

**MIKLOS ZRINYI NATIONAL  
DEFENCE UNIVERSITY**

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**PhD Institution in Military  
Technology**

Major Eng. Laszlo FOLDI:

**ACTIVITIES OF THE HUNGARIAN DEFENSE FORCES IN THE SYSTEM OF CHEMICAL DISASTER  
RELIEF**

(PhD dissertation)  
author's exposition

Scientific consultant:  
**Dr. László Halász, DSc**

**2003**

## **I. SUMMARY AND AIMS OF MY RESEARCH WORK**

Problems with the chemical disaster relief were never so actual, like nowadays. The role of the armed forces, including the Hungarian Defense Forces should grow as an answer for the raising challenges, among others because of the threat of the NBC terrorism. We can think here about the terrorist activities with chemical warfare agents, but do not forget the danger emanating from the chemical industrial installations as potential chemical weapons.

After the end of the cold war, from the beginning of the nineties, the Hungarian Defense Forces (together with the armed forces of other countries) had to face with serious problems. Its role and tasks decreased, it has lost from its importance. The development started to slow down, the existed equipment grew old, the logistics system, the repair and maintenance background faced financial, personal and other shortages. The NBC service was also included in this process, if I can say this, even more seriously. Analysts said that the area had to be decreased drastically; some of them questioned even its existence. They said that the threat emanating from the weapons of mass destruction went to zero, so it was not necessary to deal with the NBC defense anymore.

But on the other hand, it was clear, that the danger of NBC weapons still existed. There were some local conflicts around the world, where some participants not hesitated to use chemical weapons trying to reach victory (e.g. Iraq-Iran war, Kurdish Rebellion). Or we can mention the mysterious Al-Eskan disease after the first Gulf War, and the use of chemical weapons by the forces of Saddam Hussein, as a possible reason for it.

These events started to raise attention towards the importance of the almost forgotten NBC defense. In addition, some other pitiable cases happened, for example, the sarin attack in the Tokyo metro system, as new form of the terrorism and as a new challenge for NBC defense. It became clear, that the threat of NBC weapons was not over, what is more, the circumstances made the situation more difficult. In the past, the weapons of mass destruction were in the hands of responsible governments more or less secured, and used only for discourage of the enemy. But now, there is a serious risk, that these weapons can be in the hands of aggressive, fanatic forces, under no control, and there is no logic in their way of thinking.

So today in the world the possible use of chemical weapons is no longer a military problem, and the threat of chemical disasters is no longer just the problem of the civil defense forces.

The military NBC experts should learn, how to deal with the toxic industrial chemicals, and the civilian disaster relief teams should know the behavior of the chemical warfare agents.

I think if we would like to build an effective disaster relief system against the harmful chemical (both industrial and chemical warfare) agents, we can not avoid creating full cooperation between the forces of the army, the civil defense, the environmental protection, the health service, etc. to minimize the weaknesses and to strengthen the capabilities.

### **Limitations of my task**

It is clear, that the word “activities” in the title of my dissertation can cover so much, that it is impossible to deal with every part in one dissertation. When I realized this, I decided to decrease the area of my research only for those parts, where I have both the scientific knowledge and the real professional practice. Because I am a chemical analytical engineer and I had been working both in laboratories and in situ on the sites of chemical disasters for years, I decided to deal in my dissertation with the following areas and problems:

- overview of the juristic regulations regarding the chemical disasters;
- analysis of the implementation of chemical disaster relief activities into the system of NBC defense;
- overview of the existing NBC equipment of the Hungarian Defense Forces and their usability in case of chemical disasters;
- development of new laboratory subsystems suitable for chemical disaster relief;
- Systematic research of in situ activities during chemical disasters.

### **Actuality and importance of my task**

As I already indicated, it is time to reorganize the system of NBC defense in the army. The lack of money and the disregard for years caused the present situation. Most of the equipment in NBC reconnaissance, personal and collective defense and decontamination are obsolete, they are simply too old to still hold them in the system. There is no industrial production for them, also. And if there is no equipment, somebody can question even the existence of the NBC defense units.

