

-
- Visegrad Fund
-
-

Dr. Waldemar Zakrzewski, Eng.

Handbook

on procedures for unexploded ordnance
and other military explosives



• Visegrad Fund

Dr. Waldemar Zakrzewski, Eng.


Handbook

on procedures for unexploded ordnance
and other military explosives

2024

The project "Security education on procedures for live bombs and other military explosive materials"
is co-financed by the Governments of the Czechia, Hungary, Poland and Slovakia through Visegrad Grants from International Visegrad Fund.
The mission of the fund is to advance ideas for sustainable regional cooperation in Central Europe





This manual has been prepared in connection with the project entitled *Education for Safety in Handling Unexploded Ordnance or Other Hazardous Materials of Military Origin*. The project is co-financed by the governments of the Czech Republic, Hungary, Poland and Slovakia under the Visegrad Grants of the International Visegrad Fund. The Fund's mission is to promote the idea of sustainable regional cooperation in Central Europe.

Project partners:

Fundacja Instytut Regionalny (Leader)

Foundation Regional Institute
Bystre 39, 38-606 Baligród, Polska
www.instytutregionalny.eu

Związek Oficerów Rezerwy Rzeczypospolitej Polskiej

Reserve Officers Association of Poland
Sikorskiego 2/18, 05-101 Nowy Dwór Mazowiecki, Polska
www.zorrrp.org

Instytut Bezpieczeństwa i Rozwoju Międzynarodowego

Institute of Security and International Development
Ordynacka 9, 00-364 Warszawa, Polska
instytut@birm.waw.pl
www.instytutbirm.pl

Detská organizácia FÉNIX Snina

Children Organisation FENIX Snina
Gagarinova 1559/4, Snina 069 01, Slovakia
www.snina.do-fenix.sk

Centrum pro bezpečnostní analýzu a prevenci

Centre for security analysis and prevention
Dolní 400, Pustá Polom, 74769, Republika Czeska
www.cbap.cz

Громадська організація “Народна самооборона Львівщини”

Non-governmental organization “People’s self-defence Lviv”
35/53 Zubrivska str., Lviv, 79066, Ukraine
www.narodnasamooborona.lviv.ua

Table of contents

Introduction	5
I. Identification of explosive and dangerous objects	7
II. Rules of safe behaviour in case of finding explosive and dangerous objects	15
III. Rules for reporting information about finding explosive and dangerous objects to state services	19
IV. Explosive and hazardous object removal system	20
V. Education – a condition for ensuring safety of the civilian population	23
Summary	24
Index of figures	27

Introduction

Wars are the worst possible form of resolving disputes and shaping international relations. In fact, they have been waged since the formation of the first social communities. As technology developed, the means of waging wars and the means of destruction used by the warring armies advanced. In the era of tremendous civilizational development at the turn of the 19th and 20th centuries, wars and military actions caused increasing losses and threats to the security of civilians. Humanity of the third decade of the 21st century, despite numerous attempts, has yet to find an effective method to achieve conditions for peaceful coexistence.

Modern technologies applied by belligerent armies pose threats to the life and health of civilians, destroy residential, industrial and communication infrastructure and cause serious destruction of the environment. All the means of warfare and destruction used by the warring parties not only bring death during the fighting but also pose a real threat afterwards. It should be noted that both during and after hostilities, the mines of various types used and the resulting unexploded ordnance pose a serious threat to the life and health of the civilian population and their main victims are most often children. In various places, in surviving residential buildings, on roads or in playgrounds, the civilian population may come into contact with unexploded ordnance or encounter „surprise mines”.¹ Contemporary UN statistics show the enormity of the misery that is caused by explosions of mines, unexploded ordnance and other explosive objects of military origin. Every year between 15,000 and 20,000 people lose their lives or suffer permanent disability

1 Surprise mine - a device set to impede the removal of other mines and prevent the enemy from using defensive facilities, military equipment, buildings and other objects in an occupied area.

due to this cause. It is estimated that nearly 47% of this number are children (The UNMAS Annual Report 2022). According to UN statistics, there are approximately 100 million anti-personnel mines set in the ground worldwide during numerous armed conflicts. It can be assumed that a potentially similar number of people are at risk of permanent disability or loss of life. Only humanitarian demining efforts, in conjunction with extensive risk education and victim assistance, have saved the lives, health of many people (The UNMAS Annual Report 2022).

