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## INDUSTRIAL SAFETY AND HIGHER EDUCATION (IPARBIZTONSÁG ÉS A FELSŐOKTATÁS)

*As a result of the appearance of New Disaster Management Regulations in the year of 2012, a unified Industrial Safety Authoritative and Supervision System was set fully operational on national, regional and local levels. Beyond the supervision of hazardous activities and the carriage of hazardous goods, there is also appeared the disaster management tasks of the authorities linked with the critical infrastructure elements, and also for the nuclear emergency management. Based on general overview of the legal regulations, in this paper we will review the higher educational system of industrial safety created at the National University for Public Safety.*

**Keywords:** industrial accidents; dangerous goods; disaster management, critical infrastructure protection, nuclear emergency

*A 2012. évi új katasztrófavédelmi szabályozás megjelenésével országos, területi és helyi szinten is megkezdte működését az iparbiztonsági hatósági és felügyeleti rendszer. A veszélyes tevékenységek felügyeletén túl megvalósult a veszélyes áruszállítás ellenőrzése, továbbá a létfontosságú rendszerek és létesítmények védelemével és a nukleáris baleset-elhárítással kapcsolatos katasztrófavédelmi feladatok végrehajtása. A hazai szabályozás általános vizsgálatát követően a szerzők a Nemzeti Közszolgálati Egyetemen létrehozott iparbiztonsági felsőoktatási képzést fogják vizsgálni.*

**Kulcsszavak:** ipari balesetek; veszélyes áru; katasztrófavédelem, kritikus infrastruktúra védelem, nukleáris esemény.

## INTRODUCTION

Development of regulation of industrial safety in the disaster management system has almost a 20 years history in Hungary. Regulation of industrial safety is mainly based on the legal, institute and task system for protection against major accidents involving dangerous substances. Namely, these regulations form one of the most important branch of the industrial safety management. The protection system for defence against major industrial accidents involving dangerous substances was established by enacting the first act on disaster management in 1999.

After establishing the supervision of the dangerous industrial establishments, the disaster management has begun performing his tasks concerning control of road transport of dangerous goods in 2001. Preparations have started in 2008 to also perform the disaster

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management tasks in relation to the vital system elements, and the related specific legislation and institute development activities turned to full strength after codification of the laws in 2012.

The fourth and not less important element of control of the industrial safety is performing the disaster management tasks of the nuclear accident prevention, what became part of the industrial safety activities of disaster management after examination of the experiences of dispensation of justice of the second act on disaster management. [1]

The authors of this article will overview and analyze the elements of industrial safety in Hungarian and as well as the related higher education system.

## SUPERVISION OF DANGEROUS ESTABLISHMENTS

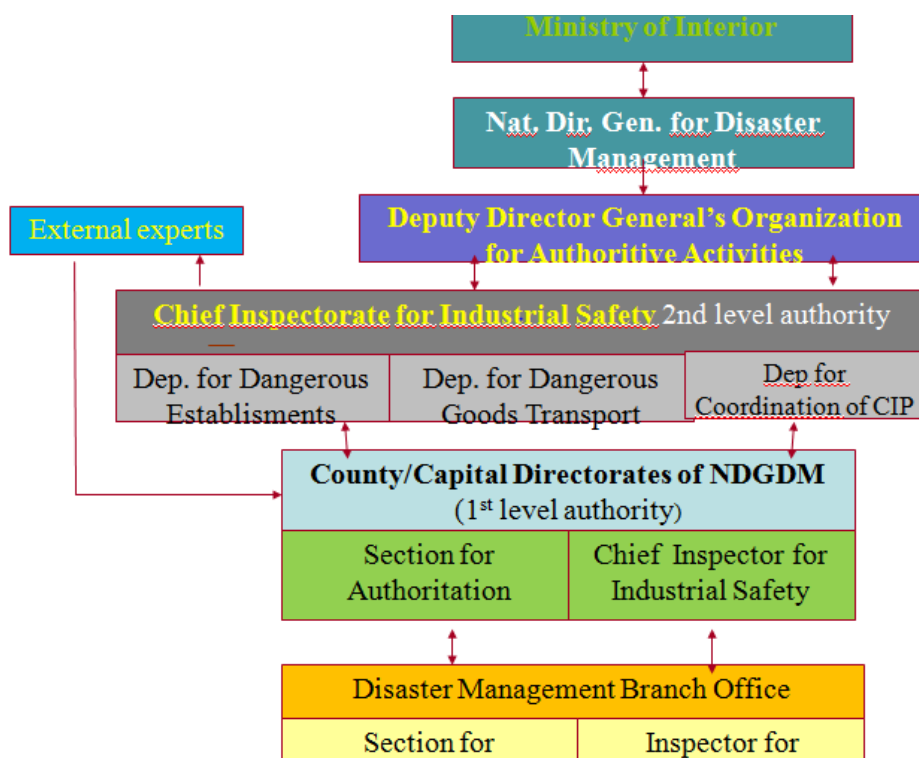
In order to prevent the major industrial accidents involving dangerous substances, to reduce the harmful consequences to the environment and health, and to protect people at a high level, the countries of the European Community enacted the Seveso II Directive of the committee on February 3, 1997. The Accident prevention and Inspection Department of the National Directorate General for Disaster Management (OKF) performed the licensing and authority control activities of the dangerous industrial establishments based on this directive and the approximated national laws.

