

**AUTHOR'S PRESENTATION
OF DOCTORAL (PhD) DISSERTATION**

**UNIVERSITY OF PUBLIC SERVICE
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**Safety of storage of dangerous substances and goods,
in particular with accidental water pollution**

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THE FORMULATION OF THE SCIENTIFIC PROBLEM

My scientific research has focused on the research of industrial and environmental safety conditions and requirements for the storage of dangerous substances and goods. Within this, I researched the legal, institutional and instrumental system for the prevention, preparation, mitigation, accident prevention and recovery of accidental water pollution as a result of non-operational events.

The primary objective of my research was to analyze and evaluate the requirements of international legal regulations and guidelines for the application of vaccine water pollution prevention. In the framework of this, I examined the antecedents of the development of the system of rules, the tasks of the authorities and operators of the collection, drainage and collection of extinguishing water and extinguishing agents (hereinafter: extinguishing water collection), as well as the technical, organizational (management) measures.

The international solution to the scientific problem was the Hungarian adaptation of the methodological guide “Safety Guidelines and Good Practice for the Treatment and Collection of Extinguishing Water” established within the framework of the UNECE Convention on Industrial Accidents. Based on the examination of the international and domestic legal and technical regulations for the prevention of extinguishing water pollution, the applied methodology and the system of tools, the relevant management, management and technical measures can be established. The measures may be imposed on the operators of existing installations on the one hand and may be used in official licensing activities on the other.

A separate technical scientific problem was the sizing of facilities suitable for the collection of contaminated fire water and the definition of the related technical requirements. Another technical problem was the technical-based examination of their applicability in existing and planned hazardous plants in the domestic environment.

RESEARCH HYPOTHESES

1. On the basis of my analysis, based on the analysis and evaluation of the organizational, management and technical regulations and recommendations set out in the international UNECE guidelines for the prevention of water pollution, a proposal can be made for the application of the UNECE guidelines in Hungary in accordance with Hungarian regulations.

2. Based on my assumption, the experience of the application of the international legal regulation dealing with the storage of dangerous substances and goods in Hungary can be assessed, and the legal regulatory and technical proposals related to possible developments can be determined.
3. In the case of newly established warehouses for dangerous goods and goods, the legal and technical conditions for the performance of operator and official tasks may be determined on the basis of the requirements of legal and technical application guidelines for contaminated fire-fighting water collection facilities and equipment generally accepted in international official and operator practice.
4. Based on my hypothesis, the scientific investigation and systematization of the processes of major accidents causing fire water pollution can provide a technical basis for the legal, organizational and institutional system to be established in the case of existing warehouses dealing with dangerous substances and goods, as well as related procedural, technical and methodological activities.

RESEARCH OBJECTIVES

1. My aim is to examine the regulations of the international fire water pollution prevention regulation, in the framework of which I analyze the antecedents of the international system of regulations, the tasks of the authorities and operators of fire water treatment and collection, and the technical, organizational.
2. My aim is to assess the operating conditions of the domestic application of the legislation on major accidents, fire protection, environmental protection and water protection dealing with the storage of dangerous substances and goods, on the basis of which to prepare a proposal for the application of legislation and technical guidelines in Hungary.
3. My aim is to develop a technical procedure and methodology for the domestic application of the technical guidelines used for the sizing of facilities suitable for the collection of internationally accepted contaminated extinguishing water and the determination of the related technical requirements. In the course of my research, I consider it expedient to explore the technical requirements for the introduction of environmental pollution prevention, management and technical operator measures in Hungary.
4. In order to determine the technical conditions for the prevention of fire water pollution affecting the logistics warehouses dealing with dangerous substances and goods already in operation, I consider it my goal to include in the scientific system the consequences and effects of fire water pollution prevention. self-monitoring for operator compliance.