An additional side effect of military operations is abandoned ammunition, which threatens the safety of civilians. Every person living in the area where fighting is taking place is exposed to the possibility of the loss of life or health and must make difficult existential decisions.

Paying attention to the problem of safety of civilians in terms of threats generated by mines, unexploded ordnance and other explosive objects presented in this manual, the author attempts to identify these threats and show the principles of safe behaviour in the event of contact with such objects. The main purpose of the study is to identify the objects contributing to the mining of an area during hostilities, to indicate the procedures for safe behaviour and, at the same time, to find answers to the following questions:

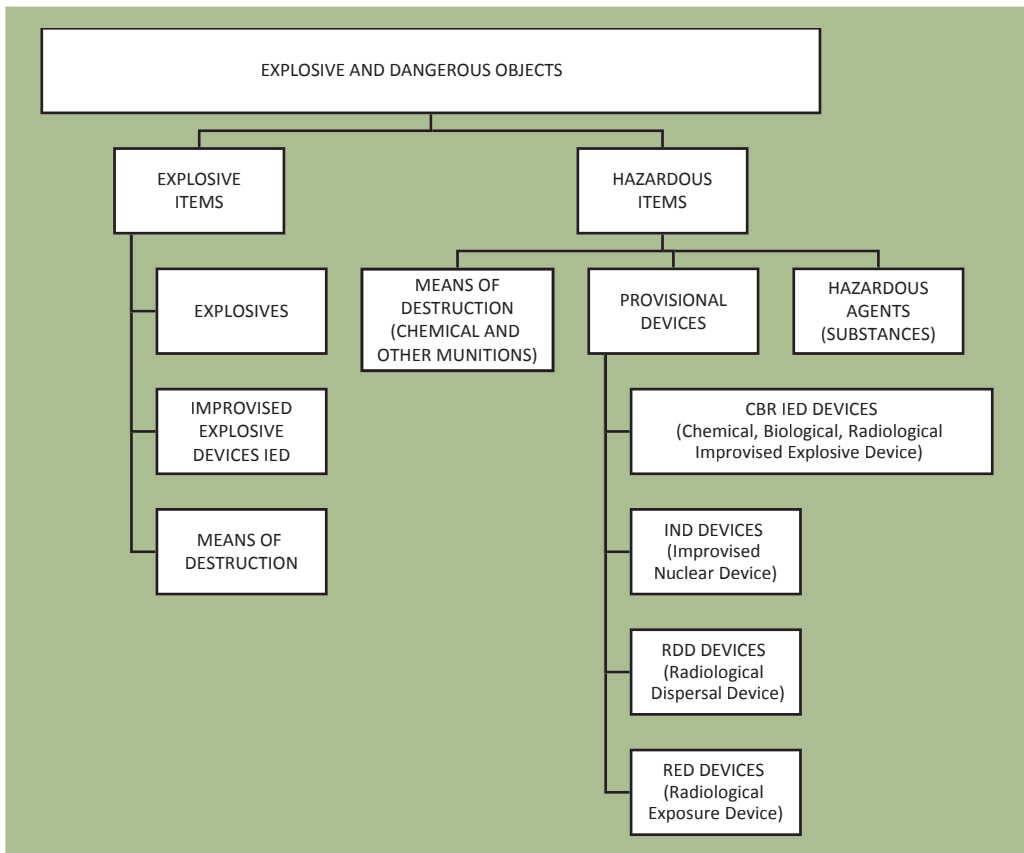
1. What is the scale of security threats to civilians generated by contamination of the national territory with explosive and dangerous objects of military origin?
2. What preventive measures should be taken to minimize security risks to civilians generated by explosive and dangerous objects?
3. How should one act to avoid tragedy having found an unexploded ordnance or other explosive object?

