

EXPLOSION OF AMMUNITION DEPOTS IN VLACHOVICE-VRBĚTICE IN THE CZECH REPUBLIC

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Abstract

The main topic of the article concerns explosions of two ammunition depots in the Vlachovice – Vrbětice area in 2014. At the end of the article are mentioned possible precautions. The article deals with ammunitions and explosives that have been found in the Czech Republic in the past. These are remnants of the First World War, but mostly of the Second World War. The history of construction of Military Ammunition Depots in the land registry of Bohuslavice, Divnice, Haluzice, Lipová, Vlachovice – Vrbětice and Slavičín is also briefly presented.

Key words

Czech Republic, Vlachovice – Vrbětice, Ammunition Depot, Explosion, Extraordinary Event, Precaution, Prevention.

Methodology

The presented work was based on the search of information from available literature and the theses papers. Furthermore, interviews with competent persons, representatives of local government and state administration were held. The TEREX computer support was used to determine the intensity of explosions, the perimeter of the explosion hazard at the ammunition depots in Vlachovice – Vrbětice and evacuation of the population.

Explosion of ammunition depots in the Czech Republic

There is a huge amount of ammunition and explosives in the Czech Republic. For example, statistics for January and February 2013 showed the fact that pyrotechnics went to 119 cases of ammunition found. For the comparable period in 2014, the number was double: 236 exits. Pyrotechnics attributed the double rate to mild winter, numerous finds, but also to earth and construction works. In the time of better weather also treasure finders with metal detectors appeared in the field – where they searched for the historical objects they collect and sell.

In the spring there are the most finds in the fields, later in the woods. According to pyrotechnics, the most common in the Czech Republic are hand and artillery shells, artillery mines, infantry ammunition, but also air bombs. Most often, these things come from the Second World War. Exceptional are neither the findings of the First World War nor the Prussian-Austrian War. However, there is also ammunition from the time when the Warsaw Pact troops and the Czechoslovak People's Army trained here. Historical events are reflected in the type of findings in various places in the Czech Republic. They differ regionally. It depends on what happened in the past on the territory. At the end of the war the ammunition depots, were at some places purposely destroyed by explosion, so there could be artillery shells and artillery mines spread in the vicinity.

In cities and their surroundings, it is more likely that people and pyrotechnics will encounter air bombs. Some urban agglomerations were the targets of raids. It is also possible to find unexploded mines, and these represent the greatest danger.

Findings in the Czech Republic can also be divided according to the progress of armies: in the west of the territory there are more frequent remains of Anglo-American ammunition and in the East Soviet. Pyrotechnics also find out how the four seasons work on the sites. Especially in the spring and autumn, they expect frequent reports of ammunition findings in the fields, in the period of mushroom picking the pyrotechnics are prepared for more frequent interventions in the forests. Experts do not assume that ammunition in the Czech Republic will diminish. We mean the ammunition the pyrotechnics find. The assumption is, that there will be the ammunition to be find again for the next hundred years. [22]

Another area is the danger of using fireworks in the Czech Republic, where health and material damage often occur.

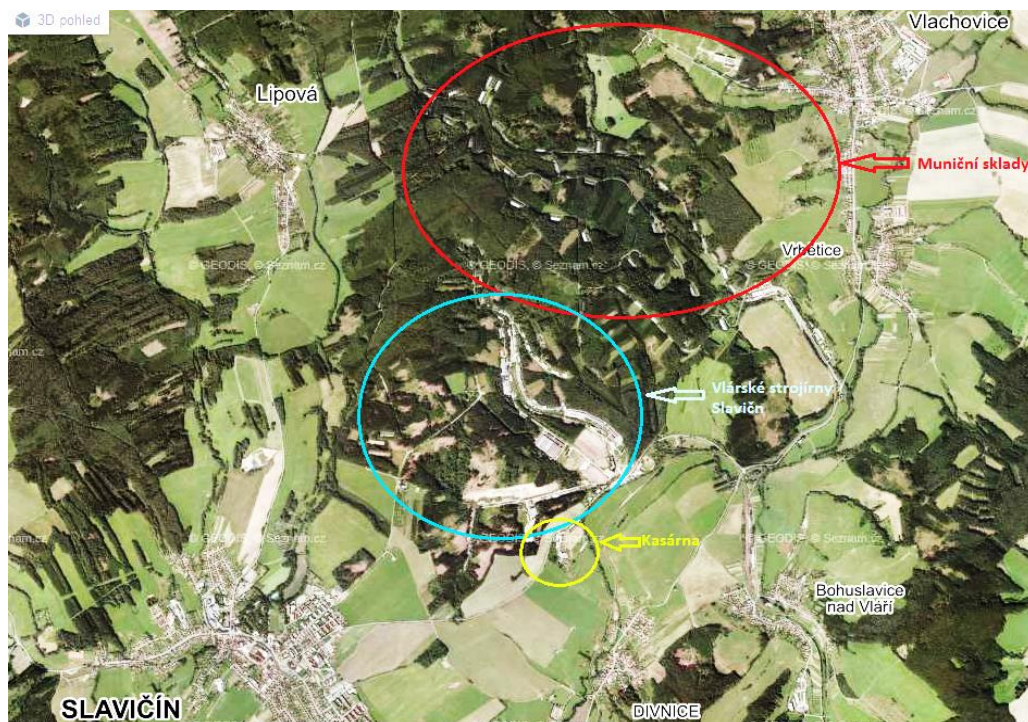
Regarding to incidents involving the handling of ammunition, a large number of these events occur in different areas of our planet. For example, in Russia, based on information from an available resource dated June 19, 2013, burned an ammunition warehouse with 18 million artillery shells. An ammunition warehouse with 18 million artillery shells burned in Russia. [5]

