 7E-5 | 1 | 3,9E-5 | | | | | | | | | |
| | | | 01009/184 | 0,0026 | 1 | 0,0014 | | | | | | | | | |
| | | | 03000/2902 | 0,4575 | 1 | 0,2542 | | | | | | | | | |
| | | | 04001/301 | 0,045 | 1 | 0,025 | | | | | | | | | |
| | | | 04002/11815 | 0,0025 | 1 | 0,0014 | | | | | | | | | |
| | | | 04003/303 | 1E-9 | 1 | 1E-12 | | | | | | | | | |
| | | | 05001/330 | 0,0425 | 1 | 0,0236 | | | | | | | | | |
| | | | 06000/337 | 0,0175 | 1 | 0,0097 | | | | | | | | | |
| | | | 11000/2754 | 0,0005 | 1 | 0,0003 | | | | | | | | | |
| | | | 11016/10509 | 8,8E-8 | 1 | 4,9E-8 | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 13101/703 | 1,8E-8 | 1 | 1E-8 | | | | | | | | | |
| | | | 15003/316 | 0,0575 | 1 | 0,0319 | | | | | | | | | |
| | | 97 | 03000/2902 | 0,04168 | 1 | 0,006944 | | | | | | | | | |
| | | 98 | 03000/2902 | 0,04168 | 1 | 0,006944 | | | | | | | | | |
| | | 99 | 03000/2902 | 0,25 | 1 | 0,034722 | | | | | | | | | |
| | | 100 | 03000/2902 | 0,25 | 1 | 0,034722 | | | | | | | | | |
| | | 101 | 03000/2902 | 0,25 | 1 | 0,034722 | | | | | | | | | |
| | | 102 | 03000/2902 | 0,25 | 1 | 0,034722 | | | | | | | | | |
| | | 103 | 03000/2902 | 0,25 | 1 | 0,034722 | | | | | | | | | |
| | | 104 | 03000/2902 | 0,25 | 1 | 0,034722 | | | | | | | | | |
| | | 105 | 03000/2902 | 0,25 | 1 | 0,034722 | | | | | | | | | |
| | | 106 | 03000/2902 | 0,36505 | 1 | 0,048611 | | | | | | | | | |
| | | 107 | 03000/2902 | 0,36505 | 1 | 0,048611 | | | | | | | | | |
| | | 108 | 03000/2902 | 0,36505 | 1 | 0,048611 | | | | | | | | | |
| | | 109 | 03000/2902 | 0,36505 | 1 | 0,048611 | | | | | | | | | |

TABLE 5. Description of harmful substances

| Pollutant code | The name of the pollutant | MPC | Coefficient of ordered settling substances |
|---|---|---|---|
| 01003/ 123 | Iron and its compounds (in terms of iron) | 0,4 | 1 |
| 01004/ 133 | Cadmium and its compounds (in terms of cadmium) | 0,003 | 1 |
| 01007/ 183 | Metal mercury | 0,003 | 1 |
| 01009/ 184 | Lead and its compounds (in terms of lead) | 0,001 | 1 |
| 01104/ 143 | Manganese and its compounds in terms of manganese dioxide | 0,01 | 1 |
| 03000/ 2902 | Substances in form of suspended solid particles (microparticles, fibers) | 0,5 | 1 |
| 03004/ 328 | Soot | 0,15 | 1 |
| 04001/ 301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) | 0,2 | 1 |
| 04002/ 11815 | Nitrogen(1)oxide(N2O) | 0 | 1 |
| 04003/ 303 | Ammonia | 0,2 | 1 |
| 05001/ 330 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | 0,5 | 1 |
| 05002/ 333 | Hydrogen sulfide | 0,008 | 1 |
| 06000/ 337 | Carbon monoxide | 5 | 1 |
| 07000/ 11812 | Carbon dioxide | 0 | 1 |
| 10002/ 1819 | Dimethylamine | 0,005 | 1 |
| 11000/ 1034 | Nonmethane volatile organic compounds | 0,03 | 1 |
| 11000/ 2754 | Nonmethane volatile organic compounds | 1 | 1 |
| 11004/ 1301 | Acrolein | 0,03 | 1 |
| 11006/ 1317 | Acetaldehyde | 0,01 | 1 |
| 11016/ 10509 | Dibenzo(a,j)anthracene | 5E-5 | 1 |

| | | | |
|---|---|---|---|
| 11028/ 1555 | Acetic acid | 0,2 | 1 |
| 11030/ 616 | Xylene | 0,2 | 1 |
| 12000/ 410 | Methane | 50 | 1 |
| 13101/ 703 | Benz(a)pyrene | 0,0001 | 1 |
| 15003/ 316 | Hydrogen chloride (hydrochloric acid as HCl molecule) | 0,2 | 1 |

TABLE 6. Description of groups of summations of harmful substances

| Group code | Substances that make up groups of summations (codes) | | | | | | | | | | Coefficient potentiation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| 31 | 04001/ 301 | 05001/ 330 | | | | | | | | | 1 |

TABLE 7. Description of background concentration distribution (U - wind speed m/s)

| Area code | Pollutant code | Background assignement | Coord. observation post | | Conc. (in shares of MPC) | Concentration (in shares of MPC) at 2<U<U* in directions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X, m | Y, m | at U<=2 | N | NE | E | SE | S | SW | W | NW |
| 1 | 01009/ 184 | a | 0 | 0 | 0,4 | | | | | | | | |
| | 03000/ 2902 | a | 0 | 0 | 0,2239 | | | | | | | | |
| | 04001/ 301 | a | 0 | 0 | 0,45125 | | | | | | | | |
| | 05001/ 330 | a | 0 | 0 | 0,07218 | | | | | | | | |
| | 05002/ 333 | a | 0 | 0 | 0,3125 | | | | | | | | |
| | 06000/ 337 | a | 0 | 0 | 0,2385 | | | | | | | | |
| | 11000/ 2754 | a | 0 | 0 | 0,4 | | | | | | | | |
| | 11030/ 616 | a | 0 | 0 | 0,4 | | | | | | | | |
| | 13101/ 703 | a | 0 | 0 | 0,4 | | | | | | | | |
| | 15003/ 316 | a | 0 | 0 | 0,4 | | | | | | | | |

Assignment for calculation

TABLE 1. The list of industrial sites

| Code of industrial site | Name of industrial site |
|---|---|
| 1 | River port (terminal) in Izmail city |

TABLE 2. List of substances

| Pollutant code | The name of the pollutant |
|---|---|
| 01009/ 184 | Lead and its compounds (in terms of lead) |
| 03000/ 2902 | Substances in form of suspended solid particles (microparticles, fibers) |
| 04001/ 301 | Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2]) |
| 05001/ 330 | Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide |
| 06000/ 337 | Carbon monoxide |
| 11000/ 2754 | Nonmethane volatile organic compounds |
| 11030/ 616 | Xylene |
| 13101/ 703 | Benz(a)pyrene |
| 15003/ 316 | Hydrogen chloride (hydrochloric acid as HCl molecule) |

TABLE 3. List of summation groups

| Group code | Substances that make up groups of summations (codes) | | | | | | | | | | Coefficient potentiation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| 31 | 04001/ 301 | 05001/ 330 | | | | | | | | | 1 |

TABLE 4. Parameters of industrial sites

| N in order | Coord. center sim. | | Length, m | Width, m | Grid step of calculation site | | Angle of rotation of calculation site relative to the axis of the general coord system, degree | Zone sign |
|---|---|---|---|---|---|---|---|---|
| | X, m | Y, m | | | axis OX, m | axis OY, m | | |
| 1 | 0 | 0 | 2000 | 2000 | 50 | 50 | 0 | 1 |

TABLE 5. Assignment for calculation.

| Name of the city | Wind speed, m/s | | | | | Wind speed shares of (Umc) | | | | | The step of sorting through the dangerous direction. the wind | Fixed direction of the wind | The number of the largest depositors | The number of max. concentrations | Calculation sign background |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | | | | | |
| Izmail | 0,5 | 1 | 1,5 | | | 0,5 | 1 | 1,5 | | | 10 | | 10 | 10 | 1 |

The results of calculations

List of the highest concentrations

1009/ 184 Lead and its compounds (in terms of lead)

The calculation site 1

| Axis OX, m | Axis OY, m | Conc. in point mg/m3 | Conc. in point, shares of MPC | Direction of the wind, degrees | Wind speed, m/s | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 250 | -300 | 0,000458 | 0,572163 | 170,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| -400 | -300 | 0,000458 | 0,572142 | 10,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| -350 | -200 | 0,000458 | 0,572009 | 30,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| 200 | -200 | 0,000458 | 0,571950 | 150,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| 100 | -50 | 0,000457 | 0,571696 | 120,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| -250 | -650 | 0,000457 | 0,571624 | 300,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| -250 | -50 | 0,000457 | 0,571469 | 60,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| 150 | -550 | 0,000457 | 0,571326 | 220,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| -200 | -700 | 0,000457 | 0,571244 | 290,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| 50 | -700 | 0,000457 | 0,571154 | 250,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |

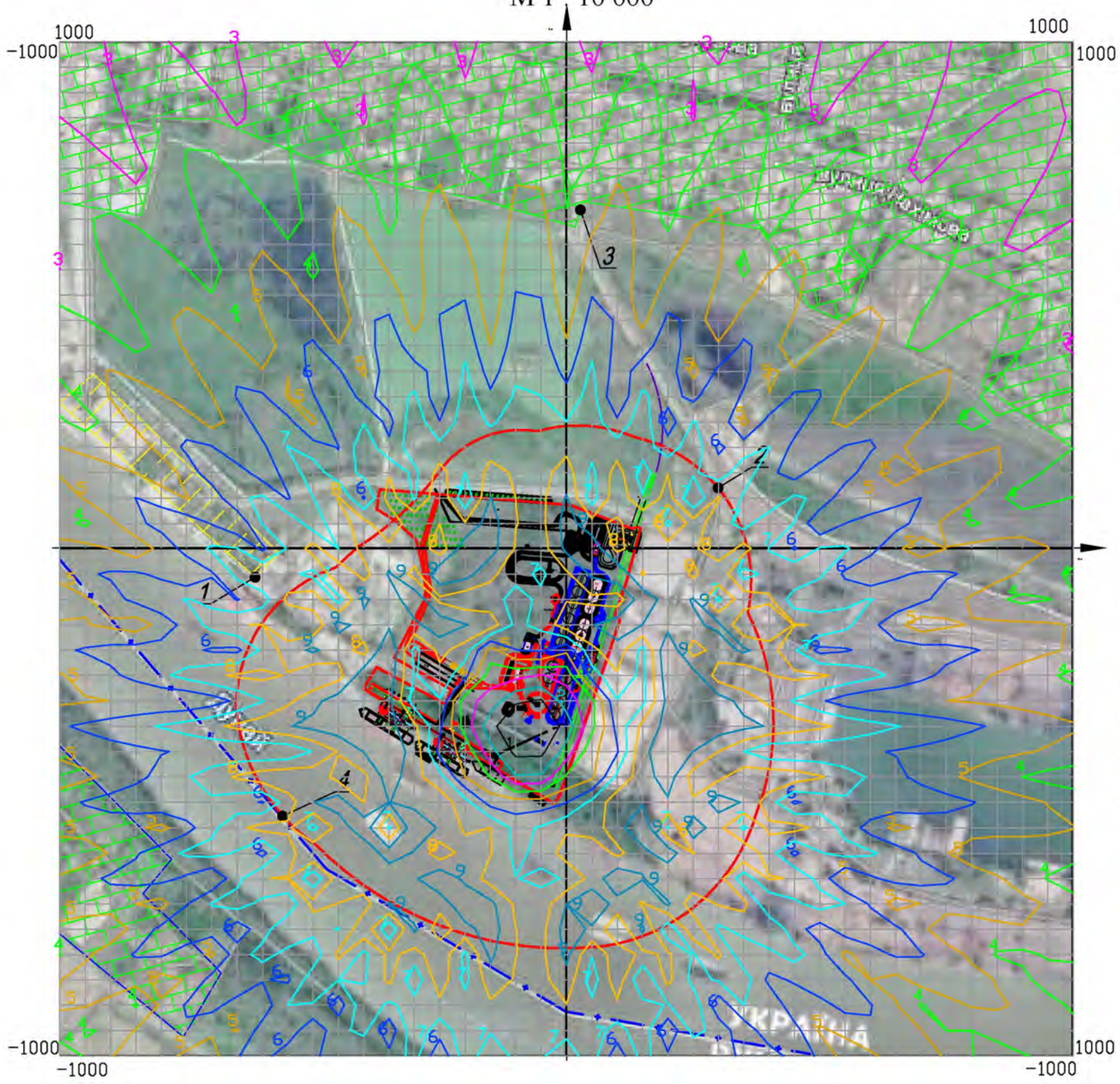
Concentrations at given points

1009/ 184 Lead and its compounds (in terms of lead)

The calculation site 1

| Coord. X, m | Coord.Y, м | Conc. in point mg/m3 | Conc. in point, shares of MPC | Direction of the wind, degrees | Wind speed, m/s | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -635 | -61 | 0,000443 | 0,553252 | 30,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| 310 | 121 | 0,000445 | 0,556771 | 130,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| 29 | 688 | 0,000424 | 0,529483 | 100,00 | 15,37 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| -578 | -546 | 0,000442 | 0,553110 | 350,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |

Map-scheme of the distribution of
pollutant concentrations
on calculated area
M 1 : 10 000




Lead and its compounds (in terms of lead)

| | | |
|---|---|---|
| 9 | – | 0.565 MPC |
| 8 | – | 0.558 MPC |
| 7 | – | 0.551 MPC |
| 6 | – | 0.544 MPC |
| 5 | – | 0.537 MPC |
| 4 | – | 0.530 MPC |
| 3 | – | 0.523 MPC |
| 2 | – | 0.516 MPC |
| 1 | – | 0.509 MPC |
| 0 | – | 0.050 MPC |

Legend

- NIBULON LLC territory
- regulatory sanitary protection zone
- control point
- the state border of Ukraine
- the residential buildings of Izmail
- the residential buildings of the comuna Plauru
- recreation zone

List of the highest concentrations

15003 / 316 Hydrogen chloride (hydrochloric acid as HCl molecule)

The calculation site 1

| Axis OX, m | Axis OY, m | Conc. in point mg/m3 | Conc. in point, shares of MPC | Direction of the wind, degrees | Wind speed, m/s | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 250 | -300 | 0,081315 | 0,508221 | 170,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| -400 | -300 | 0,081315 | 0,508219 | 10,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| -350 | -200 | 0,081313 | 0,508204 | 30,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| 200 | -200 | 0,081312 | 0,508197 | 150,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| 100 | -50 | 0,081307 | 0,508168 | 120,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| -250 | -650 | 0,081306 | 0,508160 | 300,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| -250 | -50 | 0,081303 | 0,508142 | 60,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| 150 | -550 | 0,081300 | 0,508126 | 220,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| -200 | -700 | 0,081299 | 0,508117 | 290,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| 50 | -700 | 0,081297 | 0,508106 | 250,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |

Concentrations at given points

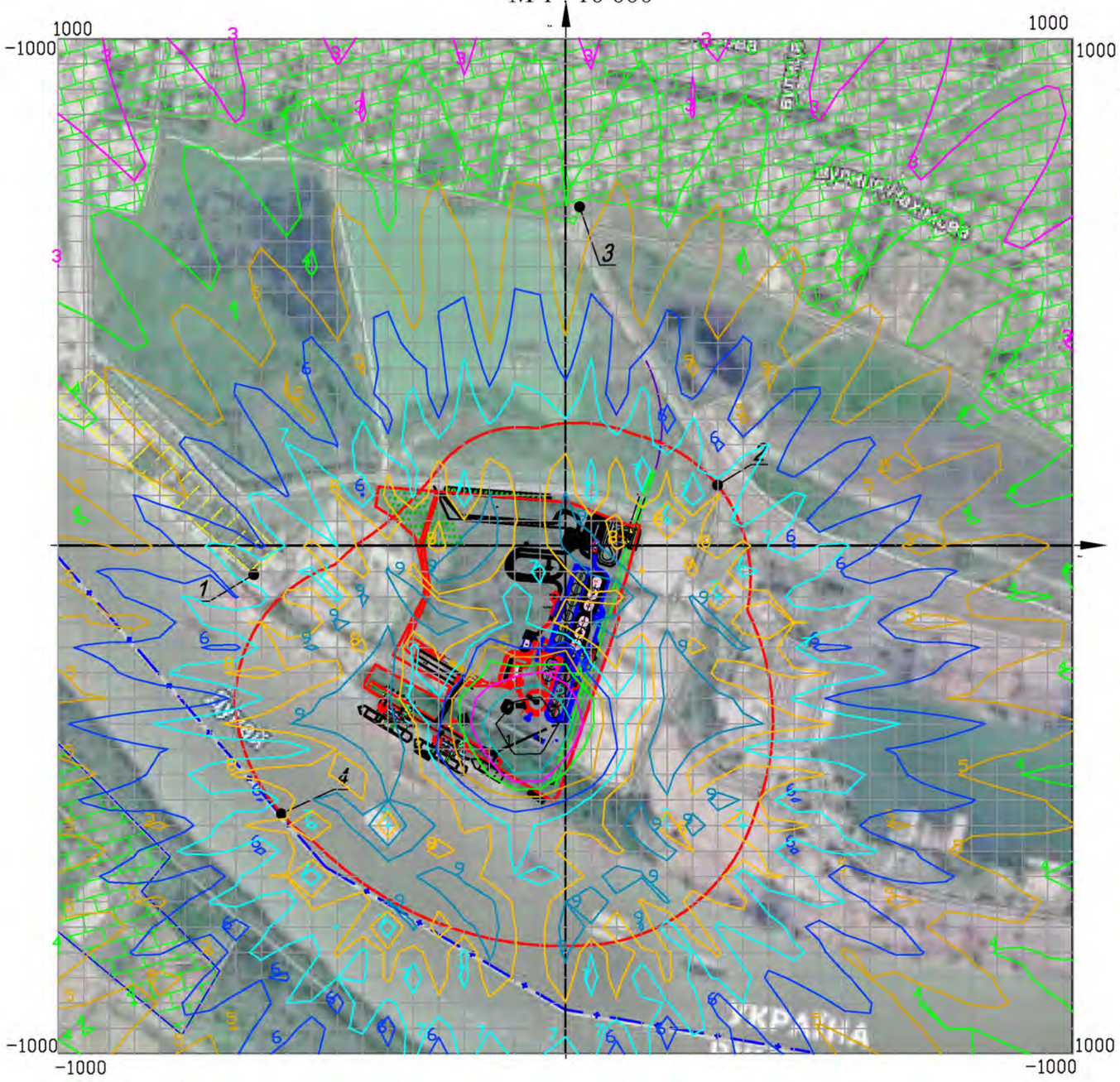
15003 / 316 Hydrogen chloride (hydrochloric acid as HCl molecule)

The calculation site 1

| Coord. X, m | Coord.Y, м | Conc. in point mg/m3 | Conc. in point, shares of MPC | Direction of the wind, degrees | Wind speed, m/s | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -635 | -61 | 0,080971 | 0,506067 | 30,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| 310 | 121 | 0,081035 | 0,506468 | 130,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| 29 | 688 | 0,080537 | 0,503359 | 100,00 | 15,37 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |
| -578 | -546 | 0,080968 | 0,506051 | 350,00 | 10,24 | 96 | 100,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,00 |

# Map-scheme of the distribution of pollutant concentrations on calculated area

M 1 : 10 000




Hydrogen chloride (hydrochloric acid as HCl molecule)

| | | |
|---|---|---|
| 9 | – | 0.507 MPC |
| 8 | – | 0.507 MPC |
| 7 | – | 0.506 MPC |
| 6 | – | 0.505 MPC |
| 5 | – | 0.504 MPC |
| 4 | – | 0.503 MPC |
| 3 | – | 0.503 MPC |
| 2 | – | 0.502 MPC |
| 1 | – | 0.501 MPC |
| 0 | – | 0.050 MPC |

## Legend

- NIBULON LLC territory
- regulatory sanitary protection zone
- control point
- the state border of Ukraine
- the residential buildings of Izmail
- the residential buildings of the comuna Plauru
- recreation zone

List of the highest concentrations

13101 / 703 Benz(a)pyrene

The calculation site 1

| Axis OX, m | Axis OY, m | Conc. in point mg/m3 | Conc. in point, shares of MPC | Direction of the wind, degrees | Wind speed, m/s | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -250 | -350 | 0,001397 | 17,457861 | 40,00 | 0,50 | 58 | 55,90 | 57 | 43,55 | 48 | 0,54 | 47 | 0,00 | 96 | 0,00 |
| -250 | -300 | 0,001109 | 13,860244 | 60,00 | 0,50 | 58 | 60,63 | 57 | 38,91 | 48 | 0,46 | 96 | 0,00 | 65 | 0,00 |
| -300 | -300 | 0,000871 | 10,891840 | 40,00 | 0,50 | 58 | 62,46 | 57 | 37,12 | 48 | 0,42 | 65 | 0,00 | 47 | 0,00 |
| -200 | -350 | 0,000828 | 10,355291 | 90,00 | 0,50 | 57 | 99,39 | 48 | 0,61 | 58 | 0,00 | 96 | 0,00 | 92 | 0,00 |
| -300 | -350 | 0,000586 | 7,329216 | 40,00 | 0,50 | 57 | 73,27 | 58 | 25,84 | 48 | 0,89 | 65 | 0,00 | 47 | 0,00 |
| -250 | -400 | 0,000402 | 5,020773 | 30,00 | 0,50 | 57 | 96,81 | 48 | 3,19 | 47 | 0,00 | 96 | 0,00 | 65 | 0,00 |
| -250 | -250 | 0,000296 | 3,698919 | 50,00 | 0,50 | 58 | 51,42 | 57 | 47,50 | 48 | 0,98 | 65 | 0,10 | 47 | 0,00 |
| -200 | -300 | 0,000295 | 3,693632 | 70,00 | 0,50 | 57 | 89,12 | 58 | 8,45 | 48 | 2,43 | 96 | 0,00 | 92 | 0,00 |
| -350 | -350 | 0,000267 | 3,342685 | 40,00 | 0,50 | 57 | 76,00 | 58 | 22,79 | 48 | 1,22 | 65 | 0,00 | 47 | 0,00 |
| -200 | -400 | 0,000248 | 3,095645 | 100,00 | 0,50 | 57 | 99,94 | 48 | 0,06 | 96 | 0,00 | 92 | 0,00 | 81 | 0,00 |

Concentrations at given points

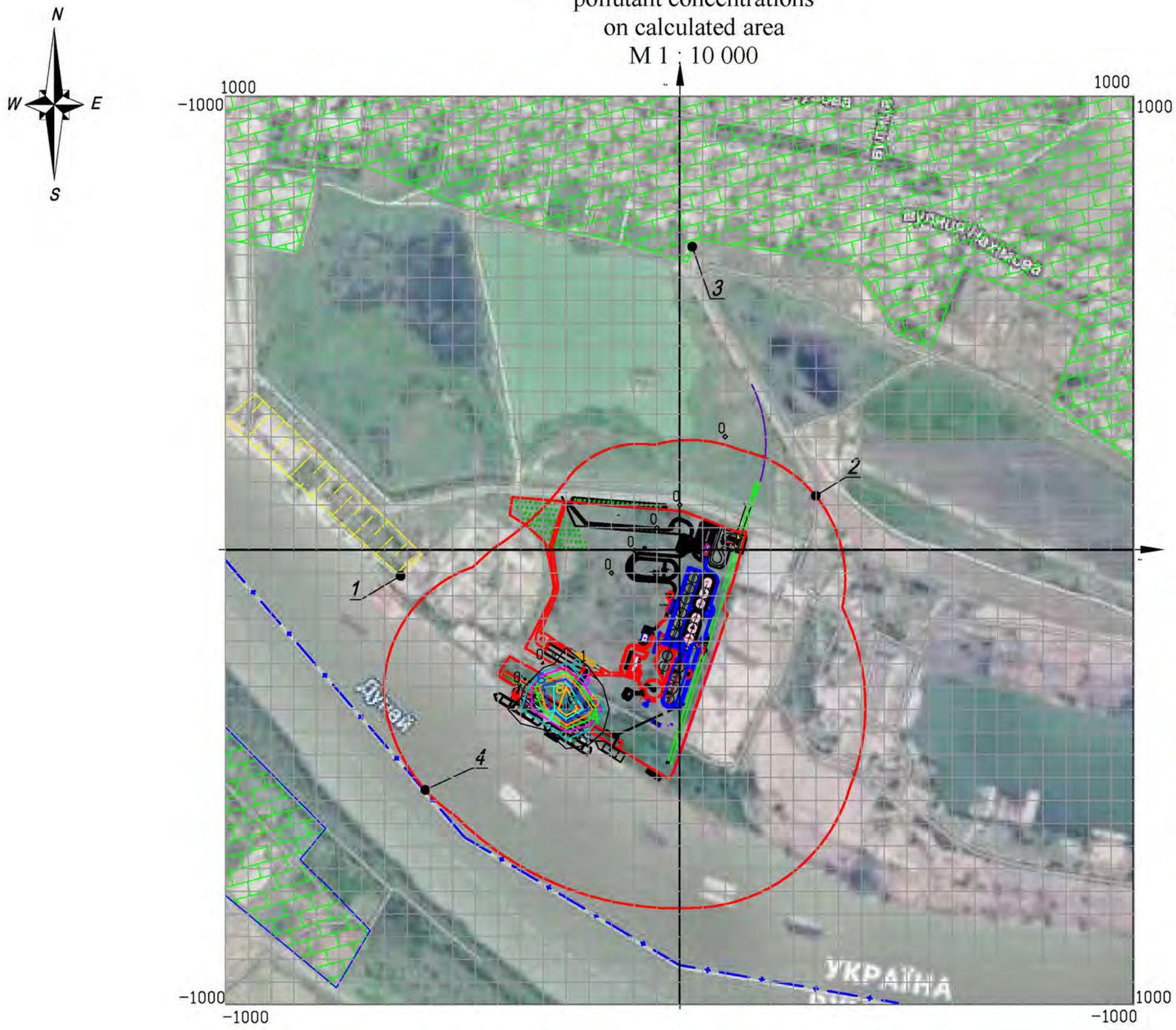
13101 / 703 Benz(a)pyrene

The calculation site 1

| Coord. X, m | Coord.Y, м | Conc. in point mg/m3 | Conc. in point, shares of MPC | Direction of the wind, degrees | Wind speed, m/s | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -635 | -61 | 0,000040 | 0,500000 | 140,00 | 0,50 | 96 | NAN | 92 | NAN | 81 | NAN | 65 | NAN | 58 | NAN |
| 310 | 121 | 0,000040 | 0,500000 | 50,00 | 0,50 | 47 | 61,50 | 48 | 38,43 | 57 | 0,08 | 96 | 0,00 | 58 | 0,00 |
| 29 | 688 | 0,000040 | 0,500000 | 210,00 | 0,50 | 96 | NAN | 92 | NAN | 81 | NAN | 65 | NAN | 58 | NAN |
| -578 | -546 | 0,000040 | 0,500000 | 240,00 | 0,50 | 81 | 73,68 | 54 | 26,32 | 46 | 0,00 | 96 | 0,00 | 92 | 0,00 |

# Map-scheme of the distribution of pollutant concentrations on calculated area

M 1 : 10 000




Benz(a)pyrene

| | | |
|---|---|---|
| 9 – | 15.712 | MPC |
| 8 – | 13.966 | MPC |
| 7 – | 12.221 | MPC |
| 6 – | 10.475 | MPC |
| 5 – | 8.729 | MPC |
| 4 – | 6.983 | MPC |
| 3 – | 5.237 | MPC |
| 2 – | 3.492 | MPC |
| 1 – | 1.746 | MPC |
| 0 – | 0.050 | MPC |

## Legend

- NIBULON LLC territory
- regulatory sanitary protection zone
- control point
- the state border of Ukraine
- the residential buildings of Izmail
- the residential buildings of the comuna Plauru
- recreation zone

List of the highest concentrations

11030 / 616 Xylene

The calculation site 1

| Axis OX, m | Axis OY, m | Conc. in point mg/m3 | Conc. in point, shares of MPC | Direction of the wind, degrees | Wind speed, m/s | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -100 | -250 | 0,529308 | 3,308176 | 60,00 | 1,00 | 61 | 100,00 | 93 | 0,00 | 45 | 0,00 | 95 | 0,00 | 94 | 0,00 |
| -100 | -300 | 0,467211 | 2,920071 | 290,00 | 1,00 | 61 | 100,00 | 44 | 0,00 | 42 | 0,00 | 41 | 0,00 | 43 | 0,00 |
| -50 | -250 | 0,392484 | 2,453024 | 150,00 | 1,00 | 61 | 100,00 | 94 | 0,00 | 93 | 0,00 | 45 | 0,00 | 95 | 0,00 |
| -50 | -300 | 0,369218 | 2,307616 | 220,00 | 1,00 | 61 | 100,00 | 94 | 0,00 | 95 | 0,00 | 44 | 0,00 | 42 | 0,00 |
| -150 | -250 | 0,300132 | 1,875828 | 20,00 | 1,00 | 61 | 100,00 | 44 | 0,00 | 93 | 0,00 | 41 | 0,00 | 42 | 0,00 |
| -100 | -200 | 0,281667 | 1,760418 | 80,00 | 1,00 | 61 | 100,00 | 93 | 0,00 | 45 | 0,00 | 94 | 0,00 | 95 | 0,00 |
| -150 | -300 | 0,281400 | 1,758749 | 330,00 | 1,00 | 61 | 100,00 | 44 | 0,00 | 41 | 0,00 | 42 | 0,00 | 43 | 0,00 |
| -50 | -200 | 0,254868 | 1,592925 | 120,00 | 1,50 | 61 | 100,00 | 93 | 0,00 | 45 | 0,00 | 94 | 0,00 | 95 | 0,00 |
| -100 | -350 | 0,246259 | 1,539119 | 280,00 | 1,50 | 61 | 100,00 | 44 | 0,00 | 95 | 0,00 | 42 | 0,00 | 41 | 0,00 |
| 0 | -250 | 0,224904 | 1,405648 | 170,00 | 1,50 | 61 | 100,00 | 94 | 0,00 | 93 | 0,00 | 45 | 0,00 | 95 | 0,00 |

Concentrations at given points

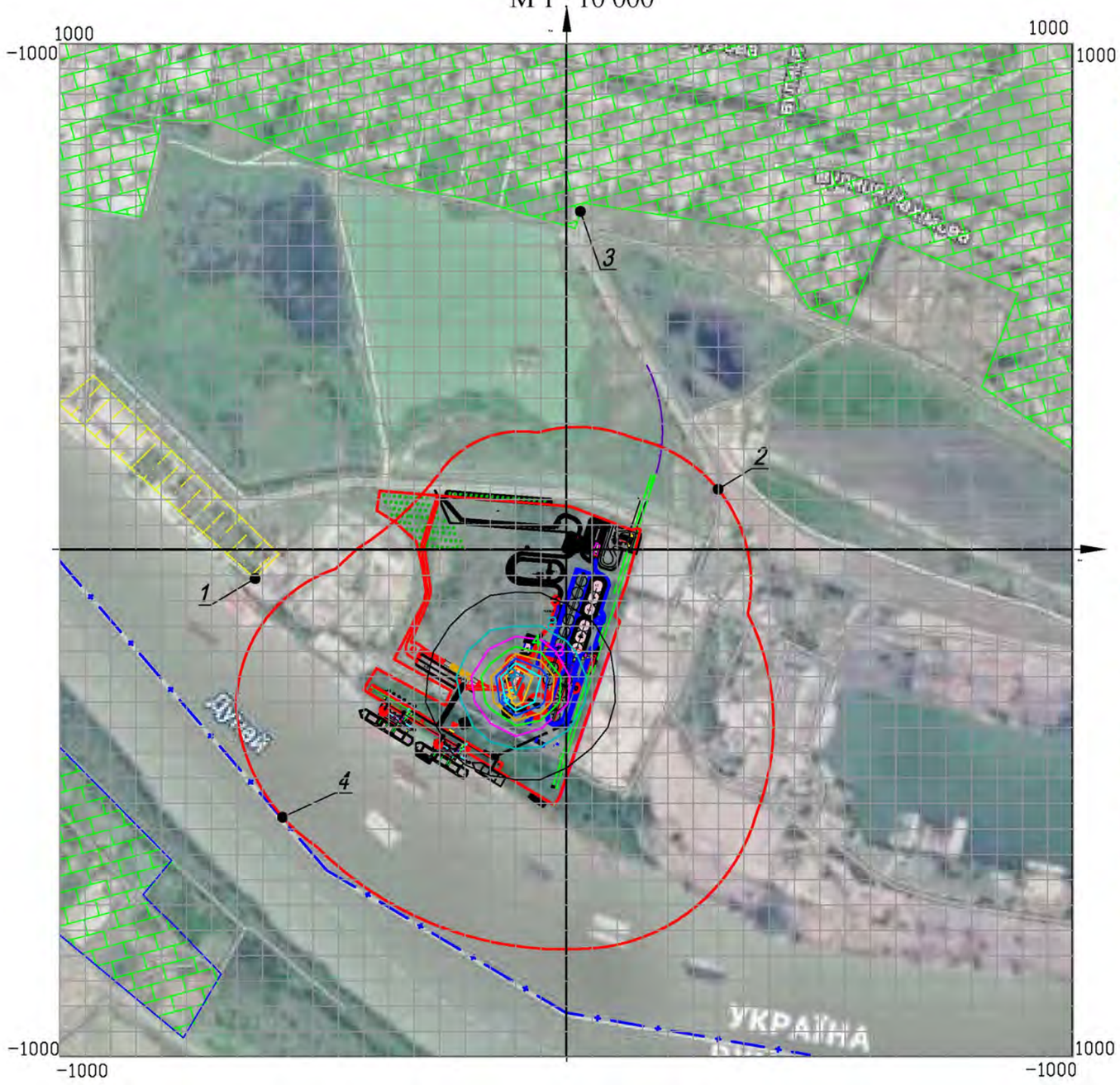
11030 / 616 Xylene

The calculation site 1

| Coord. X, m | Coord.Y, м | Conc. in point mg/m3 | Conc. in point, shares of MPC | Direction of the wind, degrees | Wind speed, m/s | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -635 | -61 | 0,086561 | 0,541009 | 20,00 | 1,50 | 61 | 99,99 | 44 | 0,00 | 93 | 0,00 | 94 | 0,00 | 45 | 0,00 |
| 310 | 121 | 0,086509 | 0,540680 | 140,00 | 1,50 | 61 | 99,60 | 44 | 0,39 | 93 | 0,01 | 94 | 0,00 | 41 | 0,00 |
| 29 | 688 | 0,083241 | 0,520258 | 100,00 | 1,00 | 61 | 99,81 | 44 | 0,17 | 93 | 0,02 | 94 | 0,00 | 95 | 0,00 |
| -578 | -546 | 0,086470 | 0,540440 | 340,00 | 1,50 | 61 | 99,93 | 44 | 0,05 | 94 | 0,01 | 93 | 0,01 | 41 | 0,00 |

# Map-scheme of the distribution of pollutant concentrations on calculated area

M 1 : 10 000




Xylene

9 – 3.028 MPC
8 – 2.749 MPC
7 – 2.469 MPC
6 – 2.189 MPC
5 – 1.910 MPC
4 – 1.630 MPC
3 – 1.350 MPC
2 – 1.070 MPC
1 – 0.791 MPC
0 – 0.050 MPC

## Legend

- NIBULON LLC territory
- regulatory sanitary protection zone
- control point
- the state border of Ukraine
- the residential buildings of Izmail
- the residential buildings of the comuna Plauru
- recreation zone

List of the highest concentrations

11000 / 2754 Nonmethane volatile organic compounds

The calculation site 1

| Axis OX, m | Axis OY, m | Conc. in point mg/m3 | Conc. in point, shares of MPC | Direction of the wind, degrees | Wind speed, m/s | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -100 | -250 | 1,761798 | 2,202247 | 60,00 | 1,00 | 61 | 99,36 | 52 | 0,64 | 93 | 0,00 | 48 | 0,00 | 45 | 0,00 |
| -150 | -200 | 0,932725 | 1,165906 | 50,00 | 1,50 | 61 | 81,06 | 64 | 12,88 | 51 | 3,78 | 65 | 1,50 | 52 | 0,78 |
| 150 | -250 | 0,866962 | 1,083702 | 30,00 | 1,00 | 61 | 90,32 | 65 | 5,53 | 51 | 3,88 | 52 | 0,27 | 64 | 0,00 |
| -250 | -350 | 0,776894 | 0,971118 | 40,00 | 0,50 | 58 | 54,74 | 57 | 42,64 | 93 | 1,23 | 52 | 0,94 | 48 | 0,44 |
| 50 | 50 | 0,774552 | 0,968190 | 30,00 | 1,08 | 44 | 99,75 | 41 | 0,12 | 42 | 0,10 | 43 | 0,02 | 46 | 0,01 |
| -250 | -300 | 0,694677 | 0,868346 | 60,00 | 0,50 | 58 | 59,82 | 57 | 38,39 | 93 | 0,99 | 52 | 0,42 | 48 | 0,38 |
| -100 | -200 | 0,647830 | 0,809788 | 60,00 | 0,50 | 61 | 96,62 | 52 | 2,82 | 51 | 0,25 | 64 | 0,22 | 65 | 0,03 |
| -200 | -200 | 0,646759 | 0,808449 | 40,00 | 1,08 | 61 | 81,81 | 64 | 6,88 | 51 | 5,64 | 65 | 4,30 | 52 | 1,36 |
| -300 | -300 | 0,632677 | 0,790846 | 40,00 | 0,50 | 58 | 60,70 | 57 | 36,08 | 52 | 1,78 | 93 | 0,93 | 48 | 0,34 |
| -200 | -350 | 0,616085 | 0,770106 | 90,00 | 0,50 | 57 | 98,64 | 93 | 0,85 | 48 | 0,50 | 45 | 0,01 | 58 | 0,00 |

Concentrations at given points

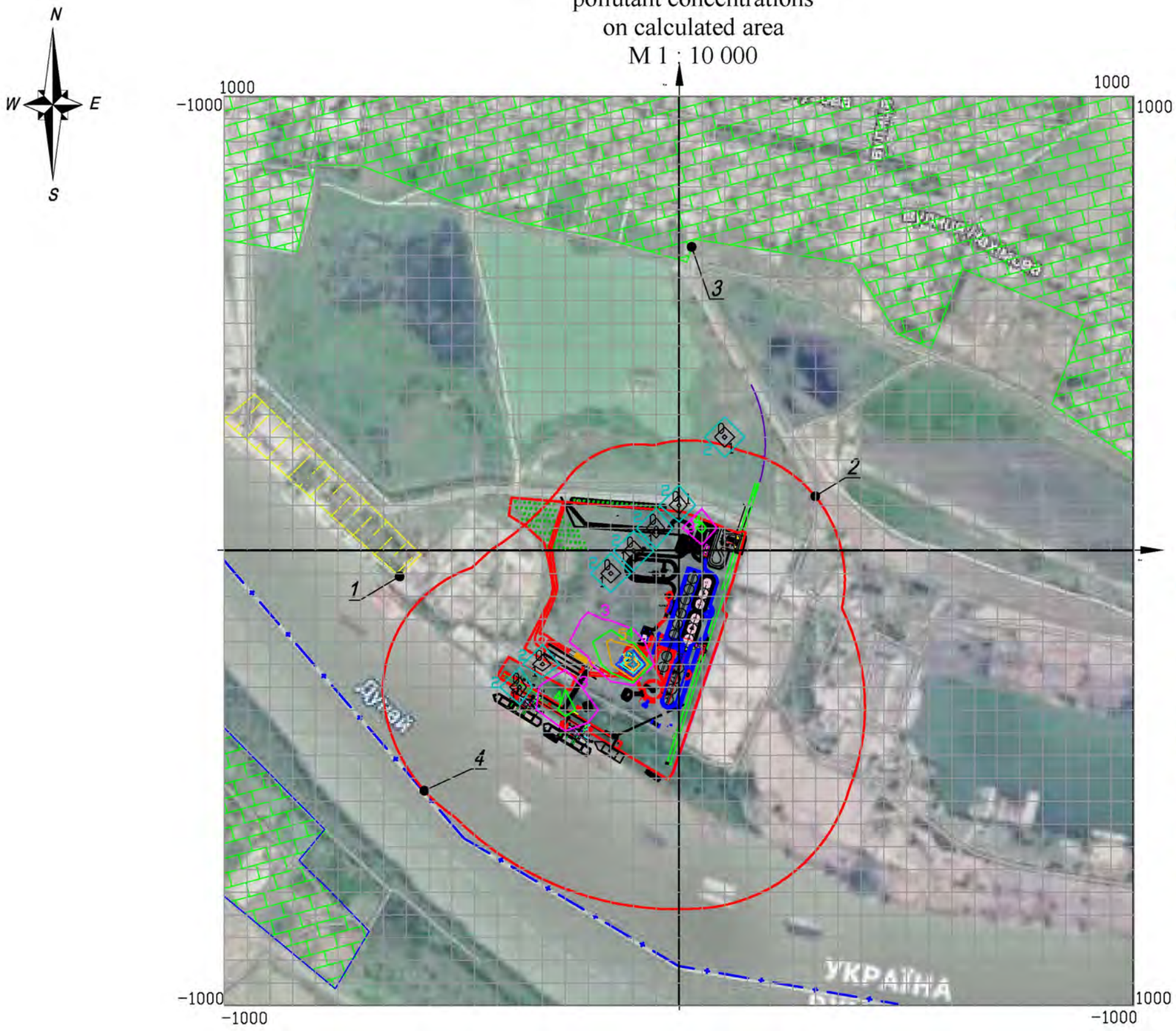
11000 / 2754 Nonmethane volatile organic compounds

The calculation site 1

| Coord. X, m | Coord.Y, м | Conc. in point mg/m3 | Conc. in point, shares of MPC | Direction of the wind, degrees | Wind speed, m/s | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -635 | -61 | 0,400000 | 0,500000 | 240,00 | 0,50 | 95 | 100,00 | 86 | 0,00 | 96 | 0,00 | 94 | 0,00 | 93 | 0,00 |
| 310 | 121 | 0,400000 | 0,500000 | 50,00 | 0,50 | 52 | 99,92 | 93 | 0,04 | 47 | 0,02 | 48 | 0,01 | 45 | 0,00 |
| 29 | 688 | 0,400000 | 0,500000 | 210,00 | 0,50 | 95 | 100,00 | 96 | 0,00 | 94 | 0,00 | 93 | 0,00 | 92 | 0,00 |
| -578 | -546 | 0,400000 | 0,500000 | 240,00 | 0,50 | 95 | 56,32 | 86 | 42,77 | 81 | 0,57 | 54 | 0,35 | 49 | 0,00 |

# Map-scheme of the distribution of pollutant concentrations on calculated area

M 1 : 10 000




Nonmethane volatile organic compounds

9 – 1.982 MPC
8 – 1.762 MPC
7 – 1.542 MPC
6 – 1.321 MPC
5 – 1.101 MPC
4 – 0.881 MPC
3 – 0.661 MPC
2 – 0.440 MPC
1 – 0.220 MPC
0 – 0.050 MPC

## Legend

- NIBULON LLC territory
- regulatory sanitary protection zone
- control point
- the state border of Ukraine
- the residential buildings of Izmail
- the residential buildings of the comuna Plauru
- recreation zone

List of the highest concentrations

6000 / 337 Carbon monoxide

The calculation site 1

| Axis OX, m | Axis OY, m | Conc. in point mg/m3 | Conc. in point, shares of MPC | Direction of the wind, degrees | Wind speed, m/s | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -200 | -350 | 2,616423 | 0,654106 | 90,00 | 0,50 | 57 | 99,61 | 48 | 0,39 | 58 | 0,00 | 52 | 0,00 | 96 | 0,00 |
| -250 | -350 | 1,913906 | 0,478477 | 70,00 | 0,50 | 57 | 95,38 | 58 | 4,04 | 48 | 0,57 | 52 | 0,00 | 96 | 0,00 |
| -200 | -400 | 1,568286 | 0,392071 | 100,00 | 0,50 | 57 | 99,96 | 48 | 0,04 | 96 | 0,00 | 92 | 0,00 | 86 | 0,00 |
| -50 | -400 | 1,302689 | 0,325672 | 40,00 | 1,50 | 52 | 100,00 | 96 | 0,00 | 92 | 0,00 | 86 | 0,00 | 81 | 0,00 |
| -50 | -350 | 1,272060 | 0,318015 | 80,00 | 1,50 | 52 | 100,00 | 48 | 0,00 | 57 | 0,00 | 96 | 0,00 | 92 | 0,00 |
| -100 | -350 | 1,246853 | 0,311713 | 50,00 | 1,50 | 52 | 100,00 | 96 | 0,00 | 48 | 0,00 | 92 | 0,00 | 86 | 0,00 |
| -50 | -300 | 1,245035 | 0,311259 | 80,00 | 1,50 | 52 | 100,00 | 48 | 0,00 | 96 | 0,00 | 57 | 0,00 | 58 | 0,00 |
| 50 | -150 | 1,243683 | 0,310921 | 20,00 | 1,00 | 47 | 100,00 | 52 | 0,00 | 96 | 0,00 | 92 | 0,00 | 86 | 0,00 |
| -100 | -300 | 1,236935 | 0,309234 | 60,00 | 1,50 | 52 | 100,00 | 96 | 0,00 | 48 | 0,00 | 57 | 0,00 | 92 | 0,00 |
| -150 | -400 | 1,235981 | 0,308995 | 90,00 | 1,00 | 48 | 100,00 | 57 | 0,00 | 52 | 0,00 | 96 | 0,00 | 92 | 0,00 |

Concentrations at given points

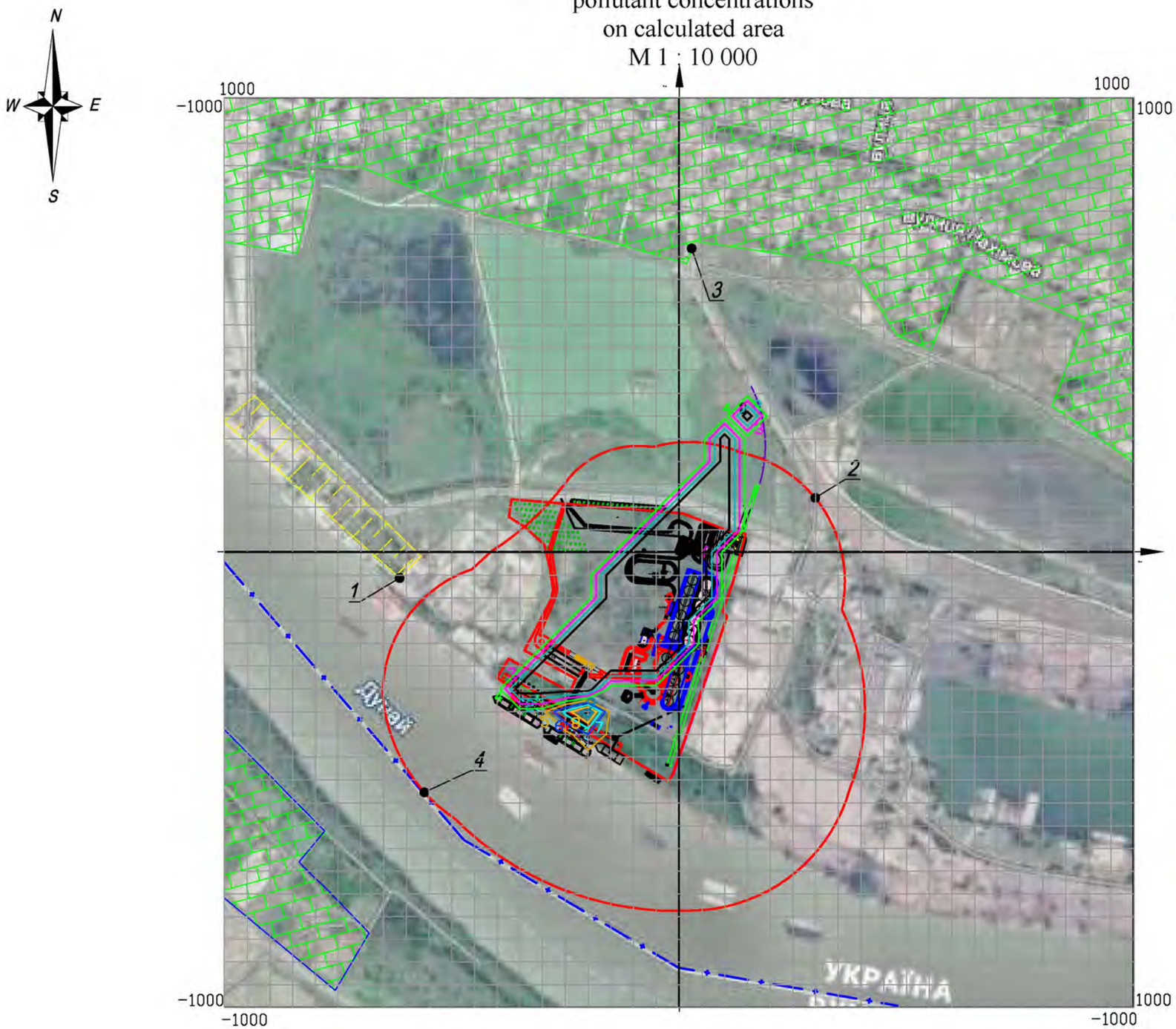
6000 / 337 Carbon monoxide

The calculation site 1

| Coord. X, m | Coord.Y, м | Conc. in point mg/m3 | Conc. in point, shares of MPC | Direction of the wind, degrees | Wind speed, m/s | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -635 | -61 | 1,192500 | 0,298125 | 140,00 | 0,50 | 96 | NAN | 92 | NAN | 86 | NAN | 81 | NAN | 65 | NAN |
| 310 | 121 | 1,192500 | 0,298125 | 0,00 | 0,50 | 96 | NAN | 92 | NAN | 86 | NAN | 81 | NAN | 65 | NAN |
| 29 | 688 | 1,192500 | 0,298125 | 210,00 | 0,50 | 96 | NAN | 92 | NAN | 86 | NAN | 81 | NAN | 65 | NAN |
| -578 | -546 | 1,192500 | 0,298125 | 240,00 | 0,50 | 86 | 86,94 | 81 | 7,16 | 54 | 5,90 | 49 | 0,00 | 46 | 0,00 |

