

Problems and Possible Solutions of Major Industrial Accident Prevention in the Slovak Republic

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Abstract: - The protection of health, life, property and environment is one of the European Union's priorities and due to this fact the prevention of major industrial accident gets an outstanding position in the current world of technological innovations and progress as well as the growing amount of hazardous substances used in the industrial processes. The article introduces statistics of major industrial accidents and immediate threats whose number, due to the size of the Slovak Republic, is not large. In conclusion we characterise the positives and negatives with outlining the possible solutions in the given area.

Key-Words: MOPORI, risk assessment, industrial accidents prevention, Seveso company, Seveso II, Seveso III

1 Introduction

Prevention represents one of the basic pillars of preventing the crisis phenomena in the current society. In the case of the industrial accidents this term achieves still greater and more important dimension due to the possible threats for inhabitants, employees, property or the environment especially from the point of view of the most dangerous industrial enterprises. The area of preventing the major industrial accidents is linked with the European directive Seveso II which endeavours to exercise control over companies disposing of selected hazardous substances and managing their activity with the main goal to limit the possibility of developing any accidents. Every member country transposes the directive into its legal regulations, in the Slovak Republic it is the law No 261/2002 Coll. about preventing major industrial accidents. The method and results of transposition of individual regulations should reflect in the area of prevention and preparedness and reducing the number of industrial accidents.

2 Problem Formulation

The industrial accidents belong among anthropogenic crisis phenomena which became a dangerous phenomenon that threatens the life and health of employees and the general public, which causes material damages and leaves consequences on the environment. On one hand there is the inevitable technical progress which brings a lot of positives, however, on the other hand there is the possible failure of the human factor or the technology used.

The industrial accidents as the explosion in Flixborough (1974), or Seveso (1976) or in the firm Union Carbide in Bhopal (1984) and the Chernobyl disaster (1986), as well as a whole range of others have shown failures of technology and its attendance due to which a lot of people died or the accident consequences caused them durable health damage, not speaking about the losses of material values and environment which can be long-lasting or even non-returnable.

After this accident, six years later, the Directive of the European Union called SEVESO I was adopted. It dealt with prevention and preparedness for overcoming major industrial accidents and was enacted in certain time intervals:

- in 1996 SEVESO II 96/82/EC,
- in 2003 SEVESO II 2003/105/EC.

The Seveso II Directive is currently valid in the European Union. However, a lot of surveys show the need to amend it or to issue new documents that are to explain some of its parts and provisions. Based on the “Report Assessing the Progress Made with the Implementation of the Seveso II Directive” from 2006 – 2008 in which all 27 countries participated it is claimed that 20 – 35 major industrial accidents occur in the framework of the EU every year. The frequency of the accidents per the total number of the companies is currently three accidents per 1,000 enterprises. The effort of the European Union is to reduce this number to be close to the value of 2. The Seveso III directive has already been expected and in member states it will take into an action in 2015.

In the Slovak Republic the Seveso II Directive is implemented in several laws (see the figure1). The decisive one is the law No.261/2002 Coll., on prevention of major industrial accident as amended. This law deals only with companies where a major industrial accident can arise, other industrial accidents are solved by the law No. 42/1994 Coll., about civil protection of inhabitants as amended.

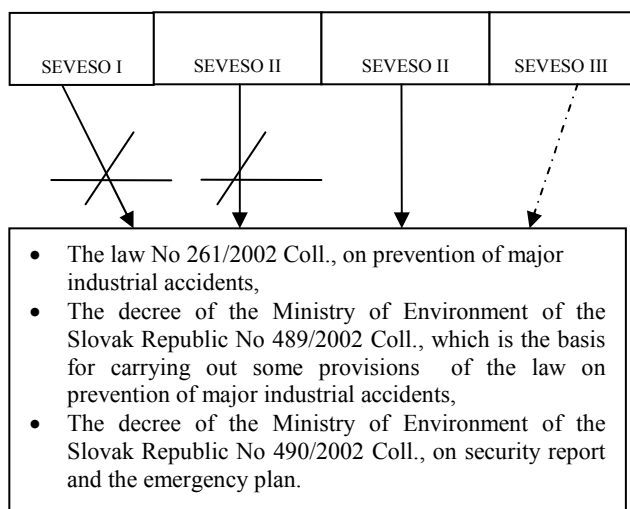


Fig. 1 Implementation of Seveso Directive to legal standards of the Slovak Republic

In Slovakia there are currently 82 SEVESO companies (see the figure 2).

