



NATIONAL ENVIRONMENTAL AUTHORITY

DEPARTMENT OF ENVIRONMENTAL QUALITY PROTECTION

**PILOT PROJECT ON STRENGTHENING THE DEVELOPMENT OF AN
INVENTORY AND RISK MANAGEMENT IN MAKING DECISIONS ON**

MERCURY

Summary of the Final Report

**“National Emissions Inventory of Mercury in
Panama”**

With the cooperation of

**United Nations Institute For Training and Research
(UNITAR)**

U. S. Environmental Protection Agency (US EPA)

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1. INTRODUCTION

According to several reports, including the Global Mercury Assessment (GMA) developed by the United Nations Environmental Programme (UNEP) in 2002, levels of mercury in the environment have increased considerably from the beginning of the industrial era. It has been determined with great exactitude, that mercury is a persistent and accumulative pollutant, which enters trophic levels of food chain in a well-known dangerous form known as methylmercury. Mercury contamination has global character and circulates around the planet, affecting as distant places as the Arctic.

Because of the high mercury levels reported worldwide, the Governing Council of the United Nations Environment Programme (UNEP), through GC decision 21/5, requested UNEP Executive Director undertake a global assessment of mercury and mercury compounds, in cooperation with other members of the Inter-Organization Programme for the Sound Management of Chemicals (IOMC), to be presented to the Governing Council at its 22nd session in 2003. In this context, UNEP established the Global Mercury Program to assist countries to identify, understand and implement actions to mitigate mercury problems; to develop guidance materials and toolkits; and to support Governments and other stakeholders to develop and implement partnerships, in a clear, transparent and accountable manner.

In the last two years, Panama has had significant progress concerning the sound chemicals management, becoming a pioneer country in the Central American Region in topics such as the implementation of the Strategic Approach for the Integrated Chemical Management (SAICM). In addition, the country counts with a National Chemicals Management Profile and has recently finished the national inventories regarding the implementation of the Stockholm Convention (for COP's pesticides, PCB's, dioxins and furans).

In June 2006 our country was chosen to be one of the five pilot countries to develop a national project related to SAICM implementation, along with Pakistan, Belarus, Mongolia and Tanzania. The project *Strengthening of Governance, Civil Society Participation and Partnerships for Chemicals and Waste Management* receives technical support of the United Nations Institute for Training and Research (UNITAR) and the financial assistance from the Government of Switzerland, as a contribution to the SAICM Quick Start Programme (QSP).

Starting in early 2007, three Latin American countries - Chile, Ecuador, and Panama - were selected to participate in a pilot project to provide information on the magnitude of mercury emissions at national level by developing National Mercury Emissions Inventories and linking them to national PRTR systems.

A Letter of Understanding was signed between the National Authority of the Environment (ANAM) of Panama and the United Nations Institute for Training and Research (UNITAR) in June 2007 to develop this project. In this context, the following outcomes were expected to be completed by the end of the project:

- A National Mercury Releases Inventory including the main categories of country emission sources, emission pathways within each category and emission quantification.
- A National Strategy to address the integration of the National Mercury Inventory within a national PRTR system.
- A National Mercury Risk Management Plan outlining options to reduce mercury releases and exposures, taking into account national conditions.

2. PROJECT OBJECTIVES

- Developing a mercury emissions inventory report
- Developing a strategy to institutionalize a mercury emissions reporting system within the framework of a national PRTR system
- Designing a plan for mercury risk management taking into account emission inventory data (and mercury containing products); and
- Engaging stakeholders in partnerships for mercury emission reporting and risk reduction

3. PROJECT RESULTS

3.1 Preparatory activities

Since March 2007, ANAM had led several informative meetings and workshops in order to facilitate the implementation of the “Reinforcing Pilot Project for the Development of a Mercury Emissions Inventory and Risk Management Decision-Making on Mercury”, as follows:

- (i) **A meeting for divulgence of the Project** was held in the Assembly Hall of the Research and Postgraduate Office of the University of Panama on March 8 of 2007. At the event were representatives of the National Authority of the Environment (ANAM), UNITAR, Ministry of Health (MINSAs), University of Panama (UP), the electric company Union FENOSA, Ministry of Commerce and Industry (MICI), Ministry of Agricultural Development (MIDA), Green Panama and the Central American Commission for Environment and Development (CCAD).
- (ii) **The National Launching of the Mercury Emissions Inventory** was held in the Regional Office of ANAM in the Province of Chiriqui on October 12 of 2007.