# Map-scheme of the distribution of pollutant concentrations on calculated area

M 1 : 10 000




Carbon monoxide

| | | |
|---|---|---|
| 9 – | 0.589 | MPC |
| 8 – | 0.523 | MPC |
| 7 – | 0.458 | MPC |
| 6 – | 0.392 | MPC |
| 5 – | 0.327 | MPC |
| 4 – | 0.262 | MPC |
| 3 – | 0.196 | MPC |
| 2 – | 0.131 | MPC |
| 1 – | 0.065 | MPC |
| 0 – | 0.050 | MPC |

## Legend

- NIBULON LLC territory
- regulatory sanitary protection zone
- control point
- the state border of Ukraine
- the residential buildings of Izmail
- the residential buildings of the comuna Plauru
- recreation zone

List of the highest concentrations

5001 / 330 Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide

The calculation site 1

| Axis OX, m | Axis OY, m | Conc. in point mg/m3 | Conc. in point, shares of MPC | Direction of the wind, degrees | Wind speed, m/s | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -250 | -350 | 0,231114 | 0,577784 | 40,00 | 0,50 | 58 | 55,74 | 57 | 43,43 | 48 | 0,83 | 96 | 0,00 | 47 | 0,00 |
| -250 | -300 | 0,189672 | 0,474180 | 60,00 | 0,50 | 58 | 60,48 | 57 | 38,81 | 48 | 0,71 | 96 | 0,00 | 65 | 0,00 |
| -300 | -300 | 0,155527 | 0,388817 | 40,00 | 0,50 | 58 | 62,31 | 57 | 37,03 | 48 | 0,65 | 96 | 0,00 | 65 | 0,00 |
| -200 | -350 | 0,149470 | 0,373675 | 90,00 | 0,50 | 57 | 99,07 | 48 | 0,93 | 58 | 0,00 | 96 | 0,00 | 92 | 0,00 |
| -300 | -350 | 0,114775 | 0,286938 | 40,00 | 0,50 | 57 | 72,92 | 58 | 25,72 | 48 | 1,36 | 96 | 0,00 | 65 | 0,00 |
| -250 | -400 | 0,088814 | 0,222036 | 30,00 | 0,50 | 57 | 95,19 | 48 | 4,81 | 96 | 0,00 | 47 | 0,00 | 65 | 0,00 |
| -200 | -300 | 0,073188 | 0,182970 | 70,00 | 0,50 | 57 | 87,98 | 58 | 8,34 | 48 | 3,68 | 96 | 0,00 | 92 | 0,00 |
| -250 | -250 | 0,072968 | 0,182419 | 50,00 | 0,50 | 58 | 51,15 | 57 | 47,25 | 48 | 1,50 | 65 | 0,10 | 96 | 0,01 |
| -350 | -350 | 0,068900 | 0,172249 | 40,00 | 0,50 | 57 | 75,51 | 58 | 22,64 | 48 | 1,85 | 96 | 0,00 | 65 | 0,00 |
| -200 | -400 | 0,065864 | 0,164660 | 100,00 | 0,50 | 57 | 99,91 | 48 | 0,09 | 96 | 0,00 | 92 | 0,00 | 86 | 0,00 |

Concentrations at given points

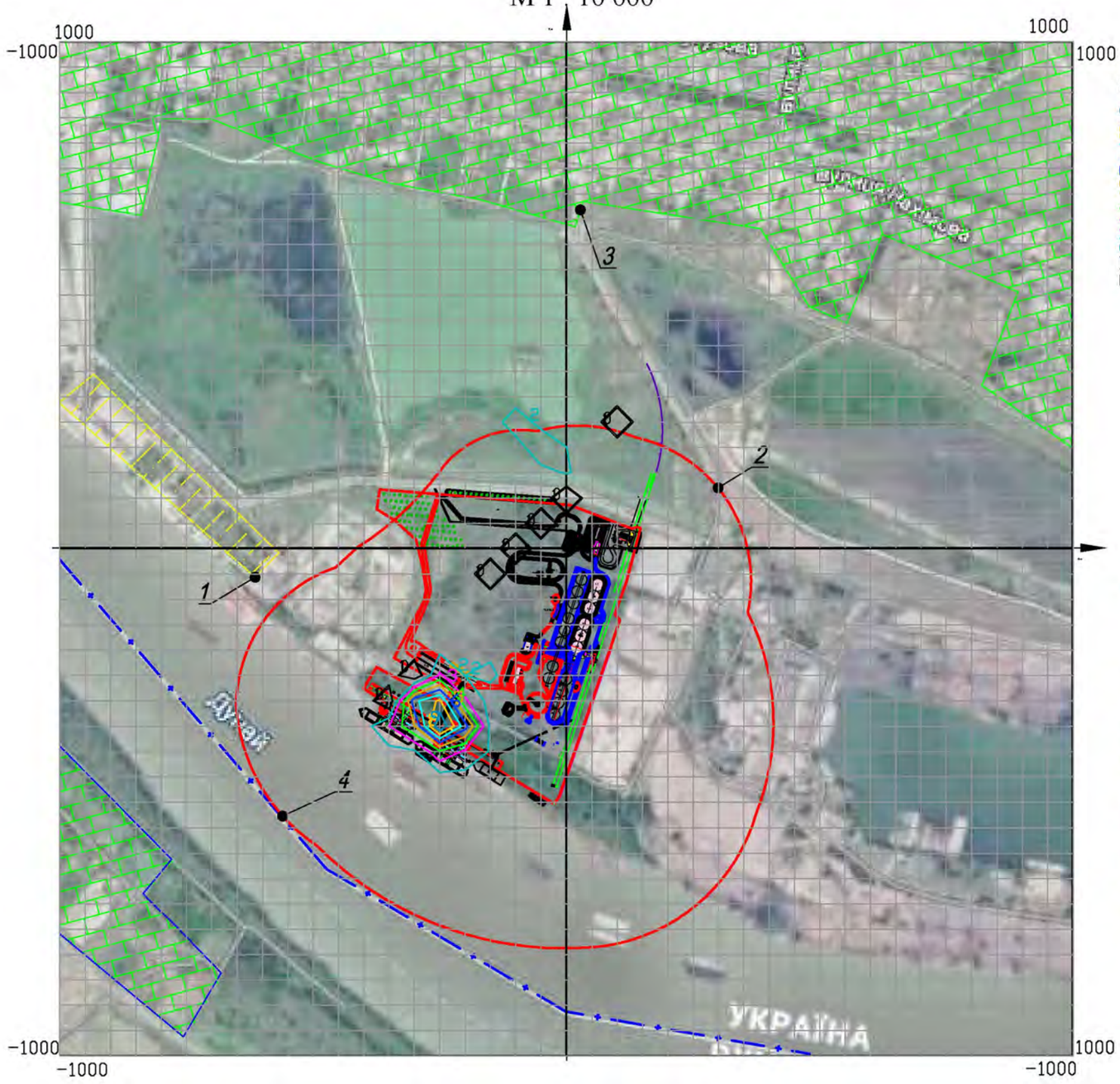
5001 / 330 Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide

The calculation site 1

| Coord. X, m | Coord.Y, м | Conc. in point mg/m3 | Conc. in point, shares of MPC | Direction of the wind, degrees | Wind speed, m/s | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -635 | -61 | 0,036090 | 0,090225 | 140,00 | 0,50 | 96 | NAN | 92 | NAN | 86 | NAN | 81 | NAN | 65 | NAN |
| 310 | 121 | 0,036090 | 0,090225 | 50,00 | 0,50 | 47 | 65,06 | 48 | 34,84 | 96 | 0,06 | 57 | 0,05 | 58 | 0,00 |
| 29 | 688 | 0,036090 | 0,090225 | 210,00 | 0,50 | 96 | NAN | 92 | NAN | 86 | NAN | 81 | NAN | 65 | NAN |
| -578 | -546 | 0,036090 | 0,090225 | 240,00 | 0,50 | 86 | 99,11 | 81 | 0,67 | 54 | 0,23 | 46 | 0,00 | 96 | 0,00 |

# Map-scheme of the distribution of pollutant concentrations on calculated area

M 1 : 10 000




Sulfur dioxide

| | | |
|---|---|---|
| 9 – | 0.520 | MPC |
| 8 – | 0.462 | MPC |
| 7 – | 0.404 | MPC |
| 6 – | 0.347 | MPC |
| 5 – | 0.289 | MPC |
| 4 – | 0.231 | MPC |
| 3 – | 0.173 | MPC |
| 2 – | 0.116 | MPC |
| 1 – | 0.058 | MPC |
| 0 – | 0.050 | MPC |

## Legend

- NIBULON LLC territory
- regulatory sanitary protection zone
- control point
- the state border of Ukraine
- the residential buildings of Izmail
- the residential buildings of the comuna Plauru
- recreation zone

List of the highest concentrations

4001 / 301 Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2])

The calculation site 1

| Axis OX, m | Axis OY, m | Conc. in point mg/m3 | Conc. in point, shares of MPC | Direction of the wind, degrees | Wind speed, m/s | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -200 | -350 | 0,885076 | 5,531726 | 90,00 | 0,50 | 57 | 98,03 | 48 | 1,96 | 58 | 0,00 | 52 | 0,00 | 96 | 0,00 |
| -250 | -350 | 0,496049 | 3,100307 | 70,00 | 0,50 | 57 | 93,15 | 58 | 3,95 | 48 | 2,90 | 52 | 0,00 | 96 | 0,00 |
| -200 | -400 | 0,297014 | 1,856340 | 100,00 | 0,50 | 57 | 99,81 | 48 | 0,19 | 96 | 0,00 | 92 | 0,00 | 86 | 0,00 |
| -150 | -400 | 0,213669 | 1,335429 | 90,00 | 1,00 | 48 | 100,00 | 57 | 0,00 | 52 | 0,00 | 96 | 0,00 | 92 | 0,00 |
| -50 | -400 | 0,172701 | 1,079379 | 40,00 | 1,50 | 52 | 100,00 | 96 | 0,00 | 92 | 0,00 | 86 | 0,00 | 81 | 0,00 |
| 50 | -150 | 0,166559 | 1,040993 | 20,00 | 1,00 | 47 | 100,00 | 52 | 0,00 | 96 | 0,00 | 92 | 0,00 | 86 | 0,00 |
| -50 | -350 | 0,149782 | 0,936137 | 80,00 | 1,50 | 52 | 100,00 | 48 | 0,00 | 57 | 0,00 | 96 | 0,00 | 92 | 0,00 |
| -150 | -350 | 0,148700 | 0,929374 | 90,00 | 1,50 | 48 | 99,99 | 57 | 0,01 | 52 | 0,00 | 58 | 0,00 | 96 | 0,00 |
| -150 | -450 | 0,140387 | 0,877417 | 110,00 | 1,00 | 48 | 100,00 | 96 | 0,00 | 92 | 0,00 | 86 | 0,00 | 81 | 0,00 |
| -100 | -350 | 0,130920 | 0,818252 | 50,00 | 1,50 | 52 | 100,00 | 96 | 0,00 | 48 | 0,00 | 92 | 0,00 | 86 | 0,00 |

Concentrations at given points

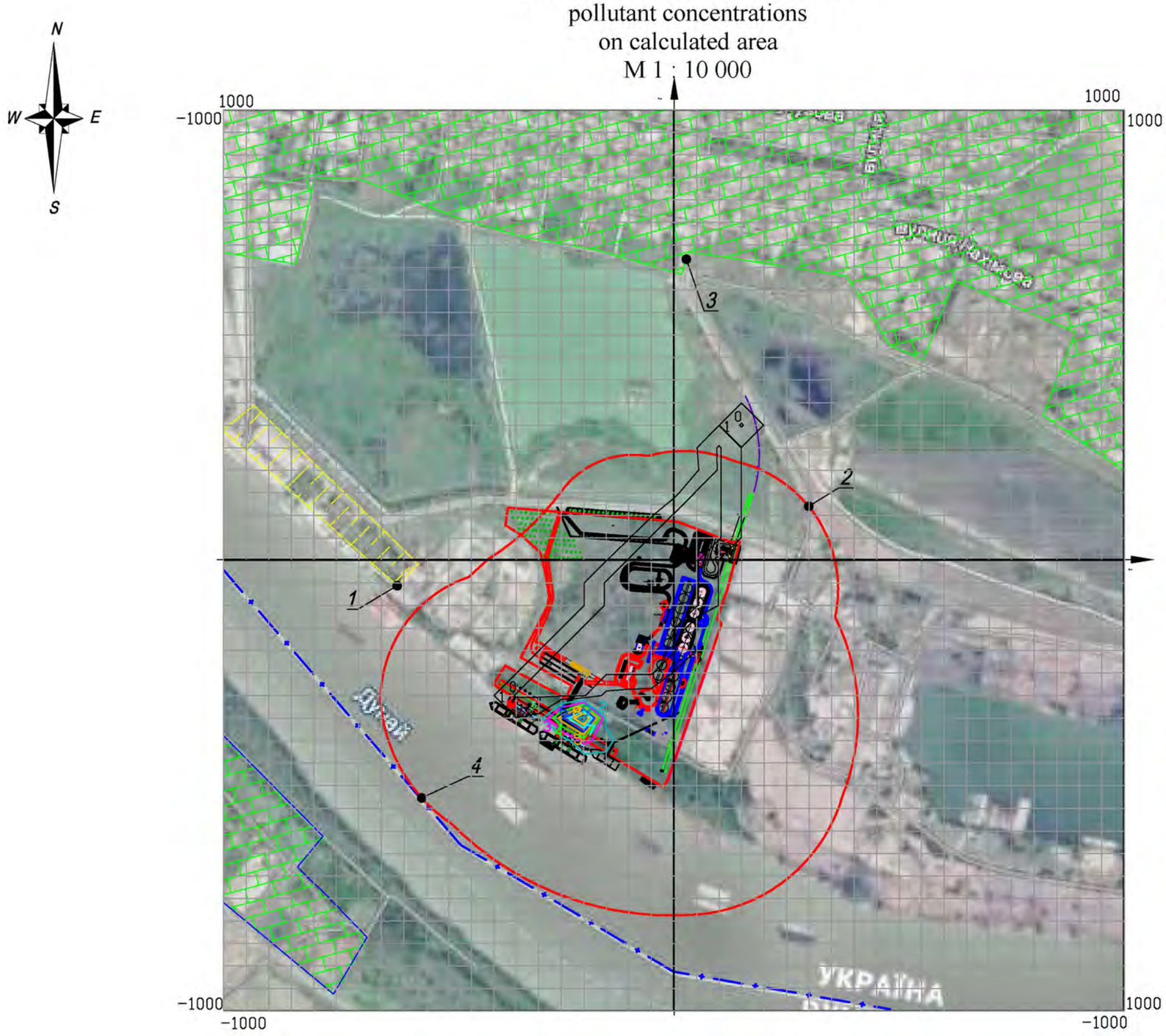
4001 / 301 Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2])

The calculation site 1

| Coord. X, m | Coord.Y, м | Conc. in point mg/m3 | Conc. in point, shares of MPC | Direction of the wind, degrees | Wind speed, m/s | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -635 | -61 | 0,090250 | 0,564062 | 140,00 | 0,50 | 96 | NAN | 92 | NAN | 86 | NAN | 81 | NAN | 65 | NAN |
| 310 | 121 | 0,090250 | 0,564063 | 40,00 | 0,50 | 52 | 100,00 | 47 | 0,00 | 48 | 0,00 | 96 | 0,00 | 92 | 0,00 |
| 29 | 688 | 0,090250 | 0,564062 | 210,00 | 0,50 | 96 | NAN | 92 | NAN | 86 | NAN | 81 | NAN | 65 | NAN |
| -578 | -546 | 0,090250 | 0,564063 | 240,00 | 0,50 | 86 | 99,06 | 81 | 0,81 | 54 | 0,13 | 49 | 0,00 | 46 | 0,00 |

# Map-scheme of the distribution of pollutant concentrations on calculated area

M 1 : 10 000




Nitrogen oxides (in terms of nitrogen dioxide [NO + NO2])

| | | |
|---|---|---|
| 9 | – | 4.979 MPC |
| 8 | – | 4.425 MPC |
| 7 | – | 3.872 MPC |
| 6 | – | 3.319 MPC |
| 5 | – | 2.766 MPC |
| 4 | – | 2.213 MPC |
| 3 | – | 1.660 MPC |
| 2 | – | 1.106 MPC |
| 1 | – | 0.553 MPC |
| 0 | – | 0.050 MPC |

## Legend

- NIBULON LLC territory
- regulatory sanitary protection zone
- control point
- the state border of Ukraine
- the residential buildings of Izmail
- the residential buildings of the comuna Plauru
- recreation zone

List of the highest concentrations

3000 / 2902 Substances in form of suspended solid particles (microparticles, fibers)

The calculation site 1

| Axis OX, m | Axis OY, m | Conc. in point mg/m3 | Conc. in point, shares of MPC | Direction of the wind, degrees | Wind speed, m/s | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -200 | -400 | 3,991195 | 9,977986 | 220,00 | 0,50 | 53 | 53,49 | 89 | 40,02 | 90 | 6,39 | 67 | 0,03 | 66 | 0,02 |
| -150 | -400 | 3,560773 | 8,901933 | 190,00 | 0,50 | 53 | 66,98 | 89 | 22,61 | 90 | 6,50 | 57 | 3,78 | 56 | 0,05 |
| -200 | -350 | 3,261100 | 8,152749 | 110,00 | 0,50 | 53 | 90,62 | 89 | 5,23 | 57 | 4,08 | 56 | 0,07 | 90 | 0,00 |
| -150 | -350 | 3,043312 | 7,608279 | 150,00 | 0,50 | 53 | 73,38 | 89 | 21,51 | 57 | 3,59 | 90 | 1,45 | 56 | 0,05 |
| -250 | -350 | 2,808421 | 7,021053 | 70,00 | 0,50 | 89 | 69,49 | 53 | 27,21 | 57 | 3,26 | 56 | 0,05 | 52 | 0,00 |
| -350 | -300 | 2,765747 | 6,914366 | 90,00 | 0,50 | 90 | 99,63 | 67 | 0,27 | 91 | 0,08 | 66 | 0,01 | 89 | 0,00 |
| -200 | -300 | 2,652410 | 6,631025 | 100,00 | 0,50 | 53 | 71,39 | 89 | 24,49 | 57 | 4,07 | 56 | 0,05 | 90 | 0,00 |
| -250 | -300 | 2,445424 | 6,113560 | 80,00 | 0,50 | 53 | 54,19 | 89 | 42,38 | 57 | 3,37 | 56 | 0,05 | 52 | 0,00 |
| -100 | -400 | 2,235771 | 5,589428 | 190,00 | 1,00 | 53 | 64,38 | 89 | 23,05 | 90 | 9,25 | 57 | 3,16 | 67 | 0,05 |
| -300 | -350 | 2,214697 | 5,536742 | 190,00 | 0,50 | 90 | 99,13 | 67 | 0,54 | 66 | 0,25 | 91 | 0,09 | 55 | 0,00 |

Concentrations at given points

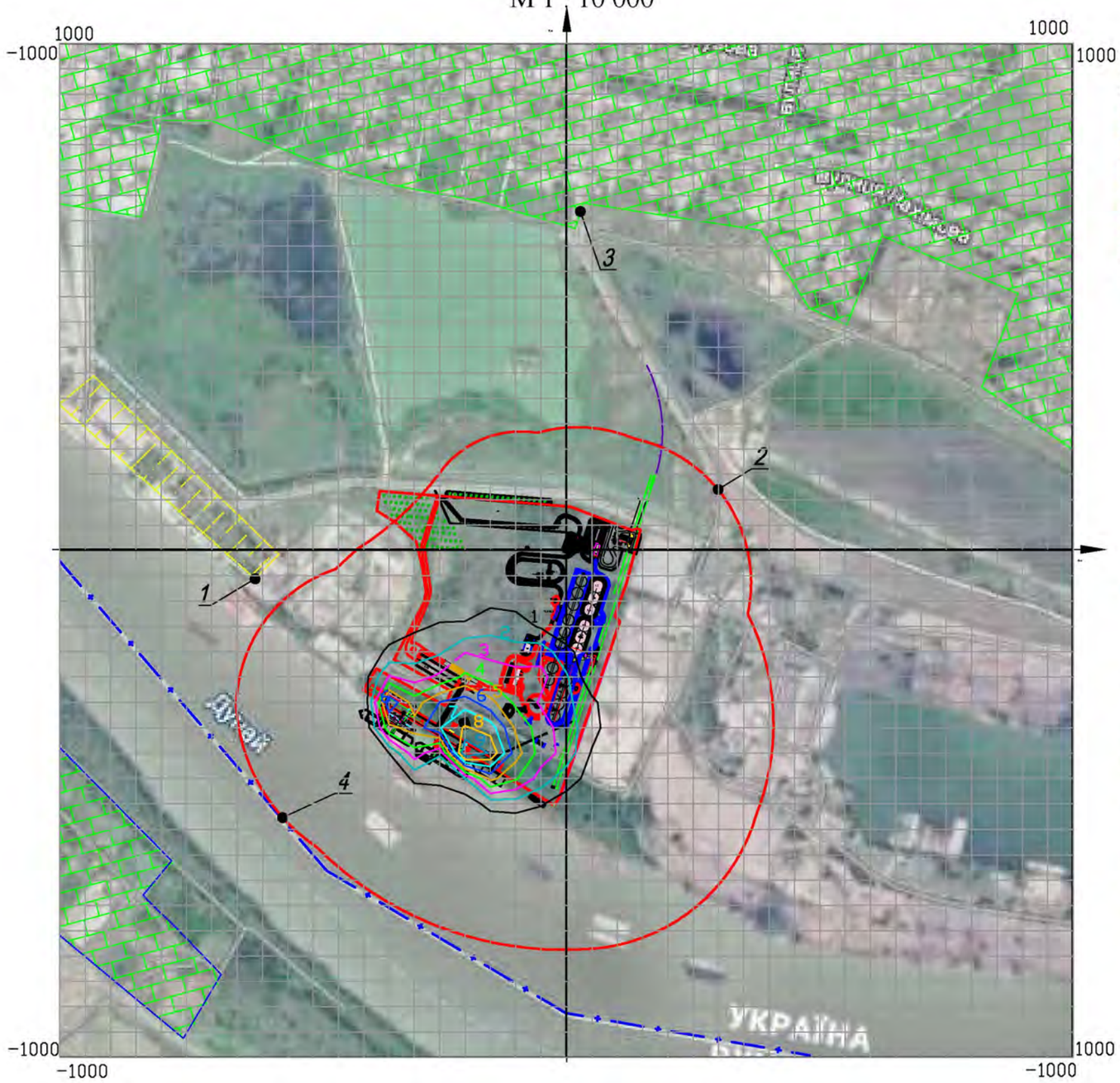
3000 / 2902 Substances in form of suspended solid particles (microparticles, fibers)

The calculation site 1

| Coord. X, m | Coord.Y, м | Conc. in point mg/m3 | Conc. in point, shares of MPC | Direction of the wind, degrees | Wind speed, m/s | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -635 | -61 | 0,112162 | 0,280405 | 280,00 | 0,50 | 20 | 98,06 | 86 | 1,94 | 54 | 0,00 | 49 | 0,00 | 63 | 0,00 |
| 310 | 121 | 0,113052 | 0,282629 | 230,00 | 0,50 | 20 | 78,96 | 86 | 21,01 | 54 | 0,03 | 49 | 0,00 | 55 | 0,00 |
| 29 | 688 | 0,111951 | 0,279878 | 190,00 | 0,50 | 55 | 99,96 | 20 | 0,04 | 90 | 0,00 | 66 | 0,00 | 91 | 0,00 |
| -578 | -546 | 0,111970 | 0,279926 | 180,00 | 1,00 | 55 | 100,00 | 96 | 0,00 | 91 | 0,00 | 90 | 0,00 | 89 | 0,00 |

# Map-scheme of the distribution of pollutant concentrations on calculated area

M 1 : 10 000




Substances in form of suspended solid particles (microparticles, fibers)

| | | |
|---|---|---|
| 9 | – | 9.008 MPC |
| 8 | – | 8.038 MPC |
| 7 | – | 7.069 MPC |
| 6 | – | 6.099 MPC |
| 5 | – | 5.129 MPC |
| 4 | – | 4.159 MPC |
| 3 | – | 3.189 MPC |
| 2 | – | 2.219 MPC |
| 1 | – | 1.250 MPC |
| 0 | – | 0.050 MPC |

## Legend

- NIBULON LLC territory
- regulatory sanitary protection zone
- control point
- the state border of Ukraine
- the residential buildings of Izmail
- the residential buildings of the comuna Plauru
- recreation zone

List of the highest concentrations

Summation groups 31

The calculation site 1

| Axis OX, m | Axis OY, m | Conc. in point mg/m3 | Conc. in point, shares of MPC | Direction of the wind, degrees | Wind speed, m/s | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -200 | -350 | 0,00E+000 | 5,905401 | 90,00 | 0,50 | 57 | 47,77 | 48 | 0,93 | 58 | 0,00 | 52 | 0,00 | 96 | 0,00 |
| -250 | -350 | 0,00E+000 | 3,334519 | 70,00 | 0,50 | 57 | 43,23 | 58 | 1,83 | 48 | 1,31 | 52 | 0,00 | 96 | 0,00 |
| -200 | -400 | 0,00E+000 | 2,021000 | 100,00 | 0,50 | 57 | 42,32 | 48 | 0,08 | 96 | 0,00 | 92 | 0,00 | 86 | 0,00 |
| -150 | -400 | 0,00E+000 | 1,446540 | 90,00 | 1,00 | 48 | 37,24 | 57 | 0,00 | 52 | 0,00 | 96 | 0,00 | 92 | 0,00 |
| -50 | -400 | 0,00E+000 | 1,169604 | 40,00 | 1,50 | 52 | 32,31 | 96 | 0,00 | 92 | 0,00 | 86 | 0,00 | 81 | 0,00 |
| 50 | -150 | 0,00E+000 | 1,143160 | 20,00 | 1,00 | 47 | 31,96 | 52 | 0,00 | 96 | 0,00 | 92 | 0,00 | 86 | 0,00 |
| -150 | -350 | 0,00E+000 | 1,029492 | 90,00 | 1,50 | 48 | 28,76 | 57 | 0,00 | 52 | 0,00 | 58 | 0,00 | 96 | 0,00 |
| -50 | -350 | 0,00E+000 | 1,026362 | 80,00 | 1,50 | 52 | 28,44 | 48 | 0,00 | 57 | 0,00 | 96 | 0,00 | 92 | 0,00 |
| -150 | -450 | 0,00E+000 | 0,976127 | 110,00 | 1,00 | 48 | 26,84 | 96 | 0,00 | 92 | 0,00 | 86 | 0,00 | 81 | 0,00 |
| -100 | -350 | 0,00E+000 | 0,908477 | 50,00 | 1,50 | 52 | 23,70 | 96 | 0,00 | 48 | 0,00 | 92 | 0,00 | 86 | 0,00 |

Concentrations at given points

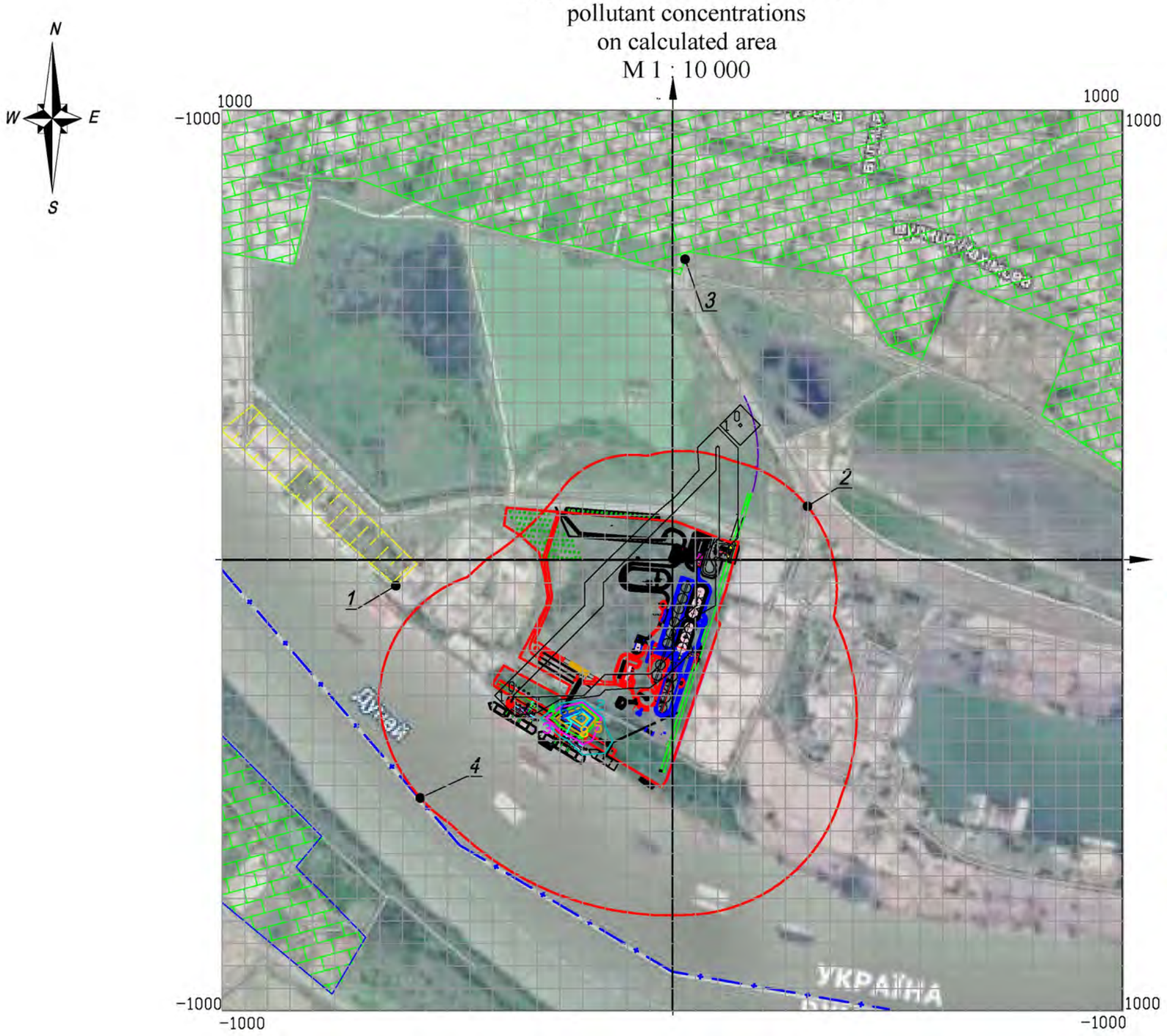
Summation groups 31

The calculation site 1

| Coord. X, m | Coord.Y, м | Conc. in point mg/m3 | Conc. in point, shares of MPC | Direction of the wind, degrees | Wind speed, m/s | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % | Source code | Contribution, % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -635 | -61 | 0,00E+000 | 0,654287 | 140,00 | 0,50 | 96 | 0,00 | 92 | 0,00 | 86 | 0,00 | 81 | 0,00 | 65 | 0,00 |
| 310 | 121 | 0,00E+000 | 0,654288 | 40,00 | 0,50 | 52 | 0,00 | 47 | 0,00 | 48 | 0,00 | 96 | 0,00 | 92 | 0,00 |
| 29 | 688 | 0,00E+000 | 0,654287 | 210,00 | 0,50 | 96 | 0,00 | 92 | 0,00 | 86 | 0,00 | 81 | 0,00 | 65 | 0,00 |
| -578 | -546 | 0,00E+000 | 0,654288 | 240,00 | 0,50 | 86 | 0,00 | 81 | 0,00 | 54 | 0,00 | 49 | 0,00 | 46 | 0,00 |

# Map-scheme of the distribution of pollutant concentrations on calculated area

M 1 : 10 000

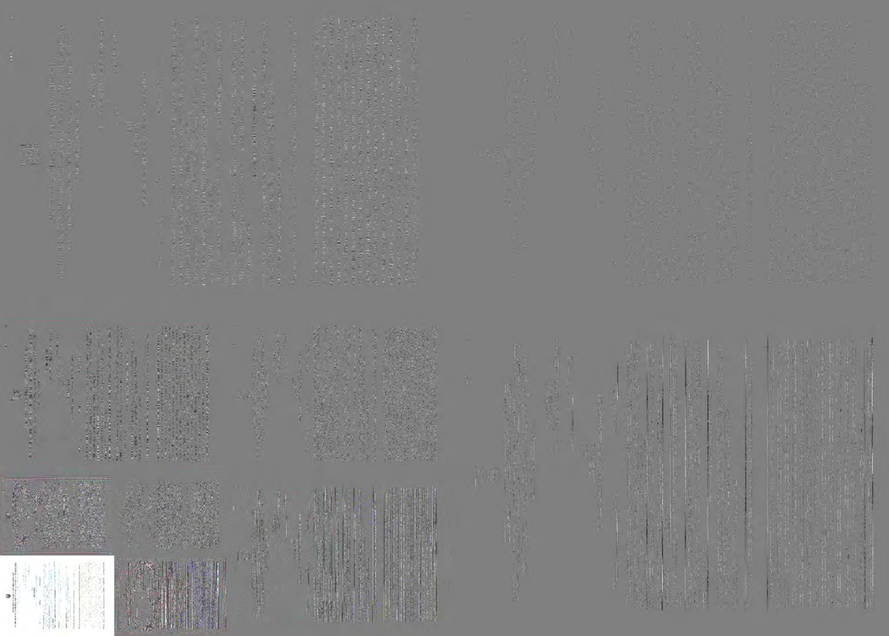


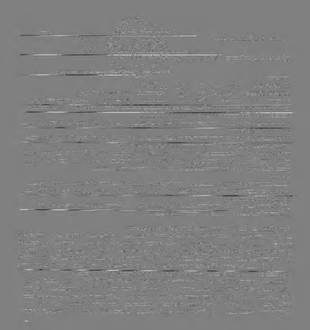

Summation group 31

| | | |
|---|---|---|
| 9 | – | 5.315 MPC |
| 8 | – | 4.724 MPC |
| 7 | – | 4.134 MPC |
| 6 | – | 3.543 MPC |
| 5 | – | 2.953 MPC |
| 4 | – | 2.362 MPC |
| 3 | – | 1.772 MPC |
| 2 | – | 1.181 MPC |
| 1 | – | 0.591 MPC |
| 0 | – | 0.050 MPC |

## Legend

- NIBULON LLC territory
- regulatory sanitary protection zone
- control point
- the state border of Ukraine
- the residential buildings of Izmail
- the residential buildings of the comuna Plauru
- recreation zone





## DETERMINATION OF THE ESTIMATED WATER QUALITY OF THE WATERCOURSE (DANUBE RIVER) IN THE CONTROL CROSS-SECTION

According to the Methodological recommendations on the development of the maximum allowable discharge of pollutants into water bodies with return waters, approved by the order of the Ministry of Environmental Protection and Natural Resources of Ukraine No. 173 dated 05.03.2021, water quality in the control section Ck (g/m$^3$) is calculated according to the formula (2.8.1):

$$C_K = \frac{(C_p - C_{nb}) * e^{-kt}}{n} - (C_a - C_{nb}) * e^{-kt} + C_{nb};$$

де, $C_p$ – concentrations of pollutants in return water; g/m$^3$

$C_{nb}$ – the background concentration of substances in the Danube River; g/m$^3$;

$C_a$ – the actual (or estimated) background concentration of pollutants in the watercourse before the release of return water, g/m$^3$;

k – coefficient of non-conservatism, 1/day;

t – the time of return water movement from the place of release to the calculated section, day;

n – the multiplicity of the total dilution of return water in the control section of the watercourse.

| Pollutants, g/m$^3$ | Cp | Cnb | Ca | k | t | n | Ck |
|---|---|---|---|---|---|---|---|
| Suspended solids | 5,0 | 9,0 | 9,0 | 0,15 | 0,006 | 4,9 | 8,18438 |
| Chemical oxygen demand (COD) | 30 | 21,93 | 21,93 | 0,15 | | | 23,57551 |
| Biochemical oxygen demand (bod5) | 4,51 | 3,17 | 3,17 | 0 | | | 3,44347 |
| Sulfates | 500 | 26,86 | 26,86 | 0 | | | 123,41918 |
| Chlorides | 350 | 25,41 | 25,41 | 0 | | | 91,65286 |
| Phosphates | 3,5 | 0,022 | 0,022 | 0,03 | | | 0,73167 |
| Ammonium nitrogen | 2 | 0,15 | 0,15 | 0,069 | | | 0,52740 |
| Nitrites | 3,3 | 0,0072 | 0,0072 | 10,8 | | | 0,63849 |
| Nitrates | 45 | 2,37 | 2,37 | 0,112 | | | 11,06436 |
| Oil products | 0,3 | 0,011 | 0,011 | 0,044 | | | 0,01896 |
| Iron (total) | 0,3 | 0,23 | 0,23 | 0 | | | 0,24429 |

**Calculation**

tax liability for the environmental tax, which is paid for pollution the environment during the implementation of the planned activity

| No. | Names of pollutants | Actual volumes of emissions, tons | Tax rates for the current year, UAH / t | The amount of accrued tax liability, UAH (column 3 x column 4) |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| Emissions into atmospheric air of polluting substances by stationary sources of pollution | | | | |
| 1. | Manganese and its compounds | 0.000350 | 20376.22 | 7.13 |
| 2. | Solid substances | 65.708630 | 96.99 | 6373.08 |
| 3. | Carbon monoxide | 2.697200 | 96.99 | 261.60 |
| 4. | Nitrogen oxides | 1.396710 | 2574.43 | 3595.73 |
| 5. | Sulfuric anhydride | 0.062780 | 2574.43 | 161.62 |
| 6. | Hydrocarbons | 4.814650 | 145.50 | 700.53 |
| | *saturated carbohydrates* | *0.358262* | | |
| | *methane* | *4.169310* | | |
| | *propionic aldehyde* | *0.009000* | | |
| | *acetic acid* | *0.000160* | | |
| | *xylene* | *0.067520* | | |
| | *mineral oil* | *0.000120* | | |
| | *propanediol* | *0.000008* | | |
| | *acetaldehyde* | *0.000160* | | |
| | *aerosol paint* | *0.032610* | | |
| | *white spirit* | *0.177500* | | |
| 7. | Hydrogen sulfide | 0.000070 | 8273.63 | 0.58 |
| 8. | Cadmium and its compounds (in terms of cadmium ) (grade I) | 0.000090 | 20376.22 | 1.83 |
| 9. | Hydrogen chloride | 0.057500 | 96.99 | 5.58 |
| 10. | Ammonia | 0.000001 | 482.84 | 0.00 |
| 11. | Dibenz(a,p)anthracene (grade I) | 8.80E-08 | 18413.24 | 0.00 |
| 12. | Polychlorinated biphenyls(grade I) | 1.50E-07 | 18413.24 | 0.00 |
| 13. | Fluoranthene (grade I) | 0.000004 | 18413.24 | 0,07 |
| 14. | Dioxins (grade I) | 6.30E-13 | 18413.24 | 0.00 |
| 15. | Lead and its compounds | 0.002600 | 109127.84 | 283.73 |
| 16. | Benz(k)fluoranthene (grade I ) | 1.60E-07 | 18413.24 | 0.00 |
| 17. | Benz(a)anthracene (grade I ) | 8.80E-08 | 18413.24 | 0.00 |
| 18. | Benz(a)pyrene | 1.80E-08 | 3277278.63 | 0.06 |
| 19. | Mercury and its compounds | 0.000070 | 109127.84 | 7.64 |
| 20. | Dimethylamine (grade II ) | 4.42E-07 | 4216.92 | 0.00 |
| 21. | Carbon dioxide | 587.815510 | 30.00 | 17634.47 |
| | **Total** | **74.74066** | | **29033.66** |
| Discharges of pollutants directly into water bodies | | | | |
| 1. | Suspended solids | 0,258010 | 110,86 | 28,60 |
| 2. | Biochemical oxygen demand (BOD5) | 0,232725 | 1547,04 | 360,03 |
| 3. | Chemical oxygen demand (COD) | 1,548060 | 1031,33 | 1596,56 |

| | | | | |
|---|---|---|---|---|
| 4. | Ammonium nitrogen | 0,1032040 | 3865,15 | 398,90 |
| 5. | Nitrites | 0,17028660 | 18983,45 | 3232,63 |
| 6. | Nitrates | 2,3220900 | 332,57 | 772,26 |
| 7. | Oil products | 0,0025801 | 22737,72 | 58,67 |
| 8. | Sulfates | 25,80100 | 110,86 | 2860,299 |
| 9. | Chlorides | 18,060700 | 110,86 | 2002,209 |
| 10. | Iron (total) | 0,0154806 | 50622,46 | 783,67 |
| 11. | Phosphates | 0,1806070 | 3089,23 | 557,94 |
| | **Total** | **48,69474** | | **12651,76** |

Placement of waste in specially designated places or facilities*

| | | Actual volumes of waste disposal, tons (units) | Tax rates in the current year, UAH | Coefficients | | Amount of accrued tax liability, UAH |
|---|---|---|---|---|---|---|
| | **II Hazard class** | 7,505 | 56,32 | 3 | 3 | 3804,13 |
| 1. | - *Damaged or waste lead batteries* | *0,166* | | | | |
| 2. | - *Oils and engine lubricants, transmission oils, other spoiled or used lubricant oils* | *0,205* | | | | |
| 3. | - *Hydraulic oils spoiled or used* | *5,184* | | | | |
| 4. | - *Residues from cleaning storage tanks containing oil products* | *1,950* | | | | |
| | **III Hazard class** | 591,892 | 14,12 | 3 | 3 | 75217,64 |
| 5. | - *Transportation waste, not otherwise specified (used oil and fuel filters)* | *0,0180* | | | | |
| 6. | - *Damaged, used, or contaminated wiping materials* | *0,120* | | | | |
| 7. | - *Transportation waste, not otherwise specified (oiled sand)* | *0,144* | | | | |
| 8. | - *Sludge of oil traps* | *3,610* | | | | |
| 9. | - *Bilge oils from shipping, spoiled or used* | *588,000* | | | | |
| | **IV Hazard class** | 1523,866 | 5,50 | 3 | 3 | 75431,37 |
| 10. | - *Other equipment (including for scientific research, printing, and office) that is damaged, used, or unrepairable (LED lamps)* | *0,048* | | | | |
| 11. | - *Waste obtained in welding processes (welding rod stub)* | *0,025* | | | | |
| 12. | - *Small ferrous metal scraps, other* | *6,100* | | | | |
| 13. | - *Turning shavings and shavings of ferrous metals, formed from the processes of their formation (including forging, welding, pressing, drawing, turning processes, cutting, and sawing)* | *0,400* | | | | |
| 14. | - *Used metal containers, including small ones (cans, etc.), except for container waste generated during transportation* | *0,020* | | | | |
| 15. | - *Grain residues from grain cleaning (dead kernel)* | *1250,000* | | | | |
| 16. | - *Tires damaged before an operation, used, damaged, or contaminated during operation* | *0,264* | | | | |
| 17. | - *Transportation waste, not otherwise specified (air filters).* | *0,009* | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 18. | - *Damaged, used or contaminated filter materials* | *0,165* | | | | |
| 19. | - *Sludge from municipal wastewater treatment* | *10,062* | | | | |
| 20. | - *Damaged, used, or non-repairable general purpose electronic equipment* | *0,200* | | | | |
| 21. | - *Fly ash* | *4,605* | | | | |
| 22. | - *Organic kitchen waste which is suitable for composting* | *4,468* | | | | |
| 23. | - *Municipal (urban) mixed waste, including trash from bins* | *247,500* | | | | |
| | **Total** | | | | | **154453,14** |
| | **Total tax liability for the environmental tax** | | | | | **196138,56** |

***Calculation of noise on the border of residential buildings from planned activities in the river port (terminal) of NIBULON LLC***

The calculation of noise is made according to Building code B.1.1-31:2013 «Protection of territories, buildings and structures from noise». The planned activities involve the creation of additional sources of noise, which will be: fans of aspiration and exhaust ventilation systems, road, rail and water transport, diesel generator. Sources of noise from the planned activities are shown on the general plan of the territory of the river port (terminal) of NIBULON LLC.

To assess the noise impact of the planned activities on the border of the residential building, a control point to the north of the industrial site was identified.

The calculation is made with the assumption that the sound spreads simultaneously from all noise sources of the planned activities.

The total equivalent sound level is determined by the formula:

$$Ltotal = 10 * Lg \sum_{i=1}^{n} 10^{0,1*Li} \quad (1)$$

where $L_i$ – the level of the noise pressure in dBA in the calculated points taking into account the reduction of the noise pressure level by screens and strips of green spaces.

$$L_i = L - \Delta L_s - L_g \quad (2)$$

where $L$ – the level of the noise pressure in dBA in the calculated points without taking into account the reduction of the noise pressure level by screens and strips of green spaces;

$\Delta L_s$ – reduction of the noise pressure level by screens in dBA;

$\Delta L_g$ – reduction of the noise pressure level in dBA by strips of green spaces.

The octave noise pressure level in dBA at the calculated points from the noise source, without taking into account the reduction of the noise pressure level by screens and strips of green spaces, is determined by the formula: $L = L_p - 15\lg r + 10\lg \Phi - \frac{\beta_a r}{1000} - 10\lg \Omega$, (3)

where $L_p$ – the sound power level in dBA of the noise source is taken according to the passport data of the equipment;

$\Phi$ – the directionality factor of the noise source, dimensionless, is determined according to experimental data. For noise sources with versatile sound emission $\Phi = 1$;

$r$ – distance from the noise source to the calculation point, m;

$\Omega$ - spatial angle of sound radiation, for noise sources located in space - $\Omega = 4\pi$; on the surface of the territory or structure enclosing buildings and structures – $\Omega = 2\pi$; in a dihedral angle of structures enclosing buildings and structures – $\Omega = \pi$;

$\beta_a$ – attenuation of sound in the atmosphere in dBA/km. According to GOST 31295.2-2005 (ISO 9613-2:1996) attenuation in an octave band with an average geometric mean frequency of 500 Hz is taken as a general estimate of attenuation.

Designed and existing buildings and structures act as protective screens on the territory of the design site, when the sound waves originate from the noise source to the control point. The reduction of sound level by screens in dBA is determined according to the table:

| The difference in the lengths of the sound beam paths $\delta$ in meters | Reduction of the sound level by screen $\Delta L_s$ in dBA | The difference in the lengths of the sound beam paths $\delta$ in meters | Reduction of the sound level by screen $\Delta L_s$ in dBA |
|---|---|---|---|
| 0,005 | 6 | 0,48 | 16 |
| 0,02 | 8 | 0,83 | 18 |

| | | | |
|---|---|---|---|
| 0,06 | 10 | 1,4 | 20 |
| 0,14 | 12 | 2,4 | 22 |
| 0,28 | 14 | 6 | 24 |

The difference in the lengths of the sound beam paths $\delta$ according to the schemes of screens are determined by formula: $\delta = (a+b)-c$,

where $a$ – the shortest distance between the geometric center of the noise source and the upper edge of the screen, m;

$b$ – the shortest distance between the calculation point and the upper edge of the screen, m;

$c$ – the shortest distance between the geometric center of the noise source and the calculation point, m.