A new branch was established in 2010 as a significant change: Industrial Safety. The extension of the professional, and authority and supervisory activities of the Industrial safety department happened in 2012, at the date of the independent industrial safety branch. The specialists of the Industrial safety department created the legal regulations and system of institutes that reach over the Seveso II Directive. The Industrial safety department coordinates the activities of four independent branches by managing dangerous establishments, dangerous transports, safety and inspection of vital systems and installations, and management of nuclear accidents. [2]

An independent and uniform industrial safety authority was established in Hungary. The old member countries of the EU were not operating a Seveso disaster management authority, what has quickly proven that handling the prevention and accident management activities by the same organization results in efficient and high level authority work. Using only one authority for performance of the Seveso tasks was also not typical.

The results of the Hungarian authority have proven to the sceptical parties clearly that there is no alternative to disaster management in the field of Seveso.

The Hungarian industrial safety authority ensures professional supervision of the dangerous establishments and activities by creation of the most up-to-date risk-based quantitative risk analysis aspect, by employment of highly trained authority specialists, and by systematic performance of the authority and supervision tasks.



**Figure 1: Structure for industrial safety” authority system for dangerous establishments, prepared by: Lajos Kátai-Urbán, source: NDGDM.**

Looking back to the history, BM OKF has introduced the Seveso II Directive in the Hungarian legislation back in 2001, and ensured the personnel and assets for performance of the tasks in relation to the directive during 2001-2003. The authority licensing and supervisory system has been operating since 2002. The stipulations of the Directive have been executed until the date of joining to the EU in May, 2004. An external emergency planning, public information, publicity and a community development system was in operation, among others.

The professional and international cooperation tasks of the Helsinki UN ECE Industrial Accident Convention were performed by BM OKF as a competent authority. The coordination with the representation organizations of the operators was continuous at an expert level. The operation of the Seveso defence working committee and establishment of the Molari system was also important. The authority methodology publications, the conferences, professional days and further education all supported ensuring the quality of the professional work. Evaluation of the major accident and incidents, and concluding the experiences determined the development of legal and institute system. The authority represented the interests of the country at the meetings of EU and international organizations. Organization of several EU and international events in Hungary, and involvement of Hungarian specialists in the international cooperation has generated significant level of acceptance to Hungary. [3]

The conditions of safe operation are guaranteed in case of 704 dangerous establishments in Hungary, supervised by the disaster management authorities.

Thanks to the legal regulations and institute development activities between 2010 and 2012, a more dynamic and strong industrial safety authority is operating in the disaster management organization since January 1, 2012. There were significant changes in the development of competences and tasks and scopes. The base of establishment of the new system of industrial safety task and tools was the dangerous establishment and transportation supervision activity operating at a high professional standard also acknowledged by the EU in 2010.

BM OKF has an industrial safety consulting committee and a higher level education institute since 2012 who perform establishment and support of the professional and scientific activities.