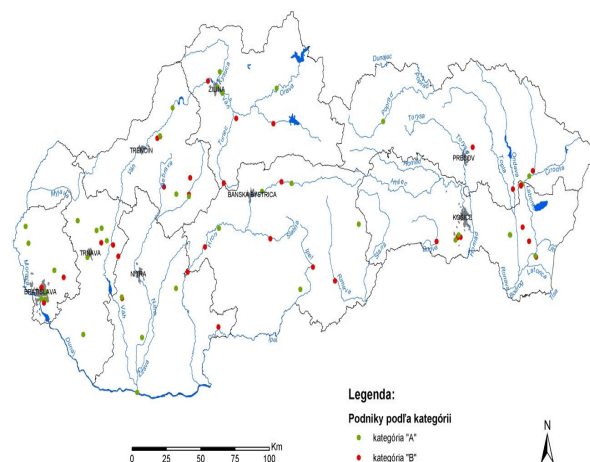


Fig. 2 Layout of SEVESO companies in the Slovak Republic

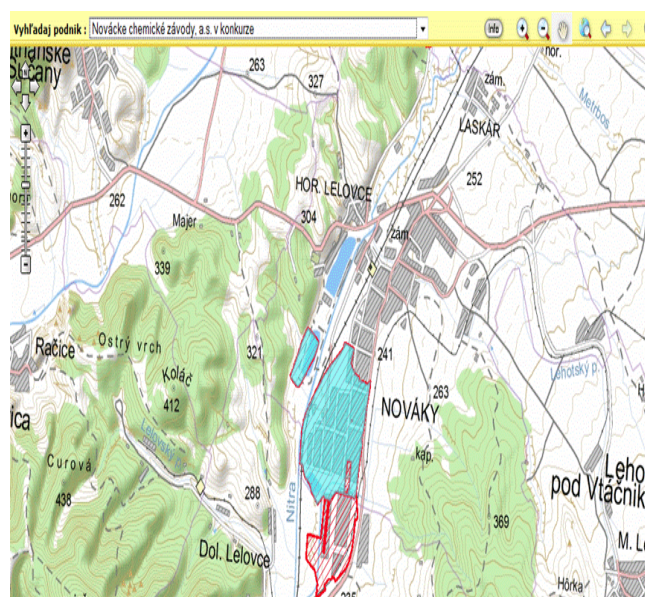


Fig. 3 Localisation of a Seveso company - illustration

Tables 1 and 2 show an overview of serious industrial accidents and near-accidents in Slovakia in the time period of 2003 – 2011.

Table 1 Serious industrial accidents in the territory of Slovakia during 2003 – 2011 (Loveček, 2012)

Company name	Date of event	Type of event	Cause
DUSLO, a.s.	24.7.2010	Administration building (production of ammonia) 1236, Šaľa, Technical failure, explosion, fire	Leakage on the flange of high-pressure distribution pipe for synthesis gas
Novácke chemické závody, a.s.	28.9.2005	Nováky, company premises, ethylhydride operation. Failure of human factor	Welding and ignition of explosive mixture caused by a point weld. .
U. S. Steel Košice, s. r. o.	28.9.2005	Division plant Energetika, operation Energetické médiá. Technical failure, explosion, fire.	Damaging and subsequent breaking the end of the shaft inside of the circular wheel of the centrifugal pump of the type A-CB 185/4-7,2 No. 1.
U. S. Steel Košice, s. r. o.	16.11.2006	Company premises – technical failure.	Failure of power supply and subsequent failure of technological and safety devices of the company.