RESEARCH METHODS

During the elaboration of some subfields of the topic, I used general research methods, such as methods of analysis, synthesis, induction and deduction. During the elaboration of the dissertation, in order to fulfill the research objectives, I used the following research methods:

1. Preparation of an impact study covering legal regulation, law enforcement activities and the performance of technical tasks, including the method of comparison and generalization.
2. Study of the professional and scientific literature related to my international and Hungarian research topic, which is supplemented by the comparative analysis and evaluation of the documentation of the operators of hazardous activities.
3. Analytical activity, an integral part of which is the formulation of proposals on the basis of the evaluation of the current legal regulations, the internal operator and official regulations, as well as the law enforcement activity, and the drawing of the resulting conclusions.
4. Study of technical guidelines, recommendations, guidelines and solutions applied in countries with significant professional and scientific background, comparative analysis with domestic solutions.
5. Professional consultation on the researched topic with domestic and foreign experts recognized in both professional and scientific circles.
6. I use the relative ranking method to develop the selection procedure for sites affected by inoculation water pollution.
7. Scientific processing and publication of research results at domestic and international professional and scientific conferences and higher education sessions.

BRIEF DESCRIPTION OF THE STUDY CARRIED OUT BY CHAPTER

In the **first chapter** I examined the requirements of the international regulation of fire water pollution, in the framework of which I will evaluate the antecedents of the development of the international system of regulations and recommendations related to the tasks of Member States, authorities and operators. I also dealt with the examination of the technical, organizational (management) measures of the perception and treatment of contaminated extinguishing water, and with the evaluation of the internationally accepted extinguishing water quantity determination procedures.

In the **second chapter** of the dissertation, I examined the requirements of the Hungarian disaster protection, environmental protection and water quality protection regulations for the prevention of the environmental effects of major accidents related to dangerous substances and their application at the operator level. I also deal with the possible content of the regulation of the storage of dangerous substances and goods based on international examples.

Based on the preliminary results, **in the third chapter** of the dissertation my aim was to analyze and evaluate the applicability in Hungary of the technical guidelines used in Germany and Switzerland for the design and construction of internationally accepted extinguishing water collection facilities and equipment in accordance with international regulations.

The main objective of the **fourth chapter** of the dissertation was to examine the risks of already operating storage of dangerous substances and goods, in the framework of which I evaluated the characteristics of dangerous substances in dangerous substances and goods storage facilities. I dealt separately with the analysis of the major accident risks and consequences of the storage of dangerous substances, the interpretation of possible major accident scenarios, the design of facilities for the prevention of extinguishing water pollution, and the analysis of the technical characteristics of extinguishing water pollution. I have also explored the possibility of inspecting the preparedness of existing facilities for the prevention of fire water pollution, in line with good foreign practice.

SUMMARIZED CONCLUSIONS

I. Analysis and evaluation of international regulations for the prevention of fire water pollution

1. On the basis of my research, I have come to the conclusion that the UNECE Guide addresses an international regulatory gap with its recommendations to UNECE Member States, competent authorities and operators. The UNECE Guide covers hazardous activities covered by the UNECE Convention on Industrial Accidents, which deal with dangerous substances equipped with fire-fighting fire protection.

2. The introduction of fire water collection and storage measures is based on the Fire Protection Concept of the given facility, which defines the design and implementation of the operator's safety system. The UNECE Guide also provides a procedure for calculating the amount of extinguishing water that can be used. For the design and construction of a system for the collection, installation and use of contaminated fire water, the UNECE Guide recommends the use of the German VdS 2557 Guide.

3. Based on my sub-research, I formulated the concept of fire water pollution prevention, which I recommend to consider as a new safety discipline.

4. To solve the scientific problem given in my Hypothesis 1, I proposed the use of the German Guide and the Swiss Guide. The first chapter of the dissertation contains a specific textual proposal for the application of the recommended standards of the UNECE Guidelines in Hungary. It is also recommended that operators use the UNECE JEG model to be used as a technical procedure for calculating the amount of contaminated extinguishing water in existing installations. For more accurate calculations, the German Guide and the Swiss Guide can be used.