For example, fire at the Brazilian club in Santa Maria (report dated January 30, 2013) caused fireworks for outdoor use. The fire extinguishers were malfunctioning and poor and the club had only one exit. Following a tragedy that claimed 235 lives, many Brazilians were worried about the safety of other clubs in the country, as well as the safe provision of sports and carnival events. From the outdoor pyrotechnics, which the performing music group acquired deliberately because of the several times lower price, the club's ceiling was covered by flammable noise insulation. Despite this, no law was violated. [6]

In the list of extraordinary events, we could proceed further. However, the aim of this paper is to point out an explosion of ammunition warehouses in Vlachovice-Vrbětice, briefly characterize some events and provide preventive and follow-up measures.

The village of Vlachovice is situated in the foothill countryside in the northernmost part of the White Carpathian Protected Landscape Area, in the south-eastern part of the Zlin Region, 6 km west of the town of Valasske Klobouky. Under the village Vlachovice belongs also Vrbetice an independently staying village until recently. Together, both parts of the village have about 1,500 inhabitants.

The construction of the Laboratory Station - Military Ammunition Factory was decided by the Ministry of National Defense of the Czechoslovak Republic in 1934. The ammunition factory in Bohuslavice was designed for the production of artillery and engineer ammunition and was marked as Military Ammunition Factory No. 2, Bohuslavice nad Vlari (further in the text only VMT-2), later used name was Military Factory No. 2 (further in the text VT-2). Placement location was practical. The Commission selected both sites at once, for ammunition stores and for the factory. The three valleys (see Figure 1) were well suited to the strategic - hiding of objects as well as practical - roads and railroad tracks were in the immediate vicinity.



Picture 1
Map of three valleys [29]

The projects envisaged the construction of a total of 41 buildings. Of these, 12 service facilities, 21 production facilities, and 8 storage warehouses and igniters. The area of the enterprise was more than 90 hectares and was built in the cadastres of Bohuslavice, Divnice, Haluzice, Lipová, Vlachovice-Vrbětice and Slavičín.

Introduction

In the area of Vrbětice, two ammunition depots exploded in 2014. In terms of Czech legislation, this is an extraordinary situation. Both warehouses were leased by the Imex Group. After the first explosion of October 16, which claimed two lives, 355 uncontrolled explosions followed. After the second explosion that occurred on December 3, there were less than a hundred uncontrolled explosions. Five evacuations were ordered, their homes, jobs, or schools had to leave 2000 people. A safety circuit of about 14 kilometers was set up, which was reduced to ten kilometers in April. According to police information, in 27 objects of the ammunition depot were stowed about 7,000 tons of military material with about 1,000 tons of explosives. From the beginning of the investigation of the first epicenter of the explosion, the police found a total of 3252 pieces of ammunition. Of this amount, the pyrotechnicians had to dispose of a total of 236 pieces of damaged ammunition unable to carry by 70 explosions directly in the munitions depot area in a temporary tear pit.

The pyrotechnicians accompanied by traffic policemen carried to the Libava military area in three shifts 2945 pieces of ammunition, which they destroyed in a tearing pit. The last shipment took place at the end of November.

The police explored the explosion as a deliberate general threat. To the beginning of February 2016, the Army of the Czech Republic was involved in the guarding of warehouses and subsequently the area was guarded by the Czech Police and the Military Forests and Farms. A total of 547 trucks with weaponry left the camp, the last in December 2015. From the environmental components were negatively affected air, soil and explosions negatively influenced also the game - the biotic component of the environment. Deterioration of water quality has not been determined on the basis of available sources.

