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paper 41

Aging Stocks of Ammunition and SALW in Ukraine: Risks and Challenges

Aging Stocks of Ammunition and SALW in Ukraine: Risks and Challenges

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Published by
©BICC, Bonn 2005
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Foreword

Following the dramatic elections in the Ukraine, Viktor Yushchenko, a politician of whom not only the Ukrainian population but the entire western world expects decisive impulses for the process of democratization now presides over the former Soviet republic. Anatoliy Hrytsenko, former President of the Razumkov Centre and long standing cooperation partner of BICC, was appointed Minister of Defense. Indeed, the change of government offers the transatlantic community a new chance to start up relationships with the Ukraine. Only a few days after assumption of office, Yushchenko clearly voiced his wish for a rapprochement to the EU with the goal of joining it when speaking in front of the European Council and the Parliament.

As state bordering the EU and neighbor state to Russia, the Ukraine ought to be of great interest to the European Union and NATO, also for security policy reasons. This refers not least to the arms burden stemming from the era of the Soviet Union, which represents a threat to the environment, and security of the region. It is true that the United States guaranteed for the destruction of some of the strategic weapons after the dissolution of the Soviet Union. However, the still highly acute disposal of conventional surplus weapons, particularly small arms and light weapons, also necessitates a commitment of European countries, amongst them Germany. Within the framework of the Transform Programme (until 2005) Germany had already focused on fostering economic aspects of cooperation. In the disarmament efforts, the Federal Republic of Germany (or German firms) has contributed by helping to destroy or recycle special types of artillery ammunition. Despite these activities, the destruction of all kinds of surplus weapons in the Ukraine ought to be supported – not only with the support of a sustainable development in mind – but also in the framework of a continued and intensified bilateral relationship. The study AGING STOCKS OF AMMUNITION AND SALW IN UKRAINE: RISKS AND CHALLENGES by Leonid Polyakov, expert at the Ukrainian Razumkov Centre, deals with the potential danger of surplus stocks of ammunition and small arms, and their stockpiling. One outcome of this study is that such an accumulation of weapons also poses dangers in times of peace. They threaten the environment and represent a high risk to security, particularly in view of the activity of international terrorist groups. The disposals of such weapons necessitates a collective, international effort. The research to this paper, which

is the first comparative study on the topic of the disposal of surplus stocks of ammunition and small arms in the Ukraine, was carried out by the Razumkov Centre, supported by the NATO Partnership for Peace (PfP) Trustfund and the NATO Maintenance and Supply Agency (NAMSA). We thank all these institutions for their commitment and feedback. Particular thanks go to Susan Pond of the NATO Trustfund.

This study also shows that lessons can be drawn from mistakes made in the past and that the Ukrainian government itself must show that it also has a stake in contributing to these efforts, for instance by establishing a state disarmament agency that provides for transparence and commitment in the disposal process and that is contact point for international donors. What is also necessary is the reduction of bureaucratic barriers and the bearing of a share of the costs for disposal. Expectations directed at the newly elected government are high – how will it manage to become the motor of a democratic, and equally supply independent development to the country, in every aspect? The reduction of the armament burden and the heritage of the Cold War will be one central aspect of Ukrainian-European rapprochement.

With this study, BICC hopes to contribute to the decision-making process amongst European members of NATO, but its main aim is to provide German policy-makers with sound information and decision guidance.

Peter J. Croll
Director of BICC

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Foreword and acknowledgements

The Razumkov Centre (Ukraine), with financial and organizational assistance from the Bonn International Conversion Centre (BICC, Germany), performed a study on the problem of disposal of the stocks of obsolete ammunition and small arms/light weapons (SALW) in Ukraine. The study concentrates on the prospects for the problem's solution with Ukraine's own means and the aid of international organizations, including NATO, European Union and individual countries.

Apart from a pilot study commissioned by NATO, this is the first comprehensive study on the problem of disposal of the stocks of obsolete ammunition and SALW in Ukraine. Prepared by the Razumkov Centre, it builds on Razumkov Centre research, as well as on the analytical materials of the Ukrainian Centre for Army, Conversion and Disarmament Studies (Valentyn Badrak, Serhiy Zhurets), information of *Defense Express* news agency (Mykola Siruk), materials of international conferences and official interviews. Serhiy Chornous (Ministry of Defense of Ukraine), Serhiy Honcharov (Political Risk Assessment Centre) and Oleksiy Melnyk (State Arms Trade Agency "*Ukroboronservice*") have provided great assistance in the coverage of specific problems of disposal in this study. Important insight was also offered by James Greene (NATO Liaison Office), Susan Pond (NATO Partnership for Peace Trust Fund), Natalya Rohovets (Committee on Military-technical Cooperation and Export Control Policy under the President of Ukraine), Jean-Paul Roves (NATO Economic Department) and Vitaliy Shved (Ukrainian Mine Action Co-ordination Centre).

We hope that this study will be of use for all experts and officials, both in Ukraine and its potential foreign partners, and help to make right decisions with regards to the disposal of the surplus &_obsolete stocks of ammunition and SALW in Ukraine. We also hope that it will be of interest to a wide circle of scholars and experts generally practicing in the security sector. We suggest that the Ukrainian experience examined in this study may prove useful in terms of solving the problems of disposal and post-conflict settlement in other countries around the world.

Leonid Polyakov
Director of Military Programs, Razumkov Centre.

Executive Summary

In Ukraine, the problem of disposal of obsolete stocks of ammunition and SALW has become a national problem. Overload of depots and arsenals, permanent lack of funds for safeguarding, conservation and disposal of ammunition in Ukraine are fraught with negative environmental consequences for Ukraine and its neighbors, and create serious challenges for the entire region in the context of the threat of terrorism and illegal arms trade.

Ukraine lacks adequate disposal capacities for a prompt solution of all tasks associated with elimination of surplus ammunition and SALW. Budget funds allocated for the solution of those tasks are limited; there are bureaucratic problems with the organization of transportation and processing of ammunition. National programs were not accomplished, despite the planned fixed volumes of ammunition disposal. The situation is further aggravated by the need for urgent disposal in volumes far exceeding the available financial and technical capabilities, and the need for recovery of huge losses related to the "wild" disposal of 1993-2001.

Despite the significant increase in allocations to disposal in the past two years, budget funds are clearly not enough for a successful solution to the problem of disposal of obsolete stocks of armaments and ammunition in Ukraine. All other problems – human, technical, related to transportation and timing – are just but a derivative of the main problem. The available technical and financial capabilities enable Ukraine to dispose of some 20-25,000 tons of ammunition a year by own efforts, but for timely and safe disposal, the target of 150,000 tons a year must be attained.

Given the grave significance of the funding problem, Ukraine seriously considers disposal of ammunition by smelting or blow-up, previously flatly rejected for environmental reasons. Environmental requirements involve higher expenditures, but despite all urgency of a removal of the dangerous heritage, financial considerations should not prevail over the need for conservation of the environment. The issue of financial, technological and managerial support for disposal has been topical for Ukraine since the declaration of independence in August 1991. This is attributed not only to the difficult financial and economic situation of the Ukrainian state but also to the insufficiency of the relevant industrial facilities and technologies.

Ukraine actually has no meaningful industrial facilities for the disposal of cartridges for small arms, small-caliber ammunition,

naval ammunition, aviation weapons (with the exception of air bombs containing TNT), multiple launch rocket systems, etc. Furthermore, the main ammunition disposal capacities are concentrated in the north and east of the country, while large quantities of ammunition subject to disposal are situated in the west of Ukraine, creating a serious obstacle for ammunition disposal. So far, there is no unified approach in Ukraine regarding the future integral system of management of scientific and technical support, production, storage and disposal of ammunition. The interests of the Government, separate agencies and ministries, enterprises, and special exporters do not always coincide.

Currently, Ukraine considers three options for the regulation of the disposal process: (1) the selection of one operator from among the existing governmental structures; (2) the creation of a new operator – a single state corporation subordinate to the Cabinet of Ministers of Ukraine; (3) the disposal on the basis of direct contracts between the MOD and enterprises – prime contractors of disposal activities.

Despite all difficulties of the first years of independence, the process of disposal is developing in Ukraine, and significant experience has been gained that, under favorable conditions, would help better solve the existing problems. Necessary capacities have been created in Ukraine for the disposal of artillery and engineer ammunition containing TNT. The first positive experience of practical cooperation with NATO and some of its individual member states in the disposal of antipersonnel mines has been obtained. However, until recently, the disposal process in Ukraine was still too often a hostage to diverging interests. Ukraine's Government so far failed to back its declared policy (programs) with required resources, it still has to create or appoint a responsible agent capable of enforcing governmental policy in the area of disposal. There is still a need for several key improvements in bureaucratic mechanisms of the disposal process: to provide for better transparency of competitive bidding; to simplify the procedures for obtaining permits; to reduce the number and streamline the procedure of tariffs payments, etc.

The lack of an authoritative Government agent for the disposal makes it difficult to attract foreign donors and partners, who naturally tend to look for reliable Ukrainian partners, as well as clear, transparent and fair rules, guaranteed by Government and enforced by a relevant legal base. Due to the current imperfection of the cooperation and disposal mechanisms, Ukraine has not always managed to employ effectively the

potential of large-scale cooperation with foreign partners. The opportunities of donor assistance within the framework of international projects were often accompanied by an inability of the Ukrainian side to agree with partners on technical issues, an unwillingness to at least partially cover the expenses, which was in the past two years aggravated by the absence of a single coordinating body.

Foreign partners could assist Ukraine with funds and technologies. Such a preparedness was demonstrated at several points by the USA, Germany, Great Britain, Canada, and other donors. In particular, the USA is interested in the disposal of Ukrainian MANPADS and ready to be the lead nation in the NATO Partnership for Peace Trust Fund assisting Ukraine with the disposal of 133,000 tons of obsolete ammunition and 1.5 million pieces of SALW. Great Britain is expected to help with the disposal of Ukrainian SALW; Canada may be interested in the disposal of stocks of antipersonnel mines. Germany has specific experience in cooperation with Ukrainian partners in the field of disposal of some types of artillery ammunition.

By and large, the conducted survey proves that (a) without the creation of new, more perfect mechanisms of ammunition and SALW disposal in Ukraine, (b) without the attraction of extra funds, (c) without mutual understanding and fruitful cooperation with potential foreign partners, the process of disposal in Ukraine may drag on for many decades.

Introduction

The risks posed by obsolete ammunition and SALW to Ukraine's national security provide a primary rationale for this study. Currently, the Ministry of Defense of Ukraine's (MOD) arsenals and depots contain huge stocks of conventional ammunition that has run out of its guaranteed storage life, is obsolete and unfit for combat use. The storage of such ammunition constitutes a serious problem for Ukraine. First, it is fraught with a permanent danger of accidents (explosions, fires) that have already more than once had disastrous consequences leading to the death of people and irreparable damage to the environment. Second, significant funds are needed to store ammunition and protect sites, which presents an increasingly acute problem under the conditions of under-funding of the AF (Armed Forces) of Ukraine and social tension in the areas where storage facilities are located.

At the same time, there are compelling reasons to believe that the Ukrainian stocks of obsolete ammunition and SALW pose significant risks to the security of all of Central and Eastern

Europe. The most visible amongst them include the environmental ones, and can be similar to the well-known aftermath of the Chernobyl nuclear disaster. But the challenge is also much wider given the possible negative impact on regional stability that these stocks may have after they end up in the hands of terrorists, criminals, weapon traffickers, or rebels. In the latter case, major social disorder on the border of European Union may follow provoking an increase in the flow of refugees, illegal migrants and weapons into the territory of the EU.

In Soviet times, neither the Soviet Army nor other military and security structures had any procedures of planned elimination of surplus arms. In the USSR, the very notion of the "disposal of arms" as a separate process appeared in the late 1980s, and referred primarily to the liquidation of nuclear weapons and means of their delivery under the Strategic Arms Limitation Treaty. From 1993 onwards conventional ammunition and weapons were added to the list of weapons disposed in Ukraine, the Russian Federation and other post-Soviet states.

The significant quantities of ammunition inherited by the Armed Forces of Ukraine after the break-up of the USSR coupled with the redeployment of extra arms and ammunition in the territory of Ukraine following the withdrawal of the Soviet troops from the former Warsaw Treaty states resulted in the accumulation of huge stocks of ammunition at the MOD arsenals. At present, these stocks, on average, exceed the maximum admissible capacity of storage facilities by 20%-40%.[1]

The stockpiles of arms and ammunition in Ukraine far exceed the needs of the shrinking Armed Forces (AF) of Ukraine, i.e. roughly 25% of the present quantity. Moreover, the state of these stockpiles is getting increasingly dangerous. According to official MOD data, the Armed Forces of Ukraine currently store 2,448,000 tons of rockets and ammunitions at 184 strategic and operational reserve storage facilities.[2] The average lifetime of this ammunition was planned at about 12 years with a maximum length of safe storage of 35 years. The most recent deliveries of the ammunition that the Armed Forces have at their disposal date

1 Oleksandr Kovalchuk. 2004. "The Country on a Powder Keg". *Argumenty i Fakty v Ukraine*, No.20.

2 Apparently, this refers to the centralised storage facilities and does not take into account ammunition depots that belong to military units. Apart from the official information provided above, former First Deputy Defence Minister Oleksandr Oliynyk in an interview to the Defense Express magazine reported higher figures: over 3 million tons of ammunition stored at 220 depots. See "Private Companies will Act as Contractors of the State Corporation for Ammunition Disposal". *Defense Express*, July 30, 2004.

back to 1989-1990. With the exception of a minor delivery of missiles, virtually no new deliveries have taken place since independence. As a result, much of the MOD stocks, with the exception of those small quantities of rockets and ammunition, will soon be technically unfit. More than 60% of the ammunition is kept in the open air and is thus subject to corrosive effects. More importantly, unstable chemical substances make up about 15% of the explosives kept in depots. After they run out of their service lifetime, their susceptibility to shock, chemical action and heat will greatly increase.[3]

As of the end of 2004, out of the bulk of the officially reported 2.5+ million tons of ammunition, some 1.5 million tons are already categorized as surplus, i.e., subject to disposal. Of these, 340,000 tons require urgent disposal. This category primarily covers the ammunitions stored since the First and Second World Wars. In many instances, they cannot even be transported. Furthermore, 24,000 tons of different types of rockets need to be urgently disposed of. In the case of an explosion or ignition, these rockets would fly dozens kilometers from their depots.

In 2½ years, the stock of such ammunition will reach 510,000 tons. According to the current plans, some 1,336,000 tons of potentially hazardous ammunition must be disposed of or sold by 2010.[4] Furthermore, it is planned that only 27 ammunition arsenals, bases and depots will be left in the Armed Forces of Ukraine in 2010.

In addition to artillery, rocket and SA ammunitions, Ukraine is getting rid of vast stocks of antipersonnel mines under the Ottawa Convention. In 2002-2003, with assistance from NATO, Ukraine disposed of 404,000 PMP-1 and PMP-2 antipersonnel mines. However, it has yet to destroy some 6 million antipersonnel mines (1.18 million PFM-1, 4.765 million PFM-1S) which are based on a liquid.

The depots of the Armed Forces of Ukraine also contain huge stockpiles of SALW. The total stocks of small arms stored at centralized depots are estimated at 7 million pieces (apart from those at regular bases of the AF or other security services). The initial estimates have identified more than 1.5 million SALW as surplus. This includes a large number of SALW that are no longer in the inventory of the Armed Forces of Ukraine. They include *Mosin* rifles, *Thompson* and *Shpagin* (PPSh) submachine guns, *Maxim*

3 See "Quite a Few Secrets Exploded Near Melitopol". *Polityka i Kultura*, May 14-20, 2004.

4 *Ukrayinski Novyny* News Agency, April 5, 2004.

machine guns, German carbines K-98, *Nagant* revolvers and many others some dating from First and Second WW.

Although the process of disposal officially began in 1995, the Ukrainian authorities began paying serious attention to this problem only in 2003. In particular, in FY 2004, only 3 million Euro was allocated to the disposal, but even this amount exceeded the sum allocated over the nine previous years.[5] In 1996-1999, disposal activities were not funded by the state at all. At the time, only "profitable" ammunitions, i.e. the systems containing non-ferrous metals that could be sold to cover the cost of disposal, were destroyed. These activities included not only domestic but also foreign companies. Today, that time is called the era of "wild" disposal, and its experience revealed a number of problems relating to bureaucracy, corruption and other abuses. This experience has already proved useful in terms of enabling Ukraine to successfully dispose a batch of antipersonnel mines with NATO assistance.

Every year, Ukraine is capable of disposing about 20-25,000 tons of ammunition and tens of thousand of pieces of SALW. Working at such pace, it will need approximately 50 years to do away with all of its obsolete and hazardous stocks. To do it in ten years, at least 150,000 tons of ammunition will have to be destroyed annually. Ukraine will need extra capacities for ammunition and SALW processing and new technologies (since far from all ammunitions kept in Ukraine can be disposed of using the available technology and production facilities) to attain such a level of productivity. The total cost of such activities is roughly several hundred million Euro.[6] The MOD officially claims that preliminary preparations alone for a large-scale disposal will require about 50 million Euro.[7]

Unfortunately, the problem of funding disposal activities, as well as the problem of the lack of some critical technologies, does not conclude the list of problems. Safe storage and fire safety of arsenals pose a huge problem, diverting scarce resources. For instance, according to the MOD estimates, only 3% of depots are now equipped with technical protection facilities. Some 900

5 For convenience of comparison in this study, all sums in Ukrainian hryvnias and U.S. dollars were converted into Euro based on the exchange rate of October 2004.

6 The ultimate amount of needed financial resources would certainly depend on the methods of destruction and other factors. So, at this moment, it will be safe to suggest that nobody knows exactly the required amount, and that only some extrapolations are available.