During the period of the world wars, intense fighting took place on the territories of many European countries. The territories affected by warfare were severely contaminated with explosive and dangerous objects and required time-consuming, very expensive and dangerous demining work.

I.

Identification of explosive and dangerous objects

Every war “litters” the terrain where battles were fought. Wreckages of damaged or destroyed combat equipment are left on battlefields, laid mines and explosive charges lie in the ground and in bodies of water, abandoned ammunition

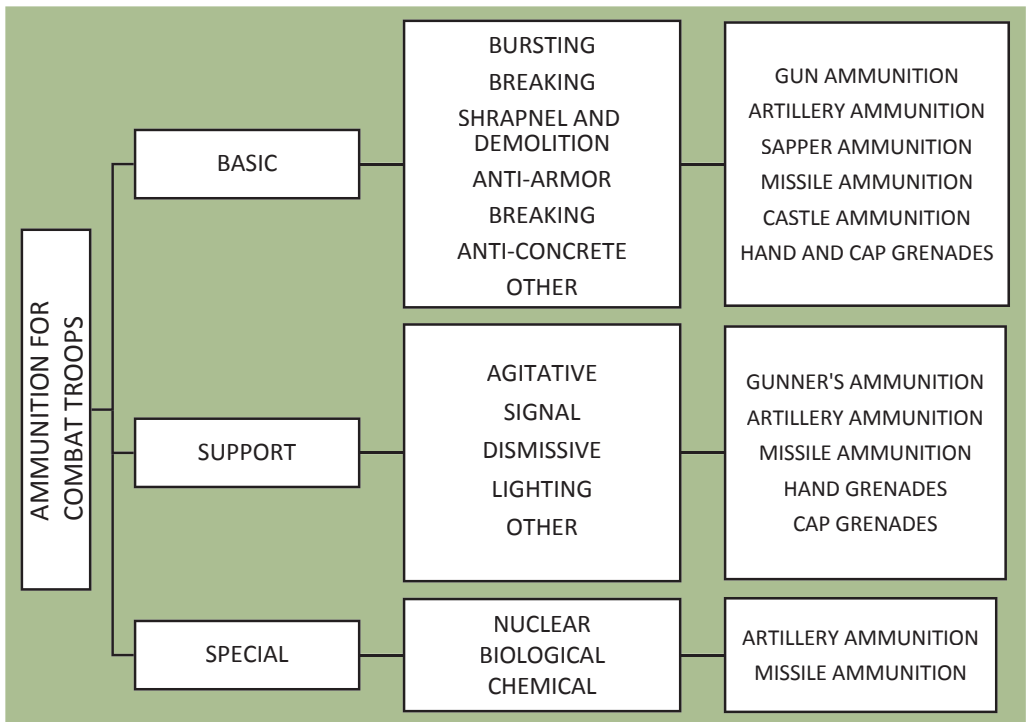


1. Classification of explosive and dangerous objects

Source: G. Piela, *Preparation of soldiers of the engineering troops for the removal of explosive and dangerous objects*, Warsaw 2020, p. 29.

and other means of warfare as well as numerous unexploded bombs and unexploded ordnance are visible in fields.

The more intense the fighting, the more explosive and dangerous objects will be found afterwards. They pose a serious threat to the life and health of civilians. Explosive and dangerous objects are defined by means of numerous terms in the specialized military vocabulary. This term includes a comprehensive collection of means and devices used in combat operations. These include explosives, land, river and sea mines, various types of shells, aerial and depth bombs, grenades and makeshift explosive devices.



2. Klasyfikacja amunicji wojsk lądowych

Source: G. Piela, *Preparation of soldiers of the engineering troops for the removal of explosive and dangerous objects*, Warsaw 2020, p. 29.

