

**INITIATIVES AND ACTIONS ON THE ELIMINATION OF
OBSOLETE PESTICIDES RISKS/HAZARDS IN THE REPUBLIC OF
MOLDOVA**

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Abstract. In spite of the fact that Moldova has never produced pesticides, including persistent organic pollutants (POPs), over 50 years of overuse of pesticides left a damaging legacy. At present, the Republic of Moldova has an estimated 7245 ton of obsolete pesticides and dangerous chemicals, which remain scattered in 22 central warehouses and 4,000 ton that are buried in the dump pesticides site in the southern part of the country. Among the pesticides that have been used in Moldova in the past are organo-chlorinated pesticides listed in the Persistent Organic Pollutants Convention of Stockholm; these are thought to pose the highest health and environmental risks due to their toxicity, persistence and bioaccumulation potential. The Government of the Republic of Moldova acknowledged that elimination of obsolete pesticides (included POPs) would serve the long-term interests of public health, environment, and economic development of the country. Since 2001, after signing the Stockholm Convention, it was defined as a separate field of actions, which became a priority one among the main environmental issues of the country. In dealing with POPs, the country followed a process that includes developing a clear understanding of the situation, setting priorities and establishing realistic

objectives for actions. Preparation of the Moldova National Implementation Plan for the Stockholm Convention followed such a process utilizing a participatory approach whereby all interested partners in society (national and local government, economy, science, energy, agriculture, education, NGOs) had an active role in the decision-making and assumed their full share of responsibility for the National Implementing Plan.

Key-words: obsolete pesticides, NATO, OSCE, GEF, WB, Ministry of Defense of the Republic of Moldova, environmental security, wine's export certification, database of stockpile's nature, public awareness.

1. Background

The presence of obsolete pesticides on the territory of the Republic of Moldova is one of the most significant risk factors for the national security as environmental, public health, food security, social, etc.

During the 1970-1980 Soviet dominated period the agricultural sector was used on an experimental basis for research on the use of pesticides. Moldova accumulated at least 7,245 tons of pesticide waste of more than 110 different types of pesticides by the end of 1980. Among the pesticides that have been used in Moldova in the past are more than 49 compounds which have been prohibited or restricted for use in agriculture as organochlorine pesticides listed in the Persistent Organic Pollutants Convention; these are thought to pose the highest health and environmental risks due to their toxicity, persistence and bioaccumulation potential.

The use of pesticides and other chemicals, toxic to both human health and the environment grew dramatically during the last 40 years in Moldova. In what follows we will use the term "pesticide" for all chemical products that serve as herbicide, insecticide, fungicide... Due to poor management practice and the lack of imposition of bans in the use of particular chemicals, Moldova has accumulated over the years large amounts of obsolete pesticides, in particular persistent organic pollutants (POPs). These substances possess toxic characteristics, are persistent, accumulate in the tissues of most living organisms and are likely to cause adverse human health or environmental effects near to and distant from their sources.

Therefore, over the period 1977-1987, more than 4,000 tons of pesticides waste, collected from various locations in the country, was buried there, including 654.1 tons of DDT. The pesticides landfill at the Cismichioi site is considered as one of the national priority sites and requires urgent attention in

order to eliminate acute risks. The 2.3 ha site contains 12 distinct burial mounds, most of which are visible from the surface. In only 4 of these sites the wastes were buried in protected conditions, in the others the chemicals are only kept isolated from the surrounding soil with a layer of plastic foil. The site is only a few km away from the Ukrainian and Romanian borders and close to watersheds discharging in the Prut River and the Lower Danube near to its estuary.

According with statistical data, in the period 1950 -1990 an estimated total amount of 560,000 ton of pesticides were used in Moldova including 22,000 tons of organochlorinated POPs (OCPs). The pesticides use registered a peak during the period 1975 to 1985, but reduced significantly over the last 10-12 years (from 38,300 ton in 1984 to 2,800 ton in 2000) (Governmental decision 1155, 2004). However, according to the data from the Ministry of Agriculture and Food Industry, the State Enterprise "Moldselhozhimnia" and the State Ecological Inspectorate, information is not always accurate and the quantities and types of the chemicals used differ a lot. An approximate estimation of the available data shows that the average amount of POPs out of the total stock of pesticides is about 20 - 30%.

