

ZRÍNYI MIKLÓS
UNIVERSITY OF DEFENSE
Thesis Council

Gyula Vass
fire-fighter colonel

Situation and role of Land use planning
in prevention of Major industrial accidents
involving dangerous substances

Presentation by the author and official commentaries on the PhD thesis

ZRÍNYI MIKLÓS
UNIVERSITY OF DEFENSE
Thesis Council

THESIS BOOKLET

Gyula Vass
fire-fighter colonel

Title of the PhD thesis:

Situation and role of Land use planning
in prevention of Major industrial accidents
involving dangerous substances

Scientific Director of Studies:

Prof. Dr. László Halász DSc.
University Professor, Doctor of the Hungarian Academy of Sciences

Budapest, 2006

Definition of the scientific problem

Most important target of Seveso I and II Directives is to prevent major industrial accidents by their introduction and application, and to reduce their effects on the population and environment. Concluding the consequences of the Bhopal and Mexico accidents (1984) where several thousand deaths occurred because the plants were too near to residential areas, the Seveso II Directive (hereinafter: the Directive) was amended by an important article, namely Article 12 handling Land use planning issues. This article requires the member countries to apply a procedure in their land use planning process that in long terms reduces significantly the harmful effects of possible accidents of hazardous establishments in the residential areas in their environment.

Most of the member countries had had regulations about regional planning before introduction of the Directive, but analysis of these actual accidents resulted in a conclusion that we must fill the gap between the risk of major industrial accidents and the regional planning, by introduction of clear and general directives. The Directive basically consists of general requirements only, and does not specify any detailed proposal concerning their actual fulfilment.

This task cannot be solved completely by simple application of risk management methods in the land use planning because interests of involved parties in this multi-party task system (operator of the hazardous establishment, authorities, local government, population, environment activists, etc.) are very different in many cases.

Due to flexibility of Article 12, Land use planning has a high level of autonomy in the member countries and has national attributes on itself very markedly what results from the different social-economical relations, from traditions of local management traditions, from differences in the risk assessment approaches and from other differences. We can state in general, that in the process of application of regulations of Article 12, we can utilize any method that most fits historical development and legal regulation style involving land use planning of that actual country. At the same time, we can expect in general, that the methods applied in the various member countries for similar situations will result mostly in similar outcomes.

Introduction of the Directive in the Hungarian legal system has been done by creation of paragraph IV of Act LXXIV in 1999 year “About management and organization of disaster prevention and about the prevention of major accidents involving dangerous substances” and by issuing Government Decree No. 2/2001. (I. 17.) “about prevention of major accidents involving dangerous substances” about its implementation. The modifications of the Directives in December, 2003 by the European Community are included in Act VIII in 2006 and Government Decree No. 18/2006. (I. 26.) replacing Government Decree No. 2/2001. (I. 17). Basic regulation of land use planning is stipulated by Act LXXVIII in 1997 year about forming and protection of constructed environment, whose definitions of terms say that Land use plans consist of the Community structure plan, the Layout master plan and the Layout plan.

Subject of this thesis in harmony with the above facts is analysis of methods in relation to Land use planning of inhabited settlements in the vicinity of hazardous industrial establishments, investigation of their efficiency, and proposal to solve them in the future.

Purposes of research

1. Summarizing risk assessment methods applied in the member countries of the European Community in relation to major industrial accidents, coding of the main components of risk assessment.
2. Examination of general principles of risk assessment in Land use planning and drawing conclusions for development of “good authority practices”.
3. Comparative examination, evaluation and also drawing conclusions of the land use planning regulations in some member countries of the European Community, defined by Article 12 of the Directive, based on the data of the available texts.
4. Summary of the land use planning regulations in Hungary within the above correlations, proposal to definition of decision making procedure.
5. Definition of risk of injury of people in case of the various accident sources with respect to the conditions specified by Government Decree No. 18/2006 (I. 26.)

Research Methods

I intended to achieve my goals by treating and carefully studying of the related textbooks and other documents, and by their subsequent analysis. I studied thoroughly the guides concerning the subject issued by the European Community, and also the decrees and regulations applied by the member countries in Land use planning, I performed their comparative analysis, examined the identical and different aspects.

Additionally base of my researches was my experience gained during my previous works that I applied mostly while I applied and enforced regulations of national laws and decrees. Besides I applied the information mentioned in the various national and international conferences, their analyzing evaluations.

