

Maxim Kátai-Urbán¹

Examination of the Firewater Pollution Prevention Regulation in Hungary

Major accidents involving dangerous substances endanger human health and the environment. Due to major industrial accidents in dangerous establishments, the contaminated firewater can cause significant environmental damage if it enters surface and groundwater or the soil. In the present study, the author examines the requirements of the Hungarian disaster management, environmental protection and water quality protection regulations applied for the prevention of the environmental effects of industrial accidents.

Keywords: industrial accidents, environmental impact, dangerous establishment, firewater pollution prevention, Hungary

1. Introduction

Industrial pollution prevention research aims to improve the industrial and environmental safety conditions, legal and technical requirements for the storage of dangerous substances. Part of the practical studies focus on analyses of the legal, institutional and enforcement systems aiming prevention, preparedness, mitigation and recovery of accidental water pollution events caused by non-operational accidents.

Major accidents involving the release of dangerous substances in dangerous establishments can cause significant environmental damage if contaminated firewater enters into surface water, groundwater or the soil.

The topic of this article focuses on the research of the border areas of environmental protection, water protection and industrial safety, in which the common research field is accidental water pollution prevention.

The most significant international organisation for preparing a regulatory framework is the United Nation Economic Commission for Europe (hereinafter referred to as: UN ECE). The scientifically appropriate solution of the research problem is the

¹ PhD student, University of Public Service, Doctoral School of Military Engineering, e-mail: maxim.katai-urban@katved.gov.hu

domestic application of the recommendations of the methodological guide entitled *Safety Guidelines and Good Practices for the Management and Retention of Firefighting Water* (hereinafter: Safety Guidelines) developed by the UN ECE.² The above mentioned regulation also appears in the internal environmental protection regulation of the European Union. Appendix II of the *Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC* (hereinafter: Seveso III Directive) specifies the requirements regarding the content of safety reports, where in Point 5 prescribes that emergency retention vessels and fire water retention facilities should also be installed at dangerous establishments.

In the present research, the author will apply as a research method the analysis of the current disaster management, environmental protection and water quality protection legal regulations, as well as will evaluate in a comprehensive way the law enforcement experience of operators of dangerous establishments involving dangerous substances.

2. Comprehensive analyses of the disaster management regulation

The disaster management regulations concerning accidental water pollution in dangerous establishments are mostly based on the legal regulations dealing with the prevention of major accidents involving dangerous substances and the fire prevention regulations as well.

2.1. Examination of major-accident prevention emergency planning regulations

The content requirements for the safety reporting documentation set out in the Seveso III Directive have generally been incorporated into Hungarian law. The implementation regulations of the Seveso III Directive in Hungary are:

- *Act CXXVIII of 2011 on disaster management and the amendment of certain related laws*
- *Government Decree 219/2011 (X. 20.) on the prevention of major-accident hazards involving dangerous substances* (hereinafter: Gov. Decree)

These regulations can also be named major-accident regulations.

The major-accident regulations unfortunately only partly contain specific prevention and mitigation provisions related to the collection and retention of contaminated firewater. Annex II of the Seveso III Directive deals with the content requirements of the safety report. In paragraph 5 (a) of Annex II, the term "fire water retention" is mentioned. Unfortunately this vital term was omitted from paragraph 1.7. (e) of

² UN Economic Commission for Europe, *Safety Guidelines and Good Practices for the Management and Retention of Firefighting Water* (Geneva: United Nations, 2019).

Annex III Gov. Decree. Therefore, there are no specific requirements in the Hungarian regulations regarding the installation and use of fire water pollution retention facilities.

In accordance with Section 19 (1) Gov. Decree, the operator of a dangerous establishment dealing with dangerous substances shall prepare an internal emergency plan in order to eliminate the consequences of the hazards specified in the safety report and analysis. An internal emergency plan sets out the procedures, personnel and technical conditions to be applied in the event of a major accident falling within the scope of the major-accident regulations.

