INFLUENCE OF SUPERFLUOUS MATERIAL RESOURCES CLASS FIVE - AMMUNITION ON THE MODERNIZATION OF THE BULGARIAN ARMY AND NATIONAL SECURITY RISKS ARISING FROM THE LARGE AMOUNT OF SUPERFLUOUS AMMUNITION IN THE ARMY

Conuy G. Conev, Stamen I. Antonov

** Artillery, Air Defense and CIS Faculty, National Military University "Vasil Levski", Shumen,Bulgaria, coni19@abv.bg*
*** Artillery, Air Defense and CIS Faculty, National Military University "Vasil Levski", Shumen,Bulgaria, stamantonov@abv.bg*

***Abstract**: The paper presents the influence of superfluous material resources class five - ammunition on the modernization of the bulgarian army and the national security risks arising from the large amount of superfluous ammunition in the army.*

***Keywords**: utilization, ammunition*

Introduction

The changes in the concepts of warfare over the last decade have increasingly led to changes in the structures and armaments of military units. The need military units to be mobile, well-equipped and armed with advanced weapons is at the forefront. The conclusion is that, in the future, the importance of the quality of the weapons will increase at the expense of their quantity.

Based on these visions and the plan for the development of the Armed Forces by 2020, structural and organizational changes were made in Bulgarian Army. The armed forces personnel reduction has led to a significant reduction in the required weapons and equipment, which in turn has led to accumulation of a considerable amount of superfluous material resources from all classes, and in particular class five - ammunition.

The superfluous (superfluous) ammunitions are a major problem for the logistics authorities, first because their commercial realization imposes special requirements, second, because they require special conditions of storage and protection in order to be prevented incidents related to the their explosion or stealing by terrorist elements, next - due to the fact that most of them have expired guarantees and bad technical condition, which makes them dangerous for storage and finally - because of the large financial the cost of the storing.

In accordance to the ongoing modernization of the army and because of the vision for the development of the Armed Forces of the Republic of Bulgaria by 2035, it can be concluded that the amount of superfluous ammunition will continue to increase.

The main ways of getting rid of the superfluous ammunition are sale and utilization.

The commercial sale is preferable, but it is difficult to be realized because of the deteriorated qualities of the superfluous ammunition and the reduced worldwide interest toward existing in our country ammunition nomenclatures.

Based on an analysis of the experience of other countries, it can be concluded that utilization is the main way of solving the problem of superfluous ammunition.

1. Influence of superfluous material resources class five - ammunition on the modernization of the Bulgarian Army and national security risks arising from the large amount of superfluous ammunition in the army

1.1. Condition of superfluous material resources class five - ammunition

The organizational changes made in the structures of the Armed Forces and the decrease in the number of the Bulgarian Army resulted in a large volume of superfluous material resources of all classes, and in particular of class five - ammunition.

According to Section I, "Decommissioning", Chapter V, " Decommissioning, Scrapping, Utilization and Destruction of Weapons, Ammunition, Explosives and Pyrotechnic Articles," art. 86, para. 2 of the "Ordinance on the terms and conditions for carrying out activities related to weapons, ammunition, explosives and pyrotechnic devices and the control over them in and by the Armed Forces of the Republic of Bulgaria" the superfluous ammunition and pyrotechnic articles for Bulgarian Army are included into three sections: Section I "For Commercial Sale", Section II "For Utilization" and Section III "For scrapping ".

The reasons for including the superfluous ammunition in the various sections are the results of the training range and laboratory tests and the analysis of their technical condition.

The section "For commercial sale" includes ammunition with good technical characteristics and with a stock of chemical stability of gunpowder, explosives and pyrotechnic compositions, providing 60% of the initially established storage life.

The sections "For Utilization" and "For scrapping " include those ammunitions with compromised technical characteristics and reduced chemical stability of the gunpowders, explosives and pyrotechnic compositions for which there is no commercial interest and which are dangerous for long-term storage.

In fig. 1 presents a diagram of the changes in the amounts of declared for superfluous ammunition and the part of them designated for utilization in the period 2016÷2020.