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As far as the future is concerned, Vlachovice-Vrbetice plans to build a water tank as a source of drinking water and to protect the surrounding against floods and drought. The tank will also be used for other purposes, for example for fishing purposes. [24] [23] [26] [25]

Extraordinary event of October 16, 2014 - Explosion 1

On October 16, 2014, the Police of the Czech Republic received the announcement of the explosion and subsequent fire of the ammunition depot in Vlachovice-Vrbětice. The Operations Officer immediately sent police patrols to the place and took several security measures. Together with the police, all the forces of the Integrated Rescue System (IRS) and the Military Police were involved. Police officers from Brno, police pyrotechnics and helicopters arrived to help the Zlín policemen during the day. Together, dozens of policemen intervened. In the surrounding area of Vlachovice-Vrbetice took place in the morning a few explosions, the strongest destroyed glass in the windows of nearby buildings. Police officers evacuated companies in the vicinity of ammunition warehouse, as well as pupils and employees of a nearby secondary vocational school, a total of several hundred people. At the time of the explosion, there were five employees in the building, three of whom had left the building before the explosion. Two men aged fifty-six and fifty-nine years were missing. The remains of both missing men were found in the area by police pyrotechnicians near the epicenter of the explosion on November 24.

In the afternoon of October 16, a police and military helicopter flew over the affected area. Their task was to monitor the environment and the place of the fire. Pyrotechnicians evaluated the images taken using thermovision, based on the results, determined the next procedure. Pyrotechnic work in the building could not be started because the building was still smoldering. There were a lot of explosives inside and around. The employees of the regional hygienic station have not detected increased contamination of chemicals in the air.

On October 17, the Crisis Team was set up, where police and fire brigades clarified further progress on the explosion site. A special telephone line for citizens who were in any way affected by an explosion was established, another purpose of the special line was the possibility for the citizens from the vicinity to be informed about the explosion or to communicate information about the event, which would help the police.

Pyrotechnicians conducted a survey using unmanned vehicles called the drones on October 18. Then the pyrotechnics began to explore the area of the explosion, a convoy of an armored police vehicle and a fire brigade emerged into the field.

The pyrotechnicians did not get to the epicenter of the explosion on October 19. During the day-long work in the northern part of the area, they explored several buildings, and in the stretch they encountered a number of ammunition scattered along buildings and warehouses. Explosives needed to be disposed or secured and stored for transport. The disposal of dangerous ammunition was fully under police control.

The first evacuation of residents from surrounding villages took place on October 23, police and firefighters checked whether nobody remained in the houses. After their clearance, the police remained in the municipalities and the premises of the Vlárské engineering works and supervised that there would be no thefts. Police officers used a pyrotechnic robot for the first time. He went as a vanguard to the affected area, explored space, presence and kind of explosives only then the police pyrotechnicians in special clothing could enter and begin to walk through and control space.

Another technic came on October 25 and 26. It was a special police car equipped with a camera for day and night vision. This equipment was brought by the Foreign police officers from the Regional Police Directorate of the South Moravian Region. A convoy of an armored police vehicle and a SPOT-55 fire-fighting tank set off again.

Other means of transport were given to the pyrotechnicians on October 31. In addition to a fire extinguishing rescue tank, had been available three police armored vehicles. Of course, they also used an unmanned vehicle to investigate before they entered the explosion area. A part of a transport capable explosives were taken to safe military areas for disposal. There were a total of 50 buildings in the area, of which in 27 an ammunition have been located and 12 of them were damaged by an scattered ammunition. Installation of odor barriers, due to wild game movements and other cameras for continuous recording of ongoing processes in the epicenter of the explosion, took place on 3rd November.

Another thirty soldiers from the 7th Mechanized Brigade in Hranice na Moravě arrived to help the police to protect the dangerous zone on November the 4th.

Prime Minister of the Czech Republic Bohuslav Sobotka and Police President Brigadier General Tomáš Tuhý visited the Vlachovice-Vrbětice munitions warehouse on November 8th. They met representatives of the Integrated Rescue System and the direction of the Zlín Region, the affected municipalities and the Petitions Committee of the citizens. The Police President informed about the current state of the accident site and the work being done.