In line with the content requirements of the safety report, it shall include a description of the process for assessing the risk of a major accident involving dangerous substances. Paragraph 1.6 of Annex III Gov. Decree determines that the safety report shall contain the assessment of the consequences of a major accident involving identified dangerous substances, as well as the presentation and assessment of possible domino effects and their consequences. Analysing the domestic regulations, it can be stated that the adverse effects of possible major accident scenarios do not include environmental impacts, in particular on soil or surface water and groundwater. However, section 1.7. of Annex VII Gov. Decree contains the acceptance of qualitative conditions for major-accident hazards involving an environmental impact set out in Table 1.

Table 1: Acceptance conditions for major-accident hazards involving an environmental impact

Source: Section 1.7. of Annex VII Gov. Decree.

Condition	Technical requirements of the regulation
Development of manufacturing, processing or storage technology	The technical design of the technology guarantees the limitation of the amount of environmentally dangerous substances released into the environment.
Technology regulations	Technological regulations are in place to collect, decontaminate and dispose of the dangerous substance realised into the surrounding environment.
Conditions for damage control	The material, technical and personal conditions of the environmental remediation procedures are ensured.
Preparing and practicing of the personnel	The plant's response organisation is prepared to perform environmental remediation tasks and carries out these tasks regularly as planned.

It can be concluded that the content requirements of the safety documentation must be adapted to the acceptance of technical requirements of an environmental impact. In this case the analysis of the consequences of environmental effects, the introduction of remediation, decontamination and disposal measures as well as the personal and technical conditions of the application of response measures must be taken into consideration.

The prevention of major accidents requires cooperation between the large number of organisations involved in protection, as "this requires continuous and timely

exchange of information and synchronisation of tasks in time and space to avoid parallel (and thus redundant) work of partners".³

2.2. Examination of fire prevention regulations

Based on the Safety Guidelines, it is recommended to develop a fire prevention concept regulating the construction and use of dangerous facilities dealing with dangerous substances. The concept applies primarily to manufacturing, processing and storage facilities in the manufacturing industry.

The Ministry of the Interior Decree 54/2014 (XII. 5.) on National Fire Protection Regulations (hereinafter: NFPR) contains the most important requirements for the design of storage facilities, which are typical for logistics warehouses dealing with dangerous goods.⁴

The most important specifications are:

- the fire protection requirements of the materials and structures belonging to the relevant risk class that can be installed during construction
- the fire distance
- the floor area of the storage fire sections
- the obligation to install fire alarm and fire extinguishing equipment
- the required amount of extinguishing water
- the obligation to install a wall fire hydrant and the required water
- the requirements for heat and smoke extraction
- the requirements for installing a fission opening surface
- the requirements for electrical equipment and lightning protection
- the regulation on safety lighting and safety signals
- rules of use related to storage and the requirements for firefighting routes
- the rules applied for the use of flammable liquids and gases

The introduction of mitigation measures during the design of firewater prevention systems may also be a part of the fire prevention concept.

These measures can be, for example, the following:

- When using the built-in fire protection systems, the gas-extinguishing or water-mist extinguishing equipment has a new and modern water-saving and firewater damage prevention role.⁵
- When designing dangerous goods logistics warehouses, the use of special non-aqueous extinguishing agents (such as gas extinguishing equipment) does not normally require an extinguishing water retention device. However,

³ Tamás Berek, László Földi and József Padányi, 'The Structure and Main Elements of Disaster Management System of the Hungarian Defence Forces, with Special Regard to the Development of International Cooperation', *AARMS* 19, no 1 (2020), 17–26.

⁴ Gergő Erces and Gyula Vass, 'Veszélyes ipari üzemek tűzvédelme ipari üzemek fenntartható tűzbiztonságának fejlesztési lehetőségei a komplex tűzvédelem tekintetében', *Műszaki Katonai Közlöny* 28, no 4 (2018), 2–22.

⁵ Rajmund Kuti and László Földi, 'A beépített vízköddel oltó rendszerek újabb alkalmazási lehetőségeinek feltárása', *Hadmérnök* 3, no 2 (2008), 60–66.

it is recommended to plan a limited capacity (20%, but maximum amount of 20 m³) of firewater retention facility.⁶

The NFPR contains provisions defining the required level of safety, while its fulfilment can be achieved by using the technical solutions, calculation methods and designer-certified solutions regulated by the Fire Protection Technical Guidelines.⁷

Based on the analysis, it can be concluded that the requirements of the fire prevention regulations can significantly affect the effectiveness of the application of the fire water pollution prevention regulations.