In my opinion, there is only one possible way in front of the NBC defense service: to find its role among the challenges of the modern era, where the most important ones are the defense against the international NBC terrorism, are the defense against the chemical industrial disasters and the participation in the international (NATO,UN) tasks.

We have to bear in mind, that nowadays the government supports only those developments and tasks, where the benefit comes both for our national and international political efforts. That is why we should think about new structures, subunits and equipment suitable for the already mentioned tasks together.

### **Methods of my research**

I have chosen the analysis of the regarding literature, the reveal of the existing problems, the synthesis of the facts and developing new answers and solutions for the problems as my research method.

### **MY AIMS WERE THE FOLLOWINGS:**

1. To develop a new multi level system of the personal chemical protection in the army, which is suitable to use during chemical disaster relief and the main point is to optimize the necessary protection level with the effective working capabilities;
2. To develop a new mobile chemical laboratory capable to work in situ at chemical disaster sites,
3. To develop a new central chemical laboratory, which is capable to analyze both qualitatively and quantitatively chemical samples taken from chemical disaster sites,
4. To create a theoretical system for the military units working in situ at chemical disaster sites, especially to develop the order of activities as a function of the time.

## II. SHORT DESCRIPTION OF MY RESEARCH WORK AND CONCLUSIONS

In the **first chapter** of my dissertation I dealt with the juristic environment concerning chemical disasters. I summarized the majority of the existing national and international laws and regulation, and I found the Hungarian system very modern, and found it to be easily attachable to the European system. The prevention, the categorization of the disasters, the area of responsibilities, the identification and tasks of the disaster relief units are very well organized.

I found some problems in the field of cooperation, especially in the lack of regulations in the clear designation of the areas of responsibility for the units of civil defense, fire brigades, army subunits and other organs, and the clear limits and borders of their area and activity. There are no real practical handbooks for chemical disaster relief suitable for the different situations.

In the **second chapter** of my dissertation I dealt with the overview of the existing NBC equipment of the Hungarian Defense Forces and their usability in case of chemical disasters.

I found most of the equipment obsolete in NBC reconnaissance, personal and collective defense and decontamination. They are clearly not suitable for use during chemical disaster relief activities. That's why at the end of this chapter I dealt with the development of a new multi level system of the personal chemical protection for the army subunits designated for chemical disaster relief, where the main point was to optimize the necessary protection level with the effective working capabilities;

In the **third chapter** of my dissertation I developed a new mobile chemical laboratory capable to work in situ at chemical disaster sites. I placed NATO recommended methods for sampling and identification for chemical warfare agents and standardized methods and equipment for analysis of toxic industrial chemicals. Personal protective gears, reconnaissance and decontamination equipment for the laboratory crew were also added to the system. I dealt with the training of the crews from sampling and sample transportation until the laboratory personnel. I developed the training methods and the necessary tasks and equipment, paying attention to the risk of working with hazardous chemicals and the importance of using simulants.

Placing a system like this into the service can also face the challenge caused by the threat of NBC terrorism.

In the **fourth chapter** of my dissertation I developed a new central background chemical laboratory capable for identification and analysis of chemical warfare agents and toxic industrial chemicals. I collected analytical methods that meet the NATO SIBCA (Subgroup on Sampling and Identification of Biological and Chemical Agents) recommendations and also the relating Hungarian standards.

If a laboratory like this will exist, it would retrieve a huge absence. Almost all of the NATO countries have their national laboratories for forensic chemical analysis. Of course, building this laboratory means large amount of investment, so I think it needs cooperation with the Ministry of Defense from the Ministries of Interior, Environmental Protection, Industry and Health.

In the **fifth chapter** I analyzed the work of disaster relief teams in places of chemical accidents and disasters. I developed a standardized method for the work of the subunits of the armed forces designated for chemical disaster relief. I splitted the forces into three subunits as:

- disaster relief management forces (commander and his crew)
- chemical expert subunit (reconnaissance, sampling and analysis)
- disaster relief workers (rescue and decontamination)

I developed the necessary and logically sorted activities of these subgroups as a function of the time.