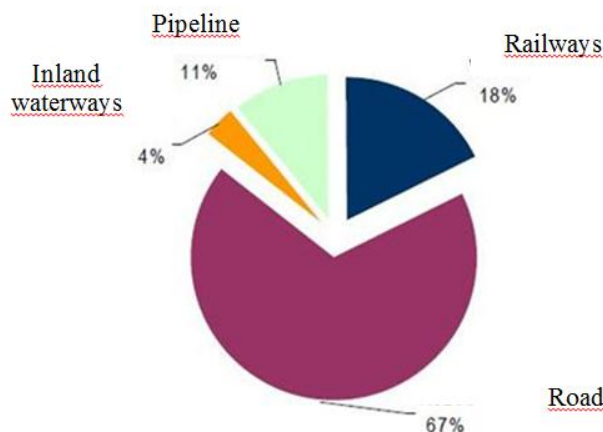
In summary we can state that the supervision of the dangerous establishments allows high level protection of the life and health, the environment and other assets in Hungary according to the requirements of the EU, the international organizations and the Hungarian Government, and it also promotes public safety in Hungary according to the Fundamental law.

## SUPERVISION OF DANGEROUS GOODS TRANSPORTATION

In Hungary the transport of dangerous goods mainly happens on main road and on rail. The track of transport in most cases leads through built-up area in which case the population is exposed to increased danger because of the quality of the transported dangerous substances. The main tracks are not only used for inland transport, but because of our geographical location also for the European transit traffic. In Hungary approximately 20% of railroad transport is dangerous goods transport. Its big advantage compared to main roads transport is a more economical transport of high quantity for a long distance. [4]

In Hungary in 2010 it meant 33700 million tonnes of km main road transport and 8800 million tonnes of km railway transport. Because 19–20% of Hungarian railway transport's capacity is dangerous goods transport, catastrophic situations cause a real problem and their solving requires careful preparation. [4]

In Hungary water transport is the less significant part of transport. The use of harbour infrastructure is low, their services are way below the European standard. For the safer and economical travel on the Danube its water path needs significant improvement. On the Hungarian part of the Danube's water path seven harbours are dangerous in putting goods. Hungary has approximately 1500-1600 km water path, which can be travelled by boat. On our main rivers there is also passenger- and goods transporting – the last takes up 5% of the national goods transporting.



**Figure 2. Share of goods transport capacity in Hungary (2011)**

Source: [www.ksh.hu](http://www.ksh.hu)

In the air transportation, two civil airports may receive and send dangerous goods. The airports have permission for service of terrestrial goods and for handling of dangerous goods. In 2011, the amount of dangerous goods arriving in Hungary was 3,9 tons, while the amount of dangerous goods departing from Hungary was 2,2 tons. In Hungary, volume of air transport is not outstanding within Europe: on our biggest airport there happened about 100 000 landing–take-off (LTO) events. Otherwise, the volume of this decreased permanently in the latest few years: from 2005 it relapsed by about 15%. Nevertheless it is stated as to be remarkable, so we have to get ready for a catastrophe originating from an airplane crash. [4]

According to the Hungarian State Bureau of Statistics it can be stated in 2011, that the share of main road goods transport (67%) is still 3 times more than the share of railway transport (18%). The share of the transportation by inland waterways is about 4 %, and the pipeline transportation is 11 %.

There is a difference of opinion among experts as to whether the rail or road transport of hazardous goods represents a higher degree of danger for those living in the area concerned. In terms of transport mode's preferences there are no special transportation authority measures or provisions in the territory of the EU member states.

In general it can be stated that it is mainly economical and logistic considerations that play a role in the selection of individual transportation modes. However it is sure that in case of the transportation of significant volumes over a long distance (more than 200 km) rail transportation services and facilities are preferred. [2]

The main road transport of dangerous goods is strictly restricted by judiciary norms. This judiciary norm the „ European Agreement concerning the international carriage of dangerous goods by road” is an international agreement, ADR in its common name, which is a measure since 1972 since its naturalisation. The current measure taking The European Agreement according to the transport of dangerous goods (hereinafter: ADR) with A and B appendix into the national rule of law creates the 2013 year CX. Act. The second most common way of transporting dangerous goods is railway transport, which is controlled by the 2013 year LXXX. Act which is an organic structure of the “Regulation concerning the International Carriage of Dangerous Goods by Rail” (hereinafter: RID), which is annex “C” to the

Convention concerning International Carriage by Rail (COTIF) C, and which was concluded on June 3, 1999 in Vilnius. The water transport of dangerous goods is controlled by the 2013 year CXI. Act according to the European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (hereinafter: ADN). The air transport is controlled by the 2007 year XLVI. Act (ICAO) according to the agreement on international civil flight signed in December 7th 1944 (Chicago Convention). The provisions of ADN, ADR and RID are similar and contain cross-references.