Representatives of ANAM, MINSA, UP, MIDA, clinics and hospitals, and mercury related industries attended the event.

- (iii) **A Workshop to Strengthen Capacities on Risk Management Decision-Making on Mercury** was organized in the Bristol Hotel of Panama City during February 18 and 19 of 2008. Among attendees were representatives of ANAM, UNITAR, MINSA, MIDA, MICI, National Authority of Customs (ANA), Non-Governmental Organizations (NGOs), Cement Manufacturing Industries, Electric Companies (Union FENOSA and Elektra Noreste), Municipal authorities (Mayors) of different provinces, General Audit of the Republic, Recycling Companies.
- (iv) **Workshops to Strengthen Capacities on Risk Management Decision-Making on Mercury** were held in different provinces of the country (Los Santos, Herrera and Veraguas) from May 12 to 16 of 2008. Representatives of several governmental and academic institutions participated as well as leaders of the community.
- (v) **A workshop on the endorsement of the National Risk Management Plan for Decision-Making on Mercury** and the strategy to institutionalize a mercury emissions reporting system within the framework of a national PRTR system was organized in the Metropolitan Natural Park of Panama City on September 22 of 2008. The event was attended by representatives of ANAM, MINSA, ANA, MIDA, MICI, Ministry of Economy and Finances (MEF), General Audit of the Republic, NGOs, UP and Recycling Companies.

3.2 Development of the Mercury Emissions Inventory Report

The results of the Mercury Emissions Inventory Report reflect country diagnosis for year 2005. Seven categories were identified, which corresponded mainly to mining, commercial and health sectors. Data of significant magnitude are mainly concentrated in the commercial and health sectors, particularly under the source category of wastes disposal. Although, there are not suitable controls and information on informal mining and other medical activities, they should not be discarded as potential risks.

Panama is not an industrial manufacturing country and all mercury containing products are exported from other countries. As Table N°1 shows, mercury release pathways have been catalogued as potential; this because during life cycle of mercury, liberation is zero (0) for the use phase (product) but not for the final disposal. Nevertheless, this consideration is limited since it cannot be applied for the health and commercial sectors, where potential risk of mercury emissions is significant during the use stage. Thus, categories with greater magnitude of mercury emissions are: (1) Production of other minerals and materials with mercury impurities, (2) Consumer products with

intentional use of mercury and (3) Wastes deposition/landfilling and waste water treatment.

Table N°1. Total Mercury Emissions by Identified Source Category

Main source category	Total mercury emissions/year				
	Air	Water	Land	Products	Wastes/residues
Extraction and use of fuels/energy sources	2.69 Kg	0.0	0.0	0.0	0.0
Production of other minerals and materials with mercury impurities	54.60 - 2.77x10 ³ Kg	0.0	0.0	0.0	0.0
Consumer products with intentional use of mercury	14.64 - 278.60Kg	5.54 - 221.78Kg	12.68 - 204.30Kg	0.0	114.60 - 1.81x10 ³ Kg
Other intentional products/process uses	57.34 Kg	234.56Kg	0.0	13.24 - 466.77Kg	13.24 - 172.93Kg
Waste and residue incineration	0.73 - 7.30Kg	0.0	0.0	0.0	0.08 - 0.82Kg
Wastes deposition/landfilling and waste water treatment	172.40 - 1.72x10 ³ Kg	2.40x10 ⁻⁵ - 4.81x10 ⁻⁷ Kg	0.0	0.0	0.0
Crematoria and cemeteries	0.65-2.6Kg	0.0	13.98-53.92Kg	0.0	0.0
Total Quantified Releases	243.02 - 4.84x10 ³ Kg	5.54 - 456.34Kg	26.66 - 258.22Kg	13.24 - 466.77Kg	127.92 - 1.98x10 ³ Kg

The previous table shows that main mercury releases occur through air, ranging from 243.02 to 4.84 x10³ kilograms. Therefore air is presumably the more contaminated release pathway.

3.3 Establishment of high-priority areas

As showed in Table N°2, the subcategories of major importance were: (1) Cement production, (2) Informal dumping of general waste and (3) Electrical switches and relays with mercury. In relationship to the estimated high values for the subcategory of electrical switches and relays with mercury, it is important to take into account that estimations were based on country actual population, which would represent a high error margin for calculations of mercury emissions.