The reduction of the sound level by strips of green spaces is determined according to the table:

| Strip of green spaces | The width of strip, m | Reduction of the sound level $\Delta L_g$ in dBA |
|---|---|---|
| Single-row with checkers-like planting of trees in the middle of the strip. | 10–15 | 4–5 |
| The same | 16–20 | 5–8 |
| Two-row with a distance between rows of 3–5 m; rows are similar to single-row planting | 21–25 | 8–10 |
| Two- or three-row with a distance between rows of 3 m; rows are similar to single-row planting | 26–30 | 10–12 |
| Note. The height of the trees should be taken at least 5–8 m. | | |

The initial data for the calculation are presented in the tables.

| № of source | The source of noise | Octave level of sound power Lp, dBA | Distance from the noise source to the calculation point r, m | The directionality factor of the noise source $\Phi$ | Attenuation of sound in the atmosphere β | Spatial angle of sound radiation Ω |
|---|---|---|---|---|---|---|
| 1 | Fan of the gas-cleaning unit | 68 | 915 | 1 | 3,000 | π |
| 2 | Fan of the gas-cleaning unit | 68 | 920 | 1 | 3,000 | π |
| 3 | Fan of the gas-cleaning unit | 68 | 925 | 1 | 3,000 | π |
| 4 | Fan of the gas-cleaning unit | 68 | 929 | 1 | 3,000 | π |
| 5 | Fan of the gas-cleaning unit | 68 | 921 | 1 | 3,000 | π |
| 6 | Fan of the gas-cleaning unit | 68 | 906 | 1 | 3,000 | π |
| 7 | Fan of the gas-cleaning unit | 68 | 957 | 1 | 3,000 | π |
| 8 | Fan of the gas-cleaning unit | 68 | 888 | 1 | 3,000 | π |
| 9 | Fan of the gas-cleaning unit | 68 | 892 | 1 | 3,000 | π |
| 10 | Fan of the gas-cleaning unit | 68 | 789 | 1 | 3,000 | π |
| 11 | Fan of the gas-cleaning unit | 68 | 866 | 1 | 3,000 | π |
| 12 | Fan of the gas-cleaning unit | 68 | 952 | 1 | 3,000 | π |
| 13 | Fan of the gas-cleaning unit | 68 | 1000 | 1 | 3,000 | π |
| 14 | Fan of the gas-cleaning unit | 68 | 778 | 1 | 3,000 | π |
| 15 | Fan of the gas-cleaning unit | 68 | 832 | 1 | 3,000 | π |
| 16 | Fan of the gas-cleaning unit | 68 | 928 | 1 | 3,000 | π |
| 17 | Fan of the gas-cleaning unit | 68 | 910 | 1 | 3,000 | π |
| 18 | Fan of the gas-cleaning unit | 68 | 911 | 1 | 3,000 | π |

| | | | | | | |
|---|---|---|---|---|---|---|
| 19 | Fan of the gas-cleaning unit | 68 | 974 | 1 | 3,000 | π |
| 20 | Fan of the gas-cleaning unit | 68 | 482 | 1 | 3,000 | π |
| 21 | Fan of the gas-cleaning unit | 68 | 964 | 1 | 3,000 | π |
| 76 | Fan of the gas-cleaning unit | 68 | 1027 | 1 | 3,000 | π |
| 77 | Fan of the gas-cleaning unit | 68 | 918 | 1 | 3,000 | π |
| 78 | Fan of the gas-cleaning unit | 68 | 925 | 1 | 3,000 | π |
| 79 | Fan of the gas-cleaning unit | 68 | 929 | 1 | 3,000 | π |
| 80 | Fan of the gas-cleaning unit | 68 | 933 | 1 | 3,000 | π |
| 99 | Fan of the gas-cleaning unit | 68 | 914 | 1 | 3,000 | π |
| 100 | Fan of the gas-cleaning unit | 68 | 916 | 1 | 3,000 | π |
| 101 | Fan of the gas-cleaning unit | 68 | 1052 | 1 | 3,000 | π |
| 102 | Fan of the gas-cleaning unit | 68 | 1058 | 1 | 3,000 | π |
| 103 | Fan of the gas-cleaning unit | 68 | 1062 | 1 | 3,000 | π |
| 104 | Fan of the gas-cleaning unit | 68 | 1072 | 1 | 3,000 | π |
| 105 | Fan of the gas-cleaning unit | 68 | 1098 | 1 | 3,000 | π |
| 106 | Fan of the gas-cleaning unit | 68 | 1074 | 1 | 3,000 | π |
| 107 | Fan of the gas-cleaning unit | 68 | 1050 | 1 | 3,000 | π |
| 108 | Fan of the gas-cleaning unit | 68 | 1099 | 1 | 3,000 | π |
| 109 | Fan of the gas-cleaning unit | 68 | 1066 | 1 | 3,000 | π |
| 46 | Road transport | 83 | 654 | 1 | 3,000 | π |
| 47 | Railway transport | 110 | 737 | 1 | 3,000 | π |
| 48 | Water transport | 110 | 1129 | 1 | 3,000 | π |
| 54 | Road transport | 83 | 639 | 1 | 3,000 | π |
| 57 | Mobile hydraulic transshipment machine | 110 | 902 | 1 | 3,000 | π |
| 58 | Mobile hydraulic transshipment machine | 110 | 926 | 1 | 3,000 | π |
| 64 | Road transport | 83 | 923 | 1 | 3,000 | π |
| 65 | Road transport | 83 | 946 | 1 | 3,000 | π |
| 81 | Water transport | 110 | 1116 | 1 | 3,000 | π |
| 86 | Diesel generator | 90 | 840 | 1 | 3,000 | π |
| 63 | Exhaust fan | 68 | 673 | 1 | 3,000 | π |

Results of the calculation are given in the table:

| № of source | The source of noise | Level of sound power $L$, dBA | The difference in the lengths of the sound beam paths $\delta$, m | Reduction of the sound level by screen $\Delta L_s$ in dBA | Reduction of the sound level $\Delta L_g$, dBA | Level of sound power $L_i$, dBA |
|---|---|---|---|---|---|---|
| 1 | Fan of the gas-cleaning unit | 15,86 | 0,34 | 14,00 | -- | 1,86 |
| 2 | Fan of the gas-cleaning unit | 15,81 | 0,34 | 14,00 | -- | 1,81 |
| 3 | Fan of the gas-cleaning unit | 15,76 | 0,34 | 14,00 | -- | 1,76 |
| 4 | Fan of the gas-cleaning unit | 15,72 | 0,35 | 14,00 | -- | 1,72 |
| 5 | Fan of the gas-cleaning unit | 15,80 | 0,34 | 14,00 | -- | 1,80 |
| 6 | Fan of the gas-cleaning unit | 15,95 | 4,31 | 22,00 | -- | -6,05 |
| 7 | Fan of the gas-cleaning unit | 15,44 | 4,24 | 22,00 | -- | -6,56 |
| 8 | Fan of the gas-cleaning unit | 16,14 | 0,33 | 14,00 | -- | 2,14 |
| 9 | Fan of the gas-cleaning unit | 16,10 | 0,32 | 14,00 | -- | 2,10 |
| 10 | Fan of the gas-cleaning unit | 17,20 | 7,16 | 24,00 | -- | -6,80 |
| 11 | Fan of the gas-cleaning unit | 16,37 | 7,85 | 24,00 | -- | -7,63 |
| 12 | Fan of the gas-cleaning unit | 15,49 | 8,64 | 24,00 | -- | -8,51 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 13 | Fan of the gas-cleaning unit | 15,03 | 9,07 | 24,00 | -- | -8,97 |
| 14 | Fan of the gas-cleaning unit | 17,33 | 0,45 | 14,00 | -- | 3,33 |
| 15 | Fan of the gas-cleaning unit | 16,73 | 0,36 | 14,00 | -- | 2,73 |
| 16 | Fan of the gas-cleaning unit | 15,73 | 0,29 | 14,00 | -- | 1,73 |
| 17 | Fan of the gas-cleaning unit | 15,91 | 4,33 | 22,00 | -- | -6,09 |
| 18 | Fan of the gas-cleaning unit | 15,90 | 4,20 | 22,00 | -- | -6,10 |
| 19 | Fan of the gas-cleaning unit | 15,28 | 4,24 | 22,00 | -- | -6,72 |
| 20 | Fan of the gas-cleaning unit | 21,34 | 2,10 | 20,00 | -- | 1,34 |
| 21 | Fan of the gas-cleaning unit | 15,37 | 4,20 | 22,00 | -- | -6,63 |
| 76 | Fan of the gas-cleaning unit | 14,77 | 4,59 | 22,00 | -- | -7,23 |
| 77 | Fan of the gas-cleaning unit | 15,83 | 4,10 | 22,00 | -- | -6,17 |
| 78 | Fan of the gas-cleaning unit | 15,77 | 4,13 | 22,00 | -- | -6,23 |
| 79 | Fan of the gas-cleaning unit | 15,72 | 4,15 | 22,00 | -- | -6,28 |
| 80 | Fan of the gas-cleaning unit | 15,68 | 4,17 | 22,00 | -- | -6,32 |
| 99 | Fan of the gas-cleaning unit | 15,87 | 1,95 | 20,00 | -- | -4,13 |
| 100 | Fan of the gas-cleaning unit | 15,85 | 1,80 | 20,00 | -- | -4,15 |
| 101 | Fan of the gas-cleaning unit | 14,55 | 0,35 | 14,00 | -- | 0,55 |
| 102 | Fan of the gas-cleaning unit | 14,49 | 0,34 | 14,00 | -- | 0,49 |
| 103 | Fan of the gas-cleaning unit | 14,45 | 0,42 | 14,00 | -- | 0,45 |
| 104 | Fan of the gas-cleaning unit | 14,36 | 0,42 | 14,00 | -- | 0,36 |
| 105 | Fan of the gas-cleaning unit | 14,12 | 0,89 | 18,00 | -- | -3,88 |
| 106 | Fan of the gas-cleaning unit | 14,34 | 0,99 | 18,00 | -- | -3,66 |
| 107 | Fan of the gas-cleaning unit | 14,56 | 4,06 | 22,00 | -- | -7,44 |
| 108 | Fan of the gas-cleaning unit | 14,12 | 0,43 | 14,00 | -- | 0,12 |
| 109 | Fan of the gas-cleaning unit | 14,41 | 0,42 | 14,00 | -- | 0,41 |
| 46 | Road transport | 33,83 | 24,07 | 24,00 | -- | 9,83 |
| 47 | Railway transport | 59,80 | 27,12 | 24,00 | -- | 35,80 |
| 48 | Water transport | 55,85 | 2,01 | 20,00 | -- | 35,85 |
| 54 | Road transport | 34,03 | 44,67 | 24,00 | 4,00 | 6,03 |
| 57 | Mobile hydraulic transshipment machine | 58,00 | 25,17 | 24,00 | -- | 34,00 |
| 58 | Mobile hydraulic transshipment machine | 57,75 | 5,65 | 22,00 | -- | 35,75 |
| 64 | Road transport | 30,78 | 9,16 | 24,00 | -- | 6,78 |
| 65 | Road transport | 30,55 | 30,23 | 24,00 | -- | 6,55 |
| 81 | Water transport | 55,97 | 8,10 | 24,00 | -- | 31,97 |
| 86 | Diesel generator | 38,64 | 14,36 | 24,00 | -- | 14,64 |
| 63 | Exhaust fan | 18,59 | 1,09 | 18,00 | -- | 0,59 |

The results of calculations according to formula (1) at the control point in comparison with normative permissible noise levels are shown in the table:

| Permissible daytime sound level according to the Building code B.1.1-31:2013, dBA | Calculated equivalent sound level, dBA |
|---|---|
| 55,00 | 41,93 |

Державна служба України з надзвичайних ситуацій

**ДУНАЙСЬКА ГІДРОМЕТЕОРОЛОГІЧНА ОБСЕРВАТОРІЯ**

**(Дунайська ГМО)**

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Від 22.04.2022 р. № 9915-04-14/323 На № _____ від _____ р.

Начальнику відділу ОНС ТОВ СП "НІБУЛОН"
Аллі ІЗМЄСТЬЄВІЙ

На Ваш запит надаємо кліматичні характеристики і коефіцієнти, які визначають умови розсіювання забруднюючих речовин, а також фонові концентрації забруднюючих речовин в атмосферному повітрі м. Ізмаїл, розраховані за даними спостережень 2019-2021 р.

**Метеорологічна інформація**

1. Коефіцієнт, що визначає умови розсіювання забруднюючих речовин в атмосфері, залежний від стратифікації атмосфери: **200**
2. Коефіцієнт рельєфу місцевості: **1**
3. Середня річна температура повітря: **12,9°С**
4. Середня мінімальна температура повітря найбільш холодного місяця: **-11,5°С**
5. Середня максимальна температура повітря найбільш жаркого місяця: **35,9°С**
6. Середня роза вітрів:

| Напрямок | Пн | ПнС | С | ПдС | Пд | ПдЗ | З | ПнЗ | Штиль |
|---|---|---|---|---|---|---|---|---|---|
| Швидкість, м/с | 3,3 | 2,9 | 2,7 | 2,5 | 2,5 | 2,3 | 2,2 | 2,8 | 0,0 |
| Повторюваність,% | 17 | 10 | 8 | 9 | 13 | 6 | 11 | 14 | 12 |

7. Середня швидкість вітру, повторюваність перевищення якої складає 5%: **9 м/с**
8. Кількість опадів:

| Місяць | I | II | III | IV | V | VI | VII | VIII | IX | X | XI | XII | Рік |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Опади, мм | 73,4 | 15,0 | 27,4 | 24,0 | 35,7 | 125,8 | 26,0 | 17,1 | 10,0 | 30,5 | 19,9 | 63,2 | 468,0 |

**Величини фонових концентрацій забруднюючих речовин**

| | | | | | |
|---|---|---|---|---|---|
| *Завислі речовини* | | | | | |
| Швидкість вітру, м/с | 0 - 2 | 3 - 13 | | | |
| Напрямок вітру, румби | Будь-яке | Північ | Схід | Південь | Захід |
| Фонова концентрація, мг/м$^3$ | 0,11195 | 0,15570 | 0,15570 | 0,15570 | 0,15570 |
| *Оксид вуглецю* | | | | | |
| Швидкість вітру, м/с | 0 - 2 | 3 - 13 | | | |
| Напрямок вітру, румби | Будь-яке | Північ | Схід | Південь | Захід |
| Фонова концентрація, мг/м$^3$ | 1,19262 | 1,19262 | 1,19262 | 1,19262 | 1,19262 |
| *Діоксид азоту* | | | | | |
| Швидкість вітру, м/с | 0 - 2 | 3 - 13 | | | |
| Напрямок вітру, румби | Будь-яке | Північ | Схід | Південь | Захід |
| Фонова концентрація, мг/м$^3$ | 0,09025 | 0,09025 | 0,09025 | 0,09025 | 0,09025 |
| *Діоксид сірки* | | | | | |
| Швидкість вітру, м/с | 0 - 2 | 3 - 13 | | | |
| Напрямок вітру, румби | Будь-яке | Північ | Схід | Південь | Захід |
| Фонова концентрація, мг/м$^3$ | 0,03609 | 0,03609 | 0,03609 | 0,03609 | 0,03609 |
| *Сірководень* | | | | | |
| Швидкість вітру, м/с | 0 - 2 | 3 - 13 | | | |
| Напрямок вітру, румби | Будь-яке | Північ | Схід | Південь | Захід |
| Фонова концентрація, мг/м$^3$ | 0,00250 | 0,00250 | 0,00250 | 0,00250 | 0,00250 |

Директор Михайло КОРНІЛОВ

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## CALCULATION OF THE RISK ASSESSMENT OF IMPACT OF THE PLANNED ACTIVITY ON THE ENVIRONMENT

### 1. Risk assessment of the impact of the planned activity on the health of the population

The assessment of the risk of the impact of the planned activity on the health of the population from atmospheric air pollution is carried out by calculating the risk of the development of non-carcinogenic and carcinogenic effects. The calculation is carried out according to the methodological recommendations of MR 2.2.12-142-2007 "Assessment of the risk to the health of the population from atmospheric air pollution" approved by the order of the Ministry of Health of Ukraine dated 13.04.07 No. 184, using the list of maximum permissible concentrations (MPC) and approximate safe action levels of pollutants in the atmospheric air of populated areas and the directory "Harmful substances. Handbook for chemists, engineers and doctors. In three volumes." "Khimiya" publishing house, 1976.

**1.1 The risk of developing non-carcinogenic effects is determined by calculating the hazard index (HI) according to the formula:**

$$HI = \sum HQ_i,$$

where

$HQ_i$ – hazard coefficients for individual substances, which are determined by the formula:

$$HQ_i = \frac{C_i}{R_i \cdot C_i},$$

where

$C_i$ – estimated average annual concentration of the i-th substance at the boundary of residential buildings, mg/m$^3$;

$R_i \cdot C_i$ – reference (safe) concentration of the i-th substance, mg/m$^3$.

The value of the reference concentration of the i-th substance is selected from the appendix to point 4.3.2 or is adopted in accordance with the recommendations of point 4.4.1 of methodological recommendations MR 2.2.12-142-2007 "Assessment of the risk to public health from atmospheric air pollution" approved by the order of the Ministry of Health of Ukraine dated 04.13.07 No. 184.

Non-carcinogenic risk assessment is carried out according to the table.

| Characteristics of risk | Hazard coefficient ($HQ$) |
|---|---|
| The risk of harmful effects is extremely small | Less than 1 |
| Acceptable amount of risk | 1 |
| The probability of the development of harmful effects | More than 1 |

| | |
|---|---|
| increases in proportion to the increase of $HQ$ | |

***Calculation of the average annual concentration of the i-th substance at the boundary of residential buildings.***

Given that there is no approved, certified methodology for calculating the average annual concentration, the scattering calculation was performed according to the Gauss model.

The Gauss equation has the form:

$$C(x,y,z) = \frac{QKV}{2\pi \cdot u_s \sigma_y \sigma_z} \times \exp\left(-0.5\frac{y^2}{\sigma_y^2}\right)$$

where:
$C(x, y, z)$ – the concentration of the substance emitted at a point with coordinates x, y, z, μg/m$^3$;
$Q$ – emission of substance, g/s;
$K$ – conversion factor = $1 \cdot 10^6$;
$V$ – vertical scattering conditions;
$\sigma_y, \sigma_z$ – standard deviations of horizontal and vertical scattering, m;
$u_s$ – wind speed at the effective source height of the emission, m/s;

**1. Calculation of wind speed at the effective source height of the emission**

$$u_s = u_{ref}\left(\frac{h_s}{z_{ref}}\right)^p$$

where:
$h_s$ –source height of the emission, m;
$u_{ref}$ – surface wind speed, m/s;
$z_{ref}$ – height of surface wind speed measurement (10 m), m;
$p$ – correction factor (select from the table)

| Atmospheric stability | *p* for the countryside | *p* for urban area |
|---|---|---|
| A | 0.07 | 0.15 |
| B | 0.07 | 0.15 |
| C | 0.10 | 0.20 |
| D | 0.15 | 0.25 |
| E | 0.35 | 0.30 |
| F | 0.55 | 0.30 |

**2. Calculation of the efficiency height of the emission source**

**Calculation of the Briggs parameter**

$$F_b = gv_s d_s^2\left(\frac{T_s - T_a}{4T_s}\right)$$

where:
$g$ – the acceleration of gravity, = 9.8 m/s$^2$;
$v_s$ – release rate of gases from an emission source, m/s;
$d_s$ – emission source mouth diameter, m;
$T_s$ – temperature of gases emitted into the atmosphere, °C;
$T_a$ – ambient air temperature, °C.

**Calculation of the modified height of the emission source:**

When $v_s < 1.5\, u_s$

$$h_s' = h_s + 2d_s\left(\frac{v_s}{u_s} - 1.5\right)$$

On the contrary

$$h_s' = h_s$$

**Calculation of the distance of maximum concentration**

If $F_b < 55$

$$x_f = 49F_b^{5/8}$$

Otherwise

$$x_f = 119F_b^{2/5}$$

**Calculation of the efficiency source height**

**For atmospheric stability classes A, B, C, D**

when $x < x_f$ the effective height of the emission source is:

$$h_e = h_s' + 1.6\frac{F_b^{1/3}x_f^{1/3}}{u_s}$$

Otherwise

$$h_e = h_s' + 1.6\frac{F_b^{1/3}x^{1/3}}{u_s}$$

**For atmospheric stability classes E and F**

calculate the stability factor $s$

$$s = g\frac{\partial\theta/\partial z}{T_a}$$

Where $\partial\theta/\partial z$ for the stability class E is equal to 0.02 K/m, for F – 0.035 K/m.

if $1.84u_s s^{-1/2} \geq x_f$ the calculation of the effective height of the source is carried out as described above for classes A - D,

otherwise, if $1.84u_s s^{-1/2} \geq x$, the effective height of the source is:

$$h_e = h_s' + 2.4\left(\frac{F_b}{u_s s}\right)^{1/3}$$

Otherwise

$$h_e = h_s' + 1.6\frac{F_b^{1/3}x^{1/3}}{u_s}.$$

**3. Calculation $\sigma_y$ and $\sigma_z$**

$$\sigma_y = 456.11628 \cdot x \cdot \tan\{0.017453293[c - d \cdot \ln(x)]\}$$

$$\sigma_z = ax^b$$

where:

*a, b, c* and *d* – coefficients are selected from the table

| **Stability classes** | ***c*** | ***d*** |
|---|---|---|
| A | 24.1670 | 2.5334 |
| B | 18.3330 | 1.8096 |
| C | 12.5000 | 1.0857 |
| D | 8.3330 | 0.72382 |
| E | 6.2500 | 0.54287 |
| F | 4.1667 | 0.36191 |

| Stability class | ***x* (km)** | ***a*** | ***b*** |
|---|---|---|---|
| A* | < 0.10 | 122.800 | 0.94470 |
| | 0.10 - 0.15 | 158.080 | 1.05420 |
| | 0.16 - 0.20 | 170.220 | 1.09320 |
| | 0.21 - 0.25 | 179.520 | 1.12620 |
| | 0.26 - 0.30 | 217.410 | 1.26440 |
| | 0.31 - 0.40 | 258.890 | 1.40940 |
| | 0.41 - 0.50 | 346.750 | 1.72830 |
| | 0.51 - 3.11 | 453.850 | 2.11660 |
| | > 3.11 | ** | ** |
| B* | < 0.20 | 90.673 | 0.93198 |
| | 0.21 - 0.40 | 98.483 | 0.98332 |
| | > 0.40 | 109.300 | 1.09710 |

| | | | |
|---|---|---|---|
| C* | All | 61.141 | 0.91465 |

| | | | |
|---|---|---|---|
| D | < 0.30 | 34.459 | 0.86974 |
| | 0.31 - 1.00 | 32.093 | 0.81066 |
| | 1.01 - 3.00 | 32.093 | 0.64403 |
| | 3.01 - 10.00 | 33.504 | 0.60486 |
| | 10.01 - 30.00 | 36.650 | 0.56589 |
| | > 30.00 | 44.053 | 0.51179 |
| E | < 0.10 | 24.260 | 0.83660 |
| | 0.10 - 0.30 | 23.331 | 0.81956 |
| | 0.31 - 1.00 | 21.628 | 0.75660 |
| | 1.01 - 2.00 | 21.628 | 0.63077 |
| | 2.01 - 4.00 | 22.534 | 0.57154 |
| | 4.01 - 10.00 | 24.703 | 0.50527 |
| | 10.01 - 20.00 | 26.970 | 0.46713 |
| | 20.01 - 40.00 | 35.420 | 0.37615 |
| | > 40.00 | 47.618 | 0.29592 |
| F | < 0.20 | 15.209 | 0.81558 |
| | 0.21 - 0.70 | 14.457 | 0.78407 |
| | 0.71 - 1.00 | 13.953 | 0.68465 |
| | 1.01 - 2.00 | 13.953 | 0.63227 |
| | 2.01 - 3.00 | 14.823 | 0.54503 |
| | 3.01 - 7.00 | 16.187 | 0.46490 |
| | 7.01 - 15.00 | 17.836 | 0.41507 |
| | 15.01 - 30.00 | 22.651 | 0.32681 |
| | 30.01 - 60.00 | 27.074 | 0.27436 |
| | > 60.00 | 34.219 | 0.21716 |

* - if the received value $\sigma_z$ exceeds 5000 m, then it is equal to 5000 m.

** - value $\sigma_z$ is equal to 5000 m.

**4. Calculation of vertical scattering conditions**

$$V = \exp\left(-0.5\frac{(z-h_e)^2}{\sigma_z^2}\right) + \exp\left(-0.5\frac{(z+h_e)^2}{\sigma_z^2}\right) +$$

$$+\sum_{m=1}^{\infty}\left[\exp\left(-0.5\frac{H_1^2}{\sigma_z^2}\right) + \exp\left(-0.5\frac{H_2^2}{\sigma_z^2}\right) + \exp\left(-0.5\frac{H_3^2}{\sigma_z^2}\right) + \exp\left(-0.5\frac{H_4^2}{\sigma_z^2}\right)\right]$$

where:

$h_e$ – effective height of the emission source (height of the middle line of the flare above ground level), m.

$H_1 = z - (2mL - h_e)$;

$H_2 = z + (2mL - h_e)$;

$H_3 = z - (2mL + h_e)$;

$H_4 = z + (2mL + h_e)$;

$m$ – interpolation counter (3 interpolations are enough for calculations);

$L$ – mixing height, m.

According to the ISCLT2 model, the mixing height can be calculated using the formula:

$$L = 320 \cdot u_{10}$$

where:
$u_{10}$ – surface wind speed (at a height of 10 m).

Interpolation components are determined only for stability classes A, B, C and D.

**5. Classes of atmospheric stability according to Pasquill**

| **Wind speed** | **Daytime. The level of sunlight** | | | **Night time. Cloudiness** | |
|---|---|---|---|---|---|
| **m/s** | **Strong** | **Medium** | **Weak** | **> 50%<** | **< 50%** |
| < 2 | A | A – B | B | E | F |
| 2 – 3 | A – B | B | C | E | F |
| 3 – 5 | B | B – C | C | D | E |
| 5 – 6 | C | C – D | D | D | D |
| > 6 | C | D | D | D | D |

***The calculation of the average annual concentration at the control point is made in tabular form:***

**1. Calculation of wind speed at the effective height of the emission source**

| Source number | height of emission source, m | surface wind speed, m/s | height of surface wind speed measurement (10 m), m | correction factor | **wind speed at the effective height of the emission source** |
|---|---|---|---|---|---|
| 1 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 2 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 3 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 4 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 5 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 6 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 7 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 8 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 9 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 10 | 8 | 9,0 | 10 | 0,07 | 8,704 |
| 11 | 8 | 9,0 | 10 | 0,07 | 8,704 |
| 12 | 8 | 9,0 | 10 | 0,07 | 8,704 |
| 13 | 8 | 9,0 | 10 | 0,07 | 8,704 |
| 14 | 8 | 9,0 | 10 | 0,07 | 8,704 |
| 15 | 8 | 9,0 | 10 | 0,07 | 8,704 |
| 16 | 8 | 9,0 | 10 | 0,07 | 8,704 |
| 17 | 8 | 9,0 | 10 | 0,07 | 8,704 |
| 18 | 8 | 9,0 | 10 | 0,07 | 8,704 |

| | | | | | |
|---|---|---|---|---|---|
| 19 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 20 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 21 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 22 | 30 | 9,0 | 10 | 0,07 | 10,612 |
| 23 | 30 | 9,0 | 10 | 0,07 | 10,612 |
| 24 | 30 | 9,0 | 10 | 0,07 | 10,612 |
| 25 | 30 | 9,0 | 10 | 0,07 | 10,612 |
| 26 | 30 | 9,0 | 10 | 0,07 | 10,612 |
| 27 | 30 | 9,0 | 10 | 0,07 | 10,612 |
| 28 | 30 | 9,0 | 10 | 0,07 | 10,612 |
| 29 | 30 | 9,0 | 10 | 0,07 | 10,612 |
| 30 | 30 | 9,0 | 10 | 0,07 | 10,612 |
| 31 | 30 | 9,0 | 10 | 0,07 | 10,612 |
| 32 | 30 | 9,0 | 10 | 0,07 | 10,612 |
| 33 | 30 | 9,0 | 10 | 0,07 | 10,612 |
| 34 | 30 | 9,0 | 10 | 0,07 | 10,612 |
| 35 | 30 | 9,0 | 10 | 0,07 | 10,612 |
| 36 | 30 | 9,0 | 10 | 0,07 | 10,612 |
| 37 | 30 | 9,0 | 10 | 0,07 | 10,612 |
| 38 | 30 | 9,0 | 10 | 0,07 | 10,612 |
| 39 | 30 | 9,0 | 10 | 0,07 | 10,612 |
| 40 | 19,5 | 9,0 | 10 | 0,07 | 9,948 |
| 41 | 2,5 | 9,0 | 10 | 0,07 | 7,310 |
| 42 | 2,5 | 9,0 | 10 | 0,07 | 7,310 |
| 43 | 2 | 9,0 | 10 | 0,07 | 7,070 |
| 44 | 2 | 9,0 | 10 | 0,07 | 7,070 |
| 45 | 2 | 9,0 | 10 | 0,07 | 7,070 |
| 46 | 1,5 | 9,0 | 10 | 0,07 | 6,771 |
| 47 | 3 | 9,0 | 10 | 0,07 | 7,513 |
| 48 | 1,5 | 9,0 | 10 | 0,07 | 6,771 |
| 49 | 5 | 9,0 | 10 | 0,07 | 8,111 |
| 50 | 5 | 9,0 | 10 | 0,07 | 8,111 |
| 51 | 5 | 9,0 | 10 | 0,07 | 8,111 |
| 52 | 5 | 9,0 | 10 | 0,07 | 8,111 |
| 53 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 54 | 1,5 | 9,0 | 10 | 0,07 | 6,771 |
| 55 | 30 | 9,0 | 10 | 0,07 | 10,612 |
| 56 | 30 | 9,0 | 10 | 0,07 | 10,612 |
| 57 | 1,5 | 9,0 | 10 | 0,07 | 6,771 |
| 58 | 1,5 | 9,0 | 10 | 0,07 | 6,771 |
| 59 | 11 | 9,0 | 10 | 0,07 | 9,130 |
| 60 | 2 | 9,0 | 10 | 0,07 | 7,070 |
| 61 | 5 | 9,0 | 10 | 0,07 | 8,111 |
| 62 | 2 | 9,0 | 10 | 0,07 | 7,070 |
| 63 | 6,4 | 9,0 | 10 | 0,07 | 8,417 |
| 64 | 1,5 | 9,0 | 10 | 0,07 | 6,771 |
| 65 | 1,5 | 9,0 | 10 | 0,07 | 6,771 |
| 66 | 30 | 9,0 | 10 | 0,07 | 10,612 |
| 67 | 30 | 9,0 | 10 | 0,07 | 10,612 |
| 68 | 20 | 9,0 | 10 | 0,07 | 9,986 |

| | | | | | |
|---|---|---|---|---|---|
| 69 | 20 | 9,0 | 10 | 0,07 | 9,986 |
| 70 | 20 | 9,0 | 10 | 0,07 | 9,986 |
| 71 | 20 | 9,0 | 10 | 0,07 | 9,986 |
| 72 | 20 | 9,0 | 10 | 0,07 | 9,986 |
| 73 | 20 | 9,0 | 10 | 0,07 | 9,986 |
| 74 | 20 | 9,0 | 10 | 0,07 | 9,986 |
| 75 | 20 | 9,0 | 10 | 0,07 | 9,986 |
| 76 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 77 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 78 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 79 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 80 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 81 | 1,5 | 9,0 | 10 | 0,07 | 6,771 |
| 82 | 2 | 9,0 | 10 | 0,07 | 7,070 |
| 83 | 2 | 9,0 | 10 | 0,07 | 7,070 |
| 84 | 2 | 9,0 | 10 | 0,07 | 7,070 |
| 85 | 4 | 9,0 | 10 | 0,07 | 7,844 |
| 86 | 3 | 9,0 | 10 | 0,07 | 7,513 |
| 87 | 4 | 9,0 | 10 | 0,07 | 7,844 |
| 88 | 4 | 9,0 | 10 | 0,07 | 7,844 |
| 89 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 90 | 3 | 9,0 | 10 | 0,07 | 7,513 |
| 91 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 92 | 1,5 | 9,0 | 10 | 0,07 | 6,771 |
| 93 | 2,5 | 9,0 | 10 | 0,07 | 7,310 |
| 94 | 2,5 | 9,0 | 10 | 0,07 | 7,310 |
| 95 | 2,5 | 9,0 | 10 | 0,07 | 7,310 |
| 96 | 10 | 9,0 | 10 | 0,07 | 9,000 |
| 97 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 98 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 99 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 100 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 101 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 102 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 103 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 104 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 105 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 106 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 107 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 108 | 6 | 9,0 | 10 | 0,07 | 8,336 |
| 109 | 6 | 9,0 | 10 | 0,07 | 8,336 |

**2. Calculation of the effective height of the emission source**
**Calculation of the Briggs parameter**

| Source name | Release rate of gases from an emission source, m/s | The diameter of the mouth of the emission source or an equivalent diameter, m | Temperature of gases emitted into the atmosphere, °C | Ambient air temperature, °C | **the Briggs parameter** |
|---|---|---|---|---|---|
| 1 | 14,17 | 0,5 | 35,9 | 12,9 | 5,566 |
| 2 | 14,17 | 0,5 | 35,9 | 12,9 | 5,566 |
| 3 | 14,17 | 0,5 | 35,9 | 12,9 | 5,566 |
| 4 | 14,17 | 0,5 | 35,9 | 12,9 | 5,566 |
| 5 | 16,92 | 0,25 | 35,9 | 12,9 | 1,662 |
| 6 | 14,06 | 0,25 | 35,9 | 12,9 | 1,381 |
| 7 | 21,66 | 0,7 | 35,9 | 12,9 | 16,676 |
| 8 | 21,66 | 0,7 | 35,9 | 12,9 | 16,676 |
| 9 | 21,66 | 0,7 | 35,9 | 12,9 | 16,676 |
| 10 | 17,37 | 0,35 | 35,9 | 12,9 | 3,343 |
| 11 | 17,37 | 0,35 | 35,9 | 12,9 | 3,343 |
| 12 | 17,85 | 0,315 | 35,9 | 12,9 | 2,783 |
| 13 | 17,85 | 0,315 | 35,9 | 12,9 | 2,783 |
| 14 | 17,37 | 0,35 | 35,9 | 12,9 | 3,343 |
| 15 | 17,37 | 0,35 | 35,9 | 12,9 | 3,343 |
| 16 | 17,85 | 0,315 | 35,9 | 12,9 | 2,783 |
| 17 | 17,85 | 0,63 | 35,9 | 12,9 | 11,132 |
| 18 | 17,85 | 0,63 | 35,9 | 12,9 | 11,132 |
| 19 | 19,77 | 0,25 | 35,9 | 12,9 | 1,941 |
| 20 | 19,77 | 0,25 | 35,9 | 12,9 | 1,941 |
| 21 | 19,77 | 0,25 | 35,9 | 12,9 | 1,941 |
| 22 | 1,5 | 22,000 | 35,9 | 12,9 | 1140,720 |
| 23 | 1,5 | 22,000 | 35,9 | 12,9 | 1140,720 |
| 24 | 1,5 | 22,000 | 35,9 | 12,9 | 1140,720 |
| 25 | 1,5 | 22,000 | 35,9 | 12,9 | 1140,720 |
| 26 | 1,5 | 22,000 | 35,9 | 12,9 | 1140,720 |
| 27 | 1,5 | 22,000 | 35,9 | 12,9 | 1140,720 |
| 28 | 1,5 | 22,000 | 35,9 | 12,9 | 1140,720 |
| 29 | 1,5 | 22,000 | 35,9 | 12,9 | 1140,720 |
| 30 | 1,5 | 22,000 | 35,9 | 12,9 | 1140,720 |
| 31 | 1,5 | 22,000 | 35,9 | 12,9 | 1140,720 |
| 32 | 1,5 | 22,000 | 35,9 | 12,9 | 1140,720 |
| 33 | 1,5 | 22,000 | 35,9 | 12,9 | 1140,720 |
| 34 | 1,5 | 22,000 | 35,9 | 12,9 | 1140,720 |
| 35 | 1,5 | 22,000 | 35,9 | 12,9 | 1140,720 |
| 36 | 1,5 | 22,000 | 35,9 | 12,9 | 1140,720 |
| 37 | 1,5 | 22,000 | 35,9 | 12,9 | 1140,720 |
| 38 | 1,5 | 22,000 | 35,9 | 12,9 | 1140,720 |
| 39 | 1,5 | 22,000 | 35,9 | 12,9 | 1140,720 |
| 40 | 1,5 | 37,13 | 30 | 12,9 | 2890,846 |

| | | | | | |
|---|---|---|---|---|---|
| 41 | 1,5 | 0,1 | 35,9 | 12,9 | 0,024 |
| 42 | 1,5 | 0,1 | 35,9 | 12,9 | 0,024 |
| 43 | 1,5 | 0,5 | 35,9 | 12,9 | 0,589 |
| 44 | 1,5 | 0,5 | 35,9 | 12,9 | 0,589 |
| 45 | 1,5 | 0,5 | 35,9 | 12,9 | 0,589 |
| 46 | 1,5 | 33,433 | 35,9 | 12,9 | 2634,416 |
| 47 | 1,5 | 13,023 | 35,9 | 12,9 | 399,720 |
| 48 | 1,5 | 13,023 | 35,9 | 12,9 | 399,720 |
| 49 | 7,08 | 0,18 | 75 | 12,9 | 0,466 |
| 50 | 12,58 | 0,18 | 75 | 12,9 | 0,828 |
| 51 | 12,58 | 0,18 | 75 | 12,9 | 0,828 |
| 52 | 12,58 | 0,18 | 75 | 12,9 | 0,828 |
| 53 | 1,5 | 0,35 | 35,9 | 12,9 | 0,289 |
| 54 | 1,5 | 71,591 | 35,9 | 12,9 | 12079,543 |
| 55 | 1,5 | 0,35 | 35,9 | 12,9 | 0,289 |
| 56 | 1,5 | 0,35 | 35,9 | 12,9 | 0,289 |
| 57 | 1,5 | 6,632 | 35,9 | 12,9 | 103,663 |
| 58 | 1,5 | 6,632 | 35,9 | 12,9 | 103,663 |
| 59 | 8,2 | 0,184 | 35,9 | 12,9 | 0,436 |
| 60 | 1,5 | 1,500 | 35,9 | 12,9 | 5,303 |
| 61 | 1,5 | 3,000 | 35,9 | 12,9 | 21,212 |
| 62 | 1,5 | 1,500 | 35,9 | 12,9 | 5,303 |
| 63 | 8,3 | 0,250 | 40 | 12,9 | 0,862 |
| 64 | 1,5 | 6,632 | 35,9 | 12,9 | 103,663 |
| 65 | 1,5 | 6,632 | 35,9 | 12,9 | 103,663 |
| 66 | 1,5 | 0,35 | 35,9 | 12,9 | 0,289 |
| 67 | 1,5 | 0,35 | 35,9 | 12,9 | 0,289 |
| 68 | 1,5 | 0,35 | 35,9 | 12,9 | 0,289 |
| 69 | 1,5 | 0,35 | 35,9 | 12,9 | 0,289 |
| 70 | 1,5 | 0,35 | 35,9 | 12,9 | 0,289 |
| 71 | 1,5 | 0,35 | 35,9 | 12,9 | 0,289 |
| 72 | 1,5 | 0,35 | 35,9 | 12,9 | 0,289 |
| 73 | 1,5 | 0,35 | 35,9 | 12,9 | 0,289 |
| 74 | 1,5 | 0,35 | 35,9 | 12,9 | 0,289 |
| 75 | 1,5 | 0,35 | 35,9 | 12,9 | 0,289 |
| 76 | 14,17 | 0,5 | 35,9 | 12,9 | 5,566 |
| 77 | 14,17 | 0,5 | 35,9 | 12,9 | 5,566 |
| 78 | 14,17 | 0,5 | 35,9 | 12,9 | 5,566 |
| 79 | 14,17 | 0,5 | 35,9 | 12,9 | 5,566 |
| 80 | 16,92 | 0,25 | 35,9 | 12,9 | 1,662 |
| 81 | 1,5 | 6,632 | 35,9 | 12,9 | 103,663 |
| 82 | 1,5 | 0,001 | 35,9 | 12,9 | 0,000 |
| 83 | 1,5 | 0,001 | 35,9 | 12,9 | 0,000 |
| 84 | 1,5 | 0,001 | 35,9 | 12,9 | 0,000 |
| 85 | 0,51 | 0,05 | 35,9 | 12,9 | 0,002 |
| 86 | 19 | 0,06 | 98 | 12,9 | 0,146 |
| 87 | 1,5 | 2,400 | 35,9 | 12,9 | 13,576 |
| 88 | 1,5 | 2,400 | 35,9 | 12,9 | 13,576 |
| 89 | 1,5 | 2,400 | 35,9 | 12,9 | 13,576 |
| 90 | 1,5 | 2,400 | 35,9 | 12,9 | 13,576 |

| | | | | | |
|---|---|---|---|---|---|
| 91 | 1,5 | 0,35 | 35,9 | 12,9 | 0,289 |
| 92 | 1,5 | 6,632 | 35,9 | 12,9 | 103,663 |
| 93 | 1,5 | 0,1 | 35,9 | 12,9 | 0,024 |
| 94 | 1,5 | 0,1 | 35,9 | 12,9 | 0,024 |
| 95 | 1,5 | 0,1 | 35,9 | 12,9 | 0,024 |
| 96 | 4,22 | 0,15 | 371 | 12,9 | 0,225 |
| 97 | 1,5 | 0,5 | 35,9 | 12,9 | 0,589 |
| 98 | 1,5 | 0,5 | 35,9 | 12,9 | 0,589 |
| 99 | 14,06 | 0,25 | 35,9 | 12,9 | 1,381 |
| 100 | 14,06 | 0,25 | 35,9 | 12,9 | 1,381 |
| 101 | 14,06 | 0,25 | 35,9 | 12,9 | 1,381 |
| 102 | 14,06 | 0,25 | 35,9 | 12,9 | 1,381 |
| 103 | 14,06 | 0,25 | 35,9 | 12,9 | 1,381 |
| 104 | 14,06 | 0,25 | 35,9 | 12,9 | 1,381 |
| 105 | 14,06 | 0,25 | 35,9 | 12,9 | 1,381 |
| 106 | 19,77 | 0,25 | 35,9 | 12,9 | 1,941 |
| 107 | 19,77 | 0,25 | 35,9 | 12,9 | 1,941 |
| 108 | 19,77 | 0,25 | 35,9 | 12,9 | 1,941 |
| 109 | 19,77 | 0,25 | 35,9 | 12,9 | 1,941 |

**Calculation of the modified height of the emission source:**

| Source name | Release rate of gases from an emission source, m/s | The diameter of the mouth of the emission source or an equivalent diameter, m | wind speed at the effective height of the emission source | **the modified height of the emission source** |
|---|---|---|---|---|
| 1 | 14,17 | 0,5 | 8,336 | 0,500 |
| 2 | 14,17 | 0,5 | 8,336 | 0,500 |
| 3 | 14,17 | 0,5 | 8,336 | 0,500 |
| 4 | 14,17 | 0,5 | 8,336 | 0,500 |
| 5 | 16,92 | 0,25 | 8,336 | 0,250 |
| 6 | 14,06 | 0,25 | 8,336 | 0,250 |
| 7 | 21,66 | 0,7 | 8,336 | 0,700 |
| 8 | 21,66 | 0,7 | 8,336 | 0,700 |
| 9 | 21,66 | 0,7 | 8,336 | 0,700 |
| 10 | 17,37 | 0,35 | 8,704 | 0,350 |
| 11 | 17,37 | 0,35 | 8,704 | 0,350 |
| 12 | 17,85 | 0,315 | 8,704 | 0,315 |
| 13 | 17,85 | 0,315 | 8,704 | 0,315 |
| 14 | 17,37 | 0,35 | 8,704 | 0,350 |
| 15 | 17,37 | 0,35 | 8,704 | 0,350 |
| 16 | 17,85 | 0,315 | 8,704 | 0,315 |
| 17 | 17,85 | 0,63 | 8,704 | 0,630 |
| 18 | 17,85 | 0,63 | 8,704 | 0,630 |
| 19 | 19,77 | 0,25 | 8,336 | 0,250 |
| 20 | 19,77 | 0,25 | 8,336 | 0,250 |
| 21 | 19,77 | 0,25 | 8,336 | 0,250 |
| 22 | 1,5 | 22,000 | 10,612 | -28,667 |
| 23 | 1,5 | 22,000 | 10,612 | -28,667 |
| 24 | 1,5 | 22,000 | 10,612 | -28,667 |
| 25 | 1,5 | 22,000 | 10,612 | -28,667 |

| | | | | |
|---|---|---|---|---|
| 26 | 1,5 | 22,000 | 10,612 | -28,667 |
| 27 | 1,5 | 22,000 | 10,612 | -28,667 |
| 28 | 1,5 | 22,000 | 10,612 | -28,667 |
| 29 | 1,5 | 22,000 | 10,612 | -28,667 |
| 30 | 1,5 | 22,000 | 10,612 | -28,667 |
| 31 | 1,5 | 22,000 | 10,612 | -28,667 |
| 32 | 1,5 | 22,000 | 10,612 | -28,667 |
| 33 | 1,5 | 22,000 | 10,612 | -28,667 |
| 34 | 1,5 | 22,000 | 10,612 | -28,667 |
| 35 | 1,5 | 22,000 | 10,612 | -28,667 |
| 36 | 1,5 | 22,000 | 10,612 | -28,667 |
| 37 | 1,5 | 22,000 | 10,612 | -28,667 |
| 38 | 1,5 | 22,000 | 10,612 | -28,667 |
| 39 | 1,5 | 22,000 | 10,612 | -28,667 |
| 40 | 1,5 | 37,13 | 9,948 | -79,513 |
| 41 | 1,5 | 0,1 | 7,310 | 2,233 |
| 42 | 1,5 | 0,1 | 7,310 | 2,233 |
| 43 | 1,5 | 0,5 | 7,070 | 0,667 |
| 44 | 1,5 | 0,5 | 7,070 | 0,667 |
| 45 | 1,5 | 0,5 | 7,070 | 0,667 |
| 46 | 1,5 | 33,433 | 6,771 | -87,655 |
| 47 | 1,5 | 13,023 | 7,513 | -31,728 |
| 48 | 1,5 | 13,023 | 6,771 | -33,228 |
| 49 | 7,08 | 0,18 | 8,111 | 4,743 |
| 50 | 12,58 | 0,18 | 8,111 | 0,180 |
| 51 | 12,58 | 0,18 | 8,111 | 0,180 |
| 52 | 12,58 | 0,18 | 8,111 | 0,180 |
| 53 | 1,5 | 0,35 | 8,336 | 5,067 |
| 54 | 1,5 | 71,591 | 6,771 | -189,409 |
| 55 | 1,5 | 0,35 | 10,612 | 29,067 |
| 56 | 1,5 | 0,35 | 10,612 | 29,067 |
| 57 | 1,5 | 6,632 | 6,771 | -16,185 |
| 58 | 1,5 | 6,632 | 6,771 | -16,185 |
| 59 | 8,2 | 0,184 | 9,130 | 10,783 |
| 60 | 1,5 | 1,500 | 7,070 | -2,000 |
| 61 | 1,5 | 3,000 | 8,111 | -3,000 |
| 62 | 1,5 | 1,500 | 7,070 | -2,000 |
| 63 | 8,3 | 0,250 | 8,417 | 6,111 |
| 64 | 1,5 | 6,632 | 6,771 | -16,185 |
| 65 | 1,5 | 6,632 | 6,771 | -16,185 |
| 66 | 1,5 | 0,35 | 10,612 | 29,067 |
| 67 | 1,5 | 0,35 | 10,612 | 29,067 |
| 68 | 1,5 | 0,35 | 9,986 | 19,067 |
| 69 | 1,5 | 0,35 | 9,986 | 19,067 |
| 70 | 1,5 | 0,35 | 9,986 | 19,067 |
| 71 | 1,5 | 0,35 | 9,986 | 19,067 |
| 72 | 1,5 | 0,35 | 9,986 | 19,067 |
| 73 | 1,5 | 0,35 | 9,986 | 19,067 |
| 74 | 1,5 | 0,35 | 9,986 | 19,067 |
| 75 | 1,5 | 0,35 | 9,986 | 19,067 |

| | | | | |
|---|---|---|---|---|
| 76 | 14,17 | 0,5 | 8,336 | 0,500 |
| 77 | 14,17 | 0,5 | 8,336 | 0,500 |
| 78 | 14,17 | 0,5 | 8,336 | 0,500 |
| 79 | 14,17 | 0,5 | 8,336 | 0,500 |
| 80 | 16,92 | 0,25 | 8,336 | 0,250 |
| 81 | 1,5 | 6,632 | 6,771 | -16,185 |
| 82 | 1,5 | 0,001 | 7,070 | 1,997 |
| 83 | 1,5 | 0,001 | 7,070 | 1,997 |
| 84 | 1,5 | 0,001 | 7,070 | 1,997 |
| 85 | 0,51 | 0,05 | 7,844 | 3,856 |
| 86 | 19 | 0,06 | 7,513 | 0,060 |
| 87 | 1,5 | 2,400 | 7,844 | -2,400 |
| 88 | 1,5 | 2,400 | 7,844 | -2,400 |
| 89 | 1,5 | 2,400 | 8,336 | -0,400 |
| 90 | 1,5 | 2,400 | 7,513 | -3,400 |
| 91 | 1,5 | 0,35 | 8,336 | 5,067 |
| 92 | 1,5 | 6,632 | 6,771 | -16,185 |
| 93 | 1,5 | 0,1 | 7,310 | 2,233 |
| 94 | 1,5 | 0,1 | 7,310 | 2,233 |
| 95 | 1,5 | 0,1 | 7,310 | 2,233 |
| 96 | 4,22 | 0,15 | 9,000 | 9,691 |
| 97 | 1,5 | 0,5 | 8,336 | 4,667 |
| 98 | 1,5 | 0,5 | 8,336 | 4,667 |
| 99 | 14,06 | 0,25 | 8,336 | 0,250 |
| 100 | 14,06 | 0,25 | 8,336 | 0,250 |
| 101 | 14,06 | 0,25 | 8,336 | 0,250 |
| 102 | 14,06 | 0,25 | 8,336 | 0,250 |
| 103 | 14,06 | 0,25 | 8,336 | 0,250 |
| 104 | 14,06 | 0,25 | 8,336 | 0,250 |
| 105 | 14,06 | 0,25 | 8,336 | 0,250 |
| 106 | 19,77 | 0,25 | 8,336 | 0,250 |
| 107 | 19,77 | 0,25 | 8,336 | 0,250 |
| 108 | 19,77 | 0,25 | 8,336 | 0,250 |
| 109 | 19,77 | 0,25 | 8,336 | 0,250 |