A maximum of seven pyrotechnicians could work at the same time as a pyrotechnic survey of the area around the roads and warehouses. For safety reasons, it was not possible to use a large number of specialists. Asanization of communications and warehouses surroundings in the area affected by explosions was ended by the pyrotechnicians on December 1st, 2014. The specialists cleared tens of kilometers of roads from ammunition and debris and their immediate surroundings, preparing space for removing material stored in dozens of buildings. [11] [12]

Extraordinary event of 3rd December 2014 - Explosion 2

An explosion of another ammunition warehouse occurred in the premises in Vrbětice, part of the Vlachovice village in Zlín region, in the morning on December 3rd, 2014. The explosion was heard until the afternoon. According to Defense Minister Martin Stropnický, the object was about 150 meters from the ammunition warehouse that exploded on October 16, 2014. [1]

From seven o'clock in the morning, uncontrolled detonations began to echo from the premises in Vlachovice-Vrbětice. This was mainly from medium to strong explosion. There was no civilian nor member of the integrated rescue system in the dangerous area. Explosion did not

occur as a result of handling explosives. For safety reasons, evacuation of some municipalities was ordered. During the day, a helicopter was used to monitor the dangerous territory, and monitoring was carried out also by military drones. By evaluating the images, it was found that the explosions are coming out from the building number 12. According to the available list of companies that stored ammunition on the site, it was found that 12.8 tons of explosives were in the building at the time of the explosion. The evacuation ended on December 5th. The police have set a new security perimeter about 1.2 km from the epicenter of the second explosion. Investigation of the causes of both explosions was taken over by the Special Investigation Team of the Police Presidium.

On December 6, the pyrotechnicians managed to remove the unexploded 40kg grenade from the roof of the building Nr.11, which they discovered during the survey. It was then placed in a safe place directly in the ammunition warehouse but at a sufficient distance from other buildings. Pyrotechnicians continued exploring nearby buildings to rule out the possibility of threatening the population.

The army of the Czech Republic took over the complete guarding of the entire fourteen-kilometer perimeter in the number of up to 180 soldiers per day on 15th December. Special police officers from regional cities also participated in the surveillance of the circuit, in two locations. They worked as an intervention group of 22 police officers who were able to respond immediately.

At the same time, police patrols in charge of the security of the citizens of Lipova, Haluzice and Vlachovice-Vrbětice were located in these premises. Around fifty policemen were in the camp every day. All members of the Integrated Rescue System (IZS) worked within a Joint Control Center, coordinating police, fire brigade, rescue squad and soldiers.

Inside the campus, a pyrotechnic survey was carried out on December 29, during which police pyrotechnicians focused on access roads and objects inside the monitored area. In addition to pyrotechnicians and intervention groups, policemen on service horses, police cynologists, traffic policemen and police officers patrolled near the villages.

The first fleet of vehicles with transport capable ammunition, which was destined for disposal, was transported from the ammunition complex in Vlachovice-Vrbětice to the Libavá military area on 27 January 2015. Minister of the Interior Milan Chovanec visited the munitions facility in Vrbětice together with the Minister of Finance Andrej Babiš on March 7, 2015. Chovanec will demand on the government 48 million crowns for necessary expenses for firefighters and policemen. The Minister of the Interior demanded for the police 43.7 million and for the firemen 4 million crowns.

Until October 19, 2015, more than 400 trucks loaded with ammunition and armament were taken and therefore 28 out of 40 warehouses were emptied. Police accused two natural persons and five legal persons who, according to them, committed a particularly serious crime - the development, production and possession of prohibited weapons with a 5 to 12-year penalty. They also committed a breach of duty in connection with the issue of a license and a license for foreign trade in military material.

From January 4, 2016, workers of military forests and goods began to work under the supervision of pyrotechnicians to build a new fencing around the guarded ammunition warehouse in Vlachovice-Vrbětice.

On January 11, 2016, thirty army pyrotechnicians began under the command of five police pyrotechnicians with complete repairs of the Vlachovice-Vrbětice warehouse area up to a depth of 50 centimeters and a collection of ammunition fragments.

Two hundred policemen and soldiers have been involved to the process of guarding the area every day. The Czech army ended up guarding the area on February 5, 2016, the monitoring of the area took over the police and the state-owned company Vojenské lesy and Czech farms, which they guarded in combination with technical security. Almost 7,000

members of the army worked at the sites along the protective perimeter from the bases in Vrbětice and Haluzice from November 2014. The base in Vrbětice left the last soldiers on 15 February 2016.

The government discussed the possibility of further utilization of the ammunition warehouse on February 17, 2016. At that time it was empty, all ammunition was taken from the warehouses. The first possibility assumed the purchase or exchange of land so the whole site would be owned by the state. The second option was the sale of land to private entities. Ministers finally preferred the first option. The whole area should be managed in the future by the state enterprise Military forests and Czech farms. In the future, it is also envisaged to use three warehouses for the needs of the VTU state-owned enterprises, respectively, his branch factory VTUVM Slavičín, which is a major regional employer. Part of the site could serve for unmanned training. [4] The pyrotechnicians managed to get to the surroundings of an exploded ammunition store number 16 from where the first explosion was heard.