Table N°2. Total Mercury Emissions by Identified Source Subcategory.

Main Source Subcategory	Total mercury emissions/year				
	Air	Water	Land	Product	Wastes/residues
Extraction and use of fuels/energy sources					
Mineral oils - extraction, refining and use	2.64Kg	0.0	0.0	0.0	0.0
Biomass fired power and heat production	0.048Kg	0.0	0.0	0.0	0.0
Production of other minerals and materials with mercury impurities					
Cement production	54.6 - 2,775.5Kg	0.0	0.0	0.0	0.0
Production of lime and light weight aggregates kilns	0.491Kg	0.0	0.0	0.0	0.0
Consumer products with intentional use of mercury					
Thermometers with mercury	1.84 - 73.92Kg	5.54 - 221.78Kg	0.0	0.0	11.1 - 443.56Kg
Batteries with mercury	45.68Kg	0.0	45.68Kg	0.0	91.36 Kg
Light sources with mercury	0.12 - 0.38Kg	0.0	0.0	0.0	1.98 - 7.25Kg
Electrical switches and relays with mercury	12.68 - 158.62Kg	0.0	12.68 - 158.62Kg	0.0	101.52 - 1.27x10 ³ Kg
Other intentional products/process uses					
Dental mercury-amalgam fillings	6.18Kg	4.33Kg	0.0	370.84Kg	74.16Kg
Manometers and gauges	0.0		0.0	13.24 - 95.93Kg	13.24 - 95.93Kg
Laboratory chemicals and equipment	51.16Kg	230.23Kg	0.0	0.0	2.84Kg
Mercury metal use in religious rituals and folklore medicine	I	I	I	I	I
Waste and residue incineration					
Incineration of municipal/general waste	0.46 - 4.6Kg	0.0	0.0	0.0	0.052 - 0.52Kg
Incineration of hazardous waste	0.27 - 2.7Kg	0.0	0.0	0.0	0.030 - 0.30Kg
Incineration of medical waste	0.0013 - 0.0048Kg	0.0	0.0	0.0	0.0004 - 0.00072Kg

Main Source Subcategory	Total mercury emissions/year				
	Air	Water	Land	Product	Wastes/residues
Wastes deposition/landfilling and waste water treatment					
Controlled landfills/deposits	39.9 – 399Kg	0.0	0.0	0.0	0.0
Informal dumping of general waste	132.5 – 1,325Kg	0.0	0.0	0.0	0.0
Waste water system/treatment	0.0	2.4x10 ⁻⁵ - 4.81x10 ⁻⁷ Kg	0.0	0.0	0.0
Crematoria and cemeteries					
Crematoria	0.65 - 2.6Kg	0.0	0.0	0.0	0.0
Cemeteries			13.98 - 53.92Kg		

I: pending further research

The analysis of the previous table pointed out that commercial and health sectors in Panama are those that generate the major amount of residues with mercury content. The following sectors have been defined of high priority to develop future strategies towards reduction of mercury emissions:

1. Laboratory chemicals and equipment (Health and Commercial sectors).
2. Production of other minerals and materials with mercury impurities (Mining and Commercial sectors).
3. Integrated waste management (waste reuse, treatment and disposal of wastes/residues with mercury content).
4. Products/process with mercury content (Health sector).
5. Mercury metal use in religious rituals and folklore medicine (Health and Commercial sectors).

The complete document of the Mercury Emissions National Inventory in Spanish, is being included in Annex 1.

3.4 Development of the National Plan for Mercury Risk Management in Panama

The Strategic National Plan for Mercury Risk Management in Panama covers a five-year period from 2008 to 2012. Therefore, institutions in charge of different products and activities must prepare annual operative plans and budgets in order to implement it.

This National Plan was reviewed and validated by relevant actors of the public and private sectors and the civil society, during a workshop carried out on September 22 of 2008. Using a validation instrument, the plan was first discussed widely in working groups and later, in a plenary session.

Table N°3 compiles in detail products, activities, indicators and responsible institutions of the National Plan for Mercury Risk Management in Panama. Coordinating institutions directly in charge of the different products and activities are bold and underlined in the respective column.

预览已结束，完整报告链接和二维码如下：

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