



PROJECT FOR STORAGE AND DISPOSAL OF MERCURY IN PANAMA



Final Report



UNEP-YMCA Panama Agreement

Elaborated by Augusto Mendoza

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María Inés Esquivel	Ministry of Health (MINSa)
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Katia Broce	Technological University of Panama
Alexander Esquivel	Technological University of Panama
Francisco Beens	YMCA, Panama
Lourdes Alvares	YMCA, Panama
Anabella Macia	YMCA, Panama
Jorge Conte	NGO Contaminación Cero
Anabel Tatis Ramirez	Consultant

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Executive Summary

A. Regulatory Framework

Results of the analysis of the regulatory framework determined that there are no specific legal rules in the Republic of Panama with environmental standards that establish maximum permissible mercury emissions to protect the environmental quality of the factors water, air, soil and biota as well as human health protection. Similarly, there are no specific rules for the temporary storage location of elemental mercury waste, mercury contaminated waste and PRTR. However, there are some legal rules that may apply to the registration of sources of emissions and other specific rules that may apply to regulate the import and export of elemental mercury and mercury-containing products.

For some very specific activities there are regulations applicable to control mercury releases.

In the Republic of Panama there is a fairly recent rule regulating the authorization procedure for activities related to hazardous waste management, which includes specifically elemental mercury, its products, and waste, within the framework of hazardous waste. Likewise, there are clear regulations that establish procedures and rules for the inspection of facilities handling mercury waste, but not for this substance in its pure state or its products. On the other hand, the process of Environmental Impact Assessment and Risk related to mercury, its products and waste is clearly stated in the regulation of the General Environmental Law.

It should be noted that there is a National Policy on Integrated Hazardous and Non-hazardous Waste Management, including elemental mercury waste and waste contaminated with mercury. Import of hazardous waste is prohibited, including elemental mercury waste and mercury-contaminated waste.

It is necessary to develop a rule establishing or directing an institutional coordination to address the issue of mercury waste, and it is essential to create a legal provision that criminalizes or defines a list of hazardous substances and waste including among them mercury waste, and likewise there should a legal provision requiring the creation and monitoring of a Pollutant Release and Transfer Register (PRTR).

B. Inventory Update

The results of the inventory update indicate increased mercury releases caused by some products; this is due to sustained economic growth experienced by the Republic of Panama in recent years. The three largest sources of mercury release will be described. For more information on the other sources of release please refer to Annex 5 on page 40.

The highest mercury releases to factors air, water and waste are identified by the Subcategory 5.5.4 *Batteries with mercury*, with a value of 18278.71 kg Hg/year.

In second place, the document describes the mercury releases to factors air, water and land, from by-products classified in the Subcategory 5.9.4 *Informal dumping of general waste*, with mercury releases valued at 2232.66 kg Hg/year.

In third place, the release of mercury to factors air, impurities in products and waste products caused by products classified in the Subcategories 5.3.1 *Cement production*, have a value of 1532.62 kg of Hg per year.

C. Potential sites for temporary storage of elemental mercury waste and mercury-contaminated waste

During the project, several potential sites for temporary storage of elemental mercury waste and mercury-contaminated waste were identified after evaluating the characteristics of location and other criteria such as:

- a. Proximity to the largest generation of waste;
- b. Availability of space;
- c. Compliance with environmental rules;
- d. Proximity to nearest populated place (near, far);
- e. Adequate security to prevent access to outsiders;
- f. Accessibility (highways, roads);
- g. Zoning (urban, semi-urban, rural);
- h. Land use (commercial, industrial, agricultural);
- i. Location in a seismic zone;
- j. Location in geological faults;
- k. Flood area;
- l. Nearby water sources;
- m. Local aquifer;
- n. Nearby vulnerabilities (cultural heritage, schools, hospitals);
- o. Waste handling in the area;
- p. Mercury waste handling in the area.