It is well known that pesticides are able, by virtue of their various physical and chemical properties to enter all environmental compartments and affect human, animal and plant organisms through various pathways. The health of local people and the quality of their environment are still severely compromised by the consequences of presence of obsolete pesticides, including POPs and unidentified stocks, and by conditions of their storage in more than 340 warehouses over the country, which are still located closely to residential areas (mainly rural ones) or/and nearby pastures, arable land and orchards/vineyards. Some of the stores are located within areas, which are regularly passed or visited by unprotected people. The result is that children, women, men and livestock are exposed to pesticide vapors, dust and contaminated soil, water and other materials on a virtually constant basis. It is also important to note that over 1500 pesticide warehouses and a similar number of grounds for preparation of pesticide solutions had been in use in Moldova in the past. It can be estimated that a few thousand areas, which are potentially polluted and pose health and environmental risks, have been found in Moldova.

It is also important to recognize that contamination of agro-products has potential impacts on the urban population's health, as many products are sold in local markets which have no rigorous pesticides residuals control. The economic losses, driven by contamination of agriculture and food products, can significantly limit Moldova opportunities on the external markets.

2. Actual Situation

Currently, the total amount of obsolete pesticides in Moldova is estimated at more than 6,000 tons of obsolete pesticides and other hazardous chemicals waste: 1,949 tons which remains scattered in 23 regional central storages of 26 districts and 4,000 tons buried in the pesticide landfill in the southern part of the country (Territorial Autonomy of Gaguz-Yeri), and cca 150 tons of pesticides waste in the uncontrolled region called "Transnistrian region". (Adams and Grama, 2010b). Until the year 2008, the quantity of harmful pesticides was more than 7,400 ton of pesticides. 3,245 tons were scattered or buried in 424 poorly equipped or unfitted facilities which lack proper monitoring and security. 1,296 tons were disposed in the Global Ecological Fund/World Bank Project "Management and disposal of the POPs stockpiles" by the French Company TREDI during the years 2007 and 2008.

During the time, the urban and rural area were extended and the pesticides warehouses are situated close/or into the residential area, aquatic basins, state protected areas, agricultural land, etc. and become a potential contamination sources of the soil and the potable water, which gravely affects people's and animal's health, and biodiversity, especially in rural area.

Because of aggression of the liquid pesticides during 2004-2011, the steel drums start to be rusty, cracked and linking and present new high risks for the environment and public health.

The Government of the Republic of Moldova has a difficult to guarantee a constitutional rights of healthy life style for the people which live close/or in the area of pesticides waste warehouses. A lot of complain letters from Local Authority, people couldn't be solved.

Life expectancy at birth in Moldova shows patterns similar to the one observed in neighboring countries and in some Eastern Europe countries. Although the decrease of this indicator has been reversed and presently it constitutes 68.4 year, it continues to register values much lower than the average for the EU states (Governmental decision 1471, 2007). The maternal mortality rate is now 16.0 maternal deaths per 100,000 live births as compared to 43.9 in 2001. However, these indicators are still higher than average European figures. The mortality of the economically active population is higher than in the EU countries. The most important death causes in Moldova include diseases of the circulatory system, poisoning, malignant neoplasm, cancer and diseases of the liver, gall bladder and pancreas. More frequently illnesses for economically active population are registered such as allergy diseases, digestive tract diseases, inflammatory diseases of skin and subcutaneous tissue (dermatitis, eczema, etc.) and others. Figure 1 presents an overview of the general pesticides application in agriculture in connection with general and infant mortality of the population from Moldova.