The tasks of the disaster management authority related to the transportation of dangerous goods are completed in line with the Hungarian and international legal regulations. The ADR authority inspections and fining tasks are within the competence of disaster management organizations since 2001. Simultaneously with the reorganization of disaster management effected on January 1, 2012 new tasks have been delegated to the disaster management authority as well. The inspection and fining of rail and water transport is within the competence of the disaster management authority. On the side of co-authorities the competent organizations of the National Transportation Authority, the National Tax and Excise Bureau, the National Police Office is participated in the inspections activities.

Since 2012, disaster management has been authorised by law to check dangerous goods transport by air, but it is only since Hungary adopted ICAO Technical Instructions on 1 January 2015 (containing detailed rules on dangerous goods transport by air) that breaches can be sanctioned.

Manuals on the inspection of dangerous goods transport are prepared by working groups whose members are experts and inspectorate generals from regional bodies. The manual for all types of transport is already available for inspectors. The training for the dangerous goods is provided by the Disaster Management Training Center. It is also requested that dangerous goods advisors (DGA) certificate is obtained by authority chief inspectors. The graduates of the Institute of Disaster Management for the National University of Public Service are entitled to the supervision of dangerous goods road transportation. [1]

## CRITICAL INFRASTRUCTURE PROTECTION – TASKS OF DISASTER MANAGEMENT

The document of the European Council adopted in December 2004, the proposal regarding the preparation of the European Program for Critical Infrastructure Protection (EPCIP) can be regarded as the first significant milestone of the legal background of the EU pertaining to the protection of critical infrastructure.

Then, in November 2005 the European Commission issued the so-called Green Book on the protection of critical infrastructure, where the basic definitions, statements, processes and codes of procedures that can be regarded as the basis of the future legal regulations are specified. Within a short time the legal regulation of the EU on the identification and selection of critical infrastructure in Europe and on the evaluation of the necessity of the improvement of their protection was adopted (the directive 2008/1145/EC, hereinafter: Directive). The Directive, mainly on the basis of the Green Book, in consideration of the specific features of

the individual branches and in line with the long-term political objectives of the EU has created the pool of procedures, tools and principles regarding the identification and selection of critical infrastructure. In addition to the Directive also a “non-mandatory guideline” has been issued with the purpose to make implementation easier by the detailed description of the tasks of member states.

*The objective of Act No. CLXVI./2012 on the identification of critical systems and installations, their selection and protection* (hereinafter: CIP act) following the line of regulations of the Directive is on one hand the identification of critical system elements, on the other hand the protection after the selection. The act took effect on March 1, 2013. In the CIP act fundamental relevant definitions are established: system element of national and European importance, operator, branch-related and horizontal criteria.

There is a separate code of procedure for the selection of system elements of national and European importance. In the act there are common rules in terms of national and European critical system elements, with regard to registration, data protection, inspection, the safety plan of the operator, the safety liaising person and sanctions. *The regulation No. 65/2013 (III.8) on the implementation of Act No. CLXVI./2012 on the identification of critical systems and installations, their selection and protection* . (hereinafter: implementing regulation) took effect on March 11, 2013. [5]

The implementing regulation, in addition to the provisions helping the legal application and not defined in the CIP act (see the definitions of identification, risk assessment) regulates also the identification of national critical system elements by the operator. Within the framework of the identification procedure the operator sends his identification report in line with the requirements stipulated in the legal regulation to the selecting authority responsible for the branch, which will convey it to the proposing authority responsible for the branch, for commenting. The proposing authority responsible for the branch concerned sends its proposals, after checking the report, to the selecting authority.