The following chart describes the identified potential sites for temporary storage of elemental mercury waste and mercury-contaminated waste, and the corresponding responsible entity:

Possible sites of interest	Responsible Entity
Bunkers	Ministry of Security
Cerro Patacon Landfill	Authority of Urban and Household Sanitation (private concession management)
EMAS controlled dump	Municipality of La Chorrera (private concession management)
Lands of the Tocumen extension of the Technological University of Panama.	Technological University of Panama
Ecologic S,A	Private company

1. Background

This document includes the results obtained within the framework of the agreement between UNEP and YMCA-Panama, to develop a Project for Storage and Disposal of Mercury in Panama - Phase 1. In particular, the contents of this report include an introduction to the legal framework (summary of deliverable 2), an analysis of the current waste management in Panama, particularly hazardous waste and mercury, including the list of treatment facilities (deliverable 1). It also provides information on updating the national emissions inventory (summary of deliverable 3), in order to contribute to a greater context to the document. This paper also contains a section corresponding to the identification of stakeholders (deliverable 4), including the description of actors, their roles, and the progress in the establishment of a working group. Finally it provides a preliminary assessment of management options (deliverable 5).

It should be noted that in February 2009 the UNEP Governing Council adopted Decision 25/5 on the development of a legally binding global instrument on mercury. On Saturday January 19, 2013, in the early morning, the governments agreed to the wording of a global legally binding instrument on mercury which gave birth to the "Minamata Convention on Mercury." The next Plenipotentiary Conference held in Minamata will celebrate the acceptance of the Convention in question.

International action is indirectly addressing the concerns in the area of healthcare through the reduction of emissions and releases to the environment. These include point sources reduction and control of products containing mercury, reducing the use of procedures that use mercury, solid waste management and structural approach to reduce the use of mercury in artisanal gold mining.

These measures will reduce mercury levels in fish and they should also lower levels in the environment as well. In some fish species, this reduction can be seen fairly quickly, while in other species, the levels will decrease more slowly. However, much of the mercury emitted in the past will impact the environment in the coming years. So it is necessary to take action starting now to lessen the impact of exposure to mercury.

2. Regulatory Framework

2.1 Summary of the review of the regulatory framework in the field of hazardous waste including the national policy on the management of hazardous and solid waste.

In the Republic of Panama there are several legal provisions applicable to hazardous waste, either in specific or general way. However, there is no proper regulatory framework for the management of mercury waste. The provisions applicable to hazardous waste are:

- **Law 66 of November 10, 1947**, which approves the Health Code
- **Law N° 21 of December 6, 1990**, which approves the Basel Convention on the Control of Transboundary Movements of Hazardous Waste and their Disposal.
- **Law N° 8 of June 7, 1991**, which prohibits the importation of toxic waste or pollutants into the territory of the Republic of Panama.

- **Law N° 13 of April 21, 1995**, which approves the Regional Agreement on Transboundary Movement of Hazardous Waste, signed at Panama on December 11, 1992.
 - **Law 41 of 1 July 1998**, General Environment Law of the Republic of Panama. **Board.**
 - **Executive Decree N° 111 of June 23, 1999**, which establishes the rules for the management and handling of solid waste from health facilities.
 - **Technical Regulations DGNTI - COPANIT 47 - 2000**, Water uses and sludge disposal.
 - **Law 3 of January 20, 2003**, which ratified the Stockholm Convention.
 - **Executive Decree N° 156 of May 28, 2004**, which establishes health standards for the approval of projects for the construction and operation of safety landfills and other provisions.
 - **Executive Decree N° 293 of August 23, 2004**, which dictates the health standards for obtaining construction and operation permits as well as for monitoring systems of incineration and co-incineration of both hazardous and non-hazardous waste.
 - **Law 5 of January 28, 2005**, which adds a title called Environmental Crimes, to Book II of the Penal Code, and introduces other provisions.
 - **Executive Decree N° 34 of February 26, 2007**, which approves the National Policy on Integrated Management of Hazardous and Non-Hazardous Waste, its Principles, Objectives and Action Items.
 - **Executive Decree N° 249 of June 3, 2008**, “Which sets the health standards regarding disposal of pharmaceutical and chemical waste.”
 - **Resolution N° 455 of June 9, 2009**, which established the registry for firms engaging in the collection and transportation of hazardous medical waste from health facilities.
 - **Executive Decree N° 123 of August 14, 2009**, which regulates Chapter II of Title IV of the Law 41 of July 1, 1998 General Environment Law of the Republic of Panama and repeals Executive Order N° 209 of September 5, 2006. It regulates the process for Environmental Impact Assessments.
 - **Executive Decree N° 40 of January 26, 2010**, establishes the activities related to high-risk situations for their implications to public health or the environment, the types of establishment that are of health interest due to their line of business, and introduces other provisions.
 - **Resolution N° 1535 of December 30, 2010**, which authorizes the Minister of Health to conduct the recruitment of duly authorized companies so that the Ministry of Health (MINSAs) will be responsible for the collection, transportation, treatment and disposal of hazardous hospital waste from public health facilities and the Social Security Fund which are located in the districts of Panama and San Miguelito.
 - **Resolution N° 1029 of November 8, 2011**, which establishes the requirements and procedures for obtaining a Health Operating Permit, for all the operators engaged or wishing to engage in activities related to the classification, packaging, packing, collection, transportation, temporary storage, treatment, grinding, neutralization, recycling, encapsulation, recovery, reuse and disposal of hazardous wastes.
 - **Resolution N° 11 of January 11, 2013**, by which the Ministry of Health will be responsible for the collection, transportation, treatment and disposal of hazardous hospital waste from health facilities nationwide by hiring companies duly authorized.
- Annex 1, page 35, describes the legal provisions on land use