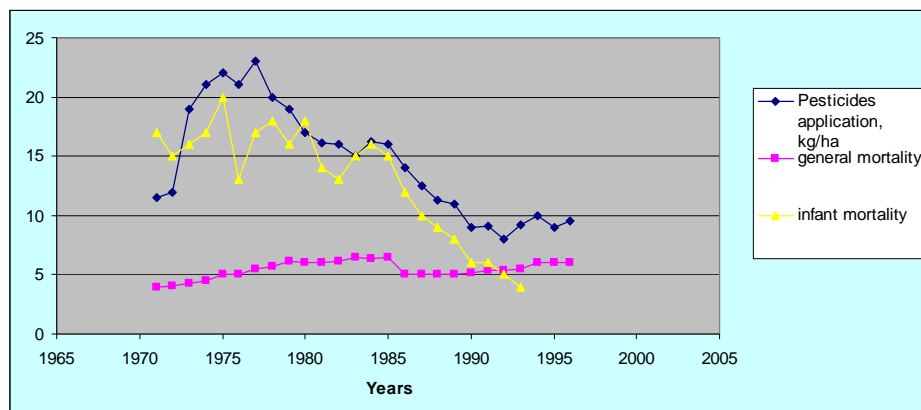


Figure 1. Total pesticide application in agriculture, general and infant (3) mortality.

The share of persistent OCPs also decreased in favor of other pesticide groups. During the period 1976-1990, soil samples showed pesticide contamination levels exceeding the maximum allowable concentration (MAC) from five times in the southern zone of the country to 50 times in the Central zone. Research undertaken by the Institute for Experimental Meteorology of the State Committee for Meteorology showed that during the period 1979-1985 about 60% of soil samples were polluted with DDT at concentrations exceeding the MAC, in spite of the fact that DDT had been prohibited since 1970. Beginning in 1989, due to reduction in pesticide application, investigations showed a decrease of pesticides-related pressure both in annual and perennial crops. During the period 1990-1995, the regional Centers of Preventive Medicine of the Ministry of Health analyzed the contents of 28 pesticides' residuals in 10 agricultural crops and foodstuffs. Pesticide residuals were found in 56% of the tomato samples and in 40 % of the grape samples analyzed.

By the early 1990s, over 1,000 warehouses for pesticide use have been built in collective farms. During 1991 - 2003 about 60% of these were destroyed or dismantled with only 20% of the remaining ones were maintained in a satisfactory condition. These were recently transformed into regional storage facilities for pesticides and fertilizers. Significant amounts of obsolete pesticides were stored there in the open. Deteriorated packaging enhanced the risk of harmful effect on people's health and environment. Some warehouses are situated close to residential areas. In addition, the pesticides should have been packaged and stored in these warehouses according to the following

instruction and rules that were developed by the Ministry of Agriculture of the Soviet Union in 1985: “Rules on Pesticides Receiving, Keeping and Delivery at Agricultural Chemistry Storages”; and “Instruction on Collecting, Preparing and Transporting of Old and Banned Pesticides and Their Packages”. However, as shown in the examples in the photographs in Figure 2, the warehouses have deteriorated to the stage that there was considerable mixing of different categories of pesticides, both in the solid and the liquids sections. Occasionally, there was even mixing of solids and liquids in the same section. In many cases bags of pesticides had broken and drums of liquids had corroded and were leaking.



Figure 2. Conditions at typical storage site in the Moldova.

It became clear that the segregation system envisioned in the 1985 was not followed in the 1990s and the stored pesticides could no longer be classified according to this system. Hence in the recently organized repackaging process the majority of the pesticide packages can only be categorized as “Unknown” and can only be classified as “hazardous waste with the potential of POPs contamination”. The photographs in Figure 2 show examples of the typical state of these warehouses prior to the repackaging program.

Also, it is important to notice that after the collapse of USSR, the Republic of Moldova lost a large part of its manufacturing sector, including the fact that the country’s industrial hub was located in the breakaway region of the Transnistrian Region. Actually, the wine industry plays a significant role in the Moldovan economy. Moldova is highly dependent on wine production; it is considered the backbone of the agricultural sector. In global terms, Moldova ranked 7th in the list of world wine exporters in 2005, exporting 2.3 million hectoliters of bottled wines. In 2005, the Moldovan wine collection “Mileștii Mici”, with 1.5 million bottles, was included in the Guinness Book, as the largest wine collection in Europe.

In March 2006 Russia imposed a total ban on Moldovan wine based on claims of contamination by pesticides and heavy metals which pose health risk. This financially devastating ban led to losses officially reaching 180 million USD in a country that was already Europe's poorest (Grama et al., 2010).

Besides, annually, the Republic of Moldova spent 260.000 EUR for security of the pesticides regional storages, etc.