7 Volodymyr Khysh. 2004. "Disposal of Surplus Ammunition is a Nation-wide Problem". *Narodna Armiya*, June 8.

depots are to be surrounded with a 4-6 meter high ground wall with the total length of 148 kilometers, and to safeguard ammunition kept at open grounds, 8 million containers of different types and 2 million pallets are needed, some 360 km of fencing around depots need repair and additional equipment.

After the Melitopol tragedy,[8] the then Defense Minister Yevhen Marchuk said that more than 150 million Euro were needed to take immediate measures to enhance the depot's physical security, explosion and fire resistance. For Ukraine, this amount is a huge sum adding up to almost 1/6 of the national defense budget, yet, funds are already lacking for both storage and disposal of ammunition and SALW. Every year the stocks of the obsolete ammunition and rockets at depots of the AF of Ukraine that require disposal grow. This problem must be solved, and the sooner it is done, the better it is for Ukraine and, ultimately, for regional security. In 2003 and 2004, fires and explosions at the rocket and artillery depot in Artemivsk (Donetsk region) and ammunition facility near Melitopol (Zaporizhzhya region) took place, resulting in numerous deaths.

The disposal of ammunition and SALW has become a key problem that has a major impact on the national security of Ukraine. In February 2004, the MOD turned to the then Prime Minister of Ukraine, Victor Yanukovych, with a request to earmark 10 million Euro in the draft of the State Budget of Ukraine for 2005 to fund the "State Program for the Disposal of Conventional Ammunition Unfit for Further Storage and Use" and to allocate about 20 million Euro annually to improve the physical security of ammunition depots. The quest for a strategy to liberate Ukraine from the "ammo threat" has become an important task for government bodies, private companies and non-governmental organizations. However, Ukraine will not be able to solve the problem on its own. The country needs assistance from partners, because the problem inherited by Ukraine from the Soviet Union does not threaten Ukraine only. In contrast to states, the environment does not have borders. Several hundred thousand tons of toxic ammunitions containing

8 A powerful blast at an ammunition depot in the village of Novobohdanivka, near Melitopol, Zaporizhzhya region (South Ukraine), on 6 May 2004. The blast scattered some 20,000 tons of shells over an area of more than 300 square kilometres. Five people were killed; the authorities have evacuated some 5,000 people from the vicinity of the depot, which has been on fire for many days. Estimates of the total material losses range from 500-1,000 million Euro. See Yuriy Butusov. 2004. "Mass Destruction Stumps. The President and the Premiere Conceal Their Responsibility for the Army Depot Explosion near Melitopol". *Dzerkalo Tyzhnya*, May 15-21.

hexogen can lead to another disaster with the dimensions of Chernobyl. It is also impossible to disregard the threat of terrorists using ammunition and SALW.

Since 2002, Ukraine has been holding negotiations with NATO, Great Britain, Germany, Canada, the USA and other countries to get assistance. It is hoped that this will lead to a step by step approach to deal with the most urgent requirements. The disposal of these weapons and ammunition may remove many threats to the security of Ukraine and the entire region, release human and material resources that Ukraine has to spend on maintenance. Cooperation between Ukraine and international organizations would also help to test technologies and methods of disposal that may be useful in similar situations in the future. Such cooperation could enhance mutual understanding and good-neighborly relations between Ukraine, NATO and the European Union.

Chapter 1 – Threats to security

In recent years the issue of threat reduction is associated with an entirely new "balance" of challenges. While the overall list of destabilizing factors remains actually unchanged (in particular, international terrorism became a global problem long before September 11, 2001), accents in that list have shifted fundamentally. The nature of threats from conventional ammunition and weapons that underwent far-going transformation after the end of the "Cold War" is not an exception. In particular, even the many-fold excesses of stocks of conventional heavy weapons (tanks, artillery pieces, armored vehicles) over the needs of national defense (although lying within the agreed limits) observed in Ukraine apparently can no longer be viewed as a substantial destabilizing factor for European (and moreover, global) security. Accordingly, the problems of their further disposal, although vital for Ukraine, financially burdensome and painful in many other respects, are nevertheless often viewed in Europe as an internal problem of Ukraine that has to be solved mainly on its own. Until recently Ukraine's partners were unaware of the scale of the problem faced by the country.

At the same time, there are reasons to state that the international community (both international organizations and separate states) can and should help Ukraine with the disposal of ammunitions and SALW. Ukraine's obsolete stocks are posing a "real danger" to the security of Ukraine's foreign partners as well. These dangers, by their nature and possible destabilizing effects,

could be categorized as environmental and/or technogenous disasters, terrorism, and illegal arms trade.

Threat of environmental and/or technogenous disasters

In Ukraine, there are 4 nuclear power plants, nearly 2,000 chemically hazardous facilities where some 300,000 tons of virulent gases are kept or used and over 1,200 facilities containing more than 10 million tons of inflammable agents. According to the National Academy of Sciences of Ukraine, in case of an accident at a reactor and a subsequent discharge of only 10% of radioactive products beyond the sanitary protection zone, over 400,000 square kilometers of Ukraine's territory with more than 5,000 towns and villages and 23 million residents will be contaminated.[9] Meanwhile, huge ammunition depots are located near many big Ukrainian cities. Sometimes it is difficult to calculate their exact quantity, like in the suburbs of Sevastopol, where the Soviet military command placed several thousand tons of ammunition in underground galleries at the beginning of World War II – they remain there even now, and local residents and criminals do not face serious obstacles in getting explosives. Additionally, there are 200 standard carloads of World War II ammunitions "officially" kept at depots near Sevastopol.[10]

Some 1,500 standard carloads of obsolete ammunition are concentrated in Odessa region, near the towns of Izmail, Bilhorod-Dnistrovskyi, Balta, and Odessa. Near the town of Chudniv, Zhytomyr region, some 330 carloads of artillery munitions are waiting for disposal, some 1,000 carloads of ammunition are kept near the town of Slavuta (Khmelnytskyi region).[11] This list is far from exhaustive, since, in addition to the above regions, dangerous neighborhoods of big settlements and obsolete ammunition are to be found in many other regions of Ukraine: Lviv (Briukhovychy), Kharkiv (Lozova, Balakliya), Zaporizhzhya (Fedorivka), Vinnytsia (Kalynivka, Pyrohovo), Kyiv (Olshanytsia), and so on.[12] All this bears witness to the significant

9 Serhiy Zyat'yev. 2004. "Powder Genie of the Ukrainian Lands". *Narodna Armiya*, March 10.

10 In accordance with the Soviet Army military transportation manuals (inherited and still used in Ukraine) one standard carload amounts to 20 tons.

11 See Annex: "List of Ammunition Subject to Disposal within the Framework of the NATO Trust Fund".

12 For more detail see Vasyl Mytyshov. 2002. "Inventory and Assessment. Speech at the international conference Capabilities for Disposal of Conventional Ammunition and Weapons by the Example of Ukraine and

threat that obsolete ammunition poses for Ukraine and the entire Central European region. Unfortunately, until recently, the problem of storage and disposal of arms, rockets and ammunition has been left to the MOD (the owner of ammunition and SALW) and the Ministry of Industrial Policy (the owner of industrial enterprises where the main disposal activities were conducted). However, there is a logical explanation for the poor attention to the disposal of ammunition and SALW in Ukraine. Ukraine is known to have inherited from the former Soviet Union a great deal of its war machine – at the end of 1991, it housed some 1.2 million military servants and civilian personnel of the Armed Forces and other military formations (in sum, 2.5% of its population). The forces of the Soviet Army and Navy on the territory of Ukraine numbered 906,000 (including 780,000 military servants).[13]

The main efforts of the Ukrainian authorities as well as the international community were concentrated on the obligations assumed by Ukraine with respect to nuclear and conventional disarmament. In 1992-1995, such an approach was probably right. Under the CFE Treaty, Ukraine was to get rid (from July 1992 till November 1995) of 2,048 tanks, 1,653 armored fighting vehicles, more than 2,260 artillery pieces, 460 warplanes and dismiss from the national Armed Forces 330,000 military servants. In fact, according to Ukraine's MOD, "by the end of 1996, more than 3,500 different military organizations had been dissolved and the armed forces had been reduced by almost 410,000 people. Weapons and military equipment were also drastically reduced: combat aircraft by 600, helicopters by almost 250, tank and combat armored vehicles by more than 2,400 and 2,000 respectively."[14] All in all, over the 13 years of independence,

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Moldova". *Materials of the international conference in Yalta on November 15-16, 2001. Friedrich Ebert Stiftung*. Kyiv. pp. 11-23.

13 For a comprehensive account of the Soviet military legacy in Ukraine see: Andreas Heinemann-Grüder. 2002. "Becoming an Ex-military man: Demobilization and Reintegration of Military Professionals in Eastern Europe". *BICC Brief 26*, August and Oleksiy Melnyk. 2003. "Ukraine's cold war legacy 12 years on: a burden from the past, a problem for the future". In: Alyson J.K.Bailes, Oleksiy Melnyk and Ian Anthony, eds., *Relics of Cold War (Europe's Challenge, Ukraine's Experience,* SIPRI Policy Paper No. 6, November.

14 See "The creation of the Ukrainian Armed Forces – a short summery. " The State program of the Ukrainian Armed Forces reform and development until 2005. Publication of Ukraine's MOD. "Press of Ukraine". Kyiv, 2000, p.6, at: www.mil.gov.ua/index.php?part=history&lang=ua.

Ukraine reduced its active military component to a third – from 780,000 military servants to 250,000.

The explosions at the ammunition depots in Artemivsk (Donetsk region, October 2003) and near Melitopol, (Zaporizhzhya region, May 2004) finally drew the attention of the authorities and the public both in Ukraine and far beyond its borders to the problem of disposal of obsolete ammunition. In the former case, there were no victims, but damage totaled some 8 million Euro. In the latter case, near Melitopol, explosions took the lives of five persons and inflicted up to one billion Euro of damages. Subsequent retirements of the Chief of the General Staff, Commander of the Land Forces and, some time later, Defense Minister Yevhen Marchuk witnessed that storage and disposal of ammunition indeed posed a serious problem for national security.

Unfortunately, nobody can guarantee that similar tragedies will not repeat themselves and that next time, the devastation and death toll will not be even greater. Apparently, near Melitopol, only heavy showers and northern wind prevented the fire from spreading to depots with rockets for long-range multiple launch systems. Theoretically, they could fly up to a maximum of 70 kilometers and hit Zaporizhzhya NPP and the industrial city of Melitopol, located respectively 40 and 25 kilometers far from the place of explosion. On the aggregate, the 275th ammunition base that exploded near Melitopol contained 4,755 standard carloads of ammunition, whose aggregate TNT is comparable with a dozen nuclear ammunitions of medium yield.

Comprehension of the problem made the Ukrainian military search for cheaper methods of disposal. Environmentalists are concerned with Ukraine's attempts to conduct disposal by the simpler and cheaper but environmentally extremely hazardous method of blow up. For that purpose, large ranges are now being selected and tested, whose size and equipment are sufficient for safe disposal of batches of shells with a total mass of up to 100 tons several times a week. There are also projects of sinking decommissioned vessels with obsolete ammunitions in deep water in the Black Sea.[15]

Fortunately, the projects of sinking so far remain unaccomplished. Apparently, history poses a warning: after the end of World War II, the USSR and its allies sank in the Baltic sea vessels with German ammunitions charged with a combat chemical agent – mustard gas. No one conclusively scrutinized

15 Serhiy Honcharov. 2004. "Under Fire. «Artillery Attack» near Melitopol: the Consequences and Lessons". *Kievsky Telegraph*, May 20.

the long-term environmental effects of tens of thousand tons of hexogen dissolved in the water.

Antipersonnel mines, too, are extremely dangerous for the environment, if disposed by the blow-up method. This is proven by the experience of demolition of a batch of PFM antipersonnel mines (banned by the Ottawa Convention) in March – April 1999, at the range of the Desna Training Center. All in all, 101,088 PFM-1 mines were blown up in Ukraine (the whole project cost some 120,000 Euro). However, after the analysis of the consequences of blow-up of PFM-1 antipersonnel mines, it was decided to destroy mines in a safer and environment-friendly manner.[16] According to preliminary estimates, environmental consequences of open-air demolition of KSF-1 clusters (with PFM-1 mines) in regular containers are extremely dangerous, first of all, due to environmental pollution with such toxic substances as aluminum oxide, lead compounds, unburned remains of liquid explosives, hydrogen cyanide (prussic acid). The size of contaminated area arouses concern: if one box is burnt, its radius ranges from 0.3 to 6.7 km, if ten boxes are disposed in such a way, the radius of the contaminated area increases to 21.2 km. The admissible level of contamination with the majority of pollutants within the operational area (radius 50 m) upon successive burning of boxes with clusters in its center was exceeded by 200–500 times. Therefore, their blow-up or burning in the air can result in serious contamination of the atmosphere with toxic gases.[17] On the other hand, disposal of those mines cannot be postponed for good, since those mines, unless disposed, can explode in case of a fire or other consequences of a breach of storage rules.

Terrorism

Evidently, given the current balance of challenges and risks, the threat of ammunition and SALW coming into "wrong hands" (the hands of wrongdoers and terrorists) seems no less serious than the evident threat for the environment (environmental) or infrastructure (technogenous). The very existence of large stocks of various ammunitions and SALW offers a kind of deferred supply for terrorist activity or for equipping organized criminals, extremist groups, irregular armed groups or feeding the criminal

16 Materials and documents of the working meeting of representatives of state institutions and public organisations "The Ottawa Convention and its Significance for Signatory Countries". Kyiv. May 17, 2004.

17 Ibid.

"black market". "Unorganized" criminals and private persons who like to exercise a "right to self-defense" may also try to get access. For the time being the greatest danger originates from the possibility of commitment of terrorist acts using nuclear, radiological, chemical or biological weapons, as well as air terrorism. It is commonly accepted that the problem of prevention of "chemical terrorism" is solved most effectively through elimination of chemical, of nuclear and radiological weapons – through reliable protection of relevant arsenals and tough control over nuclear materials.

There is no doubt that from the viewpoint of the purely military threat, this is true, but if "asymmetric" aspects of the terrorist threat are considered, things look somewhat differently. The civilian economy of any developed country produces enough radioactive waste (not being nuclear materials in the exact sense of this word) and highly toxic chemical agents, that, in presence of suitable types of conventional ammunition and means of delivery, can also be used as *ad lib* radiological or chemical weapons, charged with, say, chemical agents, liquid or powdery radioactive waste. The threat to the life and health of terrorists themselves originating from home production of such ammunition does not present a sufficient deterrent factor here.

Terrorists may well use ammunitions and SALW that, if "leaked" from the storage facilities, can be "converted" into radiological, chemical or biological weapons, or used as chemical weapons, originally not being such. They include, first of all, various incendiary, illuminating ammunitions and means of their delivery, all types of weapons, multiple launch rocket systems and ammunition for them, etc. Finally, the huge quantity of ammunition and SALW kept at numerous depots could prompt terrorists or rebels to seize them for immediate explosion or removal to covert places, for example for suicide acts, acts of sabotage at hazardous sites (involving discharge of large quantities of radioactive or toxic substances into the air) or acts of mass terror. In this connection, elimination of compact weapons (first of all, man-portable air defense systems and antiaircraft missiles) that can be used to attack civilian aircraft without entering on board presents an extremely important factor impairing the chances of terrorist organizations to get means for effective attainment of their goals. Exactly due to the high effectiveness of man-portable air defense systems (MANPADS), the international community has paid increasingly attention to the problem of security and safe disposal of MANPADS and the related problem of liquidation of surplus small arms at the depots of the Armed Forces of Ukraine. When Ukraine began searching for foreign

investors in projects of disposal of obsolete ammunition and SALW, the USA announced its readiness to become the main sponsor of a project on the demolition of 1.5 million pieces of SALW and 133,000 tons of ammunition, provided that Ukraine puts MANPADS on the disposal list.[18] To be sure, such readiness attests to the concern of the USA and others with the possibility of MANPADS coming into the hands of terrorists.[19]

Unfortunately, there are reasons for such concern. According to the CIA, in 1978-1997 alone there were at least 27 attacks on civilian planes using MANPADS. The attack on an El Al Boeing 757 in the vicinity of Mombassa (Kenya, East Africa) in November 2002 was one of the best known most recent cases.[20] So far, a fundamental solution of this problem – equipment of civilian planes with anti-missile systems – seems impracticable due to many years of work and tens of billions of dollars needed for that purpose. Meanwhile, even a partial elimination of stocks of such weapons would be a far more economic contribution to the reduction of this threat to civil aviation. In the near future, elimination of stocks of MANPADS launchers will present the most effective way of limiting air terrorism using air defense weapons. Elimination of the stocks of missiles themselves seems desirable but less important. It should also be noted that relatively poorly trained fighters or terrorists would most probably chase after simple, tactically obsolete MANPADS that are much cheaper than newer systems, whose storage (after decommissioning) is controlled less strictly.

Another variety of terrorism, spread in the recent years all over the world, is presented by so-called "bomb terrorism". Usually, acts of "bomb terrorism" are committed using high-yield directional (if targeted at a specific person or a small group) or non-directional fragmentation ammunitions, or massive (weighing

18 See "The USA is Ready to Finance Liquidation of Small Arms and Ammunition on the Condition of Disposal of MANPADS", *Defense Express*, April 16, 2004.

19 Arthur Lantant. 2004. "Ammunition Threat. The Scale of Ammunition Disposal Requires Concentration of Efforts of the State". *Eksport Oruzhiya i Oboronnyi Kompleks Ukrainy*, No.8-9, pp. 58-62.