A short description of the performed investigation

Chapter I

Assessment of risks during major industrial accidents

In this chapter, I describe the system and flow chart of Risk assessment of major industrial accidents in general terms. In the following steps I worked out the principles of risk assessment applied in Land use planning, and I specifically examined the technical and safety principles to be introduced in order to execute Article 12 of Seveso II Directive. Based on these, I compiled a flow chart about good authority practices for Land use planning and the decision making procedure.

Chapter II

Examination of international practice of Land use planning

I summarized briefly the relation of Seveso II with other directives of the European Community and international agreements. I examined what principles are applied in the field of land use planning in the practice of five different member countries selected as examples because they have especially developed chemical industry. I examined their regulations, disclosed the organizational structure of the land use planning and the system of decision making.

Based on my analysis, I found that the various countries formed decision making systems that follow their traditions, and the procedures applied for land use planning were different in every case.

Chapter III

Examination of national regulations of Land use planning

In this chapter, I summarized legal regulations of Land use planning in Hungary, I disclosed the interconnection system of those who participate in Land use planning, and correlations of procedure of decision making. I worked out a proposal for assignment of Danger zones in order to define individual risks caused by heat radiation, poisons and explosion.

Summarized Conclusions

The methods selected for performance of the research work allowed overall acquaintance of the research areas. As a summarized result of these data altogether I reached cumulative conclusions and findings what led to proposals that can be utilized in relation to the practice of land use planning.

The performed research works based on the goals set out previously:

1. Summary of risk assessment methods

I analyzed the risk assessment methods applied in the member countries of the European Community in relation to the major industrial accidents. I established the followings:

- Examining from viewpoint of the individual, the risk can be acceptable and tolerable depending on what benefits and disadvantages the risk is accompanied to.
- It is accepted in the European Community in the field of land use planning that hazard level is acceptable from viewpoint of individual risks if possibility of death rate due to a major accident is not higher than 10^{-6} value, whereas acceptance level

of societal risk depends on the number of people exposed to the risk.

- risk assessment of major industrial accidents is a complex procedure, where dynamic balance of risk assessment and risk control results in a system of risk management that is acceptable by everybody (operator, local government, population, etc.)

2. Risk analysis in the land use planning

I examined what principles are applied for risk assessment in the process of land use planning, and what methods can be applied to ensure these methods are applied. I found the followings:

- The risk assessment must focus on key events in sequence of occurrences of a major industrial accident; everybody must be clearly aware of his own responsibility in the process of decision making; the control system must fulfill requirements of the local political system of the country.
- In order to fulfill regulations of Article 12 of the Directive, the member country must respect a series of other aspects as well, such as:
 - Effects of land use planning appear only in periods of several decades.
 - The societal risk level can change during this period, therefore the risk level must be monitored continuously.
 - The requirements of the operators of the hazardous establishments and the surrounding population must be harmonized so that the risk endangering the population will not increase.
- Reduction of risk levels in the land use planning can be achieved not only by increasing the distance, but also by introduction of additional technical measures, whose application should be practiced nationwide.

3. Land use planning regulations of member countries of the European Community

I analyzed and compared land use planning regulation principles in the practice of five different member countries, their methods used in land use planning, and fulfillment of requirements of Article 12 of the Seveso Directive in the involved countries.

Based on summary of these analyses, I concluded the following statements:

- The examined countries had regulated the land use planning in the vicinity of the hazardous establishments even before the Directive came into effect; the land use planning regulations follow the traditional political structure of the country, the central, regional, territorial or local government levels.
- Every country has a central organization (competent authority) and its network that supervises hazardous establishments with authority rights and at the same time supports the local governments by advices.
- The methods and acceptable threshold limits of evaluations of the majors accident risks are different in the individual countries; some countries specified the threshold limits by legal regulations, whereas these specifications are only recommendations in other countries – both are enforced by the competent authorities.
- Every country has created his own evaluation procedure for risk assessment that can be based on consequences or risks with quantity or quality approach.

4. Land use planning regulations in Hungary

I examined the requirements in relation to land use planning in Hungary, revised the regulation system of the sector in Hungary and based on this, I concluded the followings

- The Hungarian regulation system conforms the requirements of the Directive.
- The Hungarian legislation generally regulates the land use planning tasks at local government, authority and operator level as well.

- The Government Decree No. 18/2006. (I. 26.) has a role of outmost importance in this regulation; it defines rules of Regional development in the hazardous zones. Authorities have central role in it who not only examine safety documents and assigns hazard zones, but also controls local governments in relation to the Land use planning.