### **III. SUMMARY OF MY RESEARCH RESULTS, RECOMMENDATIONS**

It was very stimulating all the way writing my dissertation, that I found my task very important and actual. The necessary participation and the role of the Defense Forces in the chemical disaster relief are still not clear. In addition, it is necessary to think over again the structure, forces and subunits of the NBC service, they place and role in the army on such a level that meets the requirements of the modern era and society. After working on my dissertation, I reached to the conclusion that the positive answer does exist for these problems.

The NBC defense in the Hungarian Defense Forces has a great history for more than 50 years now. It is very shameful, that nowadays there is no independent NBC service that can lead

and manage command and control the received tasks and orders concerning NBC (chemical) problems.

All the areas I studied in my dissertation, all my results and recommendations are for just one purpose: using my recommendations it is possible to reorganize the system of NBC defense in the army, to find the new way of thinking and the answers for the new challenges, so the NBC service can reborn and can have a great future.

### **My scientific results**

I recommend accepting as my independent scientific research results the followings

1. I developed a new multi level system of the personal chemical protection for the army subunits both for joint forces and special NBC defense subunits, where the main point was to optimize the necessary protection level with the effective working capabilities;
2. After detailed functional analysis I developed a new mobile chemical laboratory for the Hungarian Defense Forces capable for working in situ at chemical disaster sites. I placed NATO SIBCA recommended methods for sampling and identification for chemical warfare agents and standardized methods and equipment for analysis of toxic industrial chemicals. This laboratory is the first one that meets both the NATO and the Hungarian standards and requirements.
3. I developed a new central background chemical laboratory for the Hungarian Defense Forces capable for identification and analysis of chemical warfare agents and toxic industrial chemicals. I collected analytical methods that first meet both the NATO SIBCA (Subgroup on Sampling and Identification of Biological and Chemical Agents) recommendations and also the relating Hungarian standards.
4. I analyzed the work of disaster relief teams in places of chemical accidents and disasters. I developed a standardized method for the work of the subunits of the armed forces designated for chemical disaster relief. I splitted the forces into subunits and developed the necessary and logically sorted activities of these subgroups as a function of the time.

## **Recommendations:**

Based on my research results I recommend the followings:

1. To take into account my research results in case of developing new mobile chemical laboratory vehicles for the Hungarian Defense Forces.
2. To take into account my research results, my recommended methods and equipment in case of modernizing the existing mobile chemical laboratory vehicles for the Hungarian Defense Forces.
3. To take into account my research results, my recommended methods and equipment in case of developing new mobile chemical laboratory vehicles for the disaster relief units of the Ministries of Interior, Transportation and Health.
4. To create the central chemical laboratory developed in my dissertation under the responsibility of the Hungarian Defense Forces.
5. Cooperation for the disaster relief departments of the Ministries of Interior, Transportation and Health with the Hungarian Defense Forces in order to create a national chemical disaster control laboratory.
6. To reorganize the designated disaster relief units of the Hungarian Defense Forces in a way developed in my dissertation.
7. To train and maintain the level of readiness of designated units of the Hungarian Defense Forces and other responsible governmental offices in chemical disaster relief based upon the rules and methods written in my dissertation.
8. To modernize the personal protective equipment for units of the Hungarian Defense Forces and other responsible governmental offices in chemical disaster relief into a new multi level system of personal chemical protection, where the main point is to optimize the necessary protection level with the effective working capabilities;

Possible practical applications of my research results

The realization of the developments written in my dissertation would mean the following practical advantages for the Hungarian Defense Forces:

***An NBC defense unit can be built that would be suitable for***

- *supporting the work of disaster relief units of the Ministry of Interior in places of chemical accidents;*
- *decreasing the threat emanating from international NBC terrorism;*
- *Participation in international (NATO, UN) tasks.*

***A chemical laboratory can be built that would be suitable for***

- *large scale analysis of chemical warfare agents as a usable tool against the NBC terrorism in peace time, and on the other hand, an important expectation from the NATO;*
- *Reliable qualitative and quantitative analysis of the toxic industrial chemicals that necessary in case of serious chemical accidents and disasters.*