20 Among the other examples of MANPADS use against passenger aircraft 1993 events of separatist war in Abkhazia (Georgia) deserve to be mentioned. Among other targets heat-seaking missiles launched by separatists shot down four Georgian passenger planes. See "Transair Georgian Airline Crash (22 September)", at: http://en.wikipedia.org/wiki/Transair_Georgian_Airline_Crash_%2822_September%29. On September 22, 1993 a Transair Georgian Airlines Tupolev Tu-154 was hit by a missile on takeoff from Sukhumi, in the republic of Georgia. The plane crashed on the runway, killing 106 of the 132 people on board. The missile had been fired by Abkhazian rebels.

tens and hundreds kilograms or, sometimes, several tons) high-explosive charges delivered by vehicles left on the site in advance or driven by "kamikaze". At that, the payload of "car bombs" is normally composed of available materials using standard "modules" of high-explosive (fragmentation-demolition) action. Used as relatively easily portable and rather effective non-directional explosive devices, fragmentation, high-explosive and combined (fragmentation-demolition, etc.) ammunitions for canons are to be found in significant quantities in Ukraine.

Furthermore, terrorists show much interest in special-purpose subversive mines and explosives. One example of use of such means occurred on May 9, 2002, in Kaspiysk (Daghestan, Russia) during a festive demonstration on the occasion of Victory Day. Then, a terrorist attack that employed a directional fragmentation mine (illegally purchased from the Russian military) combined with a demolition bomb resulted in 42 people dead and more than 100 wounded. Such and similar systems are quite many in Ukraine[21], and their disposal would certainly meet the interests not only of Ukraine but also of other countries.

Illegal arms trade

The threat of illegal arms trade equally concerns surplus ammunition and surplus SALW. In this connection, one general problem for Ukraine that potentially may give rise to attempts of illegal trade in arms is that the presence of huge quantities of ammunitions and SALW by itself seriously hinders their strict account, for which, there are neither funds, nor time or personnel. For instance, in 2004, it was reported that the MOD had no data on several hundred rockets sent for disposal, and vice versa, de-registered rockets were found in military units after many years.

In the context of possible illegal trade in obsolete types of Ukrainian ammunition and SALW, there is more evident and probable demand for simple automatic small arms, like *Kalashnikov* machineguns and sub-machineguns.[22] However, the

21 These systems could be used for terrorist purposes in Ukraine as well, as proved by the failed attempt on life of the member of Ukraine's Parliament Volodymyr Sivkovych by use of "Claymore" type antipersonnel mine MON-50. See "There are antipersonnel mine and triton blocks found near the house of Sivkovych", ICTV TV channel, at: www.ictv.ua/content/publications/ukraine/sdfh_jfdf.html.

22 For more information on Ukrainian agenda in the context of illegal arms trade, see Leonid Polyakov. 2003. "Managing The Challenge Of Illegal Arms Transfers". Conflict Studies Research Center at Defence Academy of the United Kingdom, G120, May.

demand for more advanced and effective systems, especially for guerrilla warfare, involving antipersonnel mines and compact multiple launch rocket systems, remains on the agenda.[23]

As regards antipersonnel mines, in addition to environmental considerations that primarily concern Ukraine, their high performance presents another reason for concern. Potential illegal export of such mines to "hot spots" may have very serious consequences for the local population.[24] For instance, the PFM-1 antipersonnel mine resembles a "butterfly" due to small wings on its body. 480 such "butterflies" neatly lie in a cluster with a propelling charge. Upon ejection from the cluster, they glide. One such cluster can cover the area of 8-10 hectares.

As regards to compact multiple launch rocket systems, it may be stated that in the tough struggle the international community wages against the proliferation of technologies of guided missile systems, another aspect of the rocket problem was neglected – namely, the sprawl of light rocket systems all over the world. As a result, proliferation of such means of irregular warfare as light rocket launchers (multiple launch systems) has become a serious problem. The practice of terrorist attacks, starting from the so-called "Japanese Red Army" in 1970s and ending with the current events in Afghanistan, Israel, Iraq, Lebanon and Chechnya, proves that moral, political, financial and economic damage (largely indirect) from "pinpoint" rocket attacks of terrorist groups is very high. In this connection, the huge stocks of rockets for systems such as *Grad* 122mm multiple launch rocket systems should be among the primary candidates for disposal in Ukraine, along with antipersonnel mines.

The same logic should apparently be applied to the rather long list of other SALW systems, their ammunitions and engineering facilities that might be in demand among terrorists,

23 On 28 October 2004 a court hearing was opened against four foreigners facing criminal charges on illegal attempt to procure weapons and hire mercenaries. A spokesman for the Ukrainian prosecutor-general's office said that four people - from Greece, Iraq and Pakistan - were on 22 March 2004 arrested in Ukraine on suspicion of the illegal weapons trade which was intended to procure small arms and other weaponry worth $800 million for an unspecified force fighting in Iraq. *Defense Express*, 22 October 2004.

24 For instance, the experience of Uzbekistan may be called demonstrative. In 1990s, 4 million mines inherited from the former Turkestan Military District of the USSR were used there to mine the southern border against drug traffickers and smugglers. There has been not a single proven report of injuring any smuggler, while 64 locals were killed and 72 wounded on the border minefields. See Serhiy Chernous. 2004. "Farewell to Mines…", *Narodna Armiya*, June 10.

rebels and the like. This list should include many types of light mortars, large-caliber machineguns, "Claymore" type antipersonnel mines, antitank and automatic grenade launchers, recoilless guns, flame-blast weapons, sights and ammunitions for such systems.[25] Both for Ukraine and for other countries of the region, possible environmental and technogenous effects of obsolete stocks pose the most immediate threat. However, there are possible long-term destabilizing affects derived from the interest of terrorists, organized criminals and illegal military formations in ammunitions and SALW. Despite some optimistic assessments, the recent terrorist attacks in Spain and Russia as well as the very existence of many "hot spots" fuelled by illegal arms supplies, added by recent warnings about the probability of major terrorist attacks in Scandinavia, Poland, and the Baltic countries demonstrate that the dangers of Ukrainian stocks of surplus ammunitions and SALW should be given no less attention than environmental dangers. Since Ukrainian resources are currently rather limited, it may be suggested that by helping Ukraine its foreign partners help themselves. But funds alone are not enough. Purchases should be determined accurately, concentrating on the disposal of those types of ammunition whose excessive stocks or storage conditions have the most negative implications, posing the greatest threat to security.

Chapter 2 – Lessons of past experiences

When Ukraine gained independence, it had neither practical experience in, nor a system of disposal of large quantities of obsolete ammunition and SALW, since during Soviet times (with the exception of the short period from the late 1980s until the breakup of the USSR), the problem of disposal management was disregarded. However, the problem of disposal soon came to the forefront. The Cabinet of Ministers of Ukraine endorsed by its Resolution No. 1079 of December 31, 1993 a decision to develop a State Program of Disposal of Unfit Ammunition.[26] The Program was intended to align the entire chain of disposal activities, the selection of contractors, provision of funds for disposal, and to specify the volumes of ammunition subject to disposal. Furthermore, the Program was to ensure state control of the turnover of explosives in the country and safety of the disposal activities. The Program was developed by the State

25 By the end of 2004, in addition to the USA, the willingness to assist Ukraine in elimination of SALW was also demonstrated by Great Britain. It is likely that two countries will join their efforts on this issue.

26 By the end of 2004, the second program was drafted.

Scientific Research Institute of Chemical Products (Shostka) on the commission of the Ministry of Engineering and Industry (then – "*Minmashprom"*). Since 1993, three revisions of the Program have been made. The most recent version, effective till 2004, was approved by the Cabinet of Ministers of Ukraine Resolution No.40-1 of January 20, 1996. After the Program coordination, the Ministry of Defense and the Ministry of Economy of Ukraine raised the target figures of disposal to 58,000 tons a year, on the average.[27]

Unfortunately, all those versions of the Program failed. As was already noted, no sufficient funding was appropriated. By and large, it was planned to allocate from the state budget some 5 million Euro to the implementation of the disposal program in 1995 – 2003; in reality, less than one million was allocated.[28] On top of disposal costs, significant funds were to be spent on another (parallel) program – to provide for safe keeping of weapons and ammunition. To ensure safety of armaments, rockets and ammunition, the MOD drew up in 1995 the "Program for the Provision of Physical Security as well as Explosion and Fire Safety of Arsenals, Bases and Depots of Weapons, Rockets and Ammunition of the Armed Forces of Ukraine in 1995-2015". Its envisaged annual minimum cost equaled some 7 million Euro. Nevertheless, over the entire period covered by the Program (from 1995), less than 6 million Euro, i.e., 13.1% of the earmarked amount, was allocated to that purpose. This proves that Ukraine and its leadership over a long period, basically from 1995 onwards, did not view the disposal of ammunition as a priority.[29]

The early projects of ammunition disposal had its "Achilles' heel" - the cost of the activities related to the disposal was to be covered at the expense of disposal products, i.e., the sale of ammunition components and products of their processing. Given such an approach, useful products of the disposal fit for further use (TNT, brass, other metals) were separated from ammunition, while other agents (in particular, hexogen and ballistic powder) were left at depots and storage facilities "for an indefinite term". Even before the adoption of the "Program of Disposal" (in 1993) *Alliant Tech Systems* of the USA tried to enter this market and jointly with Ukrainian businessmen set up industrial facilities for

27 Viktor Banishevskyi. 2003. "By the Dangerous Line. Problems of Ammunition Disposal in Ukraine". *Eksport Oruzhiya i Oboronnyi Kompleks Ukrainy*. No.11, p.26.

28 Nykyfor Lysytsya. 2004. "A Bomb Depot is Not an Apple Orchard". *Narodna Armiya*, March 17.

29 "Ukraine: ´War`on Ammunition in Figures". *Defense Express*, May 11, 2004.

the disposal of artillery ammunition on the territory of a military unit in Ichnya (Chernihiv region). According to Ukrainian estimates, in 1994 – 1998, the Ukrainian-US Joint Venture "*Alliant Kyiv*" officially disposed of 20,000 tons of ammunition. However, after four years of cooperation, Ukrainian officials, mostly military authorities, protested against "*Alliant Kyiv`s*" failure to perform all the assumed commitments. The company was accused of making profit at the expense of safety and national interests of Ukraine. The military was supported by some Ukrainian business companies. In particular, Borys Kozhevnykov, the former President of *Spivdruzhnist* Corporation, - the main Ukrainian operator on the market of disposal services - said that "*Alliant Kyiv*" employed an environmentally damaging technology of disposal. "Upon the receipt of ammunition containing brass, they separated the projectile from the shell, unscrewed the primer plug, and put the projectile into the same box. They poured out and burnt powder, and then sold the brass shell. This method of disposal was a gold mine for the firm. … Clean disposal is a loss-making process. On the average, full disposal of one shell costs 5 US dollars".[30]

In the end, the American partners left one million dollars worth of equipment, returned back home and lodged an insurance claim for 17 million dollars. According to Ukrainian sources, the lawsuit is not over yet.[31] After the withdrawal of "*Alliant Kyiv*", their domestic competitor *Spivdruzhnist* remained the only big contractor for ammunition disposal in Ukraine. However, the peculiar fact is that a few years later, in 2004, after the explosion at the artillery ammunition depot near Melitopol, *Spivdruzhnist* was also accused of sins similar to those ascribed to "*Alliant Kyiv*".

As far back as 1995, the Corporation won the tender for disposal of ammunition in the Land Forces of Ukraine. In fact, from 1995 up until recently, *Spivdruzhnist* Corporation was the main contractor of disposal activities in Ukraine. The Corporation included: *Spivdruzhnist* Association, State Scientific Research Institute of Chemical Products (Shostka), *TASKO* Corporation

30 "Disposal of Ammunition. The Experience of *´Spivdruzhnist`*. The "*Alliant Kyiv"* company spread rumours all over Ukraine that they had advanced technologies and that disposal was extremely profitable and beneficial. According to the *Defense Express* (July 1, 2002), their Director General, an Odessa-born American, received $40,000 a month. "They skimmed the cream, leaving disposal to Ukraine... This was nothing but theft", the *Defense Express* claimed.

31 Ivan Stupak. 2004. "Saw, Alex, They Are Golden…". *Viysko Ukrayiny*, No.6, pp.7-9.

(Kyiv), Ukrainian Scientific Research Institute of Aviation Technologies (Kyiv) PJSC, the MOD of Ukraine, particularly its military unit A-1352. The Corporation solved the problems of disposal in close contact with the Frunze Scientific-Production Association, *Impuls* and *Zorya* factories (Shostka), the Chemical Association named after Petrovskyi (Luhansk region), the Artemivsk Non-ferrous Metal Factory (Donetsk region), *Ukrspetsexport* State Arms Trade Company and its subsidiaries (e.g., *Ukroboronservice*). Contractors for the disposal of other types of ammunition were selected on the basis of separate tenders.

The MOD tasked *Spivdruzhnist* with the entire scope of work. The contract was to encompass the disposal of both "profitable" and "unprofitable" ammunition. The general contractor made agreements with subcontractors possessing special equipment to dispose specific components of ammunition in required quantities within terms set by the MOD. Where the productivity of the equipment was insufficient, a similar agreement was made with another subcontractor. In this way, JV "*Halayev-LTD*", *TASKO* Corporation, "*Iner-Vast*" CJSC and a number of other entities entered the market of disposal services.[32] Under the „Program of Disposal", by the end of 2001, arsenals and depots of the Armed Forces of Ukraine were transferred to certain enterprises. The main (sub) contractors for the disposal of nearly 185,000 tons of unfit ammunition were the following:

- *Spivdruzhnist* Corporation – 102,211 tons
- "Alliant-Kyiv" CJSC – 78,202 tons
- "Halayev LTD" JV – 300 tons
- A-1352 military unit – 886 tons
- "ELKO" NVGA – 3,550 tons

All in all, in the period of 1995 – 2001, from the above quantity more than 93,000 tons of ammunition was actually disposed of, in that:

- *Spivdruzhnist* Corporation – 73,728 tons
- "Alliant-Kyiv" CJSC – 19,138 tons
- "Halayev Ltd." JV – 200 tons[33]

However, somewhere in the period of 2000-2001, the pace of disposal began slowing down in Ukraine. The disposal by basically unregulated business companies that had lasted for years,

32 "Ukraine: ´War` on Ammunition in Figures". *Defense Express*, May 11, 2004.
33 Yuriy Butusov. 2004. "Missiles Go Around the World. Ukrainian Weapons Are Available to Metalists and Terrorists". *Dzerkalo Tyzhnya*, April 17–23.

was actually over. Since 1993, various business entities "extracted" valuable high-quality non-ferrous metals, leaving tens of thousand tons of loss-making explosive components at military depots. All in all, by 2004, some 130,000 tons of ammunition were "disposed of" in a wild manner. Only 3% of the remainder contains TNT, to be converted into industrial explosives, the remaining 97% contains hexogen[34].

According to the "*Spivdruzhnist*" executives, before 2000 the ratio of "profitable" to "unprofitable" ammunition subject to disposal enabled the disposal of ammunition on the basis of repayment. But since 2001 the process of disposal has been steadily loss-making – "only 3% of ammunition subject to disposal can be disposed of at the expense of funds obtained from ´liquid` products of the disposal".[35]

From 2000 to the first half of 2001, the *Spivdruzhnist* Corporation made 35,000 Euro of profit, amounting to 1% of the total cost of the disposal activities. Under the agreement with the MOD, the Corporation transferred 51% of that amount to the Defense Agency. In the second half of 2002, the Corporation suffered losses. In 2003, losses amounted to 30% of the income generated by processing usable components, given the same terms of interaction with the MOD of Ukraine and other governmental agencies.[36]

In absence of an effective state support for the process of disposal, Ukraine created sufficient (but narrow) industrial capacities for processing ammunition containing TNT. At the same time, insufficient funding prevented the *Spivdruzhnist* Corporation from a timely commencement of the creation of capacities for the disposal of many other types of ammunition and explosive substances:

- artillery ammunition charged with mixed explosives;
- anti-aircraft guided missiles;
- anti-tank guided weapons;
- airborne guided missiles (air-to-air and air-to-surface) and unguided rockets;
- naval weapons (sea mines, depth bombs, torpedoes, etc.);
- small caliber ammunition (23–37 mm);

34 Volodymyr Knysh. , 2004. "Disposal of Surplus Ammunition is a Nation-wide Problem". *Narodna Armiya*, June 8.

35 Statement of the Minister of Defence of Ukraine. *Ukrayinski Novyny* News Agency, April 5, 2004.

36 Viktor Banishevskyi. 2003. "By the Dangerous Line. Problems of Ammunition Disposal in Ukraine". *Eksport Oruzhiya i Oboronnyi Kompleks Ukrainy.* No.11, p.26.

- small arms ammunition;
- for processing hexogen, SeaMix[37], mixed explosives and pyrotechnic compounds obtained after disposal.[38]

The Corporation, supported by the Ministry of Industrial Policy and MOD, approached foreign investors for financial assistance in order to create adequate capacities for the ammunition disposal. In particular, they surveyed the possibility of obtaining technologies and equipment for ammunition disposal from the German companies EBV and RHEINMETALL, and (through their inter-mediation) from WASAG and UTHE.[39] The Corporation reported about successful cooperation with the German EBV firm in the disposal of fragmentation-demolition projectiles charged with hexogen-based explosives of A–IX–2 type.[40] This enabled the Corporation to dispose of some ammunition charged with that type of explosive as well. At the same time, according to a representative of the Ministry of Industrial Policy, "ammunitions whose disposal is associated with the greatest losses were actually not addressed, although their share is relatively low, while the environmental hazard is high. Such ammunitions also include antipersonnel cluster mines PFM-1 and PFM-1S".[41] An initial NATO/PfP Trust Fund led by Canada was established in 2002 to destroy 404,000 APLs. In addition to contributions from Canada and Ukraine, the work was funded by Hungary and Poland. Day to day work was overseen on behalf of the Allies by the NATO Management and Supply Agency (NAMSA).

