A MODEL OF PHOSPHINE "BEHAVIOR" IN SIMULATED SHIPBOARD EMERGENCIES DURING SHIPMENT OF FUMIGATED GRAIN

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The results of toxicological hygienic control of ship atmosphere are presented. These studies were conducted during the transportation of phosphine fumigated grain aboard the Blasco and Novoship bulkers and were conducted with the cooperation of DM (France) Research Fumigation Company and Degesch America, Inc. (U.S.A.).

Phosphine ejection due to depressurization of ship holds and the distribution of the gaseous cloud formed from such an accident was modeled. In the study on the Novoship the total surface of the "emergency" hole was 250 m^2, the volume of ejected gas was 4,000 m^3 which came from an initial fumigant concentration of 215 ppm. The parameters of the ejected gaseous cloud depended on the ship atmospheric characteristics at the moment of the "accidental" discharge. In this study the length of the cloud on the cargo deck was 70-80 m and the initial concentration of 215.0 ppm of phosphine decreased to 9.2 ppm in 16 min. In the next 8 min the concentration decreased to 2.5 ppm and 45-50 min. after the discharge phosphine was not detected on the deck.

These data have been the basis for the development of recommendations to provide safety for seamen in case of an emergency when fumigated goods are transported by ship.