



## Slate Production and Environmental Impact Assessment

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**Abstract:** This article describes issues of reducing the environmental impact of harmful compounds produced by production enterprises in various fields and the introduction of a new type of dust-gas cleaning equipment at the enterprise, which allowed harmful substances to exceed the permissible limits. In addition, analytical work and calculation issues on increasing the economic efficiency of the enterprise were presented.

**Key words** – production enterprises, inventory, economic efficiency, dust-gas cleaning equipment, norm, rule, compensation payments.

### INTRODUCTION

Along with the modernization of cleaning equipment in the construction materials production industry, extensive measures are being taken to prevent excessive air pollution and to ensure that harmful substances do not exceed the permitted limit. In the Strategy of Actions for the further development of the Republic of Uzbekistan, tasks on "...timely implementation of measures aimed at environmental protection, prevention of negative impact on the gene pool and public health" are defined. Based on these tasks, by using new types of dust-gas cleaning equipment in production enterprises, increasing the efficiency of the equipment and reducing and evaluating the impact of enterprises on atmospheric air, human health and plant life acquires important scientific and practical importance.

The integration of knowledge about the environment allows future specialists to foresee the impact of the consequences of production activities on the state of the biosphere, and to develop engineering measures to preserve and ensure the potential of natural resources and the reasonable state of the habitat.

Although scientific and technical progress can do great things to save the biosphere, scientists and statesmen are constantly sounding the alarm about the threat that threatens the lives of all living things. Although mother nature surprises us with all its beauty and freshness and urges us to be aware, pollution of the environment between countries and continents, cases of destruction of living creatures, soil erosion and salinization, unfortunately, continue. Examples of such ecological disasters are the Chernobyl disaster at the turn of the last century, the drying up of the Aral Sea, nuclear tests in Baikonir, and others.

**Methods.** Methods of calculation and analysis were used to assess the environmental impact of industrial enterprises, in addition, modern methods of determining air parameters and aerodynamics of industrial buildings, analysis and determination of the amount of dust and gaseous substances, monitoring in enterprises, experimental and statistical analysis methods were



used. The following methods are used to determine the composition and amount of pollutants in the exhaust gas streams:

- theoretical (balance);
- calculation and analytical (experimental);
- reporting-static.

The theoretical method allows to establish the composition and quantity of pollutants on the basis of drawing up thermal and material balances of technological processes taking into account the chemical composition and properties of raw materials, fuel, materials, structural and geometric features of units, technological parameters, processes that ensure maximum performance of units and data on specific emissions of pollutants of the operated equipment.

**Analysis and Results.** The limited liability company "URGUT TEXTILE SHIFER" is located in the Pochvan neighborhood of the Urgut district of the Samarkand region. The total land area of the enterprise is 4.72 hectares.

The enterprise is bounded by a local highway in the north, irrigated arable land in the south-east, irrigated arable land in the west, open space in the east and south-east, and the residents of Pochvan village at a distance of 550 meters.

The village of Qairaqli is 350 meters from the north-west side, the village of Sanchikul is 900 meters from the north-east side, and Khojaqishloq is 500 meters from the south side. The main activity of the enterprise is the production of asbestos slate. The annual capacity of the enterprise is 52.2 mln. piece During the 2018 annual reporting period, 696,700 pieces of slate were produced. The working mode of the enterprise is 24 hours/day, 270 days/year. The number of employees working in the enterprise is 99 people. The relief of the area where the enterprise is located is flat, the coefficient of the relief effect of the place is equal to 1. Meteorological information and coefficients of the region where the enterprise is located are shown in the table.

According to climatic conditions, Urgut district belongs to 3 types of climate regions. The limited liability company "URGUT TEXTILE SHIFER" includes the following sections and departments: 1st and 2nd production line. The total length of the network is 160 meters. The network consists of: boiler house, cement storage warehouse, cement receiving hopper, cement transmission network, asbestos storage warehouse, asbestos transmission network, water storage and heating department, mixture preparation department, formatting department, corrugated department, drying department, cooling department, finished product warehouse. 3rd production line. The total length of the network is 134 meters.

Water heating, steam generation, natural gas in the boiler room, and the use of coal when the natural gas supply is interrupted emit pollutants into the atmosphere. E-1/9-1G and D-721 heating boilers are used in the 1st and 2nd production lines, and E-1/9-1G boilers are used in the 3rd production line. Carbon monoxide, nitrogen oxides, benz(a)pyrene are released into the atmosphere as a result of natural gas combustion, carbon monoxide, nitrogen dioxide, solid particles (soot), sulfur oxides and benz(a)pyrene substances are released as a result of coal combustion. [3; 319-b]

Table 1.

