for wood extended service life retardant efficiency may be reduced by an average of 1.5 times.

Keywords: flammability, thermal decomposition, burning, wood, lignin, service life, fire-retardant efficiency, fire protection.

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*[1]**V.M. Shmandij** – Dr.Sci.(Tech.), Professor, Head of Ecological Safety and Nature Management Organization Dept.*
*[2]**V.V. Vambol'**, – Cand.Sci.(Tech.), Docent, Docent of Chemistry, Ecology and Expert Technologies Dept.*
*[3]**O.M. Kondratenko** – Cand.Sci.(Tech.), Docent of Applied Mechanics Dept.,*
[1]M. Ostrogradsky Kremenchuk National University, Kremenchuk, Ukraine,
[2]N.E. Zhukovsky National Aerospace University "KhAI", Kharkiv, Ukraine
[3]National University of Civil Defense of Ukraine, Kharkiv, Ukraine

CONCEPTUAL BASIS AND CREATION OF ECOLOGICAL SAFETY MANAGEMENT SYSTEM OF HARMFUL AEROSOL SUPPRESSION, WHICH USES MULTIPHASE DISPERSED STRUCTURES

For the first time, it was constructing, described and illustrated the hierarchic structure of ecological safety management system of a water-drop curtain generation process. Application of that approach allows complex carrying out the problem of ecological safety of loading and unloading operations in ports and storage facilities of the particulate product, the suppression of explosion hazardous aerosol sprays in the mines, as well as localization and liquidation of consequences of forest fires.

***Keywords*:** systematic approach, multilevel decomposition, ecological safety management system, suppression of aerosols.

Introduction. The process of formation of multiphase dispersed structures (MDS) in the respective statement of the problem may take a worthy place in the creation of ecological safety management system (ESMS) [1].

Analysis of recent publications. During the technical preparations for the implementation of management processes must be based on the existing normative and technological documentation and results of carried out experimental researches, perform spatial and temporal structuring of danger and its quantitative indicators. It should take effective schemes of implementation of ESMS [2].

On the basis of these materials is being developed technological processes that use MDS, designing and manufacturing funds of equipment of the process, determined the

form of organization of the technological processes and also the processes themselves are implemented.

Thus, an integrated model of the processes of ecological safety management, reflecting the variety of factors that affect the content of work for ensuring ecological safety, can be arranged only if its decomposition and the development of relatively independent models of individual complexes of preparation for ensuring the ecological safety.

Since preparations for the implementation of ecological safety technologies requires significant investment of time and resources, the possibility of experimental verification of different options to address specific tasks of development of ESMS practically impossible.

Under these conditions, modeling and definition of the rationality of decisions taken is the only and very effective way to solve problems using computer technology with minimal cost and sufficient accuracy.

Formulation and solving of problem. Based on the conceptual basis of a systematic approach [3], we propose the following scheme for solving the problem of formation of a control system (Fig. 1).

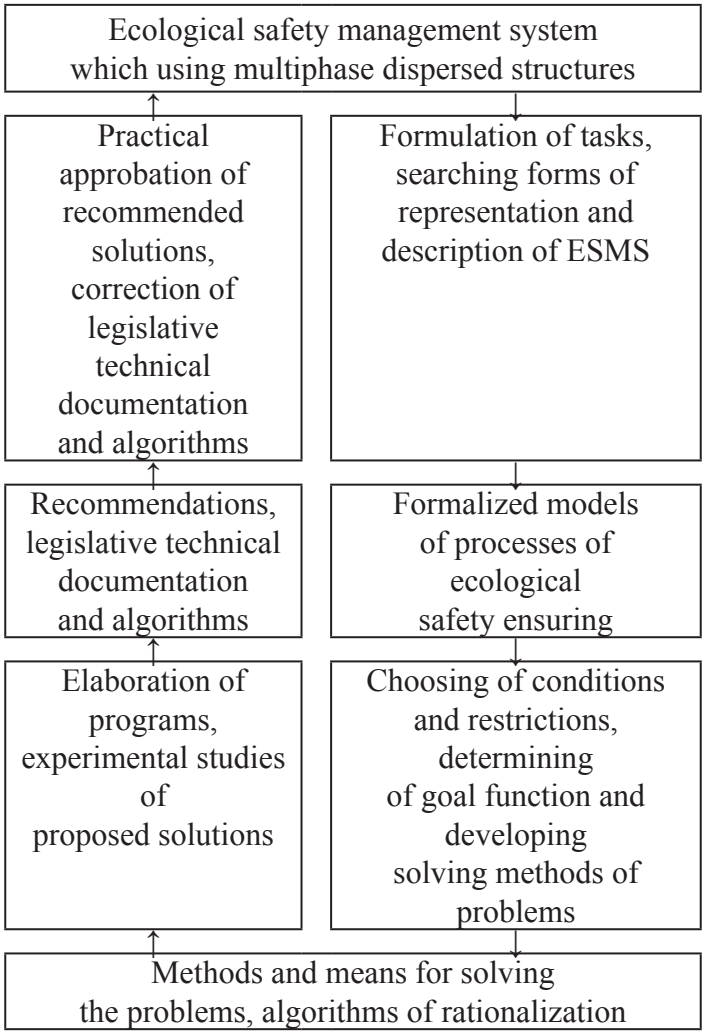

Fig. 1 - Scheme of solving of ecological safety management system creation problem

