NATIONAL UNIVERSITY
OF PUBLIC SERVICE
Institute for Disaster Management

HANDBOOK

for the Implementation of the Basic Tasks of the Hungarian Regulation on „Industrial Safety”

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NATIONAL UNIVERSITY OF PUBLIC SERVICE
Institute for Disaster Management

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1.1 Introduction

Technological catastrophe demanded the most victims occurred in 1984 in course of an accident at the chemical plant of company Union Carbide in Bhopal (India). In consequence of a malfunction and failure, 40 tons of toxic methyl isocyanate cloud was released from the plant, resulting in 2500 deaths and additional 200 000 injuries.

Table 1, showing the rank of industrial accidents which demanded at least 5 casualties and occurred in the period of 1945-'91, justifies the importance of industrial safety as well.

Country	Number of accidents	Ranking by number of accidents	Number of deaths	Ranking by number of deaths	Number of deaths per accident	Ranking by severity
USA	144	1	2241	2	15,5	8
Japan	30	2	526	5	17,5	6
India	18	3	4430	1	246,1	1
German Federal Republic	18	3	158	10	8,8	10
Mexico	17	4	848	3	49,9	3
France	15	5	236	8	15,7	7
Italy	14	6	260	7	18,6	5
Brazil	13	7	815	4	62,7	2
China	13	7	454	6	34,9	4
United Kingdom	13	7	170	9	13,1	9

Table 1: Severity rank of fatal accidents (at least 5 deaths) by countries, 1945-1991. [1]

The situation in the field of industrial safety has not changed even to our days: in consequence of the industrial accident occurred in 1998 in Spain almost the entire fauna and flora of Coto Donana National Park died out. On 30 January 2000 a pollutant with cyanide content 800 times higher than the permitted one, spilled to the river "Lápos", then to the river "Szamos" and "Tisza", from the water clarifying plant of the Romanian-Australian company Aurul in Zazar (Romania). In consequence of the accident fauna and flora of the river "Tisza" got near to extinction.

On 13 May 2000 an explosion occurred in the firework factory near to Enschede (the Netherlands). The accident resulted in 21 deaths and more than 1000 injuries. The accident was the result of an organisational shortcoming, as it was established in the course of inspection. 21 persons died and 700 persons injured in the course of an explosion occurred in a fertilizer plant 3 kilometres far from Toulouse (France) on 21 September 2001. A crater with diameter of 50 meter developed in the plant. The accident is supposed to be retraceable to human failure.

1.2 Causes Of Major-Accidents

Hazardous industrial establishments, arising from their activities, always mean some kind of risks to the environment and people living there. Statistical analysis of the major-accidents occurred last decade indicates that the most frequent reasons for the industrial accidents are 'human errors' which are retraceable mainly to managerial shortcomings. Failures of technical and technological facilities, which can be retraced to human failures finally, as defects could be prevented with sufficient control, inspection and maintenance, contributed measurably to the occurrence of major-accidents.

Primary causes of industrial major-accidents are human error (50%), technical failure (24%), uncontrolled chemical reaction (10%), external factors (16%) [1].

The following conclusions can be drawn from the statistical analysis of the industrial major-accidents:
- even if the most qualified experts operate the most advanced equipments made by the best producers, incident failures may develop;
- though safety systems were designed and tested (under operative circumstances) on the basis of experiences of the past, they proved not to be efficient enough in case of certain accidents.

Aim of the operators and the various administrative bodies is to minimize the risks originating from the activities of hazardous industrial establishments, through application of various means. A really wide-range of means can be applied: the operator can for example substitute a dangerous substance for a less dangerous substance as means of risk minimization, or adopt various measures for prevention of major-accidents; or the authorities can specify various stipulations in its resolutions, or the drawing up of various emergency plans.

1.3 Major Industrial Accidents

Risks originating from the activities of the hazardous establishments can be retraced to several initiating events. There is need to analyse the consequences of potential accidents (incident failures) in terms of emergency planning and disaster management. Consequences of release of dangerous substances can be derived from the models presented below.

A dangerous substance can be released from a tank in the ways below:
- release of liquid from an atmospheric tanks;
- release of gas and/or liquid from a pressurized tank and technological equipment;
- release of gas and/or liquid from a pressurized pipeline [2].

Release of any dangerous gas or liquid (liquefied gas) for any reason may lead to development of a direct or indirect gas (vapour) cloud. The direct gas (vapour) cloud develops generally in consequence of release of gases. An indirect vapour cloud may develop, if the out-flowing liquid forms a pool. In case of direct or indirect release the substance shall gets into the air in its vicinity, and shall move depending on the weather conditions.

If a flammable gas or vapour gets into the air and there is an ignition source present in its direct vicinity, then it has to be considered that fire shall start, resulting in heat-load of the environment.

If ignition of the vapour of a flammable substance released is:

– immediate, and release occurs through a narrow hole, a jet fire develops;

– delayed, and the rate of combustion in the gas cloud is extremely high, it results in a gas cloud explosion;

– is caused by a distant ignition source, a deflagration occurs, which reversing may get to the outflow point and a fire ball may develop.

In case of release of dangerous liquids:

– if the liquid released spreads on the surface (forms a pool) in the vicinity of the tank (pipeline) and then ignite, a pool fire shall develop. When outflow of a liquid results in pool fire, it may take place in an area compassed with fire-barrier or without the presence thereof.

– if release of a dangerous liquid is consequence of heat-effect, then the liquid is supposed to be boiling in the tank and ignite immediately. In this case we talk about “boiling liquid expanding vapour explosion" (BLEVE), resulting in development of fireball.

– in course of the combustion of dangerous liquids, toxic combustion products may develop which – lifting for the effect of heat of combustion, and travelling for the effect of wind – may have a toxic effect far as well.

– in case of instantaneous release of a dangerous liquid, due to adiabatic expansion the temperature drops sharply. The temperature, in case of certain substances, can reach either -100°C at the initial point of release. In a situation like that, effect of the high cooling should be taken into account besides other dangerous effects.

– if the liquid released, does not form an explosive mixture with the air, or does not ignite, then the cloud shall disperse slowly in the surrounding air. In case of a cloud involving toxic substances – in a certain concentration – living beings are exposed to danger in the area contaminated by the cloud.

– In case of explosive substances (hereby release of the explosive substance is not a necessary condition), if the conditions of explosion are developed in the course of storage, transportation or processing, then an explosion occurs, the blast of which shall have a dangerous effect on man or may lead to another major-accident (domino effect).

The table below shows the possible ways and consequences of release of dangerous substances.

Accident sequence	Cause	Consequence
Jet fire	Immediate ignition of flammable	Heat load of the environment.
Unobstructed vapour cloud explosion (UVCE)	Delayed ignition of flammable vapours/gases releasing	Air blast.
Vapour cloud deflagration	Ignition of a flammable vapour/gas caused by distant ignition source.	Heat load of the environment, reverse burning to the source of release.
Pool fire (obstructed and unobstructed)	Dispersion of a flammable liquid on the	Heat load of the environment.
Boiling Liquid Expansive Vapour Explosion (BLEVE)	Vapour /gas explosion is caused by a boiling liquid.	Heat load of the environment, air blast, (fireball).
Dispersion of toxic cloud (primary, secondary)	Release of a vapour/gas from the tank, or evaporation of a liquid	Intoxication of man (animals), and environment.
Explosion of the entire explosive substance	Development of conditions of an	Air blast.

Table 2: Potential consequences [2]

1.4 Effects Of Major-Accidents

Accidents involving dangerous substances can lead to various hazards to human life and health. In most cases various kinds of dangerousness emerge at the same time. The following examples provide a general summary on consequences of the potential hazards.

HAZARDS	CONSEQUENCES
Explosion	Blast from explosion and projectiles, as well as high temperature.
Intoxication	Toxic substances can be inhaled or get into the body through skin.
Fire	Heat effect that may cause burn injuries.
Oxidation	Accelerates burning and may cause burn injuries.
Burning, irritation	Skin, eyes and mycoderm may be hurt due to contact with weak acids and bases.
Frost-bite	Release of deep-frozen liquids and pressurized gases may cause frost-bites.
Infection	Organism infection.
Anhelation	Inhalation of fumes and other gases may lead to state of anoxia.
Dangers to the environment	Risk of water, soil and air contamination.

Table 3: Consequences of the potential hazards [2]

Analysis of the major accidents occurred in the past justified that the population is basically exposed to four effects listed below:

Physical effect: Fires and uncontrolled chemical reactions can lead to explosion, the blast of which can damage buildings (broken windows, collapsed apparatuses, etc.), and may cause human injuries (rupture of the drum). In case of especially heavy explosions the projectiles may spread to hundreds of metres.

Heat effect: Accidents involving dangerous substances often lead to severe fires not only at the initial scene of the accident, but also far away from the initial scene of the accident, in consequence of the dispersion of flammable liquids and gases/ vapours. In case of severe fires, objects in the vicinity of the fire may ignite due to the heat-effect.

Potential effect on human health: burn injuries.

Intoxication: A toxic dangerous substance can get into human body in three ways: by inhalation, through the skin and by ingestion, generally with consuming contaminated foods.

Toxic substances released in accidents may travel several kilometres in the atmosphere. Danger zone may extend to several square kilometres, which in this way can be much larger than the area affected by physical effects, fire or heat-effects. The actual risk shall continue to exist till the gas cloud passes over the area (it takes usually a few hours). Sensation of various smells and gases, or burning of the mycoderms (eye, throat), or difficulties in breathing can be the first signs of release of pollutants. Not all the substances can be perceived by human sense organs. Consumption of plants contaminated by toxic substances may have serious effects on health.

Potential effect to human body: intoxication.

Contamination of the environment: Release of dangerous substances may lead to the contamination of soil, surface and underground waters. The dangerous vapour cloud may contaminate large areas through rain-out, and in consequence of bioaccumulation a dangerous substance may accumulate in the food chain. Time of decay for harmful effects can be very extended, until the contaminants are removed and clearing is carried out [3] [4].

References – Chapter 1.

[1] Kátai-Urbán Lajos (szerk.) Módszertani segédlet a veszélyes anyagokkal kapcsolatos súlyos ipari balesetek elleni védekezés területi és helyi feladatainak ellátásához: 116 p. (2005), BM Országos Katasztrófavédelmi Főigazgatóság

[2] Kátai-Urbán Lajos (szerk.) Ipari biztonsági kézikönyv a veszélyes anyagokkal kapcsolatos súlyos balesetek elleni védekezés szabályozás alkalmazásához. Budapest: KJK-KERSZÖV Jogi és Üzleti Kiadó Kft., 2003. (ISBN:963 224 716 7)

[3] Lajos Kátai-Urbán; József Solymosi: Overview of consequence modelling in process industry, ACADEMIC AND APPLIED RESEARCH IN MILITARY SCIENCE (ISSN: 1588-8789) 3: pp. 407-416. (2006)

[4] SZAKÁL BÉLA, CIMER ZSOLT, KÁTAI- URBÁN LAJOS, SÁROSI GYÖRGY, VASS GYULA: Iparbiztonság I. veszélyes anyagok és súlyos baleseteik az iparban és a szállításban. (Industrial safety I. Dangerous goods and major accidents in industry and transportation) Korytrade Kft. Budapest 2012. ISBN 978-963-89073-3-2.

2. INTERNATIOANAL FRAMEWORK

The international network of safety related activities broad confused enough. The existence of numerous activities in this field of industrial safety also complicates the situation. Issues concerning chemical accident prevention, preparedness and response involve many different sectors and disciplines. In addition, industrial safety is closely linked with a range of other issues, including occupational health and safety, general environmental protection and planning, industrial audits, and civil protection. Moreover, each country is different in terms of legal and industrial development.

Let us analyse the **international legal framework** of the activities in the field of industrial safety!

2.1 Industrial safety related activity in European Union

In fact the strategy of the accession to the **European Union** determine the real international obligations, which we have to undertake until the deadline of the accession according Hungarian State scenario.

As you are aware, a structure of the European union is based on three pillars, namely the European Economic Community, Common Foreign and Security Policy, Justice and home affairs. The co-operation between member states (15) the closest within the framework of the I.st pillar. The safety type policies are considered, as the mostly harmonised policies, which regulated by mandatory legislative instrument, like directive. The main executive body for the adaptation, implementation and enforcement of common European law is the European Commission. Among the 23 general directorates, the General Directorate XI Environment, Nuclear Safety and Civil Protection is engaged in activities related the Industrial Risk Management. It consists of two fields: Control of Product and Control of Processes. The Control of Processes could be split into two directions: Nuclear Safety and Chemical Plant Safety. [1]

For the purposes of industrial plant safety, was elaborated the **Council Directive 96/82/EC** of **on the control of major-accident hazards involving dangerous substances, so-called the Seveso II. Directive.**

The Seveso II Directive is based on Article 130s of the Treaty, establishing the European Community. This Article forms part of a Title within the Treaty, which establishes the objectives of the Environmental Policy of the Community. Each member state obligated to adopt and implement the Directive. It is important to mention that, according to Article 130t, Member States can maintain or adopt stricter measures than those adopted by the Community in the field of its Environmental Policy. This can, of course, have an impact on the competitiveness of the industries concerned. [2, 3]

2.2 The UN/ECE (Helsinki) Convention

The **United Nation Economic Commission for Europe Convention on the Transboundary Effects of Industrial Accidents** was adopted in Helsinki, on 18 March 1992. 26 States signed this convention out of the 57 UN/ECE members, including 14 Member States of the Community, as well as by the Community itself.

The aim of the Convention is two-fold: prevention of major industrial accidents involving dangerous substances; limitation of the consequences of such accidents on man and the environment.

In the case of transboundary effects:

Co-operation between UN/ECE countries and/or EU Member States before, during and after an accident:

- before" - notification of hazardous activities, exchange of technology / technical assistance, co-operation in research and development;
- "during"- mutual assistance / co-ordination of response;
- "after " - industrial accident notification systems, exchange of information on 'lessons learned'.

To facilitate the endeavours of countries the UN/ECE Accident Notification System has been prepared for immediate use by the countries concerned. Therefore a consolidated list of points of contact were designated. Their main functions include receiving and transmitting the formal accident notifications as well as offers and acceptance of assistance in direct contact with other points of contact operational 24 hours a day. [4]

The notification system is based on three different forms:

(a) UN/ECE EARLY WARNING REPORT gives information or warning in the event of an industrial accident or the imminent threat thereof;

(b) UN/ECE INFORMATION REPORT gives detailed supplementary information on an accident once the situation has been assessed;

(c) UN/ECE ASSISTANCE REQUEST REPORT deals with matters related to the provision of assistance in order to mitigate consequences including transboundary effects.

The Seveso II Directive is considered as the legal and technical instrument to fulfil the obligations of the European Community arising out of the Convention. [5]

2.3 OECD work related to industrial accidents

Hungary is a member of **OECD**, an organization comprising of the most advanced industrial nations of the world.

OECD work related to industrial accidents began in 1988, following a call by Ministers and other high-level officials at the OECD Conference on Accidents Involving Hazardous Substances. This work is carried out by the Expert Group on Chemical Accidents under the auspices of the OECD Chemicals Group and Management Committee of the Special Programme on the Control of Chemicals. The Expert Group consists of national experts and representatives of relevant international organizations. Representatives of industry, labour organizations and other interested groups take part in the work of the Expert Group.

The activities of the OECD work on industrial accidents can be grouped into two primary areas:

- The establishment of mechanisms for the effective exchange and provision of information; and
- The development of common principles, procedures and policy guidance on accident prevention, preparedness and response.

OECD regularly issues regulatory recommendations within the sphere of its competence. The publication of the Expert Group includes the "OECD Guiding Principles for Chemical Accident Prevention, Preparedness and Response". These provide guidance to public authorities, industry, labour and others for the establishment of programmes and policies to improve prevention and response to accidents. It is complimentary to the regulations as adopted by the European Union. Efforts are also being made to ensure the wide dissemination and implementation of the Guiding Principles in both OECD and non-member countries, including countries whose economies are in transition.

The terms of reference of the Expert Group specifies that it work products should be made available to non-OECD countries, and other international organizations. [6]

References – Chapter 2

[1] Council Directive 96/82/EC on the control of major accident hazards involving dangerous substances.

[2] 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

[3] Chemical Accidents (Seveso I, II and III) - Prevention, Preparedness and Response. European Comission. URL: http://ec.europa.eu/environment/seveso/index.htm

[4] Industrial Accidents – Home. UN ECE http://www.unece.org/env/teia/welcome.html

[5] United Nation Economic Commission for Europe Convention on the Transboundary Effects of Industrial Accidents

[6] OECD (Organisation for Economic Co-operation and Development), (1992) Guiding principles for chemical accident prevention, preparedness and response, Environment Monograph No 51, OCDE/GD (92) 43, OECD Environment Directorate, Paris.

3. CHEMICAL ACCIDENTS – EU LEGISLATION

3.1 Prevention, Preparedness and Response

Major accidents in chemical industry have occurred world-wide. In Europe, the Seveso accident in 1976 prompted the adoption of legislation aimed at the prevention and control of such accidents. The resulting 'Seveso' directive now applies to around 10,000 industrial establishments where dangerous substances are used or stored in large quantities, mainly in the chemicals, petrochemicals, storage, and metal refining sectors.