**Calculation of the distance of reaching the maximum concentration and calculation of the efficiency source height**

| Source name | **the Briggs parameter** | **the modified height of the emission source** | **distance of reaching the maximum concentration** | **effective source height** |
|---|---|---|---|---|
| 1 | 5,566 | -6,910 | 0,500 | 143,272 |
| 2 | 5,566 | 0,218 | 0,500 | 143,272 |
| 3 | 5,566 | 0,218 | 0,500 | 143,272 |
| 4 | 5,566 | 0,218 | 0,500 | 143,272 |
| 5 | 1,662 | 0,218 | 0,250 | 67,312 |
| 6 | 1,381 | 0,400 | 0,250 | 59,954 |
| 7 | 16,676 | 0,350 | 0,700 | 284,448 |

| | | | | |
|---|---|---|---|---|
| 8 | 16,676 | 0,350 | 0,700 | 284,448 |
| 9 | 16,676 | 13,591 | 0,700 | 284,448 |
| 10 | 3,343 | -19,098 | 0,350 | 104,179 |
| 11 | 3,343 | -13,537 | 0,350 | 104,179 |
| 12 | 2,783 | -19,098 | 0,315 | 92,900 |
| 13 | 2,783 | 8,445 | 0,315 | 92,900 |
| 14 | 3,343 | 5,659 | 0,350 | 104,179 |
| 15 | 3,343 | 1,857 | 0,350 | 104,179 |
| 16 | 2,783 | 0,857 | 0,315 | 92,900 |
| 17 | 11,132 | 0,857 | 0,630 | 220,955 |
| 18 | 11,132 | 0,857 | 0,630 | 220,955 |
| 19 | 1,941 | 0,857 | 0,250 | 74,167 |
| 20 | 1,941 | 0,857 | 0,250 | 74,167 |
| 21 | 1,941 | 0,700 | 0,250 | 74,167 |
| 22 | 1140,720 | 0,700 | -28,667 | 1988,010 |
| 23 | 1140,720 | 31,953 | -28,667 | 1988,010 |
| 24 | 1140,720 | 31,953 | -28,667 | 1988,010 |
| 25 | 1140,720 | 0,710 | -28,667 | 1988,010 |
| 26 | 1140,720 | 0,450 | -28,667 | 1988,010 |
| 27 | 1140,720 | 0,500 | -28,667 | 1988,010 |
| 28 | 1140,720 | 0,630 | -28,667 | 1988,010 |
| 29 | 1140,720 | 0,630 | -28,667 | 1988,010 |
| 30 | 1140,720 | 1,852 | -28,667 | 1988,010 |
| 31 | 1140,720 | 1,916 | -28,667 | 1988,010 |
| 32 | 1140,720 | 1,910 | -28,667 | 1988,010 |
| 33 | 1140,720 | 0,200 | -28,667 | 1988,010 |
| 34 | 1140,720 | 0,710 | -28,667 | 1988,010 |
| 35 | 1140,720 | 0,710 | -28,667 | 1988,010 |
| 36 | 1140,720 | -65,369 | -28,667 | 1988,010 |
| 37 | 1140,720 | -44,090 | -28,667 | 1988,010 |
| 38 | 1140,720 | -13,659 | -28,667 | 1988,010 |
| 39 | 1140,720 | 0,857 | -28,667 | 1988,010 |
| 40 | 2890,846 | 0,857 | -79,513 | 2883,746 |
| 41 | 0,024 | 9,851 | 2,233 | 4,762 |
| 42 | 0,024 | -0,286 | 2,233 | 4,762 |
| 43 | 0,589 | 0,250 | 0,667 | 35,198 |
| 44 | 0,589 | 0,714 | 0,667 | 35,198 |
| 45 | 0,589 | -19,098 | 0,667 | 35,198 |
| 46 | 2634,416 | -65,369 | -87,655 | 2778,566 |
| 47 | 399,720 | 0,500 | -31,728 | 1306,921 |
| 48 | 399,720 | 0,827 | -33,228 | 1306,921 |
| 49 | 0,466 | 0,832 | 4,743 | 30,404 |
| 50 | 0,828 | 0,857 | 0,180 | 43,548 |
| 51 | 0,828 | -10,929 | 0,180 | 43,548 |
| 52 | 0,828 | 0,710 | 0,180 | 43,548 |
| 53 | 0,289 | 7,143 | 5,067 | 22,556 |
| 54 | 12079,543 | -1,786 | -189,409 | 5109,368 |
| 55 | 0,289 | -1,786 | 29,067 | 22,556 |
| 56 | 0,289 | -1,786 | 29,067 | 22,556 |
| 57 | 103,663 | -1,786 | -16,185 | 761,722 |

| | | | | |
|---|---|---|---|---|
| 58 | 103,663 | 0,400 | -16,185 | 761,722 |
| 59 | 0,436 | -19,098 | 10,783 | 29,166 |
| 60 | 5,303 | 7,571 | -2,000 | 139,002 |
| 61 | 21,212 | 2,279 | -3,000 | 330,605 |
| 62 | 5,303 | 0,200 | -2,000 | 139,002 |
| 63 | 0,862 | 2,770 | 6,111 | 44,657 |
| 64 | 103,663 | -1,429 | -16,185 | 761,722 |
| 65 | 103,663 | -5,838 | -16,185 | 761,722 |
| 66 | 0,289 | -49,209 | 29,067 | 22,556 |
| 67 | 0,289 | -45,623 | 29,067 | 22,556 |
| 68 | 0,289 | -11,714 | 19,067 | 22,556 |
| 69 | 0,289 | 0,857 | 19,067 | 22,556 |
| 70 | 0,289 | 0,857 | 19,067 | 22,556 |
| 71 | 0,289 | 7,143 | 19,067 | 22,556 |
| 72 | 0,289 | -28,622 | 19,067 | 22,556 |
| 73 | 0,289 | 14,629 | 19,067 | 22,556 |
| 74 | 0,289 | 14,632 | 19,067 | 22,556 |
| 75 | 0,289 | 14,642 | 19,067 | 22,556 |
| 76 | 5,566 | 14,645 | 0,500 | 143,272 |
| 77 | 5,566 | 14,852 | 0,500 | 143,272 |
| 78 | 5,566 | 0,200 | 0,500 | 143,272 |
| 79 | 5,566 | 15,520 | 0,500 | 143,272 |
| 80 | 1,662 | 7,827 | 0,250 | 67,312 |
| 81 | 103,663 | 7,831 | -16,185 | 761,722 |
| 82 | 0,000 | 7,825 | 1,997 | 0,000 |
| 83 | 0,000 | 7,829 | 1,997 | 0,000 |
| 84 | 0,000 | 11,391 | 1,997 | 0,000 |
| 85 | 0,002 | 2,619 | 3,856 | 1,008 |
| 86 | 0,146 | 2,635 | 0,060 | 14,720 |
| 87 | 13,576 | 2,895 | -2,400 | 250,137 |
| 88 | 13,576 | 0,300 | -2,400 | 250,137 |
| 89 | 13,576 | 0,300 | -0,400 | 250,137 |
| 90 | 13,576 | 6,995 | -3,400 | 250,137 |
| 91 | 0,289 | 11,186 | 5,067 | 22,556 |
| 92 | 103,663 | 10,711 | -16,185 | 761,722 |
| 93 | 0,024 | 10,720 | 2,233 | 4,762 |
| 94 | 0,024 | 0,250 | 2,233 | 4,762 |
| 95 | 0,024 | 0,200 | 2,233 | 4,762 |
| 96 | 0,225 | 0,200 | 9,691 | 19,289 |
| 97 | 0,589 | 15,019 | 4,667 | 35,198 |
| 98 | 0,589 | 14,779 | 4,667 | 35,198 |
| 99 | 1,381 | 14,703 | 0,250 | 59,954 |
| 100 | 1,381 | 0,320 | 0,250 | 59,954 |
| 101 | 1,381 | 14,809 | 0,250 | 59,954 |
| 102 | 1,381 | 14,869 | 0,250 | 59,954 |
| 103 | 1,381 | 0,230 | 0,250 | 59,954 |
| 104 | 1,381 | 0,250 | 0,250 | 59,954 |
| 105 | 1,381 | 0,090 | 0,250 | 59,954 |
| 106 | 1,941 | 0,120 | 0,250 | 74,167 |
| 107 | 1,941 | 0,120 | 0,250 | 74,167 |

| | | | | |
|---|---|---|---|---|
| 108 | 1,941 | -2,530 | 0,250 | 74,167 |
| 109 | 1,941 | -5,838 | 0,250 | 74,167 |

**Calculation $\sigma_y$ and $\sigma_x$**

For calculations, a control point on the residential area with coordinates is taken

**T.1*(29,0; 688,0)***

For control point ***T.1***

| Source name | Source or site center coordinates | | $\sigma_y$ | $\sigma_x$ | $\sigma_x$ accepted |
|---|---|---|---|---|---|
| | X, m | Y, m | | | |
| 1 | 42,6 | -226,8 | 2180 | 3085 | 3085 |
| 2 | 41,4 | -232,2 | 2073 | 2892 | 2892 |
| 3 | 40,3 | -237,3 | 1755 | 2336 | 2336 |
| 4 | 38,8 | -240,7 | 1606 | 2086 | 2086 |
| 5 | 38,3 | -233 | 2726 | 4114 | 4114 |
| 6 | 38 | -218,2 | 1020 | 1173 | 1173 |
| 7 | -192,5 | -242,9 | 16353 | 45276 | 5000 |
| 8 | -36,8 | -197,2 | 5702 | 10799 | 5000 |
| 9 | -38 | -201,4 | 5788 | 11016 | 5000 |
| 10 | 41,8 | -101 | 1464 | 1854 | 1854 |
| 11 | 14,7 | -177,5 | 1377 | 1715 | 1715 |
| 12 | -15,4 | -263 | 3937 | 6634 | 5000 |
| 13 | -31,5 | -309,8 | 5120 | 9368 | 5000 |
| 14 | 9,4 | -89,6 | 2046 | 2844 | 2844 |
| 15 | -9 | -143 | 3589 | 5879 | 5000 |
| 16 | -42 | -237,1 | 6001 | 11558 | 5000 |
| 17 | 5,3 | -221,5 | 2233 | 3182 | 3182 |
| 18 | 9 | -222,6 | 1911 | 2605 | 2605 |
| 19 | -199,4 | -258,6 | 16709 | 46668 | 5000 |
| 20 | -198,6 | 263,2 | 16374 | 45358 | 5000 |
| 21 | -184 | -252,6 | 15903 | 43542 | 5000 |
| 22 | 62,6 | -69,1 | 3372 | 5420 | 5000 |
| 23 | 54,5 | -92,4 | 2726 | 4114 | 4114 |
| 24 | 46,3 | -115,6 | 2020 | 2796 | 2796 |
| 25 | 35,7 | -145,5 | 1041 | 1203 | 1203 |
| 26 | 27,7 | -168,8 | 151 | 109 | 109 |
| 27 | 19,5 | -192,2 | 876 | 968 | 968 |
| 28 | -2,3 | -254,7 | 2844 | 4346 | 4346 |
| 29 | -10,5 | -277,9 | 3525 | 5742 | 5000 |
| 30 | -18,7 | -301,2 | 4132 | 7066 | 5000 |
| 31 | -26,9 | -324,6 | 4726 | 8430 | 5000 |
| 32 | 31,1 | -58,5 | 255 | 208 | 208 |
| 33 | 22,9 | -81,7 | 749 | 795 | 795 |
| 34 | 14,8 | -105 | 1549 | 1993 | 1993 |
| 35 | 4,3 | -134,9 | 2469 | 3621 | 3621 |

| | | | | | |
|---|---|---|---|---|---|
| 36 | -3,8 | -158,2 | 3143 | 4947 | 4947 |
| 37 | -12 | -181,4 | 3796 | 6324 | 5000 |
| 38 | -28,8 | -228,7 | 5010 | 9101 | 5000 |
| 39 | -36,9 | -252 | 5587 | 10512 | 5000 |
| 40 | 11,7 | -213,6 | 1653 | 2164 | 2164 |
| 41 | 115,6 | 15,1 | 7129 | 14542 | 5000 |
| 42 | 113,3 | 21,6 | 6966 | 14099 | 5000 |
| 43 | 96,9 | 24,2 | 2869 | 4396 | 4396 |
| 44 | 95,8 | 19,5 | 2869 | 4396 | 4396 |
| 45 | -125,4 | -426,3 | 2869 | 4396 | 4396 |
| 46 | 59,3 | 34,3 | 2978 | 4612 | 4612 |
| 47 | 108,1 | -45 | 4078 | 6945 | 5000 |
| 48 | -138,3 | -428,1 | 13136 | 33370 | 5000 |
| 49 | 6,5 | 23,5 | 2313 | 3327 | 3327 |
| 50 | -43,2 | 18,9 | 3557 | 5811 | 5000 |
| 51 | -108,2 | -248,5 | 10451 | 24377 | 5000 |
| 52 | -35,6 | -392,2 | 5449 | 10171 | 5000 |
| 53 | -195 | -362,3 | 16210 | 44724 | 5000 |
| 54 | -115,7 | 65,5 | 11340 | 27255 | 5000 |
| 55 | -206,3 | -355,3 | 16839 | 47181 | 5000 |
| 56 | -195 | -376,3 | 16231 | 44806 | 5000 |
| 57 | -187,4 | -381,5 | 15834 | 43277 | 5000 |
| 58 | -207,4 | -340 | 16886 | 47365 | 5000 |
| 59 | -95 | -244,7 | 9639 | 21834 | 5000 |
| 60 | -91,3 | -242,7 | 9408 | 21126 | 5000 |
| 61 | -87,8 | -254,4 | 9187 | 20458 | 5000 |
| 62 | -88,3 | -232,6 | 9219 | 20554 | 5000 |
| 63 | -53,4 | 20,1 | 3242 | 5149 | 5000 |
| 64 | -110,5 | -224,4 | 10591 | 24822 | 5000 |
| 65 | -118 | -246,9 | 11042 | 26279 | 5000 |
| 66 | -357 | -301,1 | 24117 | 78825 | 5000 |
| 67 | -321,2 | -322,5 | 22474 | 71173 | 5000 |
| 68 | 8,1 | -203,3 | 1983 | 2732 | 2732 |
| 69 | 11,1 | -203,6 | 1727 | 2289 | 2289 |
| 70 | 14,6 | -204,9 | 1387 | 1731 | 1731 |
| 71 | 16,8 | -205,8 | 1111 | 1307 | 1307 |
| 72 | 21,2 | -206,8 | 716 | 752 | 752 |
| 73 | 12 | -226,4 | 1634 | 2133 | 2133 |
| 74 | 9,5 | -233,6 | 1865 | 2526 | 2526 |
| 75 | 6,9 | -240,8 | 2091 | 2924 | 2924 |
| 76 | -0,2 | -338,7 | 3364 | 5403 | 5000 |
| 77 | 58,6 | -229,6 | 3533 | 5759 | 5000 |
| 78 | 57,4 | -236,1 | 3445 | 5572 | 5000 |
| 79 | 55,7 | -240,8 | 3258 | 5183 | 5000 |
| 80 | 54 | -244,6 | 3168 | 4998 | 4998 |
| 81 | -268 | -387,4 | 9439 | 21222 | 5000 |
| 82 | 6,2 | 6,9 | 3078 | 4813 | 4813 |
| 83 | -34,8 | 18,3 | 2029 | 2812 | 2812 |
| 84 | -108,3 | -260,7 | 5809 | 11070 | 5000 |
| 85 | -14,1 | 32,7 | 10597 | 24841 | 5000 |

| | | | | | |
|---|---|---|---|---|---|
| 86 | -40 | -149,3 | 10736 | 25288 | 5000 |
| 87 | -187,5 | -257,1 | 16089 | 44255 | 5000 |
| 88 | -193,8 | -399,8 | 1250 | 1518 | 1518 |
| 89 | -219,8 | -352,2 | 17531 | 49937 | 5000 |
| 90 | -359,2 | -345 | 23030 | 73730 | 5000 |
| 91 | -342,2 | -318,6 | 23283 | 74905 | 5000 |
| 92 | -356,5 | -322,4 | 24139 | 78932 | 5000 |
| 93 | -128,4 | -424 | 12578 | 31425 | 5000 |
| 94 | -140,2 | -430,5 | 23876 | 77688 | 5000 |
| 95 | -122,5 | -428,2 | 12231 | 30239 | 5000 |
| 96 | -101 | -355,7 | 8388 | 18089 | 5000 |
| 97 | 37,9 | -218,2 | 15903 | 43542 | 5000 |
| 98 | 35,6 | -226,9 | 15903 | 43542 | 5000 |
| 99 | 48 | -225,6 | 3258 | 5183 | 5000 |
| 100 | 54,1 | -227,4 | 3258 | 5183 | 5000 |
| 101 | -349,1 | -293,2 | 3258 | 5183 | 5000 |
| 102 | -352,3 | -299 | 3258 | 5183 | 5000 |
| 103 | -295,5 | -323,3 | 3258 | 5183 | 5000 |
| 104 | -300,3 | -331,9 | 3258 | 5183 | 5000 |
| 105 | -135 | -398 | 3258 | 5183 | 5000 |
| 106 | -91,6 | -379,5 | 3258 | 5183 | 5000 |
| 107 | -45,8 | -359,4 | 3258 | 5183 | 5000 |
| 108 | -146,9 | -396,4 | 3258 | 5183 | 5000 |
| 109 | -238,1 | -344 | 3258 | 5183 | 5000 |

**4. Calculation of vertical scattering conditions**

For control point ***T.1***

| Source name | **effective source height** | $\sigma_z$ accepted | **vertical scattering conditions** |
|---|---|---|---|
| 1 | 21,0 | 3085 | 3,3999 |
| 2 | 19,8 | 2892 | 3,1008 |
| 3 | 16,3 | 2336 | 2,3827 |
| 4 | 14,7 | 2086 | 2,1768 |
| 5 | 27,3 | 4114 | 5,0027 |
| 6 | 8,7 | 1173 | 2,0000 |
| 7 | 243,0 | 5000 | 6,1303 |
| 8 | 65,8 | 5000 | 6,1303 |
| 9 | 67,0 | 5000 | 6,1303 |
| 10 | 13,2 | 1854 | 2,0641 |
| 11 | 12,3 | 1715 | 2,0284 |
| 12 | 42,2 | 5000 | 6,1303 |
| 13 | 57,8 | 5000 | 6,1303 |
| 14 | 19,5 | 2844 | 3,0289 |
| 15 | 37,8 | 5000 | 6,1303 |
| 16 | 70,0 | 5000 | 6,1303 |
| 17 | 21,6 | 3182 | 3,5544 |
| 18 | 18,0 | 2605 | 2,6941 |
| 19 | 249,8 | 5000 | 6,1303 |
| 20 | 243,4 | 5000 | 6,1303 |

| | | | |
|---|---|---|---|
| 21 | 234,5 | 5000 | 6,1303 |
| 22 | 35,1 | 5000 | 6,1303 |
| 23 | 27,3 | 4114 | 5,0027 |
| 24 | 19,2 | 2796 | 2,9585 |
| 25 | 8,9 | 1203 | 1,9988 |
| 26 | 1,0 | 109 | 1,8445 |
| 27 | 7,3 | 968 | 1,9979 |
| 28 | 28,7 | 4346 | 5,3255 |
| 29 | 37,0 | 5000 | 6,1303 |
| 30 | 44,7 | 5000 | 6,1303 |
| 31 | 52,5 | 5000 | 6,1303 |
| 32 | 1,8 | 208 | 1,9560 |
| 33 | 6,1 | 795 | 1,9970 |
| 34 | 14,1 | 1993 | 2,1226 |
| 35 | 24,3 | 3621 | 4,2576 |
| 36 | 32,3 | 4947 | 6,0706 |
| 37 | 40,4 | 5000 | 6,1303 |
| 38 | 56,3 | 5000 | 6,1303 |
| 39 | 64,2 | 5000 | 6,1303 |
| 40 | 15,2 | 2164 | 2,2315 |
| 41 | 86,3 | 5000 | 6,1303 |
| 42 | 83,9 | 5000 | 6,1303 |
| 43 | 29,0 | 4396 | 5,3924 |
| 44 | 29,0 | 4396 | 5,3924 |
| 45 | 29,0 | 4396 | 5,3924 |
| 46 | 30,3 | 4612 | 5,6712 |
| 47 | 44,0 | 5000 | 6,1303 |
| 48 | 184,0 | 5000 | 6,1303 |
| 49 | 22,5 | 3327 | 3,7874 |
| 50 | 37,4 | 5000 | 6,1303 |
| 51 | 138,2 | 5000 | 6,1303 |
| 52 | 62,3 | 5000 | 6,1303 |
| 53 | 240,3 | 5000 | 6,1303 |
| 54 | 153,0 | 5000 | 6,1303 |
| 55 | 252,3 | 5000 | 6,1303 |
| 56 | 240,7 | 5000 | 6,1303 |
| 57 | 233,2 | 5000 | 6,1303 |
| 58 | 253,2 | 5000 | 6,1303 |
| 59 | 125,0 | 5000 | 6,1303 |
| 60 | 121,3 | 5000 | 6,1303 |
| 61 | 117,8 | 5000 | 6,1303 |
| 62 | 118,3 | 5000 | 6,1303 |
| 63 | 33,5 | 5000 | 6,1303 |
| 64 | 140,5 | 5000 | 6,1303 |
| 65 | 148,0 | 5000 | 6,1303 |
| 66 | 402,8 | 5000 | 6,1303 |
| 67 | 367,0 | 5000 | 6,1303 |
| 68 | 18,8 | 2732 | 2,8667 |
| 69 | 16,0 | 2289 | 2,3373 |
| 70 | 12,4 | 1731 | 2,0314 |

| | | | |
|---|---|---|---|
| 71 | 9,6 | 1307 | 2,0002 |
| 72 | 5,8 | 752 | 1,9993 |
| 73 | 15,0 | 2133 | 2,2087 |
| 74 | 17,5 | 2526 | 2,5943 |
| 75 | 20,0 | 2924 | 3,1494 |
| 76 | 35,0 | 5000 | 6,1303 |
| 77 | 37,1 | 5000 | 6,1303 |
| 78 | 36,0 | 5000 | 6,1303 |
| 79 | 33,7 | 5000 | 6,1303 |
| 80 | 32,6 | 4998 | 6,1281 |
| 81 | 121,8 | 5000 | 6,1303 |
| 82 | 31,5 | 4813 | 5,9155 |
| 83 | 19,3 | 2812 | 2,9817 |
| 84 | 67,3 | 5000 | 6,1303 |
| 85 | 140,6 | 5000 | 6,1303 |
| 86 | 142,9 | 5000 | 6,1303 |
| 87 | 238,0 | 5000 | 6,1303 |
| 88 | 11,0 | 1518 | 2,0060 |
| 89 | 265,7 | 5000 | 6,1303 |
| 90 | 379,0 | 5000 | 6,1303 |
| 91 | 384,5 | 5000 | 6,1303 |
| 92 | 403,3 | 5000 | 6,1303 |
| 93 | 174,2 | 5000 | 6,1303 |
| 94 | 397,5 | 5000 | 6,1303 |
| 95 | 168,2 | 5000 | 6,1303 |
| 96 | 105,3 | 5000 | 6,1303 |
| 97 | 234,5 | 5000 | 6,1303 |
| 98 | 234,5 | 5000 | 6,1303 |
| 99 | 33,7 | 5000 | 6,1303 |
| 100 | 33,7 | 5000 | 6,1303 |
| 101 | 33,7 | 5000 | 6,1303 |
| 102 | 33,7 | 5000 | 6,1303 |
| 103 | 33,7 | 5000 | 6,1303 |
| 104 | 33,7 | 5000 | 6,1303 |
| 105 | 33,7 | 5000 | 6,1303 |
| 106 | 33,7 | 5000 | 6,1303 |
| 107 | 33,7 | 5000 | 6,1303 |
| 108 | 33,7 | 5000 | 6,1303 |
| 109 | 33,7 | 5000 | 6,1303 |

The total average annual concentration of pollutants in the nearest residential building is:

For control point ***T.1***

| Pollutant | Average annual concentration, $mg/m^3$ |
|---|---|
| Nitrogen oxide (N2O) | 1,99E-07 |
| Acraldehyde | 3,65E-14 |
| Ammonia | 8,20E-10 |

| | |
|---|---|
| Acetaldehyde | 1,74E-09 |
| Benz[a]anthracene | 5,21E-13 |
| Benzo[a]pyrene ( µg / 100m$^3$) | 9,29E-09 |
| Benzo(k)fluoranthene | 7,81E-13 |
| Hydrogen chloride (hydrochloric acid by HCl molecule) | 2,86E-07 |
| Carbon dioxide | 0,030 |
| Carbon monoxide | 1,40E-04 |
| Dibenz[a,h]anthracene | 4,40E-13 |
| Dimethylamine | 2,20E-12 |
| Sulfur dioxide (dioxide and trioxide) in terms of sulfur dioxide | 2,01E-06 |
| Dioxins | 3,12E-18 |
| Iron and its compounds (in terms of iron) | 1,69E-07 |
| Cadmium and its compounds (in terms of cadmium) | 4,22E-10 |
| Acetic acid | 1,03E-08 |
| Xylene | 2,83E-07 |
| Manganese and its compounds in terms of manganese dioxide | 5,02E-09 |
| Methane | 1,76E-06 |
| Non-methane volatile organic compounds | 3,55E-06 |
| Nitrogen oxides (nitrogen oxide and dioxide) in terms of nitrogen dioxide | 1,91E-05 |
| Polychlorinated biphenyls | 7,27E-13 |
| Substances in the form of suspended solid particles | 6,04E-06 |
| Mercury and its compounds (in terms of mercury) | 3,97E-10 |
| Soot | 2,22E-06 |
| Lead and its compounds (in terms of lead) | 1,26E-08 |
| Hydrogen sulfide (H2S) | 4,23E-09 |
| Fluoranthene | 1,80E-11 |

The calculation of the risks of the development of non-carcinogenic effects is summarized in the table:

For control point ***T.1***

| Pollutant | Estimated average annual concentration at the border of the sanitary protection zone ($C_i$),mg/ m$^3$ | Reference (dangerous) concentration ($R_i \cdot C_i$), mg/ m3, or maximum permissible concentration (MPC), or approximate safe level | Hazard coefficient ($HQ_i$) | Critical organs / systems |
|---|---|---|---|---|
| Nitrogen dioxide | 1,91E-05 | 0,04 | 4,78E-04 | respiratory system |
| Acraldehyde | 3,65E-14 | 0,00002 | 1,83E-09 | respiratory system |
| Propionaldehyde | 2,410E-08 | 0,01 | 2,41E-06 | respiratory system |
| Ammonia | 8,20E-10 | 0,1 | 8,20E-09 | respiratory system |
| Sulfur dioxide. | 2,01E-06 | 0,08 | 2,51E-05 | respiratory system |
| Acetaldehyde | 1,74E-09 | 0,009 | 1,93E-07 | respiratory system |
| Benzo[a]pyrene | 9,29E-09 | 0,0001 | 9,29E-05 | respiratory system |
| Saturated hydrocarbons | 7,15E-06 | 1 | 7,15E-06 | CNS, skin, blood |
| Carbon monoxide | 1,40E-04 | 5 | 2,80E-05 | CNS, cardiovascular system, blood |
| Dimethylamine | 2,20E-12 | 0,005 | 4,40E-10 | respiratory system |
| Iron oxide | 1,69E-07 | 0,04 | 4,23E-06 | respiratory system |
| Valeric acid | 2,860E-07 | 0,03 | 9,53E-06 | CNS, cardiovascular system, blood |
| Acetic acid | 1,03E-08 | 0,2 | 5,15E-08 | respiratory system |
| Xylene | 2,83E-07 | 0,2 | 1,42E-06 | respiratory system |
| Manganese and its compounds | 5,02E-09 | 0,00005 | 1,00E-04 | CNS |
| Mineral oil | 4,400E-13 | 0,05 | 8,80E-12 | respiratory system |
| Methane | 1,76E-06 | 50 | 3,52E-08 | CNS, skin, blood |
| Total suspended particles (TSP) | 6,04E-06 | 0,1 | 6,04E-05 | respiratory system |
| Propanediol | 5,503E-07 | 0,03 | 1,83E-05 | respiratory system |
| Mercury and compounds | 3,97E-10 | 0,003 | 1,32E-07 | CNS |
| Soot | 2,22E-06 | 0,05 | 4,44E-05 | respiratory system |
| Hydrogen sulfide | 4,23E-09 | 0,008 | 5,29E-07 | respiratory system |
| Ethanol | 2,86E-07 | 5 | 5,72E-08 | respiratory system |
| White spirit | 2,41E-07 | 1 | 2,41E-07 | respiratory system |
| Lead and its compounds (in terms of lead) | 1,26E-08 | 0,00015 | 8,40E-05 | CNS, development, blood |

| | | | | |
|---|---|---|---|---|
| Cadmium and its compounds (in terms of cadmium) | 4,22E-10 | 0,0002 | 2,11E-06 | Kidneys, respiratory system |
| Consolidated figures | | **HI $_{overall}$** | **4,54E-04** | |
| | | HI $_{respiratory\ system}$ | 3,69E-04 | |
| | | HI $_{CNS}$ | 8,47E-05 | |
| | | HI $_{skin}$ | 5,81E-07 | |
| | | HI $_{cardiovascular\ system}$ | 8,80E-12 | |
| | | HI $_{blood}$ | 5,81E-07 | |

For control point ***T.1***

***HI $_{overall}$ = 4,54 E-04 < 1 – the risk of harmful effects is extremely small***

**1.2 The risk of developing individual carcinogenic effects.**

The risk of developing individual carcinogenic effects ($ICR_i$) from substances that have a carcinogenic effect is calculated according to the formula:

$$ICR_i = C_i \cdot UR_i,$$

where

$C_i$ – estimated average annual concentration of the i-th substance at the boundary of residential buildings, mg/m$^3$;

$UR_i$ – single carcinogenic risk of the i-th substance, mg/m$^3$.

Carcinogenic risk under the combined action of certain carcinogenic substances polluting the atmosphere ($CR_a$) is calculated according to the formula:

$$CR = \sum I\,CR_i,$$

where

$IRC_i$ – carcinogenic risk of the i-th substance;

Assessment of carcinogenic risks is carried out according to the table:

| Risk level | Lifetime risk |
|---|---|
| Unacceptable for professional groups of the population | More than $10^{-3}$ |
| Acceptable for professional groups and unacceptable for the general public | $10^{-3} - 10^{-4}$ |
| Conditionally accepted | $10^{-4} - 10^{-6}$ |
| Accepted | Less than $10^{-6}$ |

The unit carcinogenic risk of the i-th substance is determined by the formula:

$$UR_i = SF_i \cdot \frac{1}{70} \cdot 20,$$

where

$SF_i$ – the cancer slope factor, (mg/(kg*day))$^{-1}$, determined in accordance with the appendix to clause 4.3.2. methodological recommendations MR 2.2.12-142-2007 "Assessment of the risk to public health from atmospheric air pollution" approved by the order of the Ministry of Health of Ukraine dated 13.04.07 No. 184;

70 – standard human weight, kg;

20 – daily air consumption by a person, m$^3$;

The calculation of the risk of developing individual carcinogenic effects is given in the table:

For control point ***T.1***

| Pollutant | The cancer slope factor, ($SF_i$), (mg/(kg*day))$^{-1}$ | Single carcinogenic risk ($UR_i$), mg/m$^3$ | The risk of developing individual carcinogenic effects ($ICR_i$) |
|---|---|---|---|
| Benzo[a]pyrene | 3,1 | 0,8857 | 8,23E-09 |
| Acetaldehyde | 0,0077 | 0,0022 | 3,83E-12 |
| Dibenz[a,h]anthracene | 3,1 | 0,8857 | 3,90E-13 |
| Benzo(k)fluoranthene | 0,39 | 0,1114 | 8,70E-14 |
| Lead and its compounds (in terms of lead) | 0,042 | 0,0120 | 1,51E-10 |
| Carcinogenic risk of combined action | | *CRa* | **8,39E-09** |

**$CR_a$ = 8,39 * $10^{-9}$ < $10^{-6}$ – the risk of developing individual carcinogenic effects is acceptable.**

**2. *Assessment of the social risk of the impact of the planned activity***

The social risk of the planned activity is defined as a risk for groups of people that may be affected by the implementation of the object of economic activity, taking into account the features of the natural and man-made system.

The estimated value of social risk is determined by the formula:

$$R_S = CR_a \cdot V_u \cdot \frac{N}{T} \cdot (1 - N_p),$$

where

$R_S$ – social risk, person/year ;

$CR_a$ – carcinogenic risk of the combined effect of several substances, carcinogenic substances polluting the atmosphere , $10^{-6}$;

$V_u$ – the vulnerability of the territory to the manifestation of atmospheric air pollution, which is determined by the ratio of the area assigned to the object of economic activity to the area of the object with a sanitary and protective zone, a fraction of a unit; $V_u = \frac{V_o}{V_c}$, $V_o$= 19050 м$^2$, $V_o$= 87600 м$^2$, $V_u$=*0,22;*

$N$ – population of Izmail,
N = 70,731 people;

$T$ – average life expectancy is assumed to be 70 years ;

$N_p$ – for the planned activity , $N_p$ = 0:

For a control point ***T.1***

$$R_{S1.2} = 8{,}39 \cdot 10^{-9} \cdot 0{,}22 \frac{70731}{70} (1 - 0) = 1{,}87 \cdot 10^{-6}$$

The assessment of the level of social risk of the planned activity is carried out according to the table:

| Risk level | Lifetime risk |
|---|---|
| Unacceptable for professional groups of the population | More than $10^{-3}$ |
| Acceptable for professional groups and unacceptable for the general public | $10^{-3} - 10^{-4}$ |
| Conditionally accepted | $10^{-4} - 10^{-6}$ |
| Accepted | Less than $10^{-6}$ |

**$R_{S1}$ = 5,03 * $10^{-7}$ < $10^{-6}$ – the level of risk is conditionally acceptable**

**Calculation of gross emissions of pollutants in case of fire in the dryer and assessment of economic loss in case of accidental release of pollutants**

The calculation was performed based on the «Combustion of organic fuel» methodology, «Compendium of emission indicators (specific emissions) of pollutants into the atmosphere by various industries», Donetsk, 2004.

**Initial data for calculation:**

Burning material – grain;

B = 5,0 t/year – fuel consumption

$A^r$ = 2,4 % – ash content of fuel;

$Q^r$ = 15,43 MJ/kg – the lower heat of combustion of natural fuel;

The gross emission of the j-th polluting substance Ej, (t), entering the atmosphere with the flue gases of the power facility during the time period P, is determined by the formula:

$$E_j = \sum_i E_{ji} = 10^{-6} \sum_i k_{ji} B_i \left(Q_i^r\right)_i, \quad (1)$$

where $E_{ji}$ – gross emission of the j-th polluting substance during the burning of the i-th fuel during the time interval P, t;

$k_{ji}$ – emission index of the j-th pollutant for the i-th fuel, g/GJ;

$B_i$ – consumption of i-th fuel during the period of time P, t;

$(Q^r_i)_i$ – lower working heat of combustion of the i-th natural fuel, MJ/kg.

**Nitrogen oxide emissions calculation**

The generalized indicator of the emission of nitrogen oxides $k_{NOx}$ is calculated according to the formula:

$$k_{NOx} = (k_{NOx})_0 f_n (1-\eta_I)(1-\eta_{II}\beta), \text{ g/GJ;}$$

where: $(k_{NOx})_0$ = 88,0 g/GJ indicator of nitrogen oxide emissions without taking into account primary measures to reduce $NO_x$ emissions (Table D.8 of Appendix D);

$f_n$ – the degree of $NO_x$ emission reduction when operating at low load, determined by the formula: $f_n = \left(Q_a / Q_n\right)^z$,

where: $Q_a$ – actual thermal capacity of the power facility; MW;

$Q_n$ – nominal thermal capacity of the power facility, MW;

$z$ = 1,15 – an empirical coefficient that depends on the type of power facility, its capacity, type of fuel, etc., (Table D.9. Appendix D)

$\eta_I$ = 0 – the effectiveness of primary (technological) emission reduction measures (Table 7 of Appendix D);

$\eta_{II}$ = 0 – efficiency of the gas-treating system (absent);

$\beta$ = 0 – coefficient of operation of the gas treatment system.

$k_{NOx}$ = 88,0 · (1,0)$^{1,15}$ · (1 – 0) · (1 – 0) = 88,0 · 1,0 = 88,0 g/GJ

Then, according to formula (1), the gross emission of nitrogen oxides will be:

$$E_{NO_x} = 10^{-6} \cdot k_{NO_x} \cdot Q^r \cdot B = 10^{-6} \cdot 88{,}00 \cdot 15{,}43 \cdot 5{,}0 = 0{,}00679 \text{ t}$$

**Calculation of emissions of carbon**

The carbon oxide emission index $k_{CO}$ is determined by the formula:

$k_{CO}$ = $(k_{CO})_0$ · (1 – $q_4$ / 100), g/GJ

where $(k_{CO})_0$ = 120 g/GJ, generalized indicator of CO emission in the absence of mechanical incompleteness of fuel combustion (Table D.19 Appendix E);

$q_4$ = 4,0 %, fuel heat loss due to mechanical incomplete combustion of fuel in %. depending on the characteristics of furnaces of power facilities (table D.3 and D.4, appendix D).

$k_{CO}$ = 120 · (1 – 4,0/ 100) = 115,2 g/GJ

According to formula (1), the gross emission of carbon dioxide $E_{CO}$ will be:

$E_{CO} = 10^{-6} k_{CO} Q_i^r B = 10^{-6} \cdot 115{,}2 \cdot 15{,}43 \cdot 5{,}00 = 0{,}00889$ t.

**Calculation of emissions of solid particles (ash).**

The solid particle emission rate is determined by the formula:

$$k_{solid} = \frac{10^6}{Q_i^r} a_{rel} \frac{A^r}{100 - \Gamma_{rel}} (1 - \eta_{ash}) + k_{solids}, \quad \text{g/GJ},$$

where $\eta_{ash}$ = 0 – efficiency of cleaning flue gases from solid particles with a fly-ash collector (absent);

$A^r$=2,4 % – mass content of ash in fuel per working mass;

$A_{rel}$ – part of the ash that is released in the form of fly ash;

$\Gamma_{rel}$ – mass content of combustible substances in solid particles carry-over;

$k_{solid}$ –an indicator of the emission of solid products of the interaction of the sorbent and sulfur oxides and solid particles of the sorbent, g/GJ;

For this type of fuel according to Table D.2 of Appendix D:

$A_{rel} / (100 - \Gamma_{rel}) = 0{,}005$.

There is no sulfur treatment plant, therefore there is no emission of solid particles of the sorbent and products of interaction between the sorbent and sulfur oxides.

Emission index of solid particles:

$$k_{solid} = \frac{10^6}{15{,}43} \cdot 0{,}005 \cdot 2{,}4(1 - 0) = 777{,}71 \text{ g/GJ}.$$

Gross emission of solid particles:

$E_{solid} = 10^{-6} k_{solid} Q_i^r B = 10^{-6} \cdot 777{,}71 \cdot 15{,}43 \cdot 5{,}00 = 0{,}06000$ t

**Calculation of carbon dioxide emissions**

The indicator of carbon dioxide emission during the burning of grain is:

$k_{CO_2} = 3{,}67 k_C \varepsilon_C$ g/GJ;

where $k_C$ = 42,50 – carbon emission index according to Table D. 20-b of Appendix D, g/GJ;

$\varepsilon_C$ – the degree of oxidation of fuel carbon, we take 0.995;

$k_{CO_2} = 3{,}67 \cdot 42{,}5 \cdot 0{,}995 = 155{,}20$ g/GJ;

Then, according to formula (1), the gross emission of carbon dioxide will be:

$E_{CO_2} = 10^{-6} k_{CO_2} Q_i^r B = 10^{-6} \cdot 155{,}20 \cdot 15{,}43 \cdot 5{,}00 = 0{,}01197$ t

**Calculation of emissions of dinitrogen oxide**

The gross emission of nitrous oxide $N_2O$ when burning grain is calculated according to the data of table D. 21-a (appendix D) and formula (1):

$E_{N_2O} = 10^{-6} k_{N_2O} Q_i^r B = 10^{-6} \cdot 5 \cdot 15{,}43 \cdot 5{,}00 = 0{,}00039$ t

**Calculation of methane emissions**

The gross emission of $CH_4$ methane during the burning of grain is calculated according to the data of table D. 22-a (Appendix D) and formula (1):

$E_{CH_4} = 10^{-6} k_{CH_4} Q_i^r B = 10^{-6} \cdot 9 \cdot 15{,}43 \cdot 5{,}00 = 0{,}00069$ t

**Non-methane volatile organic compounds (NMVOC)**

The generalized NMVOC emission indicator for grain is $k_{NMVOC}$= 50.0 g/GJ (table D.23, appendix D). Hence the gross emission:

$E_{NMVOC} = 10^{-6} k_{NMVOC} Q_i^r B = 10^{-6} \cdot 50 \cdot 15{,}43 \cdot 5{,}00 = 0{,}00386$ t/year.

According to the results of the calculations, the estimated amount of pollutants emitted during a fire will be:

- nitrogen dioxide – 0,00679 t;
- carbon monoxide – 0,00889 t;
- saturated hydrocarbons– 0,00386 t;
- suspended particles, undifferentiated by composition (ash) – 0,06000 t;
- methane – 0,00069 t;
- dinitrogen oxide – 0,00039 t;
- carbon dioxide – 0,01197 t.

In addition, when the equipment is destroyed, grain dust is released into the atmosphere. According to international contracts, the maximum permissible grain contamination is 2.0%. Accordingly, the emission of suspended particles, undifferentiated by composition, will be 5.0 2.0% = 0.1 t.

Emissions into the atmosphere in the case of an emergency are above the norm, therefore economic losses from them are calculated in accordance with the «Methodology for calculating the amount of compensation for loss caused to the state as a result of excessive emissions of pollutants into the atmosphere».

The amount of loss for the excessive emissions of one ton of a pollutant into the atmosphere is calculated based on the minimum wage multiplied by a factor of 1.1, and taking into account the regulatory coefficients and the relative danger index of each pollutant.

The amount of loss is calculated according to the formula

$L = m_i \cdot 1{,}1P \cdot A_i \cdot K_t \cdot K_{pi}$,

where L - the amount of loss, UAH;

$m_i$ - the mass of the i-th pollutant released into the atmosphere above the norm, t;

1,1P - the amount of the minimum wage (P) for one ton of conditional polluting substance, multiplied by the factor (1.1), UAH/t;

$A_i$ - a dimensionless indicator of the relative danger of the i-th pollutant;

$K_t$ - coefficient that takes into account territorial socio-ecological features;

$K_{pi}$ - coefficient that depends on the level of atmospheric pollution of the settlement with the i-th pollutant.

The total amount of loss is calculated as the sum of the amounts of loss for the excessive emission into the atmosphere of each of the polluting substances.

The dimensionless indicator of the relative danger of the i-th pollutant ($A_i$) is determined from the ratio according to the formula:

$A_i = 1/MPC_i$,

where $MPC_i$,- average daily maximum permissible concentration or approximately safe level of influence (ASLoI) of the i-th pollutant, mg/m$^3$.

For substances with MPC greater than one, a correction factor of 10 is introduced in the numerator.

For substances for which there is no value of the average daily limit-permissible concentration when determining the indicator of relative danger, the value of the maximum single MPC of the pollutant in the atmosphere is taken. For substances for which there are no values of MPC and ASLoI, the relative hazard index $A_i$ is taken as equal to 500.

The coefficient that takes into account territorial socio-ecological features ($K_t$) depends on the population of the settlement, and its national economic value and is calculated according to the formula: $K_t = K_{pop.} \cdot K_a$,

where $K_{pop.}$ - coefficient depends on the population of the settlement.

For the Izmail $K_{pop.} = 1{,}00$;

$K_a$ - coefficient that takes into account the national economic value of the settlement

For the Izmail $K_a = 1{,}00$;

The coefficient, which depends on the level of atmospheric pollution of the settlement with the i-th polluting substance ($K_{pi}$), is determined by the formula:

$$K_{pi} = \frac{\rho \cdot B_i}{\text{MPC}_{adi}}$$

where $\rho_{Bi}$ - is the average annual concentration of the i-th polluting substance according to direct instrumental measurements at stationary stations for the previous year, mg/m$^3$;

$MPC_{adi}$ - average daily maximum permissible concentration of the i-th pollutant, mg/m$^3$.

The results of the economic loss calculation are given in the Table

| Pollutant name | The volume of emissions /discharges of pollutants resulting from the accident, i.e. t | The amount of the minimum wage at the time of the accident, P, UAH., | The value of MPC, mg/m$^3$ | Average annual concentration of pollutant according to direct instrumental measurements, mg/m$^3$ | The coefficient that takes into account territorial socio-ecological features ($K_t$) | The coefficient, which depends on the level of pollution, $K_{pi}$ | Amount of loss, UAH |
|---|---|---|---|---|---|---|---|
| Fire | | | | | | | |
| Solid* (ash) | 0,06000 | 6500,00 | 0,15 | 0,11195 | 1 | 1 | 3802,08 |
| Carbon monoxide | 0,00889 | | 3 | 1,19262 | | | 21,19 |
| Nitrogen oxides ($NO_2$+$N_2O$) | 0,00718 | | 0,04 | 0,09025 | | | 25735,88 |
| Saturated hydrocarbons | 0,00386 | | 1 | – | | | 27,60 |
| Total | | | | | | | **29586,75** |
| Destruction of equipment | | | | | | | |
| Solid* (grain dust) | 0,10000 | 6500,00 | 0,15 | 0,11195 | 1 | 1 | **6336,81** |

## Predictive calculations of the distribution of waters contaminated by oil products. Simulation of an emergency situation

The performed calculations are simulations of emergency situations regarding the spread of oil-contaminated waters in the water area of the Danube River. The main characteristics of the water movement of the oil pollution zone include:

$\tau_{CMax}$ - the time it takes for the zones with the maximum concentration of oil products to reach the given control point;

$C_{max,X}$ - the maximum concentration of oil products in a given control point;

$\tau_{X, фр}$, $\tau_X$, the minimum time through which the frontal and tail parts of waters polluted by oil products reach the given control point;

$\tau_{X,c}$ - the length of time during which a concentration of oil products at a high pollution level can be expected in a given control point.

A number of assumptions were made when conducting predictive calculations of the spread of water contaminated with oil products:

- - the distribution of oil product concentration values in the zone of high pollution has approximately the same shape over the entire width;
- - the contours of the cross section are close to a rectangle;
- – vertical mixing of water occurs almost instantly.

These assumptions allow us to base the model on the well-known solution of the one-dimensional dispersion equation for a point discharge of a substance into a water stream:

$$C_{L,\tau} = \frac{m_в}{F(4\pi D_x \tau)^{0,5}} \exp\left[-\frac{(L_x - v\tau)^2}{4D_x\tau} - K\tau\right]$$

where $C_{L,X}$ the average concentration of the substance in the water flow at a distance $L_X$ after time $\tau$, g/m$^3$;

$m_в$ - the initial mass of the substance discharged into the watercourse, g;

F - cross-sectional area of the water flow, m$^2$;

$D_X$ - longitudinal dispersion coefficient, m$^2$/s;

$\tau$ - the time elapsed from the beginning of the discharge of the substance into the watercourse, s;

K - coefficient of water self-purification rate from the discharged substance, 1/s.

To solve the problem, it is expedient to consider the longitudinal distribution of substance concentration values as the only set of such point discharges of substances. This condition allows us to transform the equation into the following form $C_{L,x} = C_{N,x} = C_ф + \sum_{n=1}^{N} C_{N,x}$,

where

$$C_{N,n} = \frac{(C_N - C_ф)v\Delta\tau_0}{2(\pi D_x \tau_{N,n})^{0,5}} \exp\left[-\frac{(L_x - v\tau_{N,n})}{4D_x\tau_{N,n}} - K\tau_{N,n}\right]$$

$$\tau_{N,n} = \frac{L_x}{\bar{v}} + (N-n)\Delta\tau_0$$

$C_{N,\tau}$ - the concentration of the substance in the Nth segment of the distribution of the concentration values of the substance in the given control point, taking into account the formation of the concentrations of the substance in all segments of this distribution of concentration values, g/m$^3$;

$C_{ф(к)}$ - concentration of a pollutant in a given control point before passing through it a zone of highly polluted waters, g/m$^3$;

$C_{nn}$ - the concentration of a pollutant in a given control point of the river in the Nth segment (or time period) of the distribution of increased concentrations according to the recalculation of the concentration values of this substance from the Nth segment (without taking into account the influence of the formation of concentration values in neighboring segments, i.e. the Nth segment considered here in isolation from the last part of the distribution of concentration values), g/m$^3$;

$C_N$- - concentration of the pollutant in the N-th segment of the distribution of concentration values in the initial point of the water body, g/m3;

$\Delta_{\tau 0}$ - time step when dividing the distribution of increased values of substance concentration into segments in this zone of highly polluted waters;

N - number of the segment in the initial distribution of substance concentration values for which extrapolation calculations are performed;

n - the number of the next segment with concentration $C_N$, included in the calculations $C_{N,n}$;

$N_c$ - the total number of segments taken to describe the distribution of substance concentration values (the number of segments in the initial and final sections should be the same).

The set of $C_{N,n}$ points allows you to reproduce the entire distribution of substance concentration values in a given control point of a water body.

To carry out prognostic calculations of the spread of highly polluted water zones by a water body, the following initial information is used:

- the total length of the section (sections) of the water body $L_x$ (m) from the starting point to the given x-th control line, 500 m;

- the value of the concentration of the $C_N$ pollutant (mg/dm$^3$) during passage through this point of the oil-contaminated zone is assumed to be 5 mg/dm3;

- approximate concentration of the pollutant $C_{ф(к)}$ (mg/dm$^3$) in the control point of the water body specified for the calculations before the accident, taken according to the data of laboratory studies 0.01 mg/dm$^3$;

- the value of time $\tau_N$ (s), starting from the moment when high concentrations of the pollutant were fixed, the corresponding value of $C_N$ was obtained;

- duration $\tau_0$ (s) (before the start of predictive calculations) of the presence of high concentrations of oil products in the water of a water body in the initial point;

- the value of the self-purification rate coefficient K (1/s) of the waters of the water body from oil products (in the absence of data, K = 0 1/s is taken);

- approximate time $\tau_c$ (s), during which self-purification of the water of the water body from oil products does not occur below the initial control point (in the absence of data, $\tau_c$ = 0 s is taken);

- average speed of water flow $\upsilon$cp,j (m/s) on the j-th selected characteristic area, taken as 0.5 m/s;

- the average depth of the water flow $H_j$ (m) in the j-th selected characteristic area, 7.32 m;

- the average width of the water flow $B_j$ (m) on the j-th selected characteristic area, 465 m;

- coefficient of roughness of the the channel of a water object, $n_{ш,j}$ on its j-th selected section, taken as 0.04;

- coefficient characterizing the tortuosity of the channel of the water body, taken equal to 1.1 and within the mixing of surface and polluted waters is the ratio of the distances along the fairway and the straight line;

- water discharge $Q_j$ (m$^3$/s) in the j-th control point of the river, taken as 6430 m$^3$/s.

Calculations of the initial data are carried out as follows.