Table 2 Near-accident in the Slovak Republic - 2003 – 2011

Company name	Date of event	Cause
Slovnaft a.s. Vlčie hrdlo	26.3.2003	Erosion caused by the stream of steam condensate
Slovnaft a.s. Bratislava	6.8.2003	Self-ignition of

		flammable waste
Slovnaft a.s. Bratislava	13.8.2003	Self-ignition of flammable sludge material of crude oil origin
Slovnaft a.s. Bratislava	25.9.2003	Air decomposition
Slovnaft a.s.	8.10.2003	Implosion of tank
Slovnaft a.s. Bratislava	22.11.2003	Fire due to breaking the sealing of the exchanger and subsequent leakage of pyroperol
Slovnaft a.s. Bratislava	16.3.2004	Realising cutting and welding operations without effective safety measures
Messer Slovaft Bratislava a.s.	3.4.2004	Damaging the hose filling tank, material fatigue
Irganox, ACHIO	2.6.2004	Loosened valves of the flexible hose
Slovaft a.s.	9.7.2004	Leakage of the mechanical packing seal caused by impurity
Duslo Šaľa	21.9.2005	Leakage of the flange connection on railway tank, filling valve unlocked
Duslo Šaľa	29.5.2006	Pump failure, leakage – production of inhibitor
Duslo Šaľa, a.s	6.3.2007	Mechanical damage of the pattern and sludge valve, broken weld
Duslo Šaľa, a.s	24.6.2007	Leakage of the saddle of manual valve
Duslo Šaľa, a.s	31.8.2007	Leakage of the flange on the

		discharge of cooler
Duslo Šaľa, a.s	6.9.2007	Failure of the ball valve control mechanism
US Steel Košice, s.r.o	2.10.2007	Damage of equipment and subsequent leakage of blast-furnace gas
Duslo a.s. odšt.z. Istrochem	30.11.2007	Fire
Duslo a.s, Šaľa	16.7.2008	Unexpected reaction resulting in explosion
Duslo a.s, Šaľa	14.8.	Leakage of the degassing pipeline after filling a 500 kg barrel
Duslo a.s, Šaľa	12.9.2008	Leakage on the flange seal
Slovnaft a.s. Vlčie hrdlo	13.8.2008	One-shot short circuit of the cable ending of the input cable to transformer
Duslo a.s, Šaľa	7.3.2008	Loosening of filter which was not depressurised
Duslo a.s, Šaľa	11.6.2008	Holes on heating spiral of gasifier
Slovenské elektrárne, Vojany	14.4.2009	
Duslo, a.s Šaľa	4.3.2009	Leakage of pipe flange connection
Slovnaft a.s., Vlčie hrdlo	17.1.2010	Fire
Slovnaft a.s., Vlčie hrdlo	9.12.2010	Explosion resulting in fire. Insufficient flushing of the device due to blind spots in the middle part of partition of the space, rests of substance

One of the most serious industrial accidents in Slovakia was the industrial accident in Košice when the European Seveso II Directive was not valid here. It happened in 1995 and arose due to the leakage of the blast-furnace gas, 11 people died and 9 of them were classified as accidental death injury and 2 as deaths of people who came wrongfully to the company premises. The industrial accident developed due to several failures or omitting the human factor and the biggest error was failing to fulfil the safety directives from the side of the executive employees but especially failing to manage the situation from the side of the management. Other shortages assessed after the rise of the industrial accident are as follows:

- the safety documentation which was worked out improperly (incomplete and outdated emergency plan),
- the decisions realised incorrectly and at incorrect time,
- failing to monitor the weather situation after the leakage of the blast-furnace gas (untypical windless conditions and inversion),
- the bad information and communication system,
- the lack of discipline of employees during evacuation,
- the lack of emergency and measuring technique in the company.

Currently in the general public there still resounds the industrial accident which happened in VOP Nováky on 2nd March 2007. An explosion in the ammunition storage with a huge pressure wave acting in the distance of several tens of kilometres – 8 persons died and several tens of people were injured. The crater which arose and its surroundings were a dangerous zone even after the explosion; the firemen had to cool here the heated ammunition for long hours to prevent another disaster. The shortages assessed after the industrial accident:

- in the company there was more ammunition than there should have been,
- the emergency plan was not worked out according to the regulations of the law about prevention of serious industrial accidents,
- the company did not rank the explosives among the sources of risk,
- informing and gathering the persons was part of another documentation than it should have been,

- the crisis staff was non-functional at the time of the rise of the industrial accident,
- the ammunition of various types was scattered at unsuitable places in the premises,
- the company management at the time of the accident rise was not able to document how many people were in the plant.