3. National Framework

Memorandum of Understanding between Government of the Republic of Moldova and the NATO Organization for Maintenance and Supply (NAMSU) on logistic co-operation, signed at 28 June 2001, ratified by Law No.541-XV of 12 October 2001, promulgated by Presidential Decree No.292 of 31 October 2001, contributed to the institutionalization of the NATO/PfP Trust Fund for demilitarization of various small arms, light weapons and munitions in 2002, financed by the NATO member countries designed to destroy an allotment of anti-person mines and expired-term ammunition from the subsidy of the National Army, as well as an important quantity of missile fuel the melanj type. Due to this project were eliminated an ecological threat and foresights on interdiction of anti-person mines of the Ottawa Convention were accomplished. Hereby, Republic of Moldova was the first country to interdict this type of mines from its arsenals.

Another project implemented with the NATO financial support regards the annihilation of the reserves of interdicted and unusable pesticides from Republic of Moldova, into Implementing Agreement 12 May 2006, Bruxelles.

The Individual Partnership Action Plan Republic of Moldova – NATO, adopted by the North Atlantic Council on 19 May and, respectively, by the Government of Moldova on 24 May 2006, sets a number of important goals, such as deepening of Moldova's cooperation with the European and Euro-Atlantic structures and institutions, promoting democratic reforms in various fields, reform and modernization of the defense and security areas, strengthening democratic control over armed forces, etc.

The National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants, approved by the Government Decision in October 2004, aims to provide a framework and management options in order to meet the obligations taken by Moldova by joining the Stockholm Convention on Persistent Organic Pollutants and to reach the national objectives and priorities regarding the POPs (Governmental decision 1155, 2004).

The Economic Growth and Poverty Reduction Strategy Paper (2004-2006) was the overarching policy framework for the sustainable development of the Republic of Moldova in the medium term. It served as the basis for developing and implementing new assistance strategies by international financial organizations and donor countries, as well as for the preparation of the annual state budgets for 2005 and 2006. The environmental component of the Paper made direct reference to the improvement of unusable pesticides waste management and the reduction of pesticides waste, actions which directly would influence on reduction of soil degradation, growth of ecological agriculture products, etc.

The Midterm Strategy for Socio-economic Development of the Republic of Moldova to 2005, approved by the Government Decision in 2001, stipulated that ecological economic goals should include: regulating impacts from economic activities on the environment; preventing environmental pollution and ensuring environmental quality and rehabilitation; improving methods for utilization of natural resources and ensuring their continuous and safe exploitation; improving environmental education; enhancing environmental research and implementation of environmentally clean technologies. Also it was mentioned that international environmental standards would be introduced in all sector of national economy, particularly the ISO 14000 standards.

The Concept of the Environmental Policy of the Republic of Moldova, approved by Parliament Decision No.605 of 02 November 2001, reflects two key objectives on prevention and reduction of negative impacts of economic activity on the environment, natural resources and health of the population within a framework of national sustainable development, and on insurance of ecological security of the country. Both directions have to be conducted by principles of “economy through ecology” and “cost-benefit”.

The *National Environmental Health Action Plan (NEHAP)* provides directions for the next 10 years for protecting human health and assigns responsibilities among Government agencies, with specific focus on aligning the country with EU by ensuring harmonization with its policies, procedures and practices. NEHAP has a few references to pesticides waste, including in: § 4.1-Water stipulating elaboration of a pesticide decontamination system for waste water discharges; § 4.2-Air stipulates development of pesticides air emissions monitoring systems and of a program for “neutralization” of the referred emissions; § 4.3-Soil seeks to encourage improving existing legislation and elaborating new maximum allowed concentration for various pesticide as well as provides for establishing a national pesticides waste inventory; § 4.5-Food – stipulates improved control of pesticides contamination of food; § 4.10-Natural Catastrophes and Industrial Accident provides for creation of a national register

of potentially toxic chemicals; § 5.4-Agriculture stipulates developing regulations regarding importing, storage and use of pesticides.