5. Definition of risks of individual injuries

The Government Decree No. 18/2006. (I. 26.) defines that the operator must submit a proposal for assignment of safety zones based on their safety report and the conclusions of the analyses.

Based on this requirement I concluded the followings:

- The Government Decree does not define the concept of injury in case of each harmful effects; they indirectly rely on regulations of the authority.
- According to the regulations, assignment of the Danger zones can be different in case of similar plants, what is contrary to the principle defined in Chapter I, stating that planning decisions must follow similar principles in case of similar dangers or risk situations.

New scientific results

1. I **defined** the most important principles of land use planning and **worked out** the general flow chart of decision making of land use planning, after analysis and disclosure of risk management in relation to the major industrial accidents, pointing out the related most important technical questions to be answered.
2. After examination of the land use planning regulations applied in the member countries of the European Community, I pointed out that we must create a simple and clear hierarchical system to share the responsibilities and tasks, and I worked out a **specific proposal** concerning this for a general method that can be applied in land use planning.
3. After analysis of the complex national management in relation to land use planning defined by the Directive, I **codified** the most important rules of land use planning **for the first time**, and I **defined** technical elements of the procedure of decision making system in Hungary.
4. I proposed for the first time a specific way to mathematically calculate the risk of personal injury in relation to poisons, by definition of constants of the probit function, that is applicable in the actual practice for assignment of the danger zones.

Proposals of the thesis

- 1 The ideas described in my thesis can support development of national institutes and task system of Seveso II EU Directive, especially for
 - uniform and technically correct performance of the authority approval tasks
 - practical application of specific rules of land use planning
 - preparation of technical concepts, internal normatives and methodology guides of the related legislation, for preparation of action plans and for definition of priorities.
- 2 My essay can be utilized at Zrínyi Miklós University of Defense, in educational system of the professional disaster management and other higher educational institutes.
- 3 The examinations and evaluations prepared in my essay can be used as base of defining further research directions and areas in the field of industrial safety and environment safety.

List of publications

Newspaper articles

1. Vass Gy.: Építésügyi eltérési engedélyezési ügyek *Construction non-compliance approval issues*, Védelem, 1998/2. szám (15-17. o.);
2. Vass Gy.: Éghető folyadékok tárolási problémái *Storage problems of inflammable liquids*, Védelem, 1998/3. szám (34. o.);
3. Vass Gy.: A nagyberuházások tűzvédelmi kérdései *Fire prevention issues of projects*, Védelem, 1999/2. szám (7-9. o.);
4. Vass Gy.: Seveso II.: hatósági döntések *Seveso II.: Authority resolutions*, Védelem, 2002/3. szám (28. o.);
5. Vass Gy.: Seveso II.: Külső védelmi tervek *Seveso II.: External emergency plans*, Védelem, 2002/6. szám (45-47. o.);
6. Vass Gy.: A biztonsági jelentés és elemzés felülvizsgálata c. fejezet szerzője *Revision of safety report and analysis chapter*, In. Kátai-Urbán Lajos (szerk.), „Ipari Biztonsági Kézikönyv a veszélyes anyagokkal kapcsolatos súlyos balesetek elleni védekezés szabályozás alkalmazásához”, KJK KERSZÖV, Környezetvédelmi Kiskönyvtár sorozat (183-245.o.), 2003.
7. Szakál B., Vass Gy. Kátai-Urbán L.: Katasztrófavédelem I., vegyipari katasztrófák *Disaster management I. Chemistry Disasters* SZIE Ybl Miklós Főiskolai Kar szakkönyve, 2004.
 5. fejezet: súlyos ipari balesetek következményeinek értékelése *Chapter 5: evaluation of consequences of major accidents*, 81-119. o;
 6. fejezet: tüzek és robbanások károsító hatásainak meghatározása *Chapter 6: definition of damage effect of fires and explosions* 113-125. o;
 7. fejezet: az egyéni kockázat meghatározása *Definition of individual risk* 135-139. o.
8. Vass Gy., Kátai-Urbán L., Cimer Zs.: Veszélyes ipari üzemek nyilvántartása *Recording of hazardous establishments*, Védelem 2004. XI. évfolyam 3. szám (45-47. o.)
9. Szakál B., Kátai-Urbán L., Vass Gy.: Veszélyes anyagokkal kapcsolatos súlyos balesetek elleni védekezés keretében telepítendő monitoring rendszerek és lakossági riasztási rendszerek telepítési helyeinek kiválasztása *Selection of monitoring systems to be installed within frames of prevention of major accidents involving dangerous substances, and locations of public alarm systems*, Tudományos közlemények, Szent István Egyetem Ybl Miklós Műszaki Főiskolai Kar I. évfolyam 1. szám / 2004. szeptember, 38-53. o.,
10. Vass Gy.: A hatósági tevékenység továbbfejlesztése az EU csatlakozás fényében *Development of activities of authorities with respect to our joining to the EU*, Belügyi Szemle 2004. 7-8. szám, 202-216.o;
11. Vass Gy.: A klímaváltozás és az ipari balesetek kialakulásának kockázata *Changes of the climate and risk of occurrence of industrial accidents* „AGRO - 21” Füzetek 2004. 36. szám, 64-88.o.