The Seveso Directive obliges Member States to ensure that operators have a policy in place to prevent major accidents. Operators handling dangerous substances above certain thresholds must regularly inform the public likely to be affected by an accident, providing safety reports, a safety management system and an internal emergency plan. Member States must ensure that emergency plans are in place for the surrounding areas and that mitigation actions are planned. Account must also be taken of these objectives in land-use planning.

There is a tiered approach to the level of controls: the larger the quantities of dangerous substances present within an establishment, the stricter the rules ('upper-tier' establishments have bigger quantities than 'lower-tier' establishments and are therefore subject to tighter control).

The "Seveso" accident happened in 1976 at a chemical plant in Seveso, Italy, manufacturing pesticides and herbicides. A dense vapour cloud containing tetrachlorodibenzoparadioxin (TCDD) was released from a reactor used for the production of trichlorophenol. Commonly known as dioxin, this was a poisonous and carcinogenic by-product of an uncontrolled exothermic reaction. Although no immediate fatalities were reported, there was widespread dispersal of kilogramme quantities of a substance lethal to man even in microgramme doses. This resulted in an immediate contamination of some ten square miles of land and vegetation. More than 600 people had to be evacuated from their homes and as many as 2000 were treated for dioxin poisoning.

Seveso I:*Council Directive 82/501/EEC on the major-accident hazards of certain industrial activities (OJ No L 230 of 5 August 1982)* – the so-called Seveso directive – was adopted in 1982. The Directive was amended twice, in 1987 by *Directive 87/216/EEC of 19 March 1987 (OJ No L 85 of 28 March 1987)* and in 1988 by *Directive 88/610/EEC of 24 November 1988 (OJ No L 336 of 7 December 1988)*. Both amendments aimed at broadening the scope of the Directive, in particular to include the storage of dangerous substances. This was in response to severe accidents at the Union Carbide factory at Bhopal, India in 1984, where a leak of methyl isocyanate caused more than 2500 deaths, and at the Sandoz warehouse in Basel, Switzerland in 1986, where fire-fighting water contaminated with mercury, organophosphate pesticides and other chemicals caused massive pollution of the Rhine and the death of half a million fish.

Seveso II: On 9 December 1996, *Council Directive 96/82/EC on the control of major-accident hazards* – the so-called Seveso II Directive - was adopted and replaced the original Seveso Directive. Seveso II included a revision and extension of the scope; the introduction of new requirements relating to safety management systems; emergency planning and land-use planning; and a reinforcement of the provisions on inspections to be carried out by Member States.

In the light of industrial accidents (Toulouse, Baia Mare and Enschede) and studies on carcinogens and substances dangerous for the environment, the Seveso II Directive was extended by Directive 2003/105/EC of the European Parliament and of the Council of 16 December 2003 amending Council Directive 96/82/EC. The most important extensions were to cover risks arising from storage and processing activities in mining; from pyrotechnic and explosive substances; and from the storage of ammonium nitrate and ammonium nitrate based fertilizers. [1]

Seveso III: Further adaptation of the provisions on major accidents occurred on 4 July 2012 with publication of a replacement directive - 2012/18/EU. The main changes in this, so-called, Seveso III Directive were:

- Technical updates to take account of changes in EU chemicals classification. In 2008, the Council and the European Parliament adopted a Regulation on the Classification, Labelling and Packaging (CLP) of substances and mixtures, adapting the EU system to the new UN international chemicals classification (Globally Harmonised System - GHS). In turn, this triggered the need to adapt the Seveso Directive, since its scope is based on the former chemicals classification which will be repealed by the CLP Regulation by June 2015.
- Better access for citizens to information about risks resulting from activities of nearby companies, and about how to behave in the event of an accident.
- More effective rules on participation, by the public concerned, in land-use planning projects related to Seveso plants.
- Access to justice for citizens who have not been granted appropriate access to information or participation.
- Stricter standards for inspections of establishments to ensure more effective enforcement of safety rules.

The Seveso III Directive 2012/18/EU was adopted on 4th July 2012 and entered into force on 13th August 2012. Member States have to transpose and implement the Directive by 1st June 2015, which is also the date when the new chemicals classification legislation becomes fully applicable in Europe. [2]

3.2 Legislation

Aim of the Seveso directive. The aim of the Seveso II Directive is two-fold. Firstly, the directive aims at the prevention of major-accident hazards involving dangerous substances. Secondly, as accidents do continue to occur, the directive aims at the limitation of the consequences of such accidents not only for man (safety and health aspects) but also for the environment (environmental aspect). Both aims should be followed with a view to ensuring high levels of protection throughout the Community in a consistent and effective manner.

Scope. The scope of the Seveso II Directive deals solely with the presence of dangerous substances in establishments. It covers both, industrial "activities" as well as the storage of dangerous chemicals. The directive can be viewed as inherently providing for three levels of proportionate controls in practice, where larger quantities mean more controls. A company who holds a quantity of dangerous substance less than the lower threshold levels given in the Directive is not covered by this legislation but will be proportionately controlled by general provisions on health, safety and the environment provided by other legislation which is not specific to major-accident hazards. Companies that hold a larger quantity of dangerous substance, which is above the lower threshold contained in the directive, will be covered by the lower tier requirements. Companies that hold even larger quantities of dangerous substance (upper tier establishments), which is above the upper threshold contained in the directive, will be covered by all the requirements contained within the directive.

Important areas excluded from the scope of the Seveso II Directive include nuclear safety, the transport of dangerous substances and intermediate temporary storage outside establishments and the transport of dangerous substances by pipelines.

General and Specific Obligations. The directive contains general and specific obligations on both operators and the Member States' authorities. The provisions broadly fall into two main categories related to the two-fold aim of the directive, that is control measures aimed at the prevention of major accidents and control measures aimed at the limitation of consequences of major accidents.

The Seveso II Directive is based on Article 174 (ex-Article 130s) of the EC Treaty. It is important to mention that, according to Article 176 (ex-Article 130t) of the EC Treaty; Member States can maintain or adopt stricter measures than those contained in the Seveso II Directive.

All operators of establishments coming under the scope of the directive need to send a notification to the competent authority and to establish a major accident prevention policy. In addition, operators of upper tier establishments need to establish a safety report, a safety management system and an emergency plan.

The competent authorities of the Member States may, at the request of an operator, decide that he may limit the information to be provided in his Safety Report (dispensation rule). The Commission Decision of 26 June 1998 (OJ No L 192 of 8 July 1998, p.19) contains harmonised criteria to be applied by the competent authorities when examining requests for dispensations.

Safety management systems. The introduction of safety management systems has taken account of the development of new managerial and organisational methods in general and, in particular, of the significant changes in industrial practice relating to risk management which have occurred over the past ten years. One of the main objectives pursued by this obligation is to prevent or reduce accidents caused by management factors which have proven to be a significant causative factor in over 90% of the accidents in the European Union since 1982. [3]

Emergency plans. Internal Emergency plans for response measures to be taken inside establishments have to be drawn up by the operator and to be supplied to the local authorities to enable them to draw up External Emergency Plans. Emergency Plans have to be reviewed, revised and updated, where necessary. Important new elements require operators to consult with their personnel on Internal Emergency Plans and on the local authorities to consult with the public on External Emergency Plans. The Seveso II Directive contains an obligation to regularly test in practice the Internal and External Emergency Plans.

Land-Use Planning. This new provision reflects the 'lesson learnt' from the Bhopal accident that the land-use planning implications of major-accident hazards should be taken into account in the regulatory process. Member States are obliged to pursue the aim of the directive through controls on the siting of new establishments, modifications to existing establishments and new developments such as transport links, locations frequented by the public and residential areas in the vicinity of existing establishments. In the long term, Land-use Planning Policies shall ensure that appropriate distances between hazardous establishments and residential areas are maintained.

Information to and consultation of the public. The Seveso II Directive gives more rights to the public in terms of access to information as well as in terms of consultation. Operators as well as public authorities have certain obligations to inform the public. Whereas passive information means permanent availability of information, i.e. that this information can be requested by the public, active information means that operators or competent authorities themselves need to be pro-active, for example through the distribution of leaflets or brochures informing the public about the behaviour in the case of an accident.

Accident Reporting. Member States have the obligation to report major accidents to the Commission. In order to fulfil its information obligations towards the Member States, the Commission has established a so-called Major-Accident Reporting System (MARS) and the Community Documentation Centre on Industrial Risks (CDCIR) at the Major-Accident Hazards Bureau established within its Joint Research Centre (JRC) in Ispra, Italy. Commission Decision 2009/10/EC establishes the report form pursuant to Council Directive 96/82/EC to be used.

Inspections. In the Directive, an attempt is made to ensure increased consistency in enforcement at European level through greater prescriptive detail of the obligations of the competent authorities. The most important new element is that competent authorities are obliged to organise an Inspection System which can either consist of a systematic appraisal of each establishment or of at least one on-site inspection per year. [4]

3.3 Implementation of the Directive

Administrative co-operation. A coherent implementation and consistent application of the provisions of the Seveso II Directive throughout the Community requires close co-operation among the competent authorities of all Member States and the European Commission.

The forum for such an administrative co-operation is the so-called Committee of Competent Authorities (CCA) which consists of representatives of the Member States and the Commission services. The work of the CCA is based upon consensus. It discusses all issues concerning the implementation of the Seveso II Directive and gives guidance as to its practical application.

Guidance documents. In order to assist Member States with the interpretation of certain provisions of the Seveso II Directive, the Commission in co-operation with Member States has elaborated the following guidance documents that are available from the Major-Accident Hazards Bureau (MAHB):

New Guidance Documents:

- Guidance on the preparation of a Safety Report
- Guidance on Land-use Planning

Both documents were adopted by the Commission on 7 June 2007 (Decision C(2007)2371) and are available in English, French and German on the following Webpages: http://sta.jrc.ec.europa.eu/ http://ipsc.jrc.ec.europa.eu/index.php/Information-material/503/0/

Lessons Learnt Bulletin. The Major Accident Hazard Bureau publishes, as from 2012, three-monthly bulletins including lessons learned from major accidents reported in eMARS and other sources.

The bulletins contain

- a description of the accidents that have been selected on the basis of a common topic;
- background information on the chosen topic, e.g., a description of the physical properties of the dangerous substance involved or the circumstances that led to the accidents. For example, a contractor/subcontractor issue or ad-hoc modification in the technical process;
- Recommendations based on the lessons learned with an emphasis on the main categories of lessons learned that may be specifically relevant to the topic.

First issue: lessons learned from accidents involving hydrogen

Second issue: lessons learned from accidents involving contractors

Further Guidance:

- Guidelines on a Major Accident Prevention Policy and Safety Management System

- Explanations and Guidelines on harmonised criteria for dispensations
- General Guidance for the content of information to the public
- Guidance on Inspections

Furthermore, a series of answers to frequently asked questions (Q&A's), which have also been agreed upon by the CCA, is published and regularly updated on the MAHB website. The above guidance documents and Q&A's have no legal status. However, they provide valuable guidance to industrial operators as well as to enforcement authorities, taking into account the fact that they represent the unanimous view of all Member States.

Major Accident reporting. The scope of the European Commission official online reporting system eMARS is facilitating the exchange of information on accidents and near misses occurred in Seveso establishments and promoting lessons learned among the EU Member States and other OECD countries as well as the general public. The system contains events on chemical accidents and near misses reported to the Major Accident and Hazards Bureau (MAHB) by the competent National Authorities under the current and prior Seveso Directives since 1982.

The information of the reported event is entered into eMARS by the EU Member States and OECD Countries themselves. Reporting an event into eMARS is compulsory for EU Member States when a Seveso establishment is involved and the event satisfies one or more of the six criteria set out in the Seveso Directive.

The reporting is done on a voluntary basis by those OECD Countries which are non EU Members.

To access the database, please go to: http://emars.jrc.it

3.4 International co-operation

The UNECE Convention on the transboundary effects of industrial accidents

This Convention of the United Nations Economic Commission for Europe was signed in Helsinki, Finland, on the 18th of March 1992 and entered into force on 19 April 2000. It aims at protecting human beings and the environment against industrial accidents capable of causing transboundary effects and at promoting active international co-operation between the Contracting Parties before, during and after such accidents.

As the Convention addresses areas where the Community has legislative competence as well as areas where the legislative competence resides with the Member States, it had to be approved by the Community and to be ratified by each Member State (*mixed competence*). On 23 March 1998, the Council of Ministers for the Environment of the European Union decided the approval by the Community of the Convention (Council Decision of 23 March 1998 *on the conclusion of the* Convention on the Transboundary Effects of Industrial Accidents – *OJ No L 326 of 3 December 1998*). The instrument of approval was deposited with the Secretary-General of the United Nations on 24 April 1998. In addition to the Community all Member States except Ireland and Malta are Parties to the Convention. [5]

The Seveso II Directive is considered as the legal and technical instrument to fulfil the obligations of the European Community arising out of the Convention. An amended Annex I of the Convention entered into force on 19 March 2008, aligning it to the amended Seveso Directive 2003/105/EC. See also Council Decision CS/2006/13962 establishing the position to be adopted on behalf of the European Community with regard to the proposal for an amendment to Annex I to the UN-ECE Convention on the Transboundary Effects of Industrial Accidents.

For more information on the Convention go to the UNECE website

UNEP Flexible Framework on Accident Prevention and Preparedness guidance

The United Nations Environmental Programme (UNEP) is leading an international initiative to promote chemical accident prevention and preparedness. The initiative focuses on the development and implementation of a Flexible Framework for Chemical Accident Prevention which offers Guidance for governments wanting to develop, review or strengthen their national chemical accidents prevention and preparedness programme. The initiative is part of UNEP's efforts to promote chemical safety in fastgrowing economies that are experiencing a rapid industrialisation process and need support to address industrial chemical accident prevention and preparedness. The Guidance builds on more than 30 years of experience in addressing chemical accident prevention following several chemical accidents in the mid 1980's.

The Guidance takes into account international agreements in this area (especially the ILO1 and UN/ECE2 conventions), key national/regional laws/ regulations (in particular the Seveso II Directive of the European Union and laws of the United States of America) and other international guidance materials (such as UNEP's APELL3 Programme and the OECD4 Guiding Principles for Chemical Accident Prevention, Preparedness and Response).

OECD Programme on chemical accidents

The OECD Programme on Chemical Accidents addresses a subject that concerns everyone who uses or handles hazardous chemicals, works in a chemical plant, or lives near one. This programme helps public authorities, industry, labour and other interested parties prevent chemical accidents and respond appropriately if one occurs.

In 1987 after major accidents with releases of hazardous chemicals from production sites in both Bhopal, India (December 1984) and Schweizerhalle, Switzerland (November 1986), member countries asked the OECD to start work related to chemicals in hazardous installations. The Chemicals Programme reacted quickly and the first results of this work were discussed at a High Level Conference on Accidents involving Hazardous Substances early 1988. [6]

3.5 Related EU legislation and initiatives

(a) CLP Regulation on classification and labelling of chemicals. The Classification & Labelling (C&L) Inventory : a **database** which contains classification and labelling information on substances notified under Regulation (EC) No 1272/2008 (the CLP Regulation) and registered under Regulation (EC) No 1907/2006 (the REACH Regulation). It also contains the list of legally binding harmonised classifications (Annex VI to the CLP Regulation). It is established and maintained by ECHA.

(b) Mining Waste Directive, aimed at ensuring the safe management of waste from extractive industries at EU level. Mining waste may may contain large quantities of dangerous substances, such as heavy metals. Moreover, the management of tailings is an intrinsically risky activity, often involving residual processing chemicals and elevated levels of metals. In many cases tailings are stored on heaps or in large ponds, where they are retained by means of dams.

(c) Proposal on offshore oil and gas production. On 27 October 2011, the EC proposed a new law which will ensure that European offshore oil and gas production will respect the world's highest safety, health and environmental standards everywhere in the EU.

(d) Community approach on the prevention of natural and man-made disasters.

(e) The European Programme for Critical Infrastructure Protection (EPCIP): The European Commission sets out the principles and instruments needed to implement the , aimed at both European and national infrastructure.

(f) The Commission Communication on strengthening CBRN security in the EU, including an EU CBRN Action Plan.Over the last decades, most terrorist attacks were carried out with the help of conventional means, such as firearms and explosives. Nevertheless, it does not seem impossible that terrorist organisations might eventually turn to unconventional weapons, such as chemical, biological, radiological or nuclear (CBRN) materials, thus potentially causing a high number of casualties and extensive socio-economic damage.

(g) Environmental Liability Directive: the Environmental Liability Directive 2004/35/EC (ELD), based on the polluter-pays principle, aims at preventing and remedying environmental damage (damage to biodiversity, water and land). Operators carrying out dangerous activities listed in Annex III of the Directive are strictly liable for the damage they have caused. They are in principle obliged to prevent the damage in case of imminent threat of damage, to remedy the damaged natural resources to or towards the baseline condition and to bear the costs of preventive and remedial action. Operators of Seveso establishments or installations are covered by the scope of strict liability under the ELD, pursuant to Annex III.7.(a). http://ec.europa.eu/environment/legal/liability/index.htm.

References – Chapter 3.

[1] 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

[2] Council Directive 96/82/EC on the control of major accident hazards involving dangerous substances.

[3] N. Mitchison and Sam Porter (Eds.) (1998): Guidelines on a major accident prevention policy and safety management system, as required by Council Directive 96/82/EC (Seveso II). EUR 18123 EN. JRC Ispra.