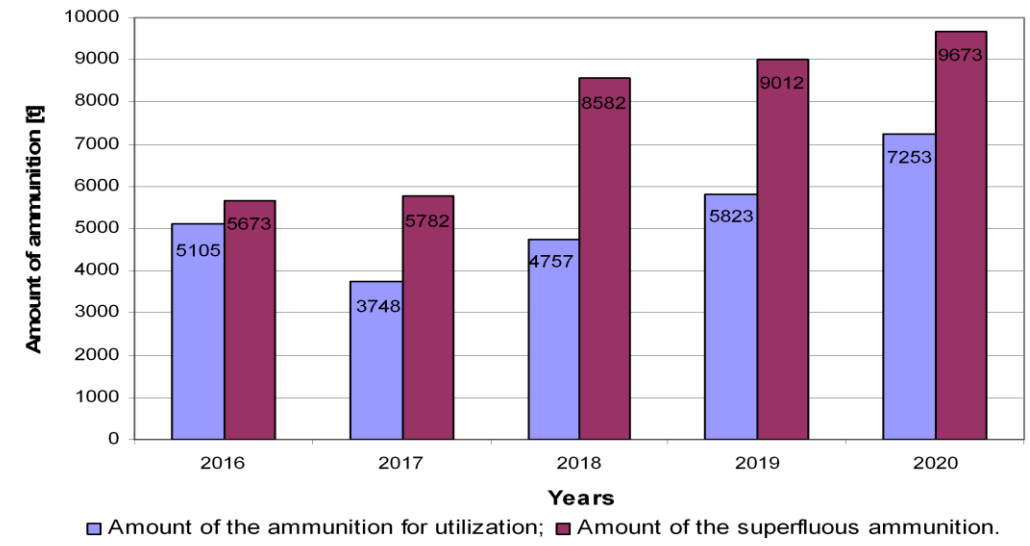

Figure 1: Diagram of the changes in the amount of the excessive ammunition and those planned for utilization in the period 2016 ÷ 2020.

The data analysis of fig. 1 shows that there is a relatively constant average annual rate of formation of new quantities of superfluous ammunition, explosives and pyrotechnic articles for the Bulgarian Army. According to the future prognosis the quantities of superfluous ammunition will increase - respectively those who must be utilized will also increase.

The superfluous ammunition for the Bulgarian Army is listed, and the list must be approved by the Minister of Defense and after that they can be deemed for decommission of exploitation and become subject to commercial sale, utilization or destruction. The list is valid until the end of the calendar year.

For 2020, superfluous ammunition of approximately 13,000 tones gross mass (9673 tones net weight) has been declared, of which ammunition with a total gross mass of 10413 tones (net mass: 7253 tones) must be utilized. They are divided into types (lots) as follows:

- Lot 1 "Classic ammunition" - 5336 tones gross weight;
- Lot 2 "Engineering ammunition" - 1123 tones gross weight;
- Lot 3 "Marine ammunition" - 2101 tones gross weight;
- Lot 4 "Anti-aircraft guided missiles and elements" - 246 tones gross weight;
- Lot 5 "Aviation ammunition"- 1608 tones gross weight;

Total: 10413 tones gross weight.

The distribution by type (lots) is shown in fig. 2.

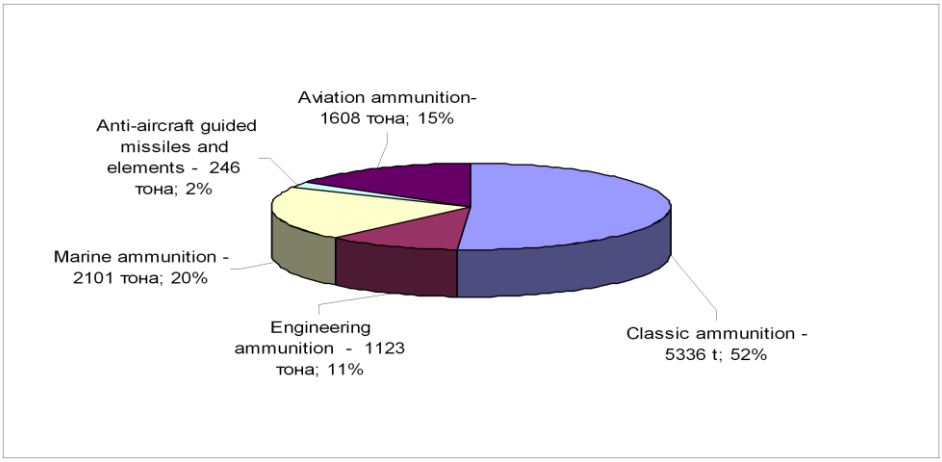

Figure 2: Diagram of the distribution of the ammunition designated for utilization by types (lots) for 2020.