#### IV. LIST OF MY PUBLICATIONS

1. Gy. Láng, L. Kiss, L. A. Janov, S. A. Sokolov, I. A. Novochatski, L. Földi: Electrochemical and corrosion study of rapidly quenched amorphous nickel-phosphorus alloys, I. Effect of the cooling rate (Korróziós Figyelő, 30, 79 (1990))
2. Győző Láng, László Kiss, Leontii A. Ianov, Sergei A. Sokolov, Igor A. Novochatskii and László Földi: Electrochemical and corrosion study of rapidly quenched amorphous nickel-phosphorus alloys, I. Effect of the cooling rate (Acta Chimica Hungarica, 128, 807-818. (1991))
3. NATO-CCMS Final report on cross-border environmental problems emanating from defense-related installations and activities (Phase I: 1993-1995, Report No. 204, p. 295) Report of the Hungarian delegation compiled by Lt. Col. Eng. J. Gáspár and 1st Lt. Eng. L. Földi
4. NATO-PFP AC/225(LG.07/SIBCA) Sub-group on sampling and identification of biological/chemical agents (Final report, 1997. p. 189) Mobile Laboratories in the HHDF by Capt. Eng. L. Földi
5. Lajos Nagy, László Földi, Károly Nagy: Disaster relief at road accidents of dangerous goods I. (VÉDELEM katasztrófa- és tűzvédelmi szemle 2000/4. p. 48.)
6. Lajos Nagy, László Földi, Károly Nagy: Disaster relief at road accidents of dangerous goods II. (VÉDELEM katasztrófa- és tűzvédelmi szemle 2000/5. p. 30.)
7. Lajos Nagy, Károly Nagy, László Földi: Transportation of dangerous goods (Hírlevél, VIII./9. September 2000. p. 13.)
8. Zoltán Lévai, László Földi: Main conclusions from the Tisza River flood in year 2000. (Katasztrófavédelmi szemle, V./4.. 2000. p. 13.)
9. István Pintér, László Földi: The system of NBC reconnaissance and control tasks during war and peacekeeping operations, (Work for competition for the 50<sup>th</sup> anniversary of NBC Defense Service)
10. Lajos Nagy, László Földi: Complex tasks of disaster relief at road accidents of dangerous goods (Work for competition for the 50<sup>th</sup> anniversary of NBC Defense Service)
11. Dr. László Halász, László Földi: Environmental Protection - Environmental Security (ZMNE university lecture book, 50% co-author)

12. László Földi, Lajos Nagy: Complex tasks of disaster relief at road accidents of dangerous goods, (Katonai logisztika 2000./3.. p. 125.)
13. László Földi, Károly Nagy: Technical equipment of the factory level defense (Presentation and CD-edition for ZMNE Disaster Management Course, November 2000.)
14. József Csurgai, László Földi: Chemical Security (Presentation and CD-edition for ZMNE Disaster Management Course, November 2000.)
15. László Földi, Kálmán Kalló: The HAVARIA Laboratory of the Hungarian Defense Forces, (ZMNE VKBT home page, <http://www.zmne.hu/tanszekek/vegyl/indexlogo.htm>)
16. Lajos Nagy, Károly Nagy, László Földi: Transportation of dangerous goods, (ZMNE VKBT home page, <http://www.zmne.hu/tanszekek/vegyl/indexlogo.htm>)
17. Lajos Nagy, László Földi: Complex tasks of disaster relief at road accidents of dangerous goods (ZMNE VKBT home page, <http://www.zmne.hu/tanszekek/vegyl/indexlogo.htm>)
18. István Pintér, László Földi: The system of NBC reconnaissance and control tasks during war and peacekeeping operations, (ZMNE VKBT home page, <http://www.zmne.hu/tanszekek/vegyl/indexlogo.htm>)
19. László Földi: Tasks of the NBC subunits of the defense forces during chemical accidents, (ZMNE VKBT home page, <http://www.zmne.hu/tanszekek/vegyl/indexlogo.htm>)
20. László Földi: Possible way of development of the personal protective equipment in the defense forces, and their suitability during chemical disaster relief (ZMNE VKBT home page, <http://www.zmne.hu/tanszekek/vegyl/indexlogo.htm>)