[4] Papadakis G. A. and A. Amendola (Eds.) (1997): Guidance on the preparation of a Safety Report to meet the requirements of Council Directive 96/82/EC (Seveso II). EUR 17690 EN. JRC Ispra.

[5] Industrial Accidents – Home. UN ECE
http://www.unece.org/env/teia/welcome.html

[6] OECD (Organisation for Economic Co-operation and Development), (1992) Guiding principles for chemical accident prevention, preparedness and response, Environment Monograph No 51, OCDE/GD (92) 43, OECD Environment Directorate, Paris.

Papadakis G. A and S.Porter (Eds.) (1999): Guidance on Inspections as Required by Article 18 of the Council Directive 96/82/EC (Seveso II). EUR 18692. JRC Ispra.

OECD (Organisation for Economic Co-operation and Development), (1992) Guiding principles for chemical accident prevention, preparedness and response, Environment Monograph No 51, OCDE/GD (92) 43, OECD Environment Directorate, Paris.

Christou, M.D., Porter, S. (1999) Guidance on land use planning as required by council directive 96/82/EC (Seveso II), Report EUR 18695, Office for publications for the EC, L-2985 Luxembourg.

4. INDUSTRIAL ACCIDENTS CONVENTION

The 1992 Convention on the Transboundary Effects of Industrial Accidents is designed to protect people and the environment against industrial accidents. The Convention aims to prevent accidents from occurring, or to reduce their frequency and severity and to mitigate their effects if required. The Convention also promotes active international cooperation between countries, before, during and after an industrial accident. The Convention helps its Parties to prevent industrial accidents that can have transboundary effects and to prepare for, and respond to, accidents if they occur. The Convention also encourages its Parties to help each other in the event of an accident, to cooperate on research and development, and to share information and technology.

The Convention was adopted in Helsinki on 17 March 1992 and entered into force on 19 April 2000. The Conference of the Parties was constituted as the Convention's governing body at its first meeting in Brussels on 22-24 November 2000. For the current ratification status see "Parties".

The Protocol on Civil Liability for Damage and Compensation for Damage Caused by Transboundary Effects of Industrial Accidents on Transboundary Waters, was adopted in Kiev on 21 May 2003. The Protocol is a joint instrument to the Convention on the Transboundary Effects of Industrial Accidents and to the Convention on the Protection and Use of Transboundary Watercourses and International lakes.

At its 3rd meeting, the Conference of the Parties adopted an Assistance Programme to support the countries from Eastern Europe, Caucasus and Central Asia and South Eastern Europe in implementing the Convention. [1]

4.1 About the Convention

Since the early 1990s the United Nations Economic Commission for Europe has concentrated its efforts on preventing industrial accidents and especially their transboundary effects in its region, which stretches from Canada and the United States in the west to the Russian Federation in the east. Its work led to the adoption of the Convention on the Transboundary Effects of Industrial Accidents. It was signed by 26 UN/ECE member countries and the European Union and entered into force on 19 April 2000.

The Convention aims at protecting human beings and the environment against industrial accidents by preventing such accidents as far as possible, by reducing their frequency and severity and by mitigating their effects. It promotes active international cooperation between the contracting Parties, before, during and after an industrial accident. Industrial operations may involve substances that do not usually represent a great threat to our health or our environment but are nevertheless potentially hazardous. Even the safest plant is never totally risk-free. In Europe, the well-publicized industrial accidents at Seveso in Italy in 1976 and Basel in Switzerland ten years later have brought this message home to us. [1]

Both accidents wreaked havoc with the environment. In Seveso, the release of dioxin contaminated the surrounding area and poisoned local residents. In Basel, the pollution of the Rhine -- in France and Germany, as well as in Switzerland -- following a fire at a chemical warehouse killed thousands of fish. As a result, risk assessment and accident prevention have received much more attention in the past two decades.

Industry itself has been trying to make its operations safer. But these two accidents have made the international community sit up and take notice as well. For instance, the Seveso accident prompted the Council of the European Union to adopt the first piece of multilateral legislation to prevent and control such accidents, the so-called Seveso Directive (82/501/EEC), in 1982.

In the meantime its scope was broadened and in December 1996 the original Seveso Directive was replaced by Council Directive (96/82/EC) on the control of major-accident hazards - also known as the Seveso II Directive. It has been in force since 3 February 1999.

However, in January 2000, another industrial accident in Romania, with severe transboundary effects, made clear that operations involving hazardous substances may still pose a serious threat to our common environment. A mining company in Baia Mare in northern Romania accidentally spilled over 100,000 cubic meters of cyanide-polluted water into the Lapus River. Within two days, the polluted water reached the Tisza, one of Hungary's largest rivers.

Not only Hungary's environment, but also that of the Danube's other downstream countries were affected. Their fish stocks were wiped out and their water supplies were threatened. The restoration of the environment will take a long time and will not be reached without international cooperation and assistance.

This incident also showed that accidental water pollution can have far-reaching transboundary effects even if it happens at a location far from any international border.

Although the courses of rivers are not limited by any international border, the prevention of industrial accidents will continue to be a major challenge. Industrial accidents can be prevented and their impact on transboundary waters can be limited by strengthening the application of both this Convention and the UN/ECE Convention on Convention on the Protection and Use of Transboundary Watercourses and International Lakes.

Pending the entry into force, work aimed at implementing the Convention on the Transboundary Effects of Industrial Accidents has been carried out by its Signatories within the framework of the Committee on Environmental Policy. Following the Convention's entry into force, the Conference of the Parties was constituted as the governing body at its first meeting on 22-24 November 2000. The United Nations Economic Commission for Europe carries out the secretariat functions for the Convention. At its first meeting, the Conference of the Parties took a number of important decisions facilitating the Convention's implementation and defining the priorities of work within its framework in the years ahead. One of the priority tasks is to enlarge the scope of the Convention's application to the entire UN/ECE region as soon as possible. [2]

The Parties agreed on the format and procedures for reporting on the implementation of the Convention and set up a Working Group on Implementation to monitor this process. They also agreed to continue work on the prevention of accidental water pollution.

The Parties to the Convention also recognized the shortcomings of existing international civil liability instruments. In this context, they stressed the need for an appropriate regime, including a legally binding instrument, in the UN/ECE region on civil liability for damage caused by hazardous activities within the scope of this Convention and that on the Protection and Use of Transboundary Watercourses and International Lakes.

A joint special session of the governing bodies of the two Conventions was held on 2-3 July 2001 and decided that a intergovernmental negotiation process should be entered into aimed at adopting a legally binding instrument on civil liability for transboundary damage caused by hazardous activities, within the scope of both Conventions. To his end, they established an open-ended intergovernmental Working Group.

The Convention on the Transboundary Effects of Industrial Accidents is part of a pan-European legal framework to protect our environment and encourage sustainable development that has been negotiated by governments within the UN/ECE in response to regional challenges. Apart from this Convention , the framework also consists of four other multilateral agreements:

- Convention on Long-range Transboundary Air Pollution and its eight Protocols;
- Convention on the Protection and Use of Transboundary Watercourses and International Lakes and its Protocol on Water and Health;
- Convention on Environmental Impact Assessment in a Transboundary Context; and
- Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters

The aim of the Convention on the Transboundary Effects of Industrial Accidents is to help its Parties to prevent industrial accidents that can have transboundary effects, to prepare for them and to respond to them. The Convention also encourages its Parties to help each other in the event of such an accident, to cooperate on research and development, and to share information and technology.

4.2 Prevention, preparedness and response measures

Prevention

Since it is better to be safe than sorry, the Convention spells out what its Parties have to do to reduce the risk and prevent industrial accidents to the extent possible. First, they should identify the hazardous operations that take place within their borders but could have an effect abroad if an accident were to occur.

The Conference of the Parties, at its first meeting, adopted guidelines to facilitate this process. Once the Parties have drawn up a list of these operations, they should inform all the other Parties that could be affected and consult them. New projects should be sited in areas where the risks are minimal and any decision to allow a project to go ahead should take account of the Convention on Environmental Impact Assessment in a Transboundary Context. Past industrial accidents will be reported and analyzed so that lessons can be learnt from them in order to be able to prevent similar accidents from happening in the future. The Parties approved the terms of reference for cooperation between the UN/ECE secretariat and the European Commission's Major Accident Hazards Bureau in this respect.

Preparedness

Yet, no matter how stringent the safety standards, accidents will occur and countries must be prepared to deal with their consequences. The Convention therefore also outlines how Parties can maintain a high level of preparedness to respond to an industrial accident, especially if its effects spill over into another country. Hazardous operations must have on-site and off-site contingency plans. If several Parties might be affected by a hazardous operation, they are expected to get together to try to make their plans compatible or even draw up joint off-site contingency plans. The local residents should be informed about what is going on. The public should also have a say in the setting-up of prevention and preparedness measures and have access to administrative and judicial proceedings if its views are disregarded. In this context, the provisions of the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters will also prove useful.

Response

If an industrial accident does occur, the Convention expects the Parties to take effective steps to minimize its effects, including those of a transboundary nature. If several countries are affected by the accident, they should work together to ease its effects. They should also help one another if asked to do so [2]

4.3 Notification, competent authorities cooperation

Notification

To respond effectively and in a coordinated way to an industrial accident, Parties must be informed as soon as possible, since time is of the essence. The Convention consequently calls on Parties to set up special notification systems . The UN/ECE Industrial Accident Notification System has been developed with this in mind and accepted by the Conference of the Parties. It includes forms for giving early warning, providing information and requesting assistance. This system makes it easier for a country where an industrial accident has taken place to notify all the others that could be affected and to give them the information they need to fight its possible effects.

Since 2008, the IAN Systen has been operated through an internet application.

Competent authorities and points of contact

Each Party must designate or set up authorities specifically to deal with industrial accidents, following the Convention's entry into force. Other UN/ECE member countries have nominated focal points .

According to the Convention, Parties must also designate points of contact, to whom industrial accident notifications and requests for assistance must be addressed. The network of points of contact now comprises 35 countries and the European Union. The secretariat regularly updates this list; however, access to it is restricted. [2]

References – Chapter 4.

[1] Industrial Accidents – Home. UN ECE
http://www.unece.org/env/teia/welcome.html

[2] United Nation Economic Commission for Europe Convention on the Transboundary Effects of Industrial Accidents

5. INTRODUCTION OF THE BASIC PROVISIONS OF THE SEVESO II. DIRECTIVE

On 9 December 1996 the Council of the European Union adopted Directive 96/82/EC on the control of major-accident hazards (so-called Seveso II Directive). Following its publication in the Official Journal (OJ) of the European Communities (No L 10 of 14 January 1997) the Directive entered into force on 3 February 1997.

Member States had up to two years to bring into force the national laws, regulations and administrative provisions to comply with the Directive (transposition period). From 3 February 1999, the obligations of the Directive have become mandatory for industry as well as the public authorities of the Member States responsible for the implementation and enforcement of the Directive.

The Seveso II Directive has replaced Directive 82/501/EEC on the major-accident hazards of certain industrial activities, now called Seveso I Directive. The fact that the Seveso I Directive was not amended but that a completely new Directive has been conceived already indicates that important changes have been made and new concepts have been introduced into the Seveso II Directive. [1]

5.1 Historical Background

Major accidents in chemical industry have occurred world-wide. Increasing industrialisation after the Second World War also lead to a significant increase of accidents involving dangerous substances. During the four decades following the Second World War, there were over 100 reported major incidents world-wide, involving toxic clouds which led to the loss of some 360 lives and significant physical and environmental damage.

In Europe, in the 1970's two major accidents in particular prompted the adoption of legislation aimed at the prevention and control of such accidents.

The **Flixborough accident** in the United Kingdom in 1974 was a particularly spectacular example. A huge explosion and fire resulted in 28 fatalities, personal injury both on and off-site, and the complete destruction of the industrial site. It also had a domino effect on other industrial activity in the area, causing the loss of coolant at a nearby steel works which could have led to a further serious accident.

The **Seveso accident** happened in 1976 at a chemical plant manufacturing pesticides and herbicides. A dense vapour cloud containing tetrachlorodibenzoparadioxin (TCDD) was released from a reactor, used for the production of trichlorofenol. Commonly known as dioxin, this was a poisonous and carcinogenic by-product of an uncontrolled exothermic reaction. Although no immediate fatalities were reported, kilogram quantities of the substance lethal to man even in microgram doses were widely dispersed which resulted in an immediate contamination of some ten square miles of land and vegetation. More than 600 people had to be evacuated from their homes and as many as 2.000 were treated for dioxin poisoning.

After almost three years of negotiations in Council and European Parliament, the **Seveso I Directive** was adopted in 1982. However, in the decade since the Directive's adoption, its strict reporting requirements have meant that some 130 major accidents have been identified EU-wide.

In the light of the severe accidents at the Union Carbide factory at **Bhopal,** India (1984) where a leak of methyl isocyanate caused more than 2.500 deaths and at the Sandoz warehouse in Basel, Switzerland (1986) where fire-fighting water contaminated with mercury, organophosphate pesticides and other chemicals caused massive pollution of the Rhine and the death of half a million fish, the Seveso I Directive was amended twice, in 1987 and in 1988. Both amendments aimed at broadening the scope of the Directive, in particular to include the storage of dangerous substances.

The reporting requirements of the Seveso I Directive were last amended in 1991 by Directive 91/692/EEC of 23 December 1991 standardizing and rationalizing reports on the implementation of certain Directives relating to the environment.

The original Seveso I Directive required a review of its scope in accompanying resolutions concerning the fourth (1987) and the fifth Action Programme on the Environment (1993), had called for a general review of the Seveso I Directive to include, amongst others, a widening of its scope and a better risk-and-accident management. Following such a review, the Commission in 1994 presented the proposal for a new Seveso II Directive to Council and European Parliament. [1]

5.2 Aim and Scope of the Directive

The aim of the Seveso II Directive is **two-fold**:

- Firstly, the Directive aims at the prevention of major-accident hazards involving dangerous substances.
- Secondly, as accidents do continue to occur, the Directive aims at the limitation of the consequences of such accidents not only for man (safety and health aspects) but also for the environment (environmental aspect).

Both aims should be followed with a view to ensuring high levels of protection throughout the Community in a consistent and effective manner.

Although in many cases substances which are dangerous for **man** are also dangerous for **the environment**, it can be said that the scope of the Seveso I Directive was more focused on the protection of persons than on the protection of fauna and flora. With the Seveso II Directive, propensity to endanger the environment is an important aspect that has been reinforced by the inclusion, for the first time, of substances classified as dangerous to the (aquatic) environment in the scope of the Directive.

Scope, Definition (Article 2)

The scope of the Seveso II Directive solely to the presence of dangerous substances in establishments. It covers both, industrial "activities" as well as the storage of dangerous chemicals.

The Directive can be viewed as inherently providing for **three levels** of proportionate controls in practice, where larger quantities mean more controls.

1. A company who holds a quantity of dangerous substance less than the lower threshold levels given in the Directive is not covered by this legislation but will be proportionately controlled by general provisions on health, safety and the environment provided by other legislation which is not specific to major-accident hazards.
2. Companies who hold a larger quantity of dangerous substance, above the **lower threshold** contained in the Directive, will be covered by the lower tier requirements.
3. Companies who hold even larger quantities of dangerous substance (upper tier establishments), above the **upper threshold** contained in the Directive, will be covered by all the requirements contained within the Directive.

Important areas **excluded from the scope** of the Seveso II Directive include nuclear safety, the transport of dangerous substances and intermediate temporary storage outside establishments and the transport of dangerous substances by pipelines.

However, the Commission has been requested by Council and the European Parliament to investigate the necessity of taking action in the areas of transport interfaces such as ports and marshalling yards, and in the area of transport of dangerous substances in pipelines.

It is recognised that the **transportation** of dangerous substances has a significant major-accident potential. Transportation to and from an establishment may involve greater risks than those at the establishment itself. Moreover, the number of people at risk from the accidental release of a dangerous substance during transportation through inhabited areas or during intermediate temporary storage near such areas might in fact be larger than at the establishment where the substance is produced, used or stored. There is ongoing liaison with the transport sector to promote coherent policies in this context.

Two-tier approach (Annex I)

The Seveso II Directive follows a so-called two-tier approach which means that for each named substance and for each generic category of substances and preparations, two different qualifying quantities (threshold levels) are mentioned **in Annex I, Parts 1 and 2** of the Directive, a lower and an upper value (e.g. for chlorine: 20 and 100 tonnes).

It is assumed that the risk of a major-accident hazard arising from an establishment in which dangerous substances are present increases with the quantities of substances present at the establishment. Consequently, the Directive imposes more obligations on upper tier establishments than on lower tier establishments. [1]

5.3 General and Specific Obligations

The Directive contains general and specific obligations on both operators and the Authorities. The provisions broadly fall into two main categories related to the two-fold aim of the Directive, that is, measures related to:

- the prevention of major accidents;
- limitation of the consequences of major accidents

1. In case of **lower tier establishment** the operator/authorities must meet requirements related to:

a) Control measures aimed at prevention

- General obligations
- notification
- major-accident prevention policy
- controls on modifications of establishments/installations

b) Control measures aimed at limitation of the consequences of a major accident

- land-use planning

2. In addition, operators of '**upper tier' establishments** need to meet requirements on:

a) Control measures aimed at prevention:

- safety reports
- safety management systems

b) Control measures aimed at limitation of the consequences of a major accident

- emergency planning
- information on safety measures (to the public)

General obligations (Article 5)

This article is intended to impose a clear simple general requirement that an operator must do all that is necessary. The Operator must

- take all necessary measures to prevent major accidents and, in the case of such a accident, to limit its consequences for man and the environment and
- be able to prove, at any time, to the public authority responsible for carrying out the duties under the Directive (so-called Competent Authority) that he has taken all the necessary measures as specified in the Directive. It is important to stress that this latter obligation imposes the burden of proof on the Operator.

