

## SAFE MANAGEMENT AND DISPOSAL OF OBSOLETE PESTICIDES (DDT) FROM THE INSTITUTE OF PUBLIC HEALTH

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**Abstract.** Institute of Public Health of the Republic of Macedonia as a public health and scientific-research facility as a result of performing its work, produce certain amount of medical waste, as well hazardous chemical waste. In the Waste Management Law, Official Gazette of the Republic of Macedonia No.68/04 and 107/07, in article 6 hazardous waste is defined as a waste that contain substances which have one or more hazardous properties, such as: explosively, reactivity (oxidants), flammable, irritation, toxicity, infectivity, carcinogenicity, mutagenicity, reproduction toxicity, eco-toxicity and properties of release poisonous gases under contact of water, air or acid, defined in accordance with this Law or other Regulative, and subsequently in the List of types of waste (Official Gazette of the Republic of Macedonia No.100/05) is noted and separately labelled as a hazardous waste, including each waste that is mixed with hazardous waste. Management with chemical waste, respectively collection, separation and its storage is properly solved in the frame of the Institute of Public Health of the Republic of Macedonia in context of the above mentioned Law. But, real problem is disposal of chemical waste produced in the laboratories of the Institute of Public Health. Related to the needs of solution of collection and transport of chemical waste produced in the former period, as well the possibility of eventual integral solution of the chemical waste problem, Institute of Public Health has conducted a situation analysis of quantities and content of hazardous chemical waste (as well DDT), which has remained in the chemical waste depots of the Institute of Public Health and at the regional Centers of Public Health. According to the Basel Convention that determines the rules and conditions for control of transboundary transport of hazardous waste and its storage, ratified by our side (Official Gazette No.49/97), there was a possibility for export of hazardous waste under conditions proscribed in the Convention and with an agreement with other side

where exists conditions for treatment of it. The aim of the paper is to review challenges, experiences, and health-related risks linked to safe management and disposal of hazardous chemicals especially DDT stored in the Institute of Public Health and Centers of Public Health in the Republic of Macedonia. The final goal is to protect public health, especially Institute's staff and people that could be exposed to hazardous chemicals.

**Keywords:** public health, safe management, disposal, DDT

## 1. Introduction

The term "pesticide" originates from two Latin words: pest and cido. Pest – is an organism which causes destruction, disease or injury on plants and animals. Cido – means destroy or kill. Pesticides are mainly chemical compounds either artificially synthesized or extracted from plant products. Pesticides from biological agents have been developed lately. The term "pesticide" includes chemical substances, preparations or organisms used in pest control (Kaloyanova, 2001).

Prior to 1972 when its use was banned, DDT was a commonly used pesticide. Although it is no longer used or produced in the United States, we continue to find DDT in our environment. Other parts of the world continue to use DDT in agricultural practices and in disease-control programs. Even though DDT has been banned since 1972, it can take more than 15 years to break down in our environment.

Harmful effects of DDT are:

- Probable human carcinogen;
- Damages the liver;
- Temporarily damages the nervous system;
- Reduces reproductive success;
- Can cause liver cancer;
- Damages reproductive system.

Exposure to DDT is possible through:

- By eating contaminated fish and shellfish;
- Infants may be exposed through breast milk;
- By eating imported food directly exposed to DDT;
- By eating crops grown in contaminated soil (EPA<sup>1</sup>).

Chemicals affect our everyday lives. They are used to produce almost everything we use, from paper and plastics to medicines and food to gasoline, steel, and electronic equipment. More than 70,000 chemicals are used regularly

around the world. Some occur naturally in the earth or atmosphere; others are synthetic, or human-made. When we use and dispose of them properly, they may enhance our quality of life. But when we use or dispose of them improperly, they can have harmful effects on humans, plants, and animals. Even when used properly, many chemicals can still harm human health and the environment. When these hazardous substances are thrown away, they become hazardous waste. Hazardous waste is most often a by-product of a manufacturing process - material left after products are made. Some hazardous wastes come from our homes: our garbage can include such hazardous wastes as old batteries, bug spray cans, and paint thinner. Regardless of the source, unless we dispose of hazardous waste properly, it can create health risks for people and damage the environment (EPA<sup>2</sup>).

The text of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was adopted on 22 March 1989 and entered into force on the ninetieth day after the date of deposit of the twentieth instrument of ratification, acceptance, formal confirmation, approval or accession by a country to the Convention, 5 May 1992. The overarching objective of the Basel Convention is to protect human health and the environment against the adverse effects of hazardous wastes. Its scope of application covers a wide range of wastes defined as “hazardous wastes” based on their origin and/or composition and their characteristics, as well as two types of wastes defined as “other wastes” - household waste and incinerator ash. Goals of the Basel Convention are:

- the reduction of hazardous waste generation and the promotion of environmentally sound management of hazardous wastes, wherever the place of disposal;
- the restriction of transboundary movements of hazardous wastes except where it is perceived to be in accordance with the principles of environmentally sound management;
- a regulatory system applying to cases where transboundary movements are permissible (Basel Convention, 1992).