2.2 National or regional policy on hazardous and solid wastes

Executive Decree N° 34 of February 26, 2007 approves the National Policy on Integrated Management of Hazardous and Non-Hazardous Waste, its Principles, Objectives and Action Items.

The general objective is to achieve an integrated management of hazardous and non-hazardous waste that is environmentally sound and sustainable, ensuring the conservation of the environment in the country and eliminating the negative effects on the environment and health of the population that is socially and economically efficient and viable.

Annex 2, page 36, details the principles and objectives of the National Policy on Integrated Management of Hazardous and Non-Hazardous Waste.

2.3 Conclusions from the analysis of the regulatory framework for hazardous waste, including those that apply to mercury and its wastes, as well as national policy for the management of solid waste and hazardous waste .

- 1- In the Republic of Panama there are specific rules with environmental standards that establish maximum permissible limits for the protection of environmental quality of air, water, soil and biota.
- 2- There are also legal rules that may apply to the registration of sources and other specific rules that could be applied to regulate the import and export of elemental mercury and its products, but there is no legal provision applicable to the PRTR.
- 3- There are regulations applicable to releases of mercury for some activities related to the handling of mercury and its products as well as for the allocation of land use depending on the activity to be performed.
- 4- There is a fairly recent legal norm regulating the authorization procedure for activities related to handling hazardous waste, including facilities engaged in activities with elemental mercury and mercury-contaminated waste.
- 5- The Republic of Panama by Law prohibited the import of contaminated waste, which applies to mercury waste.
- 6- There are legal provisions that apply to or provide procedures and rules for the inspection of facilities handling mercury wastes, but not for this substance in its pure state or its products. Similarly, the process of Environmental Impact Assessment and Risk related to mercury, its products and waste is clearly stated in the regulation of the General Environmental Law.
- 7- There is no specific standard for the location of temporary storage of mercury waste, Executive Decree N° 111 of 1999 only provides the features that should comply with the temporary storage of hazardous hospital wastes in the hospitals, and Resolution N° 1029 establishes health requirements for those wishing to engage in activities related to the storage of hazardous wastes, including mercury waste.
- 8- There is much regulatory dispersion, meaning that there are many regulations that talk about mercury specifically and others in a very general way.
- 9- Notably, in the Republic of Panama there is an excellent National Policy for Integrated Management of Hazardous and Non-Hazardous Waste, with its well-established principles in accordance with international principles, viable objectives and applicable lines of action, but that is not being developed nor implemented.