Notification (Article 6)

The principle intent behind an article on notification is that it should be illegal for companies to hold large quantities of a dangerous substance without identifying this to the authorities. The Directive requires that a notification shall contain the following information:

- the name of the Operator and the address of the establishment
- the registered place of business of the Operator
- the name or position of the person in charge of the establishment
- information sufficient to identify the dangerous substances or category of substances involved
- the quantity and physical form of the dangerous substance or substances involved
- the activity of the installation or storage facility
- the immediate environment of the establishment

For **new establishments**, a notification has to be sent to the Competent Authority within a reasonable period of time prior to the start of construction or operation. 'Reasonable period of time' means that the Competent Authority must have sufficient time to examine the notification and to react to it, for example by requesting supplementary information or by raising doubts as regards the safety of the establishment.

Operators of **existing** establishments not previously covered by the Seveso I Directive have to transmit a notification within a year's period from 3 February 1999, i.e. before 3 February 2000.

Of course, **in the event of significant changes** in quantities and/or nature of dangerous substances or the permanent closure of an establishment/installation, the Operator has to inform the Competent Authority. [2]

Major-accident prevention policy - MAPP (Article 7)

The obligation to establish and to properly implement a MAPP applies to Operators of both lower and upper tier establishments. As seen from the fact that 'management factors' have contributed to many of the accidents, which have occurred since the implementation of Seveso I, appropriate policies and management systems within a company are necessary to safeguard against major accidents.

The MAPP must be established in writing and should include the Operator's overall aims and principles of action with respect to the prevention and control of major-accident hazards. It shall be designed to guarantee a high level of protection for man and the environment by appropriate means, structures and management systems.

Some major differences exist in the practical ways that Operators of lower and upper tier establishments make the contents of their MAPP known to the authorities.

- Operators of lower tier establishments shall make the MAPP available to the Competent Authorities (at their request) which means that they have no obligation to actually send the written document setting out their MAPP to the Competent Authority.

– Operators of upper tier establishments must demonstrate in their Safety report that a MAPP has been put into effect. The Safety report must be sent to the Competent Authority.

Safety report (Article 9)

The obligation to **produce** a Safety report and to **send it to the Competent Authority** only applies to Operators of upper tier establishments.

Safety reports shall have the **purpose** of:

– demonstrating that a MAPP and a SMS have been put into effect,

– demonstrating that major-accident hazards have been identified and that all necessary measures have been taken to prevent such accidents and to limit their consequences for man and the environment,

– demonstrating that adequate safety and reliability have been incorporated into the design, construction, operation and maintenance of any establishment/installation and/or storage facility, as well as equipment and infrastructure connected,

– demonstrating that Internal Emergency Plans have been drawn up, supplying information to enable the External Emergency Plan to be drawn up,

– providing sufficient information to the Competent Authority to enable decisions to be made in terms of the siting of new activities or developments around existing establishments.

The Safety report must include the following **minimum data and information**, which are specified in more detail in **Annex II** of the Seveso II Directive:

– Information on the MAPP and on the SMS

– Presentation of the environment of the establishment

– Description of the installation(s)

– Identification and accidental risk analysis and prevention methods

– Measures of protection and intervention to limit the consequences of an accident. [2]

Tasks of the Competent Authority with regard to the safety report

The Competent Authority has the task of examining the Safety report and to communicate the conclusions of its examination to the Operator.

The Competent Authority has not only the right to request further information from the Operator but also to proceed to an inspection of the establishment, if necessary.

It seems clear that the Competent Authority has to take an “active decision” to either allow or prohibit the bringing into use, or the continued use of the establishment.

Time limits for the submission of the safety report

The Safety report has to be sent to the Competent Authority

– For new establishments within a 'reasonable period of time' prior to the start of construction or operation.

– For existing establishments previously covered by the Seveso I Directive, the Safety report has to be sent to the Competent Authority before 3 February 2001.

– For existing establishments not previously covered by the Seveso I Directive, the Safety report has to be sent to the Competent Authority before 3 February 2002.

Review of the safety report

The Safety report must be reviewed and, if necessary, updated

– at least every five years or

– at the initiative of the Operator or at the request of the Competent Authority, where justified by new facts, new technical knowledge about safety or about hazard assessment, or

– in case of a modification of a site which means modification of the establishment, the installation, the storage facility, the (chemical) process, the nature of dangerous substance(s) or the quantity of dangerous substance(s) [3]

Limitation of the information required in safety reports (Article 9.6 - dispensations)

The applicability of this provision of the Directive requires in the first instance the development of so-called **harmonized criteria** for a decision by a Competent Authority that particular substances present at an establishment or part thereof, are "in a state incapable of creating a major-accident hazard".

The Commission on 26 June adopted these harmonised criteria which have been elaborated by the Commission, in close co-operation with the Member States.

In conclusion, this provision allows the Competent Authorities, at the (justified) request of an Operator, to decide and to communicate to the Operator that he may limit the information to be provided in his Safety report. However, it is clear that this cannot mean a total dispensation from the obligation to submit a Safety report.

The Member States are obliged to notify any dispensations granted to the Commission, including the reasons. The Commission shall forward the lists containing the notifications to the Committee established under the Directive (see point 19. below) on a yearly basis. [3]

Safety management systems - SMS (Annex III)

The introduction of the obligation for Operators of upper tier establishments to put into effect an SMS has taken account of the development of new managerial and organisational methods in general and, in particular, of the significant changes in industrial practice relating to risk management which have occurred over the past ten years. One of the main objectives pursued by this obligation is to prevent or reduce accidents caused by management factors which have proven to be a significant causative factor in over 90 per cent of the accidents in the EU since 1982.

The SMS shall address the following issues, which are specified in more detail in **Annex III** of the Seveso II Directive:

- organisation and personnel
- identification and evaluation of major-accident hazards
- operational control
- management of change
- planning for emergencies
- monitoring performance
- audit and review. [2]

Emergency Plans (Article 11)

The Internal Emergency Plan for the measures to be taken inside the establishment has to be drawn up by the Operator and to be supplied to the Local Authorities to enable them to draw up an External Emergency Plan. Emergency Plans have to be reviewed, revised and updated, where necessary.

New requirements for the Operator to consult with his personnel on the **Internal Emergency Plan** and on the Local Authority to consult with the public on the **External Emergency Plan**. For the first time, the Seveso II Directive contains an obligation to test in practice the Internal and External Emergency Plan at least every three years. Moreover, **Annex IV** of the new Directive contains specific requirements on data and information to be included in Internal and External Emergency Plans.

Internal and External Emergency Plans have to be drawn

- For new establishments prior to the start of operation.
- For existing establishments previously covered by the Seveso I Directive, the Internal Emergency Plan has to be drawn up before 3 February 2001.
- For existing establishments previously not covered by the Seveso I Directive, the Internal Emergency Plan has to be drawn up before 3 February 2002.
- The competent local authorities are obliged to draw up External Emergency Plans within a reasonable period of time.

Domino Effects (Article 8)

This provision obliges the Competent Authority to

- identify establishments or groups of establishments where the danger of an accident and its possible consequences may be increased because of the location and the proximity of the establishments, and the dangerous substances present and to
- ensure an exchange of information and co-operation between the establishments.

Land-Use Planning (Article 12)

This provision reflects the request of the Council, following the Bhopal accident that the land-use planning implications of major-accident hazards should be taken into account in the regulatory process.

Member States are obliged to pursue the two-fold aim of the Directive through controls on

- the siting of new establishments, modifications to existing establishments, and
- new developments such as transport links, locations frequented by the public and residential areas in the vicinity of existing establishments.

In the long term, Land-use Planning Policies shall ensure that appropriate distances between hazardous establishments and residential areas are maintained. Where such establishments already exist in the vicinity of residential areas, the Seveso II Directive calls for consideration of additional technical measures so as not to increase the risks to people, in the context of application of the above mentioned controls. [4]

Information and consulting of the public (Article 13)

The Seveso II Directive gives more rights to the public in terms of access to information as well as in terms of consultation. It is expected that this Article will continue to promote the benefits of an effective dialogue between the operator and the residents living in the vicinity of plants who are liable to be affected by major accidents.

a. Information to the public

Operators as well as public authorities have certain obligations to inform the public. These information obligations can be divided into two forms of information: Passive and Active Information.

Passive Information means permanent availability of information i.e. that the public can request this information. This concerns the possibility of the public to scrutinise Safety reports.

Active Information means that the Operator or the Competent Authority themselves need to be pro-active, for example through the distribution of leaflets or brochures, to "actively" inform the public.

Member States are obliged to supply persons liable to be affected by a major accident with information on safety measures and the requisite behaviour in the event of an accident. The items of information to be communicated are specified in more detail in **Annex V** of the Seveso II Directive.

The information shall be reviewed at least every three years and repeated at least every five years, and always in the case of a modification of a site.

Consultation of the public

The public must be able to give its opinion in the cases of

- planning for new upper tier establishments,
- modifications to existing establishments (see definition under point 8.3 before),
- developments around existing establishments, and on

– External Emergency Plans.

b. Information on safety measures to other potentially affected Member States (Article 13, paragraph 2)

Member States have to supply information on upper tier establishments to other potentially affected Member States where there is a **possibility of transboundary effects** of a major accident in order to enable them to take account of this in the establishment of Emergency Plans, their Land-use Planning andthe information to their public.

Information obligations of the Operator and the Member States following a Major-Accident

As concerns the obligations of the Operator following a major accident, the broad definition of a major accident applies.

Annex VI of the Directive gives criteria for the notification of an accident to the Commission by the Member State and relates to the consequences of a major accident in terms of

– substances involved,

– injury to persons and damage to real estate,

– immediate damage to the environment,

– damage to property,

– cross-border damage.

It is important to note that the general definition of a major accident is much broader than the Annex VI criteria and should not be restricted to the latter.

The Operator has the obligation to

– inform the Competent Authority,

– provide information on the circumstances of the accident, the substances involved, data for an assessment of the effects of the accident and the emergency measures taken

– inform about the steps envisaged to alleviate the effects of the accident and to prevent a recurrence of such an accident

– update the information about the accident.

The Competent Authority must

– ensure that all necessary measures are taken;

– collect all information necessary for a full analysis of the accident, which might also include on-site inspection,

– ensure that the Operator takes all necessary remedial measures and

– recommend future preventive measures. [1]

5.4 Information obligations of the Member States following a major-accident

As concerns the obligations of the Member States following a major accident, the Annex VI criteria apply.

Member States have the obligation to report to the Commission all accidents, which correspond to this definition of a major accident. However, this means that the Member States are not obliged to report all the major accidents that they have been informed of by Operators.

a) An **initial accident report** (short report) by a Member State must include the following:

- name and address of the responsible authority of the Member State
- date, time and place of the accident
- name of the Operator and address of the establishment
- description of the circumstances of the accident (substances involved, immediate effects on man and the environment)
- emergency measures and precautions taken.

b) After a more detailed **analysis** of an accident, Member States are obliged to send to the Commission a more detailed report using a harmonised report form (long report).

Information obligations of the Commission: the Major Accident Reporting System - MARS (Article 19)

In order to fulfil its information obligations towards the Member States, the Commission has established a so-called **Major-Accident Reporting System (MARS)** and the **Community Documentation Centre on Industrial Risks (CDCIR)** at the **Major-Accident Hazards Bureau (MAHB)** established within the Joint Research Centre (JRC) in Ispra, Italy.

MARS is an information system containing descriptive data of accidents supplied by the Member States and evaluated by MAHB. It is a database network, consisting of 15 local databases in each Member State and a central analysis system at MAHB that allows complex text retrieval and pattern analysis to generate lessons learned from accidents. The CDCIR is a library and information system that collects and evaluates guidelines, regulations, codes of good practice, and accident case histories related to all aspects of relevant Community and international legislation in the area of industrial risks.

Reporting obligations of the Commission concerning the implementation of the Seveso II Directive (Article 19)

The provisions of this framework Directive - 91/692/EEC of 23 December 1991 standardizing and rationalizing reports on the implementation of certain Directives relating to the environment – oblige in three-year reporting periods:

- the Committee established under the framework Directive to adopt a 'questionnaire' to standardise the reporting, at the latest 6 months prior to the beginning of the reporting period,
- the Member States to provide the Commission with a three-year report based on the questionnaire, at the latest 9 months after the end of the reporting period,
- the Commission to establish and publish in the OJ a summary of this information, at the latest 18 months after the end of the reporting period. [1]

5.5 Inspections by the Public Authorities (Article 18)

In order to increase the efficiency of implementation of the directive, The Competent Authorities are obliged to organise an **Inspection System**, which shall ensure that:

- the Operator has taken all necessary measures with regard to the two-fold aim of the Directive (prevention of major accidents and limitation of their consequences),
- the Safety report is correct and complete; however, inspections and control measures are not dependent on the submission of a Safety report or other documents,
- the public has been informed.

An Inspection System shall comprise

- a programme of inspections by the Competent Authority consisting either of a systematic appraisal of each establishment or of at least one on-site inspection per year
- an inspection report to be drawn up by the Competent Authority
- a follow-up with the Operator within a 'reasonable period' following the inspection. This is of course particular important when the Competent Authority has detected deficiencies in the safety of an establishment and has requested the Operator to take supplementary measures to improve safety.

Prohibition of Use (Article 17)

Competent Authorities are obliged to **shut down** or to **prohibit the bringing into use** of establishments, installations, storage facilities, or parts thereof, if the safety measures taken by the Operator are seriously deficient.

However, Competent Authorities may also proceed to a **prohibition of use** if the Operator has not submitted the Notification and/or the Safety report or any other information required by the Directive.Member States must ensure that an appeal procedure is in place against a prohibition order by a Competent Authority. In conclusion, the provision of the Seveso II Directive concerning the prohibition of use serves a double objective:

- On the one hand, Competent Authorities must be empowered to apply strict measures where the health and safety of the population and/or the protection of the environment is at stake.
- On the other hand, Competent Authorities can exercise pressure against Operators who are not willing or who fail to fulfil their formal obligations under the Directive (disciplinary measure). [5]

5,6 Administrative co-operation between member states

A coherent implementation and consistent application of the provisions of the Seveso II Directive throughout the Community necessitates a close co-operation of the Competent Authorities of all Member States and the European Commission. In order to underline the importance of a continuous administrative co-operation, the Directive obliges the Member States and the Commission to **exchange information** on the experience acquired and the functioning in practice of the Directive.

The forum for such an administrative co-operation is the so-called **Committee of Competent Authorities (CCA)** which consists of representatives of the Member States and the Commission services. The CCA is chaired by a representative of the Commission and meets once in every Council presidency, i.e. every six months. The work of the CCA is based upon consensus.

The CCA discusses all issues concerning the implementation of the Seveso I and II Directives and gives guidance as to their practical application. In this context, the Guidance documents and Guidelines on important provisions of the Seveso II Directive play an important role. Although they have no legal status, they provide valuable guidance to industrial operators as well as enforcement authorities, taking into account the fact that they represent the unanimous view of all Member States on the issue concerned.

The following Guidance documents are developed by the **Major-Accident Hazards Bureau (MAHB)**:

- Guidance on Inspections as Required by Article 18 of the Council Directive 96/82/EC (Seveso II), EUR 18692 EN (1999)
- Guidance on Land Use Planning as Required by Council Directive 96/82/EC (Seveso II), EUR 18695 EN (1999)
- Guidelines on a Major Accident Prevention Policy and Safety Management System, as required by Council Directive 96/82/EC (SEVESO II), EUR 18123 EN (1998)
- Explanations and Guidelines for the application of the Dispensation Rule of Article 9, paragraph 6 of Council Directive 96/82/EC on the control of major-accident hazards involving dangerous substances, EUR 18124 EN (1998)
- Guidance on the preparation of a Safety Report to meet the Requirements of Council Directive 96/82/EC (Seveso II), EUR 17690 EN (1997)

- General Guidelines for Content of Information to the Public (Directive 82/501/EEC - Annex VII) EUR 15946 EN (1994)
- Guidance on Domino Effects.

Furthermore, a series of answers to frequently asked questions (Q&A's) which have equally been agreed upon by the CCA is published. [1]

Referencies – Chapter5.

[1] Council Directive 96/82/EC on the control of major accident hazards involving dangerous substances.

[2] N. Mitchison and Sam Porter (Eds.) (1998): Guidelines on a major accident prevention policy and safety management system, as required by Council Directive 96/82/EC (Seveso II). EUR 18123 EN. JRC Ispra.

[3] Papadakis G. A. and A. Amendola (Eds.) (1997): Guidance on the preparation of a Safety Report to meet the requirements of Council Directive 96/82/EC (Seveso II). EUR 17690 EN. JRC Ispra.