12. Vass Gy.: A kockázatkezelés eredményeinek értelmezése c. fejezet szerzője 2004. *Interpretation of results of risk analysis chapter*, In. Kátai-Urbán Lajos (szerk.), „Ipari Biztonsági Kockázatkezelési Kézikönyv a veszélyes anyagokkal kapcsolatos súlyos balesetek elleni védekezés szabályozás alkalmazásához”, KJK KERSZÖV, Környezetvédelmi Kiskönyvtár sorozat (191-203.o.),
13. BM OKF tájékoztatója a településrendezési tervezés műszaki követelményeiről *Briefing of National Directorate General for Disaster Management of the Ministry of the Interior about technical requirements of land use planning*, BM OKF 2004. szeptember 7. Településrendezési tervezés.
14. Vass Gy.: Veszélyes anyagok jelenlétében bekövetkezett ipari balesetek *Industrial accidents in presence of dangerous substances*, Katasztrófavédelem, XLVII. évfolyam. 2005. 6. szám, 3-4. o.
15. Vass Gy., dr. Kátai-Urbán L.: Az új Seveso - szabályozás bevezetése *The new Seveso – Introduction of the regulations*, Katasztrófavédelem, XLVII. évfolyam. 2005. 7. szám, 17-19. o.
16. Vass Gy., Máté J.: Tervek és tények a Monitoring és Lakossági Riasztó Rendszerről *Plans and facts about the monitoring and public alarm systems*, Katasztrófavédelem, XLVII. évfolyam. 2005. 7. szám, 19-20. o.
17. Vass Gy.: Technológiai katasztrófák kockázatértékelése *Risk evaluation of technology disasters*, Katasztrófavédelem, XLVII. évfolyam. 2005. 10. szám, 5-6. o.
18. Vass Gy.: „6. *Requirements of Land Use Planning*” c. fejezet szerzője, “Guidance on the implementation of regional and local tasks for the prevention of major accidents involving dangerous substances” c. BM OKF angol nyelvű kiadványa (54-64. o), 2005;
19. Vass Gy.: Településrendezési tervezés követelményei c. fejezet szerzője *Requirements of land use planning chapter*, „Módszertani segédlet a veszélyes anyagokkal kapcsolatos súlyos ipari balesetek elleni védekezés területi és helyi feladatainak ellátásához” c. BM OKF kiadványa (54-64.o), 2005;
20. Vass Gy., Halász L., Solymosi J.: A veszélyes ipari üzemek kapcsolatos hazai településrendezési szabályozás értékelése *Evaluation of national land use planning regulations in relation to hazardous establishments*, Tudományos közlemények, SZIE YMMF (megjelenés alatt)
21. Gy. Vass; L. Halász: *Assessment of the Land-use Planning Practices Applied in the Vicinity of EU Seveso Establishments*, AARMS ZMNE angol nyelvű lektorált kiadványa (megjelenés alatt)

Konferencia előadás

1. IV. Nemzetközi Tűzvédelmi Konferencia, Gyula, 2003. május 8., A katasztrófavédelem és az EU csatlakozás *Disaster management and joining to the EU*
2. V. Nemzetközi Tűzvédelmi Konferencia, 2004, szeptember 16-17., Félix fürdő Románia,

A veszélyes anyagok magyarországi szállításával kapcsolatos katasztrófavédelmi tapasztalatok *disaster management experiences concerning transportation of dangerous substances in Hungary*. TSZVSZ, Interprotect, GTE közös kiadványa (30-44.o.)