The expected minimum $\tau_{x,фр}$ time, when the frontal part of the zone of highly polluted waters will reach the given control point of the water object, is calculated according to the formula:

$$\tau_{x,фр} = \frac{1}{v^*}\left(L_x - 5{,}01\sqrt{D_x\tau_{cm}}\right)$$

If the initial data $t_к$ has the expected $\tau_x$, the minimum time when the tail part of the zone of highly polluted waters will reach the control point of the water body, counting from the time $t_к$, is determined by the formula

$$\tau_{x,хв} = \frac{1}{v^*}\left(L_x + 5{,}01\sqrt{D_x\tau_{cm}}\right)$$

Calculations of the Chézy coefficient c are made according to the formula:

$$c = \frac{H^{2{,}5\sqrt{n^*_ш} - 0{,}13 - 0{,}75\sqrt{H}\left(\sqrt{n_ш} - 0{,}1\right)}}{n^*_ш}$$

$$c = \frac{7{,}32^{2{,}5\sqrt{0{,}04} - 0{,}13 - 0{,}75\sqrt{7{,}32}\left(\sqrt{0{,}04} - 0{,}1\right)}}{0{,}04} = 34{,}865$$

Longitudinal dispersion coefficients $D_x$ are calculated according to the formula:

$$D_x = 43000 H v_x c^{-2{,}63}$$

$$D_x = 43000 \cdot 7{,}32 \cdot 0{,}5 \cdot 34{,}865^{-2{,}63} = 13{,}819$$

Calculations of the total number of the main segments $N_c$,, which are used to describe the longitudinal profile of the distribution of high concentrations of oil products in the original control point, are carried out according to the formulas:

$$N_c = \frac{\tau_0}{\Delta\tau_0} = 10$$

$$\Delta\tau_0 = \frac{0{,}1\tau_0}{1 + 0{,}001\tau_0},$$

at the same time, if $\frac{\tau_0}{\Delta\tau_0} < 50$, then it is assumed that $\Delta\tau_0 = \frac{\tau_0}{50}$ ; if $\frac{\tau_0}{\Delta\tau_0} < 1000$ , then it is assumed that $\Delta\tau_0 = \frac{\tau_0}{1000} = 10$.

After calculating the number of main segments $N_c$ in the zone of high concentrations of oil products in the initial point, each of them is given a serial number and the time that has passed since the beginning of registration in this point of concentrations at the level of $C_{вз}$. The temporal characteristics of the segments of the substance concentration distribution in the initial point will have the form $N_{\Delta\tau 0}$,, in the given control point after time $\tau_{ст} = (\tau_{ст} + N_{\Delta\tau 0})$, where N is the sequence number of the segment.

Calculations of the longitudinal profile of the concentration distribution of the pollutant in the zone of highly polluted waters when it passes through the specified control point are carried out according to the following stages.

Parameter definition $\tau_{N,n}$:

$$\tau_{N,n} = \tau_{cm} \pm n\Delta\tau 0,$$

where $\tau_{N,n}$ - the time value for calculating the change in the concentration of the substance in the n-x segments that "participate" in the formation of $C_N$ values;

n is the serial number of the segment with $C_N$. concentration used for calculations of the $C_{N,n}$ value.

Parameter calculation $C_{N,n}$:

$$C_{N,n} = \frac{(C_N - C_\phi)v\Delta\tau_0}{2(\pi D_x \tau_{N,n})^{0,5}} \exp\left[ -\frac{(L_x - v\tau_{N,n})^2}{4D_x\tau_{N,n}} - K(\tau_{N,n} - \tau_з) \right]$$

Calculations of the pollutant concentration in N-x segments in the given control point of the river:

$$C_{N,n} = C_\phi + \sum_{n=1}^{N} C_{N,n}$$

The results of the calculations are given in tabular form

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **τ'N,** | 29,09090 | 38,18180 | 47,27270 | 56,36360 | 65,45450 |
| **exp** | 0,22616 | 0,37549 | 0,53051 | 0,68846 | 0,84812 |
| **C'N** | 0,2797 | 0,2103 | 0,1618 | 0,1266 | 0,1001 |

| | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|
| **τ'N,** | 74,54540 | 83,63630 | 92,72720 | 101,81810 | 110,90900 |
| **exp** | 1,00886 | 1,17034 | 1,33233 | 1,49470 | 1,65735 |
| **C'N** | 0,0799 | 0,0642 | 0,0518 | 0,0420 | 0,0342 |

| | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|
| **τ'N,** | 119,9999 | 129,0908 | 138,1817 | 147,2726 | 156,3635 |
| **exp** | 1,82023 | 1,98327 | 2,14646 | 2,30976 | 2,47316 |
| **C'N** | 0,0280 | 0,0229 | 0,0188 | 0,0155 | 0,0128 |

| | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|
| **τ'N,** | 165,4544 | 174,5453 | 183,6362 | 192,7271 | 201,8180 |
| **exp** | 2,63663 | 2,80017 | 2,96377 | 3,12741 | 3,29109 |
| **C'N** | 0,0105 | 0,0087 | 0,0072 | 0,0060 | 0,0050 |

| | 21 | 22 | 23 | 24 | 25 |
|---|---|---|---|---|---|
| **τ'N,** | 210,9089 | 219,9998 | 229,0907 | 238,1816 | 247,2725 |
| **exp** | 3,45482 | 3,61857 | 3,78235 | 3,94616 | 4,10999 |
| **C'N** | 0,0041 | 0,0034 | 0,0028 | 0,0024 | 0,0020 |

| | 26 | 27 | 28 | 29 | 30 |
|---|---|---|---|---|---|
| **τ'N,** | 256,3634 | 265,4543 | 274,5452 | 283,6361 | 292,7270 |
| **exp** | 4,27384 | 4,43770 | 4,60159 | 4,76548 | 4,92939 |
| **C'N** | 0,0016 | 0,0014 | 0,0011 | 0,0010 | 0,0008 |

| | 31 | 32 | 33 | 34 | 35 |
|---|---|---|---|---|---|
| **τ'N,** | 301,8179 | 310,9088 | 319,9997 | 329,0906 | 338,1815 |
| **exp** | 5,09331 | 5,25725 | 5,42119 | 5,58514 | 5,74910 |
| **C'N** | 0,0007 | 0,0006 | 0,0005 | 0,0004 | 0,0003 |

| | 36 | 37 | 38 | 39 | 40 |
|---|---|---|---|---|---|
| **τ'N,** | 347,2724 | 356,3633 | 365,4542 | 374,5451 | 383,6360 |
| **exp** | 5,91307 | 6,07704 | 6,24103 | 6,40501 | 6,56901 |

| $C'_N$ | 0,0003 | 0,0002 | 0,0002 | 0,0002 | 0,0001 |
|---|---|---|---|---|---|

| | **41** | **42** | **43** | **44** | **45** |
|---|---|---|---|---|---|
| $\tau'_N$, | 392,7269 | 401,8178 | 410,9087 | 419,9996 | 429,0905 |
| **exp** | 6,73300 | 6,89701 | 7,06102 | 7,22503 | 7,38905 |
| $C'_N$ | 0,0001 | 0,0001 | 0,0001 | 0,0001 | 0,0001 |

| | **46** | **47** | **48** | **49** | **50** |
|---|---|---|---|---|---|
| $\tau'_N$, | 438,1814 | 447,2723 | 456,3632 | 465,4541 | 474,5450 |
| **exp** | 7,55307 | 7,71709 | 7,88112 | 8,04515 | 8,20918 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | **51** | **52** | **53** | **54** | **55** |
|---|---|---|---|---|---|
| $\tau'_N$, | 483,6359 | 492,7268 | 501,8177 | 510,9086 | 519,9995 |
| **exp** | 8,37322 | 8,53725 | 8,70130 | 8,86534 | 9,02938 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | **56** | **57** | **58** | **59** | **60** |
|---|---|---|---|---|---|
| $\tau'_N$, | 529,0904 | 538,1813 | 547,2722 | 556,3631 | 565,4540 |
| **exp** | 9,19343 | 9,35748 | 9,52153 | 9,68559 | 9,84964 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | **61** | **62** | **63** | **64** | **65** |
|---|---|---|---|---|---|
| $\tau'_N$, | 574,5449 | 583,6358 | 592,7267 | 601,8176 | 610,9085 |
| **exp** | 10,01370 | 10,17776 | 10,34182 | 10,50588 | 10,66994 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | **66** | **67** | **68** | **69** | **70** |
|---|---|---|---|---|---|
| $\tau'_N$, | 619,9994 | 629,0903 | 638,1812 | 647,2721 | 656,3630 |
| **exp** | 10,83401 | 10,99807 | 11,16214 | 11,32621 | 11,49028 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | **71** | **72** | **73** | **74** | **75** |
|---|---|---|---|---|---|
| $\tau'_N$, | 665,4539 | 674,5448 | 683,6357 | 692,7266 | 701,8175 |
| **exp** | 11,65435 | 11,81842 | 11,98249 | 12,14656 | 12,31064 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | **76** | **77** | **78** | **79** | **80** |
|---|---|---|---|---|---|
| $\tau'_N$, | 710,9084 | 719,9993 | 729,0902 | 738,1811 | 747,2720 |
| **exp** | 12,47471 | 12,63879 | 12,80286 | 12,96694 | 13,13102 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | **81** | **82** | **83** | **84** | **85** |
|---|---|---|---|---|---|
| $\tau'_N$, | 756,3629 | 765,4538 | 774,5447 | 783,6356 | 792,7265 |
| **exp** | 13,29510 | 13,45917 | 13,62325 | 13,78734 | 13,95142 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 86 | 87 | 88 | 89 | 90 |
|---|---|---|---|---|---|
| $\tau'_N$, | 801,8174 | 810,9083 | 819,9992 | 829,0901 | 838,1810 |
| exp | 14,11550 | 14,27958 | 14,44366 | 14,60775 | 14,77183 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 91 | 92 | 93 | 94 | 95 |
|---|---|---|---|---|---|
| $\tau'_N$, | 847,2719 | 856,3628 | 865,4537 | 874,5446 | 883,6355 |
| exp | 14,93591 | 15,10000 | 15,26408 | 15,42817 | 15,59226 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 96 | 97 | 98 | 99 | 100 |
|---|---|---|---|---|---|
| $\tau'_N$, | 892,7264 | 901,8173 | 910,9082 | 919,9991 | 929,0900 |
| exp | 15,75634 | 15,92043 | 16,08452 | 16,24861 | 16,41269 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 101 | 102 | 103 | 104 | 105 |
|---|---|---|---|---|---|
| $\tau'_N$, | 938,1809 | 947,2718 | 956,3627 | 965,4536 | 974,5445 |
| exp | 16,57678 | 16,74087 | 16,90496 | 17,06905 | 17,23314 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 106 | 107 | 108 | 109 | 110 |
|---|---|---|---|---|---|
| $\tau'_N$, | 983,6354 | 992,7263 | 1001,8172 | 1010,9081 | 1019,9990 |
| exp | 17,39723 | 17,56132 | 17,72541 | 17,88951 | 18,05360 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 111 | 112 | 113 | 114 | 115 |
|---|---|---|---|---|---|
| $\tau'_N$, | 1029,090 | 1038,181 | 1047,272 | 1056,363 | 1065,454 |
| exp | 18,21769 | 18,38178 | 18,54588 | 18,70997 | 18,87407 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 116 | 117 | 118 | 119 | 120 |
|---|---|---|---|---|---|
| $\tau'_N$, | 1074,544 | 1083,635 | 1092,726 | 1101,817 | 1110,908 |
| exp | 19,03814 | 19,20224 | 19,36634 | 19,53043 | 19,69453 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 121 | 122 | 123 | 124 | 125 |
|---|---|---|---|---|---|
| $\tau'_N$, | 1119,999 | 1129,090 | 1138,181 | 1147,272 | 1156,363 |
| exp | 19,85862 | 20,02272 | 20,18682 | 20,35091 | 20,51501 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 126 | 127 | 128 | 129 | 130 |
|---|---|---|---|---|---|
| $\tau'_N$, | 1165,453 | 1174,544 | 1183,635 | 1192,726 | 1201,817 |
| exp | 20,67909 | 20,84319 | 21,00728 | 21,17138 | 21,33548 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 131 | 132 | 133 | 134 | 135 |
|---|---|---|---|---|---|
| $\tau'_N$, | 1210,908 | 1219,999 | 1229,090 | 1238,181 | 1247,272 |
| exp | 21,49958 | 21,66368 | 21,82777 | 21,99187 | 22,15597 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 136 | 137 | 138 | 139 | 140 |
|---|---|---|---|---|---|
| $\tau'_N$, | 1256,362 | 1265,453 | 1274,544 | 1283,635 | 1292,726 |
| exp | 22,32005 | 22,48415 | 22,64825 | 22,81235 | 22,97645 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 141 | 142 | 143 | 144 | 145 |
|---|---|---|---|---|---|
| $\tau'_N$, | 1301,817 | 1310,908 | 1319,999 | 1329,090 | 1338,181 |
| exp | 23,14055 | 23,30465 | 23,46875 | 23,63285 | 23,79695 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 146 | 147 | 148 | 149 | 150 |
|---|---|---|---|---|---|
| $\tau'_N$, | 1347,271 | 1356,362 | 1365,453 | 1374,544 | 1383,635 |
| exp | 23,96103 | 24,12513 | 24,28923 | 24,45333 | 24,61743 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 151 | 152 | 153 | 154 | 155 |
|---|---|---|---|---|---|
| $\tau'_N$, | 1392,726 | 1401,817 | 1410,908 | 1419,999 | 1429,090 |
| exp | 24,78153 | 24,94563 | 25,10973 | 25,27384 | 25,43794 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 156 | 157 | 158 | 159 | 160 |
|---|---|---|---|---|---|
| $\tau'_N$, | 1438,180 | 1447,271 | 1456,362 | 1465,453 | 1474,544 |
| exp | 25,60202 | 25,76612 | 25,93022 | 26,09433 | 26,25843 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 161 | 162 | 163 | 164 | 165 |
|---|---|---|---|---|---|
| $\tau'_N$, | 1483,635 | 1492,726 | 1501,817 | 1510,908 | 1519,999 |
| exp | 26,42253 | 26,58663 | 26,75073 | 26,91483 | 27,07894 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 166 | 167 | 168 | 169 | 170 |
|---|---|---|---|---|---|
| $\tau'_N$, | 1529,089 | 1538,180 | 1547,271 | 1556,362 | 1565,453 |
| exp | 27,24302 | 27,40712 | 27,57123 | 27,73533 | 27,89943 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 171 | 172 | 173 | 174 | 175 |
|---|---|---|---|---|---|
| $\tau'_N$, | 1574,544 | 1583,635 | 1592,726 | 1601,817 | 1610,908 |
| exp | 28,06353 | 28,22764 | 28,39174 | 28,55584 | 28,71995 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 176 | 177 | 178 | 179 | 180 |
|---|---|---|---|---|---|
| $\tau'_N$, | 1619,998 | 1629,089 | 1638,180 | 1647,271 | 1656,362 |
| exp | 28,88403 | 29,04813 | 29,21224 | 29,37634 | 29,54044 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 181 | 182 | 183 | 184 | 185 |
|---|---|---|---|---|---|
| $\tau'_N$, | 1665,453 | 1674,544 | 1683,635 | 1692,726 | 1701,817 |
| exp | 29,70455 | 29,86865 | 30,03275 | 30,19686 | 30,36096 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 186 | 187 | 188 | 189 | 190 |
|---|---|---|---|---|---|
| $\tau'_N$, | 1710,907 | 1719,998 | 1729,089 | 1738,180 | 1747,271 |
| exp | 30,52505 | 30,68915 | 30,85325 | 31,01736 | 31,18146 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 191 | 192 | 193 | 194 | 195 |
|---|---|---|---|---|---|
| $\tau'_N$, | 1756,362 | 1765,453 | 1774,544 | 1783,635 | 1792,726 |
| exp | 31,34557 | 31,50967 | 31,67377 | 31,83788 | 32,00198 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

| | 196 | 197 | 198 | 199 | 200 |
|---|---|---|---|---|---|
| $\tau'_N$, | 1801,816 | 1810,907 | 1819,998 | 1829,089 | 1838,180 |
| exp | 32,16607 | 32,33017 | 32,49428 | 32,65838 | 32,82249 |
| $C'_N$ | 0,0000 | 0,0000 | 0,0000 | 0,0000 | 0,0000 |

Based on the above, the results of calculations that simulate an emergency situation of oil pollution of surface waters of the Danube River in the area of activity of "NIBULON" JV LLC are:

$\tau_{x,фр}$ = 833.24 s, or 14 min. - time after an emergency discharge of oil products, when the frontal part of the zone of waters polluted with oil products reaches the specified control point of the water body (500 m downstream);

$\tau_{C,max}$ = 1166.76 s, or 19 min. - time after an emergency discharge of oil products, when the maximum concentration of oil products will be observed in the control point;

0.2797 mg/dm$^3$ is the maximum concentration of oil products in the control point.

**Calculation of economic damage to the aquatic environment.**

The discharge of pollutants into a water body in the event of an emergency is determined in accordance with the "Methodology for calculating the amount of compensation for damages caused to the state due to violations of the legislation on the protection and rational use of water resources", approved by order of the Ministry of Natural Resources No. 389 of 07.20.2009.

Calculation of the amount of compensation for damages caused to water bodies as a result of pollution by substances, in pure form as part of products or raw materials, in UAH, is carried out according to the formula:

$$C = K_c \cdot K_{кат} \cdot K_p \cdot k_з \cdot M_i \cdot \gamma_i ,$$

where $K_c = 1,5$ - a coefficient that takes into account the increase in damage caused to the aquatic ecosystem during an emergency discharge;

$K_{кат}$ - the coefficient that takes into account the category of the water body, for the Danube River, it is accepted as a water body for fishery use, $K_{кат} = 2.5$;

$K_p$ - the regional coefficient of scarcity of water resources of surface water, which is determined in accordance with Appendix 3, for the Odesa region $K_p = 1,26$;

$k_з = 1,5$ - the coefficient of damage to the aquatic ecosystem;

$M_i$ - the mass of the discharged pollutant into the water body as part of products or raw materials, we take 2.0 $m^3$ = 1.70 t;

γi - specific economic damage from water pollution, attributed to 1 ton of conditional pollutant, UAH/t, which is determined by the formula

$$\gamma i = \gamma \cdot A_i,$$

where γ is the indexed specific economic losses from the pollution of water resources in the current year, UAH/t, determined by the formula

$$\gamma = \gamma_{\Pi} \cdot \frac{I}{100}$$

де $\gamma_П$ - where $\gamma_П$ - indexed specific economic losses from water pollution in the previous year, UAH/t;

Indexed specific economic losses from water pollution ($\gamma_П$) in 2011 amount to UAH 766.96/t.

I - inflation index (consumer price index), average annual growth rate for the previous year, the inflation index is: for 2011 – 104.6%, for 2012 – 99.8%,
for 2013 – 100.5%, for 2014 – 124.9%, for 2015 – 143.3%, for 2016 – 112.4%, for 2017 – 113.7%, for 2018 – 109 .8%, for 2019 – 104.1%, for 2020 – 105.0%, for 2021 – 110.0%,

$A_i$ - dimensionless indicator of the relative danger of the i-th pollutant, which is determined from the ratio according to the formula: $A_i = \frac{1}{MPC_I}$

where $MPC_i$ is a dimensionless value numerically equal to the $MPC_i$ of the pollutant in the water of the water body of the corresponding category.

For substances with MPC equal to one or more, a correction factor of 10 is entered in the numerator ($A_i = 10/MPC$).

Since 2012, the indexation of the specific economic loss from the pollution of water resources attributed to 1 ton of conditional pollutant has been carried out annually, UAH /t.

The result of the calculation of economic losses to the aquatic environment is shown in the table:

| The name of the pollutant | The mass of the discharged pollutant into the water body, t | Indexed specific economic losses from water pollution in the current year, UAH /t | Value of MPC, mg/m$^3$ | A dimensionless indicator of the relative danger of the i-th pollutant,A | Correction coefficients ($K_c \cdot K_{кат} \cdot K_p \cdot k_з$) | Amount of damages, UAH. |
|---|---|---|---|---|---|---|
| Oil products | 1,70 | 2429,83 | 0,3 | 3,33 | 7,0875 | ***97490,46*** |

Based on the results of the calculations, it follows that in the event of an emergency situation associated with the discharge of 2 m$^3$ of oil into the Danube, the amount of economic damage to the environment is 97,490.46 UAH.

After the emergency release of oil products, water contaminated with oil products will reach the control point located 500 m downstream within 1 hour 46 min, while the maximum concentration of oil products in the control site will be 1.17470 mg/dm$^3$.

(date of official publication in the Unified Register of Environmental Impact Assessments (automatically generated by the Register maintenance software, not specified by the business entity)

20225199566

(registration number of the environmental impact assessment case of the planned activity) (automatically generated by the Register maintenance software, for the paper version is indicated business entity

# NOTIFICATION
## of planned activities subject to environmental impact assessment

***LIMITED LIABILITY COMPANY AGRICULTURAL ENTERPRISE "NIBULON" (NIBULON LLC).,***

***Code of the Unified State Register of Enterprises and Organizations of Ukraine – 14291113***

(full name of the legal entity, code according to the CUSREOU or surname, name and patronymic of a natural person - an entrepreneur, identification code or series and passport number (for natural persons who, due to their religious beliefs, refuse to accept the registration number of the taxpayer's registration card and have officially reported this to the relevant supervisory authority and have a mark in their passport)

informs about the intention to carry out the planned activity and the assessment of its impact on the environment.

1. Information about the business entity

***Legal Address: Ukraine, 54002, Mykolayiv region, Mykolayiv City, 1 KABOTAZHNYY SPUSK.***
***Postal Address: Ukraine, 54000, Mykolayiv region, Mykolayiv City, 9-B Falieievska Str., tel: (0512) 48-94-28***

(location of a legal entity or place of business of an individual entrepreneur (postal code, address), contact phone number)

2. Planned activity, its characteristics, technical alternatives*.

Планована діяльність, її характеристика.

***Planned activities are a new construction of a transport infrastructure object - a river port (terminal) in Izmail, Izmail District, Odesa Region with a railway access track - adjacency to the Izmail station of the "Odesa Railway" regional branch.***

***The planned activity includes the construction and operation of hydraulic facilities of the port (cargo berths, operational water area with an approach channel), an access railway track, a production transshipment complex for grain, leguminous and oil crops (railway and road reception facilities, dryer, storage containers, shipping devices for water and road transport), a fueling station (drainage railway overpass, two underground tanks, fueling stations for motor vehicles and watercraft).***

***The construction of the operational water area with an approach channel involves dredging to a depth of 7.32 m, in the future - 8.23 m from the "0" of the Izmail sea port with the excavation of bottom soil in the volume of 112.0 thousand m3 and its storage in the coastal heap.***

***The location of the project works is on the left bank of the Danube River, industrial enterprises are downstream: Service Station "BLAZ", SE "Izmail Sea Trading Port", Izmail***

*Cannery, PJSC "Ukrainian Danube Shipping Company", SE "Administration of Sea Ports of Ukraine", Fish Processing Plant "Danube" LLC/*

Technical alternative 1.

***To ensure the operation of the transshipment complex for grain, leguminous and oil crops, the following buildings and structures are planned to be located on the allocated site: an administrative and household building with a laboratory and a canopy, a transformer substation with a distribution point and an operator's office, an operator's weighing station, a cafe for staff and agricultural producers, a mechanical workshop with a garage, a warehouse, a post office, three toilets, home for business travelers.***

***It will be used for transport: the railway of the New Izmail station of the Odesa Railway regional branch, internal waterways of Ukraine, national and local highways.***

***It is planned to receive grain and oil crops through the unloading posts of road and railway transport, equipped with built-in transport mechanisms.***

***This alternative is the optimal option for selecting buildings and equipment with technical characteristics that will ensure their unification into a technological complex.***

***Water supply for the needs of the river port (household and practical needs, industrial, fire-fighting needs, and needs for land improvement) from the surface water intake from the Danube, which is the object of new construction***

Technical alternative 2.

***Water supply of the household and practical needs, production and fire protection needs of the port due to the connection of the port water supply to the municipal networks, provision of the needs for the improvement of the territory – from the surface water intake from the Danube River, which is the object of new construction***

* The business entity has the right to consider more technical and territorial alternatives

3. Place of implementation of the planned activity, territorial alternatives.

Place of implementation of the planned activity: territorial alternative 1.

***The city of Izmail of the Izmail district of Odesa region within the boundaries of Portova street, Luki Kapikrayana Embankment and Dunayska street, on the banks of the Danube River.***

***The specified territory is located in the industrial zone of the city of Izmail with saturated coastal infrastructure and intensive shipping and is promising for joining the existing transport and energy infrastructure, and also meets the requirements for the construction and operation of a transshipment complex for grain, leguminous and oil crops, which is planned to be built.***

***The planned activity requires the allocation for use for a period of 49 years of two land plots, classifying them as "Transport land": an area of 19.0 ha from reserve lands and an area of 5.29 ha from water fund lands***

Place of implementation of the planned activity: territorial alternative 2.

***Not considered, territorial alternative 1 is the best option for placing the river port (terminal).***

4. Socio-economic impact of the planned activity

***The construction of a river port (terminal) on the Danube River with the possibility of delivering grain cargoes by rail and road to the border zone is strategically important for***

***ensuring the food security of the state in wartime conditions and is aimed at the development of agricultural production and the region as a whole.***

5. General technical characteristics, including the parameters of the planned activity (power, length, area, volume of production, etc.)

***The total area of the site planned for the construction and operation of the river port (terminal) transport infrastructure facility is 19.0 hectares from reserve lands and 5.29 hectares from water fund lands. The area of the planned development is 7.0 hectares.***

***The territory is free from construction by capital structures and is overgrown with self-sowing green plantations, according to the results of the commission survey of green plantations, it was determined that 841 emergency and dead trees and 740 bushes are subject to removal.***

***Reception of grain cargoes is planned to be carried out by road, rail and water transport. The technological scheme of the complex provides for the possibility of simultaneous reception and shipment operations and ensures the simultaneous reception of three types of grain crops through the unloading points of motor vehicles; the possibility of simultaneously performing internal operations (bringing them to marketable conditions (cleaning, drying) and moving grain from silo to silo for airing or forming a batch of shipment) and external operations (reception and shipment); stability of the complex.***

***Operation of the transshipment complex includes the following technological operations: laboratory quality control of grain, leguminous and oil crops; weighing loaded and empty road transport; reception of grain cargoes from road, rail and water transport; transportation of grain cargoes from landfill pits by conveyors (belt, chain) and norias for their further storage or processing (cleaning, drying); moving grain loads to containers of wet grain for further drying; storage of conditioned grain in granaries according to the types of grain crops and the content of waste impurities; cleaning of grain and oil crops using a scalper and a separator; drying of grain and oil crops in a grain dryer; suction of dusty air from technological equipment units (aspiration) followed by its cleaning on dust-cleaning equipment; weighing of grain cargoes before shipment to water transport; shipment of grain and oil crops by water and road transport.***

***Transshipment of grain cargoes:***

- ***throughput capacity – 3.1 million tons per year of grain products, including reception from railways – 1.0 million tons, from vehicles – 2.0 million tons, from water transport – 100 thousand tons;***
- ***the volume of simultaneous storage of grain products – 118.5 thousand tons;***
- ***work schedule – three shifts, 365 days a year;***
- ***number of employees – 100 full-time staff, including engineering and technical personnel – 31 workplaces;***
- ***- resource consumption volumes: gas – 218.7 thousand $m^3$/year; water - 4,117 thousand $m^3$/year.***

***As part of the planned activities on the territory of the river port (terminal), it is planned to build a fuel-filling station with a maximum annual capacity of 1950 t/year, which includes:***

- ***drain railway overpass for 2 tank wagons;***
- ***two underground storage tanks V=75 m3;***
- ***control room;***
- ***the place of filling diesel fuel into vehicles;***
- ***watercraft filling station.***

***Construction of hydrotechnical structures (the operational water area of the berth structure and the approach channel to it):***

***- cargo berth: total length - 300 m, including the 1st stage of construction - 140 m, the 2nd stage - 160 m, width - 20 m, design depth near the border - 8.23 m from the "0" mark of the Izmail Sea Port;***

***- shore fortifications on both sides of the cargo berth;***

***- operational water area with an approach channel on the Danube River from 91.09 to 91.55 km: length - 460 m, width - 115 m, area - 5.29 ha, design depth - 8.23 m from "0" of the Izmail Sea Port .***

***Structurally, the cargo berth is equipped with equipment for receiving domestic sewage, potable water, solid household waste from ships, as well as replenishing the ship's supplies of drinking water and fuel.***

***The construction of the object of the planned activity is planned to be carried out by start-up complexes with alternate (5 stages) construction of buildings and structures and equipping them with technological equipment.***

6. Environmental and other limitations of the planned activity according to alternatives:
technical alternative 1

***- atmospheric air pollution - values of maximum permissible concentrations (MPC) of pollutants at the border of the SZZ, levels of maximum permissible emissions (MPE) from technological equipment, the background content of pollutants in atmospheric air, the use of diesel fuel in engines that meets the requirements of the Technical Regulation on requirements for automobile gasoline, diesel, marine and boiler fuels, which was approved by the resolution of the Cabinet of Ministers No. 927 of August 1, 2013;***

***- pollution of the water environment – the MPC value of pollutants in the surface water of a water object, the background content of pollutants in the surface water of a water object;***

***- soil pollution - lack of direct intensive influence, the MPC value of pollutants in the soil, radiation safety standards;***

***- sanitary-epidemiological - standards of noise impact on humans;***

***- impact on the animal world - prohibition of dredging during the spawning period, prohibition of works and activities that are a source of increased noise and disturbance (driving piles) during the period of mass reproduction of wild animals;***

territorial alternative 2
***the same as for technical alternative 1;***

territorial alternative 1
***the limitation of the planned activity is to comply with the regulatory state of the environment; compliance with the dimensions of the sanitary protection zone in accordance with the requirements of the "State Sanitary Rules for the Planning and Development of Settlements", approved by the Order of the Ministry of Health of Ukraine dated 19.06.1996 No. 173 and DBN B.2.2-12:2019 "Planning and Development of Territories ".***

territorial alternative 2
***is not considered, territorial alternative 1 is the best option.***

7. Necessary environmental engineering preparation and protection of the territory according to alternatives:

technical alternative 1
- ***maximum preservation of green spaces with the removal of dry, emergency and those that fall into the spot of the building;***
- ***vertical planning of the territory with a level rise of 1 m;***

*- strengthening of the coastline;*
*- organization of maps of bottom soil leachate removed during dredging operations (temporary construction) on its territory: layout of the site with collapse around the perimeter, selection of sedimentation zone, installation of discharge pipes;*

technical alternative 2
***the same as for technical alternative 1;***

territorial alternative 1
*- engineering-geological and geodetic surveys on the construction site and along the route of laying communications;*
*- reclamation of subsoil leach maps;*
*- organization of drainage of rainwater and meltwater;*

territorial alternative 2
***is not considered, territorial alternative 1 is the best option.***

8. Scope, sources and types of possible impact on the environment:
technical alternative 1
***during construction works:***

- ***to atmospheric air** – emissions of pollutants during preparatory and construction works, welding works, earthworks, construction machinery and transport;*
- ***on the aquatic environment** - deposition of dust emissions on the surface waters of the Danube during the pouring and storage of bulk construction materials, increase in the turbidity of surface waters in the dredging zone due to the transition of the finely dispersed bottom soil component to a suspended state and its loss;*
- ***for the flora and fauna** - removal of self-sowing trees, which are recognized as faulty, dry and emergency. Landscaping and beautification of the territory with the planting of green plants, the creation of lawns and flower gardens are planned;*
- ***on soils and the geological environment** - the impact is due to preparatory and construction works, there is no irreversible impact;*
- ***acoustic impact** - work of construction equipment, entry and exit to the transport construction site;*
- ***generation of waste** - the generation of construction and other types of waste is expected, which is planned to be transferred to specialized enterprises for the purpose of further processing, burial or disposal, provided for in accordance with current regulations.*

***during operation of the designed facility:***

- ***to atmospheric air** – emissions of pollutants from vehicle engines; sawing during transshipment and storage of goods, operation of engineering equipment, etc.;*
- ***acoustic impact** – noise effect during operation of internal combustion engines of vehicles, engineering and technological equipment;*
- ***on the water environment** - the negative impact is mediated due to the increase in water consumption and drainage, it is planned to connect to the existing engineering networks of the city; deposition of dust emissions on the surface waters of the Danube during transshipment operations, discharge of treated surface runoff from the port territory;*
- ***on the social environment** - increasing the cargo turnover of the port, creating optimal conditions for developing existing and creating promising cargo flows, creating additional jobs, improving the economic situation in the region;*
- ***on man-made environment** - the risk of developing emergency situations is extremely insignificant, the enterprise is expected to mechanize and automate, equip dusty air*

***aspiration systems, fire breaks are maintained;***

- ***<u>generation of waste</u> - the generation of industrial and household waste is assumed. All waste is planned to be stored in specially designated places and transferred for further disposal, burial or processing to specialized enterprises in accordance with the contracts. The temporary accumulation of waste to the transport lot is planned to be carried out in accordance with the requirements of current legislation.***

technical alternative 2
***the same as for technical alternative 1;***
territorial alternative 1
***<u>social environment, sources of influence</u>:***

- ***non-compliance with the size of the sanitary and protective zone of production, possible impact - exceeding the hygienic standards of the permissible content of chemical substances in the atmospheric air of populated areas, exceeding the sanitary norms of permissible noise on the territory of residential buildings;***
- ***violation of the legal regime of zones of sanitary protection of water bodies, possible impact - exceeding sanitary norms of the maximum permissible content of harmful substances in a water body;***

territorial alternative 2
***is not considered, territorial alternative 1 is the best option.***

9. Belonging to the first or second category of activities and objects that may have a significant impact on the environment and are subject to environmental impact assessment (indicate the relevant point and part of Article 3 of the Law of Ukraine "On Environmental Impact Assessment")
Belongs to the first category of types of planned activities and objects that can have a significant impact on the environment and are subject to an environmental impact assessment, such as the construction of hydrotechnical facilities of sea and river ports that can receive ships with a tonnage of more than 1350 tons (paragraph 6, item 7, part 2 Article 3).
10. The existence of grounds for carrying out an assessment of the transboundary impact on the environment (including the presence of a significant negative transboundary impact on the environment and a list of states whose environment may be subject to a significant negative transboundary impact (affected states)
***Transboundary impact on the environment is likely, the following may fall into the impact zone:***

- ***residential buildings in Romania, in particular, the minimum distance from the sources of emissions of polluting substances of the main production to the residential buildings of the Romanian city of Plauru is 570m;***
- ***the Danube River, the protection and sustainable use of which is regulated by the Convention "On the Protection of the Danube River", adopted on June 29, 1994 and ratified by the Law of Ukraine dated January 17, 2002 No. 2997-III.***

11. The planned scope of research and the level of detail of information to be included in the environmental impact assessment report
***In full, in accordance with the requirements of current legislation, including:***

- ***calculations of pollutant emission volumes and their dispersion in atmospheric air;***
- ***carrying out noise calculations at the boundary of residential buildings;***
- ***determination of the nomenclature and volumes of generated waste;***
- ***carrying out risk assessment calculations for planned activities;***
- ***determination of bottom soil volumes based on the results of depth measurements in the water area;***
- ***obtaining information about the values of background concentrations of pollutants in the atmospheric air, climatic characteristics of the area of performance of works;***

- ***conducting instrumental laboratory research of bottom soil regarding its sanitary condition and environmental safety;***
- ***an inventory of green spaces with commission installation of green spaces to be removed.***

12. Environmental impact assessment procedure and opportunities for public participation in it

The activity planned by the business entity may have a significant impact on the environment and, therefore, is subject to an environmental impact assessment in accordance with the Law of Ukraine "On Environmental Impact Assessment". Environmental impact assessment is a procedure that requires:

preparation of an environmental impact assessment report by a business entity;

public discussion of planned activities;

analysis by the authorized body of the environmental impact assessment report, any additional information provided by the business entity, as well as information received from the public during public discussion, during the transboundary impact assessment procedure, other information;

provision by the authorized body of a reasoned conclusion on the assessment of the impact on the environment, which takes into account the results of the analysis provided for in the fifth paragraph of this clause;

taking into account the conclusion of the environmental impact assessment in the decision on the implementation of the planned activity, specified in paragraph 14 of this notice.

In the conclusion on the assessment of the impact on the environment, the authorized body, based on the assessment of the impact on the environment of the planned activity, determines the admissibility or justifies the inadmissibility of the implementation of the planned activity and determines the environmental conditions of its implementation.

It is forbidden to start the implementation of the planned activity without assessing the impact on the environment and obtaining a decision on the implementation of the planned activity.

The environmental impact assessment procedure provides for the right and opportunities of the public to participate in such a procedure, in particular at the stage of discussion of the scope of research and the level of detail of information to be included in the environmental impact assessment report, as well as at the stage of consideration by the authorized body of the submitted by the business entity environmental impact assessment report.

At the stage of public discussion of the environmental impact assessment report for at least 25 working days, the public is given the opportunity to submit any comments and suggestions to the environmental impact assessment report and the planned activity, as well as to participate in public hearings. More details about the procedure for public discussion of the environmental impact assessment report will be announced in the announcement of the start of public discussion.

Temporarily, for the period of validity and within the territory of the quarantine established by the Cabinet of Ministers of Ukraine in order to prevent the spread of acute respiratory disease (COVID-19) caused by the SARS-CoV-2 coronavirus on the territory of Ukraine, until its complete cancellation and within 30 days from the date of cancellation quarantine, public hearings are not held and are not scheduled for dates falling within this period, as stated in the announcement of the start of public discussion of the environmental impact assessment report.

13. Public discussion of the scope of research and the level of detail of information to be included in the environmental impact assessment report

Within 20 working days from the date of publication of this notice on the official website of the authorized body, the public has the right to provide the authorized body specified in paragraph 15 of this notice with comments and suggestions on the planned activity, the scope of research and the level of detail of information to be included in the report with environmental impact assessments.

When submitting such comments and suggestions, indicate the registration number of the environmental impact assessment case of the planned activity in the Unified Environmental Impact Assessment Register (listed on the first page of this notice). This will greatly simplify the process of registration and consideration of your comments and suggestions.

If such public comments and suggestions are received, they will be placed in the Unified Register of Environmental Impact Assessment and transferred to the business entity (within three working days from the day of their receipt). Persons providing comments and suggestions certify their consent to the processing of their personal data with their signature. During the preparation of the environmental impact assessment report, the business entity is obliged to fully take into account, partially take into account or reasonably reject the comments and suggestions of the public, provided in the process of public discussion of the scope of research and the level of detail of information to be included in the environmental impact assessment report the environment Detailed information on this is included in the environmental impact assessment report.

14. Decision on implementation of the planned activity

In accordance with the legislation, the decision on the implementation of this planned activity will be ***a Construction Permit***

(type of decision in accordance with the first part of Article 11 of the Law of Ukraine "On Environmental Impact Assessment"),

issued by the ***State Inspection of Architecture and Urban Planning of Ukraine***

(a body responsible for making such a decision)

15. All comments and suggestions from the public regarding the planned activity, the scope of research and the level of detail of information to be included in the environmental impact assessment report must be sent to

***Ministry of Environmental Protection and Natural Resources of Ukraine, postal address: 03035, Kyiv, str. Metropolitan Vasyl Lypkivskyi, 35, OVD@mepr.gov.ua,***

***tel. (044) 206-31-40; (044) 206-31-50, Lada Pavlovna Kotyash***

(name of the authorized body, postal address, e-mail address, phone number and contact person)

{Appendix 2 with changes introduced in accordance with Resolution of the CM No. 824 of 09/14/2020}

НІБУЛОН
ТОВАРИСТВО З ОБМЕЖЕНОЮ ВІДПОВІДАЛЬНІСТЮ
СІЛЬСЬКОГОСПОДАРСЬКЕ ПІДПРИЄМСТВО
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12.05.2022р. № 3143/3-22/50

на № _____ від _____

Міністерство захисту довкілля та природних ресурсів України

На підставі п. 6 статті 5 Закону України «Про оцінку впливу на довкілля» прошу Вас внести до Єдиного реєстру з оцінки впливу на довкілля Повідомлення про плановану діяльність, яка підлягає оцінці впливу на довкілля, Товариства з обмеженою відповідальністю сільськогосподарське підприємство «НІБУЛОН» «Нове будівництво об'єкту транспортної інфраструктури - річковий порт (термінал) у м. Ізмаїл Ізмаїльського району Одеської області із залізничною під'їзною колією - примикання до станції Ізмаїл регіональної філії «Одеська залізниця»

Додаток на 16 арк. В 1 прим.

З повагою,

Заступник генерального директора
по взаємодії з органами влади,
доктор юридичних наук Михайло Різак

К.т (0512) 58-04-28

КН
Региональный информационно-рекламный еженедельный журнал Измаил. Килия. Болград. Рени
Газета является членом Украинской Ассоциации издателей периодической прессы
КУРЬЕР НЕДЕЛИ
БИЗНЕС
№21 (1807) суббота, 28 мая 2022

В ЭТОМ НОМЕРЕ 455 ОБЪЯВЛЕНИЙ

# Придунайские озера обмелели, в Катлабух принудительно закачивают воду из Дуная

2

## В Одесской области сократили комендантский час

Глава Одесской областной военной администрации Максим Марченко распорядился сократить действие комендантского часа на территории области.

С 25 мая комендантский час начинается с 23:00 каждый день и будет действовать до 05:00 следующего дня. Запрещено пребывание людей в указанное время на улицах и других общественных местах без специально выданных пропусков и удостоверений.

## «Фисташковая арифметика» измаильского фермера Андрея Петкова

8

# ПОВІДОМЛЕННЯ
## про плановану діяльність, яка підлягає оцінці впливу на довкілля

*Товариство з обмеженою відповідальністю сільськогосподарське підприємство «НЕПТОН», код ЄДРПОУ 14291113*

(повне найменування юридичної особи, код згідно з ЄДРПОУ або прізвище, ім'я та по батькові фізичної особи - підприємця, ідентифікаційний код або серія та номер паспорта (для фізичних осіб, які через свої релігійні переконання відмовляються від прийняття реєстраційного номера облікової картки платника податків та офіційно повідомили про це відповідному контролюючому органу і мають відмітку у паспорті)

інформує про намір провадити планову діяльність та оцінку її впливу на довкілля.

1. Інформація про суб'єкта господарювання

*Юридична адреса: 54002, м. Миколаїв, вул. Кобозький спуск, 1, поштова адреса: 54030 м. Миколаїв, вул. Фалеєвська, 9-Б, тел. (0512)58-04-28*

(місцезнаходження юридичної особи або місце провадження діяльності фізичної особи - підприємця (поштовий індекс, адреса), контактний номер телефону)

2. Планована діяльність, її характеристика, технічні альтернативи

*Планована діяльність, її характеристика.*

*Планована діяльність - нове будівництво об'єкта транспортної інфраструктури - річковий порт (термінал) в м. Ізмаїл Ізмаїльського району Одеської області із залізничною під'їзною колією - примикання до станції Ізмаїл регіональної філії «Одеська залізниця».*

*Планована діяльність включає будівництво та експлуатацію гідротехнічних споруд порту (вантажний причал, операційна акваторія з підхідним каналом), під'їзної залізничної колії, виробничого перевантажувального комплексу для зернових, зернобобових та олійних культур (споруди залізничного та автомобільного прийому), сушарка, складські ємності, пристрої відвантаження на водний і автомобільний транспорт), паливозаправного пункту (зливна залізнична естакада, два підземні резервуари, пости заправки автотранспорту та плавзасобів).*

*Будівництво операційної акваторії з підхідним каналом передбачає виконання днопоглиблювальних робіт до глибини 8,23 м від «0» Ізмаїльського морського порту з вийомкою донного ґрунту в об'ємі 112,0 тис. м3 та його складуванням в береговий відвал.*

*Місце розташування планованої діяльності - лівий берег р. Дунай, нижче за течією розташовані промислові підприємства: СТО «БЛАЗ», Ізмаїльський морський торгівельний порт, ПАТ «Ізмільський річковий порт «Дунайсудносервіс».*

Технічна альтернатива 1.

*Для забезпечення діяльності перевантажувального комплексу для зернових, зернобобових та олійних культур передбачається розташувати на відведеній ділянці наступні будівлі та споруди: адміністративно-побутовий корпус з лабораторією та навісом; трансформаторна підстанція з розподільчим пунктом та операторною; операторна вагової; кафе внутрішнього використання; механічна майстерня з гаражем, складом, пожпостом; 3 каналізовані дворові вбиральні; будинок для відряджених.*

*Для транспортного зв'язку буде використана: залізниця Нової станції Ізмаїл регіональної філії «Одеська залізниця», внутрішні водні шляхи України, автошляхи загальнодержавного та місцевого значення.*

*Передбачається здійснювати прийом зернових та олійних культур через пости розвантаження автомобільного та залізничного транспорту, оснащених вбудованими транспортними механізмами.*

*Дана альтернатива є оптимальним варіантом підбору споруд та обладнання з технічними характеристиками, що забезпечать їх об'єднання в єдиний технологічний комплекс.*

*Водозабезпечення потреб річкового порту (господарсько-побутових, виробничих, протипожежних потреб, а також потреб з благоустрою території) з поверхневого водозабору з р. Дунай, що є об'єктом нового будівництва.*

Технічна альтернатива 2.

*Водозабезпечення господарсько-побутових та виробничих потреб порту за рахунок приєднання водопроводу до муніципальних мереж, забезпечення потреб з благоустрою території - з поверхневого водозабору з р. Дунай, що є об'єктом нового будівництва*

*Суб'єкт господарювання має право розглядати більше технічних та територіальних альтернатив.

3. Місце провадження планованої діяльності, територіальні альтернативи.

*Місце провадження планованої діяльності: територіальна альтернатива 1.*

*Місто Ізмаїл Ізмаїльського району Одеської області на узбережжі р. Дунай.*

*Зазначена територія знаходиться в промисловій зоні м. Ізмаїл з насиченою береговою інфраструктурою та інтенсивним судноплавством та є перспективною для приєднання до існуючої транспортної та енергетичної інфраструктури, а також задовольняє вимогам, що надаються для будівництва та експлуатації перевантажувального комплексу для зернових, зернобобових та олійних культур, що планується будувати.*

*Планована діяльність потребує виділення у користування строком на 49 років двох земельних ділянок з віднесенням їх до категорії «Землі транспорту»: площею 19, 0 га із земель запасу та площею 5,29 га із земель водного фонду.*

Місце провадження планованої діяльності: територіальна альтернатива 2.