3. Evaluation of the environment and water quality protection regulation

One of the most important areas of environmental protection legislation developed on the European model is the protection of surface and groundwater, and soil (protection of water quality). In this content, we distinguish between environmental and water operator's obligations.

3.1. Examination of the environment protection regulation

In line with *Government Decree 314/2005 (XII. 25.) on the environmental impact assessment and the unified environmental use permit procedure*, the environmental protection authority issues an environmental use permit for the activities covered by this decree. The procedure is based on the obligation to carry out an environmental impact assessment procedure. Among the content requirements concerning the preparation of the environmental impact study, we can find an obligation to present and evaluate possible major accident scenarios that may cause environmental impact, the possibilities of failures, and the resulting factors.

With regard to the estimation of the expected direct and indirect effects on the environment, the extent of the risk of major accidents shall be presented, in particular with regard to the dangerous substances and the technology used. The quantitative risk analysis procedure can be performed according to internationally used guidelines and methodologies.⁸

Permit application of the operator of the planned activity shall include the determination of the impact area.⁹ The operator shall also take into account the possible effects of major accidents of dangerous establishments situated nearby the

⁶ György Sárosi, *Veszélyes áru raktárlogisztika – korszerű követelmények* (Budapest: Complex Kiadó, 2006), 25.

⁷ László Bérczi and Csaba Badonszki, 'A tűzvédelmi tervezés fő tartópillérei: a tűzvédelmi műszaki irányelvek', *Védelem Tudomány* 6, no 2 (2021), 66–96.

⁸ Ministry for Housing, Spatial Planning and the Environment, *Guidelines for quantitative risk assessment – CPR 18E* (The Hague: VROM, PGS 3, October 1997).

⁹ Zsolt Cimer and Béla Szakál, 'Control of major-accidents involving dangerous substances relating to combined terminals', *Science for Population Protection* 7, no 1 (2015), 1–11.

examined facility. In accordance with the major-accident regulation, the operator of the facility is obliged to evaluate the extent of the endangered area.¹⁰

The territorially competent regional body of disaster management participates in the environment impact assessment procedure as a specialised authority.

In accordance with Table 9 Annex I of *Government Decree 531/2017 (XII. 29.) on the designation of specialised authorities acting on overriding reasons in the public interest* the designated Regional Disaster Management Directorates act in environmental and nature protection authority matters as water management and water protection specialised authority.

The water management and water protection specialised authority examines among others:

- whether the water supply of the activity, drainage of the generated rainwater and wastewater is ensured
- whether the requirements specified in the legislation or authority decision on the protection and deterioration of the quality and quantity of surface and groundwater can be enforced

3.2. Investigation of the water quality regulation

The procedure for the prevention and remediation of environmental damage in water quality is regulated by *Government Decree 90/2007 (IV. 26.) on procedures for the prevention and remedying of environmental damage* (hereinafter: Environment Remediation Decree) with regard to groundwater and surface water as environmental elements, taking into account the environmental and nature protection requirements.

The use of the environment must be carried out in such a way as to exclude, inter alia, environmental damage. It is the responsibility and obligation of the operator to carry out the loss prevention and remediation activities. The guidance document used in the United Kingdom can provide a good example of how to perform these relevant tasks.¹¹

In the course of loss prevention activities, damage to other environmental elements (soil, air, wildlife, surface water, built environment) must be prevented and when the environment is endangered, it is necessary to minimise the impact on the environment. In case of pollution of surface and groundwater, the location, nature and extent of the environmental damage shall be identified and notified to the territorial water authority and the territorial water directorate.

Operators are obliged to cooperate with water management and environmental protection state bodies in preparing for remediation activities. The territorial water management bodies are obliged to prepare a so-called territorial damage management plan. The economic organisations (operators) are obliged to prepare an operational damage prevention plan for the activities listed in Annex II of the Environment Remediation Decree.

¹⁰ Béla Szakál and Zsolt Cimer, 'Major Disaster Recovery Plans', *Science for Population Protection* 6, no 1 (2014), 1–7.

¹¹ Environment Protection Agency, *Managing Fire Water and Major Spillages*: PPG18.