In spite of these facts the Slovak Republic is prepared and exerts maximum effort in the area of industrial accident prevention.

One of the main problems of this area is risk assessment and risk treatment what is part of risk management process.

3 Project MOPORI

One of the possible solutions is to solve these problems through the research project. Here the University of Žilina in Žilina – Faculty of Special Engineering works in the “A Complex Model of Risk Assessment in the Industrial Processes” which is in the process of prevention one of the most important actions, however, one of the processes with the most complicated character.

The main objective of project is improvement of security in industrial establishments “Seveso establishments” in Slovak Republic, by creating a complex model of industrial enterprise risk assessment using quantitative methods, its synchronization with standards of EU and following application in conditions of Slovak republic.

Project target groups:

- „Seveso establishments“ in SR from the industrial accidents point of view (their activities are limited by the Law about),
- Reviewers/experts (natural or legal person) of major industrial accidents prevention,
- Evaluators/auditors of safety (Ministry of environment Slovak republic),
- University students of programmes connected to industrial safety.

The main project partners are:

- University of Žilina in Žilina,
- Ministry of Environment of Slovak Republic,
- Risk consult (company),

- Slovak Environmental Agency.

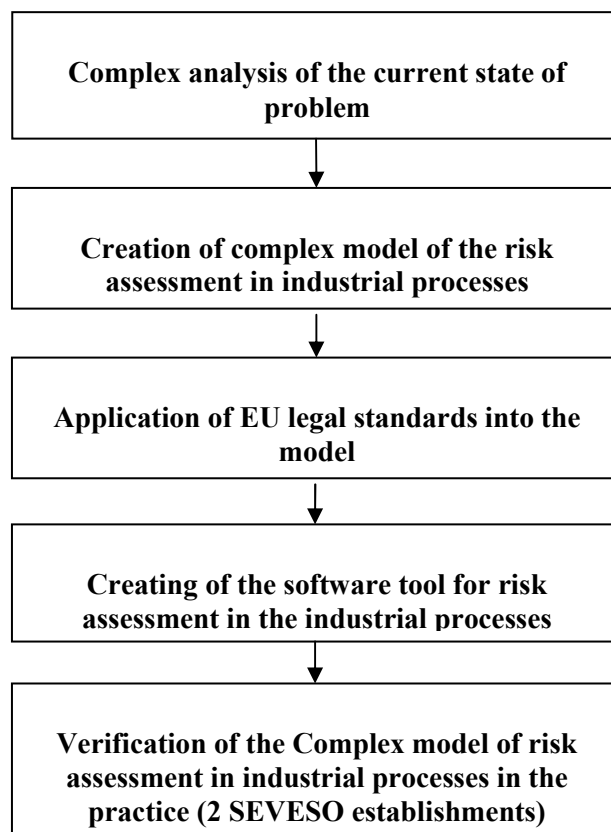


Fig.4 The main project idea

This project finishes in 2014 and we as a project team hope that the results will help Seveso establishment and also to state administration and private companies.

4 Conclusion

The environment of preventing major industrial accidents is an area which is being solved in all EU member countries through the Seveso II Directive. Regarding to several changes which have arisen due to the new classification of the hazardous substances and other facts which are to be revised in this directive, space for research and necessary modifications in this area not only in the whole EU but also in the legal systems and legal standards and their practical utilisation in individual member countries has developed. The new Seveso III has been adopted and it will be implemented to individual legal systems of individual member states. In the framework of prevention the so called Seveso companies have to fulfil criteria which result from the legal requirements of the given country and

in this way to ensure maximal preparedness for the rise of industrial accidents.

There are other problems arising from this actual problem of industrial accident prevention:

- Seveso companies are checked and what about the below-the-limit ones? Much greater amount of accidents develop just here,
- the companies do not want to belong under the Seveso II directive due to complicated and costly administration,
- the arrival of the law about the critical infrastructure will cause increasing the administration and duties to fulfil them for some companies,
- the enterprises make their work as easy as possible,
- the inspections are not effective and regular.

In spite of all of these problems European union is trying to coordinate all of these areas connected to major industrial accident prevention as much reasonably as it is possible. But each member state is different and requires a different approach to application these kind of standards.

5 Acknowledgements

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