The main objectives of the national framework consist of:

- To guarantee the fundamental human rights in according with Charter of the fundamental rights and ensure the rights to a healthy environment (EU 2010/C 83/02, the Universal Declaration of Human rights, the Constitution of the Republic of Moldova, national policy and strategies on human rights) (Parliament decision No. 90, 2011), etc.
- To prevent illegal trafficking of hazardous waste, in special pesticides waste (strong links need to be maintained with the Basel Convention and Stockholm Convention).
- To prevent using of pesticides waste as chemical weapons in the terrorist actions (Geneva Protocol, 1925).
- To protect human health and the environment from pesticides waste as persistent organic pollutants not only from Moldova but entire Southern European Region (Stockholm Convention on Persistent Organic Pollutants).
- To address international security issues linked to elimination of acute risks of hazardous waste. Solution range from regularizing exchange of information across the border to a full application of the Espoo Convention on environmental impact assessment in transboundary context.
- From dialogue to sustainable settlement through engagement of Moldova's Transnistrian region into environmental cooperation for destroying hazardous waste in the region.
- To increase environmental security with impact on pesticides migration into water distribution in the Lower Danube Delta and Black Sea, recovery ecological balance of the Danube River and Black Sea To assist implementation of the Healthcare System Development Strategy for the period 2008-2017 (Government Decision 1471, 2007), National Strategy on implementation of Stockholm Convention on POPs in the RoM (Government Decision 1155, 2004), The National Strategy for Sustainable Development of the Agricultural Infrastructure for 2008-2015 (Government Decision.282,2008).

4. Actions and Initiatives

4.1. AT THE NATIONAL LEVEL

During the last decade the problem of obsolete pesticides was placed on the environmental agenda of the Republic of Moldova as part of toxic substances and waste management programmes.

In dealing with obsolete pesticides and other dangerous chemicals, the country followed a process that includes developing a clear understanding of the situation, setting priorities and establishing realistic objectives for actions.

The Moldovan authorities recognized that the long term storage of obsolete pesticides is not sustainable option since a series of deficiencies revealed in the process of repackaging and storage raised concerns about the integrity and security of the storage facilities.

In 2001, the Government adopted a decision (Governmental decision, 2001) stipulating the measures to be undertaken, timeframe and responsibilities of involved ministries, departments and local public authorities with regard to centralized storage and disposal of obsolete pesticides. In particular, it asked the Ministry of Agriculture, the Ministry of Ecology and the local authorities to select 3-4 storehouses in each judet (former administrative unit in Moldova) to be used for centralized storage; the Ministry of Agriculture, the Ministry of Healthcare, the Institute of Chemistry of the Academy of Sciences and the Department for Standardization and Metrology to participate in laboratory investigation of pesticides to determine their chemical composition and amount of active substance; the Ministry of Agriculture and the local authorities to rehabilitate the storehouses; the Institute of Chemistry to investigate the possibilities of further incineration of pesticides; the Ministry of Agriculture, the Ministry of Healthcare and the Department for Standardization and Metrology to make provisions for transportation of pesticides to cement factory for further elimination while the Ministry of Agriculture was given the task to apply to the Council of Europe for a grant to support the elimination of pesticides.

In 2002 the Government adopted the decision No. 1543 “On Additional Measures for Central Storage and Disposal of Out-of-Use and Banned Pesticides” which stated that the Ministry of Defense and the Department of Emergency Situations is to ensure the transportation of pesticides as well as other relevant technical actions. (Government decision 1543, 2002).

In 2003 the Government adopted the Decision No. 1389 “On approval of modifications and agenda in the Governmental Decision 1543 as of 29 November, 2002” (Government decision 1389, 2003). The latest Decision stated that heads of rayons, and mayors of settlements must select one

storehouse on the administrated territory, and in coordination with the Ministry of Defense and Department of Emergency Situations should make provisions for the repackaging, transportation and guarding of pesticides until a destruction option is found. Besides, the Ministry of Defense of the Republic of Moldova has been nominated as the national authority for implementation of the programs for the destruction of the obsolete pesticides stockpiles and /or for evacuation from the Republic of Moldova territory in according with Government Decision No.1543 of 29 November 2002 “On additional measures for central storages and neutralization of the forbidden and unusable pesticides” and Parliament Decision No.90 of 12 May 2011 “On approval of the National Action Plan for human rights for period 2011-2014”, and other national actions plans or strategies (Parliament decision, 2011). For the efficient implementation of the programs, the Ministry of Defense cooperate with all state structures at the Central level (Ministry of Agriculture and Food Industry and its territorial Inspectorate for Fitosanitation; Ministry of Health and its territorial Public Health Services; Ministry of Environment and its territorial State Ecology Inspectorate, etc.) and Local level as Local Public Administration through Territorial Emergency Situation Commission created at the district level, which include responsible authorities of Mayors, Civil Protection, Ecological Inspectorate, Public Health Services, etc. The implementation of this Decision is under way.