Various types of ammunition are used in combat operations. Each type of military (land, air, naval) uses a rich assortment of munitions. This large number and variety of means of destruction (munitions) amplifies the risks to human health and life and specifically affects the environment and surroundings. The land forces apply the following types of munitions:

- demolition,
- fragmentation and demolition,
- anti-tank,
- incendiary,
- anti-concrete,
- illuminating and signalling in the form of shooting, artillery, rocket, sapper, cartridge ammunition
- as well as hand grenades and cap grenades.

Small arms ammunition is an assortment of means of destruction most encountered by people who come into contact with explosive and dangerous objects. However, these small objects pose a serious threat to human health and life.

Artillery shells and tank ammunition constitute a severe threat to civilians, due to their high explosive content and being armed with an incendiary device. Irresponsible behaviour can lead to a tragedy.



3. Artillery shells

Source: D. Kapinos, Sappers found 16 artillery shells in a creek, <https://nto.pl/pociski-juz-niegroznepociagi-na-linii-nysa-brzeg-znow-kursuja/ar/4555587>



4. Artillery shells

Source: Central Bureau of Investigation, <https://cbsp.policja.pl/cbs/aktualnosci/132971,Funkcjonariusze-CBSP-zabezpieczyli-pociski-artyleryjskie.html?search=47421114512139>



5. R.A.F. aerial bombs

Source: Imperial War Museums, <https://www.iwm.org.uk/collections/item/object/205213144>

Aerial bombs are used to destroy objects on land and at sea. They have different amounts of explosive material and means of impact on the external environment. Unexploded bombs pose very serious dangers due to their explosive power and burst effects.

Classic mines

The essential means of land mining used in combat operations are various types of mines. They are used to establish minefields or in the form of mine groups and individual mines. Depending on the setting environment, mines are divided into land, sea and river mines. Mines used on land are divided into anti-tank mines, dedicated to destroying armoured means and vehicles, and anti-personnel mines designed to eliminate soldiers from a combat. According to wartime experience, mines are the greatest threat to civilians. Each mine explosion can cause the loss of life or permanent disability of many people. Tragic statistics show that the most common accidental victims of mines are children and teenagers. Some examples of mines that were used during the period of warfare include:



6. Anti-tank mine

Source: Mikołów District Police Station, <https://mikolow.policja.gov.pl/k15/informacje/wiadomosci/169297,Policjanci-zabezpieczali-miny-przeciwpancerne.html>

Sea and river mines, on the other hand, are placed in bodies of water. Their objective is to impede navigation and destroy vessels. They are most often set in shipping lanes and on approaches to ports. Laminated waterways pose a serious threat to people, floating equipment and the performance of economic tasks.



7. Contact naval mine

Source: M. Pulkowski, <https://www.zabytki-techniki.org.pl/index.php/muzeum-wojska-polskiego-w-warszawie-wirtualny/133-mwp-morskie/823-mina-kontaktowa-wz-08-39>



8. Marine mine

Source: Australian War Memorial, <https://www.awm.gov.au/collection/C255751>

Trap mines

In addition to classic minefields, the standard mine laying of objects prepared for destruction, booby-trapped mines are very often laid in areas abandoned by troops. These are constructions using classic anti-personnel mines or hand grenades, which in combination with everyday objects (household appliances, radio and television equipment, children's toys, jewellery) create deadly traps that constitute a threat to human life and health. Trap mines are set in abandoned residential buildings, stores, food warehouses and even playgrounds.

Improvised explosive devices

Improvised explosive devices are a specific and very dangerous type of booby-trapped mines. Due to their special design, the type of detonators used, explosives and means of amplifying the effect of the explosion (pieces of metal, nails, screws), and the way the explosion is initiated, they pose a deadly threat to human life and health. The design and method of activation of these devices depend on the creativity of the designers. Often these devices are installed in vehicles, in parcels, in roadside structures and even in the crowns of roads. In these conditions they are very difficult to neutralize.