In fact, this project has been the only tangible success so far in cooperation between Ukraine and a foreign partner within the framework of international assistance programs. This positive result was attained mainly thanks to the mutual interest of the parties in fast disposal of this type of ammunition and the

37 SM – "SeaMix", a plastic aluminium-hexogen explosive (50% of hexogen, 25% of aluminium powder, 25% of paraffin) compressed to 1.66 gr./cm³ and painted orange; mainly used to charge naval mines and torpedoes, depth bombs, anti-amphibious mines (e.g., PDM-2), and installation mines designed for long stay in the water (SRM, UPM).

38 Vyacheslav Taran. 2002. "Experience of Disposal of Unfit Ammunition in Ukraine". *Materials of the international conference in Yalta on November 15-16, 2001, Friedrich Ebert Stiftung*, Kyiv, p.86.

39 Ibid.

40 Ibid., p.78.

41 Mykola Kovtun (Head Specialist of the Ministry of Industrial Policy of Ukraine). 2002. "Organisation of Disposal of Conventional Ammunition Unfit for Further Use in Ukraine". *Materials of the international conference in Yalta on November 15-16, 2001, Friedrich Ebert Stiftung*, Kyiv, p.47.

combination of qualified management by NAMSA, control by the State Commission for the Defense Industry Complex as well as the experience of ammunition disposal accumulated by *Spivdruzhnist* Corporation. In other words, Ukrainians proved that sometimes, they could work competently and effectively co-operate with foreign investors.

This seems especially positive set against the backdrop of the negative experience of the previous "wild" disposal of conventional ammunition and scandals that accompanied the elimination of stocks of strategic nuclear weapons in Ukraine. Significant funds extended by the USA in 1990s under the Nunn-Lugar Program quite often were not used expediently and not always strictly controlled, although the main targets were in the end accomplished. By and large, between 1995 – 2002, 168,900 tons of unfit rockets, artillery shells, land-based mines and other ammunition (on the average – some 20-25,000 tons a year) were disposed of. Some 80% of all ammunition disposed of in that time frame fell on *Spivdruzhnist* Corporation. In 2003, as much as 35.100 tons were disposed of (evidently, this relatively high figure was attained primarily as a result of the execution of the contract of disposal of 404,000 antipersonnel mines).

In 2004, the state budget for the first time allocated substantial funds for the disposal of obsolete ammunition. As a result, the volumes of disposal of rockets and ammunition were planned to reach 49,900 tons. Yet, in the course of the first eight months of 2004 the enterprises of the Ministry of Industrial Policy and MOD did not dispose of a single shell. Even the *Spivdruzhnist* Corporation, the only certified operator on the market, did not manage to sign contracts of disposal for 2004. The main reason for the delay was the dissatisfaction of the MOD officials with the actual implementation of the contracts. The bases and arsenals accumulated several thousand tons of explosive components of dismantled ammunition: powder, projectiles, primers, fuses that were supposed to be disposed of according to the contract, but were unprofitable for the contracting companies.[42]

The experience of ammunition disposal allows one to draw the conclusion that in the absence of effective state support and control, and as a result of so-called "partial" disposal practiced at the initial stage of ammunition disposal in Ukraine and mainly confined to ammunition dismantling and extraction of the most economically profitable components (non-ferrous and ferrous

42 Ivan Stupak, and Alex Saw. 2004. "They Are Golden…". *Viysko Ukrayiny*, No.6, pp.7-9.

metals), not the most dangerous but the most profitable ammunitions were disposed of. "Unprofitable" products of disposal were often neglected, resulting in an increase of fire and explosion hazard at arsenals and bases. Such consequences indeed occurred in 2003 and 2004, with explosions at the depots in Artemivsk and near Melitopol.

At the same time, the experience proves that in the presence of proper funding and state control, the issue of disposal can be quite effectively solved. When an accountable tender is announced, the contender who offers the best solution performs the state order, obtaining guaranteed profit irrespective of the profitability or unprofitability of one or another operation and finally solving the problem of disposal. For that, Ukraine has the necessary industrial facilities, scientific potential as well as the experience of cooperation with foreign partners, in case the domestic capacities are deficient. There are examples of such positive experience, such as the disposal of a batch of antipersonnel mines with NATO assistance, and the small but promising experience of cooperation between Ukrainian companies and German firms in the field of disposal technologies.

Chapter 3 – Plans and capabilities

After the explosion of the depots near Melitopol in May 2004, Ukraine entered a new stage in its ammunition disposal history. New approaches have been developed since mid-2004, and the process is not completed yet [as of the end of 2004]. However, the fist official statements have been made that give grounds to define the interests of both old and new actors. First of all, the Cabinet of Ministers of Ukraine instructed the State Scientific Research Institute of Chemical Products (DerzhNDIKhP) to draw a new version of the State Program of disposal of ammunition, to envisage the processing of 500,000 tons of obsolete ammunition by 2010. The MOD has drawn a list of 300,000 tons of shells, and *DerzhNDIKhP* began a feasibility study for their processing.[43]

The "Second Program of Disposal" was drafted at the end of October 2004. Currently, it is being considered by the MOD. According to the Director of the State Scientific Research Institute of Chemical Products, General Designer of ammunition and explosives, Viktor Banishevskyi, the document elaborates who can engage in ammunition disposal, how to get a permit and

43 "Ukraine Draws a New Version of the State Programme of Ammunition Disposal". *Defense Express*, May 11, 2004.

license for such activities.[44] Meanwhile, it may be stated that there is no unity in Ukraine regarding the optimal and effective system of development, maintenance, production, storage and disposal of ammunition. The interests of the Government, separate agencies and ministries, enterprises and special exporters do not always coincide. Departmental and commercial interests in this segment of activity resulted in the emergence of various centres of influence on the process of disposal and selection of its immediate participants.

Administrative Capacities of the Government

In May 2004, the Government of Ukraine announced its intention to establish a new state company specialising in disposal of ammunition. Vice Prime Minister Andriy Kliuyev reported that the company would unite a number of MOD enterprises and state factories of the Ministry of Industrial Policy.[45] The decision to concentrate arsenals and industrial enterprises was passed by the Government in connection with recommendations of a special meeting of the National Security and Defense Council (NSDC) of Ukraine held on May 25, 2004. This event concentrated on the measures for removal of emergency situations that occurred at MOD depots.

The status of the new state company so far remains unclear – the proposal has been submitted to the President but is not signed yet. The Head of the Sector of Security, Defense and Military Issues of the National Center of Euro-Atlantic Integration of Ukraine, Volodymyr Tereshchenko,[46] believes that the state company should be subordinate to the Cabinet of Ministers of Ukraine, should formulate the strategy of ammunition disposal, and manage the necessary resources.[47] The state company is also supposed to prepare and formulate a state order and select contractors for the disposal of specific kinds of

44 Noteworthy, at present, the permit to start disposal activities is given by the State Inspection of Labour Safety, while the Ministry of Industrial Policy and Ministry of Internal Affairs issues the licence. Obtaining a conclusion and a certificate of safety of work precedes the issue of a licence. Enterprises of the Ministry of Industrial Policy get a conclusive answer on obtaining the licence from *DerzhNDIKhP*. See "The Process of Disposal Got Off the Ground – DerzhNDIKhP Director". *Defense Express*, October 18, 2004.

45 "Undermining of Fundamentals. Now in Special Chemistry". *Delovaya Stolitsa*, June 1, 2004.

46 Lieutenant General (ret.), former Commander of Artillery of the Armed Forces of Ukraine.

47 Database of *Defense Express* News Agency, August 12, 2004.

ammunition on a tender basis. Organization of activities on a tender basis would encourage the development of effective technologies at all specialised domestic chemical enterprises that can and may perform such activities. At that, MOD functions should be confined to the storage of ammunition and transfer of expired items for disposal.

The opinion of the current Director General of *Spivdruzhnist* Corporation, Vyacheslav Taran, is also of interest. He said that if a large-scale program of disposal of obsolete ammunition was to be implemented in Ukraine, a holding company similar to *Ukrspetsexport* (State Arms Trading Company – state monopolist in Ukraine's arms trading business) should be created.[48] In this case management will be concentrated in a single centre, while separate companies will engage in disposal of various kinds of ammunition. Budget funds, both obtained from foreign sponsors and received from commercial disposal of ammunition, will be distributed in a centralized manner. "This is the only way to solve the problems facing us. It seems more logical to leave only storage, use and certification of ammunition to the MOD".[49] Furthermore, the creation of an interdepartmental state company might help win foreign assistance for disposal. NATO in general and some of its member states (for example, Great Britain, Germany, Canada, the USA, etc.) may assist Ukraine, but for the time being Ukraine has no single interdepartmental structure with which Western organizations might hold negotiations on this subject. Such a situation arose especially after the liquidation of the State Commission for Defense Industry Complex in Ukraine in 2003.

Ministry of Defence

In the first half of 2004, the leadership of the Defense Ministry announced its intention to unite the available disposal facilities into a company under the auspices of the MOD. The objective was to concentrate resources and create up-to-date production lines as well as "closed cycles" using 100% of the proceeds from the sale of the products of disposal for development and procurement of armaments and equipment for the Armed Forces.

48 In this regard, many Ukrainian experts think that such a new agency should have the status similar to Russia's "Russian Munitions Agency" – a federal executive power body, providing for the implementation of the state policies in the munitions industrial field, special chemistry and chemical disarmament, at: www.munition.ru/eng/func.asp.

49 "Ukraine Lacks Funds for Ammunition Disposal". *Donetskie Novosti*, October 20, 2003.

In particular, this proposal was made by then Defense Minister Yevhen Marchuk in a letter to the Prime Minister of Ukraine in March 2004. A decision in favor of the MOD would expand the capabilities of the military at the expense of enterprises of the Ministry of Industrial Policy, since previously, the MOD enterprises that did not have the appropriate technologies performed only a small part of the disposal activities. Military units had special workshops and special teams for repair of ammunition that were retargeted to dismantle ammunition. Throughout 2003, the MOD implemented the disposal mainly by making contracts with *Spivdruzhnist* Corporation.

On a NSDC meeting on June 3, 2004 the MOD was instructed to sign direct contracts with governmental and other state enterprises for disposal of rockets and ammunition within a month period. Direct contracts meant that the previous scheme of interaction between the MOD and enterprises where the *Spivdruzhnist* Corporation functioned as an intermediary or general contractor had to be abolished. It should be noted that with the appointment of Oleksandr Kuzmuk as the new Defense Minister at the end of September 2004 and the subsequent replacement of the deputy ministers, the decision-making processes in the field of disposal somewhat intensified. Within the MOD, the Department of Disposal was established, with a division in charge of disposal of ammunition and military equipment. The MOD began to sign direct contracts with enterprises. Furthermore, a mutual understanding was achieved between the new MOD leadership and one of the "special export enterprises". ("Special exporters" focus on the export of military goods and services; except for some 4-5 licensed individual arms producers, these are subsidiaries of the State Arms Trading Company *Ukrspetsexport* – for instance, the already mentioned *Ukroboronservice*). In the last quarter of 2004, the MOD planed to dispose of 27.200 tons of ammunition. By October 2004, 12,500 tons had already been transferred for disposal. Another 14.700 tons of ammunition wait for their turn.

Enterprises

According to the Head of the Department of the Cabinet of Ministers of Ukraine Secretariat for Military-Technical Cooperation Borys Kostenko, the disposal is conducted within the framework of the agreements the MOD signed with four factories: two chemical factories in Shostka (*Impuls* and *Zorya)*, and

the *Donetsk* and *Pavlohrad*_chemical factories.[50] The biggest of these is the *Pavlohrad Chemical Factory* Production Association – a state enterprise subordinate to the National Space Agency of Ukraine. The enterprise is considered the branch leader, as it can produce more than 100,000 tons of explosives a year. At that enterprise, capacities are created and activities are underway for the organization of the disposal of various kinds of ammunition. The *Pavlohrad Chemical Factory* was the only manufacturer of solid rocket fuel in Ukraine. The factory was selected to be the main enterprise performing the disposal of parts of the intercontinental ballistic missiles RS-22 (SS-24), inherited by Ukraine from the Soviet Union and subject to elimination under the Ukraine-US Co-operative Threat Reduction Agreement (Nunn-Lugar Program). Although at present the disposal of ballistic missiles remains the main task of the enterprise, the factory's facilities for hydraulic and mechanical disposal of missiles can be converted to the disposal of conventional ammunition with minimal expenditures. Potentially, the factory can dispose of about 10-12,000 tons of ammunition a year. Being a major producer of explosives, the *Pavlohrad Chemical Factory* can also conduct chemical tests of ammunition components.

Before the end of 2004, the *Pavlohrad Chemical Factory* plans to dispose of 4,000 tons of ammunition. The factory will process both TNT- and hexogen-based ammunition. Among the problem types of ammunition, the enterprise representatives mentioned artillery ammunitions above 152 mm containing hexogen, whose disposal requires extra facilities, and rockets for *Grad* and *Uragan* multiple launch rocket systems.

The *Donetsk Governmental Factory of Chemical Products*[51] is also located in the East of Ukraine. It is one of the main Ukrainian enterprises performing the entire range of operations of disposal of artillery projectiles and mines, antitank mines, air bombs and missile warheads.

The factory has introduced a wide range of technologies, for example:

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50 "By the Year End, the Defence Ministry will Dispose of More than 27,000 Tons of Ammunition". *Defense Express*, October 6, 2004.

51 The enterprise is a member of the *Vybukhprom* Corporation (Ministry of Industrial Policy), uniting six factories: Horlivka Chemical Factory, Donetsk Governmental Factory of Chemical Products, Rubizhne Governmental Chemical Factory *Zorya*, Shostka Governmental Factory *Impuls*, Shostka Governmental Factory *Zorya*, and two branch scientific-research institutions – State Scientific Research Institute of Chemical Products (Shostka) and Makiyivka State Design Institute. – Cabinet of Ministers of Ukraine Resolution No.409 of April 27, 2001.

- the melting of TNT from medium-caliber artillery projectiles by the method of contact melting with hot water or steam;
- the disposal of antitank TNT mines by cutting the body and subsequent crushing of the product;
- the disposal of fragmentation-demolition artillery projectiles containing hexogen by sawing;
- the discharge of hollow-charge 100-125 mm projectiles by dismantling with subsequent melting of mastic and extraction of hexogen-based mixtures;
- the disposal of antipersonnel mines;
- the dismantling of projectiles with prefabricated strike elements;
- the disposal of warheads of 160-240 mm rockets by the method of non-contact melting[52].

The industrial capacities of that factory, as well as of the *Pavlohrad Chemical Factory*, are sufficient for disposal of 10-12,000 tons of ammunition a year. The factory management and workers demonstrated their ability to conduct such activities within set terms, within the budget limits, with high quality, when implementing the known project of disposal of 404,000 antipersonnel mines.

All in all, over the period of implementation of the State Program of disposal, the Donetsk Governmental Factory of Chemical Products processed 51,929 tons of ammunition. Meanwhile, the capacities of that enterprise are used only at 55-60%. The factory signed with the MOD two contracts in pursuance of the state order and one commercial agreement for disposal of 12,000 tons of ammunition totaling nearly 2 million Euro. They deal with processing of rockets for *Grad* launchers. By and large, the enterprise is ready to dispose next to all kinds of ammunition containing TNT and hexogen. Given all this, plus the existence of appropriate infrastructure and transport communications, the factory may be viewed as one of the main enterprises performing the program of disposal in Ukraine.

The governmental factories *Impuls* and *Zorya* in Shostka are also disposing of surplus weapons. The latter has signed with the MOD Resources Department a contract on the disposal of 600,000 30mm cartridges. According to the contract, the state budget is to allocate for this purpose some 400,000 Euro.

52 Viktoriya Khomotyuk. "Problems of Safety of the Processes of Discharge and Disposal of Articles Containing TNT". at: http://masters.donntu.edu.ua/2003/feht/khomotyuk/diss.

Furthermore, the enterprise intended to dispose of a batch of 125mm shells by the end of 2004. The estimated cost of disposal of that batch will amount roughly to the same amount. The disposal of this type of ammunition is "self-repaying" and the funds spent are to be fully returned, resulting from the sale of materials recovered in the process of disposal. So far, the enterprise plans to dispose of only the types of ammunition it used to produce.[53]

By the end of 2004, *Impuls* factory will have disposed of 25,000 antitank mines, an amount that totals 150 tons. A relevant contract has already been signed with the MOD, the factory capacities are sufficient to dispose of up to 10,000 mines a months. An antitank mine disposal line was commissioned already in 1995. The process of disposal of such ammunition fully repays itself – TNT extracted from mines is fit for further use as an industrial explosive. The equipment operated by the enterprise can dispose of all types of detonators and fuses.

In addition to the four above-mentioned leading enterprises, another big enterprise is set to enter the disposal market. The *Governmental Petrovskyi Chemical Association* (Luhansk region) is ready to commence disposal of ammunition but cannot do that in the absence of a state order. The enterprise has signed a contract with the MOD for the disposal of 65,000 rockets for *Grad* launchers from 1 September 2004 until the end of 2004. It possesses both equipment and technologies necessary for the disposal of such rockets. Their disposal does not envisage a return of material resources and, being entirely unprofitable, requires state funding, which may be provided only after the approval of the state order. The association management hopes that the state order will be approved in the near future; meanwhile, the industrial capacities of the enterprise can utilise 30-40,000 rockets by the end of 2004. Furthermore, the enterprise plans to dispose of other types of ammunition, e.g., air-to-air and air-to-surface missiles; ammunition for grenade launchers and mortars; antitank guided weapons.