[4] Papadakis G. A and S.Porter (Eds.) (1999): Guidance on Inspections as Required by Article 18 of the Council Directive 96/82/EC (Seveso II). EUR 18692. JRC Ispra.

[5] Christou, M.D., Porter, S. (1999) Guidance on land use planning as required by council directive 96/82/EC (Seveso II), Report EUR 18695, Office for publications for the EC, L-2985 Luxembourg.

6. ESTABLISHMENT AND OPERATION OF SYSTEM FOR INDUSTRIAL SAFETY WITHIN THE HUNGARIAN DISASTER MANAGEMENT

6.1 Preface

The Hungarian Parliament, in order to improve the safety of the public and of the environment and the efficiency of the prevention of manmade disasters, to strengthen the system of disaster management organizations and to improve the results of emergency actions, by the adoption of Act CXXVIII/2011 on disaster management and on the amendment of individual, related acts (hereinafter: disaster management act) created on January 1, 2012 the standardized system of authority tasks, organizations and procedures for industrial safety. The newly enacted industrial safety regulations (the third individual sector beside civil protection and fire prevention) cover the prevention of major accidents involving dangerous substances, and the protection of shipments containing dangerous goods, protection of critical systems and installations and the disaster management tasks of nuclear safety [1].

In the present article the objective of the author is to identify the hazard sources being relevant for the occurrence of manmade disasters. Their objective is furthermore to typify such hazard sources and then to evaluate the exposure to major dangers in terms of industrial safety. The article is dedicated exclusively to sources of danger (hazardous activities) that are relevant in terms of the application of the law by the disaster management authority and I prepare only a general status report about the present status (June 30, 2013) of the implementation of the legal regulations.

I have used basically the public data (prepared for the general information of the public) provided by the National Directorate General for Disaster Management of the Ministry of the Interior (MI NDGDM), National Chief Inspectorate for Industrial Safety. Furthermore I have used also the specialist literature that is rather limited in this field.

In this article, in a way not yet examined by others, I propose a hazard source classification system based on the industrial safety aspects of manmade disasters. In addition I provide a comprehensive overview about the exposure to hazardous activities in Hungary and describe the established industrial safety system for the protection against such hazards.

General classification of activities posing disaster risks

There are several versions of grouping disasters (hazard sources) known for professionals and scientists. In the legal provisions it is only the implementing regulation of the disaster management act, where there is a split related to effects posing hazards, applied in risk assessment procedures. From the scientific point of view several grouping systems can be identified, however it is common in those systems that disasters are basically assigned to two groups: natural and manmade group.

In terms of industrial safety, we shall evaluate manmade disasters, major accidents and other events endangering human health and life, the environment and critical assets affecting, from the point of view of the disaster management act, „critical system components" covered by the regulations about critical systems and installations or related to "dangerous activities", or the "transportation of dangerous goods".

Dangerous activities are, in the application of the disaster management act (art. 3 §. clause 31.) *"is an activity carried out by using industrial, biological (agricultural), chemical procedures, which, if it becomes uncontrolled, can endanger massively human health, the environment and the safety of life and security."*

Hazardous activities (as stationary sites) can be classified in terms of industrial safety basically as follows: activities related to dangerous substances and goods; activities related to hazardous wastes; activities related to radioactive materials and hazardous mining activities.

The transportation of hazardous goods (as mobile hazard sources) are differentiated in almost all technical literature in Hungary by transportation on public road, by railway, inland waterways and air transport.

Critical systems are defined in Act CLXVI/2012 on the identification, selection and protection of critical systems and installations in the explanatory provisions (1. § clause g) as follows: *„a system component of systems, assets, installation belonging to one of the sectors defined in the annexes 1-3, that are essential for the completion of social tasks, thus in particular for healthcare, for the personal safety and security of the public, for economic and social public services, which, in case of their unavailability, due to the lack of the continuous completion of these tasks would result in major consequences,"*

Critical system elements can be assigned according to the law to 10 main groups: energy, transportation, agriculture, healthcare, finances, industry, information and communication technologies, water, law and order, government and public safety and defense.

Following the aforementioned concept, on figure No. 1 the principal summarized results of the classification of activities (based on aspects of industrial safety) that pose risks of manmade disasters are illustrated.

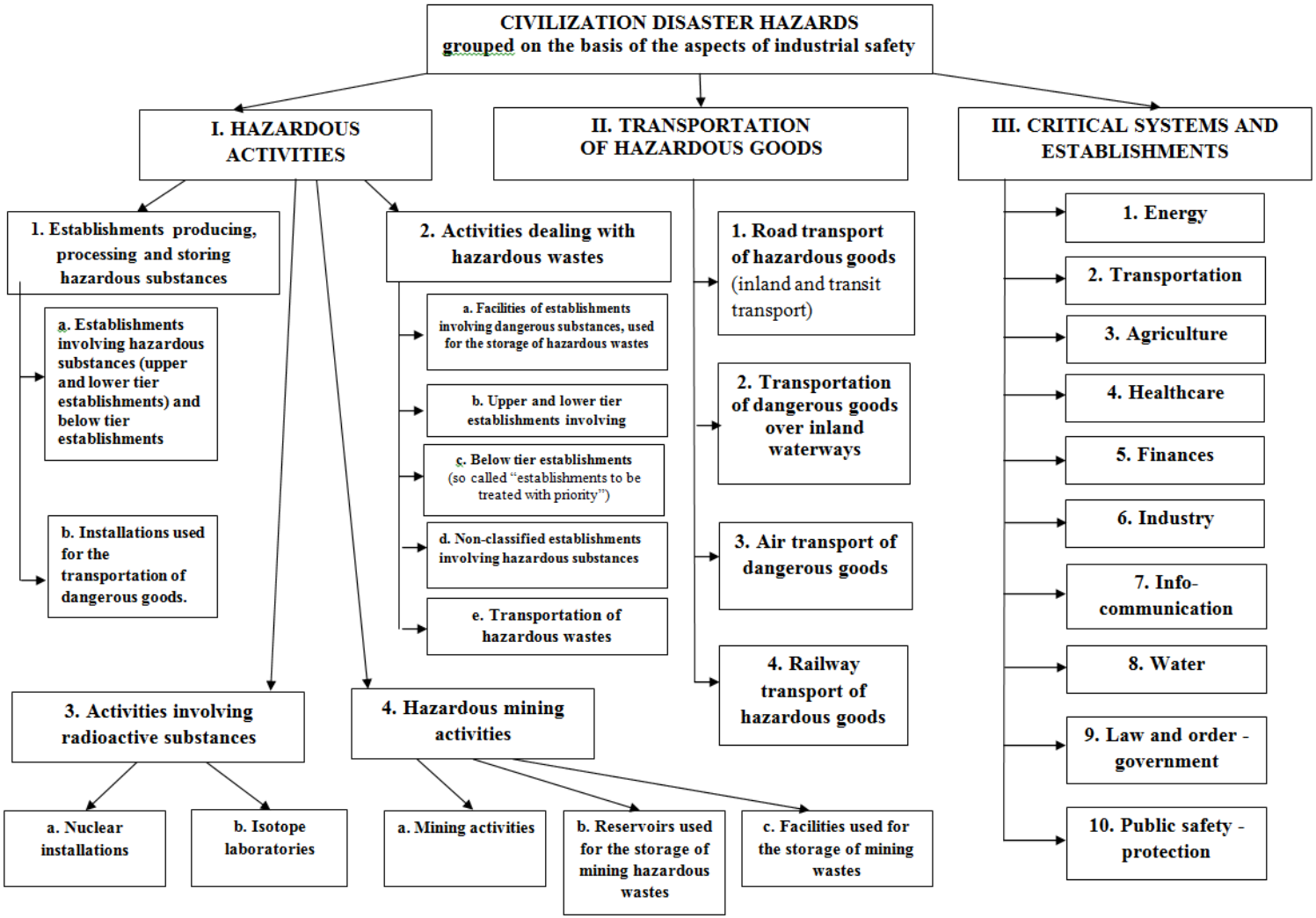

Figure 1. Classification of the civilization disaster hazards (prepared by the author)

Hereinafter I will cover the general evaluation of the hazards posed by hazardous activities in Hungary. The next figure shows the classification of Hungarian Hazardous activities.

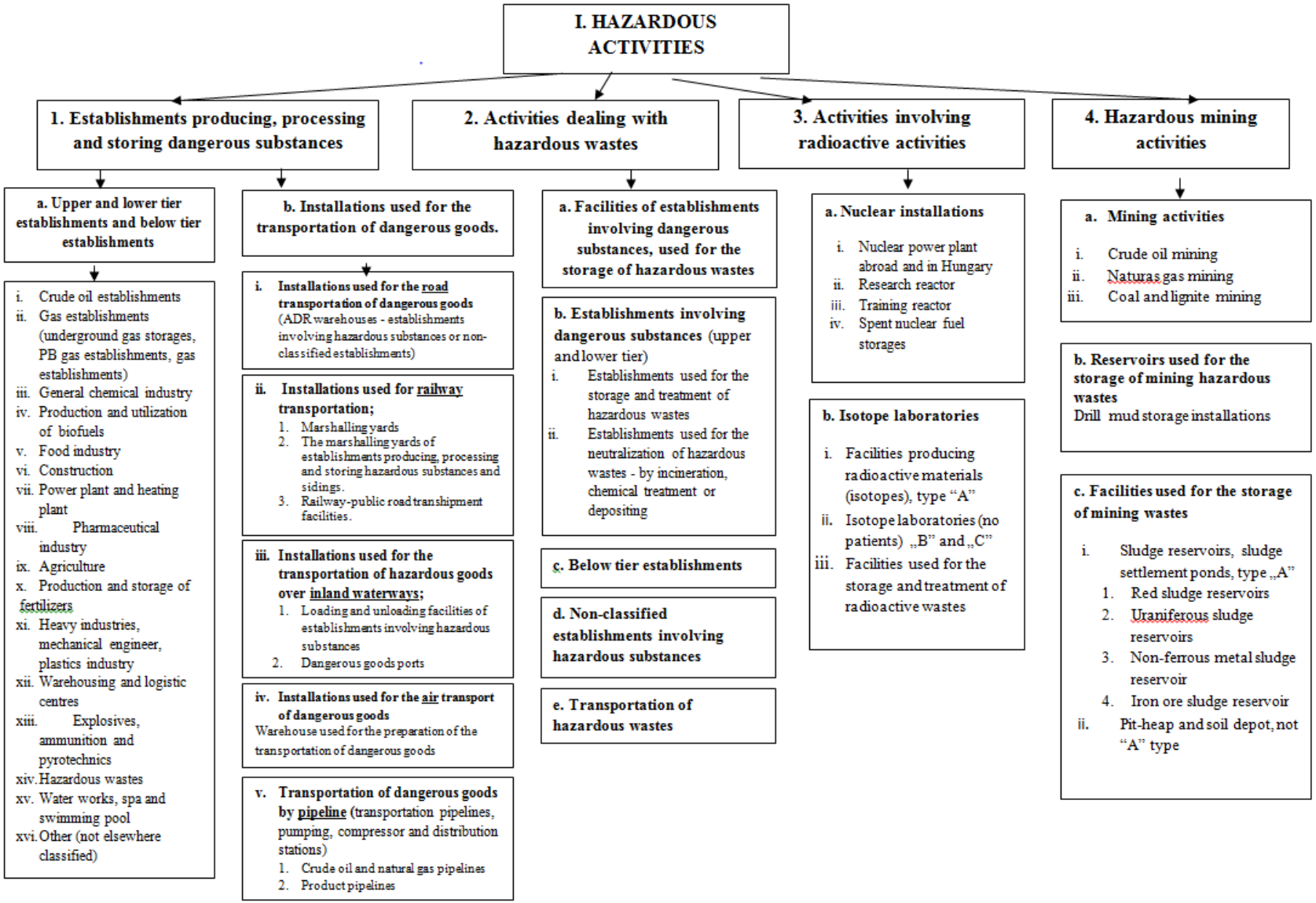

Figure 2. Classification of Hungarian hazardous activities (prepared by the author)

6.2 Production, storage and processing of hazardous substances

In the course of major accidents happening during the production, storage, processing of dangerous substances (goods) there can be fire, explosion, substances harmful for the health and environment might be released into the air or watercourses, thus endanger the public and the environment. The harmful effects of fire and explosions will most probably cause damage in the direct vicinity of dangerous establishments only, harming human health or the environment, within a very short time after the accident. The release of dangerous substances into the air, depending on the type, quantity, physical properties, the meteorological, surface and other conditions, can cause danger several or in extreme case several tens of kilometers far away from the location of the accident. This takes, according to my experience, several tens of minutes, maybe hours. In case of substances with permanent effect the effects can be long-lasting, occasionally even for decades [2].

In Hungary, because of the hydrography of the country, dangerous substances can get into watercourses because of incidents, low technological level of operation or human mistake. The effects of the catastrophic contamination of living waters can last for several days, maybe even several weeks, and the danger can emerge even several hundreds of kilometers far away. As 95% of the water catchment area of Hungarian rivers is located outside of our borders, in the course of the preparation it is not enough to consider only dangerous industrial establishments located in Hungary.

Explosions happening in the course of major accidents, radiating heat, or burning materials emitted can trigger, within or outside of the establishment, further major accidents (domino effect) and can cause massive panic resulting in major consequences.

From the four main groups of dangerous activities first I have checked the activities involving dangerous substances and dangerous goods in terms of industrial safety.

In the field of the production (manufacturing) storage and processing of dangerous substances and goods, activities designated as installed establishments can be divided into two main groups.

Establishments involving dangerous substances covered by the rules regulating major accident prevention, and so called below tier establishments belong to the first group. The establishments involving dangerous substances, the so-called „Seveso establishments" mean dangerous activities identified in line with the rules of the Seveso II. Directive. Based on the definition of the disaster management act (3 §, clause 28) the establishment involving dangerous substances *"is the complete area under the management of an operator, where, in one or more installations involving dangerous substances, common or related infrastructure included, there are dangerous substances present in quantities reaching the tier value specified in the legal regulation issued for the implementation of the present act.*"

Establishments involving dangerous substances can be assigned on the basis of the methodology listed in the implementing regulation, annex 1, to lower and upper tier categories. The basis of categorization is the quantity of dangerous substances at the sites (including also materials that will expectedly be produced because of the runaway reaction of the process) and their danger categories [6]. Dangerous substances (chemical agents and formulations) are assigned to danger categories in line with Act XXV/2000 on chemical safety and the related implementing regulation.

As of January 1, 2012, in addition to the lower and upper tier establishments involving dangerous substances covered by the Seveso II Directive also the procedures and obligations applying to the operators of below tier establishments have been added. The new regulation (Disaster management Act Chapter IV. and its implementing regulations) impose, in addition to the existing regulations, obligations on operators as well, at whose sites there are dangerous substances in quantities exceeding one fourth of the lower tier quantity specified in the regulation but not reaching the lower tier level and on operators of installations that shall be handled with priority. The sites, where chlorine or ammonia is present in quantities of at least 1,000 kg, where hazardous wastes are neutralized by incineration, and installations used for the transportation of hazardous wastes, dangerous substances beyond the battery limits are also included in this group [3].

Installations used for the transportation of hazardous goods that are, as main rule, not covered by the Seveso II. Directive belong to the second group of activities. When regulations were amended in Hungary in the year 2012, the codifier extended the effect of the regulations over establishments involved in the temporary storage of hazardous goods and installations used for the transportation of hazardous goods by pipeline.

However in the practice of the application of law in Hungary marshaling yards and ports are an exception. As the authority regards switching yards and ports to be part of the transportation activity, they are not yet deemed establishments involving dangerous substances. In connection with the modification of disaster management regulations the codifier subjected these activities to authority inspection. However the licensing and supervising activity at dangerous establishments and the application of emergency plans are still missing.

The dangers resulting from the dangerous establishments installed can be most simply demonstrated by the application of a GIS tool (danger map or hazard map).

The Major Accident Hazard Bureau working at the Joint Research Center of the European Commission has prepared, in line with the Seveso II. Directive, Art. 13 on trans-boundary effects, the Seveso Plants Information Retrieval System (SPIRS). “Seveso establishments” can most simply be typed on the basis of the SPIRS system. In the SPIRS system - irrespective of the actual dangers of the dangerous establishment, the danger resulting from lower tier establishments is demonstrated by a circle with a diameter of 2 km, and in case of upper tier establishments by a circle with a diameter of 5 km [4].

In the practice of the application of the law in Hungary the elements of SPIRS are integrated into the Industrial Accident Information System (hereinafter: IAIS) of the disaster management authority. IAIS includes, in addition to the Seveso establishments, also the basic data of below tier establishments, like their geographic location (address of the site), their status (lower, upper tier and below tier) or the industrial classification of the dangerous establishment.

Based on the IAIS the establishments producing, processing and storing dangerous substances can be assigned to a total of 17 groups (activities). The activities of the IAIS, because of the characteristics of below tier establishments, are not fully in conformity with the SPIRS classification. The disaster management authority sends every year the list, address, status and activities of the establishments to the Joint Research Centre of the European Commission.

The classification of below tier establishments is identical with that of Seveso establishments, with the difference, that among below tier establishments there are "installations to be handled with priority". In these hazardous activities the 25% threshold of the lower tier is not considered. The establishments, where there is at least 1,000 kg of chlorine or ammonia present, if these establishments are not establishments dealing with dangerous substances, belong to the group of below tier establishments. The installations used for the transportation of dangerous substances by pipeline are registered as installations used for the transportation of hazardous goods, while installations used for the neutralization of hazardous wastes by incineration are recorded among establishments involving hazardous wastes.