Table 1
Events of occurrence and destruction of the consequences of explosions
in the ammunition warehouse

Year 2014	
16th Oct.	Explosion of warehouse No. 16 of the Imex Group from Ostrava, 2 dead. Out of the 50 buildings, in 27 were ammunition (7,000 tons of military material with about 1,000 tons of explosives), 12 warehouses were damaged by scattered ammunition.
17th Oct.	Session of the Crisis staff of the Zlín Region.
18th Oct.	Airborne pyrotechnic survey conducted by unmanned vehicles (drones).
19th Oct.	A ground-based pyrotechnic survey was carried out using an armored police vehicle (OKV-P) and a fire-fighting tank (VT-72b-SPOT).
23rd Oct.	The first evacuation of the population.
25th Oct.	Installation of camera system for day and night vision (OKV-P).
31st Oct.	Removal of parts of explosives capable of being transported to military premises for disposal.
3rd Nov.	Installation of odor barriers (due to game movement).
4th Nov.	Arrival of 30 soldiers from the 7th Mechanized Brigade in Hranice na Moravě to strengthen units of the Police of the Czech Republic.
8th Nov.	Meeting of the Prime Minister of the Czech Republic and the Police President with representatives of the IRS, the leadership of the Zlín region, the affected municipalities and the petition committee of the Citizen.
24th Nov.	Finding the remains of two missing men near the epicenter of the explosion.
1st Dec.	Terminating the decontamination of the surroundings of roads and warehouses in the area affected by the explosions, the space is ready for removal of the material.
3rd Dec.	Explosion of warehouse No. 12 of the Imex Group of Ostrava, about 150 meters from the ammunition warehouse, which exploded on October 16, without injuries.
	Evacuation of residents (ended on December 5th).
3rd Dec.	Removal of an unexploded 40kg grenade from building no 11.
15th Dec.	The Czech army took over the complete guarding of the whole fourteen-kilometer long perimeter in the number of approximately 180 soldiers a day.
29th Dec.	Realized ground pyrotechnic survey inside the premises (OKV-P).

Continuation of table 1

Year 2015	
27th Jan.	Departure of a convoy with a transfer capable ammunition to the Libava military area.
7th Mar.	A visit to the ammunition complex by the Interior and Finance Ministers. The Minister of the Interior calls on the government 48 million crowns for necessary expenses for firefighters and policemen.
19th Oct.	To date, more than 400 ammunition and armament trucks have been taken and 28 out of 40 warehouses were emptied.
Year 2016	
4th Jan.	The construction of a new fence around the guarded ammunition storage area.
11th Jan.	Start of a complete decontamination of the site to a depth of 50 centimeters underground and the collection of ammunition fragments (30 ACR pyrotechnicians under the leadership of 5 police pyrotechnicians).
5th Feb.	The army of the Czech Republic terminates the guarding of the premises, monitoring the area takes over the Police of the Czech Republic and the state enterprise Military forests of the Czech Republic (combination with technical security).
17th Feb.	The Government of the Czech Republic discussed the possibilities of further utilization of the ammunition warehouse. It is currently empty, the all amount of ammunition has been removed from the warehouses.
31st Oct.	The Military Technical Institute (VTU) denounced to this date private owners of ammunition warehouses (the last displaced by 31st December 2016).
12th Dec.	The demolition of object No. 16 by members of the HZS Hlučín Rescue Service.
18th Dec.	To present day, 3,252 pieces of unexploded ammunition have been found, of which 236 ammunition pieces, were destroyed in 70 explosions. The pyrotechnicians took over 2945 pieces of ammunition into the Libavá military area, where the ammunition was disposed of in the blasting pit.
Year 2017	
5th Jan.	Interruption of professional pyrotechnic activity due to extremely aggravated weather conditions for the necessary time.
22nd Mar.	The compensation of the armaments for Babis's statements about the Vrbětice was by court refused.
28th Jun.	The intervention at Vrbětice will last until mid-2018.
17th Aug.	The ammunition warehouses area is full of pigs, and the extraordinary veterinary measures associated with African swine fever also act in the peripheral areas of the Zlín district, which are several tens of kilometers away from the central outbreak of the disease.