Much of the superfluous ammunition, respectively, the ammunition for utilization, currently, has a long term of storage (over 20–30 years) that exceeds the manufacturer's warranty period.

A feature of the long-term storage of the ammunition is the deterioration of their general technical condition as a result of:

- deteriorated storage conditions, mainly due to delayed and unfulfilled activities related to the repairing of the warehouses;
- failure to carry out activities related to ensuring the optimal temperature and humidity regime in the warehouse;
- failure to carry out activities related to the maintenance of the ammunition.

The deterioration of the technical condition is displayed mainly in the presence of corrosion on the elements of ammunition and aging of the gunpowder and explosives.

The corrosion leads to a decrease in the overall strength of the parts and components and the inability to use the ammunition.

The aging of gunpowder and explosives is displayed by the occurrence of irreversible processes of change in their physical and chemical properties, mainly under the influence of the temperature and wa-

ter (temperature and hydrolysis decomposition). The physical and chemical changes in the properties of the compounds are mainly expressed in decomposition and molecular diffusion. For example, heating of the gunpowder with approximately 15OC accelerates the decomposition process by 1,5 to 2 times.

The presence of moisture, in small quantities, accelerates the hydrolysis decomposition process 10 times. Decomposition is accompanied by the phenomenon of autocatalysis, whereby nitrogen oxides and other gaseous products are released, which in turn stimulate chemical decomposition. As a result of these chemical changes, the gunpowder and explosives become highly sensitive to external influences, and under certain conditions chemical decomposition can proceed so quickly that self-ignition or self-explosion can occur.

Particularly dangerous to handle after long-term storage are some elements of ammunition, which are: fuses and lighters, in which there are certain types of initiating explosives or pyrotechnic compositions. The danger of handling them is increased if they are stored incorrectly, in an inappropriate humid temperature regime, in open areas or in an unsealed packing.

From the above it can be concluded that much of the superfluous ammunition cannot be repaired and the storage, transportation and handling of them carries significant risks of occurrence of incidents related to their self-explosion in the processes of storage and transportation.

1.1.2. Problems for the modernization of the Bulgarian Army, resulting from the presence of large quantities of superfluous ammunition

The main problems for the modernization of the Bulgarian Army, resulting from the accumulation of large quantities of superfluous ammunition, are mainly related to the spending of considerable financial resources to ensure their proper storage and protection.

At present, until ready to be traded or utilized superfluous ammunition are stored in the storage base of the Bulgarian Army formations. Essentially, they require storage and maintenance under the same conditions as those ammunition that are on use. The main activities that need to be carried out are: security and maintenance of storage areas and storage facilities, technical inspections, control and maintenance of the humidity and temperature regime, etc. These activities require the separation of technically trained staff, which further increases the financial cost.

According to some reports, the cost of this is estimated at 6.5 million BGN per year for the maintenance of 11 storage areas with superfluous ammunition.

The separating of such an amount of financial resources that could be used to be bought new weapons, ammunition and equipment has a negative impact on the modernization of the Bulgarian Army and delays the completion of this process.

1.1.3. National security risks and threats arising from the presence of large quantities of superfluous ammunition

From the above it can be concluded that there are certain risks for the national security of the Republic of Bulgaria, arising from the accumulated large quantity of superfluous ammunition in the warehouses of the Armed Forces. The main part of them can be structured in the following groups:

- risks associated with the self-detonation of the ammunition in the processes of storage, transport and utilization;

The risks of self-detonation of the superfluous ammunition are related to the changes that occur in their physical and chemical properties.