3. "Csongrád 2004" felkészítő gyakorlás, A súlyos ipari balesetek elleni védekezés területi és helyi feladatai *Local and territorial tasks of prevention of major accidents*, 2004. szeptember 9.
4. Haváriaesetek és kezelésük c. Konferencia, A Seveso II. Irányelv bevezetésének helyzete és tapasztalatai *Situation and experiences of introduction of Seveso II Directive* ZMNE, Budapest, 2005. március 22.;
5. Tűzvédelem 2005. c. szakmai konferencia: A veszélyes anyagokkal kapcsolatos súlyos balesetek megelőzése a Magyar Köztársaságban *Prevention of major accidents involving dangerous substances in the Hungarian Republic*, Budapest, 2005. április 20.
6. VI. Nemzetközi Tűz- és Katasztrófavédelmi Konferencia, 2005, szeptember 21-23., Hajdúszoboszló, A veszélyes anyagokkal kapcsolatos katasztrófavédelmi hatáskörök *The disaster management functions involving dangerous substances*, TSZVSZ és Interprotect közös kiadványa (12-17.o.).
7. „Mutual Joint Visit in Hungary” *Implementation of regional and local tasks for the prevention of major accidents involving dangerous substances: Implementation of the Directive in Hungary*”, Tiszaújváros, 2005. szeptember 28-30. BM OKF kiadványa.
8. CEI Conference titled „Industrial and Transporting Accident Prevention And Response”: *The activities of the NDGDM in protection against major industrial and dangerous goods transport accident*, Balatonföldvár, 2005. október 24-25. BM OKF kiadványa
9. „A súlyos ipari balesetek elleni védekezés jogi szabályozása, helyi és területi feladatai *Legislation of prevention of major accidents, its local and territorial tasks*” című regionális továbbképzés: A Seveso II. Irányelv végrehajtása Magyarországon (általános tájékoztató), Budapest, 2005. október 20., a BM OKF és a KKEKI közös kiadványa;
10. Határtalan biztonságért szakkiállítás és konferencia: Az EU szabályai az ipari és polgári biztonság, a polgárok védelme érdekében *Rules of EU for industrial and personal safety, for protection of the population*, Szeged, 2005. november 17-19. Szeged, Duna-Körös-Maros- Tisza Eurorégiós Fejlesztési Ügynökség Kht.

Curriculum Vitae Professional-Scientific

Name: Vass Gyula

Place and date of birth: Budapest, 02 November, 1957

Course of studies

- 1986 - Ybl Miklós College of Technology, Construction Institute, Fire Prevention Faculty, Dipl. Fire Prevention Engineer;
- 1991 – Technical University of Budapest, Architect Branch, Structural Engineer Faculty, Dipl. Architect;
- 2005-től - Zrínyi Miklós University of Defense, Military Technical Doctor Institute, individual doctorate training.

Professional career

- 1982-1983** Fire Brigades of District V-VI-VII. Budapest, Fire Fighter;
- 1983-1986.** Ybl Miklós College of Technology Budapest, Fire Fighter Student (rank: ensign, troop ensign from 1994);
- 1986-1987.** Fire Brigades of District V-VI-VII. Budapest, Prevention Consultant;
- 1987-1991.** National Directorate General for Fire Fighting of the Ministry of the Interior, Budapest (BM TOP), Fire prevention Department, Prevention Chief Consultant;
- 1991-1993.** National Directorate General for Fire Fighting of the Ministry of the Interior, Deputy of Head of Department;
- 1993-1999.** National Directorate General for Fire Fighting of the Ministry of the Interior, Head of Department;
- 2000-2003.** National Directorate General for Disaster Management of the Ministry of the Interior, Budapest (BM OKF), Prevention Authority Department, Head of Department;
- from 2003 continually** National Directorate General for Disaster Management of the Ministry of the Interior, Industrial Accident Prevention and Supervision Department, Head of Department;

Research and scientific activities

- publication data: 21 magazine articles.; 1 textbook.; 10 lectures published on conference publications
- Subject specialist and professor - RTF disaster prevention faculty (disaster prevention subject);
- Committee of Competent Authorities in charge of introduction of SEVESO II Directive, Hungarian Representative;
- Member of Association of Fire Prevention Engineers.

Language skills

- 2005** English High level proficiency examination, type “C”
- 2006** German High level proficiency examination, type “C”

Budapest, June 6, 2006

Vass Gyula Fire-fighter Colonel, head Counselor