## **2. Material and Methods**

It was used prospective environmental – epidemiological study to explore the quantity and content of hazardous waste stored in the Institute of Public Health and Centers of Public Health in the Republic of Macedonia. As well it was studied the manner of safe management of this hazardous waste. Study has been conducted from 2009-2011.

### 3. Aim

The aim of the paper is to review challenges, experiences, and health-related risks linked to safe management and disposal of hazardous chemicals especially DDT stored in the Institute of Public Health and Centers of Public Health in the Republic of Macedonia.

The specific goal is to protect public health, especially Institute's staff and people that could be exposed to hazardous chemicals.

### 4. Results and Discussion

Institute of Public Health of the Republic of Macedonia (IPH) as a public health and scientific-research facility as a result of performing its work, produce certain amount of medical waste, as well hazardous chemical waste.

In the Waste Management Law, in article 6 hazardous waste is defined as a waste that contain substances which have one or more hazardous properties, such as: explosively, reactivity (oxidants), flammable, irritation, toxicity, infectivity, carcinogenicity, mutagenicity, reproduction toxicity, eco-toxicity and properties of release poisonous gases under contact of water, air or acid, defined in accordance with this Law or other Regulative, and subsequently in the List of types of waste (Official Gazette of the Republic of Macedonia No.100/05) is noted and separately labelled as a hazardous waste, including each waste that is mixed with hazardous waste (Law, 2004).

Management with chemical waste, respectively collection, separation and its storage is properly solved in the frame of the IPH in context of the above mentioned Law. But, real problem is disposal of chemical waste produced in the laboratories of the IPH.

Related to the needs of solution of collection and transport of chemical waste produced in the former period, as well the possibility of eventual integral solution of the chemical waste problem, IPH has conducted a situation analysis of quantities and content of hazardous chemical waste (as well DDT), which has remained in the chemical waste depots of the Institute of Public Health and at the regional Centers of Public Health.

According to the Basel Convention that determines the rules and conditions for control of transboundary transport of hazardous waste and its storage, ratified by our side (Official Gazette No.49/97), there was a possibility for export of hazardous waste under conditions proscribed in the Convention and with an agreement with other side where exists conditions for treatment of it.

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But, real problem is disposal of chemical waste produced in the laboratories of the IPH.

Actual practice (until 2011) include its storage in the chemical safety depot in close vicinity of the Institute, with regard of secured regular surveillance, as well environmental protection measures and measures to protect human health.

Based upon article 32, paragraph 1 and 2 of the Waste Management Law, IPH needed final solution of the storage and final disposal of the hazardous chemical waste, up to article 33, paragraph 4 storage of hazardous waste cannot be longer than one year in case waste is planned for disposal.

IPH as hazardous waste producer has carried the evidence in accordance with the article 60, paragraph 1 of this Law.

In article 65, paragraph 1 is proscribed that legal and physical entities that are producing or posses hazardous waste can make an agreement for collection and transport of chemical waste with legal entities that have Licence for collection and transport of hazardous waste.

IPH during its work is continuously aiming on environmental protection and prevention of adverse health effects of the employees, as well population living nearby. In order to be able to solve this actual issue, particularly from the aspect of non-existing Hazardous Waste Landfill in the Republic of Macedonia, as well lack of the Hazardous Waste Treatment Facility, IPH as a health facility for tertiary preventive health care had a goal for proper solution of this actual environmental-health risk that exist in all country, in all legal entities that produce hazardous chemical waste. Related to the needs of solution of collection and transport of chemical waste produced in the former period, as well the possibility of eventual integral solution of the chemical waste problem, IPH has conducted a situation analysis of quantities and content of hazardous chemical waste (as well DDT), which was still in the chemical waste depots of the Institute of Public Health (1126.5 liters liquid and 5888 kg solid chemical waste) and at the regional Centers of Public Health (122.65 liters liquid and 90.95 kg solid chemical waste), or totally from the IPH and CPHs - 1249.15 liters liquid and 5978.95 kg solid chemical waste.

Dunne et al. 1990 in their paper have presented the results of a community health survey of people living near a hazardous chemical waste site in Kingston, Queensland. In comparison with a matched control group, people near the site were no more likely to report serious diseases, and reports of cancer and mortality rates did not differ in the two groups. Kingston residents reported higher rates of symptoms of general poor health, high levels of stress and anxiety and a higher incidence of miscarriages. The reports of poor physical health appear to be independent of proximity to the hazardous waste site and duration of residence in the area. Symptom prevalence and perceived recent decline in health correlate most strongly with the stress and anxiety measures.