The selecting authority responsible for the branch, in view of the standpoint of the competent professional disaster management organization, makes a decision in a resolution about the selection of a system element of national or European importance. The precondition of the selection is that the occurrence of at least one of the branch-related and horizontal criteria each is possible. The resolution about the selection, in addition to the approval of the identification report, also determines the selection, the registration of the system element selected, the obligation to prepare the operator’s safety plan and the employment of the safety liaising person and can furthermore determine other conditions in order to protect the critical system element.

With regard to the qualifications required of the safety liaising person in the implementing regulation technical, defense management, disaster management and police management qualifications are preferred. In the act also the requirements of the operator’s safety plan, the individual rules of the inspection, and the general rules of procedure to be followed in case of extraordinary events, and the amount of the public administration fine that can be imposed on the operator are specified.

The first time when the operator has to submit the identification report is within 180 days as of the effective date of the implementing regulation.

In the CIP regulation, in the field of the protection of critical infrastructure, the primary scopes of responsibility of the minister (minister of the interior) being responsible for protection against disasters are defined as follows:

- tasks of the special authority in case of all sectors, in order to examine horizontal criteria - CIP act Impl. reg. 4§ (2), 13§ (1);
- CIP registration authority - CIP act. Impl. reg. 12§ (1);
- proposing authority in case of the sector within its scope of tasks - CIP act Impl. reg. 3§;
- coordination of authority inspections - CIP act. Impl. reg. 8§ 13§ (3);
- Operation of a CIP Information Security Event Management Center in order to respond to events related to network safety - CIP act. Impl. reg. 10§;
- management of extraordinary events - CIP act. Impl. reg. 11§ (6);
- CIP POC tasks, Act on Disaster Management's Impl. reg. [6]

For so-called coordinated inspections and for the registration of European and national critical system elements the central organization of the professional disaster management organization was given authorization. With regard to the empowering provisions of the CIP act the particular rules related to the identification, selection and authority inspection branches and the branch-related criteria are specified in separate government regulations for each individual branch. [6]

## DISASTER MANAGEMENT'S TASKS IN NUCLEAR SAFETY

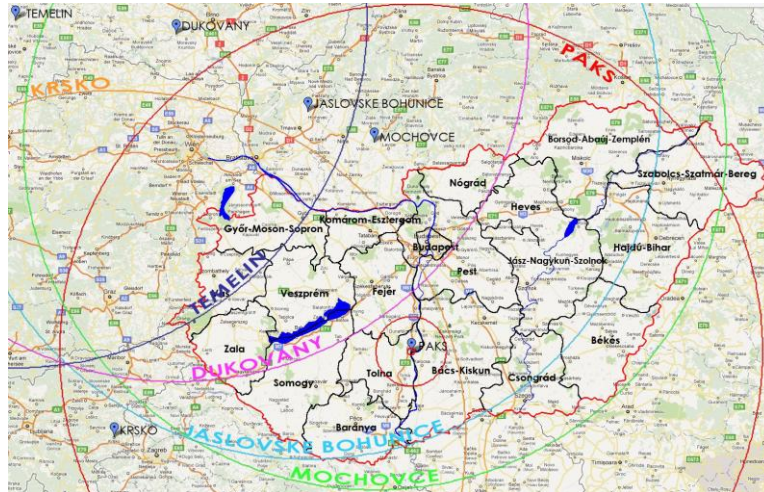
Activities dealing with radioactive substances can be divided in terms of industrial safety into two main groups: nuclear installations and isotope laboratories. In Hungary, the following facilities exist, which could release significant amount of radioactive material into the environment, during a nuclear or radiological accident:

- Paks Nuclear Power Plant (Paks NPP) with 4 reactor units supplying about 40% of the required electricity of the country; the units (1485 MW thermal power each) were set into operation in 1982, 1984, 1986 and 1987;
- Spent Fuel Interim Storage Facility, for interim storage of spent fuel rods produced throughout the lifetime of Paks NPP; operated since 1997;
- Budapest Research Reactor (10 MW thermal power); operated since 1959;
- Institute of Isotopes Co., producing different radioactive isotopes and other products for healthcare, research and industry applications; since 1993,
- Training Reactor of the Institute of Nuclear Techniques of the Budapest University of Technology and Economics (100 kW thermal power); since 1971 [6].

