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Kobrina Nataliia

**ENVIRONMENTAL SAFETY DURING LOADING AND
UNLOADING BULK MATERIALS IN PORTS**

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ABSTRACT

Relevance of the topic . The ecological situation in Ukraine is characterized by a critical man-made load on the components of the geosphere. Among the factors in the formation of environmental hazards, we must single out dust. Contamination of the components of the geosphere with dust belongs to the technogenic risk group of environmental hazards. A significant amount of dust enters the air during the implementation of such technological processes as the destruction of rocks, loading and unloading of dusty bulk materials. During these operations, a significant amount of finely dispersed (suspended) particles with a diameter of 2...10 μm enter the air, which cause negative changes in the geosphere and lead to human diseases. In particular, the task of ensuring environmental safety in seaports of Ukraine is very urgent. This is due to the fact that these ports are historically located in large cities (eg Odessa, Mariupol, Berdyansk) in the immediate vicinity of residential buildings.

The most common technologies for reducing the ecological burden on the natural environment from the influence of dust in seaports are technologies that completely or partially close the working area during the loading-unloading process, or technologies that irrigate the sources of dust with various technological liquids or water. In Ukraine, a significant part of the dusty bulk materials is loaded into vessels by portal cranes equipped with grapples. At the same time, the currently used methods and means of dust suppression are considered ineffective. A particular difficulty is the task of dedusting the air in the conditions of the implementation of technological processes, in which the area of the sources of dust emission is hundreds of square meters, and the volume of dusty air is thousands of cubic meters, which is typical for seaports.

The simplest and at the same time effective method of combating suspended dust particles, which are formed during loading and unloading of bulk materials, is irrigation. During irrigation, suspended particles of dust are caught and deposited by finely dispersed drops of technological liquid or water. Drops are generated and transported to the dust formation zone by a particular dispersing system. Therefore, **the scientific and applied task**

of ensuring environmental safety during loading and unloading of dusty bulk materials in seaports using means of irrigation of the working area is urgent.

Connection of work with scientific programs, plans, topics . The dissertation work was carried out within the framework of R&D, which was carried out at the National Aerospace University named after NOT. Zhukovsky "KHAI" in accordance with the plans of research works of the Ministry of Education and Science of Ukraine on state budget topics G203-29/ 00 "Use of jet energy for grinding and transportation of technological liquids"; DR 0100 U 002200 "Fundamentals of mathematical modeling and safety forecasting of man-made objects of aerospace engineering".

The results of the work were part of complex research within the framework of R&D conducted by the National Aerospace University named after NOT. Zhukovsky "HAI" on the topic "Design and manufacture of carriage barrels for dust suppression during loading and unloading operations of bulk materials."

The purpose and tasks of the research . The purpose of the work is to increase the efficiency of environmental safety management in the case of contamination of the components of the geosphere with suspended dust particles by transporting and distributing dispersed particles of the technological liquid in the area of loading and unloading of bulk dusty materials.

To achieve this goal, the following tasks were set and solved:

– analysis of the formation of environmental hazards in seaports during loading and unloading of bulk dusty materials;

- study of dust as a source of ecological danger during loading and unloading of coal on the example of Mariupol Sea Trade Port;

- theoretical study of increasing the efficiency of environmental safety management when the components of the geosphere are contaminated with dust suspended particles when using sprinkler systems for dust suppression during the loading and unloading of bulk dusty materials ;

- creation and experimental research of water spraying devices for dust suppression systems during loading and unloading operations;

- development of an ecological safety management system in the process of loading and unloading coal in the Mariupol Sea Trade Port.

The object of research is the processes of formation, delivery and distribution of dispersed particles of a technological liquid in the management of environmental safety in areas of atmospheric air pollution.

The subject of research is the parameters of the transportation of flows and the formation of zones that contain small drops of technological liquid in places of dust pollution, and technical means of ensuring environmental safety.

Research methods : the methodological basis of theoretical research is based on the use of systematic, scientifically based analysis in the field of environmental safety. The theory of partial differential equations and numerical modeling were applied. In experimental studies, methods of physical modeling are used, from experimental samples to experimental industrial installations, production, research and implementation of natural samples.

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