*Не розглядається, територіальна альтернатива 1 є оптимальним варіантом для розміщення річкового порту (терміналу).*

4. Соціально-економічний вплив планованої діяльності

*Будівництво річкового порту (терміналу) на річці Дунай з можливістю доставки зернових вантажів залізницею та автошляхами в прикордонну зону має стратегічно важливе значення для забезпечення продовольчої безпеки держави в умовах воєнного часу та націлене на розвиток сільськогосподарського виробництва та регіону в цілому.*

5. Загальні технічні характеристики, у тому числі параметри планованої діяльності (потужність, довжина, площа, обсяг виробництва тощо)

*Загальна площа ділянки, що запланована для будівництва та експлуатації об'єкта транспортної інфраструктури – річкового порту (терміналу), - 19,0 га, операційної акваторії 5,29 га. Площа запланованої забудови складає 7,0 га.*

*Територія вільна від забудови капітальними спорудами та заросла самосійними зеленими насадженнями, за результатом комісійного обстеження зелених насаджень визначено, що видаленню підлягають аварійні та сухостійні 841 дерево та 740 кущів.*

*Приймання зернових вантажів планується здійснювати з автомобільного, залізничного та водного транспорту. Технологічна схема комплексу передбачає можливість одночасного виконання операцій прийому і відвантаження та забезпечує одночасний прийом трьох видів зернових культур через пункти вивантаження автотранспорту; можливість одночасного виконання внутрішніх операцій (доведення до товарних кондицій (очистка, сушка) та переміщення зерна з силосу в силос для провітрювання або формування партії відвантаження) і зовнішніх операцій (прийом і відвантаження); стабільність роботи комплексу.*

*Експлуатація перевантажувального комплексу включає наступні технологічні операції: лабораторний контроль якості зернових, зернобобових та олійних культур; зважування завантаженого та порожнього автомобільного транспорту; прийом зернових вантажів з автомобільного, залізничного та водного транспорту; транспортування зернових вантажів із завальних ям транспортерами (стрічковими, ланцюговими) і норіями для подальшого їх зберігання або переробки (очистка, сушіння); переміщення зернових вантажів до ємностей вологого зерна для подальшого сушіння; зберігання кондиційного зерна в зерносховищах по видах зернових культур та вмісту смітної домішки; очищення зернових та олійних культур з використанням скальператора та сепаратора; сушіння зернових та олійних культур у зерносушарці; відсмоктування запиленого повітря від вузлів технологічного обладнання (аспірація) з наступним його очищенням на пилоочисному устаткуванні (ПОУ); зважування зернових вантажів перед відвантаженням на водний транспорт; відвантаження зернових та олійних культур на водний та автомобільний транспорт.*

*Перевантаження зернових вантажів:*

*- пропускна спроможність – 3,1 млн. т на рік зернової продукції, в тому числі прийом із залізниці – 1,0 млн. т, з автотранспорту – 2,0 млн. т, з водного транспорту – 100 тис. т;*

*- обсяг одночасного зберігання зернової продукції – 105,5 тис. т;*

*- розклад роботи – трьохзмінний, 365 діб на рік;*

*- штат працівників - 100 штатного персоналу, в тому числі ІТР - 30 од.;*

*- об'єми споживання ресурсу: газ – 218,7 тис. м3/рік; вода – 4, 117 тис. м3/рік.*

*Будівництво паливозаправного пункту з максимальною річною продуктивністю 1950 т/рік, до складу якого входять:*

*- зливна залізнична естакада на 2 вагоно-цистерни;*

*- два підземні резервуари V=75м3;*

*- операторна;*

*- острівець наливу дизельного палива у автотранспорт;*

*- пункт заправки плавзасобів.*

*Будівництво гідротехнічних споруд (вантажний причал, операційна акваторія з підхідним каналом):*

*- вантажний причал: загальна довжина - 300 м , в тому числі 1 черга будівництва - 140 м, 2 черга – 160 м, ширина – 20м, проектна глибина біля кордону - 8,23 м від позначки «0» Ізмаїльського морського порту;*

*- берегоукріплення з обох сторін від вантажного причалу;*

*- операційна акваторія з підхідним каналом на р. Дунай від 91,09 до 91,55 км: довжина - 460 м, ширина - 115м, площа - 5,29 га, проектна глибина - 8,23 м від «0» Ізмаїльського морського порту .*

*Конструктивно вантажний причал забезпечений обладнанням для прийом з суден господарсько-побутових стічних вод, лляльних вод, твердого побутового сміття, а також поповнення суднових запасів питної води та палива.*

*Будівництво об'єкту планованої діяльності передбачено здійснювати пусковими комплексами з почерговим (5 черг) зведенням будівель та споруд та оснащенням їх технологічним обладнанням.*

6. Екологічні та інші обмеження планованої діяльності за альтернативами:

щодо технічної альтернативи 1

*- по забрудненню атмосферного повітря - значення гранично допустимих концентрацій (ГДК) забруднюючих речовин на межі СЗЗ, рівні граничнодопустимих викидів (ГДВ) від технологічного обладнання, фоновий вміст забруднюючих речовин в атмосферному повітрі, використання у двигунах дизельного палива, що відповідає вимогам Технічного регламенту щодо вимог до автомобільних бензинів, дизельного, суднових та котельних палив, що затверджений постановою КМУ №927 від 01.08.2013р.;*

*- по забрудненню водного середовища – значення ГДК забруднюючих речовин у поверхневій воді водного об'єкта, фоновий вміст забруднюючих речовин у поверхневій воді водного об'єкта;*

*- по забрудненню ґрунту - відсутність прямого інтенсивного впливу, значення ГДК забруднюючих речовин в ґрунті, нормативи радіаційної безпеки;*

*- санітарно-епідеміологічні – нормативи шумового впливу на людину;*

*- впливи на тваринний світ – заборона проведення днопоглиблювальних робіт в період нересту, заборона проведення робіт та заходів, які є джерелом підвищеного шуму та неспокою (забиття паль) у період масового розмноження диких тварин;*

щодо технічної альтернативи 2

*ті ж самі, що для технічної альтернативи 1;*

щодо територіальної альтернативи 1

*обмеження планованої діяльності полягає у дотриманні нормативного стану навколишнього середовища; дотримання розмірів санітарно-захисної зони відповідно до вимог "Державних санітарних правил планування та забудови населених пунктів", затверджених наказом Міністерства охорони здоров'я України від 19.06.1996 р. № 173 та ДБН Б.2.2-12:2019 "Планування і забудова територій".*

щодо територіальної альтернативи 2

*не розглядається, територіальна альтернатива 1 є оптимальним варіантом.*

7. Необхідна еколого-інженерна підготовка і захист території за альтернативами:

щодо технічної альтернативи 1

*- максимальне збереження зелених насаджень із видаленням сухостійних, аварійних та тих, що потраплять в пляму забудови;*

*- вертикальне планування території з підняттям рівня на 1м;*

*- укріплення берегової лінії;*

*- організація на своїй території карт намиву донного ґрунту, вилученого при днопоглиблювальних роботах (тимчасова споруда): розпланування майданчику з обвалуванням по периметру, виділення відстійної зони, встановлення скидальних труб;*

щодо технічної альтернативи 2

*ті ж самі, що для технічної альтернативи 1;*

щодо територіальної альтернативи 1

*- інженерно-геологічні та геодезичні вишукування на майданчику під будівництво та по трасі прокладання комунікацій;*

*- рекультивація карт намиву донного ґрунту;*

*- організація відведення дощових і талих вод;*

*щодо територіальної альтернативи 2*

*не розглядається, територіальна альтернатива 1 є оптимальним варіантом.*

8. Сфера, джерела та види можливого впливу на довкілля:

щодо технічної альтернативи 1

*при проведенні будівельних робіт:*

*- на атмосферне повітря – викиди забруднюючих речовин при проведенні підготовчих та будівельних робіт, зварювальних робіт, земляних робіт, при роботі будівельної техніки та транспорту;*

*- на водне середовище – осідання викидів пилу на поверхневі води Дунаю при пересипанні та зберіганні сипучих будівельних матеріалів, підвищення мутності поверхневих вод в зоні днопоглиблення за рахунок переходу тонкодисперсної складової донного ґрунту в завислий стан та його втрат;*

*- на рослинний та тваринний світ – видалення самосійних дерев, що признані фаутними, сухостійними та аварійними. Передбачено озеленення та благоустрій території з висадкою зелених насаджень, створення газонів та квітників;*

*- на ґрунти та геологічне середовище – вплив обумовлений проведенням підготовчих та будівельних робіт, невідворотний вплив відсутній;*

*- акустичний вплив - робота будівельної техніки, в'їзд-виїзд на майданчик будівництва транспорту;*

*- утворення відходів - передбачається утворення будівельних та інших видів відходів, які планується передавати спеціалізованим підприємствам з метою подальшої переробки, захоронення чи утилізації, що передбачені відповідно до діючих норм.*

*при експлуатації проектованого об'єкту:*

*- на атмосферне повітря – викиди забруднюючих речовин від двигунів транспортних засобів; пилиння при здійсненні перевантажувальних робіт та зберіганні вантажів, роботі інженерного обладнання, тощо;*

*- акустичний вплив – шумова дія при роботі ДВЗ транспортних засобів, інженерного та технологічного обладнання;*

*- на водне середовище – негативний вплив опосередкований за рахунок збільшення показників водоспоживання та водовідведення, планується підключення до існуючих інженерних мереж міста; осідання викидів пилу на поверхневі води Дунаю при перевантажувальних роботах, скид очищеного поверхневого стоку з території порту;*

*- на соціальне середовище - збільшення вантажообігу порту, створення оптимальних умов для освоєння існуючих та створення перспективних вантажопотоків, створення додаткових робочих місць, покращення економічної ситуації в регіоні;*

*- на техногенне середовище – ризик розвитку аварійних ситуацій вкрай незначний, підприємством передбачається механізувати та автоматизувати, обладнати системами аспірації запиленого повітря, протипожежні розриви витримано;*

*- утворення відходів – передбачається утворення виробничих та побутових відходів. Всі відходи планується зберігати в спеціально відведених місцях та передавати з метою подальшої утилізації, захоронення або переробки спеціалізованим підприємствам відповідно до договорів. Тимчасове накопичення відходів до транспортної партії планується здійснювати відповідно до вимог чинного законодавства.*

щодо технічної альтернативи 2

*ті ж самі, що для технічної альтернативи 1;*

щодо територіальної альтернативи 1

*соціальне середовище, джерела впливу:*

*- недотримання розміру санітарно - захисної зони виробництв, можливий вплив - перевищення гігієнічних нормативів допустимого вмісту хімічних речовин в атмосферному повітрі населених місць, перевищення санітарних норм допустимого шуму на території житлової забудови;*

*- порушення правового режиму зон санітарної охорони водних об'єктів, можливий вплив – перевищення санітарних норм гранично допустимого вмісту шкідливих речовин у водному об'єкті;*

щодо територіальної альтернативи 2

*не розглядається, територіальна альтернатива 1 є оптимальним варіантом.*

9. Належність планованої діяльності до першої чи другої категорії видів діяльності та об'єктів, які можуть мати значний вплив на довкілля та підлягають оцінці впливу на довкілля (зазначити відповідний пункт і частину статті 3 Закону України "Про оцінку впливу на довкілля")

*Належить до першої категорії видів планової діяльності та об'єктів , які можуть мати значний вплив на довкілля та підлягають оцінці впливу на довкілля, як будівництво гідротехнічних споруд морських і річкових портів, які можуть приймати судна тоннажністю понад 1350 тонн (абзац 6 п.7 частини 2 ст. 3).*

10. Наявність підстав для здійснення оцінки транскордонного впливу на довкілля (в тому числі наявність значного негативного транскордонного впливу на довкілля та перелік держав, довкілля яких може зазнати значного негативного транскордонного впливу (зачеплених держав)

*Транскордонний вплив на довкілля ймовірний, в зону впливу може потрапити:*

*- житлова забудова Румунії, зокрема мінімальна відстань від джерел викидів забруднюючих речовин основного виробництва до житлової забудови румунського м. Plauru становить 570м;*

*- р. Дунай, охорона та стале використання якої врегульоване Конвенцією «Про охорону ріки Дунай», що прийнята 29 червня 1994 року та ратифікована Законом України від 17 січня 2002 № 2997-III.*

11. Плановий обсяг досліджень та рівень деталізації інформації, що підлягає включенню до звіту з оцінки впливу на довкілля

*В повному об'ємі, відповідно до вимог чинного законодавства, включаючи:*

*- проведення розрахунків об'ємів викидів забруднюючих речовин та їх розсіювання в атмосферному повітрі;*

*- проведення розрахунків шуму на межі житлової забудови;*

*- визначення номенклатури та об'ємів утворюваних відходів;*

*- проведення розрахунків оцінки ризиків планової діяльності;*

*- визначення об'ємів донного ґрунту по результатах промірів глибин в акваторії;*

(дата офіційного опублікування в Єдиному реєстрі з оцінки впливу на довкілля (автоматично генерується програмними засобами ведення Єдиного реєстру з оцінки впливу на довкілля, не зазначається суб'єктом господарювання)

(реєстраційний номер справи про оцінку впливу на довкілля планованої діяльності (автоматично генерується програмними засобами ведення Єдиного реєстру з оцінки впливу на довкілля, для паперової версії зазначається суб'єктом господарювання)

*- отримання інформації про величини фонових концентрацій забруднювальних речовин в атмосферному повітрі, кліматичну характеристику району виконання робіт;*

*- проведення інструментальних лабораторних досліджень донного ґрунту щодо його санітарного стану та екологічної безпечності;*

*- інвентаризація зелених насаджень з комісійним встановленням зелених нсаджень, що видаляються.*

12. Процедура оцінки впливу на довкілля та можливості для участі в ній громадськості

Планована суб'єктом господарювання діяльність може мати значний вплив на довкілля і, отже, підлягає оцінці впливу на довкілля відповідно до Закону України "Про оцінку впливу на довкілля". Оцінка впливу на довкілля - це процедура, що передбачає:

підготовку суб'єктом господарювання звіту з оцінки впливу на довкілля;

проведення громадського обговорення планованої діяльності;

аналіз уповноваженим органом звіту з оцінки впливу на довкілля, будь-якої додаткової інформації, яку надає суб'єкт господарювання, а також інформації, отриманої від громадськості під час громадського обговорення, під час здійснення процедури оцінки транскордонного впливу, іншої інформації;

надання уповноваженим органом мотивованого висновку з оцінки впливу на довкілля, що враховує результати аналізу, передбаченого абзацом п'ятим цього пункту;

врахування висновку з оцінки впливу на довкілля у рішенні про провадження планованої діяльності, зазначеного у пункті 14 цього повідомлення.

У висновку з оцінки впливу на довкілля уповноважений орган, виходячи з оцінки впливу на довкілля планованої діяльності, визначає допустимість чи обґрунтовує недопустимість провадження планованої діяльності та визначає екологічні умови її провадження.

Забороняється розпочинати провадження планованої діяльності без оцінки впливу на довкілля та отримання рішення про провадження планованої діяльності.

Процедура оцінки впливу на довкілля передбачає право і можливості громадськості для участі у такій процедурі, зокрема на стадії обговорення обсягу досліджень та рівня деталізації інформації, що підлягає включенню до звіту з оцінки впливу на довкілля, а також на стадії розгляду уповноваженим органом поданого суб'єктом господарювання звіту з оцінки впливу на довкілля.

На стадії громадського обговорення звіту з оцінки впливу на довкілля протягом щонайменше 25 робочих днів громадськості надається можливість надавати будь-які зауваження і пропозиції до звіту з оцінки впливу на довкілля та планованої діяльності, а також взяти участь у громадських слуханнях. Детальніше про процедуру громадського обговорення звіту з оцінки впливу на довкілля буде повідомлено в оголошенні про початок громадського обговорення.

*Тимчасово, на період дії та в межах території карантину, встановленого Кабінетом Міністрів України з метою запобігання поширенню на території України гострої респіраторної хвороби (COVID-19), спричиненої коронавірусом SARS-CoV-2, до повного його скасування та протягом 30 днів з дня скасування карантину, громадські слухання не проводяться і не призначаються на дати, що припадають на цей період, про що зазначається в оголошенні про початок громадського обговорення звіту з оцінки впливу на довкілля.*

13. Громадське обговорення обсягу досліджень та рівня деталізації інформації, що підлягає включенню до звіту з оцінки впливу на довкілля

Протягом 20 робочих днів з дня оприлюднення цього повідомлення на офіційному веб-сайті уповноваженого органу громадськість має право надати уповноваженому органу, зазначеному у пункті 15 цього повідомлення, зауваження і пропозиції до планованої діяльності, обсягу досліджень та рівня деталізації інформації, що підлягає включенню до звіту з оцінки впливу на довкілля.

Надаючи такі зауваження і пропозиції, вкажіть реєстраційний номер справи про оцінку впливу на довкілля планованої діяльності в Єдиному реєстрі з оцінки впливу на довкілля (зазначений на першій сторінці цього повідомлення). Це значно спростить процес реєстрації та розгляду Ваших зауважень і пропозицій.

У разі отримання таких зауважень і пропозицій громадськості вони будуть розміщені в Єдиному реєстрі з оцінки впливу на довкілля та передані суб'єкту господарювання (протягом трьох робочих днів з дня їх отримання). Особи, що надають зауваження і пропозиції, своїм підписом засвідчують свою згоду на обробку їх персональних даних. Суб'єкт господарювання під час підготовки звіту з оцінки впливу на довкілля зобов'язаний врахувати повністю, врахувати частково або обґрунтовано відхилити зауваження і пропозиції громадськості, надані у процесі громадського обговорення обсягу досліджень та рівня деталізації інформації, що підлягає включенню до звіту з оцінки впливу на довкілля. Детальна інформація про це включається до звіту з оцінки впливу на довкілля.

14. Рішення про провадження планованої діяльності

Відповідно до законодавства рішенням про провадження даної планованої діяльності буде

*Дозвіл на виконання будівельних робіт*

(вид рішення відповідно до частини першої статті 11 Закону України "Про оцінку впливу на довкілля"),

що видається

*Державною інспекцією архітектури та містобудування України*

(орган, до повноважень якого належить прийняття такого рішення)

15. Усі зауваження і пропозиції громадськості до планованої діяльності, обсягу досліджень та рівня деталізації інформації, що підлягає включенню до звіту з оцінки впливу на довкілля, необхідно надсилати до

*Міністерство захисту довкілля та природних ресурсів України, поштова адреса:*
*03035, м. Київ, вул. Митрополита Василя Липківського, 35, OVD@mepr.gov.ua,*
*тел. (044) 206-31-40; (044) 206-31-50.*
*Котяш Лада Павлівна*

(найменування уповноваженого органу, поштова адреса, електронна адреса, номер телефону та контактна особа)

*(Додаток 2 із змінами, внесеними згідно з Постановою КМ № 824 від 14.09.2020)*

# Придунайские вести

ГАЗЕТА ИЗДАЕТСЯ С 1940 ГОДА

ПЯТНИЦА,
27 МАЯ 2022 г.,
№ 18 (13 264)

vestiizm@ukr.net


## НОВАЯ УСЛУГА

**С 23 мая в Украине можно получить услугу одновременного оформления ID-карты и загранпаспорта. Об этом сообщает МВД Украины в Facebook.**

Основания для получения услуги:

- в случае оформления ID-карты впервые в 14 лет;
- в случае утери документов или их обмена в связи с изменением персональных данных.

За получением услуги можно обращаться в подразделение ГМС, центр обслуживания "Паспортный сервис" или ЦПАУ.

Стоимость услуг:

1105 грн - в случае оформления в течение 20 рабочих дней.

1583 грн - в случае срочного оформления в течение 7 рабочих дней.

В случае первого оформления ID-карты в 14 лет оплачивается только услуга оформления загранпаспорта.

## ТРАССА РЕНИ-ОДЕССА СЕГОДНЯ

**Пограничники рассказали, можно ли ехать по трассе Одесса-Рени мужчинам призывного возраста.**

*Движение общественного транспорта остается, трасса Одесса – Рени не закрыта, проезд возможен для граждан обоих полов.*

*Режим ограничения касается, в частности, дополнительных проверок на соответствие цели поездки.*

То есть на контрольных пунктах в Маяках и Удобном пограничники имеют право дополнительно проверить намерения путешественников, в том числе и по транзитному участку.

Если вы имеете подтверждение цели поездки (служебная деятельность, следование к месту жительства и регистрации, билеты для дальнейшего движения, т.д.) и во время опроса у пограничника не возникает подозрений относительно ваших намерений воспользоваться особенностями местности преступным способом, вы следуете далее в общем порядке.

## ОДНОЙ СТРОКОЙ

**С 25 мая в Одесской области сократят комендантский час — теперь он будет длиться с 23:00 до 05:00.**

## К СВЕДЕНИЮ

**В апреле украинцы, выехавшие за границу из-за войны с Россией, потратили там около $2 млрд, рассчитываясь или снимая наличные с карт украинских банков. Об этом пишет Forbes со ссылкой на информацию Нацбанка.**

80% средств от израсходованных в апреле $2 млрд – это оплата товаров в терминалах торговой сети и обналичивание.

Траты распределились так:

17% – оплата в продуктовых магазинах/супермаркетах;

11% – покупка непродовольственных товаров;

8% – оплата гостиниц;

5% – операции на АЗС;

4% – расчеты в заведениях питания.

На услуги мобильных операторов украинцы за границей тратят в среднем 12 долларов в месяц.

* * *

Правительство Болгарии уменьшит компенсации на питание и проживание беженцев из Украины, размещенных в болгарских отелях и базах отдыха. Суммы уменьшат с 40 левов (около 20 евро) до 15 левов (около 7,5 евро) в день. Новая программа, разработанная оперативной координационной группой, предусматривает, что 15 левов хватит на оплату размещения и трехразового питания.

ЗАБОТЫ НАСУЩНЫЕ

# НА ПЕРВОМ ПЛАНЕ ВЗАИМОВЫРУЧКА

Староста Богатого М.П. Бабенко, говоря о подвижках в жизнедеятельности своего старостинского округа, всегда с благодарностью отзывается о поддержке руководителей базовых сельхозпредприятий. Восхищает ее и четкость действий партнеров: когда бы к ним ни обратились, вопрос решается оперативно. Они, по ее словам, относятся к породе людей глубокомыслящих, со «стержнем», к мнению которых можно прислушаться, получить дельный совет. Один из них — Александр Иванович Тосмасис, исполнительный директор АРК «Придунайская нива», человек, уважаемый не только в своем коллективе, но и в Богатом.

Взаимоотношения представителей АРК «Придунайская нива» с администрацией села, пайщиками одной лишь деловой стороной не исчерпываются. Партнеры не забывают дорогу в старостат, вот и на этот раз А.И. Тосмасис заглянул сюда, чтобы пообщаться со старостой и главами ветеранской и женской организаций Богатого: Иваном Пантелеевичем Минжинером и Марией Васильевной Мариновой, а также секретарем этих двух общественных объединений Татьяной Николаевной Сапунжи. М.П. Бабенко практикует постоянные встречи с активистами своей громады, ветеранами труда, принимающими деятельное участие в жизни Богатого, прислушивается к их суждениям. Как обычно, получился заинтересованный разговор сторон, своего рода заседание «круглого стола», в ходе которого затронули самые актуальные вопросы нынешнего времени, в том числе реформу децентрализации в Украине, приведшую к изменениям в административно-территориальном устройстве. Должность старосты в объединенных территориальных громадах — совершенно новая, и если говорить о процессе формирования местного бюджета, на данном этапе отчетливее видится разница между полномочиями сельского головы и старосты.

— Марии Петровне не позавидуешь: остаться в таком большом населенном пункте фактически без бюджета (для сравнения: *в прошлом году он составлял 12 миллионов гривен*) означает, образно говоря, ходить с протянутой рукой, — поделился мыслями Александр Иванович. — Ведь если раньше финансовые рычаги были сосредоточены в руках сельского головы, то сегодня при его новом статусе у него имеется… печать и штат помощников, которых можно пересчитать на пальцах одной руки. Ему приходится сложнее, чем, допустим, мне, потому что скорость принятия решения зависит от наличия ресурсов. Тем не менее, здесь делают все, что от них зависит.

Взаимоотношения у нас нормальные, деловые. Мы стараемся откликаться на все просьбы селян. Власть организует праздники — Новый год, День села и другие мероприятия, мы по традиции участвуем в них, как и наши соседи-предприниматели, содействуем решению повседневных задач. Владимир Иванович Ратнюк, к примеру, помогает содержать футбольный клуб. Работа идет, продолжают тренировки спортсмены — борцы, футболисты. На таких людей, как он, хочешь, не хочешь, будешь равняться и стараться не отставать от них.

Населенный пункт большой, значит, и забот много — благоустройство, поддержание санитарного состояния, в том числе мусоросвалки, водоснабжение и прочее. Старосте приходится быть «многостаночником»: вникать в специфику работы каждого специалиста, обеспечивать взаимозаменяемость. Если, скажем, кто-то в коллективе ушел в отпуск, его объем работы нужно продолжать выполнять, готовить, как положено, для получателя админуслуг пакет документов и т.д. Глава села осуществляет нотариальные действия, ему приходится выступать диспетчером, отвечать за координацию действий подчиненных, то есть отчасти он и секретарь, и деловод, и бухгалтер в одном лице. В штате, безусловно, присутствует специалист по социальной работе, но староста — самый опытный кадр: он знает каждую семью в своем селе...

Мария Петровна в этот момент поправила собеседника, заверив, что в составе сельской администрации каждый специалист — на своем месте и досконально знаком с тонкостями своего дела, как, впрочем, и должно быть…

А.И. Тосмасис продолжил:

— К сожалению, мы сегодня тоже стеснены в средствах и возможностях, но все равно стараемся подставить плечо богатянцам, оказать посильную помощь. Держимся на плаву, потому что являемся одним из предприятий групп компании «ТРАНСШИП». Наше руководство уделяет ему много внимания. Были планы, направленные на развитие, обновление, качественную работу, но их спутала война.

Вспомогательным видом деятельности АРК «Придунайская нива» является выращивание сельскохозяйственных культур. Из-за засухи состояние некоторых неорошаемых участков местами вызывает тревогу. Урожай на таких местах погибнет, если не будет дождя.

Правда, не все посевы внушают беспокойство, есть у нас плантации ячменя и пшеницы хорошего качества. В начале, когда только приступаешь к полевым работам, тебя всегда питает надежда, а затем не раз приходится поволноваться...

*Наверное, тревоги земледельца — дело привычное, потому что А.И.* Тосмасис с удовлетворением отметил, что коллектив «Придунайской нивы» с осени позаботился о прочном заделе. Кропотливо соблюдая технологию, произвел все необходимые обработки, подкормки. Были логистические задержки в производственной цепочке, но из трудной ситуации тогда удалось выйти.

В прошлом году в стране были начаты ремонты насосных станций, водоводов. Правительство уделяло достаточно много внимания этому инфраструктурному аспекту экономики. В АРК планировали расширять поливные площади, в этом году оборудовали одну линию для гарантированного полива. В подтверждение этих слов на поле у въезда в село можно видеть дождевальную машину семейства «Фрегат»…

— Пока на орошении у нас находятся около шестисот гектаров, — рассказал Александр Иванович. — Посеяли еще тысячу гектаров пропашных — кукурузы, подсолнечника. Важно, каков будет финансовый результат, ведь нам предстоит рассчитаться с пайщиками, которых у нас восемьсот. Люди заключили с нами договора, а «Придунайская нива» — ответственный арендатор. Свои обязательства нужно выполнять. Нам предстоит отдать пайщикам более семисот тонн зерна. Среди них есть те, кто не получил свою долю в прошлый сезон и согласился подождать до следующего, то есть, до нынешнего года. Я уверен, что в любом случае необходимые возможности будут изысканы, нам ведь не впервые приходится переживать трудные годы. Хочется, чтобы наши ожидания оправдались. Необходимо окупить свои затраты, вложенный труд, но, опять таки, пока нет ясности, сможем ли его убрать в сложившихся условиях, как затем пойдет реализация. Надеемся на нашу армию, на то, что все предпринятые усилия не окажутся напрасными...

**Продолжение на 2-й странице**

# УКРЕПЛЕНИЕ РУБЛЯ И ПОИСК ЛАЗЕЕК ПО ИМПОРТУ

## ЧТО ПРОИСХОДИТ С ЭКОНОМИКОЙ РФ ЧЕРЕЗ ТРИ МЕСЯЦА ПОСЛЕ НАЧАЛА

**Окончание. Начало на 5-й странице**

Российская авиакомпания "Победа" уже начала разбирать самолеты на запчасти.

*"Но все равно компании еще сидят на остатках. Через несколько месяцев ситуация значительно ухудшится. Особенно для авиапрома, где используется так называемая продукция двойного назначения (то есть импорт, который может идти как на мирные цели, так и на оборонку - Ред.). Если по "обычному" импорту запчастей еще можно как-то обойти санкции, то, например, оптика, навигация и др. относятся к позициям двойного назначения, и там контроль жестче. А для авиапрома критический именно такой импорт"*, - говорит Пендзин.

Российские власти заявляют о возрождении собственного авиапроизводства. На эту программу выделили 2,5 трлн рублей, на которые планируют выпустить 735 гражданских самолетов. Но эксперты оценивают перспективы такого производства весьма скептически. По крайней мере, в обозримом будущем, так как нет двигателей, авионики, шасси, фюзеляжей внутреннего производства.

В российском автопроме ситуация с импортозамещением тоже, мягко говоря, не радужная. Мы уже писали, что из России ушли все мировые автогиганты, остановилась поставка комплектующих.

Это заставило российские власти пойти на попятную в вопросе экологических стандартов. В РФ недавно разрешили производить авто класса "Евро-0" без подушек безопасности. Необязательными станут также такие уже давно привычные для водителей системы, как ABS (антиблокировочная система тормозов) и ESP (динамическая система стабилизации).

В целом ситуация в российском автопроме на сегодня такова: после ухода из РФ мировых автоконцернов производство работало с перебоями или вообще не работало. А в начале мая было "временно остановлено". АвтоВАЗ сообщил, что с июня переходит на четырехдневную рабочую неделю из-за дефицита комплектующих, включая электронику. А уже летом начнется то самое "упрощенное" производство авто (без подушек безопасности и ABS).

16 мая стало известно, что российские активы, ранее принадлежавшие Renault (АвтоВАЗ и московский автозавод) переходит в государственную собственность: доля французов в "АвтоВАЗе" досталась НАМИ "за один рубль" (при этом заявлена возможность обратного выкупа в течение 6 лет), московский завод - властям столицы РФ (на нем хотят наладить производство автомобилей под маркой "Москвич").

Петербургский завод Nissan в середине мая японское руководство отправило в годовой простой. До июня в простое также завод Hyundai (скорее всего, простой будет продлен). О продлении простоя завода во Владивостоке с 19 мая заявила компания Mazda.

### Сработают ли лазейки

*"Именно в технологических отраслях, в машиностроении, авиа и автопроме влияние санкций уже ощущается больше всего и наносит самые большие удары. Вплоть до того, что микрочипы россиянам придется из холодильников и стиральных машин выковыривать. А через год-два все вообще остановится"*, - говорит Олег Пендзин.

Впрочем, это в идеале. На самом деле есть черный рынок и схемы по обходу санкций, которые уже включились, добавил Пендзин.

*"В мире есть огромный черный рынок технологической продукции, а у России - деньги на ее покупку, пусть и с накрутками. И сейчас продавцы и покупатель ищут друг друга. Схема проста: компания-посредник из третьих стран, которая не находится под санкциями, спокойно покупает нужный товар у производителя, а затем продает его российскому заказчику. Такие схемы могут идти через страны, которые не присоединились к санкциям против РФ, начиная от Китая, Индии, арабских стран и заканчивая, например, Грузией. Понятно, что схемы пытаются отслеживать, но полностью их перекрыть вряд ли реально"*, - говорит Пендзин.

Так, автомобильные комплектующие Россия собирается закупать в Таиланде, причем заявляет об этом открыто. По словам министра экономического развития РФ Максима Решетникова, товарооборот между Россией и Таиландом может вырасти минимум втрое, поскольку Таиланд обладает "очень мощной промышленностью в области автомобилей и компонентов, что может пригодиться российскому автопрому". Решетников, очевидно, имел ввиду комплектующие для АвтоВАЗа, ГАЗа, УАЗа, но в профильном российском сообществе считают, что будут идти запчасти и по "параллельному импорту" - для иномарок, которые уже эксплуатируются в России.

Впрочем, у параллельного импорта есть ряд ограничений. Он может сработать в случае с относительно простым товаром (теми же запчастями), но практически непригоден для IT-отрасли. Плюс непонятно, зачем крупным производителям рисковать репутацией и бизнесом, снабжая Россию товарами по серым схемам, если на большинство номенклатуры сейчас в мире высокий спрос и ее не хватает (скажем, тех же микрочипов, электроники и др.).

В Главном разведуправлении Минобороны Украины недавно сообщили, что Россия для минимизации последствий от санкций использует соседние страны.

*"Москва уже ведет переговоры с Грузией, Арменией, Азербайджаном для реэкспорта российской продукции на международные рынки. Снабжение планируется осуществлять под видом грузинской, армянской, азербайджанской продукции и экспортировать ее в третьи страны. На территории этих стран уже создано более 200 компаний"*, - отметили в ГУР.

К примеру, Армения, якобы, создает благоприятные условия для работы российских IT-компаний.

Российские СМИ также сообщают, что в последнее время выросло предложение услуг по регистрации компаний в офшорах. Для россиян сейчас доступны налоговые гавани Невиса, Сейшел, ОАЭ, Турции (как видно, список офшорных юрисдикций заметно сократился).

*"Нехватка импорта становится весьма болезненной для России. В результате, РФ готова даже челноками завозить товары. Однако в масштабах страны это безусловно мизер. Импортозамещение буксует, поскольку отношения с РФ стали токсичными. Эта токсичность отражается и на возможностях обхода санкций"*, - говорит Шевчишин.

От того как Россия сможет решить проблему с импортом необходимых товаров в общем-то и зависит ответ на вопрос - сможет ли ее экономика выстоять под санкционным ударом или нет.

По сути, мы сейчас наблюдаем исторический эксперимент планетарного масштаба - может ли страна выжить, когда развитые страны Запада ее фактически "отключили" от финансовой системы и поставок продукции своих компаний.

Это первый такой прецедент. Даже СССР не был полностью "отключен" - за доллары он мог покупать те или иные товары.

От исхода этого грандиозного эксперимента будет зависеть дальнейшее развитие мировой экономики, геополитики и всей системы международных отношений.

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(дата офіційного опублікування в Єдиному реєстрі з оцінки впливу на довкілля (автоматично генерується програмними засобами ведення Єдиного реєстру з оцінки впливу на довкілля, не зазначається суб'єктом господарювання)

(реєстраційний номер справи про оцінку впливу на довкілля планованої діяльності (автоматично генерується програмними засобами ведення Єдиного реєстру з оцінки впливу на довкілля, для паперової версії зазначається суб'єктом господарювання)

## ПОВІДОМЛЕННЯ

**про плановану діяльність, яка підлягає оцінці впливу на довкілля**
**Товариство з обмеженою відповідальністю сільськогосподарське підприємство «НІБУЛОН», код ЄДРПОУ 14291113**

(повне найменування юридичної особи, код згідно з ЄДРПОУ або прізвище, ім'я та по батькові фізичної особи - підприємця, (інтегрований код або серія та номер паспорта для фізичної особи, які через свої релігійні переконання відмовляються від прийняття реєстраційного номера облікової картки платника податків та офіційно повідомили про це відповідним контрольним органу і мають відмітку у паспорті).

Інформує про намір провадити планованy діяльність та оцінку її впливу на довкілля.

1. Інформація про суб'єкта господарювання

Юридична адреса: 54002, м. Миколаїв, вул. Каботажний спуск, 1, поштова адреса: 54030 м. Миколаїв, вул. Фалеєвська, 9-Б, тел. (0512)58-04-28

(інформація про фізичні особи або місце проведення діяльності фізичної особи - підприємця підлягає вимогам, адресі, визначені номер телефону)

2. Планована діяльність, її характеристика, технічні альтернативи

Планована діяльність, її характеристика.

Планована діяльність - нове будівництво об'єкта транспортної інфраструктури - річковий порт (термінал) в м. Ізмаїл Ізмаїльського району Одеської області із залізничною під'їзною колією - примикання до станції Ізмаїл регіональної філії «Одеська залізниця».

Планована діяльність включає будівництво та експлуатацію гідротехнічних споруд порту (вантажний причал, операційна акваторія з підхідним каналом), під'їзної залізничної колії, виробничого перевантажувального комплексу для зернових, зернобобових та олійних культур (споруди залізничного та автомобільного прийому, сушарка, складські ємності, пристрої відвантаження на водний і автомобільний транспорт), паливозаправного пункту (зливна залізнична естакада, два підземні резервуари, пости заправки автотранспорту та плавзасобів).

Будівництво операційної акваторії з підхідним каналом передбачає виконання днопоглиблювальних робіт до глибини 8,23 м від «0» Ізмаїльського морського порту з виїмкою донного ґрунту в об'ємі 112,0 тис. м3 та його складуванням в береговий відвал.

Місце розташування планованої діяльності - лівий берег р. Дунай, нижче за течією розташовані промислові підприємства: СТО «БЛАЗ», Ізмаїльський морський торговельний порт, ПАТ «Ізмаїльський річковий порт «Дунайсудноскрес».

Технічна альтернатива 1.

Для забезпечення діяльності перевантажувального комплексу для зернових, зернобобових та олійних культур передбачається розташувати на відведеній ділянці наступні будівлі та споруди: адміністративно-побутовий корпус з лабораторією та навісом; трансформаторна підстанція з розподільним пунктом та операторною; операторна вагової, кафе внутрішнього використання; механічна майстерня з варіантом, складом, тяжкостом; 3 каналізовані дворові вбиральні; будинок для відрядження.

Для транспортного зв'язку буде використана: залізниця Нової станції Ізмаїл регіональної філії «Одеська залізниця», внутрішні водні шляхи України, автошляхи загальнодержавного та місцевого значення.

Передбачається здійснювати прийом зернових та олійних культур через пости розвантаження автомобільного та залізничного транспорту, оснащених вбудованими транспортними механізмами.

Дана альтернатива є оптимальним варіантом підбору споруд та обладнання з технічними характеристиками, що забезпечать їх об'єднання в єдиний технологічний комплекс.

Водозабезпечення потреб річкового порту (господарсько-побутових, виробничих, протипожежних потреб, а також потреб з благоустрою території) з поверхневого водозабору з р. Дунай, що є об'єктом нового будівництва

Технічна альтернатива 2.

Водозабезпечення господарсько-побутових та виробничих потреб порту за рахунок приєднання водопроводу до муніципальних мереж, забезпечення потреб з благоустрою території - з поверхневого водозабору з р. Дунай, що є об'єктом нового будівництва

* Суб'єкт господарювання має право розглядати більше технічних та територіальних альтернатив.

3. Місце провадження планованої діяльності, територіальні альтернативи.

Місце провадження планованої діяльності: територіальна альтернатива 1.

*Місто Ізмаїл Ізмаїльського району Одеської області, на узбережжі р. Дунай.*

*Зазначена територія знаходиться в промисловій зоні м. Ізмаїл з насиченою береговою інфраструктурою та інтенсивним судноплавством та є перспективною для приєднання до існуючої транспортної та енергетичної інфраструктури, а також задовольняє вимогам, що надаються для будівництва та експлуатації перевантажувального комплексу для зернових, зернобобових та олійних культур, що планується будувати.*

*Планована діяльність потребує виділення у користування строком на 49 років двох земельних ділянок з віднесенням їх до категорії «Землі транспорту»: площею 19, 0 га із земель запасу та площею 5,29 га із земель водного фонду.*

Місце провадження планованої діяльності: територіальна альтернатива 2.

*Не розглядається, територіальна альтернатива 1 є оптимальним варіантом для розміщення річкового порту (терміналу).*

4. Соціально-економічний вплив планованої діяльності

*Будівництво річкового порту (терміналу) на річці Дунай з можливістю доставки зернових вантажів залізницею та автошляхами в прикордонну зону має стратегічно важливе значення для забезпечення продовольної безпеки держави в умовах воєнного часу та націлене на розвиток сільськогосподарського виробництва та регіону в цілому.*

5. Загальні технічні характеристики, у тому числі параметри планованої діяльності (потужність, довжина, площа, обсяг виробництва тощо)

*Загальна площа ділянки, що запланована для будівництва та експлуатації об'єкта транспортної інфраструктури - річкового порту (терміналу), - 19,0 га, операційної акваторії 5,29 га. Площа запланованої забудови складає 7,0 га.*

*Територія вільна від забудови капітальними спорудами та заросла самосійними зеленими насадженнями, за результатом комісійного обстеження зелених насаджень визначено, що видаленню підлягають аварійні та сухостійні 841 дерево та 740 кущів.*

*Приймання зернових вантажів планується здійснювати з автомобільного, залізничного та водного транспорту. Технологічна схема комплексу передбачає можливість одночасного виконання операцій прийому і відвантаження та забезпечує одночасний прийом трьох видів зернових культур через пункти вивантаження автотранспорту; можливість одночасного виконання внутрішніх операцій (доведення до товарних кондицій (очистка, сушка) та переміщення зерна з силосу в силос для провітрювання або формування партії відвантаження) і зовнішніх операцій (прийом і відвантаження); стабільність роботи комплексу.*

*Експлуатація перевантажувального комплексу включає наступні технологічні операції: лабораторний контроль якості зернових, зернобобових та олійних культур; зважування завантаженого та порожнього автомобільного транспорту; прийом зернових вантажів з автомобільного, залізничного та водного транспорту; транспортування зернових вантажів із завальних ям транспортерами (стрічковими, ланцюговими) і норіями для подальшого їх зберігання або переробки (очистка, сушіння); переміщення зернових вантажів до ємностей вологого зерна для подальшого сушіння; зберігання кондиційного зерна в зерносховищах по видах зернових культур та вмісту смітної домішки; очищення зернових та олійних культур з використанням скальператора та сепаратора; сушіння зернових та олійних культур у зерносушарці; відсмоктування запиленого повітря від вузлів технологічного обладнання (аспірація) з наступним його очищенням на пилоочисному устаткуванні (ПОУ); зважування зернових вантажів перед відвантаженням на водний транспорт; відвантаження зернових та олійних культур на водний та автомобільний транспорт.*

*Перевантаження зернових вантажів:*

*- пропускна спроможність – 3,1 млн. т на рік зернової продукції, в тому числі прийом із залізниці – 1,0 млн. т, з автотранспорту – 2,0 млн. т, з водного транспорту – 100 тис. т;*

*- обсяг одночасного зберігання зернової продукції – 105,5 тис. т;*

*- розклад роботи – трьохзмінний, 365 діб на рік;*

*- штат працівників - 100 штатного персоналу, в тому числі ІТР - 30 од.;*

*- об'єми споживання ресурсу: газ – 218,7 тис. м3/рік; вода – 4, 117 тис. м3/рік.*

*Будівництво паливозаправного пункту з максимальною річною продуктивністю 1950 т/рік, до складу якого входять:*

*- зливна залізнична естакада на 2 вагоно-цистерни;*

*- два підземні резервуари V=75м3;*

*- операторна;*

*- острівець наливу дизельного палива у автотранспорт;*

*- пункт заправки плавзасобів.*

*Будівництво гідротехнічних споруд (вантажний причал, операційна акваторія з підхідним каналом):*

*- вантажний причал: загальна довжина - 300 м , в тому числі 1 черга будівництва - 140 м, 2 черга – 160 м, ширина – 20м, проектна глибина біля кордону - 8,23 м від позначки «0» Ізмаїльського морського порту;*

*- берегоукріплення з обох сторін від вантажного причалу;*

*- операційна акваторія з підхідним каналом на р. Дунай від 91,09 до 91,55 км: довжина - 460 м, ширина - 115м, площа - 5,29 га, проектна глибина - 8,23 м від «0» Ізмаїльського морського порту ,*

*Конструктивно вантажний причал забезпечений обладнанням для прийом з суден господарсько-побутових стічних вод, ляльних вод, твердого побутового сміття, а також поповнення суднових запасів питної води та палива.*

*Будівництво об'єкту планованої діяльності передбачено здійснювати пусковими комплексами з почерговим (5 черг) зведенням будівель та споруд та оснащенням їх технологічним обладнанням.*

6. Екологічні та інші обмеження планованої діяльності за альтернативами:

щодо технічної альтернативи 1

*- по забрудненню атмосферного повітря - значення гранично допустимих концентрацій (ГДК) забруднюючих речовин на межі СЗЗ, рівні граничнодопустимих викидів (ГДВ) від технологічного обладнання, фоновий вміст забруднюючих речовин в атмосферному повітрі, використання у двигунах дизельного палива, що відповідає вимогам Технічного регламенту щодо вимог до автомобільних бензинів, дизельного, суднових та котельних палив, що затверджений постановою КМУ №927 від 01.08.2013р.;*

*- по забрудненню водного середовища – значення ГДК забруднюючих речовин у поверхневій воді водного об'єкта, фоновий вміст забруднюючих речовин у поверхневій воді водного об'єкта;*

*- по забрудненню ґрунту - відсутність прямого інтенсивного впливу, значення ГДК забруднюючих речовин в ґрунті, нормативи радіаційної безпеки;*

*- санітарно-епідеміологічні – нормативи шумового впливу на людину;*

*- вплив на тваринний світ – заборона проведення днопоглиблювальних робіт в період нересту, заборона проведення робіт та заходів, які є джерелом підвищеного шуму та неспокою (забиття паль) у період масового розмноження диких тварин;*

щодо технічної альтернативи 2

*ті ж самі, що для технічної альтернативи 1;*

щодо територіальної альтернативи 1

*обмеження планованої діяльності полягає у дотриманні нормативного стану навколишнього середовища; дотримання розмірів санітарно-захисної зони відповідно до вимог "Державних санітарних правил планування та забудови населених пунктів", затверджених наказом Міністерства охорони здоров'я України від 19.06.1996 р. № 173 та ДБН Б.2.2-12:2019 "Планування і забудова територій".*

щодо територіальної альтернативи 2

*не розглядається, територіальна альтернатива 1 є оптимальним варіантом.*

7. Необхідна екологo-інженерна підготовка і захист території за альтернативами:

щодо технічної альтернативи 1

*- максимальне збереження зелених насаджень із видаленням сухостійних, аварійних та тих, що потрапляють в плямy забудови;*

*- вертикальне планування території з підняттям рівня на 1м;*

*- укріплення берегової лінії;*

*- організація на своїй території карт намиву донного ґрунту, вилученого при днопоглиблювальних роботах (тимчасова споруда); розпланування майданчику з обвалуванням по периметру, виділення відстійної зони, встановлення скидальних труб;*

щодо технічної альтернативи 2

*ті ж самі, що для технічної альтернативи 1;*

щодо територіальної альтернативи 1

*- інженерно-геологічні та геодезичні вишукування на майданчику під будівництво та по трасі прокладання комунікацій;*

*- рекультивація карт намиву донного ґрунту;*

*- організація відведення дощових і талих вод;*

щодо територіальної альтернативи 2

*не розглядається, територіальна альтернатива 1 є оптимальним варіантом.*

8. Сфера, джерела та види можливого впливу на довкілля:

щодо технічної альтернативи 1

*при проведенні будівельних робіт:*

*- на атмосферне повітря – викиди забруднюючих речовин при проведенні підготовчих та будівельних робіт, зварювальних робіт, земляних робіт, при роботі будівельної техніки та транспорту;*

*- на водне середовище – осідання викидів пилу на поверхневі води Дунаю при пересиланні та зберіганні ситучих будівельних матеріалів, підвищення мутності поверхневих вод в зоні днопоглиблення за рахунок переходу тонкодисперсної складової донного ґрунту в зважений стан та його втрат;*

*- на рослинний та тваринний світ – видалення самосійних дерев, що признані фаутними, сухостійними та аварійними. Передбачено озеленення та благоустрій території з висадкою зелених насаджень, створення газонів та квітників;*

*- на ґрунти та геологічне середовище – вплив обумовлений проведенням підготовчих та будівельних робіт, невідворотний вплив відсутній;*

*- акустичний вплив - робота будівельної техніки, в'їзд-виїзд на майданчик будівництва транспорту;*

*- утворення відходів - передбачається утворення будівельних та інших видів відходів, які планується передавати спеціалізованим підприємствам з метою подальшої переробки, захоронення чи утилізації, що передбачені відповідно до діючих норм.*

при експлуатації проектованого об'єкту:

*- на атмосферне повітря – викиди забруднюючих речовин від двигунів транспортних засобів; пиління при здійсненні перевантажувальних робіт та зберіганні вантажів, роботі інженерного обладнання, тощо;*

*- акустичний вплив – шумова дія при роботі ДВЗ транспортних засобів, інженерного та технологічного обладнання;*

*- на водне середовище – негативний вплив опосередкований за рахунок збільшення показників водоспоживання та водовідведення, планується підключення до існуючих інженерних мереж міста; осідання викидів пилу на поверхневі води Дунаю при перевантажувальних роботах, скид очищеного поверхневого стоку з території порту;*

*- на соціальне середовище - збільшення вантажообігу порту, створення оптимальних умов для освоєння існуючих та створення перспективних вантажопотоків, створення додаткових робочих місць, покращення економічної ситуації в регіоні;*

*- на техногенне середовище – ризик розвитку аварійних ситуацій вкрай незначний, підприємством передбачається механізувати та автоматизувати, обладнати системами аспірації запиленого повітря, протипожежні розриви витримано;*

*- утворення відходів – передбачається утворення виробничих та побутових відходів. Всі відходи планується зберігати в спеціально відведених місцях та передавати з метою подальшої утилізації, захоронення або переробки спеціалізованим підприємствам відповідно до договорів. Тимчасове накопичення відходів до транспортної партії планується здійснювати відповідно до вимог чинного законодавства.*

щодо технічної альтернативи 2

*ті ж самі, що для технічної альтернативи 1;*

щодо територіальної альтернативи 1

*соціальне середовище, джерела впливу:*

*- недотримання розміру санітарно - захисної зони виробництв, можливий вплив - перевищення гігієнічних нормативів допустимого вмісту хімічних речовин в атмосферному повітрі населених місць, перевищення санітарних норм допустимого шуму на території житлової забудови;*

*- порушення правового режиму зон санітарної охорони водних об'єктів, можливий вплив – перевищення санітарних норм гранично допустимого вмісту шкідливих речовин у водному об'єкті;*

щодо територіальної альтернативи 2

*не розглядається, територіальна альтернатива 1 є оптимальним варіантом.*

9. Належність планованої діяльності до першої чи другої категорії видів діяльності та об'єктів, які можуть мати значний вплив на довкілля та підлягають оцінці впливу на довкілля (зазначити відповідний пункт і частину статті 3 Закону України "Про оцінку впливу на довкілля")

*Належить до першої категорії видів планової діяльності та об'єктів , які можуть мати значний вплив на довкілля та підлягають оцінці впливу на довкілля, як будівництво гідротехнічних споруд морських і річкових портів, які можуть приймати судна тоннажністю понад 1350 тонн (абзац 6 п.7 частини2 ст. 3).*

10. Наявність підстав для здійснення оцінки транскордонного впливу на довкілля (в тому числі наявність значного негативного транскордонного впливу на довкілля та перелік держав, довкілля яких може зазнати значного негативного транскордонного впливу (зачеплених держав)

*Транскордонний вплив на довкілля ймовірний, в зону впливу може потрапити:*

*- житлова забудова Румунії, зокрема мінімальна відстань від джерел викидів забруднюючих речовин основного виробництва до житлової забудови румунського м. Ріаши становить 570м;*

*- р. Дунай, охорона та стале використання якої врегульоване Конвенцією «Про охорону ріки Дунай», що прийнята 29 червня 1994 року та ратифікована Законом України від 17 січня 2002 № 2997-III.*

11. Планований обсяг досліджень та рівень деталізації інформації, що підлягає включенню до звіту з оцінки впливу на довкілля

*В повному об'ємі, відповідно до вимог чинного законодавства, включаючи:*

*- проведення розрахунків об'ємів викидів забруднюючих речовин та їх розсіювання в атмосферному повітрі;*

*- проведення розрахунків шуму на межі житлової забудови;*

*- визначення номенклатури та об'ємів утворюваних відходів;*

*- проведення розрахунків оцінки ризиків планової діяльності;*

*- визначення об'ємів донного ґрунту по результатах промірів глибин в акваторії;*

*- отримання інформації про величини фонових концентрацій забруднювальних речовин в атмосферному повітрі, кліматичну характеристику району виконання робіт;*

*- проведення інструментальних лабораторних досліджень донного ґрунту щодо його санітарного стану та екологічної безпечності;*

*- інвентаризація зелених насаджень з комісійним встановленням зелених насаджень, що видаляються.*

12. Процедура оцінки впливу на довкілля та можливості для участі в ній громадськості

Планована суб'єктом господарювання діяльність може мати значний вплив на довкілля і, отже, підлягає оцінці впливу на довкілля відповідно до Закону України "Про оцінку впливу на довкілля". Оцінка впливу на довкілля - це процедура, що передбачає:

підготовку суб'єктом господарювання звіту з оцінки впливу на довкілля;

проведення громадського обговорення планованої діяльності;

аналіз уповноваженим органом звіту з оцінки впливу на довкілля, будь-якої додаткової інформації, яку надає суб'єкт господарювання, а також інформації, отриманої від громадськості під час громадського обговорення, під час здійснення процедури оцінки транскордонного впливу, іншої інформації;

надання уповноваженим органом мотивованого висновку з оцінки впливу на довкілля, що враховує результати аналізу, передбаченого абзацом п'ятим цього пункту;

врахування висновку з оцінки впливу на довкілля у рішенні про провадження планованої діяльності, зазначеного у пункті 14 цього повідомлення.