The *Uman Disposal Centre* is located in the central part of Ukraine. It was established by the *Spivdruzhnist* Corporation[54] for disposal of shells of 30 mm and below. If necessary, it can be expanded and may form the core of the main disposal centre in

53 "Zorya Factory Began Disposal of the First Batch of Ammunition". *Defense Express*, October 8, 2004.

54 Ibid.

Central Ukraine.[55] The *Kalynivka Disposal Centre* is located 250 km to the west of Kyiv on the territory of one of the largest arsenals (previously used for storage and maintenance of ballistic missile warheads). It was also established by the *Spivdruzhnist* Corporation. Its technological capabilities are now limited, but given the developed transport infrastructure, large storehouses, and geographic location (1,400 km west of Donetsk), it may be viewed as the most promising disposal centre in the West of Ukraine.

So far, all these enterprises (with the exception of the *Uman Disposal Center*) have no clear specialization and, accordingly, no say in the formulation of a clear position on the single system of ammunition disposal, although each of them will deal with specific types of ammunitions or rockets. For instance, the *Donetsk Factory of Chemical Products* possesses a sophisticated technology of disposal of ammunition containing hexogen. But it needs to be introduced on much larger scale, to increase the volumes of disposed ammunition.

Special exporters

Some Ukrainian companies established especially for the export and import of military and dual-purpose goods and services are also interested in participation in the process of disposal. For instance, an *Ukrspetsexport* subsidiary – *Ukroboronservice* company – announced its willingness to invest in the establishment of five disposal centers in Ukraine and the maintenance of ammunition and armaments.[56] One such center has already been established in Kyiv. It ensures proper maintenance of S-300 air defense systems and disposal of some other types of obsolete weapon systems. The company, confidently positioned on the international arms market, plans to establish similar centers in other regions, among them:

- a center for disposal of Air Force armaments and ammunition and ammunition containing TNT in the Khmelnytskyi region;
- a center for de-mining and the disposal of ammunition in the Crimea;

55 See: Annex 2. "Flowchart of Disposal of Small Calibre Ammunitions". The Spivdruzhnist Corporation presented the Chart to the NATO Steering Committee for assessment.

56 Arthur Lantant. 2004. "Ammunition Threat. The Scale of Ammunition Disposal Requires Concentration of Efforts of the State", *Eksport Oruzhiya I Oboronnyi Kompleks Ukrainy*, No.8-9, pp.58-62.

- a center for disposal of Air Force equipment and armaments in Kyiv region; and
- an international center of ammunition disposal.

Ukroboronservice is already engaged in the elimination of the remains of the depot explosion near Melitopol, de-mining the area. Apart from that, it conducts negotiations for joint disposal activities with the *Pavlohrad Mechanical Factory*. Meanwhile, the specialists of *Ukroboronservice* hold negotiations with foreign governments or companies about investing in these centers. The greatest progress has been reported in negotiations with international *Nammo* company.[57] It may become a successor to the Ukrainian-US Joint Venture "*Alliant Kyiv*", which is no longer active.

Regional initiatives

Against the backdrop of insufficient national action local initiatives emerge. For instance, in August 2004, the MOD and the Vinnytsya regional state administration announced that a "Center for Disposal of Armaments, Ammunition, Explosives and Rocket Fuel" would be set up in Vinnytsya region on the basis of a state enterprise.[58] The establishment of such a Center is envisaged by the "Program of Joint Activities for Implementation of Immediate Measures for Safe Operation of Arsenals, Bases and Depots of Ammunition and Rocket Fuel" located in Vinnytsya region. The program is intended for 2004-2010 and encompasses the entire range of activities and funding of safety measures at arsenals, bases and depots of ammunition and rocket fuel. Some 39,000 tons of ammunition are stored in the region, half of that with expired "lifetime". The local authorities of Vinnytsya were the first and so far the only ones in Ukraine to demonstrate initiative and express a readiness to co-finance the disposal of ammunition. The MOD would allocate some 3.5 million Euro and the Vinnytsya Regional State Administration nearly 2.5 million Euro. The dismantling would not take place at bases or arsenals but at idle enterprises. It is unknown which enterprises would be selected. Furthermore, the technologies of disposal

57 Nammo Buck GmbH is division of the Nammo AS (Nordic Ammunition Company). It is located in Germany (Land of Brandendurg, 90 km north of Berlin). This company conducted disposal of the major part of armaments and ammunition of the former GDR military. It also has an experience in fulfilling the orders from NAMSA, German MOD, and governments of the UK, Switzerland and USA.

58 Release of the MOD of Ukraine Press Service of August 2, 2004.

guaranteeing environmental safety are not determined yet. It can not be ruled out that the Vinnytsya initiative will remain just a declaration of intent.

By and large, it may be stated that as of end of 2004 there was no unity of views in Ukraine with regard to the optimal and effective system of development, maintenance, production, storage, and disposal of ammunition. For the regulation of the process of disposal, a single operator could be found among the existing companies, a new operator could be created or a single interdepartmental state corporation, subordinate to the Cabinet of Ministers, could be put in charge. No matter how the management structure will be optimized, it should be transparent. The practice proves that while there may be several contractors performing disposal activities, there should be a single control of this process of funding, distribution, and account of ammunition.

A fast establishment of a state corporation for the disposal of armaments would also help to involve foreign investors in the disposal of 1.5 million pieces of SALW and 133,000 tons of ammunition within the framework of the NATO Partnership for Peace Trust Fund.[59] The feasibility study, conducted under the Joint Working Group on Defense Reform (JWGDR), presents potential contributors with an overall assessment of the problem faced by Ukraine, an assessment of Ukraine's own resources to deal with the longer term issue of surplus stocks of munitions and SALW as well as how Ukrainian capacities may be increased. The overall cost for the destruction of 133,000 tons of munitions and 1.5 million SALW is estimated at 75 million Euro. The feasibility study focused on overcoming obstacles and recommends that international investors focus on making funding available for capital cost to enhance Ukraine industrial capacity. Ukraine's contribution to this project would include services in kind such as

59 In June 2002, the Ukrainian Government presented a request to NATO for assistance in destroying surplus SALW and conventional munitions. At the [NATO-Ukraine] Joint Working Group on Defence Reform Senior Level meeting in Yalta in September 2002, Greece volunteered to serve as lead nation and provide funding to prepare a feasibility study for the destruction of 133,000 tons of munitions and 1.5 million SALW stored at 41 sites. Turkey and Germany also provided financial support to the feasibility study. Given the size and scope of the project, a steering committee was established to support the development of a detailed project proposal. The steering committee led by the NATO International Secretariat Divisions also included representatives of NAMSA as well as two NGOs – the Fund for Peace (USA) and the Razumkov Center (Ukraine). The steering committee met with Ukrainian authorities and visited Ukrainian ammunition and SALW storage and destruction sites in 2002 and 2003. The feasibility study was presented to the JWGDR in October 2003.

security and transportation. The feasibility study was presented to the JWGDR in October 2003. Since that time NATO nations have examined the feasibility study and how to make more effective use of bi-lateral and multi-lateral tools. It is hoped that these consultations may lead to the establishment of a second trust fund project for Ukraine. Establishment of a NATO/PfP Trust Fund project requires a volunteer as lead nation.

It is hoped that work to identify a lead nation and preparation of a formal project proposal will be complete in early 2005. As foreseen, the project would be managed by NAMSA on behalf of the contributors. Ukraine as the host, would be expected to make maximum contributions to any eventual project. The project may be implemented in several stages over a number of years. NATO and non-NATO members may contribute to a NATO/PfP Trust Fund Project. Other international organizations may also make contributions to a project. It was reported that in the course of negotiations with Ukrainian representatives, the USA expressed readiness to become the main sponsor of the project, should Ukraine put MANPADS on the disposal list.[60]

The past experience and declarations make it possible to identify particular interests of not only the USA but also of other probable sponsors. In particular, Great Britain is expected to show specific interest in the disposal of Ukrainian SALW, and Canada, in the disposal of stocks of antipersonnel mines. Germany has some experience of cooperation with Ukrainian partners in the field of disposal of various types of artillery ammunition. Evidently, such experience, in case of German involvement in the initial stages of the project of ammunition disposal within the framework of the NATO Trust Fund, might create good prospects for the disposal of significant quantities of other types of ammunition, especially containing hexogen.

Drawing on the experience to date, it would appear that the NATO/PfP Trust Fund mechanism provides an effective tool for nations such as Ukraine. As regards the acceptable variants of receipt and use of foreign assistance, with account of the previous experience of disposal of ammunition and SALW in Ukraine, there are grounds to suggest that for the time being, all (or the bulk) of foreign contributors use the NATO/PfP Trust Fund mechanism and NAMSA to support Ukraine. This would make it possible to use a tested mechanism of cooperation and, accordingly, secure the planned character and coherence in the

60 USA is ready to Finance Liquidation of Small Arms and Ammunition on the Condition of Disposal of MANPADS. *Defense Express*, April 16, 2004.

process of disposal, minimize the risks of frustration of plans, financial fraud and breach of safety regulations at disposal.

Chapter 4 – Assessment of resource requirements

Every attempt to identify the reasons and to find a solution for the problem of disposal of ammunition and SALW is ultimately confined by the available funding. This section provides a brief assessment of seven key problems relating to the disposal of Ukraine's obsolete ammunition and SALW (financial, time, industrial, transportation, managerial, technological, and environmental). There is also an overview of some possible sources of funds and of approaches to solve these problems.

Key problems

As regards to the cost of disposal, it may be assumed that nobody knows the ultimate sum. The figures published in open sources are sometimes rather contradictory. Expressions like "hundreds millions of dollars" in the estimates of officials and independent experts may reflect the "bookkeeper's" accuracy of available calculations. The main reason probably lies not in the absence of calculations but in their complexity and different approaches to disposal as well as methods of calculation. Defense Minister Yevhen Marchuk estimated the costs of initiating the effective disposal process of surplus ammunition with at least 50 million Euro. This sum was needed to create primary disposal facilities. He spoke about 340,000 tons (June 2004), stressing the need to increase this quantity to 510,000 tons over the next 2 ½ years.[61] To comprehend the difficulty, complexity and, consequently, probable high cost of the process of disposal of obsolete stocks of ammunition and SALW in Ukraine, it makes sense to review a detailed list of the main operations that must be performed.[62]

Group I – operations at the places of storage:

- assessment of safety of handling ammunitions and their components;
- preparation of ammunition for shipment or dismantling;
- dismantling of ammunition using facilities of arsenals;
- storage of ammunition components before shipment or use;

61 See "Defence Minister Yevhen Marchuk Assessing the Cost of Disposal". At: http://www.versii.com.ua/newss.php?pid=35476.

62 "Disposal of Ammunition, Ukrainian Style. The Results and Prospects". *Defense Express*, October 6, 2004.

- demolition of hazardous ammunition.

Group II – transport operations:

- handling;
- provision of escort or cover for explosive components or ammunition;
- transportation of ammunitions or their components to the places of disposal or demolition.

Group III – demolition or disposal of ammunitions or their components at specially created facilities.

Group IV – operations with materials and explosives obtained in the result of disposal:

- preparation of non-explosive materials for sale or processing;
- preparation of explosives extracted from ammunition for sale or processing.

Group V – conversion of explosives extracted from ammunition into industrial explosives (at specially created facilities, abiding by technical and environmental safety rules.)

Group VI – activities related to scientific research

- disposal of ammunition and development of new industrial explosives on the basis of extracted explosives, development of disposal technologies and manufacture of civilian products.

Group VII – creation of facilities for disposal of unfit ammunitions and their components.

Group VIII – provision of regulatory and technical documentation for all kinds of activities and designer supervision.

This list should also include expenses associated with ammunition storage, provision of safety in expectation of disposal, and explosion and fire safety of depots. For the provision of explosion or fire safety alone (as was indicated in Chapter 2) some 7 million Euro are to be allocated.

Time limitations are almost as important as the funding. One of the former top executives of the "Main Rocket and Artillery Department" of the MOD once presented his calculations for a single arsenal. "Provided one would have the whole car park of

Ukraine at ones disposal, it would take up to 20 years to just move the entire stock from that storage place to the place of its ultimate disposal."[63] To liquidate only one depot in Briukhovychy (Lviv region), 10 million Euro is needed. Given the present rate of ammunition movement to the places of disposal, four years would be needed for its accomplishment. If the disposal were conducted on the site, it would be completed within 2½ years.[64] Yet, every passing year adds some 10-15,000 tons of obsolete ammunition, which require urgent disposal, thus creating preconditions for ever more frequent accidents.

When assessing the volume of ammunition subject to disposal, it is important to remember that actually all ammunition in Ukraine (approx. 2.5 million tons) should be viewed as "subject to disposal" in the not too distant future.[65] According to the MOD estimate, by 2015, 1,336 million tons of "redundant" ammunition is to be disposed of.[66] The situation is further aggravated by the need to settle unfulfilled obligations of the past, permanent under-funding, huge losses associated with "wild" disposal and the time lost, resulting in an urgent need to dispose of quantities far exceeding the available financial and technical capabilities. The third problem concerns the inconsistency of the available industrial capacities with the volumes and range of ammunition subject to disposal. Necessary capacities have been created for disposal of artillery projectiles and engineer ammunition containing TNT. There are actually no industrial facilities for disposal of cartridges for small arms, small-caliber ammunition, naval ammunition, Air Force weapons, and ammunition (with the exception of air bombs containing TNT), multiple launch rocket systems, etc.[67] The available industrial ammunition disposal capacities can solve the problem of disposal only to a limited extent. It depends on the condition that all ammunitions are dismantled, prepared for disposal and delivered to enterprises. The available capabilities so far enabled the disposal of some 20-25,000 tons of ammunition per year. In 2003,

63 Interview with Ivan Tsaryk, Executive Director of *Ukroboronservice* State Enterprise. *Defense Express*, July 30, 2004.

64 Dmytro Hutsulyak. 2004. "Public Organisations and Public Opinion Should Help with the Reform of the Armed Forces of Ukraine". *Armiya Ukrayiny*, May 20.

65 The average term of technical fitness of ammunition is 12 years. The latest deliveries date back to 1990. See "Disposal of Ammunition, Ukrainian Style. The Results and Prospects". *Defense Express*, October 6, 2004.

66 Volodymyr Vyrva. 2004. "Heritage Without the Right to Life". *Narodna Armiya,* June 25.

67 Interview with Ivan Tsaryk, Executive Director of *Ukroboronservice* State Enterprise. *Defense Express*, July 30, 2004.

Ukraine for the first time reached the level of 35,000 tons, but in 2004, due to Melitopol blast, all activities were suspended. Meanwhile, for the implementation of the State Program of Disposal, the target of 150,000 tons a year must be attained![68]

There is an urgent need for up-to-date, safe and effective technologies for the disposal of explosives based on hexogen, octogen and similar (composite) substances, which make up to 70% of missile and torpedo warheads as well as projectiles. The industrial capacities available in Ukraine can dispose only of a few types of ammunition charged with these explosives, but their productivity is insufficient for their timely disposal. Without new decisions in this field, the process of disposal may last for decades. Transportation is another major problem with an impact on timing and finances. The main capacities of ammunition disposal are concentrated in the East (Donetsk, Pavlohrad, Petrovske (Luhansk region)) and North of the country (Shostka). Meanwhile, a great deal of ammunition subject to disposal is located in the west of Ukraine. The problem is that 60-70% of all expenses on ammunition disposal falls on preparation and transportation to the places of disposal. For this reason, to reduce the cost of transportation of ammunition and the risk of accidents during transportation, extra capacities should be created for ammunition disposal in the western regions of Ukraine. For instance, the *Spivdruzhnist* Corporation also sustains significant costs associated with transportation of ammunitions, their components and products of disposal to the places of disposal, processing and utilization. As a Corporation representative said at the end of 2001 (and the situation is no better now), "the average length of ammunition movement from the places of storage to the places of disposal is approximately 750 km. For the time being, transportation accounts for 25–30% of the total cost of ammunition disposal, on the average. At that, the cost of transportation increased 6-fold, compared to 1995, and it grows further. In this situation, the Corporation is trying to get preferences for rail transportation and setting up a motor transport enterprise. Receipt of funds from foreign investors to acquire heavy trucks will enable the Corporation to reduce the costs of formation of a stock of heavy trucks for transportation of ammunitions, their components and products of disposal to the places of disposal, processing and utilization".[69]

68 Ibid.

69 Vyacheslav Taran. 2002. "Experience of Disposal of Unfit Ammunition in Ukraine". *Materials of the international conference in Yalta on November 15-16, 2001, Friedrich Ebert Stiftung,* Kyiv, p.87.

In particular, to move just two shells, one special box is needed (impregnated high-quality board, partitions, shell holders, accessories, etc.), whose cost may reach 80 Euro. Transportation of charged ammunition with a fuse and primer is strictly prohibited. Special equipment and armored cabins are needed for dismantling. The cost of shell containers for loading one 60-ton carriage with 122mm shells makes approximately 30,000 Euro. Transportation of one carriage with ammunition from Khmelnytskyi region to, say, Donetsk region will cost, at the least estimate, some 2,000 Euro.[70] One should add the cost of guarding, handling, insurance against accidents, etc. According to the DerzhNDIKhP Director Viktor Banishevskyi who was in charge of development of the new version of the State Program of Disposal, "when searching funds for extension of disposal on the basis of self-repayment, one should keep in mind that payment for the MOD of Ukraine activities accounts for 26% of the cost of the ammunition disposal... Transportation of ammunition consumes far more funds – 34%. Furthermore, for organization of ammunition transportation, a lot is to be paid for permits of state bodies, such as the Ministry of Internal Affairs".[71]

The need for End User Certification, Transit Authorization, Export Licensing and other necessary documentation further exacerbates the cost of disposal. For instance, there are special companies operating in Ukraine for trucking dangerous cargo. They charge a bit less than one Euro per ton per km. And their tariffs look rather reasonable taking into account prices for receiving numerous permits for a dangerous cargo transportation charged by the Ministry of Internal Affairs of Ukraine (see table 1). Surprisingly, the railroad transportation of dangerous cargo is even more expensive (which is likely the reason, why *Spivdruzhnist* so vocally insists on lowering railroad tariffs). At first glance, these sums do not look as essential. However, after multiplying by the number of tonnes to be carried and kilometers to be driven, one appreciates the above-mentioned reason for the necessary expenses sharing among all the state actors and agencies.