- 10- It is necessary to develop a rule establishing or addressing an institutional coordination to address the issue of mercury and its wastes.
- 11- It is essential to create a legal provision that typifies or define a list of hazardous substances and wastes including among these the disposal of mercury.
- 12- There should be a legal provision requiring the creation and monitoring of a Pollutant Release and Transfer Register.
- 13- It is advisable that, through the appropriate norm, the international conventions ratified by the Republic of Panama, in which mercury and mercury wastes apply, should be regulated.
- 14- The Technical Guidelines of the Stockholm and Basel Conventions should be taken in through appropriate legislation.

3. Management and Handling of Hazardous Wastes

3.1 Management of Hazardous Waste

This category includes general industrial waste (manufacturing, agriculture, services, etc.), health facilities, waste generated in laboratories, wastes from armaments and other sources with hazardous characteristics such as batteries, cells, switches, relays, fluorescent tubes, mercury containing lamps, silver and zinc, etc.

In the Republic of Panama, the competence of the municipalities is restricted to the management of municipal solid waste; MINSA, in coordination with the National Environmental Authority (ANAM) maintains the powers of governance and regulation of hazardous wastes.

It is noteworthy that the hazardous waste management in general is the responsibility of the generators. Industrial waste generators submit their generated waste to treatment methods existing in the country, in order to neutralize their dangerousness and to dispose them in the available disposal sites in the various municipalities.

In the case of hazardous waste generated in health facilities belonging to the MINSA and Caja de Seguro Social (Social Security Fund [CSS]), state institutions, located in metropolitan districts of Panama and San Miguelito, it was verified that after an acceptable intrahospital management and collection in red bags, these wastes were collected by the collection vehicles of the urban sanitation system and taken to the landfill at Cerro Patacon and deposited in a hole previously opened for that purpose and then covered with soil. In the rest of the country, some of these wastes are disposed in open dumps and others are burned in the open or in small makeshift ovens.

Until 10 January 2013 competent authorities have been in compliance with what was ruled in Resolution 1535 of December 30, 2010, which stated that MINSA, through duly authorized contracting business, is responsible for the collection, transportation, treatment and final disposal of hospital hazardous wastes generated by the public health facilities and the CSS that are located within the districts of Panama and San Miguelito.

In this regard, firms from the incineration sector were hired to proceed to the collection, transportation and incineration of hazardous hospital wastes generated in the health facilities mentioned above; for the rest of the country the situation has not changed.

Resolution N° 011 of January 11, 2013 states that the Ministry of Health, through duly authorized contracting business, is responsible for the collection, transportation, treatment and disposal of hazardous hospital waste from public health facilities nationwide. Private health facilities, the facilities of the Social Security Fund and those administered by them, the Trustees except those located in the province of Panama, will be responsible for ensuring collection, transportation, treatment and disposal of dangerous hospital waste by contracting companies duly authorized by the Ministry of Health, complying with current standards in this area.

Likewise, the legal rule states that if there are no firms for the collection, transportation, treatment and disposal of hazardous hospital waste, private health care facilities, the Social Security Fund and the Trustees in coordination with the Ministry of Health and municipalities will seek necessary alternatives to address immediately the collection of hazardous hospital waste from these health care facilities nationwide.

By provisions of Executive Decree N° 249 of June 3, 2008, the disposal of pharmaceuticals and chemicals wastes should be done following the methods and procedures in accordance with the basic guidelines issued by the manufacturer and approved by the Ministry of Health.

There is an initiative from several private companies and NGOs involved in recycling of hazardous waste, including waste from batteries and cells in general, fluorescent lights and computers. It may be noted in this regard that:

1. The batteries are collected by a recycling program that is implemented at fairs and schools, and then stored in a warehouse of the company that is dedicated to this task, and then subjected to a treatment that involves encapsulating them in concrete, which is within of the Technical Guidelines of the Basel Convention, preventing them from being deposited in dumps or landfills.
2. Fluorescent lamps are picked up by the NGOs directly from large generators (private companies) to be crushed and then, by means of a special filter, the white powder is collected; when the filter is filled it is then stored in 55-gallon tanks and stored in the company's warehouse until treated or shipped abroad for either treatment purposes or permanent storage; the same process applies to the resulting glass waste.
3. Computers are received, on one hand, by an NGO that repairs them by making one good computer from several damaged ones and resells them, but keeps a large amount of computer scrap without any storage rescue; on the other hand, a private company captures computers, scraps them and ships the electronic waste to the United States of America, whereas plastic waste and cathode ray tubes are sent to the landfill at Cerro Patacon.