Taking into account the basis of systematic approach in case of solving of difficult problems as well as the analysis of specific features of a system ecological safety management creation process [3, 4], we propose using the following sequence when forming a model ecological safety management, which using multiphase dispersed structures:

– determination of problems and analyzing relevant information for final statement of problems;

– elaboration of models in a descriptive, mathematical or other forms of representation;

– selection efficiency criteria or criteria of decision making for rationalization of such systems;

– development of methods and means for resolving identified problems, including the development of computer algorithms and programs to implement them with the help of computer technology;

– experimental studies to verify the results of theoretical developments, including in industrial conditions and real operation conditions;

– development of recommendations and regulatory technical documentation for practical application of proposed and studied method and means and also optimization models of ecological safety management systems.

Like any complex system, the management of ecological safety consists of many components that form the basis of their functional characteristics and relationships in the operation of the whole system. This allows presenting the system in the form of model suitable for analytical research and synthesis of components-subsystems of systems as itself and environment. The starting point for the development of such a system is proposed the differentiation of production process on the specific stages.

Each of the components of management system of ecological safety during waste utilization is a very complicated and a large target subsystem and characterized by certain functions, methods and means of their implementation.

The main tasks for management system of ecological safety are to prevent (or substantially reduce) the negative impact on the natural environment, mitigate the effects of manifestations of sources of danger, the weakening of the intensity of the action of hazards. In this case the priority management technical solutions are the use of schemes of joint processing of waste of different economic systems.

Results of research. Using the principle of multilevel decomposition [3 – 5], we have to go to the formalization of solution of the problem of rational management of ecological safety during aerosol suppression process by water-drop curtain generation. The process of designing of the system is due to the division into hierarchical levels of functionally completed stages (of which there are 4) of the solution of the complex of subtasks of that level (of which there are 8 – two for each stage) (Fig. 2) [5].

The 1st Stage – "Formation of the initial data" – includes two levels defining the approaches to the identification of wastes and hazards.

At the 1st Level – "Identification of hazard aerosols" – are determined by the types of hazard aerosols (of mineral dust, explosive coal dust of combustion smoke in air). In this case especially allocated groups promoting the formation of highly toxic substances (in case of forest fires) or explosive particle-air mixtures (in case of coal mines) of mineral dust and air aerosols (in case of storage facilities) [5].

The 2nd level – "Identification of hazards dependently of principals of the formation" – involves detection and identification of hazard aerosols with taking into account the characteristic features of the region (each of regions have its own priorities and hierarchy of aerosol particles kind structures), space and time structuring of hazards (set of ecological dangerous aerosols of any kind of genesis, which because of interaction and mutually influence are hazard generators – coal mine, ports and storage facilities or forest fires), quantitative structuring (involves amiability of statistic data of each of types of hazard aerosol). That level is finalizing by development of variants of principle technological schemes of hazard aerosol suppression by water-drop curtain generation with taking into account ensuring of ecological safety.

The 3rd Stage – "New and improving technologies" – as well as the previous consists of two serial levels.

The 3rd Level – "Preparing processes" – covers the preparatory processes of creating of technological system of hazard aerosol suppression by water-drop curtain generation, which taking into account ecological safety. It includes the technological process of generation and delivery to the desired location of water-drop curtain, which prevents formation of highly toxic substances in environment air.

On the 4th Stage – "Equipment" – produced technical requirements and developed equipment necessary for hazard aerosol suppression process that ensured ecological safety. By these we mean servicing of technological processes by main, auxiliary and additional equipment with taking into account safety of staff. The character feature of that level is taking into account volumes and nomenclature of manufacturing processes and also dates of performances.

The 3rd Stage – "Organization and executing the processes, which using ecological safety management system" – consists of two serial levels.

Here is 5th Level – "Organization and controlling of ecological safety management system" – that characterized by the solution of tasks of control and organization of technological process. If we considering of specificity of the tasks, these level characterized by presence follow components of:

– organization of sequence of process;

– organization of shop sections of executing of technological process;

– systems of dispatching and management.

The complex solving of tasks of that level must be carried out jointly with solving of tasks of 6th Level – "Manufacturing processes". That involves the organization of technological and manufacturing processes on, considering ensuring of ecological safety.

The final, 4th, Stage of this algorithm – "Results of using of which using of ecological safety management system" – is control of results of application of ecological safety management system.

The 7th Level – "Output results of using of ecological safety management system" – imply obtaining of following parameters of ensuring of ecological safety, which basis on executing hazard aerosol suppression by water-drop curtain generation process: reducing of pollutants concentration in environment air, increasing the ecology, fire and explosive safety level of coal mines, ports and storage facilities or forests.

At the last, 8th Level – "Control system" – is necessary to organize the system of controlling that allows evaluating efficiency of works for ensuring of ecological safety.