While long-term investigation is necessary, it appears at this stage that the chemical waste is not associated with an increase in major diseases as reported by those who were interviewed. When health in a broader sense is considered, however, it is clear that the situation has had a negative impact.

Increasing worldwide use of chemicals, including heavy metals used in industry and pesticides used in agriculture, may produce increases in chronic diseases in children unless steps are taken to manage the production, use, trade, and disposal of chemicals. In 2020 the developing world will account for 33 percent of global chemical demand and 31 percent of production, compared with 23 percent and 21 percent, respectively, in 1995. Trasande et al. 2011 in their paper have described present and potential costs of environmental exposures and discussed policy options to protect future generations of children in a sustainable development context. Specifically, they have described the principles of sound chemicals management. Authors recommended that industrializing nations in particular employ these principles to prevent disease among their populations while at the same time minimizing the risk to their own economic development.

The amount of waste produced is connected with the degree of a country's economic development; more developed countries produce more waste. The paper of Marinkovic et al. 2005 reviews the quantities, manipulation and treatment methods of medical waste in Croatia, as well as hazardous potentials of medical waste for human health. They stressed that Croatian medical waste legislation is not being implemented. They recommended that it is very important to establish a medical waste management system that would implement the existing legislation in all waste management cycles from waste production to treatment and final disposal.

Gunson et al. 2011 in their paper have elaborated a chemical exposure within the Mohs laboratory that can present a significant occupational hazard. Acutely toxic and potentially carcinogenic formaldehyde was found at high levels in a relatively standard laboratory configuration. They have recommended that a laboratory can be designed with a combination of physical environment and operational protocols that minimizes hazards and creates a safe working environment.

In the paper of Ma et al. 2007 rates of hospitalization for asthma and respiratory infectious disease in children were modelled as a function of residence. After adjustment, living in a zip code containing a POPs waste site significantly increased the frequency of hospitalization for asthma and infectious respiratory disease. Living in a zip code with an 'other' waste site also increased hospitalization frequencies for both diseases. The association was strongest for zip codes whose residents were in the lowest quartile of medium

family income. This evidence supports the hypothesis that living near a hazardous waste site increases risk of respiratory disease in children.

Approximately 1 in 4 Americans lives within 4 miles of a hazardous waste site according to the EPA. In light of this large proportion and the public's high level of concern that hazardous waste causes health problems, it is important for primary care physicians and other health care providers to know that residential proximity to some kinds of hazardous waste sites is associated with adverse reproductive effects. Findings from both state-based surveillance programs and studies of individual hazardous waste sites have shown increased risk of congenital malformations and reductions in birth weight among infants born to parents living near hazardous waste sites (Johnson, 1999).

Material Safety Data Sheets (MSDS) must accompany all initial incoming shipments of all chemicals. MSDSs must be readily available to all personnel in the labs where the chemicals are stored and where they are used. MSDSs shall be kept in three-ring binders near the door so that personnel can familiarize themselves with new chemicals before getting them out and using them. Before ordering a new chemical, laboratory personnel should obtain information on proper handling, storage, and disposal methods for that chemical. The chemical storage area should be posted with an appropriate sign. Chemicals must be stored in appropriate containers and correctly labelled. Chemical compatibility must be determined to reduce the likelihood of hazardous reactions. All chemicals should be labelled before being transported. Containers used for the accumulation of hazardous waste must be in good condition, marked with the words "waste" or "spent" and its contents indicated, free of leaks and compatible with the waste being stored in them. All accidents, hazardous materials spills, or other dangerous incidents should be reported. All lab's staff must be trained how to use Personal Protective Equipment (Burton et al. 2007).

Kochubovski, 2011 in his paper has stressed the importance of organizing training for proper management of the health-care waste. In 2000, 2002, 2007 and 2008 have been provided training courses to responsible persons from the Health care Institutions, as well State Sanitary and Health Inspectorate.

## **5. Conclusion**

It can be concluded that the way of managing and disposal of hazardous chemical waste from the Institute of Public Health and Centers of Public Health in the Republic of Macedonia has been made according to the rules established by the Basel Convention with the aim to safeguard the environment and human health.

## 6. Recommendation

All Health care Institutions that are producing chemical hazardous waste should have a chemical depot. Also they need to follow safe procedures to protect their staff's health, and to use personal protective equipment. Final disposal of hazardous chemical waste should be done on a Hazardous Landfill, or to be treated in High-Temperature Hazardous Waste Incinerators that fulfil emission standards according to the EU's requirements in order to protect the environment and human health.

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