While these reuse and recycling initiatives are in an incipient process, authorities in charge of the steering role of residues and wastes may aim to invest resources and implement policies related to

this issue to achieve an increase in the residues and waste generated, thus reverse the large amount of residues and wastes entering dumps and landfills across the country. It is estimated that the amount of hazardous waste recycled is between 2% to 5% of the total, nationwide.

As we have verified, the Republic of Panama is still in the process of creating a culture of recycling and reuse, so waste generators deposit waste in containers or throw them directly in communal dumpsters, not caring whether they can take advantage of these wastes or that by disposing of them in these spaces can generate, in the future, irreversible damage to the environment and humans. However, there are considerable efforts on the part of the National Environmental Authority, in coordination with some environmentalist NGOs, municipalities, the Ministry of Education and universities, aimed at implementing pilot projects for recycling and reuse through training and evaluation.

3.2 Management of Mercury Waste

The Panama Canal Authority performs a selective collection of mercury-containing luminaires, crush and transport them properly stored in special bags to the Cerro Patacon landfill to be deposited in an area previously coordinated and especially equipped for this purpose; it should be pointed out that the Panama Canal Authority carries out all its operations based on the implementation of ISO 9001 and 14000. Similarly, electric power distribution companies perform a selective collection of mercury-containing lamps, store them in 55-gallon tanks with special features (glass mixed with dust and metal); these companies are scheduled to ship in 2013 equipment contaminated with PCBs and mercury-contaminated luminaires to France for treatment and/or disposal.

A small amount cells and batteries containing mercury, as well as double-ended fluorescent lamps and compact fluorescent lamps are collected by the company Ecologic, S.A. The cells and batteries are stored in a temporary storage of the company and then subjected to a treatment that involves encapsulating them in concrete, which is within of the Technical Guidelines of the Basel Convention. The double-ended fluorescent lamps and compact fluorescent lamps are specially treated to, according to the company, trap mercury vapor that is subsequently neutralized in steel tanks that are then stored in temporary deposits on company grounds.

In the case of elemental mercury waste generated in health facilities belonging to the government, they are placed in glass jars and stored in working areas either in pre-made shelves, improvised deposits or under desks. Providing temporary storage is unknown in private firms for the mercury waste they generate, what is certain, however, is that there are no records in the Ministry of Health for approval of treatment or disposal of elemental mercury waste.

Other medical mercury-containing waste such as denture amalgams are placed in municipal solid waste disposal sites without any pretreatment.

Medical equipment disused or damaged that contain mercury are kept in deposits within health facilities and in few cases they end up in landfills or solid waste landfills.

According to a query run using the SICE database from the National Customs Authority, since 2009 to date there have been no imports of glass, medical or any other use mercury-containing thermometers, only digital features thermometers are entering the country.

Other mercury-contaminated waste such as electrical and electronic switches, contactors, relays, light sources, cells and batteries, gauges, blood pressure gauges, barometers, pressure valves and thermostats are handled in similar fashion to other waste, i.e., there is no selective collection of them and mostly end up in existing dumps and landfills.

4. Mercury waste flows in Panama

4.1 Summary of the updated national inventory of releases

This report contains the Updated Mercury Emissions Inventory of 2008 adapted to the new 2011 version of the Toolkit. The results framed in each of the identified sources reflect the country diagnosis for 2011. We identified nine main categories corresponding to the health and trade sectors, respectively. Like the 2008 inventory, again the trade and health sectors are highlighted. Annex 3, page 37, shows the distribution by sector the identified categories.

4.2 Mercury release sources identified

This section presents the discharges and emissions sources identified as existing in the territory.

Annex 4, page 38, shows the release sources identified as present or absent only, nationwide, and the mercury inputs in kg/year. It is important to consider that most of the evaluations come from the categories of products that are only consumed in the country (imports) because our territory is characterized as rather one of service and/or consumption than manufacturer.