Unexploded ordnance and unexploded shell

Another type of explosive and dangerous objects posing a very serious threat to both life and health of the civilian population are unexploded ordnance and unexploded shell. These are items containing explosive material that can explode uncontrollably. The military definition of an unexploded ordnance defines it as an object containing explosive material in which, despite the conditions created for explosion, the potential chemical energy of the crushing material has not been transformed into chemical energy. Causes of unexploded ordnance include, among others: chemical changes in the composition of the crushing material, technical errors in workmanship, etc.

An unexploded ordnance, on the other hand, is an agent of destruction that has not been fired due to a technical malfunction and has been abandoned or lost. Unexploded ordnance and unexploded shell are side effects of the use of rocket

shells, artillery shells, tank shells, anti-tank and hand grenades, anti-tank guided missiles or aerial bombs. According to military experts, an estimated 10% to 30% of bombs, explosives and munitions of all types used in operations never explode. This contributes to the contamination of the ground and bodies of water by explosive and dangerous objects.



II.

Rules of safe behaviour in case of finding explosive and dangerous objects

Explosive and dangerous objects may be encountered in a variety of everyday situations:

- in agricultural fields, while conducting field work,
- on construction sites, during excavation works,
- in forests, during forest tours, logging, and forest management,
- on sea beaches, where storms have thrown ashore unexploded ordnance lying on the seabed,
- while diving,
- during hiking trips on trails.

Only responsible behaviour of people who come into contact with unexploded ordnance will protect against a tragedy. First of all, objects found in various places must not be touched. Under no circumstances should they be unearthed and moved to another location. Let them remain intact until the arrival of the services that will professionally handle them. Sometimes we want to help the sappers and this can lead to a tragedy.

Once the place where explosive and dangerous objects were found had been marked, we should immediately move away from the danger area. We move away to a distance of 4-5 meters, because we can never be sure if we are dealing with a single explosive and dangerous object or if there are more in the area of the find.



9. Unexploded ordnance found in the forest

Source: T. Kopaczewski, <https://inforowadeba.pl/aktualnosci/230-sztuk-roznego-rodzaju-amunicji-zdetonowano-na-nowodebskim-poligonie>



10. Unexploded ordnance discovered at a construction site

Source: T. Zieliński, *Thousands of unexploded ordnance are found in Poland every year*, <https://geekweek.interia.pl/militaria/news-nieybuchy-i-miny-juz-nie-beda-grozne,nld,2247019>

Let us bear in mind!!!

If we come across explosive and dangerous objects we should try to mark the place where we find such an explosive object. Marking will protect other people from the possibility of contact with explosive and dangerous objects while, at the same time, constituting an indicator for the services dispatched to neutralize this danger. To mark the place where explosive and dangerous objects are found, we can use handy means such as a branch, a stick driven into the ground, a soda bottle placed on a stick driven into the ground. It is always about prevention.

If you are a child notify an adult you meet in the area.

When you move away to a safe place, immediately notify one of the following institutions by phone:

- **Emergency number 112** – there, the operator will take all the information from us and then inform the relevant services,
- **Forest Guard** – if we have found explosive and dangerous objects in the forest area. Forest Guard officers will secure the find until the sapper service takes action,
- **Police** – after receiving the report, it will direct a patrol to the area of the find, which will identify the object and secure the area until the explosive and dangerous objects are neutralized,
- **Fire Department** – after receiving the report it will direct a patrol to the area of the find, which will identify the object and secure the area until the explosive and dangerous objects are neutralized,
- **Municipal / City Guard** – upon receiving the report, it will direct a patrol to the area of the find, which will identify the object and secure the area until the explosive and dangerous objects are neutralized,
- **Border Guard** – in the border area, after receiving the report, it will direct a patrol to the area of the find, which will identify the object and secure the area until the explosive and dangerous objects are neutralized,
- **Municipality / City Hall** – upon receipt of the report, it will direct a patrol to the area of the find, which will identify the object and secure the area until the explosive and dangerous objects are neutralized.