Model situation in the TEREX Information System

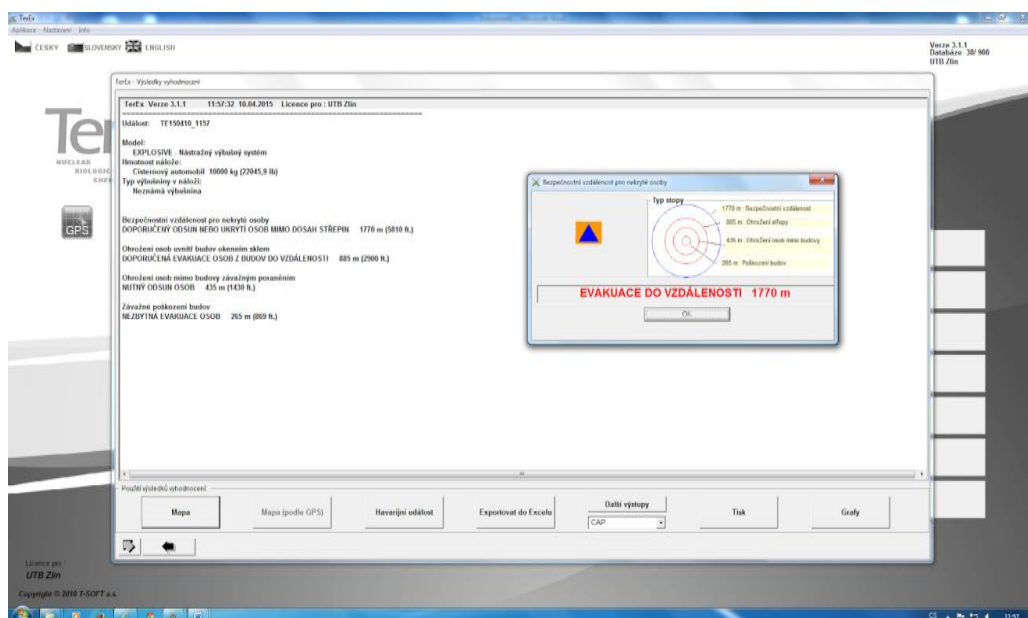
With the help of the TEREX information system, extraordinary events, explosions of ammunition depots in the village of Vlachovice - Vrbětice were modeled.

The TEREX Terrorist Expert program is designed to quickly assess the consequences of accidents, terrorist attacks, or military attacks. It has extensive use for the Operational units of Integrated Rescue System (IRS) in both the control center and the field. The program provides results even if input information is lacking. Prediction of consequences is based on

a conservative prognosis - the results match the conditions, in which the maximum possible consequences are reached - the worst option. The advantage lies in an immediate evaluation of the situation.

The TEREX software uses nine basic emergency models, which cover different accident types: terrorist attacks, and a list of dangerous substances. In the Vlachovice - Vrbetice emergency case modeling, a quick estimate guide for an unknown explosive was used, to evaluate quickly and with minimal knowledge the impact of an emergency case (EC). TEREX is linked to a geographic information system (GIS), so results can be displayed directly on maps. An integrated part of this program is a module for displaying results into the maps.

The Quick Estimate Guide was used to model the explosions of October 16, 2014 and December 3, 2014. Event type setting - unknown explosive charge. Charge weight 50,000 kg and 12,000 kg. The TEREX system models the situation for a maximum of 10,000 kg of unknown charge.

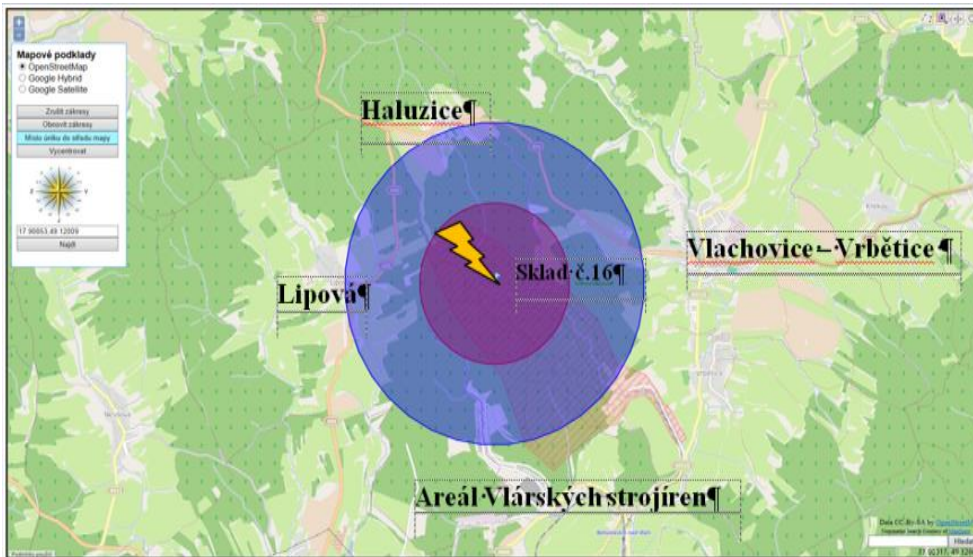


Picture 2
TEREX Sample of consequences [29]

- Picture 2 shows the safety distance for uncovered persons
- red color indicates the area of explosion and fire hazard,
 - blue color indicates a toxic substance hazard.