II. Investigation of the domestic system of prevention of fire water pollution related to the storage of dangerous substances and goods

1. In the context of the international requirements, recommendations and practices discussed in detail in the interpretation of the scientific problem, I assessed the experience of the application of the legal regulation dealing with extinguishing water pollution in Hungary.

2. The regulations on major accidents, fire prevention, water quality prevention and environmental protection apply to logistics warehouses storing dangerous substances and goods. The specific accident regulations for dangerous substances do not contain a specific provision on the capture of contaminated extinguishing water. The same applies to environmental impact assessment and unified environmental impact assessment, as well as water quality remediation planning regulations and related environmental and water protection authority activities. In my opinion, the precondition for the logistical storage of dangerous substances and goods must be the environmental impact assessment procedure, one of the essential parts of which is the determination of the retention and trapping capacity of fire-fighting water. Fire prevention regulations do not currently regulate fire water pollution prevention requirements.

3. Based on the experience of the application of the law in the field of compliance with the regulations of the specialized field, I determined the possible development directions of the relevant regulatory area and the conditions of the legal and technical application of the UNECE Guideline on Prevention of Pollution Prevention.

III. Design and construction of facilities for the storage of contaminated fire-fighting water in new warehouses for dangerous goods and materials

Based on the examination of the applicability of the German regulations on the storage of dangerous substances and the German Guide, it can be concluded that the guide may be suitable for complying with the fire prevention pollution control regulations for new dangerous substances and goods depots in an appropriate regulatory environment.

2. In my dissertation, based on my relevant research results, I prepared a scientifically based proposal for the introduction of certain elements of the German Guidelines and the Swiss Guidelines in Hungary, in accordance with the requirements of the UNECE Guidelines.

3. It can be stated that there is a need for regulation in connection with the draft Decree on Disaster Protection Regulations 2014 laying down the order of storage of dangerous substances and goods. Therefore, it is recommended that the requirements for extinguishing water collection spaces and equipment discussed in detail in my dissertation be presented in Hungary in the form of a Technical Directive, which is already well-proven by German regulations.

IV. In the field of environmental risk assessment and management of storage facilities for dangerous substances and goods already in operation

1. Based on my research on existing dangerous substances and storage facilities, I have come to the conclusion that existing logistics warehouses for the storage of dangerous substances and goods may be significantly involved in the prevention of fire water pollution.

2. Fires in hazardous activities may have a detrimental effect on the environment in the form of the spread of toxic combustion clouds and contaminated fire water containing dangerous substances (combustion products). The harmful effects of fire-fighting water pollution occur in the form of environmental pollution in the medium and long term. Emissions of dangerous substances and possible fires can contribute to the pollution of surface and groundwater, a special area of which is less researched in Hungary for the collection, treatment and disposal of polluted extinguishing water generated during storage fires.

3. I also found that in the field of the application of foreign technical practice in the construction of warehouses for the storage of dangerous substances or goods, there are significant differences in the equipment and thus the safety of each warehouse, both in terms of modern fire prevention systems and pollution reduction.

4. In view of the above, in the case of the already operating logistics warehouses, in order to prevent the environmental effects caused by possible major accidents and fire water pollution, I proposed in the present dissertation the identification of these sites and the control criteria of risk analysis and safety documentation. This is complemented by a technical proposal for the use of a questionnaire to be used for the official control of fire water pollution at the sites concerned.