11. Sample marking the site of an unexploded ordnance find

Source: Żory City Police Station, https://zory.policja.gov.pl/k31/informacje/wiadomosci/282_503/Jak-zachowac-sie-w-przypadku-znalezienia-niewybuchu.html



12. Unexploded ordnance found in the forest near Starachowice

Source: Centre for Preparation for Foreign Missions, <https://cpdmz.wp.mil.pl/aktualnosci/pracowity-poczonek-roku-dla-kieleckich-saperow/>

III.

Rules for reporting information

about finding explosive and dangerous objects to state services

The action of the institution receiving the report of finding explosive and dangerous objects will consist in:

- directing a patrol to identify explosive and dangerous objects,
- isolating the finding area, closure of access roads, protecting the finding area against unauthorized access,
- notifying the sapper patrol responsible for the area,
- establishing the crisis staff (in the event of a serious threat, it makes a decision),
- ordering evacuation of the population from the emergency area.

Rules for reporting information about finding explosive and dangerous objects to state services:

- applications can be made in person or by phone,
- one must specify the exact location of the find,
- one must describe what was found (appearance, dimensions, quantity),
- one must wait at the distance for the arrival of the services that will secure the find.

IV. Explosive and hazardous object removal system

The organization of the system of modern explosive and dangerous objects disposal in Poland, Slovakia and the Czech Republic is related to the dangers of warfare and the experience of demining of the national territory carried out after the end of the war. Historical conditions resulting from the course of operations during World War II and the experience gained in modern armed conflicts fundamentally determine the type and scope of explosive and dangerous objects' neutralization projects carried out by engineering troops.

On the one hand, the state of mine-laying was influenced by the preparatory and defensive activities carried out during World War II by the German Army, which used the latest technological discoveries, including mine-blasting measures. On the other hand, the operations carried out by the Soviet Army and the national armies were characterized by the use, among other things, of mine barrages whose primary purpose was to fortify the captured areas. The conduct of operations in addition to the use of mines was also associated with the use of various types of means of destruction (munitions). The cited means of destruction often, as a result of improper operation, took the form of unexploded ordnance, unexploded shell or, in special situations, became munitions abandoned on the battlefield. Despite the passage of almost 80 years since the end of World War II, the number of found explosive items from that particular period is still a major factor in determining the maintenance of specific forces and resources on national territory for their disposal.

Clearing (removal) of explosive and dangerous objects of military origin is carried out within the subsystem for clearing the area of explosive and dangerous

objects included in the engineering support system. The chief command authority of the engineering troops is responsible for the implementation of tasks within the framework of the system and subsystem in question. The functional structure of the system for clearing the area of explosive and dangerous objects ensures the implementation of this task in two modes, i.e. a planned clearing of areas and facilities and intervention clearing.

The subdivisions in question with land clearing authority include:

- demining patrols,
- diver-miner groups.

The planned mode of clearing an area or facility includes the implementation of pre-planned projects for the removal of explosive objects of military origin, which are carried out by specialized subdivisions of engineering troops or subdivisions of other types of troops.

Intervention clearing of the area is carried out as part of the emergency response system. Sapper patrols are ready for action around the clock, all days of the year.



13. Sapper patrol in action

Source: E. Antoniak, <https://15bsap.wp.mil.pl/pl/articles6-aktualnosci/12-patrol-saperski-w-akcji/>



14. Sapper patrol in action

Source: Archives of the 21st Demining Patrol, <https://www.polska-zbrojna.pl/home/articleshow/9269>



Education

– a condition for ensuring safety of the civilian population

For decades, military engineering specialists have been neutralizing the dangers of contaminating the country's territory and clearing it of explosive and dangerous objects, which continue to be a deadly threat to life and health of the civilian population. Victims of mines, unexploded ordnance and unexploded shell are civilians of all ages, including children and teenagers, who are unaware of the danger.