Based on the data of MI NDGDM the number of 169 lower and upper tier establishments covered by the regulations before 2012 increased by 37% because of the new regulation taking effect. In Hungary, as of July 2013, there are 129 lower tier, 97 upper tier and 509 below tier establishments and 3 more establishments are being constructed. There are further 537 below tier establishments under the effect of the new regulation, and accordingly there are already 758 dangerous establishments covered by the disaster management act and by its implementing regulation.

The upper tier establishments covered by the agreement of the UN Economic Commission for Europe about the trans-boundary effects of industrial accidents are located along the Slovakian and Ukrainian border. The number of dangerous activities identified within a 15 km zone of the state boundary is 9, whereas the number of activities identified in the water catchment areas and endanger Croatia and Serbia is 14 [5]. The Hungarian Disaster Management authority is responsible for the implementation of the technical, bilateral and multilateral provisions of the UN ECE international piece of legislation. The technical information provided for the purposes of the bilateral cooperation is written in safety documentation handled in by the operator of the upper tier establishments dealing with dangerous substances [6].

Installations used for the transportation of hazardous goods belong to the second main group of the so called "fixed" establishments involving dangerous substances. Installations used for the transportation of hazardous goods can be divided into five groups in line with the transportation methods, as follows: Installations used for the road transportation of hazardous goods; Installations used for railway transportation; Installations used for the transportation over inland waterways; installations used for the preparation of air transport; Installations used for transportation by pipeline.

As installations used for the road transportation of hazardous goods warehouses used for the storage of hazardous goods in ADR packaging are recorded. Almost all warehouse facilities that are of great significance in terms of logistics are located in the agglomeration of Budapest. This is otherwise also logical, as most of the consumption and business life is concentrated in Budapest and in its direct surroundings. From this region the products desired can be transported to any point of the country within 2-3 hours [7].

Installations used for railway transportation are first of all marshaling yards that do not belong to the group of establishments involving dangerous substances. These installations shall prepare an internal emergency management plan in line with "Regulation concerning the International Carriage of Dangerous Goods by Rail, RID" 1.10 and this plan regulates basically the consequence mitigation and prevention rules of the Seveso Directive applied to safety reports. On the basis of the data of Hungarian Railways identified a total of 14 yards in the area of Hungary, the most significant ones are the yards in Budapest (Ferencváros), Miskolc, Szolnok and Záhony [8].

Another major type of the installations of rail transport are the switching yards and sidings of establishments producing, processing and storing dangerous substances. Switching yards located in the area of establishments involving dangerous substances or in the area of below tier establishments or sidings closely related to the sites pose major hazards. Sidings connected to sites can cause individual and significant dangers, as there is a high number of wagons there without any physical protection, without the supervision of the operator and of the authority.

Railway-public road transshipment facilities can be establishment dealing with dangerous substances or establishments not classified. The most significant operating establishment is in Budapest (Bilk Kombiterminál Zrt.). During the transshipment of containers the fact that the safety of containers arriving at the terminal depends on the variable quality of dispatch in Hungary or abroad and on the technical condition of the wagons is a frequent problem.

Loading and unloading facilities of establishments involving dangerous substa nces and ports dealing also with dangerous substances are registered as installations used for inland waterway transportation. In Hungary there are loading and unloading installations at the petroleum port in Csepel (MOL Csepel base site, and Oil Tanking Kft), at MOL Plc. Danube Refinery in Százhalombatta and at the site of Lukoil in Dunaföldvár [9].

In case of the facilities used for the preparation of air transport the warehouses used for the storage of dangerous goods at the airport (Liszt Ferenc Airport) are registered, which cause, due to the relatively low material quantities, no significant danger compared to other transportation methods.

Prevention, preparedness and response measures in connection with the protection against major accidents involving dangerous substances.

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).

Our country undertook as of January 1, 2002 to integrate the Seveso II. Directive into the legal regulations of Hungary and to implement the provisions specified in the same until the date of the EU accession. The directive (2003) took effect in 2006 in Hungary with the objective of the prevention of major industrial accidents involving hazardous substances, to mitigate its effects on man and environment, and to ensure a high-level of protection in a consequent and efficient way on the territory of the European Community. The UN ECE Convention on Industrial Accidents introduced simultaneously with the Seveso regulation handles also the transboundary effects and consequences of industrial accidents potentially occurring in upper tier establishment using dangerous substances identified according to the Seveso II. Directive.

One of the triggers of the changes in legal regulations between 2010-2011 serving for the improvement and development of the disaster management system was the strengthening and establishment of more efficient protection against major accidents involving dangerous goods. Recent events, like the industrial catastrophe caused by the damburst of the mining waste reservoir in the outskirts of Ajka on October 4, 2010 or major accidents that happened in establishments processing hazardous wastes, in meat processing establishments, in establishments using chlorine and in establishments handling pyrotechnic products have contributed to the changes of the disaster management regulations concerning the legal field of industrial safety.

Disaster management act and the regulation 219/2011 (X. 20.) on the protection against major accidents involving dangerous substances (hereinafter: implementation regulation) - in line with the Seveso II. Directive - clearly define the scope of activities covered by the regulations, the tasks of the authorities related to the activities, the tasks of the operators of dangerous establishments, of the government and municipalities related to the prevention of and preparation for major accidents, and to the emergency management of the same and also the obligations related to the information to the public. There are new tasks and competences of industrial safety specified in the disaster management act and in the implementing regulations: extension of the rights of the disaster management authorities (licensing, supervision, inspection) over establishments below the lower threshold level; introduction of new legal institutions (emergency management fine, administration service fee); disaster management tasks of the protection of critical infrastructure; making the authority activities and procedures more simple and efficient; extension of the controlling and fining authorisations of the disaster management authority with regard to the transportation of dangerous goods by rail, air and inland waterways. [3]

The last modification of the Seveso II. Directive was necessary among others to adapt the Seveso regulation to the CLP regulation (Regulation 1272/2008/EC of the European Parliament and Council on the classification, labelling and packaging of materials and blends). The directive 2012/18/EU of the European Parliament and Council (Seveso III directive) on the management of the hazards of major accidents involving dangerous substances and on the modification and latter cancelation of directive 96/82/EC has been adopted on July 4, 2012. The Seveso III. Directive shall be introduced by the EU member states and thus also Hungary by the end of May 2015.

The implementation regulation includes the definition of the transportation of hazardous substances by pipeline (as establishment to be handled with special attention). Transportation pipelines, pump, compressor and distribution stations belong to this group, with the exception of the distribution pipelines used for natural gas supply to the public, and the collection pipelines with a nominal diameter below 400 mm used for hydrocarbon mining.

The Disaster Management Act requires the operators of hazardous establishments to demonstrate that their activities do not pose an unacceptable hazard to the population, material assets and the environment, and that they made every reasonable effort to prevent major accidents and reduce their effects. Depending on the hazardous impact, the operator can be required to provide data, prepare safety reports, safety analyses or serious damage prevention plan, and an internal protection plan for the site (as part of the safety report or safety analyses), ensure the conditions for carrying out the responsibilities specified in the internal protection plan, information of the population on the hazardous activities, potential hazards to the population and protection measures taken.

The plants subject to the Disaster Management Act shall assess the realistic possibility, probability, causes and conditions of major accidents on grounds in the documentation submitted to the authorities. These assessments shall describe the external or internal causes of accidents, and the probable stages of the course of accidents. The operator may use any method to identify the risks and assess the risk of major accidents that are used in the international practice and generally recognised by the professional community. The most widespread method used in Hungary is the quantitative risk assessment method [2]

The operator of a dangerous establishment shall draw up an internal emergency plan meeting the requirements of content and form determined in national legislation to eliminate the consequences of hazards identified in the safety report and safety analysis. The operator shall provide conditions necessary for the accomplishment of tasks defined in the internal emergency plan. The task within the hazardous establishment for limiting the consequences of major accident involving dangerous substances shall be determined by the operator, while the tasks outside the hazardous establishment of the concerned state and municipal organs shall be determined in external emergency plans. An important step in the evaluation of the risk assessments submitted in the safety documentation is to compare the risk indices calculated on the basis of these assessments with the authorization criteria defined in the legislation. The most important authorization criteria are the value for individual risk and social risk.

According to the national legislation in force, the responsibilities of the National Directorate General for Disaster Management (NDGDM) and of the 20 regional directorates, established in the protection against major accidents involving dangerous substances, include the operation of the administrative authorization system and the supervision and control system for the plants subject to the Seveso II Directive and for below tier plants (establishments under lower-tier threshold is 25%). The preparation of the external emergency plans is the duty of the competent local organs of the NDGDM with the cooperation of the mayors of the relevant localities endangered. The cost of the preparation of external emergency plans and their exercise are provided in the own budget of the NDGDM [3]

6.3 Activities dealing with hazardous wastes

Among activities involving hazardous substances own temporary storage facilities used for the storage of hazardous wastes produced at establishments involving hazardous wastes are listed. There might be hazardous wastes produced in below tier establishments, and in low quantities at a high number of non-classified sites.

The hazardous wastes accumulated in these facilities are assigned to hazardous waste categories on the basis of the environmental regulations and are transported to neutralization plants or to other sites specializing in the preparation and collection of hazardous wastes. The classification of hazardous wastes according to European Waste Catalogue (EWC), is, based on the KöM (Ministry of the Environment) regulation No. 16/2001 (VII. 18.) the task and duty of the producer. Classification is influenced also by other objective aspects and interests. If a waste is hazardous or not, is determined by the aforementioned KöM regulation, according to the presence of components expressed in % and characterized by R-phrases. New hazardous wastes or hazardous wastes with unknown composition can be classified on the basis of the composition and hazard parameters. Based on the production technology of wastes (statistical approach), the EWC systemizes wastes in predefined groups. In the technical content of these groups some of the exact physical, chemical and other parameters applied in ADR can be found in exceptional cases only.

Among the neutralization activities, from the point of view of hazards, establishments neutralizing hazardous wastes by incineration are regarded most dangerous. There is just a low number of hazardous waste incineration plants in Hungary, the most significant ones are in Dorog, Győr, Sajóbábony, Balatonfüred, Tiszaújváros and Tiszavasvár.

Among the activities involving hazardous wastes the ones that are most significant from the point of view of hazards are subject to the regulations about the prevention of major accidents.

One of the unresolved questions of the last decades is environmental safety, and within this the handling of hazardous wastes as independent hazard sources. In Hungary several millions of hazardous wastes are produced every year. The quantity of industrial wastes and liquid and sludge-like hazardous wastes drops, while the quantity of solid hazardous wastes increases. Some 30% of the hazardous wastes recorded (based on the calorific value) can be combusted. Other wastes need further treatment, first of all physical, chemical, biological decontamination, whereas unavoidable residues require professional disposal. Some 0.5-0.7 % of domestic solid wastes are hazardous wastes [4]

In my opinion hazardous wastes are first of all an environmental and health problem and jeopardize mainly the environment, human health is only indirectly endangered. The risk of danger occurs in case of the various environmental elements, usually as permanent environmental pollution.

6.4 Activities involving radioactive substances

Activities dealing with radioactive substances can be divided in terms of industrial safety into two main groups: nuclear installations and isotope laboratories.

Nuclear installations.

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 [3].

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. [3]

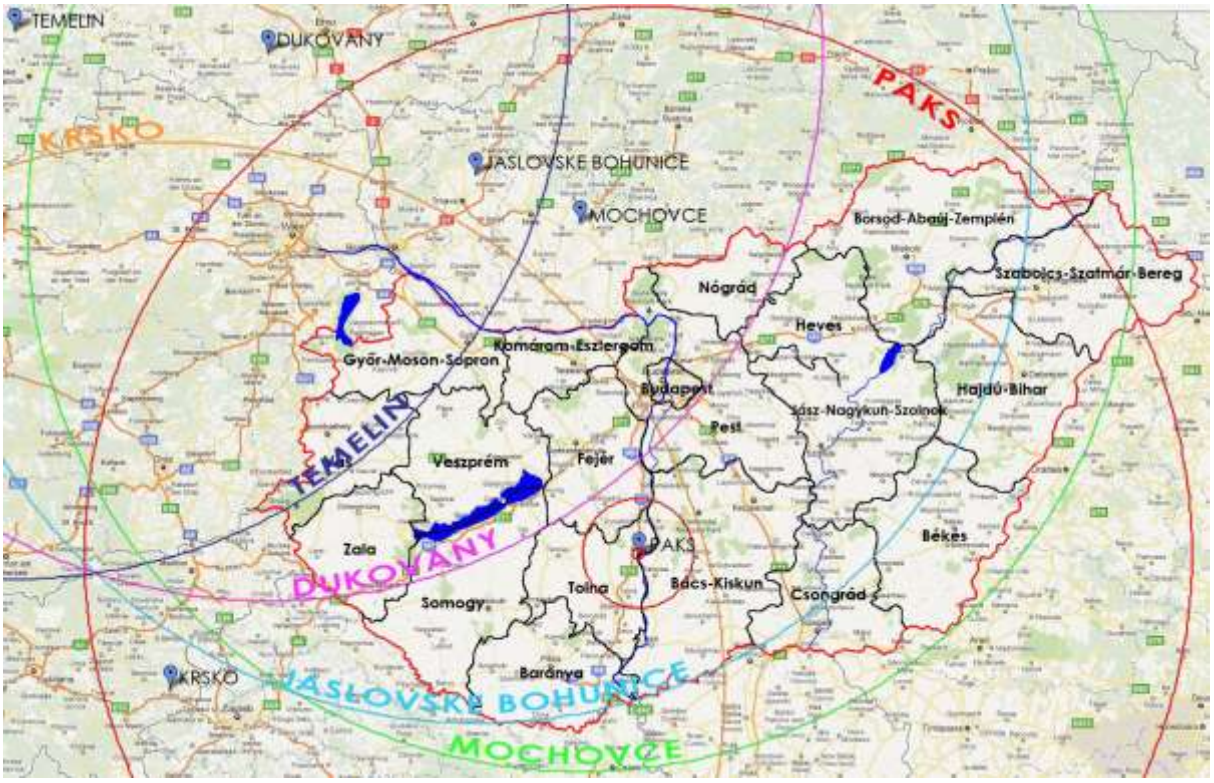

Figure 3. Nuclear hazards in Hungary [3]

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 [13].

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. According to the Government Decree 275/2002 (XII.21.), which established the NERMS, its main tasks are the determination of the radiation burden of the Hungarian Population arising from either natural or artificial sources, and the collection of activity concentrations measured in the environment.

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.

Facilities producing radioactive materials (isotopes).

Based on the data of MI NDGDM there is a total of 33 pieces of „B” and „C” category isotope laboratories with no patients working in the country, which pose only limited danger to their environment in terms of disaster management. There are 12 installations, mainly medical and industrial gamma-irradiators, which contain relatively large amount of radioactive material (Co-60), but the consequences of incidents with these sources would surely be limited to the immediate vicinity of the event.

The aspects used for the civil defense classification of isotope laboratories depend mainly on the classification of the laboratory (A, B, C levels), and on the category of importance of the installation (priority, I., II., III. category). In addition to the aforementioned aspects the factors of the activities of laboratories dealing with radioactive substances posing a risk to the public influence the classification as well. The EüM regulation No. 16/2000 (VI. 8.) on the implementation of the Nuclear Energy Act No. 1996/CXVI. includes detailed provisions about the aforementioned point.

With regard to the civil defense classification, the establishment of adequate safety systems in laboratories that frequently work with volatile, gas- and steam phase radioactive isotopes with long half-life period, and with toxic radioactive isotopes with long half-time period, and the regular inspection of such laboratories, combined with environmental sampling is highly important.

In addition to radioactivity measurements, in justified cases, the inspection shall be carried out by sampling and by radioactivity analytics, chemical, biological measurement carried out in special laboratories. The frequency of the authority inspections at isotope laboratories is properly described in the regulation 16/2000 (VI.8.) EüM, Annex 7. [3]

6.5 Hazardous mining activities

Mining activities.

I have anticipated in the field of hydrocarbon production the mining of crude oil and natural gas, the primary processing of the raw material takes place still within the battery limits of the mine. In the course of the processing of the produced and imported hydrocarbons intermediate products; fuels and lubricants; and the byproducts of processing (e.g.: bitumen) are produced. Most of the substances are highly flammable and explosive, and can cause major industrial accidents, disasters and environmental disasters.

In the course of the extraction and processing of hydrocarbons the following dangerous situations might arise: danger and environmental damage caused by unexpected bursts during the extraction of crude oil and natural gas, and exploratory drills; fire or explosion, environmental damage during the storage or primary processing of the extracted crude oil and natural gas in the area of the mine; fire or explosion, or environmental damage caused during the processing and storage of imported and extracted crude oil (crude oil refining, production of secondary products (PB gas); fire and explosion, environmental damage during storing and logistic activities (product pipeline).