In the same time, since 2001, after signing the Stockholm Convention, it was defined as a separate field of actions, which became a priority one among the main environmental issues of the country. In dealing with obsolete pesticides like persistent organic pollutants, the country followed a process that includes developing a clear understanding of the situation, setting priorities and establishing realistic objectives for actions. Preparation of the Moldova National Implementation Plan (NIP) for the Stockholm Convention followed such a process utilizing a participatory approach whereby all interested partners in society (national and local government, economy, science, energy, agriculture, education, NGOs) had an active role in the decision-making and assumed their full share of responsibility for the National Implementation Plan.

Later, in October 2004, the Persistent Organic Pollutants National Implementation Plan was approved which aimed to provide a framework, management options and measures in order to meet the obligations taken by Moldova through joining the Stockholm Convention on Persistent Organic Pollutants. National objectives and priorities were defined.

Despite the existing difficult economic situation, the Republic of Moldova is committed to fulfilling its obligation regarding obsolete pesticides under international treaties. This required increased internal institutional and financial resources and the mobilization of international assistance.

4.2. COOPERATION WITH INTERNATIONAL ORGANIZATIONS INTO ENVIRONMENTAL SECURITY INITIATIVE

To address and prevent increasingly high risks to population and the environment, NATO, in collaboration with other international organizations embedded in the Environment and Security (ENVSEC) initiative for Eastern Europe (the United Nations Environment Programme, the United Nations Development Programme and the Organization for Security and Co-operation in Europe), accepted supporting Moldova to achieve its objectives in the management and safe destruction of its chemical hazards and the fulfillment of its obligations under international Conventions, Agreements and protocols, especially the Stockholm Convention.

On 12 May 2006 the Implementing Agreement between the Government of the Republic of Moldova and the NATO Maintenance and Supply Organization (NAMSO) for destruction of pesticides and dangerous chemicals, was signed at the NATO Headquarters, in Brussels. This Agreement aims to improve the environment and health situation of the population in Moldova through the reduction of negative impacts of old environmental burdens - remnants of obsolete pesticides scattered on whole territory of the country through implementation of four distinct phases:

- ✓ Repackaging, relocation and safe storage of 3,245 ton of obsolete pesticides from 424 to 37 regional central warehouses;
- ✓ Identification of the nature and composition of the pesticides stockpiles;
- ✓ Disposal of the pesticides and dangerous chemicals;
- ✓ Remediation of contaminated facilitation.

These four phases have been implemented in four projects with the intention to address Moldovan environmental issues, which are perceived to threaten security, social stability and peace, human health and sustainable development at the local level, as well as in the entire South East European Region.

Repackaging and safe storage of obsolete pesticides was managed by the NATO Maintenance and Supply Agency (NAMSA) on behalf of the Lead Nations (Belgium and Romania).

The first phase of the project, rendering the chemicals safe repackaging and storage, was funded through a NATO Partnership for Peace (PfP) Trust Fund project (EUR 804,000). Contributing nations were Bulgaria, Czech Republic, Ireland, Lithuania, Luxembourg, the Netherlands, Norway, Romania, Sweden and Turkey, Belgium, Finland, and Germany (Table 1).

The process of *repacking of 3,245 tons of pesticides and dangerous chemicals* from 424 poorly equipped/demolished places/warehouses and safe storage in the 37 centralized facilities was completed in June 2008, with collaborative efforts by the Moldavian State Budget and the National Ecological Fund (430,000 EURO), NATO/Partnership for Peace Trust Fund –

OSCE/ENVSEC (658,000 EURO, including the Dutch NGO MILIEUKONTAKT (150,000 EURO)).