## V. PROFESSIONAL CURRICULUM VITAE

### 1. Personal Data

- Name: Major Eng. FÖLDI, László
- Date of Birth: 25<sup>th</sup> August 1967.
- Place of Birth: Budapest, HUNGARY
- Gender: MALE
- Nationality: HUNGARIAN
- Marital Status: MARRIED  
Dependants: FÖLDI, Alexandra age: 8 years, my daughter
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- Official position:  
Officer of the Hungarian Army in the rank of Major  
Assistant lecturer of the Miklós Zrínyi National Defense University, Department of NBC and Environmental Security

### 2. Education

<i>Period of study</i>	<i>Name of the institution</i>	<i>Original Title</i>	<i>English Title</i>	<i>Major field(s)</i>	<i>Date it was obtained</i>
5 years	Eötvös Loránd University of Budapest Faculty of Natural Sciences	Okleveles Vegyész	Dipl. Ing Chemist	Physical and Organic Chemistry	1990
2 years	Technical University of Budapest Faculty of Chemical Engineering	Környezet- védelmi szakmérnök	Environmental Expert Engineer	Environmental Chemical Analysis	1994
3 years	Miklós Zrínyi National Defense University	Doktor (Ph.D.)	Ph.D. Military Engineering Sciences	Disaster Relief in NBC Defense	----

### 3. Professional Work History Chart

Organization	Title/Function	Field of Work	Duties	Number of Staff Supervised	Reason to Leave
NBC Supply Centre of the Hungarian Army	My first assignment was deputy chief of Mobile NBC Laboratory	Disaster relief,  Chemical and radiological analysis	In situ work on accident places with HAZMATs, frequent work with gas chromatograph and mass spectrometer, enlarging of database on CW agents and TICs	5	promotion
NBC Supply Centre of the Hungarian Army	Chief of Chemical and Radiological Laboratory	Chemical analysis of CW agents, management of rad. sources used in the Army	Laboratory quality control of NBC equipment, development and application of destruction methods of CW agents in according to the Chemical Weapons Convention, experience in laboratory work with live agents	6	promotion
NBC Supply Centre of the Hungarian Army	Chief of Mobile NBC Laboratory (“HAVARIA lab”)	Disaster relief,  Chemical and radiological analysis	In situ work on accident places with HAZMATs, frequent work with gas chromatograph and mass spectrometer, enlarging of database on CW agents and TICs	6	promotion
NBC Supply Centre of the Hungarian Army	Leader of Nuclear Disaster and Chemical Accident Relief Technical Branch	Organization of work, commanding of staffs, training	Commanding the work of mobile NBC laboratory and supervising the technical maintenance of the nationwide Nuclear Early Warning System of the Army	13	promotion
Miklós Zrínyi National Defense University, Department of NBC and Environmental Security	University assistant	Environmental protection, disaster relief	Research,  teach and supervise of students	-	

## 5. Summary of Work Experience

1992-1995	Representative of Hungary as a co-operation partner in NATO CCMS pilot study “Cross border environmental pollution emanating from military installations and activities”
1997-1998	Representative of Hungary as a co-operation partner in NATO group LAND 7, SICA subgroup (Sampling and Identification of Chemical Agents)
1998-2001	Ph. D. student of Miklós Zrínyi National Defense University, Department of NBC and Environmental Security Title of dissertation: “Tasks of the Hungarian Army in the coherence system of chemical disasters and accidents”
2002-2003	Member of the UNMOVIC weapons inspection team in Iraq as a chemical weapons inspector.

## 6. Language Proficiency

Language	Speaking	Writing	Reading
Hungarian /mother tongue/	Excellent	Excellent	Excellent
English	Fluent	Fluent	Fluent
Russian	Basic	Basic	Basic

## 7. Other Important Information

1992	Completed the US EPA training in Hungary
1994	Completed the Advanced Metrology training course
1999	Completed the Advanced Radiation Protection training organized by the ZMNE
2001	Completed the UNMOVIC Chemical Weapons Inspectors' basic training course
2002	Completed the UNMOVIC Chemical Laboratory and the UNMOVIC Dual Use Items and Technologies in the Chemical Industry advanced training courses

## 8. Professional memberships

1996-	Member of the Nuclear Environmental Control Working Division of the Hungarian Academy of Sciences
1996-	Member of the Air Quality Engineering Group of Hungarian Committee of Standards

Budapest,

2003.

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Major Eng. László FÖLDI