Major crude oil fields are in Algyő and the oil field in North and South Zala. There are major natural gas fields in Jász-Nagykun-Szolnok, Hajdú-Bihar and Zala County. There are some 700 exploratory and extraction wells, MOL Plc. carries out crude oil and natural gas extraction activities at 5 mining plants, and six business organizations specialize in crude oil exploration. In Zala, in the course of crude oil extraction the danger of fire and explosion, and the potential release of carbon dioxide used in high quantities can be anticipated. Toxic gases that are harmful for human health (H2S) that are more heavy than air and that are released in a mixed condition, can jeopardize several settlements and several thousands of people for several days due to the local relief conditions and in case of unfavorable weather conditions. The extracted crude oil and natural gas and significant quantities of the PB gas produced are stored in 5 underground gas storages (e.g. gas storage in Pusztaedecser in Zala) at 8 PB gas filling sites and in above-ground facilities (e.g. PB gas storage in Algyő - 30,000 m3). Among the industrial plants processing crude oil the white and black storage capacities of the Danube, Tisza and Zalaegerszeg refineries are significant.

The danger related to hydrocarbon transportation pipelines is covered in the subchapter “Transportation of hazardous goods”, but due to its nature it shall be mentioned here. In case of transportation pipelines the starting and relay stations and process installations used for operation (e.g. pressure booster, loading, unloading etc. stations) pose major hazards. The exposure to dangers results mainly from above-ground installations, where the accidents and disasters described in the chapter about dangerous industrial installations might happen.

Coal and lignite mining pose no special hazard in terms of industrial safety. The facilities used for the storage of crude oil drilling mud considered hazardous waste can pose a danger to the environment [4].

Facilities used for the storage of mining wastes.

Facilities used for the storage of mining wastes can be divided into two main groups: (1) sludge reservoirs and sludge settlement ponds and (2) pit-heaps and soil depots. Sludge reservoirs are divided into four main groups according to the raw material extracted: (1) red sludge reservoirs (2) spent nuclear fuel storages (3) non-ferrous sludge reservoirs and (4) iron ore sludge reservoirs. The wastes produced in the course of coal and lignite mining are stored on pit-heaps and on soil depots. According to the records of the NDGDM there are 400 facilities for the storage of mining wastes in Hungary and most of them are not classified. The total number of qualified "A" type facilities is 12 pieces. Some storages e.g.: the red sludge storage in Ajka is split into several cassettes. The disaster management authority pays special attention to the safety of facilities used for the storage of mining wastes following the industrial disaster in Kolontár.

In connection with the dam break of the red sludge reservoir on October 4, 2010 in Kolontár the Environmental Chief Inspectorate of the European Commission (EiB) sent an official notice on October 22, 2010 regarding the disaster at the site of MAL Zrt. in Ajka. EiB asked for information among others on the classification under 96/82/EC Council Directive (Seveso II.) about the inspection of hazards of major accidents related to dangerous substances. With regard to the applicability of the Seveso II. Directive the European Commission accepted in its reply the standpoint of MI NDGDM, as Hungarian authority, namely that the red sludge and sodium hydrate do not qualify as dangerous substances under the Seveso II, thus the installation is not covered by the Directive.

The first step in Hungary in the elimination of deficiencies affecting environmental and mining law identified and complained by the European Commission was the amendment of regulations in Hungary regarding mining wastes. In the topic of mining wastes the Hungarian Parliament has adopted Act CLXXXI/2010 on the amendment of individual energy acts and of Act LXXVIII/1997 on the alteration and protection of the built-in environment. According to the law, the Mining Act No. XLVIII/1993 was amended as of January 1, 2011. Certain parts of the amendments were aimed at the conformity with the Directive No. 2006/21/EC (March 15, 2006), namely the treatment of wastes produced in the mining of minerals.

Accordingly the effect of Act No. XLVIII/1993 covers mining wastes (wastes produced during mining and red sludge produced during the processing of bauxite).

The competence of the Mine Inspectorate was extended by authority procedures related to the management of mining wastes and to the construction, commissioning and operation, closing and aftercare of related facilities and installations. Resulting from the change of the legal regulations, the regulation No. 267/2006 (XII. 20.) on the Hungarian Office for Mining and Geology has been amended, and this allows the disaster management authority to participate, as specialized authority, in the construction and occupancy licensing procedure to check the internal emergency management plan. With the amendment of the GKM regulation No. 14/2008 (IV. 3.) GKM (Ministry of the Economy and Transportation) the regional organizations of MI NDGDM will prepare, revise, along with the majors of the settlements concerned, the external emergency plans serving for the protection of the settlements and have them drilled.

With the modification of the regulation of mining rights, with the introduction of external emergency response actions, there is a possibility to manage the coordinated activities of disaster management, and of the state and municipal organizations involved in the rescue and emergency response.

6.6 Transport of hazardous goods

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% or 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 33 700 million tonnes of km main road transport and 8 800 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 our country 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.

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 figure below 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%).

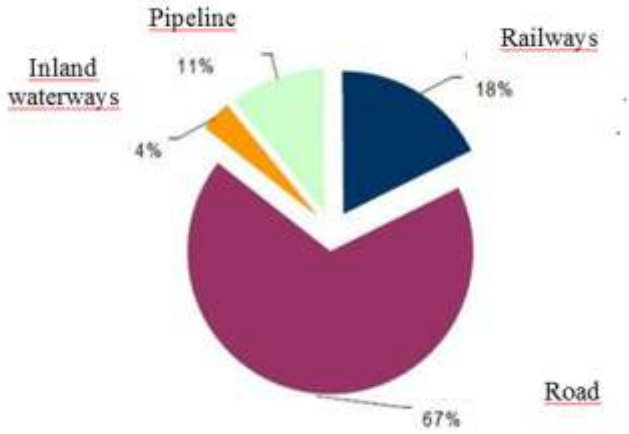

Figure 4. Share of goods transport capacity in Hungary (2011) Source: www.ksh.hu

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.

Risk reduction measures stated in Hungarian regulations.

The main road transport of dangerous goods are 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.

The rules of the standardized procedure applying to the inspection of dangerous goods and to the fines to be imposed in the course of the actions of the professional disaster management organization and the amount of fines that can be imposed in case of the violation of the rules and the general rules of authority tasks related to fines are stipulated in Gov. Decree No. 312/2011. (XII. 23.) .

The local organization of the disaster management authority has the right to carry out inspections within the competence area of other disaster management authorities based on previous approval [8]

6.7 Critical infrastructure protection

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 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 [10]

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 registration authority;
- proposing authority in case of the sector within its scope of tasks;
- coordination of authority inspections;
- Operation of a CIP Information Security Event Management Center in order to respond to events related to network safety;
- management of extraordinary events;
- CIP POC tasks [10]

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 (hereinafter: MI NDGDM) was given authorization. In the implementing regulation IM NDGDM is appointed, in terms of certain functions (public order, public security, protection of the public, national security, counter-terrorism) also as proposing authority.

The rules related to network safety are covered in a regulation on the tasks and scope of the event management center of critical systems and installations and of the governmental and branch-related event management centers of electronic information systems (Gov. decree No. 233/2013 VI.) 30.) MI NDGDM operates an event management center under the name Event Management Center of Critical Systems and Installations in order to carry out activities ensuring the network safety of national critical systems and installations. The minister in charge of disaster prevention supervises the center.

Within the scope of the tasks of the National Chief Inspectorate for Industrial Safety operating in the organization of the MI NDGDM since January 1, 2012 the protection of critical infrastructure is a preferential area.

The minister of the interior is in charge of the tasks of the national liaising officer and coordinator as ECIP contact point. Furthermore the minister of the interior is in charge of the coordination of the civil crisis management, disaster management tasks and the tasks of critical infrastructure protection on government level, and prepares in particular the legal rules related to the critical elements of infrastructure. [10]

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. By the end of March 2014 the following branch-related regulations have been adopted by the government of Hungary:

- Gov. decree No. 360/2013 (X. 11.) on the identification, selection and protection of critical systems and installations in the energy sector;
- Gov. decree No. 512/2013 (XII. 29.) on the identification, selection and protection of the critical systems and installations of individual police organizations and on the amendment of the regulation No. 329/2007 (XII. 13.) on the organizations of the police and on the tasks and scope of police organizations;
- Gov. decree No. 540/2013. (XII. 30.) on the identification, selection and protection of critical agricultural systems and installations;
- Gov. decree No. 541/2013. (XII. 30.) on the identification, selection and protection of critical water management systems and installations and hydraulic structures.

The aforementioned regulations are already effective and the period for the completion of operator tasks has started. With regard to the other sectors the implementing regulation is still in the regulatory phase.

Based on the implementing regulation, the safety liaison person shall have the professional qualification relevant for the sector concerned. The safety liaison person, in addition to the professional qualification relevant for the sector concerned, shall also have a college or university degree obtained at a faculty for emergency management or police administration; a professional qualification as police administration manager specializing fire safety, industrial safety, civil protection or equivalent; a completed course for industrial safety; university or college degree at a course for industrial safety or a practice of at least 5 years in the field of industrial safety, spent at professional disaster management organizations.

After July 1, 2018, the safety liaison person, in addition to the professional qualification relevant for the sector concerned, shall also have a college or university degree specializing in industrial safety and relevant for the sector concerned, or a practice of at least 5 years in the field of industrial safety, spent at professional disaster management organizations. Qualification in industrial safety can be obtained at the foundation course for industrial safety that was started at the Disaster Management Institute of the National University of Public Service in the year 2013 for the first time. At this course, in addition to general disaster management, fire prevention and emergency management also so-called industrial safety is part of the curriculum.

The special knowledge about industrial safety cover also the safety of hazardous plants and dangerous shipments, the response to events occurring in the presence of hazardous substances, response to nuclear accidents and the protection of critical systems and installations. [11]

6.8 Conclusions

In the article the dangers resulting from hazardous activities in Hungary covered by industrial safety regulations, being part of disaster management have been generally analyzed. The evaluation of the activities in Hungary that pose risks of disaster, based on the aspects of industrial safety can essentially be found in case of establishments involving dangerous substances only, where dangerous establishments have maps illustrating the individual risk of fatalities and the hazard zones of establishments will be integrated into the land-use plans. The data base of MI NDGDM (IBIR) offers adequate possibilities for the extraction of statistical data. The results of the hazard analyses are available for each establishment in the safety documentation, however the maps applied there are not standardized. The data of events related to industrial safety are also separately recorded, and these records shall continuously be updated to prepare executive summaries and reports. With regard to sludge reservoirs and isotope laboratories there is a separate registration not linked to central data bases. In terms of nuclear hazards we are aware of precautionary action zones established empirically. These zones are visualized as map as well.

All in all it can be stated that most of the activities covered by industrial safety regulations in Hungary are visualized on so-called hazard maps, where data can be analyzed as to the main parameters and location of the hazard source. The danger maps corresponding to the quantitative risk criteria are available in case of the establishments involving dangerous substances, but at the present they are not visualized on the GIS platform. The identification of activities that pose risks of manmade disasters (hazard identification), the creation of standardized data bases, the completion of hazard analyses, the visualization of the results on maps are the continuous task of disaster management organizations. It is possible to develop mainly by bundling the authority and professional data bases and by standardized data handling. 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.

References – Chapter 6.

[1] Kátai-Urbán L. – Vass Gy. 2013a: Development of Hungarian System for Protection against Industrial Accidents. *In: Jozef Ristvej (eds.) 18. medzinárodná vedecká konferencia Riešenie krízových situácií v špecifickom prostredí. Zilina, Slovakia, 2013.06.05-06. (ISBN:978-80-554-0699-2) University of Zilina* pp. 229-239.

[2] Szakál, B – Cimer Zs. - Kátai-Urbán, L. – Vass Gy. 2013: Industrial Safety II. Consequences and Risks of Major Accidents involving Dangerous Substances. (Iparbiztonság II.: A veszélyes anyagokkal kapcsolatos súlyos balesetek következményei és kockázatai.) Budapest: TERC Kereskedelmi és Szolgáltató Kft., 2013. 182 p. (ISBN:978 615 5445 002)

[3] Bognár, B. - Kátai-Urbán, L. - Kossa, Gy. - Kozma, S. – Szakál, B. – Vass, Gy.: Kátai-Urbán L. (eds.) 2013. *INDUSTRIAL SAFETY I. Handbook on Implementation's Tasks of Operators and Authorities. (IPARBIZTONSÁGTAN I.: Kézikönyv az iparbiztonsági üzemeltetői és hatósági feladatok ellátásához.)* Nemzeti Közszolgálati és Tankönyvkiadó, Budapest p. 564 (ISBN:978-615-5344-12-1)

[4] NDGDM 2011. National Report on Disaster Risk Assessment, National Directorate General for Disaster Management Ministry of the Interior (Nemzeti Katasztrófakockázat Értékelés, BM Országos Katasztrófavédelmi Főigazgatóság,) National Directorate General for Disaster Management Ministry of the Interior, Budapest p 140

[5] NDGDM 2012. Country Report on the Implementation of UN ECE Convention of Transboundary Effects of Industrial Accidents. (Országjelentés az ipari balesetek országhatáron túli hatásairól szóló ENSZ EGB egyezmény magyarországi alkalmazásáról), National Directorate General for Disaster Management Ministry of the Interior Budapest p 20.

[6] Kátai-Urbán, L. – Vass Gy. 2013, Possible Content of the Information Required by the Provisions of the UN ECE Industrial Accident Convention. (Ipari baleseti ENSZ EGB egyezmény előírásai szerinti adatszolgáltatás lehetséges tartalma.) BOLYAI SZEMLE (ISSN: 1416-1443) XXII.: (3) pp. 115-126. (2013)

[7] Kátai-Urbán L. – Szabó Á. 2013 Activities of Dangerous Goods Logistics Sector in Hungary. (Veszélyes áru raktárlogisztikai szektor tevékenysége Magyarországon.) *BOLYAI SZEMLE (ISSN: 1416-1443)* **XXII.: (3)** pp. 227-235.

[8] Horváth H. - Kátai-Urbán L. 2013 Assessment of the Implementation Practice of Emergency Planning Regulations Dedicated to the Rail Transportation of Dangerous Goods. *ACADEMIC AND APPLIED RESEARCH IN MILITARY SCIENCE* **12:(1)** pp. 73-82.

[9] Kátai–Urbán L. - Kiss E. 2014: Inspection of the Transportation of Dangerous Goods by Inland Waterways in Hungary. *ACADEMIC AND APPLIED RESEARCH IN MILITARY SCIENCE (ISSN: 1588-8789) (eISSN: 1788-0017)* **13: (2)** pp. 261-266.

[10] Kátai-Urbán, L. - Vass, Gy. - Sibalinné Fekete K. 2014: Establishment and Implementation of Hungarian System for Critical Infrastructure Protection. *In.: 19. medzinárodná vedecká konferencia Riešenie krízových situácií v špecifickom prostredí. Zilina, Slovakia, 2014.05.21-2014.05.22. (ISBN 978-80-554-0872-9)* pp. 353-360.

[11] Bleszity, J., Kátai-Urbán, L. 2014: Training of Specialists in the Field of Industrial Safety in Hungary (Подготовка специалистов в области промышленной безопасности в Венгрии) POZHARY I CHREZVYCHAJNYE SITUACII: PREDOTVRASHENIE LIKVIDACIA **11:(2)** pp. 53-58.

[12] Szakál, B. - Cimer, Zs. - Kátai–Urbán, L. – Sárosi, Gy. – Vass Gy 2012: *"Industrial Safety I. Dangerous Substances and their Major Accidents in the Industry and Transportation" (Iparbiztonság I. veszélyes anyagok és súlyos baleseteik az iparban és a szállításban.)* Korytrade Kft. Budapest P. 110. ISBN 978-963-89073-3-2

7. DEVELOPMENT OF HUNGARIAN SYSTEM FOR PROTECTION AGAINTS INDUSTRIAL ACCIDENTS

7.1. International and national legal regulation of the prevention of major accidents in Hungary

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 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]

Our country undertook as of January 1, 2002 to integrate the Seveso II. Directive into the legal regulations of Hungary and to implement the provisions specified in the same until the date of the EU accession. The directive (2003) took effect in 2006 in Hungary with the objective of the prevention of major industrial accidents involving dangerous substances, to mitigate its effects on man and environment, and to ensure a high-level of protection in a consequent and efficient way on the territory of the European Community .[2] The UN ECE Industrial Accidents Convention introduced simultaneously with the Seveso regulation handles also the transboundary effects and consequences of industrial accidents potentially occurring in upper tier establishment using dangerous substances identified according to the Seveso II. Directive.

One of the triggers of the changes in legal regulations between 2010-2011 serving for the improvement and development of the disaster management system was the strengthening and establishment of more efficient protection against major accidents involving dangerous substances. Recent events, like the industrial catastrophe caused by the damburst of the mining waste reservoir in the outskirts of Ajka on October 4, 2010 or major accidents that happened in establishments processing dangerous wastes, in meat processing establishments, in establishments using chlorine and in establishments handling pyrotechnic products have contributed to the changes of the disaster management regulations concerning the legal field of industrial safety.

Act 2011 CXXVIII. on disaster management and on the amendment of individual, related acts (disaster management act) and the regulation 219/2011 (X. 20.) on the protection against major accidents involving dangerous substances (hereinafter: implementation regulation) - in line with the Seveso II. Directive - clearly define the scope of activities covered by the regulations, the tasks of the authorities related to the activities, the tasks of the operators of dangerous establishments, of the government and municipalities related to the prevention of and preparation for major accidents, and to the emergency management of the same and also the obligations related to the information to the public.