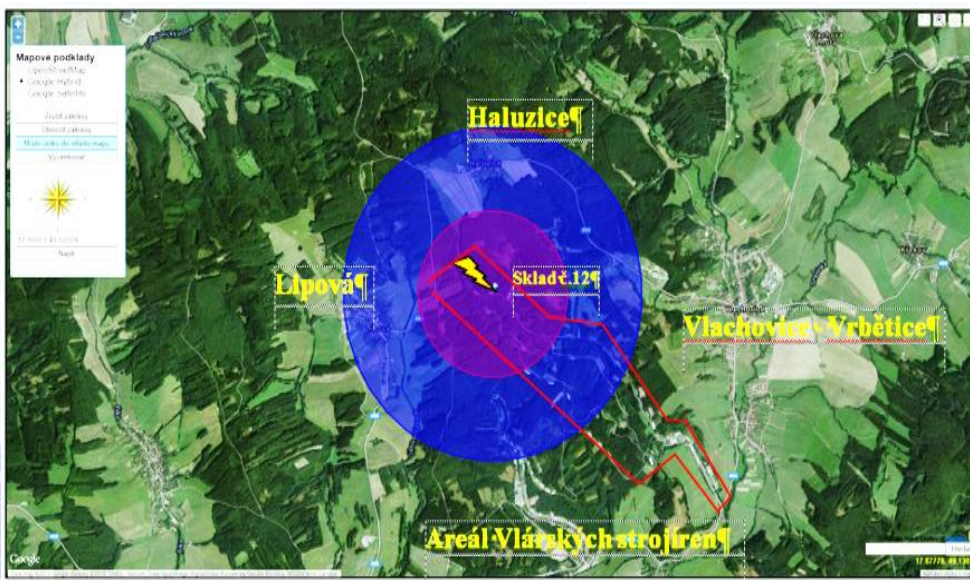
In the case of both explosions of ammunition depots, the perimeter in a given circuit is closed for throwing shrapnel. Both EC has been modeled by TEREX software for 1 770 m explosion hazard area. The TEREX system does not assume the possibility, that so high amount of explosives will explode at the same time at once. The model situation implies the threat of shards to a distance of 885 m, the risk of persons outside the buildings up to 435 m and the damage of buildings in the range of 265 m (Picture 2). The evacuation of persons is assumed to be up to the distance 1 770 m.

Model situation TEREX 16. 10. 2014 - warehouse No. 16



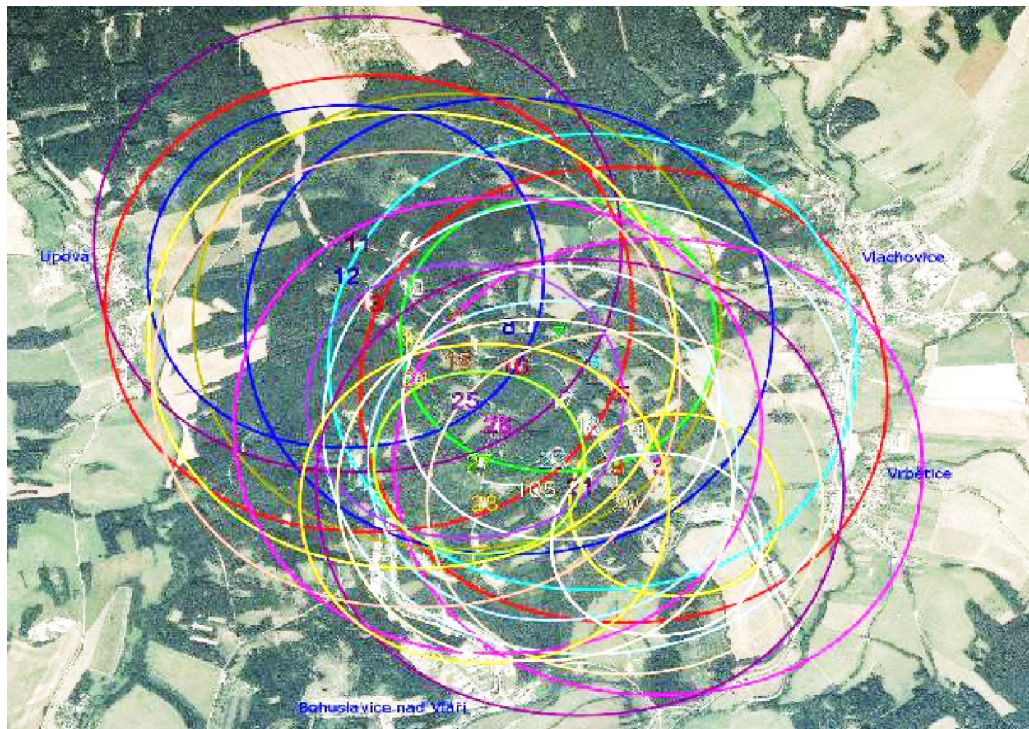
Picture 3
Model situation Vlachovice - Vrbětice, warehouse No. 16 [29]