In order to minimize the dangers generated by unexploded ordnance and dangerous objects, it is necessary to conduct safety education to familiarize the population (especially children and adolescents) with the dangers posed by explosive and dangerous objects and to teach proper behaviour in situations of contact with explosive and dangerous objects. These activities will enable adequate preparation of citizens for proper behaviour in an emergency situation caused by contact with explosive and dangerous objects.

Education among children and adolescents is of particular importance in this process since these groups most often become victims of explosive and dangerous objects. It is necessary to strive for a situation where:

- every citizen will be aware of the dangers generated by mines, unexploded ordnance, unexploded shell and other explosive and dangerous objects,
- citizens will know how to behave properly having found explosive and dangerous objects,
- citizens will consciously avoid risky behaviour and not endanger their own health and life.



Summary

The handbook illustrates a number of problems, threats, opportunities and challenges generated by unexploded ordnance, unexploded shell and other explosive and dangerous objects of military origin. Any war seriously affects the security system of the country's civilian population. All citizens participate in its construction but also become potential victims of the dangers caused by mines, improvised explosive devices, unexploded shell and unexploded ordnance. For many years, our country's authorities have been involved in the process of clearing up the effects of military warfare, with mining constituting its side effect.

The dangers of contaminating the national territory with explosive and dangerous objects are likely to continue to pose a real threat to the civilian population for years to come. Realizing the complete clearing of the country's territory of thousands of mines, unexploded ordnance and explosive objects will continue to require the commitment of specialized forces and resources in the form of sapper patrols. However, these forces require adequate training and appliances with state-of-the-art technical equipment that guarantees safety of sapper soldiers and bystanders. Education is a prerequisite in terms of reducing civilian casualties (including children and young people). As part of educational activities, the civilian population must be made familiar with safety rules on how to behave and act when encountering explosive and dangerous objects. The public must be kept informed of all the risks and dangers arising from the country's mining.

Unexploded shell, explosions

Hazardous Items:

- Items of military origin, e.g., fuses, shells, aerial bombs, artillery and rifle cartridges, grenades, mines, explosives, scrap metal containing remnants of explosives,
- materials of military or industrial origin that are flammable, corrosive, poisonous and posing a danger when handled or in contact with air or high temperature, such as the contents of steel cylinders, fire extinguishers, residues of substances in laboratory apparatus.

The explosive used in military technology is completely weather-proof and retains its explosive properties regardless of the date of manufacture.

If a suspicious object is found:

- do not dig it out,
- do not touch, and in particular do not lift, move or use any tools against the object,
- do not throw into campfires, ponds or deep ditches,
- if possible, secure the location of the find against access of others,
- notify the police – follow directions,
- until the arrival of the called services, remain near the find – do not allow other people to approach or manipulate the object.

Remember:

- do not enter areas marked with a ban on entry (training grounds, exercise areas, firing ranges, warehouses),
- do not touch, do not tamper with found suspicious objects (bombs, bullets, ammunition, grenades),
- familiarize your children with how to deal with this type of case.

Emergency telephone numbers in case of danger:	Poland	Slovakia	Czech Republic	Ukraine
integrated emergency number	112			
emergency	999	155	155	03
fire department	998	150	150	01
police	997	158	158	02

Index of figures

1. Classification of explosive and dangerous objects	7
2. Classification of land army munitions	8
3. Artillery shells	10
4. Artillery shells	10
5. R.A.F. aerial bombs	11
6. Anti-tank mine	12
7. Contact naval mine	12
8. Marine mine	12
9. Unexploded ordnance found in the forest	16
10. Unexploded ordnance discovered at a construction site	16
11. Sample marking the site of an unexploded ordnance find	18
12. Unexploded ordnance found in the forest near Starachowice	18
13. Sapper patrol in action	21
14. Sapper patrol in action	22