TABLE 1. General distribution of project funding by sources.

	UN/ADR Package	Non UN/ADR Package	Total
NATO/PIP-OSCE/ENVSEC Trust Fund	1,269	309	1578
Other sources	27	344	371
Total	1,296	653	1,949

Actually status showed, that from totally amount of 1,949 tons of pesticides, 1,296 tons of pesticides are repacked in the UN/ADR package, and 653 tons – in Non UN/ADR package.

Since 2003 year, in the project's activities were involved more than 720 military personnel and 35 military techniques from NBC units of the National Army of the Republic of Moldova (Figure 3).

The benefits of this project are:

- ✓ Overall reduction of the environmental, health, and socio-economic risks associated with obsolete pesticides dissipation in the environment:
 - Eliminating the health and environmental risks of further releases of obsolete pesticides from temporary unsafe storage sites;
 - Raising opportunities for organic agriculture thus increasing the income levels of small farmers and the rural poor by improving the export potential of agriculture products and increasing the land value in the proximity of emptied warehouses;
- ✓ Assisting Moldova in meeting its obligations under international Conventions, Agreements and protocols.

Besides the repackaging and safe storage of the obsolete pesticides, *the POPs Information Management and Reporting System and Monitoring Network* in the Republic of Moldova have been developed in order to improve POPs (including new POPs) environmental management and reduce their potential negative impacts.

In the framework of the *NATO Science for Peace and Security Project "Clean-up chemicals - Moldova"* (298,000 EURO), were established the analytical laboratory with sophisticated equipment for systematic characterization and analysis of the pesticides stockpiles, based on gas chromatography-mass spectrometry (GC-MS), high pressure liquid chromatography (HPLC), thin layer chromatography (TLC) and ion selective electrode (ISE). A NATO-funded laboratory is located at the State Centre for

Certification and Registration of Phyto-Sanitary Means and Fertilizers in Chisinau. The project employs specialized personnel from Ministry of Defense of the Republic of Moldova for sampling and general project management and specialist scientists in the “phytosanitary products and fertilizers” of the Ministry of Agriculture for the laboratory activities. In addition, the Moldavian State University participates with specialists in analytical chemistry including a number of young scientists with general scope on training a new generation of scientists, that have been involved in the future in the Republic of Moldova for the pesticides issues. All personnel became operationally in standard sampling, analysis and data management techniques.



Figure 3. Cleaning of an abandoned obsolete pesticide storage site.

By the end of July 2009, an overview was obtained of the nature and composition of 3,245 tons of harmful pesticides stored in 2 municipalities, 32 districts of Republic of Moldova and the Territorial Autonomy Gagauzia. A total of 5,000 samples were tested by GC-MS, HPLC, TLC and ISE methods of analysis, which provided the identification in cca 87% of samples.

More than 70 active ingredients and their metabolites were detected. Among the identified compounds 49 of them have been prohibited or restricted for use in agriculture, in Moldova since 1970, while the use of 24 substances was prohibited or restricted in the UE countries.

The NATO-funded laboratory has been played an important role in solving the problems related with obsolete pesticides, as follows:

- To make the incineration process safer and more efficient, TREDI used a database of the chemicals composition and toxicological evaluation, created by NATO-funded laboratory for the destruction of 1296 tons of obsolete pesticides;
- To enhance food security in the country, with sophisticated equipment test agricultural products, in October 2007, Russia, Belarus and Ukraine recommenced importation of Moldavian wine after more than 650 samples of wine from 35 companies were certified by the lab to be pesticide-free. Since December 2008, the laboratory has been started certification of the pesticides-free in the apples for export, too;
- During January 2009 – January 2010, the project activities were focused on environmental issue on the systematic study of the waste dump from s.Cismichioi, Teritorial Autonomy Gagauzia – the national strategic object, where more than 4,000 ton of pesticides have been buried in the early 1980s. The site is located at few km away from the Ukrainian and Romanian borders and close to watersheds discharging in the Prut River and the Dniester River.