4.3 Missing Data

As in the 2008 inventory, the current update of the inventory presented difficulty in obtaining information, including that which was obtained from the tariff system of the National Customs Authority, as to suggests the need to rethink the import controls of elemental mercury and mercury-containing products, through the authorizing agency or authority, by raising a red flag, so that it would require importers of these products to provide certain relevant information to maintain an updated inventory in the future.

The corresponding and/or affected categories by these limitations are:

- Consumer products with intentional use of mercury.
- Other intentional uses of mercury in products and processes.

On the other hand there is a certain suspicion by the governmental, commercial and industrial to supply relevant information that directly affects the input data for the calculation of mercury releases for each point source located.

Similarly, it is relevant to take into account the setbacks obtained from information provided by the health sector, specifically medical activities since the mercury content in each product is unknown (e.g., dental amalgams and materials having mercury metal within the metal structure of certain medical devices such as stethoscopes, pressure gauges, etc.). In this sense the release of mercury expressed in this report are based on input factors provided in the spreadsheet template from the UNEP toolkit, and for those where there is no corresponding data available a specific percentage of mercury metal is assumed according to the available literature.

4.4 Results of the Inventory Update

Annex 5, page 40, describes the results of the updated national inventory of mercury, detailing mercury releases for each identified source subcategory, and outputs of mercury to the different environmental factors defined in the updated version of the Toolkit provided by UNEP.

4.5 Conclusions from the inventory update

The results of the inventory update show an increase in mercury releases caused by some products; this is due to sustained economic growth experienced by the Republic of Panama in recent years.

a) The highest mercury releases are identified by subcategory 5.5.4 *Batteries with mercury*, which showed the following quantifiable results:

Factor air	= 1,320.70 kg of Hg per year
Factor earth	= 1,374.89 kg of Hg per year
Factor wastes	= 15,583.12 kg of Hg per year

b) In second place, mercury releases caused by products classified in subcategory 5.9.4 *Informal waste dumping sites* as follows:

Factor air	= 223.27 kg of Hg per year
Factor water	= 223.27 kg of Hg per year
Factor earth	= 1,786.12 kg of Hg per year

c) In third place, the releases produced by the by-products classified in subcategory 5.3.1 *Cement production* with mercury releases, are detailed below:

Factor air	= 316.38 kg of Hg per year
Factor impurities in products	= 146.02 kg of Hg per year
Factor waste	= 146.02 kg of Hg per year

d) In fourth place, the releases produced by products classified in subcategories 5.6.1 *Mercury dental amalgams* and 5.6.2 *Manometers and gauges with mercury*, are detailed below:

Mercury dental amalgams

Factor water = 235.00 kg of Hg per year
Factor waste = 122.61 kg of Hg per year
Factor treatment or specific sector = 122.61 kg of Hg per year

Manometers and gauges with mercury

Factor water = 153.33 kg of Hg per year
Factor waste = 260.68 kg of Hg per year

e) In fifth place, mercury releases generated by the activity classified in the subcategory 5.8.3 *Informal waste burning*, have a value of 248 kg of Hg per year to air factor.

f) In sixth place, mercury releases produced by the activity detailed in subcategory 5.1.5 *Extraction and use of other fossil fuels*, have a value = 135.76 kg of Hg per year to air factor.

g) Other products and subcategorized activities, according to the updated version of the Toolkit provided by UNEP, returned release values determined as less than 100 kg of Hg per year. For accurate information please refer to Annex 5 on pages 40 and 41.

5. Current treatment, waste collection and disposal facilities

5.1 Treatment facilities, storage and disposal of hazardous waste

There are few companies dedicated to the treatment of hazardous waste nationwide, but one must consider that industry is not the strongest sector in the service-oriented Panamanian economy. However, the few existing industrial facilities are concentrated in the provinces of Panama and Colon.

It is noteworthy that most of the hazardous wastes treated by incineration are expired drugs and international waste from ships transiting the country, which request the service of waste discharge, whether these are in solid or liquid state.