The most serious nuclear and radiological event happened in Hungary was a serious incident in Paks NPP in 2003 (radioactive release through chemical cleaning of spent fuel assemblies, Level 3 on International Nuclear Event Scale - INES) In Hungary, the system of preparedness, as all over the world, was boosted by the Chernobyl accident. The developed



National Nuclear Emergency Response System integrates all state, regional, local and facility level players as the subsystems of preparedness and response in order to cope with a nuclear or radiological accident of any kind and extent in Hungary. The national system is governed by the National Nuclear Emergency Preparedness and Response Plan, to and with which all the plans of the subsystems are adjusted and harmonized. The risks resulting from nuclear installations in Hungary can be characterized on the basis of the planning zones applied in response activities following nuclear accidents, as shown in the next map. [6]



**Figure 3. Nuclear hazards in Hungary [6]**

There is a Preventive Precautionary Zone marked in Hungary around the Paks Nuclear Power Plant only, this is an area with a radius of 3 km. There is an Urgent Precautionary Zone marked in Hungary around the Paks Nuclear Power Plant only, this is an area with a radius of 30 km and the KFKI site that includes the Budapest Research Reactor. The circles with a radius of 300 km around the Paks Nuclear Power Plant and around foreign nuclear power plants, that is the Precautionary Zone of Food Consumption Restrictions (ÉÓZ) cover practically the whole area of Hungary. Due to the location of nuclear power plants abroad their marked Preventive and Precautionary Zones do not reach Hungary.

Nuclear legislation in Hungary is based on the Act on Atomic Energy (Act CXVI of 1996) that came into force on 1 June 1997. The Act establishes the basis for the development of a legislative and regulatory system for the safe application of nuclear energy. The Act specifies that the tasks of control and surveillance of the safe application of nuclear energy are the responsibility of the Government.

The structure and functions of the National Nuclear Emergency Management System (hereinafter: NNEMS) is regulated by the Government Decree 167/2010. (V. 11.) Korm. and the establishment, organization and operation of the Inter-ministerial Disaster Management Coordination Committee is regulated by the Government Decision 1150/2012. (V. 15.).

The National Environmental Radiological Monitoring System (NERMS; in Hungarian: OKSER) consists of different ministries, authorities and special installations, whose responsibilities could be related to the different societal or economic aspects of the general use and protection against the ionizing radiation.

In Hungary a National Radiation Early Warning, Monitoring and Surveillance System (hereinafter: NREWMS) is operated for supporting the decision making activity of the governmental coordination body. The Minister of Interior coordinates the operation and controls the professional work of NREWMS. The central body of the NREWMS is the Nuclear Emergency Information and Analysis Centre (hereinafter: NEIAC) that carries out the central tasks of the country's radiological early warning and international radiological monitoring data exchange systems. Currently six subsystems operate altogether 132 gamma dose rate measuring stations and send their data to the national radiological monitoring centre, NEIAC. The Mobile Disaster Management Laboratories are the second subsystem of NREWMS. They detect, locate and analyse the contamination in case of a radiological emergency. The third subsystem of NREWMS is the network of fix laboratories that analyse the samples taken throughout the country (food, milk, soil, water, etc.). These measurements provide the basis of the long term countermeasures (grazing prohibition, restriction of food and water consumption, etc.).

The disaster management prepared plans for the evacuation, relocation and hosting of the whole population living in the urgent protective action zone. The technical device of the alarm is the Population Information and Alerting System installed in the 30 kilometre zone of the Paks NPP. The 227 modern population information-alert devices provide the possibility of alerting about 225.000 inhabitants of 74 settlements on 2800 square kilometre area. [6]

## HIGHER EDUCATION IN THE FIELD OF INDUSTRIAL SAFETY

The common goal of academic courses at the NUPS university is to socialize those preparing for a career in public service (law enforcement and defense administration) along identical base values, to lay the foundation for the mobilization during their career, and to make everyday cooperation among the different professions easier. The goal of the education at the department of disaster management is that graduates shall be able to carry out general prevention and authority tasks in the partial fields of general disaster management (prevention of disasters, organisation of response to disasters, restoration, preparation for civil protection) and of fire prevention and fire fighting, technical rescue, fire investigation, related preparation and primary disaster response activities, implementation of prevention and authority tasks related to industrial safety.