There are new tasks and competences of industrial safety specified in the disaster management act and in the implementing regulations listed below:

- Extension of the rights of the disaster management authorities (licensing, supervision, inspection) over establishments below the lower threshold level,
- Introduction of new legal institutions (emergency management fine, administration service fee);
- Disaster management tasks of the protection of critical infrastructure;
- Making the authority activities and procedures more simple and efficient;
- Extension of the controlling and fining authorisations of the disaster management authority with regard to the transportation of dangerous goods by rail, air and inland waterways. [3]

These new tasks and competences and their efficient and successful implementation requires the extension of the previously operated structure of industrial safety and the establishment of an organisation for industrial safety and code of procedure.

7. 2. Emergency management planning system of dangerous establishments

The paramount goal of emergency management planning in Hungary is to create a standardized system of documents by means of the identification and analysis of various endangering factors, containing disaster management tasks and actions with the allocated human resources, finances and technical means. The rules of the preparation of the plans, those obliged to prepare emergency plans, the content of the plans and the order of approval are described in the Government Decree 234/2011 (XI. 10.) on disaster management and on the execution of act CXXVIII. of 2011 on the amendment of related individual acts (Act on Disaster Management).

Emergency management planning helps in every case minimize consequences, where an accident causing serious damage to the environment or to the public can occur. It integrates the order, implementation of disaster management tasks and actions into a standard system, by allocating the necessary human resources, funds and technical means.

The levels of emergency management planning are:

a) settlement emergency plan,

b) workplace emergency plan,

c) the summarized plan of the local organisation of the official emergency management organisation,

d) regional (county or capital) emergency management plan,

e) central (national level) emergency management plan.

In the plans first of all the conditions of emergency management in the course of the dangerous situation and the actions to be taken within a short time after the accident and the key decisions that can significantly influence the success of the mitigating actions. On this basis it is clear that the deep understanding of the probable scenario of the events and of the counter-actions is very useful for those who can play a role in the emergency response and damage control.

In the sense of the IV-th chapter of the Disaster Management Act. the operator of the establishment dealing with dangerous substances prepares an internal emergency plan in order to eliminate the consequences of the dangers described in the safety report (upper tier site) or in the safety analysis (lower tier site).

The provisions of the safety analysis and safety report regarding the prevention and control of major accidents related to dangerous substances shall be elaborated in such a way as to ensure the high-level protection of human health and the environment. To this end it has to cover also the concept regarding the resources and tools, organisation and management system required for an efficient emergency management system.

The safety documentation that includes the internal emergency plan as well, is revised and if necessary modified by the operator in case of an establishment dealing with dangerous substances in the cases stipulated in the execution regulations (government decrees), but at least every five years. The operator sends the result of the revision and the modified safety analysis or report to the disaster management authority. The authority decides on the basis of the safety report or analysis received about the extension of the permit or about requiring prevention or consequence mitigation measures. [4]

7.3 Experiences on control of dangerous establishments

The new legal regulations impose requirements in addition to current regulations on those operators as well whose industrial sites are used for the simultaneous storage of dangerous materials which exceed one fourth of the lower tier limits but do not reach the lower tier limits set forth by the applicable legal provisions. Moreover it also concerns the operators of so called “high supervision priority establishments”. These dangerous establishment operators include those commercial sites where chlorine or ammonia are present in the quantity of at least 1000 KGs, those that deal with the neutralization of dangerous wastes by combustion, furthermore the establishments that involve the transportation of dangerous substances and dangerous waste materials by pipelines located outside of their industrial sites.

From amongst the group of operators newly introduced to official supervision by the authority those spa and bath establishments and waterworks sites that utilize chlorine may be highlighted as a result of their increased hazard threat, aside with the food processing industries commercial organizations using large amounts of ammonia gas. In the case of this new group of operators the significant developments achieved in operations safety culture as a result of disaster management official supervision has created a sufficient basis for the protection of residents living in the direct surroundings of the establishments.

The number of lower and upper tier establishments utilizing dangerous substances falling under the previous regulation scheme as a result of the implementation of the new regulations has increased by 37 % from 169 to a total of 231 (including 138 lower tier and 93 upper tier establishments). An additional 537 below tier establishments have been placed under the new regulation scheme, as a consequence of which presently 758 dangerous establishments in Hungary fall within the scope of the disaster management law provisions and the government decree dedicated to its implementation.

The Disaster Management Directorates as first degree authorities can pose a requirement on any commercial organization for providing information to ascertain whether the specific establishment falls within the scope of the disaster management law, and the authorities may conduct an on-site supervisory inspection. Disaster Management Directorates have been devoting great attention to the inspection of commercial organizations not showing an acceptable behavior in implementing the legal provisions as required, for which the Directorates may employ the available and legally instituted instruments of on-site official inspections, intermittent inspections, inspections regarding internal safety plan exercises, supervisory inspections, and official inspections subsequent to dangerous events.

The authorities have initiated more than 1400 identification procedures for establishments in accordance with the new regulations mandates in the year 2012. Throughout these procedures the disaster management authorities have conducted an on-site inspection in all cases, and if it has been ascertained that the operator did not provide an adequate amount of information to the authorities with regards to the applied dangerous substances and processes, the operator was sent a notification of discrepancy, whereby the operator has been obliged under an additional requirement to supply sufficient information.

The disaster management authority makes a decision on granting the disaster management license on the basis of the demonstrated facts in the safety documentation and in the so called “major incident management plan”, or if the situation so requires a decision is made on the limitation or suspension of the dangerous activities.

In the course of the licensing procedure the authority conducts inspections on the site of each of the establishments and examines the accuracy of information describer in the safety documentations, such as the safety reports, the safety analyses or the major incident management plans.

The safety documentation must include the analyses of the establishments’ dangerous effects, the prevention and response measures, as well as the deployment and implementation orders and conditions of actions taken towards the mitigation of the adverse effects of major accidents involving dangerous substances. Based on the identification and in-depth analysis of major accident hazards regarding dangerous substances within the documentation the operator determines the possibilities and adverse impacts of the release of dangerous substances into the environment. Along with this the dispersion of the dangerous substances or their physical effects and the damage impact indicators on persons, material assets and the environment are defined as well. Operators are also required to demonstrate the establishments’ management and safety equipment systems dedicated to the prevention and management of major accidents involving dangerous substances and their effects which will ensure a high level of protection for health and the environment. [5]

The group of operators falling under the scope of the Seveso II Directive henceforward is proved to be cooperating well with the authorities and has prepared their safety documentations with adequate content. In the cases of the below tier dangerous establishments the professionalism standards of major accident management plans are not always satisfactory, nevertheless a continuous development has been achieved in the aspects of cooperating with the authorities and in creating the proper safety culture for the establishments as well.

The Disaster Management Directorates – in pre-determined time intervals (once a year in the case of upper-tier establishments, once every two years for lower tier establishments and once in every three years for below tier establishments) – control by on-site inspections whether the operation of dangerous activities falls within the specified framework of the disaster management regulations. With respect to high risk installations the authorities may perform more frequent inspections, and an out-of-schedule immediate priority inspection is performed for operational disruptions or after an incidents. On the basis of experience gathered in the course of the inspections the regional disaster management authority may require that the operator be under obligation to revise the safety documentation, furthermore if the operator is in a more serious breach of safety regulations even a penalty may be instituted or the operator's activities may be put under the threshold quantity level.

In the year 2012 regional authorities have detected maintenance systems problems and issues with the organized training for internal emergency plans on several occasions. Increased number of official inspections and authority revisions of the establishment' safety management systems have significantly contributed to the minimization of hazard threats in respect of these establishments. Simultaneously with the periodic inspections performed in dangerous establishments usually fire prevention and dangerous goods transport control actions are also performed.

Moreover, the Disaster Management Directorates had experienced a new task, namely the on-site evaluation of the internal emergency plan exercise performed in lower and upper tier dangerous establishments. It has happened even during the course of the previous year that the authority had to disrupt the exercise and require that the operator shall be under obligation to organize a new exercise due to inadequate preparedness as well as for example the lack of use of individual protective equipment. The authority has dedicated special attention to the fact that the performance and repetition of the internal emergency plan exercise be within the framework of the regulations. In case of an event the personnel detecting and/or responding, or even those responsible for the management of the on-site non-establishment personnel must solely carry out actions that have been specified in the safety documentation and that are suitable for ensuring effective response. The authority makes notice of useful experiences gathered on the occasion of emergency plan exercises and disseminates them amongst the operators of other establishments operating similar activities as well. [5]

The performance of major industrial safety' (supervisory) authority tasks have called for a reconsidered scope of cooperation with associate authorities. As a result of the implementation of these tasks - during the course of the past year - over 100 industrial safety inspections have been conducted jointly with the associate authorities which aided in a broad spectrum control of the establishments concerned. Upon such inspection visits the competent in their sphere of scope associate authorities conduct a joint and all encompassing, efficient examination lead by disaster management authorities.

In the course of the past year the disaster management authorities have acted on 69 occasions within the framework of supervisory inspections, out of which the proceeding cooperating authorities have issued an authority notification on 56 occasions, in 2 instances the operations of the dangerous establishment have been fully suspended, and in 7 cases operations partially limited.

The disaster management authority has created and operates an Industrial Supervision Database for the purpose of preventing major accidents involving dangerous substances in connection with making the dangerous activities disaster-, fire- and civil protection supervisory operations more efficient. The associate authorities have been granted access to this industrial supervision database.

The appearance of legal provisions for disaster management penalties has further strengthened the role of disaster management authority control. Disaster management authorities have instituted a total of over 35 million HUF in penalties on 18 occasions for reasons such as breaching any of the following: the obligation to identify a dangerous establishment, the requirement to notify emergency incidents as they occur in dangerous establishments, the non-compliance with technical, process safety improvements as required by the decision of the disaster management authority, or the operating of dangerous activities without a valid license.

It is a requirement for the operators also that a major accident or emergency incident involving dangerous substances shall be reported by written declaration within 24 hours of the occurrence or its acknowledged appearance to the disaster management authority. The authority may issue a disaster management penalty for the operator in the case of the omission of reporting or for reporting the major accident or emergency incident not in the manner specified by the obligatory regulations. Subsequent to already occurred major accidents and in the case of repeating events the competent disaster management authority may – apart from issuing a penalty – even limit the operation of dangerous activity or may suspend the dangerous activity as well altogether.

On a few occasions in the former period (33 emergency incidents and 2 major accidents in year 2012) non-expected events have occurred at a few dangerous establishments whereupon the disaster management authorities have investigated the incidents in depth and learned the lessons from the consequences and moreover have taken measures for the prevention of similar emergency incidents. A vast majority of these events occurred due to the failure of an element of the establishments safety management systems such as the disregarding of required process maintenance intervals or discrepancies in the quality and quantity of training conducted. [6]

7.4. Mobil and stabile devices applied for chemical monitoring

For investigation of harmful effects of major-accidents involving dangerous substances are in first instance the Disaster Management Mobil Laboratories (DMML) are designated. In Hungary there are 19 DMML-s operating, which tasks are the estimation of zones endangered, collecting and forwarding of data and information about hazards, co-operation in quick alarm of the public, co-operation with other operative bodies, furthermore at site polluted with chemical or radioactive substances with co-operation in giving professional advise for first aid.

The vehicles of DMML-s are equipped with chemical detectors and automatic gas-detectors, micro meteorological measuring station, scavenger materials and personal protective equipment's. The meteorological and chemical monitoring, civilian alarming system (further MoLaRi) to be established in the range of dangerous establishments" will assure the timely signalling of dangerous substances released during the accidental major accidents, the determination of dispersion data, the presentation of data for decision-makers, the early alarming of the public and activisation of external emergency plan.

The MoLaRi system consists of three main system elements: meteorological and chemical monitoring system, civilian alarming and information system and communication and informatical data transmission system. The construction of MoLaRi system will be realised in the vicinity of 20 dangerous industrial establishments. The system at the moment covers nine Hungarian counties and the capital.

The system built in three levels:

a) Local (community level). The monitoring subsystem. The monitoring system built on the site of dangerous industrial establishments (in directions of hazards) and in the direct vicinity of localities endangered. The measured data of monitoring system's detectors are registered continuously in the collection centre (local centre) of a dangerous industrial establishment, which is processed in the national centre, from where the information is forwarded to the relevant county (capital) disaster protection (civil protection) directorate's office in charge. After exceeding the dangerous concentration – after consultation with the dangerous industrial establishment – the local public will be alarmed. The placing of monitoring end-points in dangerous industrial establishment and appropriate setting of alarming thresholds assures that only in case of real major accident there is alarming signal.

The measuring detectors of the monitoring subsystem installed on residential area signal at the plank of the dangerous industrial establishment the appearance, dilution of gaseous cloud already signalled by the system earlier in residential area. Its main task is to support data for the introduction of civil protection measures on time.

Public alarming and information subsystem. The alarming system means installation of hooter system for alarming the public. The control centres authorized to order the alarm are placed to the county (capital) directorate's office in charge, the end-points would be started by free group-forming. The alarming system will be activated by alarm signal of the monitoring system.

b) County (regional) level. The data processing and decision preparation is done in the office in charge of county (capital) directorate for disaster management (civil protection). In case of reaching the dangerous limit an alarm is generated, effecting the manual alarming of the public – in accordance with the decision-making (action) plan defined in the external emergency plan – using the end-points of public alarming system (electronic hooters suitable also for speech emission). The control centres assuring the alarming will be placed to the relevant county (capital) directorate's office in charge, the end-points would be started by free group-forming.

c) National level. The national level assures the supervision of the centralized system. The access to the measured data via the WEB is assured in the National Directorate for Disaster Management, in the relevant office in charge of county directorates for disaster management, in the professional fire-fighting department's offices of the relevant locality.

In the MoLaRi system the data is transferred via data transmission ways which apply appropriate data protection procedures and which are in line with high safety standards and are working with high availability and redundancy. The system is planned to establish to be expandable in order to assure the reception of signals from other monitoring systems and/or in case of installation of new plants the integration of those.

Before the handing-over/taking-over there will be a test run. The internal and external emergency plans has to be modified before the start of the system and/or the personnel involved in the operation of the system has to be trained as part of the annual training program.

7.5. Conclusions

In the field of the prevention of major accidents involving dangerous substances another important element besides prevention is the introduction of measures for preparedness for and response to accidents. A key element in the efficiency of such measurements is the interlocking of internal and external emergency plans. Additionally successful cooperation has to be worked out between the dangerous establishment and the organizations responsible for response and intervention through the preparation and training of the internal and external emergency plans.

Regarding the effective and quick response and intervention of accidents involving dangerous substances and the minimizing of their consequences early detection of such accidents, calculation and monitoring of their possible effects and informing the decision makers are of high importance. This aim can be reached by implementing developed stable and mobile monitoring systems for dangerous substances at the dangerous establishments.

The most important element of measurements for the protection of the public is the operation of the emergency information system in case of dangerous industrial accidents, which includes the warning of the public and informing them about the behavioral rules to be followed. Informing the public could be carried out by the use of complex chemical monitoring and public warning systems at the dangerous establishments during which the interacting internal and external emergency plans are activated and worked within satisfactory conditions.

References - Chapter 7.

[1] KÁTAI- URBÁN, L: Evaluation and development of the conditions of the application of the protection against the transboundary effects of industrial accidents, Phd dissertation, Budapest, 2006. (Az ipari balesetek országhatáron túli hatásai elleni védekezés alkalmazási feltételeinek ért ékelése és fejlesztése, Doktori (PhD) értekezés, Budapest, 2006.)

[2] VASS, GY.: The place and role of the land use plan in the prevention of major industrial accidents involving dangerous substances, Phd dissertation, Budapest, 2006 (A településrendezési tervezés helye és szerepe a veszélyes anyagokkal kapcsolatos súlyos ipari balesetek megelőzésében, Doktori (PhD) értekezés, Budapest, 2006.).

[3] KOSSA, Gy.: Industrial safety - tasks and challenges to protect the future Iparbiztonság – feladatok és kihívások a jövő védelmében. Védelem- Katasztrófa-Tűz- És Polgári Védelmi Szemle (ISSN: 1218-2958) 18: (6) pp. 49-50. 2011.

[4] Act 2011/CXXVIII. on disaster management and the modification of related individual acts (2011. évi CXXVIII. törvény a katasztrófavédelemről és a hozzá kapcsolódó egyes törvények módosításáról)

[5] KÁTAI-URBÁN, L.; VASS, Gy.: 7. “Disaster Management (SEVESO) (Katasztrófavédelem (SEVESO)); 7.3. „Guidelines for the Preparation of Safety Documentation.” (Útmutató a biztonsági dokumentáció elkészítéséhez), In: SÁROSI, Gy. (edit.) “Transportation and Storage of Dangerous Goods” October 2009 pp. 1-54. ((szerk.) Veszélyes áruk szállítása és tárolása. 2009. október, Budapest: Verlag Dashöfer Szakkiadó, 2010. pp. 1-54.

[6] SZAKÁL, B.; CIMER, Zs.; KÁTAI-URBÁN, L.; SÁROSI Gy.; VASS Gy.: “Industrial Safety I. Dangerous Substances and their Major Accidents in the Industry and Transportation” (Iparbiztonság I. veszélyes anyagok és súlyos baleseteik az iparban és a szállításban.) Korytrade Kft. Budapest 2012. ISBN 978-963-89073-3-2