A private company is doing the work of collecting fluorescent and compact lamps as well as batteries and cells waste, and treating these as previously detailed in section 3.1 on page 11. There is also another private company that is dedicated to disassembling computers in order to send the resulting electronic waste to the United States, which is also detailed in sections 3.1 and 3.2 on pages 11 and 13.

Table 1 describes relevant information related to the facilities for treatment of hazardous wastes.

Table 1. Description of facilities for treatment of hazardous wastes, their use, type and location

Facilities	Use	Description	Location
Incinerators	Hazardous waste and international waste treatment	Private firms	Provinces of Panama and Colon
Ecologic S,A.	Treatment of mercury-containing lamps, cells and batteries	Private firm	Province of Panama
Private firm	Disarm computer scrap to export e-waste out of the country	Private firms	Province of Panama
Goodwill Industries	Collects damaged computers, recycle and reuses parts that have usage value	NGO	Province of Panama

5.2 Treatment facilities, collection and disposal of non-hazardous waste

The Republic of Panama does not have any systems for the treatment of non-hazardous waste or facilities for their collection; however, there are three sites for the disposal of non-hazardous waste performing with proper and adequate waste handling. One of these, called Cerro Patacon landfill, located in the district of Panama, is the largest and the only actual sanitary landfill in the country, and it handles has about 39% of all household waste and properly treated hazardous waste generated in the country.

The other two sites that carry out a proper disposal of non-hazardous waste are the controlled landfills at David and Santiago, located in the provinces of Chiriqui and Veraguas, respectively.

In the rest of the country the disposal of non-hazardous waste is done in open air dumps, which are not controlled, and in most of them the waste is treated through open air burning.

6. Potential sites for temporary storage of elemental mercury and mercury-contaminated waste

6.1 Assessment of management options for elemental mercury and mercury-contaminated waste

Some of the activities carried out in order to define options for mercury waste management within the framework of the provisions set out in the Country Work Plan included the following:

6.1.1. Meetings with the working group constituted for this purpose, which evaluated:

- a. The current situation of the management of this type of waste nationwide.
- b. The sites generating most of the mercury waste in the country, considering the geographical location, to have a clear picture
- c. The results of the regulatory framework analysis applicable to mercury waste, and the existence of a national policy on this issue, in order to incorporate the legal needs so that waste management is conducted in an environmentally sound manner.

After examining the above issues and brainstorming, and further analyzing the resulting ideas, waste management options for mercury waste and mercury-contaminated waste were identified.

The second meeting evaluated the preliminary results of the inventory update and validated the basic options for the environmentally sound management proposed in the first meeting, resulting in the following:

6.1.2. Results of the evaluation of basic management options

- a. The Republic of Panama will opt for the option of temporary storage of elemental mercury and mercury-contaminated waste.
- b. The need for two temporary storage sites are considered, one for elemental mercury and one for waste contaminated with mercury.
- c. The possibility of enacting a statutory provision requiring importers of products containing mercury to implement a policy of recovery of these products once their useful life expires, and to manage their export further to producing or importing countries, is not being ruled out.

6.2 List of potential sites for temporary storage of elemental mercury waste and mercury-contaminated waste

The concentration of the generation of hazardous wastes, including mercury takes place in the districts of Panama, San Miguelito, Colon, La Chorrera and Arraijan, so it is necessary to locate a site for the temporary storage of mercury waste near to these municipalities or on them.

Several potential sites for the temporary storage of elemental mercury and mercury-contaminated waste have been identified in the Republic of Panama using the guidelines and methodology proposed by UNEP, which are in line to the objective of the study.

In a meeting with the working group responsible for identifying sites for the temporary storage of mercury and mercury waste, the need for two (2) storage sites was defined: one for temporary storage of elemental mercury and the other for the temporary storage of waste contaminated with mercury.