When carrying out transport, the risks are mainly related to the increased sensitivity of the gunpowder and explosives, due to the long-term storage, as well as the effects of the shocks and inertial forces arising from the movement of the vehicles and loading and unloading activities.

The risks of self-detonation at the utilization stage are related mainly to the methods of carrying out the process, the conditions created for safe work and the qualifications of the employed personnel.

An example for the risk-free utilization is the complete automation of the process and its execution in armored or protected cameras and rooms under continuous video surveillance.

- risks associated with the self-explosion of the elements remaining after the ammunition utilization at their storage and transportation;

The main risks are determined by the state of the gunpowder and the explosives after they have been separated from the ammunition. After their removal from the ammunition, the explosives and gunpowder are no longer hermetic and are a subjected to the intense environmental impact, which leads to a significant acceleration of the physical and chemical processes of decay in them and increasing the possibility of self-ignition and self-explosion. This possibility is further increased if these items are stored outdoors in the areas of the companies contractors.

- risks associated with the misappropriation of the superfluous ammunition by terrorist organizations and people in the process of storage, transportation and utilization;

The possibility of misappropriation of superfluous ammunition increases due to the need to be allowed on people from companies contractors to enter the military storage areas. In doing so, they receive information about the type and quantities of the ammunition, and their storage sites, as well as information regarding their transportation to the company contractor. In number of these people includes not only people from the governing bodies of the company contractor, but also individuals with low qualifications performing activities related to the loading, transportation and utilization of the ammunition.

- risks of terrorist acts being carried out at storage and utilization sites or in the time of transportation.

The nature of these risks is based on the possibility of doing an act of terrorism related to the detonation of warehouses with superfluous ammunition located in the areas of the military forces or in the company contractor or when transportation activities are performed. To reduce the risks of this group, it is necessary the security of the ammunition storing facilities to be strengthened, guarding during transportation to be provided and special requirements to be kept when performing activities with ammunition (it is forbidden ammunition to be loaded on vehicles during the night).

The occurrence of incidents related to the written above risks can lead to a loss of confidence in the government, subsequent destabilization and eventual replacement of the current government and creating prerequisites for diminishing public order and security in the country.

2. Conclusions

1. The continuing modernization of the Bulgarian Army involves the replacement of weapons and equipment of all types of armed forces, which in turn will lead to a significant increase of superfluous ammunition for the Bulgarian Army.

2. The superfluous ammunition in the Bulgarian Army is dangerous, morally and physically obsolete. The accumulation of large quantities of it leads to the delay of modernization of the Armed Forces of the Republic of Bulgaria and carries risks for the national security of the country.

3. The utilization of ammunition is a complex and highly risky process. For this reason, it is imperative to carry out a thorough analysis of the problems associated with the utilization of superfluous ammunition and take adequate decisions at national and interagency level.

References

1. Травис Б., *Преглед на проучването за инвестиции в разработването на мобилни апарати в САЩ за Агенцията за поддръжка и снабдяване на НАТО (NAMSA)* - Капелен, 2012.

2. Пиер Г., *Значителни излишъци: Складове на оръжия и боеприпаси в Югоизточна Европа* – Женева, 2011.

3. *Закон за оръжията, боеприпасите, взривните вещества и пиротехническите изделия*, обн. ДВ. бр.73 от 17 септември 2010 г., изм. ДВ. бр.88 от 9 ноември 2010 г., изм. ДВ. бр.26 от 29 март 2011 г., изм. ДВ. бр.43 от 7 юни 2011 г., изм. ДВ. бр.44 от 12 юни 2012.

4. Kalev, Krasimir., A study of the influence of the parameters of a reaction zone on the burning rate., *Collection of papers: „Defense And Security, Mechanical Engineering And Military Technology, Communication And Computing Technologies, Social Science". 2016*. Shumen. ISSN 2367-7902.

5. *Наредба за условията и реда за осъществяване на дейностите, свързани с оръжията, боеприпасите, взривните вещества и пиротехническите изделия и контрола над тях във и от въоръжените сили на Република България*, приета с ПМС № 278/06.11.2010 г., обн. ДВ. бр.96 / 2010.