NEW SCIENTIFIC FINDINGS

1. Based on the comprehensive examination of the operator task and technical requirements of the international regulation on the prevention of extinguishing water pollution, in order to facilitate its application in Hungary, I defined the operator and regulatory tasks of the treated and treated polluted water, technical procedure. In order to develop the correct technical legal interpretation, I was the first to formulate the concept of prevention of fire water pollution.
2. On the basis of the examination of the domestic legal regulations, institutional system and device system related to the storage of dangerous substances and goods, I established the conditions for the domestic legal and technical application of the UNECE Guideline on the Prevention of Water Pollution.
3. Based on the examination of the domestic adaptability of the internationally accepted fire water pollution prevention guidelines, I developed the legal regulatory conditions and technical requirements for the introduction of management, management and technical operator measures in accordance with international requirements and good operator practice.
4. In order to ensure the safe operation of the logistics warehouses dealing with the storage of dangerous substances and goods already in operation, I determined the technical compliance requirements of the fire water pollution risk analysis and the technical compliance requirements of the warehouses, based on which I proposed the a system of procedural and technical criteria that can be used for self-monitoring.

RECOMMENDATIONS

1. I propose to use the study examining the situation and possibilities of the adaptation of the international extinguishing water pollution regulation in Hungary in the elaboration of the Hungarian legal and technical founding documents.
2. A study of the consequences, effects and possible sequence of accidental contamination caused by the storage of dangerous substances and goods in hazardous activities can be used to prepare the relevant pool of operators and disaster management experts.
3. The fire-fighting water pollution guidelines used in Germany can be used - in accordance with the Hungarian fire prevention specifications - in the development of the Hungarian fire protection technical guidelines.

4. I propose to use the evaluation of the Hungarian legal, institutional, procedural and instrumental system related to the storage of dangerous substances and goods to establish the legal regulatory conditions and technical requirements for management, management and technical operator activities related to the collection and storage of extinguishing water.

THE PRACTICAL APPLICABILITY OF RESEARCH RESULTS

1. The Guideline for the Prevention of Extinguishing Water Pollution may be used to develop procedures and methodologies for domestic law, institutions and tools, and to define technical requirements for the collection, storage and treatment of specific contaminated extinguishing water.

2. A study on the storage situation of dangerous substances and goods may be used to develop relevant legislation or a technical directive on fire protection.

3. The dissertation can be used to establish the implementation of the tasks of the operator of fire water pollution prevention, to define the topics of the trainings, exercises and preparations and to develop the drainage plans.

4. My dissertation can be used as a professional teaching aid in higher education in disaster management, especially in the undergraduate and master's programs of the National Institute of Disaster Management, as well as in the adult education of the Disaster Management Education Center. to establish the legal conditions and technical requirements for the opening, management and operation of technical operators.

LIST OF PUBLICATIONS PREPARED BY THE PHD CANDIDATE

REVIEWED BOOK, APPLICATION, NOTE (ALSO ON-LINE)

Book chapter

- [1] Hoffmann Imre, Kátai-Urbán Maxim: A raktárcsarnokkal szemben támasztott biztonsági követelmények. In: Hábermayer, Tamás (szerk.) *Katasztrófák, kockázatok, önkéntesek*. Szekszárd, Magyarország: Tolna Megyei Katasztrófavédelmi Igazgatóság, (2020) pp. 80-86., 7 p.

ARTICLES REVIEWED AND SELECTED FROM PROFESSIONAL PERIODICALS (ON-LINE AS WELL)

In periodicals published in foreign language

- [2] Kátai-Urbán Maxim: Safety of Dangerous Goods Logistics Warehouses. *MŰSZAKI KATONAI KÖZLÖNY* 29 : 3 pp. 119-129., 11 p. (2019)

- [3] Kátai-Urbán Maxim: Managing the Environmental Risks of Dangerous Goods Warehouses. HADMÉRNÖK 15 : 4 pp. 89-96., 8 p. (2020)
- [4] Kátai-Urbán Maxim: Examination of Firewater Pollution Prevention Regulation in Hungary HADMÉRNÖK 17 : 4 pp. 1-9., 9 p. (2022) Under publication