**Information about products received and used at the enterprise**

T/r	Name of products received and spent	Unit of measure	The quantity
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1	Cement	tons	13828,7
2	Asbestos	tons	2073,0
3	Total land area	to	4,72
4	Number of employees	person	99
5	Natural gas	m3	1038000
6	Coal	tons	16,0
7	Liquefied gas	m3	1527,6
8	Diesel fuel	tons	4,2

**Source:** the table was developed based on the author's research.

As a result of the processes of reception, storage and distribution of petroleum products, hydrocarbons are formed from the hermetically sealed areas of the oil product storage tanks, pressure increase in the tanks, and are released into the atmosphere through the valve. Welding dust and manganese oxide are formed during the welding process with the help of electrowelding equipment.

Table 2

### Information about the company's vehicles

T/r	Vehicle type	Unit of measure	The quantity
1	HOWO model "224257 N 3847 eICB	piece	2
2	Bus ISUZU 14 seats	piece	1
3	Autocrane lifting capacity 50 t	piece	1
4	Nexia dons and sons	piece	2
5	Cara	piece	1
	Total		7

**Source:** the table was developed based on the author's research.

There are 11 types of pollutants released into the atmosphere at the enterprise, the total amount of which is 37.768277 t/year, according to ingredients: cement dust - 17.888 t/year, 47.362%, asbestos dust - 7.423 t/year, 19.654%, carbon monoxide - 9.6747 t/year, 25.616%. , Nitrogen oxide – 1.955 t/year, 5.176%, nitrogen dioxide – 0.000315 t/year, 0.0008%, Sulfur oxide – 0.00288 t/year, 0.008%, soot – 0.816 t/year, 2.161%, benzapyrene – 0.000172 t/year, 0.0004% the hydrocarbon - 0.00071 t/year, 0.0019%, welding dust - 0.0066 t/year, 0.0175%, manganese oxide - 0.0009 t/year, 0.0024%, amount of solid pollutants - 26.1345 t/year (69.197%), amount of gas and liquid substances 11.633777 t/year (30, 803 %)

Table 3

### INDICATORS OF POLLUTION SOURCES

№	Name	T/year	%	Number of sources
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1	Main production departments	37,760067	99,978	19
2	Auxiliary buildings	0,00821	0,022	2
	TOTAL:	37,768277	100	21

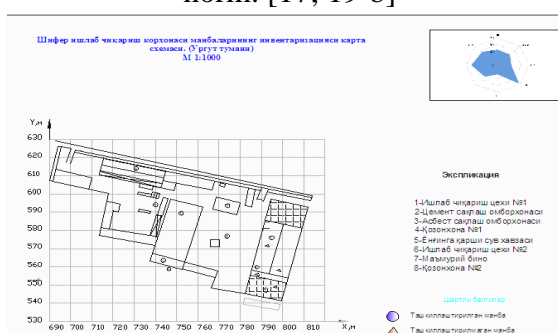
**Source:** the table was developed based on the author's research.

"URGUT TEXTILE SHIFER" limited liability company. Devices and equipment for separating pollutants - 23 units. Sources emitting pollutants - 21 of them: organized sources - 10, unorganized sources - 11, dust and gas cleaning equipment (ChGTU) - 2, total amount of pollutants - 37.768277 t/year. Of this: solid state - 26.1345 t/year, 69.197%, gas and liquid state - 11.633777 t/year, 30.803%;

Pollutants: cement dust, asbestos dust, carbon monoxide, nitrogen oxide, nitrogen dioxide, sulfur oxide, soot, hydrocarbon, welding dust (iron II oxide), manganese oxide, benz(a)pyrene.

In accordance with the Regulation approved by the decision of the Cabinet of Ministers of the Republic of Uzbekistan No. 14 of January 21, 2014 "On the procedure for the development and agreement of projects of environmental regulations", an inventory of sources of pollutants into the atmosphere was carried out in the limited liability company "URGUT TEXTILE SHIFER". The number of sources emitting pollutants, the amount of substances released from the sources and the most dangerous of them, that is, those emitting more pollutants, were determined.