The territorial and operational plan is approved by the environmental protection authority with the assistance of the water protection authority.

Government Decree 366/2015 (XII. 2.) on the designation of bodies performing water protection administrative tasks and amending certain government decrees on water issues designate the Disaster Management Directorates to implement the water protection authority's tasks prescribed in the Environment Remediation Decree.

The Environment Remediation Decree regulates, inter alia, the stockpiling of remedial materials and equipment, the recording of data, the applied remedial practices, the detection and classification of environmental damage, the operational management of remediation implementation and the readiness of remediation.

When examining the submitted damage prevention plans, the competent authority checks whether the documentation complies with the content requirements specified in the Environment Remediation Decree.

3.3. Assessment of the operator's experience on law enforcement for water pollution prevention

In the course of evaluating the water pollution prevention regulation, the author finds detailed requirements for the retention of liquid dangerous substances, and a detailed analysis of the consequences on air. However, the major-accident scenarios of dangerous substances discharges developed on the basis of the consequence analysis, the related operator's internal emergency plans in most cases do not include a description of firewater pollution events. If they did include such scenarios, we can only come across quality measures based on discharges of minor quantity dangerous substances. Unfortunately I could not find quantitative accident scenarios for firewater pollution events. This is especially true for logistics warehouses, where in almost all cases operators analyse the air pollutant effects of toxic combustion products. Most measures to protect the environment are related with the neutralisation of small amounts of discharged liquid substances with absorbent materials, soaking in sand, and of course collection and storage as hazardous waste.

It can therefore be concluded that the introduction of firewater pollution prevention measures is lacking in the majority of operators emergency planning practice.

Among the dangerous establishment, logistics warehouses can be singled out in terms of preventing environmental damage, in connection with that, the following general conclusions can be made:

1. Storage activities at the warehouses of operators dealing with dangerous substances may be subject to major-accident prevention, fire prevention, water quality damage prevention and environmental protection regulations on the basis of the quantitative and qualitative properties of the dangerous substances present and the nature of the technology used at economic activity.

2. Specific regulations related to the retention of contaminated firewater in warehouses shall include requirements on risk and consequence analysis procedure, installation and usage rules, and also content requirements for the preparation of the

operator's safety documentation, furthermore prescriptions for the implementation of internal and external emergency measures.

4. Conclusions

In the present study, the author made the following detailed findings based on an examination of the legal requirements of disaster management and environmental protection regulation for the prevention of the environmental effects of industrial accidents:

1. Major accident regulations deal with the mitigation measures only in a general way, where there is no specific provision for the retention of contaminated firewater.

2. It can be stated that the majority of accidents involving a release of a dangerous substance and requiring intervention in the field of disaster management are in most cases fire events, which could have a dangerous impact not only on the air but also on the surface and groundwater.

3. In the form of quality requirements in the major-accidents regulation, there are only qualitative requirements for the acceptability of the risk of major accidents involving environmental damages.

4. One of the decisive bases for the installation and usage of dangerous goods storage facilities – from the point of view of disaster management – is the fire prevention concept. The amount of firewater and extinguishing agent is determined by the efficiency of the fire alarm system, the type of fire extinguishing equipment installed, and the amount of firewater used.

5. The National Fire Protection Regulations does not yet have an industrial and logistics chapter dealing with the handling and storing of dangerous substances or goods.

6. In the field of prevention and remediation of environmental impacts on water quality, the preparation and application of operators remediation plans based on the Environment Remediation Decree have a decisive role.

7. Investigation of pollution issues with firewater is not currently addressed by water protection authorities due to the lack of enforceability of a specific legal requirement.

8. The main lesson is that most of the dangerous establishments are prepared for the release and localisation of small amounts of dangerous substances. In storage warehousing facilities, the floor itself serves as a remediation tool. The amount of firewater is unfortunately not quantified.

9. It is necessary to provide training in the field of industrial pollution prevention in Hungarian industrial safety higher education, as well as in the traditional fields of activity of industrial safety.¹²

¹² Gyula Vass, 'Industrial Safety Training in Disaster Management Higher Education in Hungary', *Pozhary i Chrezvychnye Situacii: Predotvrashenie Likvidacia* 8, no 2 (2017), 80–84.

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