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- [5] Kátai-Urbán Maxim; Cimer Zsolt, Lévai Zoltán: Az oltóvízzel történő szennyezés megelőzésével kapcsolatos nemzetközi szabályozás vizsgálata – I. rész. Hadtudomány: A Magyar Hadtudományi Társaság Folyóirata 10 : E-szám pp. 1-10. (2019)
- [6] Kátai-Urbán Maxim; Cimer Zsolt, Lévai Zoltán: Az oltóvízzel történő szennyezés megelőzésével kapcsolatos nemzetközi szabályozás vizsgálata – II. rész. Hadtudomány: A Magyar Hadtudományi Társaság Folyóirata 10 : E-szám pp. 31-44. (2019)
- [7] Bíró Tibor; Hoffmann Imre; Kátai-Urbán Maxim: oltóvíz felfogó és tároló létesítmények tervezése és létesítése német útmutató alapján HADMÉRNÖK 14 : 2 pp. 111-122., 14 p. (2019)
- [8] Kátai-Urbán Maxim: Veszélyes áru-raktárak környezeti kockázatainak kezelése – I. rész. KATONAI LOGISZTIKA XXVII. : 3. pp. 103-120., 18 p. (2019)
- [9] Kátai-Urbán Maxim: Veszélyes áru-raktárak környezeti kockázatainak kezelése – II. rész. KATONAI LOGISZTIKA XXVIII. 1 - 2. pp. 182-197., 16 p. (2020)

PRESENTATION PUBLISHED IN AN INTERNATIONAL PROFESSIONAL CONFERENCE DOCUMENT

Articles reviewed and selected from professional periodicals and written in foreign language

- [10] Kátai-Urbán, Maxim ; Hoffmann, Imre; Bíró, Tibor: ОБЕСПЕЧЕНИЕ БЕЗОПАСНОСТИ ЛОГИСТИЧЕСКИХ КОМПЛЕКСОВ В ВЕНГРИИ. In: двадцать восьмой международной научно-технической конференции “СИСТЕМЫ БЕЗОПАСНОСТИ – 2019” : PROCEEDINGS of Twenty Eighth International Scientific-Technical Conference “SAFETY SYSTEMS – 2019” (2019) pp. 323-326. , 4 p.

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Lecture in Hungarian

- [11] Kátai-Urbán Maxim, Cimer Zsolt: A veszélyes anyagokat tároló raktáracsarnokok tervezésének tűzvédelmi és iparbiztonsági aspektusai. In: Hábermayer, Tamás (szerk.) II. Iparbiztonsági és Hatósági Szakmai Nap: Tolna Megyei Katasztrófavédelmi Igazgatóság, 2021. szeptember 02. pp. 55-61., 7 p.

THE DOCTORAL CANDIDATE'S PROFESSIONAL AND ACADEMIC BIOGRAPHY

Name: Capt. Kátai-Urbán Maxim

Place and date of birth: Budapest, 10 May 1992

Studies:

In 2016, he graduated from the NKE in the field of industrial safety with a bachelor's degree in disaster management, and in 2018 with a master's degree in disaster management.

Professional career:

2013-2015 He was the desk officer of the North Pest Disaster Management Office for the Disaster Management Directorate of the Budapest. After that, he became the Chief desk officer of the Pest County Disaster Management Directorate at the Authority Department.

Language skills:

He has advanced (C1) advanced language examinations in English, German and Russian, and intermediate advanced language examinations in Serbian. In addition, he has taken an advanced (C1) complex language exam in Russian supplemented with a language of economics, as well as an advanced language exam at the Pushkin Russian State Institute in Moscow.

Education:

He has completed a dangerous goods advisor course, a comprehensive radiation protection course and an ICAO course for the transport of dangerous goods by air. He graduated from the Mobile Laboratory for Disaster Management and the Course in Industrial Risk and Consequence Analysis.

Scientific activity:

In 2015, he won first place in the Disaster Management Department at the National Scientific Student Conference.

Budapest, June 25, 2022.



Maxim Kátai-Urbán