"URGUT TEXTILE SLATE" limited liability company is included in the list of category 1 objects in accordance with paragraph 26 of Appendix 2 of the Decree of the Cabinet of Ministers of the Republic of Uzbekistan No. 949 of November 22, 2018 "On Approval of the Regulation on State Environmental Expertise". In the technological process of production of the enterprise, the total amount of pollutants was determined for each source of atmospheric pollutants separately and for the enterprise. The identified information will be submitted to the Department of Ecology and Environmental Protection of Samarkand Region for review and approval as an environmental norm. [17; 19-b]



**Figure 1.** Inventory process map of the enterprise.

It was determined that there are 13 different types of production and household waste at the enterprise. There are 9 sources of waste in the enterprise. There are 13 waste collection sites, the total amount of waste is 122.27892 t/year.

Fluorescent lamp waste from the above-mentioned wastes is temporarily collected on the territory of the enterprise and handed over to the collection enterprise for demercurization.

Black metal waste is delivered to the "Secondary Black Metal" enterprise. Accumulator case waste is sent to a plastic recycling company, and used tires are sent to a tire recycling



company. Electrolyte is still used in the enterprise. Cement dust, asbestos dust is temporarily collected in the enterprise territory and reused. Empty polypropylene bag waste is handed over to a plastic recycling facility. Used motor oil is used in the enterprise to lubricate equipment and devices. Asbestos cement suspension waste is collected on the territory of the enterprise and given to entrepreneurs who use construction materials. Oily rags are temporarily collected in the transport department on the territory of the enterprise and burned in the oven. Solid household waste is collected in a separate container and taken to the district landfill. [90; 224-b]

According to the results of the analysis of calculations, it was found that the amount of ingredients coming from the sources of the enterprise exceeded the permitted capacity RES under the current operating conditions.

A sanitary protection zone was established for the enterprise, and it was found that the discharges into the atmosphere exceeded the permissible capacity (RES) even in the sanitary protection zone. This leads to pollution of the natural environment above the norm. It can have a negative effect on the health of humans and other living organisms.

Ensuring compliance with the standard of release of harmful substances into the atmosphere

As a result of the use of the newly created dust gas cleaning equipment in production enterprises, the amount of pollutants released into the atmosphere: (inorganic dust, cement dust, asbestos dust, carbon oxide, nitrogen oxide, nitrogen dioxide, etc.) is reduced.

The base rate of payments and the penalty coefficient have been reduced based on the application of the regulation on the procedure for applying compensation payments for environmental pollution and waste disposal in the territory of the Republic of Uzbekistan, approved by the decision of the Cabinet of Ministers of the Republic of Uzbekistan No. 820 dated October 11, 2018 "On measures to further improve the economic mechanisms of nature protection". Economic efficiency is achieved due to the reduction of pollutants emitted into the atmosphere, i.e., dust gases, as a result of the use of dust gas cleaning equipment with the help of newly created small filling materials in production enterprises.

Compensation payments for environmental pollution and waste disposal were calculated based on the requirements of the REGULATION on the procedure for applying compensation payments for environmental pollution and waste disposal in the territory of the Republic of Uzbekistan.

The amount of compensation payments for environmental pollutant discharges in excess of the norm and norm, waste placement in excess of the specified limit and limit, by the entities paying compensation according to the types of activities, compensation by the entities of the first and second categories affecting the environment (hereinafter referred to as the entities paying compensation of the I and II categories) compensation by the entities according to the 1st, 2nd, 3rd and 4th appendices of this Regulation in accordance with the established basic rates of payments, the mass of environmental polluting substances, specific information related to the generation of waste and their placement, as well as the environmental norms approved by legislation are determined independently.

The exact mass of environmentally polluting discharges and disposal of waste is determined by compensation-paying entities of category I and II, based on preliminary calculations, as well as confirmed data obtained as a result of state, departmental and industrial



public environmental control carried out by laboratories of state and agencies, production laboratories of compensation-paying entities of category I and II or laboratories of audit organizations accredited in accordance with the procedure established by law. [90; 224-b]

The amount of compensation paid by subjects belonging to categories I and II for pollution of the natural environment, generation of waste and their disposal is calculated according to the following formula:

$P = (M_n * R * E_{KIOIH}) + (M_{cn} * R * E_{KIOIH} * B_k)$ , where:

**P**-the amount of compensation for environmental pollution and disposal of waste, in soums;

**M<sub>n</sub>**-the mass, in tons and kilograms, of releasing and discharging pollutants into the natural environment and placing them within the framework of approved environmental regulations;

Discharge, discharge and disposal of **MSN**-polluting substances into the natural environment in excess of the approved ecological norm, in tons or kilograms;