70 Interview with Ivan Tsaryk, Executive Director of *Ukroboronservice* State Enterprise. *Defense Express*, July 30, 2004.

71 Viktor Banishevskyi. 2003. "By the Dangerous Line. Problems of Ammunition Disposal in Ukraine". *Eksport Oruzhiya i Oboronnyi Kompleks Ukrainy*, No.11, 2003, p.26.

Table 1: Dangerous cargo transportation charges by the Ministry of Internal Affairs of Ukraine

Fee for receiving a permit (for one agreement)	
Paper work and issuing a trucking permit	€5.5
Computer services for a single paper work	€2.5
Permit for the installation and use of special yellow fleshing lights	€1.5
Special paper form	€0.5
Other fees	
Special tests for drivers	€2.1
Paper work for issuing special driver's permit for the trucking dangerous cargo (DPOG)	€2.2
Special DPOG paper form	€2.3
Computer services for a paper work on a DPOG	€2.5
Police escort fee per one km for one truck	€0.4

Sources:Commentaries by traffic police authorities,
http://gai.kharkov.ua/document/opasn01-ua.htm;
http://www.konsultant.kiev.ua/new1_04/04140103.html

One should keep in mind that, as was already noted, economically, disposal of armaments and ammunition is generally a loss-making business. However, the domestic and international experience proves that the rate of losses greatly depends on the effectiveness of management of this process by concerned state bodies. According to NAMSA experts, economic return from the processing of products of disposal of ammunition and small arms does not cover the expenses and is measured in symbolic figures – on the average, 25 Euro from processing one ton of ammunition and 15-20 from processing one ton (300 pieces) of small arms.[72]

72 It should be noted that according to many experts, most types of ammunition and small arms can be utilised without losses, in the worst case. See David DeClerq. 1999. "Destroying Small Arms and Light Weapons. Survey of Methods and Practical Guide". *BICC Report 13,* p.28, at: *www.bicc.de/publications/reports/report13/content.htm.*

Table 2: Estimated cost of ammunition disposal[73]

Description	Calibre (mm)	Cost of disposal per ton, Euro*
Cartridges	5.45-12.7	127
Cartridges	14,5-20	177
Projectiles	23-37	258
Projectiles for portable grenade launchers	40-90	612
Artillery projectiles	57-76	655
Artillery projectiles	85-90	448
Artillery projectiles	100	328
Artillery projectiles	122	318
Artillery projectiles	130-140	318
Artillery projectiles	152	324
Artillery projectiles	203	273
Artillery projectiles	220	271
Tank projectiles	115	318
Tank projectiles	125	373
Mines (for mortars)	82	1181
Mines (for mortars)	107	341
Mines (for mortars)	120	331
Mines (for mortars)	160	288
Mines (for mortars)	240	246
Antitank mines		288
Air bombs		619
Sea mines		728
Torpedoes		655

Source: Feasibility study to destroy surplus munitions and small arms and light weapons in Ukraine, 2003.

The next (fifth) major problem is management. The previous experience of disposal in Ukraine has demonstrated that what matters is not only the presence or absence of funds but also the existence of an effective management and control system to ensure uninterrupted supply and effective spending of funds. At present, such a system is only in the making in Ukraine, and one can hardly predict its effectiveness at this point of time.

Supporters of a disposal under direct contracts between the MOD and enterprises hope that the "Disposal Division" of the MOD Department of Resources established in the beginning of 2004 will be able to ensure co-ordination of the process of all-

73 Data based on calculations presented to NAMSA by the *Spivdruzhnist* Corporation and *Pavlohrad Chemical Factory* in course of preparation of an international project of disposal of surplus stocks of small arms and ammunition in Ukraine.

round disposal, the creation of the required capacities, and the employment of contractors. The Division has started joint activities with state enterprises of the MOD of Ukraine (*Ukroboronresurs*, *Ukroboronlizing*) and other enterprises (*Ukroboronservice* State Company, *TASKO* company and so on) which are searching for investment funds and keen to establish contacts with foreign partners. Such searches remain extremely urgent.

According to a representative of the *Spivdruzhnist* Corporation[74], acquisition of deficient technologies and equipment would make it possible to create facilities:

- for processing hexogen, SeaMix and mixed explosives obtained as a result of disposal and creation of industrial explosives on their basis and
- for disposal of ammunition for small arms, small-caliber projectiles, fuses, primer plugs, detonators, flare decoys, etc.

Certain technologies are already employed by foreign companies. The task is to find mutually advantageous terms of cooperation. In particular, the German company *Spreewerk Lübben GmbH* (a division of the General Atomic Group) has offered its services to Ukraine for the creation of disposal facilities for small arms, small caliber projectiles, and fuses. In order to create facilities for processing hexogen, SeaMix and mixed explosives and the production of industrial explosives on their basis, the Ukrainian side may invite cooperation from German companies such as the aforementioned *EBV* and *Nammo Buck GmbH*, or *MDSG Logistic (Material Depot-Service Gesellschaft mbH).*[75]

Economic and time targets as well as the choice of methods depend on environmental concerns. Given the acuteness of the problem, Ukraine considers the possibility of ammunition disposal by means of smelting or blow-up, previously flatly rejected for environmental reasons.[76] The latter method is considered suitable primarily for demolition of some heat-resistant ammunition, the disposal of which is very expensive. On the one hand, environmental requirements limit the freedom of choice of the methods of disposal and increase the costs. On the

74 Vyacheslav Taran. 2002. "Experience of Disposal of Unfit Ammunition in Ukraine". *Materials of the international conference in Yalta on November 15-16, 2001, Friedrich Ebert Stiftung,* Kyiv, p.87.

75 For more detail on the proposals of German companies see "Opportunities of international assistance". *Materials of the international conference in Yalta on November 15-16, 2001, Friedrich Ebert Stiftung,* Kyiv, 2002, pp.122-138.

76 Oleksiy Panov. 2004. "Ammunition Disposal by Blow-up – A Good Start". *Armiya Ukrayiny*, September 14.

other hand, despite all urgency of removal of the dangerous heritage, financial considerations should not prevail over environmental. In this respect, the German experience is interesting – they blew up 500 shells per shift and used 10 big furnaces API-1236 for the smelting of ammunition.[77] In Ukraine, the disposal of limited quantities of ammunition by blow-up can be conducted at the ranges of the Ministry of Defense and in other restricted areas, such as the Chernobyl zone or former depot of strategic missiles near the town of Makarove.

Sources and solutions

As regards to the prospects of foreign assistance, a project on the elimination of the Ukrainian stock of antipersonnel mines seems to be promising. Ukraine has signed with the UN Development Program a special draft document – "Preparatory Stage of Elimination of the Stock of PFM Antipersonnel Mines". 250,000 US dollars have been allocated for that purpose.[78] The disposal of antipersonnel mines in Ukraine requires the solution of a number of technical tasks. Dependent on their stuffing, those mines may be conventionally divided into three groups: TNT, TNT-hexogen and "butterfly" mines filled with liquid explosives. The latter type is made using chlorine and highly toxic. Workers involved in its production wear gas masks. Special armoured furnaces are needed for smelting of "butterfly" mines. Some 7 million Euro is needed for elimination of these mines, with account of creation of industrial facilities.[79] The European Commission is ready to grant 4 million Euro for elimination of Ukrainian antipersonnel mines on the condition of the ratification of the Ottawa Convention.[80] In this connection, the Cabinet of Ministers of Ukraine submitted a respective bill to the Verkhovna Rada (Parliament) of Ukraine for consideration.

The funds reserved by the European Commission are evidently not enough to liquidate all stocks of antipersonnel mines in the Armed Forces of Ukraine, moreover, the terms for such activities are very limited. However, Ukraine should not protract

77 "Ammunition Disposal Anew?". *Defense Express*, May 17, 2004.

78 See "Marchuk: Explosions near Melitopol Might Be Caused by Malicious Acts", Interfax-Ukraine, May 11, 2004.

79 "Ammunition Disposal. The Experience of "*Spivdruzhnist", Defense Express*, July 1, 2002.

80 On 16 March 2004, the European Commission adopted a decision to allocate 4 million Euro for the purpose of disposal of Ukraine's antipersonnel mines. The Acting Head of the EC Representation in Ukraine, Mr. Stefen Scowmand, informed Ukraine's former Prime Minister Victor Yanukovich about this decision in a letter dated 12 May 2004.

this process and reject money. If time is lost, it will have to spend decades performing those activities on its own. Most probably, an interdepartmental state body in charge of disposal might push sooner ratification, a resumption of negotiations with representatives of Canada and the European Commission, and further conduct of a tender and selection of the most effective and safe technologies of mine disposal.

Decisions should be found that would make it possible to attract extra sources of funds (foreign and domestic investors, international assistance), to obtain profit from the sale of disposal products, and to choose the most effective methods. There is a need for changing the very procedure of funding the disposal of unfit ammunition. Part of the expenses related to transportation might be covered by the Ministry of Transport and Communication, particularly the Railway Administration. For railways, ammunition transported for disposal occupies a meager share in the aggregate turnover. If ammunition disposal is treated as a *force major*, special low tariffs are needed.

The organization of ammunition transportation requires various permits of state bodies to be paid for. Targeted voiding of those fees seems very reasonable and desirable.[81] Under the existing tax system, the contractor is to pay taxes not upon the disposal of all ammunition but on each case of product sold, which prevents accrual of circulating assets. Contractors begin with ammunitions for which the sale of products of disposal may bring circulating assets for disposal of "unprofitable" ammunition, and under the current tax legislation, this is next to impossible. Banking credits, under the current interest rates, further aggravate the financial standing of contractors engaged in disposal.[82] In any case, Ukraine should rule out or minimize expenses that unreasonably increase the cost of disposal. The involvement of manufacturers of arms and ammunition in the process of their disposal may become another important source of funds. Elimination of old stocks therefore creates a new market for their product.[83]

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81 Viktor Banishevskyi. 2003. "By the Dangerous Line. Problems of Ammunition Disposal in Ukraine". *Eksport Oruzhiya i Oboronnyi Kompleks Ukrainy*, No.11, p.26.

82 In 2003, the average interest rate on credits in the national currency totalled 17.9%, in foreign currency – 11.9%. – National Bank of Ukraine, at: *www.bank.gov.ua/Statist/PROCENT/prst.htm.*

83 In mid-1990s, the U.S. Government supplied to Greece 58,000 "old"tank shells. The biggest American manufacturer of ammunition *Alliant Tech System* strongly criticized such a «gift» and accused the Government of unfair competition. The thing is that Greece cancelled 30-million order for supply of ammunition by the *Alliant Tech System.* See L. Lumpe. 1996.

The disposal of stocks of small arms has one distinctive feature – it is less time sensitive. Huge stocks of small arms primarily pose a threat because of illegal proliferation (illegal sale, theft, threat of mass dissemination in case of civil disturbances). If this threat is removed or minimized, small arms might descend to the bottom of the list of disposal priorities. But even in presence of a reliable system of prevention of illegal trade, theft and a low probability of civil disturbances, one should keep in mind the financial, material and human resources bound by their storage. According to expert assessments, there are nearly 7 million pieces of small arms in Ukraine kept at depots since the First and Second World Wars, stockpiled during the "Cold War" or brought from Central and East Europe in the late 1980s and early 1990s. Despite the seemingly secondary importance, the problem of SALW disposal cannot be postponed forever.

The choice of methods of SALW disposal available in the domestic and international practice (ranging from the simplest and cheapest smelting to more expensive full dismantling and melting) will primarily depend on the funds. According to *Ukroboronservice* experts, the cost of metal used to make a machinegun or a rifle costs 50 Cents Euro, while dismantling a piece of fire arms normally costs some 5 Euro. Since huge quantities of old weapons, including of foreign origin, are kept at depots, one source of income would be the sale of the most valuable pieces at auctions or the "conversion" into neutralized souvenir pieces. As the chief specialist of *Ukroboronservice* Viktor Ryabets puts it: "…we manufactured a pilot batch of PPSh sub-machine guns, a popular weapon of World War II used by the Soviet Army. We converted those PPSh into so-called neutralized pieces. A mark is put on such a modified weapon and a certificate is issued. Under such a scheme, we converted a batch of 500 sub-machine guns into gift items, got necessary permits, made nice wrappings – and the batch was sold out in a trice."[84] Such a souvenir costs from 80 to 250 Euro, while the production cost is 20-30 Euro.

As regards to more modern weapon systems, the main obstacle for their disposal is probably presented by the fact that since the disposal of a "Kalashnikov" costs money, no matter how little it may be, there is always a temptation to sell it abroad and obtain solid profit. Rough calculations show that, proceeding from the available estimates of the cost of disposal (on the

"Costly Givaways". *Educational Foundation for Nuclear Science*. Washington D.C., at: www.bullatomsci.org.issues/1996/so96lumpel.html.

84 "Select Weapons: A Hobby or Business?". *Defense Express*, January 9, 2003.

average, 350 Euro per ton of ammunition; 2 Euro per mine; 3-5 Euro per piece of fire arms), the cost of disposal of obsolete ammunition and SALW in Ukraine could amount to no less than 200 million Euro. The total sum may be even higher if the volume of SALW disposal goes up. According to the Strategic Defense Bulletin of Ukraine (White Paper of Ukraine) presented to the public in 2004, Ukraine will have to allocate almost 600 million Euro to the disposal of armaments, military equipment and ammunition until 2015.[85]

These calculations are mainly illustrative, since the real cost may substantially differ from estimates, especially given the unaccomplished inventory of the available stocks.[86] But even rough estimates prove that this amount is very burdensome for Ukraine's budget, for the time being. So far the available technical capabilities enabled the disposal of some 20-25,000 tons of ammunition per year, while for the implementation of the State Program of disposal, 150,000 tons must be disposed of annually.

The industrial capacities available in Ukraine can solve the problem of ammunition disposal only to some extent, provided that the ammunition is dismantled, prepared for disposal and delivered to enterprises. By and large, despite the substantial increase in state budget allocations to disposal over the past two years, budget funds are clearly not enough. Foreign partners may help Ukraine with funds and technologies. However, the cooperation depends on improved mechanisms. Ukraine's authorities still have to come to terms with the appropriate disposal architecture. They have to display more consistency, resoluteness, and flexibility in creating an effective disposal process. This is paramount for serving Ukraine's security and business interests as well as to convince international organizations that Ukraine is a reliable partner and provides attractive opportunities.

85 Chart No.52 "Funding of the Transitional Period Programmes". Strategic Defence Bulletin of Ukraine through 2015 (White Paper of Ukraine)", Kyiv, Avanpost-Prim, 2004, p.86. Unfortunately, the chart provides only generic data without differentiation between the estimated cost of disposal for hardware and cost of disposal for ammunition and SALW; and without the break down for sources of domestic funding and expected foreign support.

86 There are grounds to suggest that this is impracticable for a number of reasons. At many depots, boxes with shells are rotten and any attempt to count them involves the risk of accidental detonation.

Recommendations

- Since Ukraine lacks the necessary technologies for ammunition disposal, such technologies have to be developed or purchased. Such activities can be better financed, organized and coordinated if there is a single agency charged with the functions of management and co-ordination of disposal. No matter how the management is organized, it should be transparent. Experience shows that while there may be several contractors performing disposal activities, there should be single control agency for the funding, distribution, and account of ammunition. Ukraine should therefore entrust one organization with the co-ordination of disposal activities – an interdepartmental operator that works with the MOD, contractors, and foreign investors and bears all responsibility for uninterrupted funding and operation.
- In order to reduce the cost of ammunition transportation and the transportation risks, additional industrial capacities for ammunition disposal should be created in the central and western regions of Ukraine. Capacities already available in Eastern Ukraine should be expanded and new facilities in the Center and the West be created, added by the development or procurement of mobile systems. This variant requires significant investment into infrastructure and equipment, while it seems to be the most cost-effective.
- Disposal of armaments and ammunition is generally a loss-making business, but the rate of losses largely depends on the effectiveness of management. When searching for funds for disposal on the basis of self-repayment, one should keep in mind that the expenditures are mainly associated with the MOD activities, the costs of ammunition transportation, and receipt of numerous permits from governmental bodies. These kind of expenditures unreasonably increase the costs of disposal and should therefore be removed or minimized. Maximum profit should be gained from the sale of disposal products.
- Deficient technologies in Ukraine should be developed or purchased, which requires a coordinated activity of the MOD, the Ministry of Industrial Policy and individual enterprises. While acquiring or purchasing deficient disposal technologies, the state may use the services of "special exporters" established on the international arms market and possessing an extended system of ties with relevant foreign

companies. "Special exporters" have circulating assets that can be used in case of a closer involvement in the process of disposal.