In the same time, the NATO-laboratory played a great role in the obsolete pesticides analytical study for the TAUW Consortium (Tauw bv, Milieukontakt International, International HCH and Pesticides Association, Witteveen+Bos Environmental Consultants and Green Cross Switzerland) activities into the World Bank Project entitled “The obsolete pesticides technical study in the Kyrgyz Republic, the Republic of Tajikistan and the Republic of Uzbekistan” (Grama et al., 2010a).

Regarding the analysis of POPs in environment components were done by laboratory of the Monitoring Centre of the State Hidrometeorological Services, funded by GEF/WB Project “Management and destruction of POPs stockpiles” in order to develop a map of polluted areas. More than 1580 potentially polluted sites were investigated. For 252 sites (about 16% of the total number) the data (expressed as a sum of all POPs detected on-site in composite soil samples) showed concentrations exceeding 50 mg/kg. At this level of pollution the soil can be classified as hazardous waste (Figure 4).

Regarding *the disposal of obsolete pesticides stockpiles, including persistent organic pollutants*, in March 2006 the Government of the Republic of Moldova received through World Bank and Global Environmental Facilities a grant for the Persistent Organic Pollutants Stockpiles Management and Destruction Project. Within funding out of this project and co-financing from state budget (3,6 mln \$ SUA (including Moldovan Contribution of 1,2 mln \$

SUA)) an amount of 1296 tons of obsolete pesticides were shipped abroad, in France, during 2007-2008, and disposed of.

Currently, the on-going Project “Remediation of environmental burdens by pesticides waste in Moldova” funded by Czech Development Agency, aims to destroy in Germany 200 tons of pesticides waste with EUR 500,000.

There are in place a new sub-project under NATO Trust Fund on disposal of the 1,269 ton of obsolete pesticides stored at 15 regional central storages. The Ministry of Defense on behalf of the Government of the Republic of Moldova signed 3rd Implementing Agreement for the destruction of pesticides and dangerous chemicals with NATO/NAMSO at 22 June 2011, in Bruxelles.

The Project will be managed by NAMSA on behalf of Romania as Lead Nation. Romania, Bulgaria, Estonia, Ireland, and Czech Republic have already specifically contributed or pledged for this Phase.

The Republic of Moldova will have essential contribution as:

- will assure necessary security at all stages of the project in the country;
- will provide cash contribution of 325,000 EUR and in-kind contribution of 557,000 EUR through manpower for any repacking, palletisation, labeling and loading activities, transport of pesticides waste between regional central storages, medical support, assistance of the territorial experts for monitoring and carrying out pesticides control, inspections and surveillance activities, and security at regional central storages (circa 260,000 EUR annually).

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Concerning *the remediation of the contaminated sites* with obsolete pesticides, including persistent organic pollutants, into GEF/CIDA Project “Remediation of POPs pesticides polluted areas and decontamination of PCB polluted oils in electric equipment” (2007-2009) were selected and tested the obsolete pesticides contaminated areas remediation technologies and techniques adjusted to Moldovan conditions (isolation of contaminated materials in cofferdams covered by protection layers (site Congaz, Teritorial Autonomy Gagauzia and site Step-Soci, Orhei district) and biological remediation with Daramend (site Bujor, Hincesti district)). But more than 1500

places/warehouses or contaminated areas are still waiting to be remediate (cca 1500 ha of land), because of lack of financial resources.



Figure 4. A publicity poster of the GEF/WB Project “Management and destruction of POPs stockpiles”

The *awareness and educational activities* related to obsolete pesticides issues is one of the pillars of Moldovan authorities based on the Communication Strategies, therefore is to increase citizens’ awareness on environmental issues and foster public participation through strong cooperation with NATO, OSCE, ENVSEC, Moldovan state actors, NATO Information and Documentation Center, Association INQUA-Moldova, Regional Environmental Centre for Moldova, Moldovan Ecological Movement, Garamond Studio SRL and Casa Imago SRL (ENVSEC, 2007).

In the conclusion, a lot of work has been done already, but still there are many urgent things need to be solved: including another 5000 tons of obsolete pesticides waiting for being disposed of, more than 1500 obsolete pesticides polluted areas to be remediated. Nowadays, Moldovan Government is strongly looking for additional funding from international organisations which will help

to solve obsolete pesticides problems in the country in order to promote a safe environment and protect the public health as part of the sustainable development of Europe.

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