У висновку з оцінки впливу на довкілля уповноважений орган, виходячи з оцінки впливу на довкілля планованої діяльності, визначає допустимість чи обґрунтовує недопустимість провадження планованої діяльності та визначає екологічні умови її провадження.

Забороняється розпочинати провадження планованої діяльності без оцінки впливу на довкілля та отримання рішення про провадження планованої діяльності.

Процедура оцінки впливу на довкілля передбачає право і можливості громадськості для участі у такій процедурі, зокрема на стадії обговорення обсягу досліджень та рівня деталізації інформації, що підлягає включенню до звіту з оцінки впливу на довкілля, а також на стадії розгляду уповноваженим органом поданого суб'єктом господарювання звіту з оцінки впливу на довкілля.

На стадії громадського обговорення звіту з оцінки впливу на довкілля протягом щонайменше 25 робочих днів громадськості надається можливість надавати будь-які зауваження і пропозиції до звіту з оцінки впливу на довкілля та планованої діяльності, а також взяти участь у громадських слуханнях. Детальніше про процедуру громадського обговорення звіту з оцінки впливу на довкілля буде повідомлено в оголошенні про початок громадського обговорення.

Тимчасово, на період дії та в межах території карантину, встановленого Кабінетом Міністрів України з метою запобігання поширенню на території України гострої респіраторної хвороби (COVID-19), спричиненої коронавірусом SARS-CoV-2, до повного його скасування та протягом 30 днів з дня скасування карантину, громадські слухання не проводяться і не призначаються на дати, що припадають на цей період, про що зазначається в оголошенні про початок громадського обговорення звіту з оцінки впливу на довкілля.

13. Громадське обговорення обсягу досліджень та рівня деталізації інформації, що підлягає включенню до звіту з оцінки впливу на довкілля

Протягом 20 робочих днів з дня оприлюднення цього повідомлення на офіційному веб-сайті уповноваженого органу громадськість має право надати уповноваженому органу, зазначеному у пункті 15 цього повідомлення, зауваження і пропозиції до планованої діяльності, обсягу досліджень та рівня деталізації інформації, що підлягає включенню до звіту з оцінки впливу на довкілля.

Надаючи такі зауваження і пропозиції, вкажіть реєстраційний номер справи про оцінку впливу на довкілля планованої діяльності в Єдиному реєстрі з оцінки впливу на довкілля (зазначений на першій сторінці цього повідомлення). Це значно спростить процес реєстрації та розгляду Ваших зауважень і пропозицій.

У разі отримання таких зауважень і пропозицій громадськості вони будуть розміщені в Єдиному реєстрі з оцінки впливу на довкілля та передані суб'єкту господарювання (протягом трьох робочих днів з дня їх отримання). Особи, що надають зауваження і пропозиції, своїм підписом засвідчують свою згоду на обробку їх персональних даних. Суб'єкт господарювання під час підготовки звіту з оцінки впливу на довкілля зобов'язаний врахувати повністю, врахувати частково або обґрунтовано відхилити зауваження і пропозиції громадськості, надані у процесі громадського обговорення обсягу досліджень та рівня деталізації інформації, що підлягає включенню до звіту з оцінки впливу на довкілля. Детальна інформація про це включається до звіту з оцінки впливу на довкілля.

14. Рішення про провадження планованої діяльності

Відповідно до законодавства рішенням про провадження даної планованої діяльності буде

**Дозвіл на виконання будівельних робіт**

(від рішення відповідно до частини першої статті 11 Закону України "Про оцінку впливу на довкілля")

що видається **Державною інспекцією архітектури та містобудування України**

(орган, до повноважень якого належить прийняття такого рішення)

15. Усі зауваження і пропозиції громадськості до планованої діяльності, обсягу досліджень та рівня деталізації інформації, що підлягає включенню до звіту з оцінки впливу на довкілля, необхідно надсилати до

**Міністерство захисту довкілля та природних ресурсів України, поштова адреса: 03035, м. Київ, вул. Митрополита Василя Липківського, 35, OVD@mepr.gov.ua,**
**тел. (044) 206-31-40; (044) 206-31-50, Котяш Лада Павлівна**

(найменування уповноваженого органу, поштова адреса, електронна адреса, номер телефону та контактна особа)

(Додаток 2 із змінами, внесеними згідно з Постановою КМ № 824 від 14.09.2020)

НІБУЛОН
ТОВАРИСТВО З ОБМЕЖЕНОЮ ВІДПОВІДАЛЬНІСТЮ
СІЛЬСЬКОГОСПОДАРСЬКЕ ПІДПРИЄМСТВО
вул. Фалєєвська, 9-Б, Миколаїв, 54030, Україна
юридична адреса:
Каботажний спуск, 1, Миколаїв, 54002, Україна
тел.: +38(0512) 37 23 44; +38(0512) 58 04 04
факс: +38(0512) 50 01 91; +38(0512) 58 04 05
E-mail: mail1@nibulon.com.ua; mail3@nibulon.com.ua
www.nibulon.com

від 31.05.2022р № 3255/3-22/50

На № _____ від _____

Ізмаїльському міському голові
Ізмаїльського району Одеської області
Андрію АБРАМЧЕНКО

Шановний Андрію В'ячеславовичу!

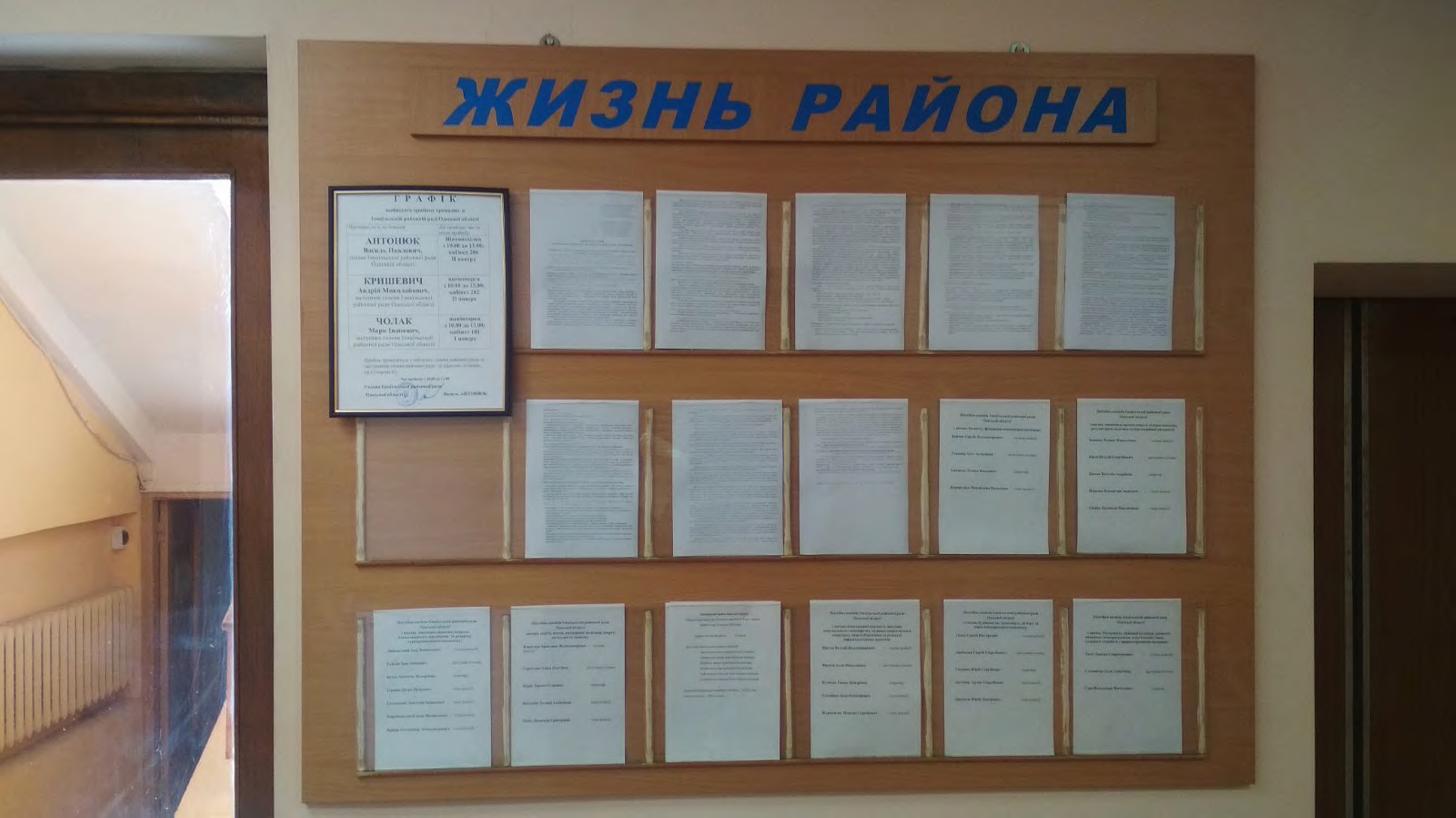
В рамках інформування громадськості щодо проекту «Нове будівництво об'єкту транспортної інфраструктури - річкового порту (терміналу) у м. Ізмаїл Ізмаїльського району Одеської області із залізничною під'їзною колією - примикання до станції Ізмаїл регіональної філії «Одеська залізниця»» та на виконання вимог п. 3 ст. 4 Закону України «Про оцінку впливу на довкілля» прошу Вас розмістити на дошках оголошень Ізмаїльської міської ради Повідомлення № 20225199566 про планову діяльність, яка підлягає оцінці впливу на довкілля.

Додаток - Повідомлення про планованої діяльність, яка підлягає оцінці впливу на довкілля 20225199566 в 1 прим. на 8 арк.

Заступник технічного директора
(довіреність №222 від 29.12.2020р.) Леонід МИХАЙЛОВ

Вик. Плошник І.О.
тел. 050-024-53-03

Виконавчий комітет Ізмаїльської міської ради
Ізмаїльського району Одеської області
Відділ діловодства, контролю
та організаційної роботи
отримано «01» 06 2022 р.


ЖИЗНЬ РАЙОНА
ГРАФІК
АНТОНЮК
Василь Павлович,
КРИШЕВИЧ
Андрій Миколайович,
ЧОЛАК
Марк Іванович,

# ЖИЗНЬ РАЙ

## Г Р А Ф І К

особистого прийому громадян в

Ізмаїльській районній раді Одеської області

| Прізвище, ім'я, по батькові | Дні прийому, час та місце прийому |
|---|---|
| **АНТОНЮК**<br>**Василь Павлович,**<br>голова Ізмаїльської районної ради Одеської області | **Щопонеділка**<br>**з 10.00 до 13.00;**<br>**кабінет 206**<br>**II поверх** |
| **КРИШЕВИЧ**<br>**Андрій Миколайович,**<br>заступник голови Ізмаїльської районної ради Одеської області | **щочетверга**<br>**з 10.00 до 13.00;**<br>**кабінет 202**<br>**II поверх** |
| **ЧОЛАК**<br>**Марк Іванович,**<br>заступник голови Ізмаїльської районної ради Одеської області | **щовівторка**<br>**з 10.00 до 13.00;**<br>**кабінет 101**<br>**1 поверх** |

*Прийом проводиться у кабінетах голови районної ради та заступників голови районної ради за адресою: м.Ізмаїл, пр.Суворова 62.*

*Час прийому з 10.00 до 13.00*

*Голова Ізмаїльської районної ради*

**МІНІСТЕРСТВО ЗАХИСТУ ДОВКІЛЛЯ ТА ПРИРОДНИХ РЕСУРСІВ УКРАЇНИ**
**(МІНДОВКІЛЛЯ)**

**вул. Митрополита Василя Липківського, 35, м. Київ, 03035, тел.: (044) 206-31-00, (044) 206-31-15, факс: (044) 206-31-07, E-mail: info@mepr.gov.ua, ідентифікаційний код 43672853**

_____ На № _____ від _____

**Товариство з обмеженою відповідальністю сільськогосподарське підприємство «НІБУЛОН»**
вул. Фалєєвська, 9-Б, м. Миколаїв, 54001

Щодо оцінки впливу на довкілля

Міністерство захисту довкілля та природних ресурсів України щодо оцінки транскордонного впливу на довкілля Товариства з обмеженою відповідальністю сільськогосподарське підприємство «НІБУЛОН» повідомляє наступне.

Відповідно до частини другої статті 14 Закону України «Про оцінку впливу на довкілля» та підпункту 1 пункту 5 Порядку прийняття рішення про здійснення транскордонної оцінки впливу на довкілля, затвердженого постановою Кабінету Міністрів України від 23.09.2020 № 877, Міндовкілля наказом від 06.06.2022 № 218 прийнято рішення про здійснення транскордонної оцінки впливу на довкілля за процедурою держави походження щодо планованої діяльності Товариства з обмеженою відповідальністю сільськогосподарське підприємство «НІБУЛОН» «Нове будівництво об'єкта транспортної інфраструктури – річковий порт (термінал) в м. Ізмаїл Ізмаїльського району Одеської області із залізничною під'їзною колією – примикання до станції Ізмаїл регіональної філії «Одеська залізниця», реєстраційний номер справи у Єдиному реєстрі з оцінки впливу на довкілля – 20225199566 (копія додається).

Окремо повідомляємо, що Міндовкілля надіслано повідомлення про плановану діяльність, яка підлягає оцінці впливу на довкілля, Товариства з обмеженою відповідальністю сільськогосподарське підприємство «НІБУЛОН» до Міністерства охорони навколишнього середовища, води та лісів Румунії для надання відповіді щодо участі в оцінці транскордонного впливу на довкілля.

Додаток: наказ Міндовкілля від 06.06.2022 № 218 на 1 арк. в 1 прим.

**Заступник Міністра** **Олена КРАМАРЕНКО**

Юлія Романенко
206-31-50

UB
Міндовкілля
№25/4-21/7202-22 від 07.06.2022
КЕП: Крамаренко О. В. 07.06.2022 17:36
58E2D9E7F900307B040000009AA434002346A300
Сертифікат дійсний з 18.05.2022 00:00 до 17.05.2024 23:59

MINISTRY OF ENVIRONMENT, WATERS AND FORESTS

Ref.no. DGEICPSC/1363/04.08.2022

To: Mr. Ruslan STRILETS, Minister

Ministry of Environmental Protection and Natural Resources of Ukraine

Ref: Transboundary environmental impact assessment procedure for the new construction of transport infrastructure facility -river port (terminal) in Izmail, Izmail district, Odessa region with a railway access track - adjacent to the Izmail station of the regional branch "Odesa Railway", Ukraine

**Dear Mr. Minister,**

Ministry of Environment, Waters and Forests presents its compliments to Ministry of Environmental Protection and Natural Resources of Ukraine and has the honor to thank for the previous cooperation between our countries, and looks forward to strengthening joint efforts in the field of environmental protection.

With regard to your letter ref. no. 25/4-21/7156-22 dated 7th of June 2022, transmitted through the Embassy of Ukraine in Romania, registered at the Ministry of Environment, Waters and Forests with the ref. no. 2/R/1363/15.06.2022, on the Notification of the planned activities - new construction of transport infrastructure facility -river port (terminal) in Izmail, Izmail district, Odessa region with a railway access track - adjacent to the Izmail station of the regional branch "Odesa Railway", as required by Article 3 of the Espoo Convention, we would like to inform you that Romania will participate in the transboundary environmental impact assessment procedure for this project.

In order to ensure compliance with the provision of Article 3 paragraph (8) of the Espoo Convention, we have made the received Notification, available to the public for making comments, by disseminating it on the official web site of the Romanian Ministry of Environment, Waters and Forests for 30 days. Furthermore, we sent the documentation to the competent Romanian authorities for assessment.

Thus, considering the notification submitted, we would like to bring to your attention that at their first meeting of the Parties to the Espoo Convention, in 1998, the Parties adopted a format for notification and recommended that Parties use the format to the extent possible when transmitting a notification according to article 3 of the Convention. Thus, the notification to an affected Party of a proposed activity under article 3 of the Convention should be done in accordance with format and information from Decision I/4.

I have the pleasure to forward, in accordance with the provisions of the Espoo Convention, several comments and proposals prepared by the Romanian institutions and experts for the scoping on the environmental impact assessment documentation of this project. I sincerely hope that all these comments and proposal will be duly taken into account in

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order to ensure that the Danube Delta and Danube river is not negatively impacted by the Ukrainian project.

I. **General comments and proposals:**

The planned activities are new construction of transport infrastructure facility - river port (terminal) in Izmail, Izmail district, Odessa region with a railway access track - adjacent to the Izmail station of the regional branch "Odesa Railway". In this way, the aim is to ensure the operation of the transshipment complex of cereals, legumes and oilseeds and to plan the location of buildings and structures on the allocated area.

The location of the designed works is on the left shore of the Danube, downstream being located industrial enterprises. In relation to the location of the works, the nearest Romanian neighboring locality to Izmail is Plauru village, Ceatalchioi commune -Tulcea county and the nearest surface water flow is the Danube river. The transboundary environmental impact can have a significant effect on the nearest neighborhood, the minimum distance from the sources of pollution emissions during the execution or operation works being 570 m - Plauru village in Romania.

The project include the construction and operation of hydro-technical installations of the port (cargo berth etc.), access railway track, production transshipment complex for grain, legumes and oilseeds (railway and road reception facilities, dryer, warehousing, transshipment facilities for water and road transport) as well as dredging to a depth of 8.23 m from the „0" of the Izmail port with the excavation of the bottom soil in the amount of 112.0 thousand $m^3$ and its storage in the shore dump.

Having analyzed the notification, the alternative considered feasible and proposed by the project is alternatives 1, being the best option for the selection of facilities/installations and technical characteristics of the equipment to ensure the integration of a complex technology.

Thus, the environmental impact assessment documentation (EIA documentation) to be elaborated for this planned activities, shall contain as a minimum, in accordance with the provisions of the Espoo Convention, the following:

- Detailed information on the project itself including: the location of the project works, description of these proposed works (please include sections, cross-sectional and longitudinal profiles of the objects related to the activities proposed), an area plan and a project location map, with reference to the state border between Romania and Ukraine;
- A description of reasonable alternatives to the proposed activities and also the no-action alternative;
- A description of the environment/factors that are likely to be significantly affected by the proposed activities and its alternatives;
- A description of the potential environmental impact of the proposed activities and its alternatives and an estimation of its significance;
- A description of prevention, mitigation measures to keep adverse environmental impact to a minimum. It is necessary to assess the transboundary impact on environmental factors and to have measures to prevent, reduce, supervise and monitor the activities during the execution/construction phase or during the operation of any negative impact on the environment according to the relevant legislation. All these measures to prevent, limit and reduce any impact on the environment are also applicable to protect the surface waters of the Danube river both during the execution works and during the operation within the river port (terminal) Izmail. We consider it imperative to take measures to reduce or prevent adverse effects and protection measures to be planned and implemented in accordance with international law at all stages of the planned activities (implementation, operation, in case of accident, etc.) and to ensure a high degree of



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environmental protection, adaptation to climate change and ensuring sustainable development.

- An explicit indication of predictive methods, including mathematical modeling methods and underlying assumptions as well as the relevant environmental data used;

- Assessment of probable consequence of changes in the environment/change intervention in the environment;

- An estimation of the duration, length, magnitude of the proposed works;

- A description of effects on key species and organisms, including impacts on sediment disturbance on maritime organisms;

- Use of natural resources;

- Monitoring and management plans;

- A description with regard to measures for prevention and response of accidents, including shipping accidents that may result in sinking;

- An identification of gaps in knowledge and uncertainties encountered in compiling the environmental impact assessment documentation.

Supplementary, we would also like to emphasize that a significant adverse transboundary impact of the project on the activities to be financed under the Interreg VI-A NEXT Programme Romania-Ukraine, can be expected taking into consideration that the Odessa oblast, including Izmail County, is part of the eligible area of this Programme. The Programme offers financing opportunities under three priorities and five specific objectives, among which we mention those activities financed under the Romania-Ukraine Programme thus, in our view, may be impacted by the mentioned project: infrastructure (construction/rehabilitation/modernization of infrastructure related to systems/structures dealing with fires, floods, strengthening the banks of rivers, canals, the condition of dams, afforestation of river banks, preservation, revitalization and re-naturalization of water bodies and ecosystems, preservation and restoration of small rivers); equipment (firefighting equipment, floods, etc.); common strategies and tools for hazard management and risk prevention including joint action plans, hydrological monitoring of rivers, water temperature, precipitation measurements, ice regime; joint projects for the creation/extension of natural reserves in a transboundary context; endowment: improving human and technical capacity and modernizing monitoring equipment of protected areas; assessment, protection and improvement of existing ecosystems (research activities, inventory of resources, protection of endangered species, eradication of invasive species, afforestation etc.).

**II. Comments and proposals regarding surface and groundwater bodies/water elements**

From the point of view of the naval transport field, through the planned activities, the Ukrainian Party intends to build 8.23 m depths in the future port/terminal in Izmail at the operating front, which involves the dredging works on the next sector: Sulina Branch, Sulina Channel, Tulcea Branch, Ceatal Izmail, then following the Chilia Arm to Izmail so that, from a depth of 7.32 m, a depth of 8.23 m is ensured.

In this respect, we would like to mention the fact that the depths of the Sulina bar and the Sulina mouth are in direct dependence on the Danube sediment intake. The higher the waters of the Danube, the more intense the sediment deposition processes are, with influences of decreasing depth. The more intense the dredging in the bar, the greater the



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depths in the bar and vice versa, so that the dredging is carried out during the year with a time delay compared to the Danube sediment supply regime.
In view of the above, it is necessary to analyze the project/activities under the following aspects:

- hydro morphological - the speed variations of the water current in several sections of the Sulina sector, Sulina Canal, Tulcea arm, Ceatal Izmail, then Chilia arm to Izmail and their influences on the existing hydro technical works on this sector, in case of works dredging from 7.32 m to 8.23 m;
- the correlation with the new hydro morphological process that appeared related to the issue of the development to the south of the secondary delta Chilia, which refers to the formation by the coarse alluvial outflows of the Stambulul Vechi of a coastal cordon that closes at the Black Sea the Gulf of Musura, which endangers navigation at the mouth of Sulina, it must be analyzed to what extent the rate of sedimentation in the mouth of the Sulina channel will intensify;

- the accomplishment of the dredging works from 7.32m to 8.23m and, subsequently, the exploitation of this waterway will have important effects on the distribution of the water and alluvium flows of the Danube between the Chilia and Tulcea arms;

- the major volumes of dredging will negatively influence the flow of water on the secondary arms of Chilia which supply water on the territory of the Danube Delta and may significantly affect the Danube Delta Biosphere Reserve.

It is also necessary to include aspects on the status of the water body and possible impact, in accordance with the requirements of the Water Framework Directive (2006/60/EC), taking into account the mention from the notification, in the context of a likely transboundary impact (page 6), of the Convention for the Protection and Sustainable Use of the Danube River in the context of a likely transboundary impact, and the Convention on the Protection and Sustainable Use of the Danube River (1994, ratified by Ukraine in 2002).

From the point of view of safety of navigation, for the normal development of the naval traffic, the carrying out of transports on the water, the physical integrity of the navigation personnel, passengers and cargoes, we inform you that the depths of 8.23 meters, planned to be carried out by dredging operations according to the project, are much higher than the draught of 23 feet (7.01 meters) allowed at the Sulina bar according to art. 3.05 Cap. 3 second Part of the Regulation of navigation on the Danube in the Romanian sector. In conclusion, the ships witch will be loaded at Izmail port, so in the future will not be able to load at full capacity, due to restrictions at Sulina bar.

The Ukrainian Party will have to comply with the provisions of international and bilateral normative acts regarding navigation on the Danube and the regime of border water drainage, such as: the Convention on the Regime of Navigation on the Danube, signed in Belgrade on 18 August 1948 (ratified by Decree No. 298/1948) hereinafter referred to as the Belgrade Convention, Treaty between Romania and Ukraine on the regime of state border (2003), Agreement between the Government of Romania and the Government of Ukraine on cooperation in the field of border water management, signed on 30 September 1997 in Galati, as well as other bilateral documents signed by Romania and Ukraine. It is necessary for the Ukrainian Party to take all possible measures to limit and manage the environmental consequences for the Danube Delta ecosystem.

Considering the pressures listed in European Commission Directive EU 2017/845 of 17 May 2017, that the proposed activities exert on the aquatic environment, there is a possibility that the marine environment may be affected in different ways. Thus, the works carried out in the project implementation area, could lead to the resuspension of some priority substances from the sediments in the water column. Moreover, the equipment and transport activities may represent additional pollution sources generating atmospheric



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emissions of priority hazardous substances (heavy metals, hydrocarbons, etc.), which may then be released into the aquatic environment, introducing contaminants into the marine area. Together with other pressures from the same activities, the cumulative impact might be a threat for the marine ecosystem.

Therefore, we consider that a monitoring programme of the Black Sea ecosystem in front of the Danube mouths is mandatory, both during the project implementation period and after the completion of the works regarding the concentration of pollutants in all matrices: water, sediments and biota.

## III. Comments and proposals regarding air quality and noise

Air quality shall be monitored by measurements, determined by the combustion of fuels at the level of machinery and equipment and by means of transport or by the circulation of materials (emissions of CO, CO2, NOX, SO2, VOC, dust, etc.) and monitoring of parameters so as to ensure that the maximum permissible concentrations under the relevant legislation are not exceeded.
Ensuring noise level measurements on site and at the limits close to the areas adjacent to the port, during the execution period (temporarily) or during the operation period through the noise produced by construction/operating equipment and material transport vehicles.

## IV. Comments and proposals regarding waste management

Waste management regarding collection through companies specialized in the field and application of hazardous and non-hazardous waste management measures. We also mention the need to manage any accidental spills/discharges on hazardous substances, especially in the category of fuels (oil, diesel, mineral oils, used engine oils, etc.) at the surface or groundwater bodies. At the same time, the waste generated during the current activity of the dredging vessels but also of the other activities will be managed, selectively collected, in storage places/containers arranged for this purpose and taken over by specialized companies in the field.

## V. Comments and proposals regarding the appropriate impact assessment on Natura 2000 sites

As you are certainly aware, the Danube Delta is an integral part of the European Ecological Network Natura **2000 in Romania** and overlaps at the level of the Danube Delta with the following special protection areas (SPA) and sites of Community importance (SCI) established under the Habitats (92/43/CE) and Birds (79/409/CE) directives:

| No | Name of SCI | Code | Surface of SCI (ha) | Biogeographical Region |
|---|---|---|---|---|
| 1. | Delta Dunării | ROSCI0065 | 453.645,5 | 49,8% Steppe and 50,2% Pontic |
| 2. | Delta Dunării - marine area | ROSCI0066 | 336.200,2 | 100% Black Sea marine area |

| No. | Name of SPA | Code | Surface of SPA (ha) | Biogeographical Region |
|---|---|---|---|---|



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| | | | | |
|---|---|---|---|---|
| 3. | Delta Dunării and Complexul Razim-Sinoie | ROSPA0031 | 508.302,3 | 44,74% Steppe and 55,26% Pontic |

The detailed maps of these sites can be found online - https://natura2000.eea.europa.eu/#. Information regarding the sites is made available on the website of the Romanian Administration of the Danube Delta Biosphere Reserve: http://www.ddbra.ro/rezervatia/delta-dunarii/biodiversitate/situri-natura-2000-administrate-de-a-r-b-d-d-a921. This link also contains the Standard Form Natura 2000 which was prepared for each Natura 2000 site.

**1. "Delta Dunării ROSCI0065"** was designated for the conservation of species/habitats of Community interest:
- 29 types of habitats of community interest, of which 7 habitats of priority interest (71,24% of the ROSCI0065 surface is occupied by Natura 2000 habitats)
- species listed in Annex II of Directive 92/43/CEE: 5 plant species, 9 invertebrates species, 15 fish species, 2 amphibians species and 3 reptile species, 7 mammals species.

**2. "Delta Dunării ROSCI0066 marine area"** was designated for the conservation of species/habitats of Community interest:
- 4 types of habitats of community interest
- species listed in Annex II of Directive 92/43/CEE: 2 fish species, 2 mammals species.

**3. "Delta Dunării and the Complex Razim Sinoe ROSPA0031"** was designated for the conservation of birds of Community interest: 221 birds species listed in Annex I of the Directive 2009/147/CE from which 13 are permanent species, 95 are for reproduction, 38 are wintering, 137 are within this area during migration.

The Romanian Party is particularly concerned about the proposed dredging works and believes that all interventions aimed at changing the cross-sectional and longitudinal sections of the branches will have a likely significant impact on most components of the Natura 2000 sites.

In conclusion, adequate assessment studies for the protected areas indicated above need to be conducted, in accordance with the provisions of the directives referred to above. The methodology adopted for identifying and evaluating negative impact should be simple and in accordance with the Danube Delta Biosphere Reserve management plan. The conclusions of the adequate assessment studies should be then addressed in the environmental impact assessment documentation.

The works in the Danube waters, in the phase of construction of the port or dredging capacities, will be able to affect the aquatic ecosystem of the Danube, in the immediate vicinity and to a limited extent downstream. The works will also affect the presence of ichthyofauna and the presence of birds that are related to aquatic ecosystems. The activity and the increased presence of people on the site within the port complex during the works are expected to have a negative effect on the fauna in the area.

## VI. Comments and proposals regarding the monitoring programme

We consider it necessary to monitor the environmental factors that may be significantly affected. The developer must implement the prescribed environmental monitoring measures in accordance with the international applicable environmental legislation.

**In conclusion,** taking into account the Notification on planned activities - new construction of transport infrastructure facility -river port (terminal) in Izmail, Izmail district, Odessa region with a railway access track - adjacent to the Izmail station of the regional branch "Odesa Railway", which involves:



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- "the construction of the operating water area with an approach canal with dredging to a depth of 8.23 m from the "0" of the Izmail seaport with the excavation of the bottom soil in the amount of 112.0 thousand $m^3$ and its storage in the shore dump";
- "the total area of the site planned for the construction and operation of the transport infrastructure facility - the river port (terminal) with an area of 19.0 hectares from the lands of the reserve and an area of 5.29 hectares from the lands of the water funds";
- "operational water area with an approach channel on the Danube River from 91.09 to 91.55 km: length - 460 m, with -115 m, area - 5.29 ha, design depth - 8.23 m from the "0" of the Izmail seaport";
- "environmental restrictions (...)" to the planned activities by technical alternative 1" are "for pollution of the aquatic environment - the value of the MPC of pollutants in the surface water of a water body, the background content of pollutants in the surface water of a water body ", and for "impact on wildlife" - ban on dredging during spawning";
- that for the notification transmitted, additional information is needed about the planned activities regarding berths, roadsides, aquariums, silos, outer port defense constructions, the current capacity of the port and to what level the expansion is carried out, if there are facilities for 8 million tons/year, if the total area of the port is 1.074.712 $m^2$, i.e. 107,47 ha as specified in the "Danube Ports Handbook, Edition December 2021[1] ";
- the Notification does not establish any possible impact on the environment, but only mentions some aspects of the impact on water during the operating period through the deposition of dust resulting from the transshipment works on the surface of the water and does not mention any possible transboundary impact, for example through the modification of the hydrological parameters of the Chilia arm with the consequence of the redistribution of flows between the Chilia and Sulina arms, in clear favor of the first;
- the likely transboundary impact, in particular due to the hydrological changes of the Danube (in terms of morphological conditions: depth and width of the course, structure and substrate of the bed of the riverbed, hydrological regime: quantity of flow, perturbation of the continuity of sediment transport, water velocity, etc.) through the implementation of the planned activities (...)", must be considered in the context of the implementation of another project: *"Development of the Danube-Black Sea deep water navigable channel on the Ukrainian side of the Danube Delta[2]" (Bystroe Channel)*, since the planning of works for the Izmail harbour with 8.23 m deep berths also requires at least similar access depths for the whole Chilia arm and the Bystroe Channel;
- in a wider context, these two interconnected projects belong to the "Development of the Danube Corridor" project, of which the LOGMOS Master Plan - Annex 6, Part II, TRACECA Inland Waterways - Danube Case Study, October 2013, ENPI 2011/264 459, "Logistics Processes and Motorways of the Sea II in Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Turkmenistan, Ukraine, Uzbekistan[3]", mentions the construction of an external port at the entrance to the Ukrainian portion of the Danube waterway for transhipment operations to increase the volumes of cargo shipped to the ports of Reni and Izmail and the reconstruction of the port of Reni;
- Research report "Analysis of the environmental impact in the Danube Delta resulting from the already implemented works related to the Danube-Black Sea

[1] https://www.danubeports.eu/images/Danube_Ports_Handbook_Edition_2021_final.pdf
[2] http://www.mmediu.ro/app/webroot/uploads/files/Notificare%20UA.pdf
[3] http://www.traceca-org.org/fileadmin/fm-dam/TAREP/65ta/Master_Plan/MPA6.2.pdf



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Deep Waterway project on the Ukrainian side of the Delta[4] " carried out from the implementation of both Phase 1 of the project and the Full development phase (which also covers the development of compensatory measures and mitigation measures likely based on the 2004-2017 integrated environmental monitoring materials and the results of field monitoring observations, at least in the transboundary context), states that the hydrotechnical works (not specifying what these works consisted of) did not generate a transboundary impact on the hydrological regime of the Danube Delta and thus:

- did not cause any changes in the flow distribution from the top of the Delta where the Danube splits into the Kiliynsky and Tulchinsky arms", but no data was provided to confirm this;
- have not changed current trends in the development of water flow in the Chilia Delta;
- no significant impact on migratory fish populations has been established.

***The Romanian Party expresses the following point of view on the implementation of the works:***

Since the Ukrainian Party intends to create depths of 8.23 m at the operating berths in the port of Izmail, we consider that it is not opportune to create these depths because the ships that are going to operate in the port of Izmail, if they enter the Sulina Channel, Tulcea Arm, Izmail Ceatal, then Chilia Arm up to Izmail, will need to ensure this depth throughout the entire sector crossed. This situation is in contradiction with what is currently going on in this segment between Bara Sulina - Sulina Channel - Tulcea Arm - Ceatal Izmail, since, in compliance with the Danube Commission Recommendations[5], it provides depths of 7.32 m for the navigation of maritime vessels with draughts of 7.01 m. Currently the navigation depths provided by the Lower Danube River Administration Galați are in accordance with the navigation gauges for which the Sulina Canal was designed, the present situation being directly proportional to the existing geomorphological conditions, the infrastructure of the banks and the port on this segment, between Bara Sulina and Ceatal Izmail. In the situation desired by this project, to ensure depths of 8.23 m in the berths of the port of Izmail, we consider that this cannot be achieved on the above-mentioned segment, namely from Bara Sulina to Ceatal Izmail, both from the geomorphological point of view, financial resources, existing equipment, as well as the fact that it is not necessary from the point of view of the Administration, which must ensure a depth of 7.32 m, according to the Recommendations of the Danube Commission. At the same time, it must be taken into account the current situation regarding high temperature and drought, as well as the high traffic flow on the Danube River compared to previous years, which led to the decrease of the Danube river flow by 50%, being necessary to ensure recommended and accepted navigability conditions in the sector concerned.

The area to be dredged additionally for the 8.23 m depth is between Bara Sulina and Ceatal Izmail (Mm43) at the critical points Bara Sulina, Mm31, Mm36, Mm40 and the dredged material must be dumped at sea. From the measurements carried out, for a covering depth of -9.00 m, it results the necessity of dredging a volume of about 1,500,000 m3, with annual periodical maintenance, with adverse effects on the Sulina Canal, both for the bank defences and on the bed, with enormous costs, unjustified by the Romania and without having additional equipment to carry out the above mentioned works. In this regard, the Romanian authorities does not agree with the realization of the Izmail port

[4] http://www.mmediu.ro/app/webroot/uploads/files/Annex_2_Analysis_of_the_impact_of_the_environment_which_follows_from_the_already_implemented_work_ENG_-_RO.pdf

[5] https://www.danubecommission.org/uploads/doc/publication/Gabaritov_farvatera/Recommandations%20gabarits%202013.pdf



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for depths of 8.23 m and recommends to take into account that the future sea berths should provide depths for ships with draughts in close correlation with the existing situation in the Sulina Channel, i.e. depths for the navigation of sea vessels with draughts of 7.01 m.

At the same time, in the case of dredging for the construction of the depths at the berths of the Izmail seaport, we recommend that the dumping areas be established as close as possible to the Ukrainian shore, that they be checked periodically to monitor the quantity of alluvium dumped, and that the dumping area be respected in order to prevent their migration into the navigable channel, towards the Romanian side, avoiding the clogging of the navigable channel maintained by the Romanian Party.

Please note that the Romanian Party, through Lower Danube River Administration Galati, ensures for the Chilia Arm, on the segment from Ceatal Izmail to Periprava navigation conditions for river vessels for the transport of goods and passengers, only for the area between the border line and the Romanian shore, is not open to navigation of maritime vessels with third flags according to international legislation under the Romanian-Ukrainian Border Treaty, art. 9, para. 1.

***The Romanian Party expresses its concern about the following matters:***

- That in Decision IS/1f on compliance by Ukraine with its obligations under the Convention in respect of the Danube-Black Sea Deep Water Navigation Canal in the Ukrainian sector of the Danube Delta (ECE/MP.EIA/27/Add.1-ECE/MP.EIA/SEA/11/Add.1)[6] adopted at the Intermediate Sessions of the Meetings of the Parties to the Espoo Convention and the SEA Protocol, Geneva, 5-7 February 2019 published on the website of the United Nations Economic Commission for Europe (UNECE), the Meeting of the Parties:

*"6. Regrets that only limited steps have been taken to bring the Bystroe Canal Project into full compliance with the Convention, further to paragraph 24 of decision VI/2;*
*7. Endorses that (...) Ukraine has not yet fulfilled its obligations (...) bringing the project itself into full compliance with the Convention;*
*8. Also endorses that the continuation of dredging activities by the Government of Ukraine constitutes a further breach of its obligations under the Convention;*
*13. Takes note of the intention of Ukraine to develop a new project for a "Bystroe Route" and to carry out a transboundary environmental impact assessment procedure on the new project in accordance with the Convention."*

- for the lack of relevant information on both the status of the complex hydrotechnical works carried out so far and the projects that are planned to be implemented, such as the Izmail terminal, which may have a transboundary impact on the Romanian territory;
- that the projects already implemented for the "Development of the Danube Corridor" are very extensive and require a lot of complex hydrotechnical works on the Chilia arm, on the Bystroe arm and in the ports of Reni and Izmail which will determine the redistribution of flows on the Danube between the Chilia arm and the Sulina arm, in clear favour of the former and which will cause a significant transboundary impact on the Romanian territory, affecting the sites of the Danube Delta Biosphere Reserve, having a strong negative social and economic effect on the local communities of the Delta and determining unfavorable conditions for navigation on the Danube in the Romanian sector;

[6] https://unece.org/fileadmin/DAM/env/eia/documents/WG2.8_Nov2019/official_docs/G1910581ENG.pdf



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- that the impact of these works is not assessed in an integrated, synergistic, direct, indirect and cumulative context and no information was provided on the possible transboundary impact, in particular due to the hydrological changes of the Danube river (in terms of morphological conditions: depth and width of the course, of the fairway, bed structure and substrate, hydrological regime: quantity of flow, disturbance of sediment transport continuity, water velocity, etc.);
- that the impact studies presented by the Ukrainian Party do not present data and information that can be compared with those obtained by the Romanian Party but only statements unsupported by numbers, i.e. without a scientific basis; e.g. "Updated information on the current depth and width of the Bystroe Channel is not available because recently carried out hydrographic measurement numbers cannot be obtained. It is not known whether hydrographic measurements are carried out regularly (at least annually), or only occasionally." - Study on current situation and likely development of the Bystroe canal and Kiliya arm, TRACECA IDEA II, Transport Dialogue and, Networks Interoperability II, January 2016[7];
- that the Ukrainian approach regarding the impacts does not take into account very sensitive areas that may be significant such as affecting sturgeon migration, this in the context that "rare reef species such as sturgeons are more common on the Bystroe than elsewhere." (Documentation on the likely significant transboundary impact of the Ukrainian Deep-Water Navigation Canal Danube-Black Sea in the context of Espoo Convention, Danube Delta National Institute Tulcea, Romania, February 2005)[8] and "regarding ultrasound-tagged individuals, records showed that in spring 2012 and 2014, 53% of the individuals that migrated to the Black Sea used the Chilia arm" - Methods, techniques and monitoring results regarding the sturgeon migration on Lower Danube, INCDPM Bucharest, Strasbourg 2015/ Bern Convention[9];
- that the estimates of the amount of **112,000 m³** of material that needs to be excavated for the Izmail port access channel are very optimistic, from the data presented this amount that would result for an excavation on an area of 5.29 ha to a depth of 8.23 m from "0" would be according to a simple calculation about **435,367 m³**;
- that the conditions for temporary or final storage of excavated, dredged material that could also have a transboundary impact on Romanian territory are not presented;
- that the Ceatal Izmail bifurcation requires special scientific attention due to the intensity and complexity of the hydromorphological processes acting on the riverbed, hydromorphological changes in this sector of the Danube are significant because they produce associated risks, affecting the ecological balance of the Danube Delta Biosphere Reserve, therefore, monitoring and assessing morphological changes in the riverbed are essential - Assessing Danube riverbed morphology as a response to natural and anthropogenic conditions using GIS: A case study of the Ceatal Izmail Branching Area, National Research-Development Institute for Marine Geology and Geoecology - Geoecomar, Romania, December 2021[10];
- that the total area of land affected by erosion in the Ceatal Izmail bifurcation is 21.5 ha, while the total area occupied by sediment accumulations is 27.4 ha for the period 1980-2020, erosion and sedimentary deposition acting differently on the three branches of the bifurcation - Assessing Danube riverbed morphology as a response to natural and anthropogenic conditions using GIS: A case study of the

[7] https://mtu.gov.ua/files/31110551_dod.pdf

[8] https://unece.org/DAM/env/eia/documents/inquiry/Rom.1.pdf

[9] https://www.afdj.ro/sites/default/files/prezentari/presentation_incdpm_deak_bern_convention_0.pdf

[10] https://www.researchgate.net/publication/359387451_ASSESSING_DANUBE_RIVERBED_MORPHOLOGY_AS_A_RESPONSE_TO_NATURAL_AND_ANTHROPOGENIC_CONDITIONS_USING_GIS_A_CASE_STUDY_OF_THE_CEATAL_IZMAIL_BRANCHING_AREA



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Ceatal Izmail Branching Area, National Research and Development Institute for Marine Geology and Geoecology - Geoecomar, Romania, December 2021[11];

- that no 3D mathematical modelling of hydrodynamic and hydromorphological effects of sediment transport has been carried out, results from the simulation of the solutions of the mentioned projects and the analysis of scenarios following the calibration and validation of 3D hydrodynamic models as well as 3D morphodynamic models in which the effects and transboundary impact on water bodies in the territories of Ukraine and Romania could be highlighted (an example Romanian coastal dynamics during cold and warm seasons analyzed by means of a numerical model, 2017, National Institute of Marine Geology and Geo-Ecology - GeoEcoMar[12]).

Thus, taking into account the provisions of the Espoo Convention, the provisions of the Treaty on the relations of good neighbourliness and cooperation between Romania and Ukraine, signed in Constanta on 2 June 1997, Article 16 on the "development cooperation in the area of protection and improvement of the environment, ... in the area of rational use of natural resources, of expansion of ecologically safe production, of implementation of efficient measures for the protection and revival of nature, in order to improve the environmental security of the two countries",

as there are reasonable grounds for believing that a significant adverse transboundary impact is likely to be caused by the planned activities to be carried out in the future, we request that the environmental impact assessment documentation which will elaborated and transmitted to Romania Party, to include the domains that have been identified as being of interest for which additional data and information are requested and for which an environmental impact assessment is required.

In the context above, we expect to receive according to Article 4 paragraph 2 of the Espoo Convention, the environmental impact assessment documentation (EIA Study), and indication of the time schedule for transmittal of comments to this or a timetable for the transboundary EIA procedure.

In the light of the foregoing, we consider that the Romanian Party has shown that it respects its responsibilities and obligations arising from international agreements and conventions to which Romania is a Party and looks forward to strengthening joint efforts in the field of Danube Delta protection.

On this occasion, I express my willingness to continue the fruitful cooperation and please accept, Ms. Deputy Minister, the assurance of my highest consideration.

Sincerely yours,

**Barna TÁNCZOS**

**Minister**

[11] Idem.

[12] https://www.geoecomar.ro/website/publicatii/Nr.23-2017/05_DINU_2017_web.pdf



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(date of official publication in the Unified Register of Environmental Impact Assessments (automatically generated by the Register maintenance software, not specified by the business entity)

20225199566

(registration number of the environmental impact assessment case of the planned activity)

# Announcement
## on the start of public discussion of the environmental impact assessment report

We announce the beginning of the public discussion of the environmental impact assessment report of the planned activity specified in point 1 of this announcement, with the aim of identifying, collecting and taking into account comments and suggestions from the public regarding the planned activity.

1. Planned activity

***Planned activity - new construction of a transport infrastructure facility in Odesa region.***

**The planned activity involves the construction and operation of:**

- **industrial transshipment complex;**
- **gas station for own needs;**
- **hydraulic structures.**

**The construction of the object of the planned activity is planned to be carried out by start-up complexes with alternate (5 stages) construction of buildings and structures and equipping them with technological equipment.**

(general technical characteristics, including parameters of the planned activity (power, length, area, volume of production, etc.), place of implementation of the planned activity)

2. Business entity

***Limited liability company agricultural enterprise "NIBULON" code EDPNOU 14291113***

(full name of the legal entity, code according to EDRPOU or surname, name and patronymic of an individual - entrepreneur, identification code or series and passport number (for individuals who, due to their religious beliefs, refuse to accept the registration number of the taxpayer's registration card and have officially reported this to the relevant supervisory authority and have a mark in the passport),

***54020, Mykolaiv region, Mykolaiv.***

***Tel.: +38 (0512) 37-23-44, +38 (0512) 58-04-04, e-mail: mail1@nibulon.com.ua***

(location of a legal entity or place of business of an individual entrepreneur (postal code, address, contact phone number)

3. An authorized body that ensures public discussion

***Ministry of Ecology and Natural resources of Ukraine, postal address: 03035, Kyiv, St. Metropolitan Vasyl Lypkivskyi, 35, OVD@mepr.gov.ua, tel. (044) 206-31-40; (044) 206-31-50, Hrytsak Olena Anatolyivna***

(name of the authorized body, location, phone number and contact person)

4. The procedure for making a decision on the implementation of the planned activity and the body that will consider the results of the environmental impact assessment

***A permit to perform construction works issued by the State Inspection of Architecture and Urban Planning of Ukraine in accordance with the Law of Ukraine "On Regulation of Urban Planning Activities".***

(the type of decision on the implementation of the planned activity, the body authorized to issue it, the regulatory document that provides for its issuance)

5. Terms, duration and procedure for public discussion of the environmental impact assessment report, including information on the time and place of all planned public hearings

**The duration of public consultation is 25 working days** (not less than 25, but not more than 35 working days) from the moment of official publication of this announcement (indicated in the title of the announcement) and providing public access to the environmental impact assessment report and other additional information specified by the enterprise, which is transferred for the issuance of a conclusion on the assessment of the impact on the environment.

During the entire period of public discussion, the public has the right to submit any comments or suggestions that, in its opinion, relate to the planned activity, without the need to justify them. Comments and proposals can be submitted in writing (including in electronic form) and orally during public hearings with entry in the protocol of public hearings. Proposals submitted after the deadline will not be considered.

**Temporarily, for the period of validity and within the territory of the quarantine established by the Cabinet of Ministers of Ukraine in order to prevent the spread of acute respiratory disease (SOVID-19) caused by the SARS-CoV-2 coronavirus on the territory of Ukraine, until its complete cancellation and within 30 days from the date of cancellation quarantine, public hearings are not held and are not scheduled for dates falling within this period.**

Public hearings (first) will be held

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(specify the date, time, place and address of public hearings)

Public hearings (second) will be held

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(specify the date, time, place and address of public hearings)

6. An authorized central authority or an authorized territorial authority providing access to the environmental impact assessment report and other available information regarding the planned activity

***Ministry of Ecology and Natural resources of Ukraine, postal address: 03035, Kyiv, St. Metropolitan Vasyl Lypkivskyi, 35, OVD@mepr.gov.ua, tel. (044) 206-31-40; (044) 206-31-50, Hrytsak Olena Anatolyivna***

(name of the authorized body, location, phone number and contact person)

7. The authorized central body or the authorized territorial body to which comments and suggestions are submitted, and the deadlines for submitting comments and suggestions

***Ministry of Ecology and Natural resources of Ukraine, postal address: 03035, Kyiv, St. Metropolitan Vasyl Lypkivskyi, 35, OVD@mepr.gov.ua, tel. (044) 206-31-40; (044) 206-31-50, Hrytsak Olena Anatolyivna***

(name of the authorized body, location, phone number and contact person)

Comments and suggestions are accepted during the entire period of public discussion specified in the second paragraph of item 5 of this announcement.