**R**-base rate in coefficients in relation to the minimum monthly wage set for one ton of discharged pollutant and disposed waste into the natural environment; **E<sub>KOI</sub>** is the minimum monthly salary, in soums; **B<sub>k</sub>** is the weighting coefficient for the exceeding (decreasing) of the approved environmental norms in the release, discharge and placement of pollutants into the natural environment. Efficiency coefficient (**B<sub>k</sub>**) is determined in a differentiated manner, depending on whether the approved ecological norms (limits) are exceeded (reduced) in the discharge, discharge and placement of the substances into the natural environment. The amount of compensation for environmental pollution and disposal of waste is determined according to the following formula:

$$P = (M_f * R * E_{KIOIH}) : B_k, \text{ where: (18)}$$

**M<sub>f</sub>** is the actual mass of pollutant release, discharge and deposition into the natural environment. **B<sub>k</sub>** is defined in the following relation. The ratio coefficient for the increase of the approved environmental standards for the release, discharge and placement of pollutants into the environment is determined as the ratio of the actual mass of the release, discharge and placement of pollutants to the separately approved environmental standards for each substance.

To calculate the amount of the compensation payment, the following are used: accurate data on the mass of pollutants released into the environment; preliminary information on keeping records of the release, release and disposal of pollutants into the natural environment by type; specific information based on state statistical reports submitted annually by entities paying compensation in accordance with the forms established in the field of nature protection; information on the results of environmental control and environmental monitoring performed by means of equipment at polluting sources.

In the event that the entities paying compensation do not have approved environmental regulations for the release, discharge and placement of pollutants into the natural environment, or when their validity period has expired, compensation payments are as follows according to the types of activities:

In entities belonging to categories I and II - it is calculated by applying a coefficient of 20 (twenty) to the specified amounts of compensation payments for the actual full mass of emissions, discharges and their placement.



The compensation payments were calculated on the example of the asbestos slate production enterprise of "URGUT TEXTILE SHIFER" limited liability company, which was tested by the research:

#### **Advance payment before installation of new equipment**

"URGUT TEXTILE SLATE" LLC asbestos slate production enterprise:

a) Cement and asbestos dust

$$P1 = (Mn * R * MRZP) + (Mcn * R * MRZP * Kkr) = (25.3 * 0.0091 * 223.6) + (4.3 * 0.0091 * 223600 * 20) = 51479.4 + 174989.4 = 226468.86 \text{ thousand soums. (19)}$$

Mn - the amount of waste is 29.6 t/year. Of this, 25.3 t/year is within the normative framework, 4.3 t/year is above the norm.

b) Carbon dioxide:

$$P2 = (Mn * R * MRZP) + (Mcn * R * MRZP * Kkr) = (9.67 * 0.0001 * 223.6) + (1.18 * 0.0001 * 223600 * 20) = 216.2 + 527.7 = 743.9 \text{ thousand soums.}$$

Mn - the amount of waste is 10.85 t/year. Of this, 9.67 t/year is within the norm, 1.18 t/year is above the norm.

c) Nitrous oxide

$$P3 = (Mn * R * MRZP) + (Mcn * R * MRZP * Kkr) = (1.95 * 0.0076 * 223.6) + (0.16 * 0.0076 * 223600 * 20) = 3313.7 + 5437.9 = 8751.6 \text{ thousand soums.}$$

The amount of Mn discharge is 2.11 t/year. Of this, 1.95 t/year is within the normative framework, 0.16 t/year is above the norm.

**Conclusion.** "URGUT TEXTILE SHIFER" limited liability company is included in the list of category 1 objects in accordance with the decision of the Cabinet of Ministers of the Republic of Uzbekistan No. 949 of November 22, 2018 "On approval of the Regulation on State Environmental Expertise".

Taking into account the allowed amount (quota) of polluting substances released into the atmosphere, the permissible amount of emissions was determined. The range of pollutant distribution and calculations were determined according to the "Eco-center" program, the calculation area measures 4x4 km, the calculation step is 40x40m. Materials of the State Committee for Ecology and Environmental Protection of the Republic of Uzbekistan and meteorological data on climatic conditions of the Samarkand Meteorological Station of the Hydrometeorology General Department of the Ministry of Emergency Situations of the Republic of Uzbekistan were used in the calculation.

The largest share of asbestos dust in the atmosphere emitted from sources in the working zone of the enterprise is 0.648 RES, and 0.422 RES outside the boundaries of the enterprise. It was found that the percentage of the pollutant asbestos dust in the atmosphere in the working area of the enterprise and outside the enterprise exceeded the RES, and it is necessary to establish additional measures.

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