Model situation TEREX 3. 12. 2014 - warehouse No. 12



Picture 4
Model situation Vlachovice - Vrbětice, warehouse No. 12 [29]

Using the TEREX system, the situation was modeled according to the coordinates, exactly according to the location of the emergency case. Picture 3 and 4 show the perimeter of both emergencies on the map.



Picture 5
Map of the total emergency circuit [21]

Picture 5 shows the map of a total emergency circuit.

Conclusion and proposal for preventive measures

Prevention should be focused on all areas related to the operation of ammunition warehouses in Vlachovice - Vrbětice. First of all, it is an area security. Both the external protection - the fencing and the security of individual storage buildings. In the framework of the prevention, an object analysis of security could be realized and based on the design of a security system.

- Perimetric protection - the existing fencing of the area was disturbed in many places by logging in the ammunition warehouse area and by vandalism. The solution would be, for example, an external fencing in a double design.
- Operation protection – operation actions should concern the entry and exit modes of the area, persons, means of transport and movement of employees within the area. A material and expedition regime should be established. It is possible to include a documents check in the system protection when entering the area.

- Electronic security - it is a complex protection of the area both in the perimeter and in the individual storage buildings. These would be EZS - electronic security system, EPS - electronic fire protection system, ESS - other electronic signaling systems.
- Technical protection of objects - these are technical barriers that prevent objects, space and penetration into objects. They can be both electronic and mechanical and protect objects from external penetration. Mechanical barriers can be, for example, grilles, security doors, warning signs. Electronic devices include, for example, lures and signaling.
- Physical protection - this is a security guard service that is in charge of security surveillance, operation protection, security exits, physical observation.
- Shipment of ammunition and explosives - requires increased attention to safety with regard to possible consequences that may arise in the event of an accident.
- Occupational Safety and Health (OSH) and staff qualifications - to achieve and maintain a high level of safety, it is essential that highly-skilled workers are employed.
- Ammunition storage - is governed by Czech Defense Standards – CDS (ČOS) 139801.
- Population awareness - currently on local internet websites, radio and local newspaper "Vlachovské listy".
- Legislation - licensing, modification of laws related to the handling and ammunition treatment. [11]

These include:

- Act No. 229/2016 of 15 June 2016 amending the Act No. 119/2002 Coll., on Firearms and Ammunition (the Weapons Act), as amended, and other related laws.
- Act No. 451/2016 Coll., Amending Act No. 61/1988 Coll., On Mining Activities, Explosives and State Mining Administration, as amended, and Act No. 83/2013 Coll., On Labeling and Traceability explosives for civil uses. On 13 January 2017, the applicable law became effective.

The army does not intend to lease the former ammunition warehouses to private entities. For this reason, the Military Technical Institute (VTU) canceled the contracts to all tenants in the technical part of the ammunition warehouse in Vrbětice, Zlín at the end of the year. This is apparent from the answer of Defense Minister Martin Stropnický (ANO), to the deputy Ludvík Hovorka (KDU-CSL). [13]

Pyrotechnicians, police officers, firefighters and rescuers will continue to operate in the former munitions warehouses in Vrbětice in the Zlín region until at least mid-2018. Explosion costs can rise up to a billion crowns.

In this context, it is necessary to mention provisioning of quality foods and meals for members of the Army of the Czech Republic, the Police of the Czech Republic and people who were affected by the explosion. This topic was researched by many authors in their professional works. [19] [17] [18] [20] [16]

The explosions in the ammunition depots of Vlachovice – Vrbětice in the territory of the Czech Republic was researched by below mentioned authors, e. g. [28] [8] [9] [10] [7].

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