- Ukraine should attract foreign assistance for the disposal of ammunition and SALW. Options include the attraction of donor funds of the UN, OSCE, individual states, and cooperation through incorporation of foreign enterprises into joint ventures or through the admission of foreign companies to public tenders for weapons disposal (announced by the Government of Ukraine or its authorized bodies). This would enable the state to obtain and implement new technologies and expand the range of ammunition and SALW subject to disposal. Furthermore, involvement of foreign investors would substantially speed up the process of disposal and reduce the threat of explosions and fires at depots and storage facilities. Furthermore, the inclusion of foreign companies would encourage Ukrainian monopolist enterprises to actively develop and adopt more effective technologies of disposal.
- As regards to variants of using foreign assistance, we suggest to use the NATO/PfP Trust Fund as the primary tool for international assistance. This solution would build on the considerable expertise of NAMSA. It would make it possible to use a tested mechanism of cooperation and, accordingly, secure the planned character and coherence in the process of disposal, minimize the risks of frustration of plans, financial abuses and breach of safety rules at disposal.
- The destruction of surplus MANPADS has become a highly visible component of the fight against terrorism. Taking into account the ongoing restructuring of the Ukrainian Armed Forces Ukraine should assess the overall requirement for this weapon system and identify an inventory of surplus stocks. The inclusion of surplus MANPADs is seen as an incentive for potential contributions from the international community.
- Ukraine should preserve and further the experience of cooperation with private or commercial firms. Evidently, if Germany is involved in the initial stages of the ammunition disposal project within the framework of the NATO PfP Trust Fund, the already available experience of cooperation might help interested German companies to lay down the basis for future disposal of greater quantities of various types of ammunition, especially containing hexogen.

- Ukraine should build its national capacity to resolve its problems. Therefore, Ukraine should find a reasonable balance between economy and security considerations, between expectations of foreign assistance and allocation of the required minimum of funds to disposal out of its state budget. Despite the permanent lack of budget funds for the solution of a great many social problems, allocations to disposal must be increased. The explosions in Artemivsk and near Melitopol have demonstrated that saving on security today may prove too expensive tomorrow.

List of Ammunition to be Demilitarised

Ser	Calibre mm	Ukraine Designation	Quantity	Tonnes	Explosive fill
Bryuhovichi, L'viv region, Military unit A3870					
1	23	antiaircraft gun ZU-23	1031885	445.938	RDX
2	40	grenade launcher RPG-7	58638	110.847	RDX
3	73	grenade launcher SPG-9	11939	48.412	RDX,TNT
4	73	cannon 2A28	105456	383.657	TNT
5	82	mortar BM-37	7933	37.983	
6	100	field artillery type 1944 BS-3	1089	6.846	
7	100	antitank gun T-12	870	16.83	
8	120	mortar BM-38	372	6.114	TNT
9	122	howitzer D-30	1809	51.75	TNT
10	125	tank gun D-81	47075	982.995	
11	152	gun type 1937ML-20M	3669	220.14	
12	152	gun D-20	5065	283.585	
Brodi, L'viv region, Military unit 3522					
13	100	antitank gun T-12	6274	143.2	RDX,TNT
14	122	howitzer D-30	14683	414.82	RDX,TNT
15	125	tank gun D-81	14786	478.66	ОКФОЛ
Slavuta, Chmelnitskii region, Military unit A3845					
16	5.45	cartridges AK-74	2140573	7.989	
17	7.62	cartridges AKM	28250893	542.519	
18	9	cartridges PM	28972	0.29	
19	12.7	cartridges DSHK	1923936	248.035	
20	14.5	cartridges KPVT	3059259	567.028	
21	23	antiaircraft gun 3SU-23	1111553	419.087	
22	30	gun 2A42	76808	63.766	RDX
23	40	grenade launcher RPG-7	189521	441.824	ОЛ
24	57	antiaircraft gun S-60	6235	17.458	RDX
25	73	gun 2A28	184821	663.43	ОЛ
26	73	grenade launcher SPG-9	25944	112.51	TNT
27	76	gun type 1942 ZIC-3	407	2.86	RDX
28	82	mortar BM-37	19660	63.3695	TNT
29	85	antitank gun D-48	150	1.433	RDX,TNT
30	85	gun D-44	11173	125.721	
31	90	armored vehicle 2P130	17	0.134	TNT
32	100	field artillery 1944 BS-3	11634	291.84	RDX,TNT
33	115	tank gun U-5TS	1054	28.331	TNT
34	120	mortar PM-38	48168	806.589	TNT
35	122	howitzer D-30	33645	968.067	RDX,TNT
36	122	armored vehicle BM-21	36329	2412.243	RDX,TNT
37	122	howitzer type 1938 M-30	14738	293.946	RDX,TNT
38	100	tank gun D-10T	29	0.616	
39	100	antitank gun T-12	12834	281.075	RDX; ОКФОЛ

Ser	Calibre mm	Ukraine Designation	Quantity	Tonnes	Explosive fill
40	125	tank gun D-81	148724	4033.585	RDX; ОКФОЛ
41	132	armored vehicle BM-13	1	0.043	
42	152	self-propelled gun 2S5	14258	797.972	TNT
43	152	howitzer D-20	10660	573.114	RDX
44	152	howitzer type 1943 D-1	13048	521.87	RDX,TNT
45	152	howitzer type 1937МL-20М	2	0.87	
46		grenade	2011033	668.863	TNT
47		PTKR	3633	90.825	
48		Shell	15689	28.932	
Novobogdanivka village, Zaporiskii region, Military unit А2985					
49	5.45	Cartridges АК-74	3676957	37.91276	
50	7.62	cartridges АКМ	16671619	305.83185	
51	9	cartridges РМ	87003	0.87	
52	12.7	cartridges DSHК	593560	77.60879	
53	14.5	cartridges КРVТ	555330	103.0102	
54	20	cartridges SHVАК	1477	0.262	
55	23	antiaircraft gun ZSU-23	1331257	236.97312	
56	30	howitzer 2А42	52232	20.3581	RDX
57	30	grenade launcher АGS-17	773	0.4886	
58	37	antiaircraft gun type 1939	3103	5.6595	
59	40	grenade launcher RPG-7	76389	138.4812	RDX
60	58.3	grenade launcher RPG-16	1254	2.5634	
61	73	gun 2А28	72037	218.4129	
62	73	grenade launcher SPG-9	21588	95.377	
63	76	gun type 1942 ZIS-3	468	4.235	
64	85	gun D-44	250	3.073	
65	85	antitank gun D-48	746	14.741	TNT
66	100	field artillery type 1944 BS-3	2289	50.785	RDX
67	100	antitank gun Т-12	25489	571.2567	RDX,TNT
68	107	mortar 107-GVPM	223	1.887	
69	115	tank gun D-68	424	4.643	
70	120	mortar РМ-38	82060	1302.321	
71	122	Howitzer D-30	6475	187.9232	RDX
72	122	armored vehicle BМ-21	4672	301.0242	RDX
73	122	armored vehicle 9P138	10	0.052	
74	125	tank gun D-81	30083	770.1856	RDX
75	132	armored vehicle BМ-13	125	5.313	RDX
76	152	Howitzer D-20	5	0.28	
77	152	Howitzer 2А65	8	0.504	RDX
78	152	gun 2А36	14859	1117.381	RDX
79		grenade launcher RPG-18	1788	4.6486	
80		Dynamic protection	25872	194.04	
81		pyrotechnics means	377571	43.35538	
82		Grenades	570765	281.1682	TNT
83		PTKR	2996	34.7132	
Bilen'koye village, Odessa region, Military unit 47158					
84	5.45	cartridges АК-74	166	0.001	
85	5.6	sports cartridges	15500	0.155	
86	7.62	cartridges АКМ	2484517	42.150023	
87	9	cartridges РМ	44616	0.446	

Ser	Calibre mm	Ukraine Designation	Quantity	Tonnes	Explosive fill
88	12.7	cartridges DSHK	162492	21.092	
89	14.5	cartridges KPVT	317208	58.592	
90	20	cartridges SHVAK	1712	0.736	
91	23	antiaircraft gun ZSU-23	500	0.225	
92	30	gun 2A42	4359	3.642	
93	30	grenade launcher AGS-17	773	0.216	
94	40	grenade launcher RPG-7	5	0.011	
95	57	gun S-60	15816	100.379	RDX
96	73	grenade launcher SPG-9	126	0.272	
97	73	gun 2A28	1979	4.605	
98	76	gun type 1942 ZIS-3	99	0.902	
99	85	antitank gun D-48	400	8.72	
100	85	gun D-44	1246	18.679	
101	100	antitank gun T-12	937	9.304	
102	100	gun D-10T	261	7.899	
103	115	tank gun U-5TS	1100	30.45	
104	120	mortar PM-38	4265	67.826	
105	122	howitzer type 1938 M-30	9198	197.078	
106	125	tank gun D-81	529	13.556	
107	130	gun M-46	309	7.72	
108	152	howitzer type 1943 D-1	320	5.867	
109		grenades	114932	64.679	
Mizgir'ye village, Crimea, Military unit 75256					
110	5.45	cartridges AK-74	40153	0.402	
111	7.62	cartridges AKM	53178	0.9715	
112	9	cartridges PM	9016	0.0902	
113	12.7	cartridges DSHK	6	0.001	
114	100	antitank gun MT-12	956	20.544	
115	122	howitzer D-30	4	0.06	
116	152	howitzer type 1937ML-20M	48	2.736	
117	152	gun 2A36	10	0.46	
118		PTKR	1383	21.19456	
119		grenades	6680	3.741	
120		pyrotechnics means	66	0.003	
Chudniv, Zitomisk region, Military unit 55477					
121	23	gun ZU-23	15378	8.046	TNT
122	30	gun 2A42	7619	6.38	TNT
123	85	gun D-44	3	0.048	
124	100	antitank gun T-12	2	0.057	
125	125	gun D-81	3235	103.094	RDX,TNT; ОКФОЛ
126	152	howitzer type 1937 ML-20M	278	16.672	RDX,TNT
		Total	26515	134.297	
Ushomir village, Zitomirsk region, Military unit 55238					
127	5.45	cartridges AK-74	7149	0.06	
128	7.62	cartridges AKM	3412314	54.487	
129	9	cartridges PM	7680	0.075	
130	12.7	cartridges DSHK	219826	29.389	
131	14.5	cartridges KPVT	93280	17.92	

Ser	Calibre mm	Ukraine Designation	Quantity	Tonnes	Explosive fill
132	23	antiaircraft gun ZU-23	40741	14.08	TNT
133	40	grenade launcher RPG-7	159	0.333	RDX
134	82	mortar BM-37	24	0.084	TNT
135	85	gun D-44	7228	110.029	TNT
136	100	antitank gun T-12	9523	218.2	RDX,TNT
137	100	field artillery BS-3	5622	171.02	TNT
138	120	mortar PM-38	296	4.74	RDX
139	122	howitzer D-30	12	0.36	RDX
140	122	armored vehicle BM-21	1449	126	RDX + TNT
141	152	howitzer type 1937 ML-20M	73	4.203	RDX
142	152	howitzer 2A65	15	0.9	RDX
143		PTRK	3272	37.8495	TNT; ОКФОЛ
144		grenades	20920	10.208	TNT
Kremenchuk, Poltava region, Military unit A1639					
145	57	antiaircraft gun S-60	30811	202.7	RDX
146	76	gun type 1942 ZIS-3	3471	30.9	TNT
147	82	mortar B-10	70	0.27	RDX
148	85	antitank gun D-48	1404	31	TNT
149	85	gun D-44	19588	304.5	RDX,TNT
150	100	antitank gun T-12	656	11.12	RDX
151	115	tank gun D-68	16217	407.8	TNT; RDX
152	120	mortar PM-38	10900	174.4	TNT
153	125	tank gun D-81	7337	96.85	
154	115	tank gun U-5TS	272	8.11	RDX
155	122	howitzer D-30	980	28.5	TNT
156	122	howitzer type 1938 M-30	79	1.61	RDX
157	152	gun D-20	384	22.4	TNT
Rozsishki, Cherkass region, Military unit A1588					
158	5.45	cartridges AK-74	773100	8.147	
159	7.62	cartridges AKM	17936446	395.148	
160	12.7	cartridges DSHK	1434080	180.799	
161	14.5	cartridges KPVT	1209760	202.793	
162	23	antiaircraft gun ZU-23	359157	152.033	RDX
163	30	gun 2A42	1278	0.069	RDX
164	30	grenade launcher AGS-17	167310	46.844	RDX
165	40	grenade launcher RPG-7	27155	45.248	RDX
166	57	antiaircraft gun S-60	6424	40.744	RDX
167	73	grenade launcher SPG-9	33993	101.382	RDX
168	73	gun 2A28	2962	10.721	ОЛ
169	76	gun type 1942 ZIS-3	187	1.751	amatol; TNT
170	85	antitank gun D-48	2008	37.2678	RDX; TNT
171	85	gun D-44	13038	203.354	RDX
172	100	antitank gun MT-12	38703	877.888	RDX; RDX
173	100	field artillery type 1944 BS-3	236	7.158	RDX
174	100	tank gun D-10T	4192	89.252	
175	115	tank gun D-68	13780	377.572	
176	115	tank gun U-5TS	223	5.864	
177	120	mortar PM-38	8009	421.461	
178	122	howitzer D-30	9649	276.546	RDX
179	122	howitzer type 1938 M-30	29238	800.784	TNT; RDX

Ser	Calibre mm	Ukraine Designation	Quantity	Tonnes	Explosive fill
180	122	tank gun М-62Т2	186	5.673	RDX
181	122	armored vehicle B М-21	6443	424.907	
182	125	tank gun Д-81	61382	15939.199	RDX; RDX
183	152	gun D-20	9412	484.57	ТNT; RDX
184	130	gun М-46	2105	103.166	RDX; TNT
185	152	howitzer type 1943 D-1	21	0.136	
186	240	mortar М-240	183	35.32	
187		grenade launcher RPG-18	362	0.51	
188		grenade launcher RPG-22	2296	3.398	
189		pyrotechnics means	11031	3.253	
190		grenades	872394	394.759	TNT
Kalinivka, Vinnitsa region, Military unit А1119					
191	23	antiaircraft gun ZU-23	900745	400.55544	RDX
192	57	antiaircraft gun S-60	27428	174.51924	RDX
193	76	gun type 1942 ZIS-3	12113	110.4706	RDX
194	85	gun D-44	6098	70.25185	Т; RDX
195	100	antitank gun МТ-12	85131	1861.76099	RDX; ОКФОЛ
196	100	field artillery type 1944 BS-3	20775	628.8919	
197	115	tank gun D-68	9801	233.3996	ТNT; RDX
198	115	tank gun U-5TS	68264	1846.07	RDX
199	120	mortar PM-38	24442	391.0327	TNT
200	122	howitzer D-30	13125	352.4897	
201	122	howitzer type 1938 М-30	679	4.209	RDX
202	122	armored vehicle B М-21	36144	2405.01284	RDX + TNT
203	125	tank gun D-81	684214	19948.46624	RDX; ОКФОЛ
204	152	gun D-20	2428	137.96	RDX,TNT
205	152	howitzer type 1937 МL-20М	66124	3769.01176	RDX,TNT
206	152	gun 2S5	550	43.3948	RDX
207	152	gun 2А65	21	1.176	RDX
208	160	mortar М-160	4452	183.155	
209	203	howitzer 1931 B-4М	1162	116.2	
210	220	armored vehicle 9P140	1811	498.79	ГЕКФОЛ-5
211	37	shell	6306	5.285368	RDX
212	57	shell	2746	7.6888	RDX
213	85	shell	2442	23.05623	amatol+ ТNT; RDX
214	100	shell	17141	268.93274	TNT; RDX
215	115	shell	20078	116.78252	TNT
216	122	shell	15961	347.31122	TNT; RDX
217	125	shell	742	16.61095	ОКФОЛ
218	130	shell	1511	50.4102	TNT; RDX
219	152	shell	202	8.79652	TNT; RDX
220	76	shell	4857	14.66814	TNT
221		powder	0	42.4309	
222		tracer	42170	1.67897	
223		detonator	167850	11.1286	
Balakleya, Kharkiv region, Military unit А1352					
224	23	antiaircraft gun ZSU-23	34	0.0097	RDX
225	40	grenade launcher RPG-2	200	0.366	
226	122	howitzer type 1938 М-30	87	2.387	TNT

Ser	Calibre mm	Ukraine Designation	Quantity	Tonnes	Explosive fill
		Total	321	2.7627	
Lozova,, Kharkiv region Military unit A0829					
227	7.62	cartridges AKM	45719666	743.028	
228	9	cartridges PM	5120	0.05	
229	12.7	cartridges DSHK	374425	49.77	
230	14.5	cartridges KPVT	1140724	210.691	
231	20	cartridges SHVAK	359	0.117	RDX
232	23	antiaircraft gun ZU-23	586132	260.595	RDX; RDX
233	30	gun 2A42	11	0.09	
234	37	antiaircraft gun type 1939	4400	5.363	RDX; RDX
235	82	mortar BM-37	11600	36.206	TNT
236	100	field artillery type 1944 BS-3	25156	605.12	RDX,TNT
237	100	antitank gun T-12	5933	124.09	TNT
238	120	mortar PM-38	57784	902.089	TNT
239	122	tank gun D-25TC	2	0.049	TNT
240	122	howitzer D-30	5666	161.431	RDX,TNT
241	122	howitzer type 1938 M-30	1	0.021	RDX
242	122	tank gun M-62T2	72	3.3	
243	125	tank gun D-81	4709	134.667	RDX
244	130	gun M-46	2	0.066	P-4
245	152	gun D-20	312	18.6	TNT
246	152	howitzer type 1937ML-20M	2244	133.52	TNT
247		grenades	260354	147.547	TNT
248		shell	478	3.127	
249		fuse	46788	20.3634	
250		pyrotechnics means	24452	5.11867	
Zvitoha, Khmelnitsk region, Military unit A1358					
251	5.45	cartridges AK-74	477740	4.911	
252	7.62	cartridges AKM	61143244	1110.954	
253	12.7	cartridges DSHK	2459607	316.64	
254	14.5	cartridges KPVT	7472293	1397.384	
255	23	antiaircraft gun ZSU-23	8408785	3772.356	RDX
256	40	grenade launcher RPG-7	99946	162	RDX
257	40	gun 2A42	30428	25.1	RDX
258	57	antiaircraft gun S-60	75902	455.86	RDX
259	73	gun 2A28	8879	26.672	RDX
260	73	heavy machine-gun grenade launcher SPG-9	5972	18.61	AT-50; RDX
261	82	mortar BM-37	5384	17.676	TNT
262	85	antitank gun D-48	154	3.35	
263	100	antitank gun T-12	71887	1800.578	RDX; ОКФОЛ
264	100	field artillery type 1944 BS-3	5038	150	TNT
265	100	tank gun D-10T	3787	78.38	
266	120	mortar PM-38	1001	16.1	TNT +amatol
267	122	howitzer D-30	36317	1012.073	RDX,TNT
268	125	tank gun D-81	178893	7430.849	RDX; ОКФОЛ
269	152	howitzer type 1937 ML-20M	2164	125.9	RDX
270		grenades	145845	82.153	TNT
Tzibul'ovo, Kirovograd region, Military unit A0981					
271	7.62	cartridges AKM	2490	0.013	
272	73	gun 2A28	23524	64.89364	TNT