It is required from the graduates that they complete their special tasks independently, under the proper management, at the same time they shall also be eligible for being involved into the master-level course education and to be employed for managerial tasks after collecting adequate practical experience. [7]

The facultative specialisations of the basic course on disaster management are: disaster management operations, fire prevention and rescue control and industrial safety. The new full-time and correspondence course will be organised by the Institute of Disaster Management operating as an independent interfaculty institute at the university (NUPC). In line with the three specializations there are three specialized departments and a section in charge of educational organisation operating at the institution.

At the specialisation of industrial safety the students shall be informed about the contents of legal regulations, standards and authority regulations concerning the settlement and operation of dangerous establishments and the system of their practical application; the legal and authority regulations related to the various transportation routes of dangerous goods and the order of relevant authority procedures; national and international regulations related to critical infrastructure, and the safety requirements determining their operation.

Those graduating from the disaster management basic courses are eligible for: the application of law by the relevant professional authority; the tasks of the commander appointed for rescue management; cooperation with other stakeholder organisations. The graduates are, within the individual specialisations, eligible for the following special tasks at the specialisation industrial safety: the safety tasks related to the settlement and operation of dangerous establishments; the authority activities related to the transportation of dangerous goods; the tasks resulting from the protection of critical infrastructure.

At the specialisation industrial safety. Industrial safety, elimination of industrial emergencies; protection of critical infrastructure; activities related to dangerous substances; disaster management and civil protection; fire protection; technology of fire fighting and response to disasters; economic fundamentals of industrial safety, facultative subjects.

The precondition of the award of the degree is the completion of the professional practice (8 weeks) in equal parts after the 2nd and 4th semester is closed. Students spend the first part of the professional practice, in line with the specialization, at the professional disaster management and professional fire department organisations, while 2 weeks of the 2nd part shall be spent at an external (law enforcement, public administration or business) organisation, two weeks in a field selected by the student serving for the preparation for the thesis submitted for degree. [8]

## CONCLUSION

In our days it is especially important and a complex task at the same time to protect the public on high level. Industrial safety embraces four special fields in Hungary: the supervision of dangerous establishments, the control of the transportation of dangerous goods, the protection of critical infrastructure and the prevention of nuclear accidents. The Hungarian industrial safety authority as part of the Hungarian Disaster Management Organisation have been applied the European and international regulations regarding industrial safety. It also should also be stated that the Hungarian regulations and their appliance by the Hungarian industrial safety authority provide a high level of protection of human life and the environment in Hungary.

The community-level integration of the prevention of industrial accidents looks back to a history of more than two decades, the Seveso directive undergoes smaller or bigger modifications and getting stricter and stricter every five years. In line with the European integration activity and the international obligations of the country the Hungarian Parliament and government has prepared the regulations about the prevention of major industrial accidents. The effective date of the Hungarian regulation is January 1, 2002 and has been modified significantly two times (2006 and 2012). [1]

Transportation of dangerous goods is happening mostly on road but is getting more and more popular on railways, inland waterways and by air as well. International rules and regulations by the European Union of the different transportation methods have been integrated into the Hungarian legislation. EU regulations based on the international convention about the transportation of dangerous goods has been implemented to the Hungarian law system around the millennium. Disaster management authority has gained significant enforcement experiences on inspecting the transportation of dangerous goods.

The Hungarian regulations on the protection of critical systems and installations is a good basis for Hungary to report about taking serious steps in order to protect critical systems and installations, protecting the elements of infrastructure that are indispensable for vital social tasks, for healthcare, for safety, for economic and social welfare and elements of infrastructure that, in case of incidents, would result in serious consequences due to the loss of the continuity of these tasks.

By regulating the protection of critical infrastructure basic supply to the public, and the protection of those living in the vicinity of hazardous activities can also be guaranteed in an efficient way. The safety of the life and assets of the public, the continuity of public services of outstanding social significance and the more efficient completion of existing public tasks and public safety can be improved.

The development of the legal, institutional system and tools of disaster management in Hungary in 2012 resulted in the standardization of higher education at the National University of Public Service and the adaptation of disaster management to the new administration system and to the new tasks. In this article, after a short international outlook, the course to be launched at the new department of disaster management and at the specialization of disaster management was presented.

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