8. Available environmental information regarding the planned activity

***Report on environmental impact assessment of the planned activity on 502 sheets.***

(specify all other materials made available to the public) (specify other environmental information relevant to the planned activity)

9. The place (places) of placing the environmental impact assessment report and other additional information (different from the premises specified in point 6 of this announcement), as well as the time from which the public can familiarize themselves with them

***Izmail City Council, postal address: 68600, Nezalezhnosti Ave., 62, ispolkom@izmail.odessa.gov.ua, tel. (04841) – 7-25-66.; responsible unit for public information requests. The date from which the public can get acquainted with the documents is October 17, 2022.***

(name of the enterprise, institution, organization, location, date from which the public can read the documents, contact person)

**ТОВАРИСТВО З ОБМЕЖЕНОЮ ВІДПОВІДАЛЬНІСТЮ**
**СІЛЬСЬКОГОСПОДАРСЬКЕ ПІДПРИЄМСТВО**
вул. Фалєєвська, 9-Б, Миколаїв, 54030, Україна
юридична адреса:
Каботажний спуск, 1, Миколаїв, 54002, Україна
тел.: +38(0512) 37 23 44; +38(0512) 58 04 04
факс: +38(0512) 50 01 91; +38(0512) 58 04 05
E-mail: mail1@nibulon.com.ua; mail3@nibulon.com.ua
www.nibulon.com

12.10.2022р. № 5066/3-22

На № _____ від _____

Ізмаїльському міському голові
Ізмаїльського району Одеської області
Андрію АБРАМЧЕНКО

Шановний Андрію В'ячеславовичу!

В рамках інформування громадськості про початок громадського обговорення звіту з оцінки впливу на довкілля реєстраційний номер 20225199566 «Нове будівництво об'єкту транспортної інфраструктури у м. Ізмаїл Ізмаїльського району Одеської області із залізничною під'їзною колією» та на виконання вимог п. 3 ст. 4 Закону України «Про оцінку впливу на довкілля», прошу Вас розмістити на дошці оголошень органу самоврядування або в інших громадських місцях, що гарантують доведення інформації до відома мешканців м. Ізмаїл, Оголошення про початок громадського обговорення вищеназваного звіту з оцінки впливу на довкілля, яке опубліковане у місцевих ЗМІ:

1. Кур'єр №41(1827) від 15.10.2022 року
2. Придунайські вісті № 35 (13281) від 14.10.2022 року

Додаток на 3 арк.

Заступник техничного директора
(довіреність №222 від 29.12.2020р.) Леонід МИХАЙЛОВ

*Вик. Плошник І.Ю,*
*тел. 050-024-53-03*

Виконавчий комітет Ізмаїльської міської ради
Ізмаїльського району Одеської області
Відділ діловодства, контролю
та організаційної роботи
отримано «13» 10 2022

**ПОКРОЙ НАС ОТ ВСЯКОГО ЗЛА, БОГОРОДИЦЕ, ЧЕСТНЫМ ТВОИМ ОМОФОРОМ!**

***ОТ ТАТЬЯНЫ ВАСИЛЬЕВНЫ МИХАЙЛОВОЙ***

## ПОКРОВА ПРЕСВЯТОЙ БОГОРОДИЦЫ

Тя величаем **Пресвятая Дево,**
И чтим **Покров Твой честный,**
За нас Христу молящуюся в Небо,
Стоящую на воздухе с Покровом
вечным!

У народа нет другой надежды,
Как уповать на Твой **святой Покров,**
На заступление, что Ты дарила прежде,
Явление **Твоё на вечный зов!**

Надеждой на Тебя **Благословенную,**
На доброту **Твою и сострадание,**
На **Мать-Царицу нашу милосердную,**
Что милость нам несёт и оправдание!
**Небесная Царица наша первая!**
Ходатаица высшая **пред Богом!**
Предстательство пред **Сыном-Богом**
верное,
И есть для нас **Твоим святым**
**Покровом!**

Подательница благ и утешения,
Надёжное прибежище для нас,
Ты наша **Матерь и наше спасение,**
В Твоих молитвах помяни о нас!

Явление **Твоё в Печерской Лавре,**
В день праздника **Покрова**
**было видимо!**
С молящимся народом вместе в Храме,
С простёртым Омофором было видимо!

**Превечный Бог избрал Царицу Неба,**
Превыше быть создания не может!
Прийди к нам той стезой белее снега,
Что всех сокровищ на земле дороже!

**Как Ты пришла во** Церковь на Афоне,
В достойном поклонении молясь!
Яко во тьме держава рухнет вскоре,
Твой Омофор укажет путь светясь!

**Твоя держава** – есть **непобедимая!**
Освобождай народ от всяких бед,
Яко на Небе и земле Ты чтимая!
К **Тебе** взывает мир две тыщи лет!

К Наставнице, к Заступнице взываем, -
**К Пречистой Деве Божей Матери!**
О нескончаемой любви Твоей мы знаем
Что *Силы Высшие* нас грешных
не утратили!

О ходотайстве пред **Божиим престолом,**
За весь народ, род человеческий,
За небо синее над нашим домом,
Да сохранит **Бог – всё наше Отечество!**

**Да сохранит Бог нашу Украину!**
От всех невзгод и всяких напастей,
И защитит в лиху годину,
От войн, смертей Своею благостью!

Так воззовём к **Великой Праведнице!**
Что пребывая во небесной славе,
По-матерински о нас заботится,
О христианах, о наследии,
и нашем праве!

Веками радуясь **Твоим явлениям,**
Мы можем **тоже Тебя возрадовать!**
Своею верою во **Сына Божия,**
**Его рождения!**
**И что Мария – Иисуса Мать!**

Его мы любим, как любишь нас,
Делами добрыми, сердцами чистыми,
**Святою верою в Христа и Спас!**
**Ты Дево радуйся со всеми вышними!**

Мы соблюдаем Его заветы,
Открыто каемся в своих грехах!
За них мы все пред **Ним** в ответе,
Как на земле, так в небесах!

**Твоим явлением, чудным Покровом,**
Ты покрываешь к Тебе прибегнувших,
Всех утешаешь **Божим Словом,**
И всех скорбящих, и всех отвергнутых!

О вечной жизни, чтоб каждый знал!
Земным путём шёл **в Царство**
**с радостью,**
В пути споткнувшись, чтоб не упал,
Ты покрываешь **Покровом благости!**

Ты нам являешься, чтоб оградить,
Как можно больше душ от погибели,
**Чтоб Кровью Сына жизнь оплатить!**
**Она за нас была пролита!**

Я склонна верить очевидцам,
И в быль войны, и в чудеса!
И в **чудо-помощь Богородицы!**
С особой силою громить врага!

Враг бил внезапно и жестоко,
Неравный бой с земли и с высоты,
Поднявши в небе головы с окопа,
Молились уцелевшие бойцы!

Кто крепко верил, тот **молился** Богу,
Бой к вечеру немного затихал,
Кто ранен в грудь, кто в руку или ногу,
Но живы! И кто-то вдруг сказал:

**«Там женщина так громко плачет…»**
А по земле густой туман клубится!
«Симфония» орудий поутихла,
что это значит?
Какая женщина могла
здесь находиться?!

Откуда женщине на поле боя взяться?
Она идёт ничейной полосой,
**О, Господи! Вы посмотрите, братцы,**
**На этот образ Пресвятой!**

На рост, что вдвое выше женщин
на земле!
На неземные тёмные «одежды»,
Плач всё переворачивал в душе,
Плач Женщины дающей нам надежду!

**Господь пославший**
**в помощь Богородицу…**
Для памятной минуты нас избрал!
И чудо на войне навек запомнится,
**Святой Покров – убитых покрывал!**

Когда **Она** склонилась над телами,
**На части плач вселенную порвал,**
Видение святое пред бойцами,
С той стороны враг тоже наблюдал!

Туман покрыл убитых как саван,
**Святейшая вдруг плакать перестала,**
И наклонилась, повернувшись к нам,
**Нас на Победу Она благословляла!**

Кто видел это чудо, тот готов,
До скону **верить в Бога – Сына и Отца,**
**Чудесный Богородичный Покров,**
Нас будет покрывать во все века!!!

*Редакцией полностью сохранены стилистика и орфография автора*

# ИСТОРИЯ ПРАЗДНИКА И ТРАДИЦИИ

**Ежегодно 14 октября наступает важный христианский праздник - Покров Пресвятой Богородицы. В этот день христиане вспоминают чудо, совершенное Богоматерью, которое свидетельствует о её покровительстве всех людей.**

В летописях сказано, что впервые Покров был учрежден осенью 1164 года князем Андреем Боголюбским. Он, будучи на одном из военных походов, читал древние предания. Узнав о чуде, которое произошло в X веке, когда мученик Андрей увидел Богородицу, князь решил в честь события учредить праздник. Так и сделал - с тех пор Покрова отмечаются 14 октября для всех, кто чтит православную веру.

Главной традицией дня считается церковная служба - она начинается накануне вечером, 13 октября, со Всенощного бдения, а утром служат Божественную литургию. Верующие приходят в храмы, читают молитвы и ставят свечи Пресвятой Богородице. Поста в этот день нет, но если вдруг выпадает, то можно сделать послабление - вкусить немного рыбы и выпить вина.

Великий праздник Покров имеет свои запреты и позволения, как и любое другое православное торжество. Таким образом получается, что на Покрова можно:

печь пироги и булочки, угощая ими соседей;

наряжаться, краситься, собирать родственников за столом;

задабривать Домового, принося ему сладости;

молиться и просить Богородицу о помощи.

В старину дома топили ветками фруктовых деревьев в эту дату - считалось, что такой ритуал привлекает в дом не только тепло, но и благополучие.

Кроме традиций, на Покрова православные верующие должны обращать внимание и на запреты, чтобы случайно не нарушить их. Помните, что на Покров день нельзя:

работать, заниматься уборкой по дому;

ссориться, спорить и сквернословить;

жадничать и отказывать в помощи.

Лучшее, что вы можете сделать - это провести важную дату в благостном состоянии, помогая всем, кто в этом нуждается, и не позволяя негативным энергиям брать над вами верх.

В эту дату наши предки обращали внимание на погодные условия - они могли рассказать о будущем:

какая погода на Покров - такой и зима будет;

ветер восточный или западный - зима окажется суровой, южный - мягкой, северный - снежной;

на Покров есть листья на деревьях - к суровым холодам;

снег выпал на Покров - Димитриев день будет снежным.

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(дата офіційного опублікування в Єдиному реєстрі з оцінки впливу на довкілля (автоматично генерується програмними засобами ведення Реєстру, не зазначається суб'єктом господарювання)

(реєстраційний номер справи про оцінку впливу на довкілля планованої діяльності)

# ОГОЛОШЕННЯ

## про початок громадського обговорення звіту з оцінки впливу на довкілля

Повідомляємо про початок громадського обговорення звіту з оцінки впливу на довкілля планованої діяльності, зазначеної у пункті 1 цього оголошення, з метою виявлення, збирання та врахування зауважень і пропозицій громадськості до планованої діяльності.

1. Планована діяльність

***Планована діяльність - нове будівництво об'єкта транспортної інфраструктури - річковий порт (термінал) в м. Ізмаїл Ізмаїльського району Одеської області із залізничною під'їзною колією.***

***Загальна площа ділянки, що запланована для будівництва та експлуатації об'єкта транспортної інфраструктури – річкового порту (терміналу), - 19,7 га, операційної акваторії 5,29 га. Площа запланованої забудови складає 7,0 га.***

***Планована діяльність передбачає будівництво та експлуатацію:***

***виробничого перевантажувального комплексу з багатоваріантною схемою переміщення зернових, зернобобових та олійних культур при їх прийомі із залізничного, автомобільного і водного транспорту, зберіганні з доведенням до товарних кондицій (очистка, сушка) та відвантаженні на водний і автомобільний транспорт;***

***паливозаправного пункту для власних потреб;***

***гідротехнічних споруд (операційна акваторія з підхідним каналом).***

***Будівництво об'єкту планованої діяльності передбачено здійснювати пусковими комплексами з почерговим (5 черг) зведенням будівель та споруд та оснащенням їх технологічним обладнанням.***

(загальні технічні характеристики, у тому числі параметри планованої діяльності (потужність, довжина, площа, обсяг виробництва тощо), місце провадження планованої діяльності)

2. Суб'єкт господарювання

***Товариство з обмеженою відповідальністю сільськогосподарське підприємство «НІБУЛОН» код ЄДРПОУ 14291113***

(повне найменування юридичної особи, код згідно з ЄДРПОУ або прізвище, ім'я та по батькові фізичної особи - підприємця, ідентифікаційний код або серія та номер паспорта (для фізичних осіб, які через свої релігійні переконання відмовляються від прийняття реєстраційного номера облікової картки платника податків та офіційно повідомили про це відповідному контролюючому органу і мають відмітку у паспорті),

***54020, Миколаївська область, м. Миколаїв. Каботажний спуск,1.***

***Тел.: +38 (0512) 37-23-44, +38 (0512) 58-04-04, e-mail: mail1@nibulon.com.ua***

(місцезнаходження юридичної особи або місце провадження діяльності фізичної особи - підприємця (поштовий індекс, адреса), контактний номер телефону)

3. Уповноважений орган, який забезпечує проведення громадського обговорення

***Міністерство захисту довкілля та природних ресурсів України, поштова адреса: 03035, м. Київ, вул. Митрополита Василя Липківського, 35, OVD@mepr.gov.ua, тел. (044) 206-31-40; (044) 206-31-50, Котяш Лада Павлівна***

(найменування уповноваженого органу, місцезнаходження, номер телефону та контактна особа)

4. Процедура прийняття рішення про провадження планованої діяльності та орган, який розглядатиме результати оцінки впливу на довкілля

***Дозвіл на виконання будівельних робіт, що надається Державною інспекцією архітектури та містобудування України відповідно до Закону України «Про регулювання містобудівної діяльності».***

(вид рішення про провадження планованої діяльності, орган, уповноважений його видавати, нормативний документ, що передбачає його видачу)

5. Строки, тривалість та порядок громадського обговорення звіту з оцінки впливу на довкілля, включаючи інформацію про час і місце усіх запланованих громадських слухань

***Тривалість громадського обговорення становить 25 робочих днів*** (не менше 25, але не більше 35 робочих днів) з моменту офіційного опублікування цього оголошення (зазначається у назві оголошення) та надання громадськості доступу до звіту з оцінки впливу на довкілля та іншої додаткової інформації, визначеної суб'єктом господарювання, що передається для видачі висновку з оцінки впливу на довкілля.

Протягом усього строку громадського обговорення громадськість має право подавати будь-які зауваження або пропозиції, які, на її думку, стосуються планованої діяльності, без необхідності їх обґрунтування. Зауваження та пропозиції можуть подаватися в письмовій формі (у тому числі в електронному вигляді) та усно під час громадських слухань із внесенням до протоколу громадських слухань. Пропозиції, надані після встановленого строку, не розглядаються.

**Тимчасово, на період дії та в межах території карантину, встановленого Кабінетом Міністрів України з метою запобігання поширенню на території України гострої респіраторної хвороби (COVID-19), спричиненої коронавірусом SARS-CoV-2, до повного його скасування та протягом 30 днів з дня скасування карантину, громадські слухання не проводяться і не призначаються на дати, що припадають на цей період.**

Громадські слухання (перші) відбудуться

(зазначити дату, час, місце та адресу проведення громадських слухань)

Громадські слухання (другі) відбудуться

(вказати дату, час, місце та адресу проведення громадських слухань)

6. Уповноважений центральний орган або уповноважений територіальний орган, що забезпечує доступ до звіту з оцінки впливу на довкілля та іншої доступної інформації щодо планованої діяльності

***Міністерство захисту довкілля та природних ресурсів України, поштова адреса: 03035, м. Київ, вул. Митрополита Василя Липківського, 35, OVD@mepr.gov.ua, тел. (044) 206-31-40; (044) 206-31-50, Котяш Лада Павлівна***

(зазначити найменування органу, місцезнаходження, номер телефону та контактну особу)

7. Уповноважений центральний орган або уповноважений територіальний орган, до якого надаються зауваження і пропозиції, та строки надання зауважень і пропозицій

***Міністерство захисту довкілля та природних ресурсів України, поштова адреса: 03035, м. Київ, вул. Митрополита Василя Липківського, 35, OVD@mepr.gov.ua, тел. (044) 206-31-40; (044) 206-31-50, Котяш Лада Павлівна***

(зазначити найменування органу, поштову та електронну адресу, номер телефону та контактну особу)

Зауваження і пропозиції приймаються протягом усього строку громадського обговорення, зазначеного в абзаці другому пункту 5 цього оголошення.

8. Наявна екологічна інформація щодо планованої діяльності

***Звіт з оцінки впливу на довкілля планованої діяльності на 332 аркушах.***

(зазначити усі інші матеріали, надані на розгляд громадськості) (зазначити іншу екологічну інформацію, що стосується планованої діяльності)

9. Місце (місця) розміщення звіту з оцінки впливу на довкілля та іншої додаткової інформації (відмінне від приміщення, зазначеного у пункті 6 цього оголошення), а також час, з якого громадськість може ознайомитися з ними

***Міністерство захисту довкілля та природних ресурсів України, поштова адреса: 03035, м. Київ, вул. Митрополита Василя Липківського, 35, OVD@mepr.gov.ua, тел. (044) 206-31-40; (044) 206-31-50, Котяш Лада Павлівна***

(найменування підприємства, установи, організації, місцезнаходження, дата, з якої громадськість може ознайомитися з документами, контактна особа)

# Программа медицинских гарантий: на что имеет право пациент

**Каждый украинец имеет возможность попасть к врачу, независимо от места нахождения и наличия декларации.**

Список бесплатных услуг, на которые имеет право каждый пациент:

* экстренная медицинская помощь;
* первичная медицинская помощь;
* специализированная медицинская помощь;
* паллиативная медицинская помощь;
* реабилитация в сфере здравоохранения;
* медицинская помощь детям до 16 лет;
* медицинская помощь в связи с беременностью и родами;
* вакцинация согласно календарю профилактических прививок;
* программа "Доступное лекарство".

Если вы являетесь внутренне перемещенным лицом, вам НЕ нужно перезаключать декларацию, достаточно обратиться за помощью напрямую в ближайшее медицинское учреждение.

Дистанционно ваш семейный врач или педиатр может:

проконсультировать;

* выписать электронный рецепт, создать электронное направление к врачу специализированной помощи;
* направить на бесплатные базовые тесты и анализы.

Список бесплатных базовых тестов и анализов, которые можно получить через семейного врача:

* общий анализ крови с лейкоцитарной формулой;
* общий анализ мочи;
* уровень глюкозы в крови;
* общий анализ холестерина;
* тест на беременность;
* тест на ВИЧ;
* тест на вирусные гепатиты;
* тест на тропонин;
* тест на COVID-19.

Важно: если вы или ваш ребенок по срокам нуждаетесь в вакцинации или пропустили плановую вакцинацию по календарю прививок, его можно наверстать. Для этого достаточно обратиться к своему семейному врачу/педиатру или в ближайшее учреждение здравоохранения.

Найти ближайшее заведение первичной помощи можно позвонив по номеру 16-77 в рабочие дни с 9:00 до 18:00 (понедельник-четверг) и с 9:00 до 16:45 (в пятницу).

Найти нужного врача и получить быструю бесплатную консультацию можно через медицинский чат-бот "Забота".

Получить онлайн консультацию врача можно также в приложении Doctor Online.

Если ваши права были нарушены, вы или ваши близкие могут пожаловаться на неправомерные действия врача как на местном уровне, так и в Национальную службу здоровья Украины (НСЗУ):

* написать жалобу на имя главного врача (медицинского директора) медицинского учреждения о неправомерных действиях врача;
* написать жалобу в Департамент здравоохранения в вашем городе или регионе;
* подать жалобу через электронную форму на сайте НСЗУ;
* обратиться в контакт-центр НСЗУ за бесплатным номером 16-77;
* позвонить с жалобой на правительственную линию Кабинета Министров Украины – 15-4 .

Призываем вас сообщать о правонарушениях, ведь именно ваше неравнодушие позволит улучшить медицинскую систему в Украине.

***Справка:***

Программа медицинских гарантий - государственная программа, направленная на обеспечение потребностей пациента в получении качественной медицинской помощи по основным направлениям, независимо от его финансовой состоятельности и состояния здоровья. Программа государственных гарантий медицинского обслуживания населения распространяется на все учреждения здравоохранения независимо от владельца заведения; на предпринимателей, ведущих медицинскую практику и заключивших договор с НСЗУ, а также на тех субъектов хозяйствования, кто ведет розничную торговлю лекарственными средствами согласно заключенному договору о реимбурсации с НСЗУ.

Реимбурсация - специальный механизм, позволяющий полностью или частично возместить стоимость лекарственных средств, отпущенных пациенту по рецепту по программе «Доступное лекарство». Оплачивают средства из государственного бюджета Украины.

## ОГОЛОШЕННЯ
## про початок громадського обговорення звіту з оцінки впливу на довкілля

Повідомляємо про початок громадського обговорення звіту з оцінки впливу на довкілля планованої діяльності, зазначеної у пункті 1 цього оголошення, з метою виявлення, збирання та врахування зауважень і пропозицій громадськості до планованої діяльності.

1. Планована діяльність

***Планована діяльність - нове будівництво об'єкта транспортної інфраструктури - річковий порт (термінал) в м. Ізмаїл Ізмаїльського району Одеської області із залізничною під'їзною колією.***

***Загальна площа ділянки, що запланована для будівництва та експлуатації об'єкта транспортної інфраструктури – річкового порту (терміналу), - 19,7 га, операційної акваторії 5,29 га. Площа запланованої забудови складає 7,0 га.***

***Планована діяльність передбачає будівництво та експлуатацію:***

***виробничого перевантажувального комплексу з багатоваріантною схемою переміщення зернових, зернобобових та олійних культур при їх прийомі із залізничного, автомобільного і водного транспорту, зберіганні з доведенням до товарних кондицій (очистка, сушка) та відвантаженні на водний і автомобільний транспорт;***

***паливозаправного пункту для власних потреб;***

***гідротехнічних споруд (операційна акваторія з підхідним каналом).***

***Будівництво об'єкту планованої діяльності передбачено здійснювати пусковими комплексами з почерговим (5 черг) зведенням будівель та споруд та оснащенням їх технологічним обладнанням.***

(загальні технічні характеристики, у тому числі параметри планованої діяльності (потужність, довжина, площа, обсяг виробництва тощо), місце провадження планованої діяльності)

2. Суб'єкт господарювання

***Товариство з обмеженою відповідальністю сільськогосподарське підприємство «НІБУЛОН» код ЄДРПОУ 14291113***

(повне найменування юридичної особи, код згідно з ЄДРПОУ або прізвище, ім'я та по батькові фізичної особи - підприємця, ідентифікаційний код або серія та номер паспорта (для фізичних осіб, які через свої релігійні переконання відмовляються від прийняття реєстраційного номера облікової картки платника податків та офіційно повідомили про це відповідному контролюючому органу і мають відмітку у паспорті),

***54020, Миколаївська область, м. Миколаїв. Каботажний спуск,1.***

***Тел.: +38 (0512) 37-23-44, +38 (0512) 58-04-04, e-mail: mail1@nibulon.com.ua***

(місцезнаходження юридичної особи або місце провадження діяльності фізичної особи - підприємця (поштовий індекс, адреса), контактний номер телефону)

3. Уповноважений орган, який забезпечує проведення громадського обговорення

***Міністерство захисту довкілля та природних ресурсів України, поштова адреса: 03035, м. Київ, вул. Митрополита Василя Липківського, 35, OVD@mepr.gov.ua, тел. (044) 206-31-40; (044) 206-31-50, Котяш Лада Павлівна***

(найменування уповноваженого органу, місцезнаходження, номер телефону та контактна особа)

4. Процедура прийняття рішення про провадження планованої діяльності та орган, який розглядатиме результати оцінки впливу на довкілля

***Дозвіл на виконання будівельних робіт, що надається Державною інспекцією архітектури та містобудування України відповідно до Закону України «Про регулювання містобудівної діяльності».***

(вид рішення про провадження планованої діяльності, орган, уповноважений його видавати, нормативний документ, що передбачає його видачу)

5. Строки, тривалість та порядок громадського обговорення звіту з оцінки впливу на довкілля, включаючи інформацію про час і місце усіх запланованих громадських слухань

***Тривалість громадського обговорення становить 25 робочих днів*** (не менше 25, але не більше 35 робочих днів) з моменту офіційного опублікування цього оголошення (зазначається у назві оголошення) та надання громадськості доступу до звіту з оцінки впливу на довкілля та іншої додаткової інформації, визначеної суб'єктом господарювання, що передається для видачі висновку з оцінки впливу на довкілля.

_____

(дата офіційного опублікування в Єдиному реєстрі з оцінки впливу на довкілля (автоматично генерується програмними засобами ведення Реєстру, не зазначається суб'єктом господарювання)

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(реєстраційний номер справи про оцінку впливу на довкілля планованої діяльності)

Протягом усього строку громадського обговорення громадськість має право подавати будь-які зауваження або пропозиції, які, на її думку, стосуються планованої діяльності, без необхідності їх обґрунтування. Зауваження та пропозиції можуть подаватися в письмовій формі (у тому числі в електронному вигляді) та усно під час громадських слухань із внесенням до протоколу громадських слухань. Пропозиції, надані після встановленого строку, не розглядаються.

**Тимчасово, на період дії та в межах території карантину, встановленого Кабінетом Міністрів України з метою запобігання поширенню на території України гострої респіраторної хвороби (COVID-19), спричиненої коронавірусом SARS-CoV-2, до повного його скасування та протягом 30 днів з дня скасування карантину, громадські слухання не проводяться і не призначаються на дати, що припадають на цей період.**

Громадські слухання (перші) відбудуться

_____

(зазначити дату, час, місце та адресу проведення громадських слухань)

Громадські слухання (другі) відбудуться

_____

(вказати дату, час, місце та адресу проведення громадських слухань)

6. Уповноважений центральний орган або уповноважений територіальний орган, що забезпечує доступ до звіту з оцінки впливу на довкілля та іншої доступної інформації щодо планованої діяльності

***Міністерство захисту довкілля та природних ресурсів України, поштова адреса: 03035, м. Київ, вул. Митрополита Василя Липківського, 35, OVD@mepr.gov.ua, тел. (044) 206-31-40; (044) 206-31-50, Котяш Лада Павлівна***

(зазначити найменування органу, місцезнаходження, номер телефону та контактну особу)

7. Уповноважений центральний орган або уповноважений територіальний орган, до якого надаються зауваження і пропозиції, та строки надання зауважень і пропозицій

***Міністерство захисту довкілля та природних ресурсів України, поштова адреса: 03035, м. Київ, вул. Митрополита Василя Липківського, 35, OVD@mepr.gov.ua, тел. (044) 206-31-40; (044) 206-31-50, Котяш Лада Павлівна***

(зазначити найменування органу, поштову та електронну адресу, номер телефону та контактну особу)

Зауваження і пропозиції приймаються протягом усього строку громадського обговорення, зазначеного в абзаці другому пункту 5 цього оголошення.

8. Наявна екологічна інформація щодо планованої діяльності

***Звіт з оцінки впливу на довкілля планованої діяльності на 332 аркушах.***

(зазначити усі інші матеріали, надані на розгляд громадськості) (зазначити іншу екологічну інформацію, що стосується планованої діяльності)

9. Місце (місця) розміщення звіту з оцінки впливу на довкілля та іншої додаткової інформації (відмінне від приміщення, зазначеного у пункті 6 цього оголошення), а також час, з якого громадськість може ознайомитися з ними

***Міністерство захисту довкілля та природних ресурсів України, поштова адреса: 03035, м. Київ, вул. Митрополита Василя Липківського, 35, OVD@mepr.gov.ua, тел. (044) 206-31-40; (044) 206-31-50, Котяш Лада Павлівна***

(найменування підприємства, установи, організації, місцезнаходження, дата, з якої громадськість може ознайомитися з документами, контактна особа)

# ЖИЗНЬ РАЙОНА

## ГРАФІК

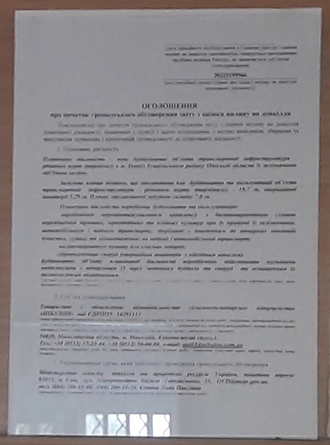
особистого прийому громадян в Іванівській районній раді Одеської області

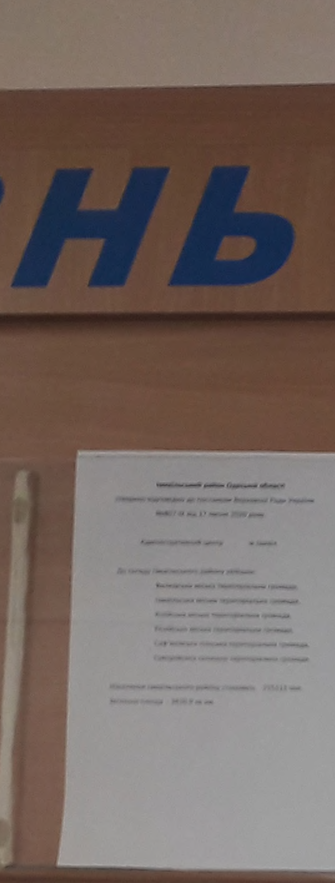
| Прізвище, ім'я, по батькові | День прийому, час та місце прийому |
|---|---|
| **АНТОНЮК** **Василь Павлович,** голова Іванівської районної ради Одеської області | **Шостівівторка з 10.00 до 13.00; кабінет 206 II поверх** |
| **КРИШЕВИЧ** **Андрій Миколайович,** заступник голови Іванівської районної ради Одеської області | **щочетверга з 10.00 до 13.00; кабінет 202 II поверх** |
| **ЧОЛАК** **Марк Іванович,** заступник голови Іванівської районної ради Одеської області | **щовівторка з 10.00 до 13.00; кабінет 101 I поверх** |

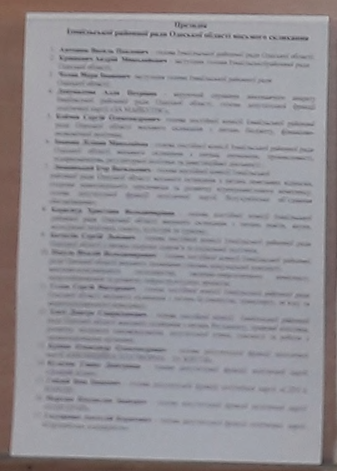
Прийом проводиться у кабінетах голови районної ради та заступників голови районної ради за адресою: м.Іванівка, пр.Б.Хмельницького,62.

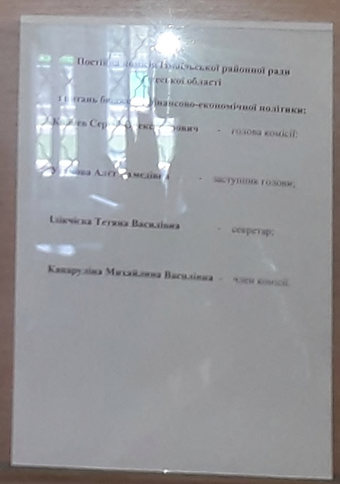
Час прийому з 10.00 до 13.00

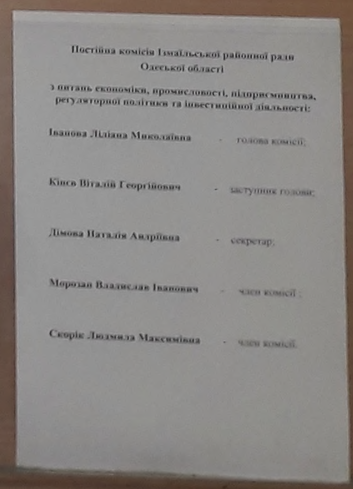
Голова Іванівської районної ради Одеської області Василь АНТОНЮК

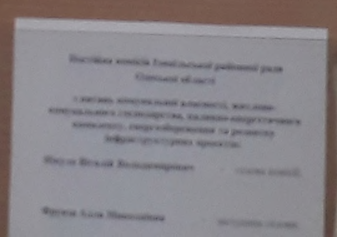


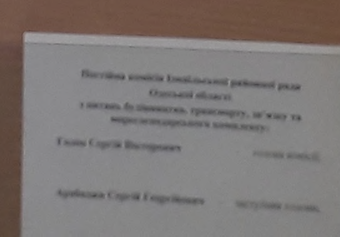


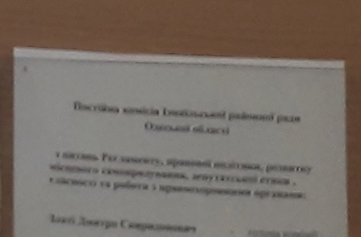


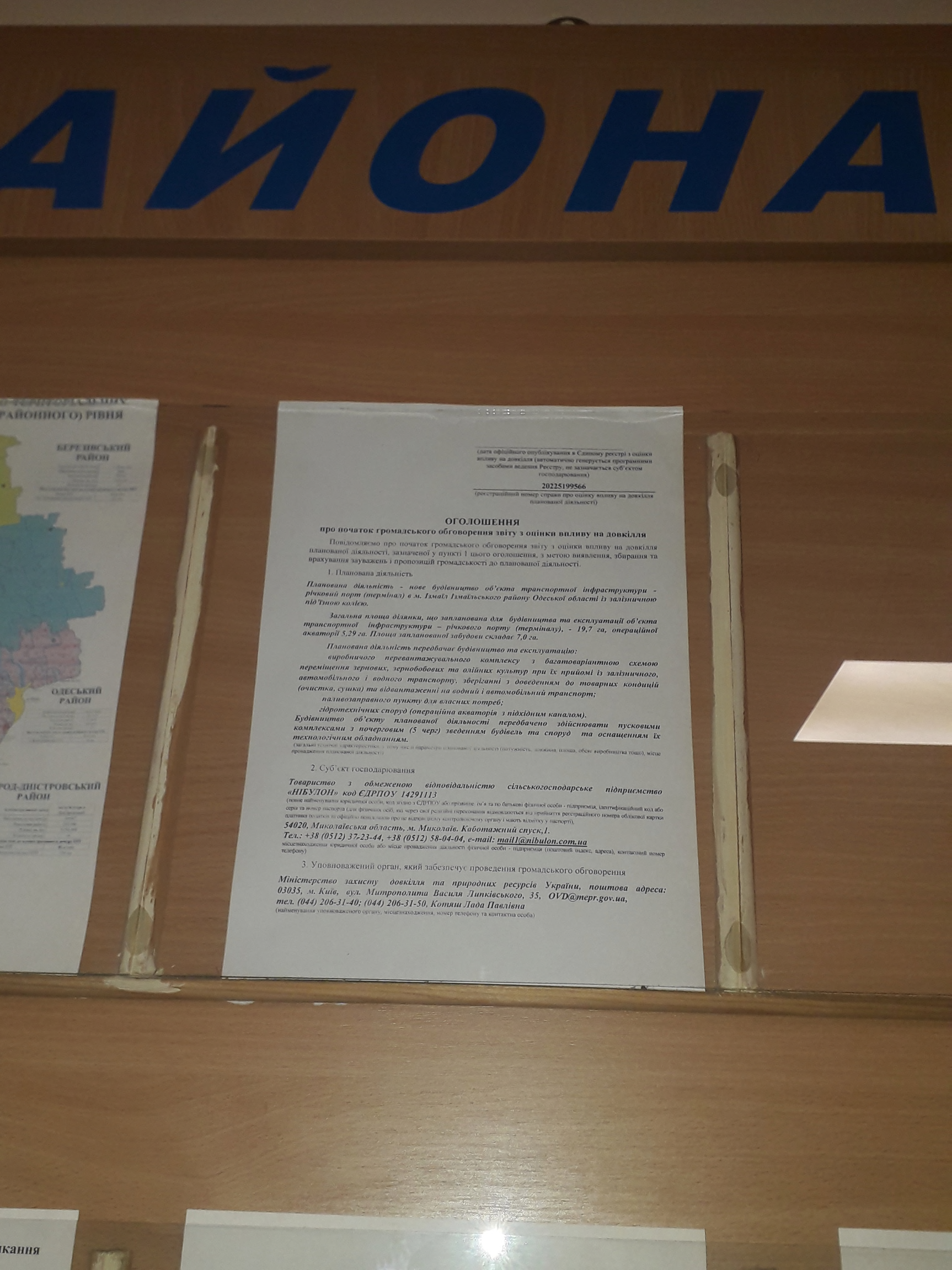











АЙОНА
РАЙОННОГО) РІВНЯ
БЕРЕЗІВСЬКИЙ РАЙОН
ОДЕСЬКИЙ РАЙОН
РОД-ДНІСТРОВСЬКИЙ РАЙОН
(дата офіційного опублікування в Єдиному реєстрі з оцінки впливу на довкілля (автоматично генерується програмними засобами ведення Реєстру, не зазначається суб'єктом господарювання)
20225199566
(реєстраційний номер справи про оцінку впливу на довкілля планованої діяльності)
ОГОЛОШЕННЯ
про початок громадського обговорення звіту з оцінки впливу на довкілля
Повідомляємо про початок громадського обговорення звіту з оцінки впливу на довкілля планованої діяльності, зазначеної у пункті 1 цього оголошення, з метою виявлення, збирання та врахування зауважень і пропозицій громадськості до планованої діяльності.
1. Планована діяльність
Планована діяльність - нове будівництво об'єкта транспортної інфраструктури - річковий порт (термінал) в м. Ізмаїл Ізмаїльського району Одеської області із залізничною під'їзною колією.
Загальна площа ділянки, що запланована для будівництва та експлуатації об'єкта транспортної інфраструктури – річкового порту (терміналу), - 19,7 га, операційної акваторії 5,29 га. Площа запланованої забудови складає 7,0 га.
Планована діяльність передбачає будівництво та експлуатацію:
виробничого перевантажувального комплексу з багатоваріантною схемою переміщення зернових, зернобобових та олійних культур при їх прийомі із залізничного, автомобільного і водного транспорту, зберіганні з доведенням до товарних кондицій (очистка, сушка) та відвантаженні на водний і автомобільний транспорт;
паливозаправного пункту для власних потреб;
гідротехнічних споруд (операційна акваторія з підхідним каналом).
Будівництво об'єкту планованої діяльності передбачено здійснювати пусковими комплексами з почерговим (5 черг) зведенням будівель та споруд та оснащенням їх технологічним обладнанням.
(загальні технічні характеристики, у тому числі параметри планованої діяльності (потужність, довжина, площа, обсяг виробництва тощо), місце провадження планованої діяльності)
2. Суб'єкт господарювання
Товариство з обмеженою відповідальністю сільськогосподарське підприємство «НІБУЛОН» код ЄДРПОУ 14291113
(повне найменування юридичної особи, код згідно з ЄДРПОУ або прізвище, ім'я та по батькові фізичної особи - підприємця, ідентифікаційний код або серія та номер паспорта (для фізичних осіб, які через свої релігійні переконання відмовляються від прийняття реєстраційного номера облікової картки платника податків та офіційно повідомили про це відповідному контролюючому органу і мають відмітку у паспорті),
54020, Миколаївська область, м. Миколаїв. Каботажний спуск,1.
Тел.: +38 (0512) 37-23-44, +38 (0512) 58-04-04, e-mail: mail1@nibulon.com.ua
місцезнаходження юридичної особи або місце провадження діяльності фізичної особи - підприємця (поштовий індекс, адреса), контактний номер телефону)
3. Уповноважений орган, який забезпечує проведення громадського обговорення
Міністерство захисту довкілля та природних ресурсів України, поштова адреса: 03035, м. Київ, вул. Митрополита Василя Липківського, 35, OVD@mepr.gov.ua, тел. (044) 206-31-40; (044) 206-31-50, Котяш Лада Павлівна
(найменування уповноваженого органу, місцезнаходження, номер телефону та контактна особа)

# Договір № 172/22-ОВД
# проведення громадського обговорення в процесі здійснення оцінки впливу на довкілля

м. Київ 05 вересня 2022р.

**Сторони:**

**Виконавець:** Міністерство захисту довкілля та природних ресурсів України в особі державного секретаря Міністерства захисту довкілля та природних ресурсів України Ярової Є.В., що діє на підставі Положення про Міністерство захисту довкілля та природних ресурсів України, затвердженого постановою Кабінету Міністрів України від 25.06.2020р. № 614, розпорядження Кабінету Міністрів України від 02.12.2021 № 1536 «Про призначення Ярової Є.В. державним секретарем Міністерства захисту довкілля та природних ресурсів України», з однієї сторони, та

**Замовник:** Товариство з обмеженою відповідальністю «НІБУЛОН» в особі технічного директора Підгородецького О.А., що діє на підставі довіреності № 546 від 30 грудня 2021р. з іншої сторони, уклали цей Договір про таке:

## 1. Предмет договору

1.1. Виконавець зобов'язується надати послуги з проведення громадського обговорення в процесі здійснення оцінки впливу на довкілля, процедура здійснення якої зареєстрована в Єдиному реєстрі з оцінки впливу на довкілля за № 20225199566, в порядку та на умовах, визначених цим Договором.

## 2. Відомості про послуги

2.1. Згідно з цим Договором, Виконавець надає Замовнику послуги з проведення громадського обговорення в процесі здійснення оцінки впливу на довкілля, зазначеної в підпункті 1.1 пункту 1 цього Договору, відповідно до Закону України «Про оцінку впливу на довкілля», Порядку передачі документації для надання висновку з оцінки впливу на довкілля та фінансування оцінки впливу на довкілля та Порядку ведення Єдиного реєстру з оцінки впливу на довкілля, затверджених постановою Кабінету Міністрів України від 13.12.2017р. № 1026, а також Порядку проведення громадських слухань у процесі оцінки впливу на довкілля, затвердженого постановою Кабінету Міністрів України від 13.12.2017 № 989.

## 3. Ціна (розмір плати) та умови оплати

3.1. Розмір плати за проведення громадського обговорення в процесі здійснення оцінки впливу на довкілля, зазначеної в підпункті 1.1 пункту 1 цього Договору, визначається Замовником відповідно до наказу Міністерства захисту довкілля та природних ресурсів України від 03.09.2020 № 117 «Про затвердження Розміру плати за проведення громадського обговорення в процесі здійснення оцінки впливу на довкілля», зареєстрованого в Міністерстві юстиції України 13.10.2020 за № 1003/35286, і становить без ПДВ: 55832 грн. 92 коп. (п'ятдесят п'ять тисяч вісімсот тридцять дві грн. 92 коп. ), з урахуванням ПДВ: 66999 грн. 50коп (шістдесят шість тисяч дев'ятсот дев'яносто дев'ять грн. 50 коп. ).

3.2. Внесення плати за проведення громадського обговорення в процесі здійснення оцінки впливу на довкілля здійснюється Замовником після отримання відповідного рахунку на оплату послуги з проведення громадського обговорення в процесі здійснення оцінки впливу на довкілля від Виконавця до подання звіту з оцінки впливу на довкілля та оголошення про початок громадського обговорення звіту з оцінки впливу на довкілля.

## 4. Обов'язки та права сторін

4.1. Обов'язки Виконавця:

4.1.1. Своєчасно та якісно надавати послуги, передбачені цим Договором.

4.1.2. При виникненні обставин, що перешкоджають належному виконанню своїх зобов'язань згідно з цим Договором, протягом п'яти робочих днів з дня виявлення цих обставин повідомити про це Замовника.

4.1.3. Складати та передавати Замовнику акти виконаних послуг.

4.2. Права Виконавця:

4.2.1. Отримувати від Замовника інформацію, необхідну для надання послуг за цим Договором.

4.2.2. Отримувати плату в розмірах і строки, передбачені цим Договором.

4.2.3. Достроково розривати договір у випадку несвоєчасного та/або не в повному обсязі надходження коштів, передбачених цим Договором, про що Виконавець письмово повідомляє Замовника за п'ять робочих днів до прийняття такого рішення.

4.3. Обов'язки Замовника:

4.3.1. Чітко, ясно і своєчасно визначати Виконавцю завдання, які відповідають покладеним на нього обов'язкам.

4.3.2. Створювати необхідні умови Виконавцю для реалізації ним своїх обов'язків за цим Договором.

4.3.3. Підписувати акти виконаних послуг у п'ятнадцятиденний строк з дня одержання від Виконавця.

4.3.4. Вносити плату на умовах та в порядку, зазначеному у пункті 3 цього Договору.

4.4. Права Замовника:

4.4.1. Вимагати від Виконавця своєчасного та якісного надання послуг згідно із умовами цього Договору.

## 5. Порядок здавання-приймання виконаних послуг

5.1. Виконавець, після завершення процедур проведення громадського обговорення в процесі здійснення оцінки впливу на довкілля, визначеної в підпункті 1.1 пункту 1 цього Договору, підписує акт виконаних послуг у п'ятнадцятиденний строк та надсилає його Замовнику для підписання.

5.2. Після підписання акта виконаних послуг Виконавцем та Замовником послуга вважається наданою.

## 6. Відповідальність сторін

6.1. У разі невиконання або неналежного виконання зобов'язань за цим Договором Сторони несуть відповідальність згідно із законодавством України.

6.2. Жодна із Сторін не несе відповідальність за невиконання чи неналежне виконання своїх зобов'язань за цим Договором, якщо це невиконання чи неналежне виконання зумовлені дією обставин непереборної сили (форс-мажорних обставин).

## 7. Обставини непереборної сили (форс-мажорні обставини)

7.1. Сторона, яка не може виконати зобов'язання за Договором, повинна письмово не пізніше п'яти робочих днів повідомити іншу Сторону про настання обставин непереборної сили (форс-мажорних обставин), наявність бажання припинення виконання своїх зобов'язань із наданням проєкту урегулювання взаємних зобов'язань.

7.2. Сторони звільняються від відповідальності за неналежне виконання зобов'язань за Договором, якщо воно є наслідком обставин непереборної сили (форс-мажорних обставин), які не існували на дату укладення Договору, і якщо ці обставини безпосередньо вплинули на виконання Договору, у зв'язку з чим виконання продовжується на строк, протягом якого діяли ці обставини.

7.3. Якщо обставини непереборної сили (форс-мажорні обставини) будуть продовжуватися більше трьох місяців, то кожна зі Сторін буде мати право відмовитися від подальшого виконання зобов'язань за Договором, і за умови досягнення Сторонами згоди про правові наслідки за всіма пунктами цього Договору, Договір вважатиметься розірваним.

## 8. Строк дії Договору та інші умови

8.1. Договір складено у двох примірниках, кожен з яких має однакову юридичну силу.

8.2. Договір набирає чинності з дня його підписання Сторонами і діє до закінчення процедури проведення громадського обговорення в процесі здійснення оцінки впливу на довкілля, визначеної в підпункті 1.1 пункту 1 цього Договору, відповідно до Закону України «Про оцінку впливу на довкілля», але у будь-якому випадку до повного виконання Сторонами зобов'язань за цим Договором, або до його розірвання.

8.3. Умови цього Договору можуть бути змінені за взаємною згодою Сторін та/або у разі зміни його ціни (розміру плати) у випадках, передбачених Порядком передачі документації для надання висновку з оцінки впливу на довкілля та фінансування оцінки впливу на довкілля, затвердженим постановою Кабінету Міністрів України від 13.12.2017 № 1026. Зміни до цього Договору вносяться шляхом укладення Договору про внесення змін до Договору, що є невід'ємною частиною цього Договору.

8.4. Кошти, перераховані на рахунок Виконавця відповідно до умов цього Договору, поверненню Замовнику не підлягають.

8.5. Договір може бути розірваний за взаємною згодою Сторін. Одностороннє розірвання Договору можливе лише у випадках, передбачених цим Договором та законодавством України.

8.6. Спори за цим Договором вирішуються шляхом переговорів. Якщо Сторони під час переговорів не дійшли згоди, спір вирішується в судовому порядку.

## 9. Місцезнаходження та реквізити Сторін

| «Виконавець» | «Замовник» |
|---|---|
| **Міністерство захисту довкілля та природних ресурсів України** | **ТОВ «НІБУЛОН»** |
| 03035, м. Київ, | Україна, м. Миколаїв, Каботажний спуск, 1, |
| вул. Митрополита Василя Липківського, 35 | 54001 , Україна, м. Миколаїв, вул. |
| IBAN: UA618201720313201014201116501 | Фалєєвська, 9-Б, |
| в ДКСУ м. Київ | ЄДРПОУ:14291113, |
| Код ЄДРПОУ 43672853 | ІПН 142911114015, |
| ІПН 436728526581 | Витяг(свідоцтво) № 100002619, |
| Статус платника податку – неприбуткова організація | р/р UA 173223130000026001000009580 в АТ "УКРЕКСІМБАНК", МФО 322313 |
| **Державний секретар** | **Технічний директор** |
| _____ **Є.В. Ярова** | _____ **О.А. Підгородецький** |
| **М. П.** | |

0410001

ПАТ "БАНК ВОСТОК" м.ДНІПРО
МФО 307123 І.К. 26237202
Одержано банком
15.09.2022
Департамент в Дніпр...
підпис банку
Електроний підпис є коректним

**ПЛАТІЖНЕ ДОРУЧЕННЯ N 108**

**від "_15_" _вересня_ 2022 р.**

Платник **ТОВ СП "НІБУЛОН"**

Код **14291113**

| Банк платника | ДЕБЕТ рах. N | СУМА |
|---|---|---|
| **ПАТ "БАНК ВОСТОК"** | **UA14 3071 2300 0002 6001 0102 7001 9** | **66999,50** |

Отримувач **МІНІСТЕРСТВО ЗАХИСТУ ДОВКІЛЛЯ**

Код **43672853**

| Банк отримувача | КРЕДИТ рах. N |
|---|---|
| **Державна казначейська служба України, м.Київ** | **UA61 8201 7203 1320 1014 2011 1650 1** |

Сума (словами)
**Шістдесят шість тисяч дев'ятсот дев'яносто дев'ять гривень 50 копійок**

Призначення платежу
**проведення громадського обговорення зг. рах. № 172 від 05.09.22 по дог. 172/22-ОВД від 05.09.22 В т.ч. ПДВ 11166,58 грн.**

ДР

М.П. Підписи Бабаніна Ольга Володимирівна
Мехеда Л.Г.

ПАТ "БАНК ВОСТОК" м.ДНІПРО
МФО 307123 І.К. 26237202
Проведено банком
Виконано
15.09.2022
підпис банку
Електроний підпис є коректним

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| Дата підпису | ID ключа у системі iBank2UA |
| 15.09.2022 15:14 | 2: 161900756554963424 |
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