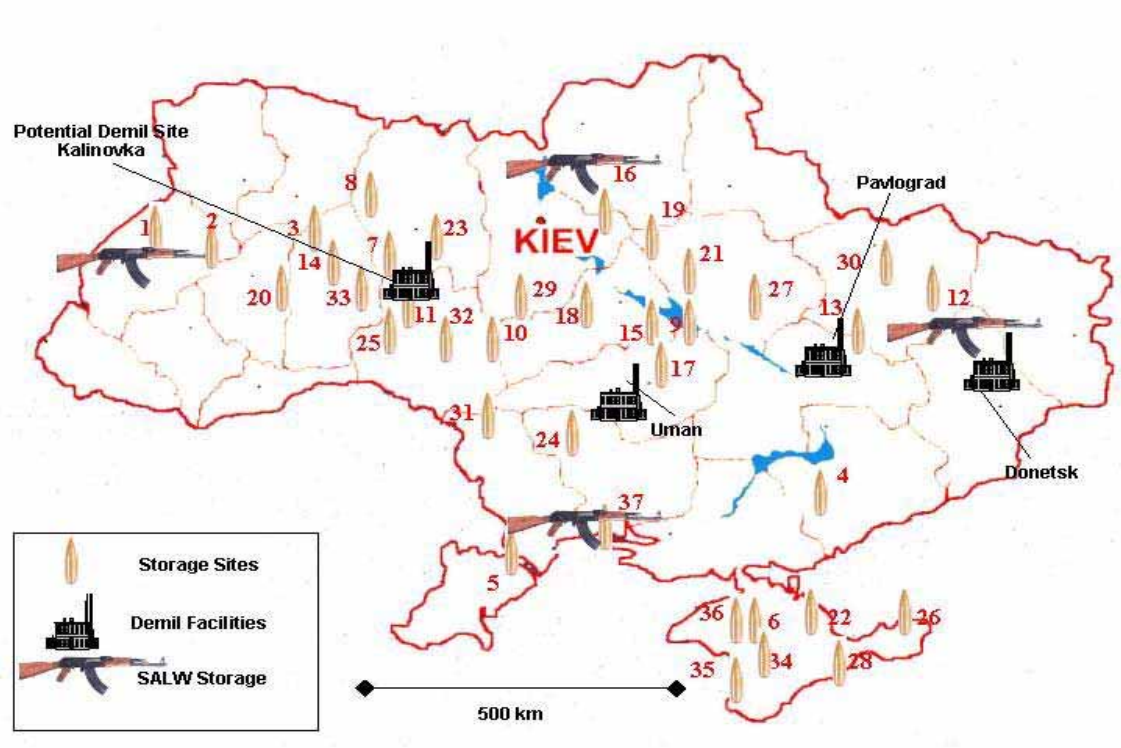
Ser	Calibre mm	Ukraine Designation	Quantity	Tonnes	Explosive fill
273	73	heavy machine-gun grenade launcher SPG-9	10	0.0328	RDX
274		grenades	118460	65.847	TNT
275		shell	22	0.0094	
Ichnya, Chernigiv region, Military unit A1479					
276	23	antiaircraft gun ZU-23	3289	1.448	RDX
277	30	gun 2A42	284	0.3	RDX
278	40	grenade launcher RPG-7	186	0.3	
279	82	mortar BM-37	321373	964.1	amatol+TNT;
280	100	field artillery type 1944 BS-3	482	10.9	RDX
281	120	mortar ПМ-38	40727	631.3	amatol
282	125	tank gun D-81	26136	724	RDX
283	152	gun D-20	639	26.8	RDX
284	160	mortar M-160	215	8.7	amatol+TNT;
285	203	shell	3763	376.3	
286		shell	64452	25.1	
287		fuse	4523415	1316.981474	
288		grenades	109446	48.7728	
289		powder		1597.192	
Bogdanivka village, Kirovograd region, Military unit A1201					
290	40	grenade launcher RPG-2	106100	18.04	
291	40	grenade launcher RPG-7	182484	279.55355	RDX
292	58.3	grenade launcher RPG-16	33	0.04517	
293	73	gun 2A28	1564	0.25	
294	73	grenade launcher SPG-9	153928	305.24	RDX,TNT
295	122	howitzer D-30	1	0.02	
296	122	armored vehicle B M-21	21095	1399.15	RDX,TNT
297	122	howitzer type 1938 M-30	911	24.84	RDX
298	122	tank gun D-25TS	26	0.65	
299	122	armored vehicle 9P138	6	0.34	RDX,TNT
300	130	gun M-46	3	0.13	
301	140	armored vehicle B M-14	9	0.22	
302	152	howitzer type 1943 D-1	86	4.04	
303	152	howitzer type 1937 ML-20M	1	0.04	
304	152	gun 2S5	2	0.12	
305		components for artilery missile	2467294	134.0836	
306		fuse	300878	451.36	
307		shell	7668	10.58891	
308		PTKR	9980	101.34	ОКФОЛ
Dubiyivka, Cherkass region, Military unit A3177					
309		aircraft bomb FAB-5000 M 54	44	231	TNT
310		aircraft bomb FAB-3000 M 46	468	1404.308	TNT
311		aircraft bomb FAB-1500-2600	28	72.352	TNT
312		aircraft bomb OFAB-250-270	25	6.77	TNT
313		aircraft bomb AO-2,5	840	92.41	TNT
314		aircraft bomb PBK-500-225 PTAB-2,5	1	0.225	TNT
315		aircraft bomb PBK-250 PTAB-2,5	827	205.096	RDX,TNT
316		aircraft bomb BKF PTM-1	1092	42.588	
317		aircraft bomb BKF PFM-1C	2288	89.232	
318		aircraft bomb ZAB-500-350 P	50	17.5	
319		aircraft bomb ZB-500	9	3.4	

Ser	Calibre mm	Ukraine Designation	Quantity	Tonnes	Explosive fill
320		aircraft bomb FOTAB-250-215	39	8.295	
321		aircraft bomb FOTAB-100-80	690	53.1155	
322	30	gun	1813000	78.98	
323	23	gun	1932400	618.3008	
324	12.7	cartridges	929000	121.1	
Priluki, Chernigiv region, Military unit A4245					
325		aircraft bomb FAB-3000 M 46	19	57.0	TNT
326		aircraft bomb FAB-1500 M 46	6	8.88	TNT
327		aircraft bomb FAB-500 M 54	5	2.365	TNT
328		aircraft bomb FAB-500 TC	50	34.9	TNT
329		aircraft bomb OFAB-250-270	10	2.7	TNT
330		aircraft bomb FAB-250 TS	36	9.36	TNT
331		aircraft bomb ZB-500	2	0.748	
Grechani, Khmelnitskii region, Military unit A3013					
332		aircraft bomb FAB-3000 M 46	6	18	TNT
333		aircraft bomb FAB-1500 M 46	25	36.875	TNT
334		aircraft bomb FAB-500 M 54	21	49	TNT
335		aircraft bomb OFAB-250-270	70	18.97	TNT
336		aircraft bomb BETAB-500 SH	9	4.3	RDX,TNT
337		aircraft bomb PTAB-2,5	16174	32.374	RDX,TNT
338		aircraft bomb RBK-500-225 PTAB-10-5A	142	35.8	RDX,TNT
339		aircraft bomb RBK-500-225 PTAB-2,5	19	4.3	RDX,TNT
340		aircraft bomb RBK-250 PTAB-2,5	2678	326.72	RDX,TNT
341		aircraft bomb RBS-100 AO-2,5-33	57	6.27	RDX,TNT
342		aircraft bomb BKF-AO-2,5 RT	392	15.288	
343		aircraft bomb BKF-PTM-1	1770	73.87	
344		aircraft bomb BKF-PTAB-2,5	14830	610.035	ГЕКФОЛ-5
345		aircraft bomb BKF-PFM-1S	7186	280.257	
346		aircraft bomb BKF-PTM-1G	9336	364.097	
347		aircraft bomb ZAB-500-350	26	6.3	
348		aircraft bomb ZAB-250-200	24	4.8	
349		aircraft bomb ZB-500	488	182.556	
350		aircraft bomb ZB-360	6	2.2	
351		aircraft bomb FOTAB-250-215	19	4.1	
352		aircraft bomb FOTAB-100-80	1024	78.844	
353	37	gun	3716800	4720.3	
354	30	gun	521800	438.356	
355	23	gun	2332400	746.384	
356	12.7	cartridges	928800	66.4372	
Mirgorod, Poltava region, Military unit A2102					
357		aircraft bomb FAB-3000 M 46	8	24	TNT
Kirovs'ke, Crimea, Military unit A0207					
358		aircraft bomb RBK-250 PTAB-2,5	15	3.72	RDX,TNT
Ozerne village, Zitomir region, Military unit A2053					
359		aircraft bomb IAB-3000	7	16.63	
Voznesensk, Mikolayiv region, Military unit A2734					
360		aircraft bomb FAB-9000 M 54	1	9.29	TNT
361		aircraft bomb FAB-3000 M 54	16	48.9	TNT
362		aircraft bomb FAB-3000 M 46	8	24.0	TNT
363		aircraft bomb FAB-1500 M 46	21	30.9	TNT

Ser	Calibre mm	Ukraine Designation	Quantity	Tonnes	Explosive fill
364		aircraft bomb FAB-500 M 54	31	14.663	TNT
365		aircraft bomb OFAB-250-270	108	29.268	TNT
366		aircraft bomb FAB-250 TS	195	50.7	TNT
367		aircraft bomb RBK-500-225 PTAB-10-5A	208	52.624	RDX,TNT
368		aircraft bomb RBK-500-225 PTAB-2,5	38	8.55	RDX,TNT
369		aircraft bomb RBK-250 PTAB-2,5	174	407.706	RDX,TNT
370		aircraft bomb BKF PTM-1	2468	96.256	
371		aircraft bomb BKF PTAB-2,5	13970	572.785	TNT
372		aircraft bomb BKF PFM-1S	808	31.506	BC-6
373		aircraft bomb FOTAB 250-215	32	6.85	
374		aircraft bomb IAB-3000	4	9.5	
375		aircraft bomb BETAB-500 SH	182	86.632	RDX,TNT
376	37	gun	72400	91.943	
377	30	gun	500000	420.02	
378	23	gun	2212800	708.1	
379	12.7	cartridges	4956400	64.461	
Lyudovka village, Khmelnitsk region, Military unit A2729					
380		aircraft bomb BETAB-500 SH	2	0.95	TNT
381		aircraft bomb PTAB-2,5	60	0.12	RDX,TNT
382		aircraft bomb FAB-250 M 46	5	1.095	TNT
383		aircraft bomb RBK-250 PTAB-2,5	178	44.142	RDX,TNT
384		aircraft bomb BKF-PTAB-2,5	19442	793.011	TNT
385		aircraft bomb BKF-PFM-1S	4200	163.8	BC-6
386	30	gun	60000	50.4	
387	23	gun	99000	31.68	
Kerch, Crimea, Military unit A1680					
388		aircraft bomb FAB-5000 M 54	4	21.0	TNT
389		aircraft bomb FAB-3000 M 46	111	333.0	TNT
390		aircraft bomb FAB-1500 M 46	128	188.8	TNT
391		aircraft bomb BRAB-500 M 55	115	61.065	TNT
392		aircraft bomb RBK-250 PTAB-2,5	6	1.5	RDX,TNT
393		aircraft bomb FOTAB-250-215	268	57.376	
Poltava, Military unit A3543					
394		aircraft bomb FAB-5000 M 54	8	24.7	TNT
395		aircraft bomb FAB-3000 M 46	10	30.0	TNT
396		aircraft bomb BETAB-500 SH	7	3.3	TNT
397		aircraft bomb RBK-250 PTAB-2,5	22	28.5	RDX,TNT
398		aircraft bomb FOTAB-250-215	6	1.3	
399		aircraft bomb OFAB-250-270	154	41.734	TNT
400	23	cartridges	223500	71.52	
Feodosiya, Crimea, Military unit A 0289					
401		antitank mines TM-57	10778	101.3132	RDX+TNT
Ol'shanitsa village, Kiyev region, Military unit A0543					
402		antitank minesTM-62M	4156	45.716	RDX+TNT
403		antitank minesTM-62Д	908	10.896	RDX+TNT
404		antitank minesTM-62П3	854	7.686	RDX +TNT
Chuguev, Kharkiv region, Military unit A2467					
405		antitank minesTM-62M	38002	418.022	RDX+TNT
406		antitank minesTM-62Б	488	4.1968	BBO-32
407		antitank minesTM-62П2	576	6.336	RDX+TNT

Ser	Calibre mm	Ukraine Designation	Quantity	Tonnes	Explosive fill
408		antitank minesТМ-62П3	18174	163.566	RDX+TNT
409		antitank minesТМ-62Т	68399	567.712	TNT
Balta, Odessa region, Military unit 44887					
410		antitank minesТМ-62М	40000	440.0	TNT;RDX+TNT
411		antitank minesТМ-62Д	3370	40.44	RDX+TNT
412		antitank minesТМ-62П	988	11.856	RDX+TNT
413		antitank minesТМ-62П2	14461	159.071	RDX+TNT
414		antitank minesТМ-62Т	55981	464.6423	TNT;RDX+TNT
Gaisin, Vinnitsa region, Military unit A3824					
415		antitank minesТМ-62Т	997	8.275	RDX+TNT
Deraznya, Khmelnitskii region, Military unit A1566					
416		antitank minesТМ-62Т	1992	16.5336	TNT
Mashino village, Crimea, Military unit A1010					
417		sea mine КВ Krab	224	4.35	TNT
Sevastopol, Crimea, Military unit A4068					
418		sea mine КВ with "UNV-1"	251	5.45	TNT
419		sea mine АМD-2М	246	7.0	RDX+TNT
420		sea mine AGSB	140	3.0	TNT
Mikenzievo railway station, Crimea					
421		torpedo SET-65	10	17.5	RDX+TNT
422		torpedo SAET-60M	86	150.5	RDX+TNT
423		mine UDM	242	358.2	TNT
424		mine RM-1	10	8.5	RDX+TNT
425		mine YM	110	38.5	TNT
426		mine KSM	145	158.5	RDX+TNT
427		mine UKSM	224	244.8	RDX+TNT
Ochakiv, Military unit A2637					
428	37	37/68 shell	32345	46.5	RDX
TOTAL			255633356	133306.94	

Location of Storage and Demilitarisation Facilities in Ukraine



List of Ammunition Storage Sites

1. Bryuhovichi, L'viv region military unit A3870
2. Brodi, L'viv region, military unit A3522
3. Slavuta, Chmelnitskii region, Military unit A3845
4. Novobogdanivka village, Zaporiskii region, Military unit A2985
5. Bilen'koye village, Odessa region, Military unit 47158
6. Mizgir'ye village, Crimea, Military unit 75256
7. Chudniv, Zitomisk region, Military unit 55477
8. Ushomir village, Zitomirsk region, Military unit 55238
9. Kremenchuk, Poltava region, Military unit A1639
10. Rozsishki, Cherkass region, Military unit A1588
11. Kalinivka, Vinnitsa region, Military unit A1119
12. Balakleya, Kharkiv region, Military unit A1352
13. Lozova, Kharkiv region, Military unit A0829
14. Zvitoha, Khmelnitsk region, Military unit A1358
15. Tzibul'ovo, Kirovograd region, Military unit A0981
16. Ichnya, Chernigiv region, Military unit A1479
17. Bogdanivka village, Kirovograd region, Military unit A1201
18. Dubiyivka, Cherkass region, Military unit A3177
19. Priluki, Chernigiv region, Military unit A4245Grechani, Khmelnitskii region, Military unit A3013
20. Mirgorod, Poltava region, Military unit A2102
21. Kirovs'ke, Crimea, Military unit A0207

22. Ozerne village, Zitomir region, Military unit A2053
23. Voznesensk, Mikolayiv region, Military unit A2734
24. Lyudovka village, Khmelnitsk region, Military unit A2729
25. Kerch, Crimea, Military unit A1680
26. Poltava, Military unit A3543
27. Feodosiya, Crimea, Military unit A 0289
28. Ol'shanitsa village, Kiyev region, Military unit A0543
29. Chuguev, Kharkiv region, Military unit A2467
30. Balta, Odessa region, Military unit 44887
31. Gaisin, Vinnitsa region, Military unit A3824
32. Deraznya, Khmelnitskii region, Military unit A1566
33. Mashino village, Crimea, Military unit A1010
34. Sevastopol, Crimea, Military unit A4068
35. Mikenzievo railway station, Crimea
36. Ochakiv, Military unit A2637