Proposed hierarchic structure implies formalization of solution of the assigned task just in strictly adhering to the basic principles of multilevel decomposition. This implies the following features:

– presents of vertical (between the levels) and horizontal (between the stages) communications;

– priority of action of levels and stages from bottom to top;

– interrelation of levels;

– varieties of choosing and solving of the tasks for each of levels.

Initial data for creation of ecological safety management system		Improved and new technologies, which using ecological safety management system		Organization and executing the processes, which using ecological safety management system		Results of using of which using ecological safety management system	
1st level	**2nd level**	**3rd level**	**4th level**	**5th level**	**6th level**	**7th level**	8th level
Identification of hazard aerosols	Identification of hazards dependently of principals of the formation	Preparing processes	Equipment	Organization and controlling of ecological safety management system	Manufacturing processes	Output results of using of ecological safety management system	Control system

Fig. 2 - General scheme of multilevel decomposition
(without excessive detailed elaboration)

Conclusions. In present paper considered conceptual basis of creation of ecological safety management system of executing hazard aerosol suppression by water-drop curtain generation process for coal mines, ports and storage facilities or forest fires, which uses multiphase dispersed structures. That was done on basis of principle of multilevel decomposition and systematic approach by formalization of rational management in executing hazard aerosol suppression task. Also it was proposed the methodological general scheme for solving of task of management of ecological, fire and explosive safety of coal mines, ports and storage facilities or forests.

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В.М. Шмандий[1] – т.ғ.д., профессор, экологиялық қауіпсіздік және табиғатты пайдалануды ұйымдастыру кафедрасының меңгерушісі

В.В. Вамболь[2] – т.ғ.к. доцент, химия,экология және сараптама технологиялар кафедрасының доценті

А.Н. Кондратенко[3] –т.ғ.к., қолданбалы механика кафедрасының доценті

[1]М. Остроградский ат.[1]Кременчуг ұлттық университеті, Кременчук, Украина

[2]Н.Е. Жуковский ат. Ұлттық Аэроғарыш университеті«Харьков авиация университеті», Харьков, Украина

[3]Украина Азаматтық қорғаныстың Ұлттық университеті, Харьков, Украина

КӨП ФАЗАЛЫ ДИСПЕРСЛІ ҚҰРЫЛЫМЫН ПАЙДАЛАНАТЫН, ЗИЯН АЭРОЗОЛЬДАРДЫҢ БАСУДЫҢ ЭКОЛОГИЯЛЫҚ ҚАУІПСІЗДІК БАСҚАРУ ЖҮЙЕСІНІҢ КОНЦЕПТУАЛДЫ НЕГІЗІЖӘНЕ ОНЫ ҚҰРУ

Сулы-тамшылы қалқанның өзгеру процесінің экологиялық қауіпсіздігін басқару жүйесінің иерархиялық құрылымы алғаш рет құрылып, сипаттамасы беріліп, безендірілген. Қолданылған тәсіл кемежай мен сусымалы өнім қоймаларында тиеу-түсіру жұмыстарының экологиялық қауіпсіздік мәселесін, шахталарда жарылу қаупі бар аэрозольдердің басу, сондай-ақ орман өрттерінің салдарын жою және оқшаулау бойынша мәселелерді кешенді шешуге мүмкіндік береді.

***Негізгі түсініктер*:** жүйелікөзқарас,көп деңгейліыдырау, экологиялық қауіпсіздікбасқару жүйесі, аэрозольдаржолын кесу.

В.М. Шмандий[1] – д.т.н., профессор, зав. кафедрой экологической безопасности и организации природопользования

В.В. Вамболь[2] – к.т.н., доцент, доцент кафедры химии, экологии и экспертизных технологий

А.Н. Кондратенко[3] – к.т.н., доцент кафедры прикладной механики

[1]Кременчугский национальный университет им. М. Остроградского, Кременчук, Украина,

[2]Национальный аэрокосмический университет им. Н.Е. Жуковского «Харьковский авиационный университет», Харьков, Украина,

[3]Национальный университет гражданской защиты Украины, Харьков, Украина

КОНЦЕПТУАЛЬНЫЕ ОСНОВЫ И СОЗДАНИЕ СИСТЕМЫ УПРАВЛЕНИЯ ЭКОЛОГИЧЕСКОЙ БЕЗОПАСНОСТЬЮ ПОДАВЛЕНИЯ ВРЕДОНОСНЫХ АЭРОЗОЛЕЙ, ИСПОЛЬЗУЮЩЕЙ МНОГОФАЗНЫЕ ДИСПЕРСНЫЕ СТРУКТУРЫ

Впервые построена, описана и проиллюстрирована иерархическая структура системы управления экологической безопасностью процесса генерирования водно-капельных завес. Примененный подход позволяет комплексно решать проблему экологической безопасности погрузочно-разгрузочных работ в портах и складах сыпучей продукции, подавления взрывоопасных аэрозолей в шахтах, а также локализации и ликвидации последствий лесных пожаров.

***Ключевые слова*:** системный подход, многоуровневая декомпозиция, система управления экологической безопасностью, подавление аэрозолей.