The decision was based on two important aspects as detailed below:

1- It was considered necessary that the elemental mercury waste be stored temporarily in a place with high security because of the risks to health and the environment in case of a waste spill, due to improper handling from either untrained staff or unauthorized people coming on this site. Likewise, the current storage situation was considered in which the waste is being stored or deposited in a very outdated and insecure way, under desks or makeshift shelves, in the work areas. Another important consideration is the existence of bunkers in certain areas of the provinces of Colon and Panama, which offer excellent security, while maintaining a very strong structure, despite the years of construction since these were built to withstand war.

2- In the case of mercury-contaminated waste, it was considered that although the temporary storage must be located in a safe place, it is not necessary to maintain the level of safety that the bunkers have, so that any of the other potential sites identified for storage can comply with that role. Commercial reasons also weighed in the decision making, as there is a company interested in the handling of mercury-contaminated waste. .

Annex 6, page 42, describes the potential sites identified, their possible use, their current use and the province in which they are located with some relevant comments.

Table 2 describes, for each of the identified potential sites for the temporary storage of elemental mercury and mercury-contaminated waste, the responsible entity.

Table 2 Potential sites identified for temporary storage of elemental mercury and mercury-contaminated waste and corresponding entity

Possible sites of interest	Responsible entity
Bunkers.	Ministry of Security
Cerro Patacon sanitary landfill	Authority of Urban and Household Sanitation (private concession management)
EMAS controlled dump	Municipality of La Chorrera (private concession management)
Grounds of the Tocumen extension of the Technological University of Panama	Technological University of Panama
Ecologic S,A	Private company

7. Constitution of a national group of experts and government officials involved in the issue of mercury

No proper national group of experts and government officials involved in the issue of mercury has been constituted in the Republic of Panama.

Notably, what was actually established was a specific working group to support activities in the development of the Project for Storage and Disposal of Mercury in Mexico and Panama, in the context of developing the Country Plan.

However, as the project development process involves a series of future liabilities within the framework of environmentally sound management of storage and disposal of elemental mercury and mercury-contaminated waste, it is essential to identify key stakeholders that could integrate a national group of experts and officials involved in the issue of mercury, which would support the authorities of the institutions responsible for decision making

7.1. Identification of actors and constitution of a national working group

7.1.1 Sectors involved

Next we will see the definitions of the sectors involved at a macro level, because different institutions have a proper role with responsibilities and their competences in each area, which can vary according to the policy of each government.

7.1.2 Government

Government (Greek κυβερνάω "steer a boat"), in general, consists of driving overall policy or exercising state power. Strictly speaking, this usually means the body (which may consist of a President or Prime Minister and a variable number of Ministers) to which the Constitution or the fundamental law of a State attributes function or executive power, and that exerts political power over a society.

In broad terms, the government is one structure that performs the various state activities, commonly referred as branches of government (state functions). Government, in its proper sense, tends to identify with political activity.

The government is not the same as the state is linked to it by the power element. The government passes, changes and transforms, while the state remains the same. In that sense, the government is the set of the governing bodies of a State through which state power is expressed by means of the legal order. It can be analyzed from three points of view: according to its actors, as a set of roles, or by its institutions.

7.1.3 Private enterprise

Entity in which the ownership of capital, management, decision making, and its control are held by private economic agents and in which the state has no say, except that which national or local regulation allows. A market system is based on private enterprise which main objective is to maximize profits; however, it may be that this is not their only goal. The fundamental feature of the private enterprise system is that individuals act independently and without government control.

7.1.4 Civil society and NGOs

Civil society and NGOs distinguish the set of organizations and voluntary civic and social institutions that form the basis of an active society, as opposed to state structures and businesses. This definition therefore includes non-profit organizations or NGOs such as associations and foundations. Although civil society entities need not necessarily be political they often influence the political activity of the society of which they are part.

7.2 Description of the responsibilities of government institutions, private sector and civil society

The various entities involved in handling elemental mercury waste and mercury-contaminated waste have different responsibilities from every point of view; in some cases, these roles and responsibilities are not assumed by various reasons, which we are not going to evaluate in this document. Table 3 describes the entities and their responsibilities.

Table 3. Entities involved and their responsibilities for waste handling of elemental mercury and mercury-contaminated waste

Entity	Responsibilities	Description of the responsible entity
Government	<ul style="list-style-type: none"> • Stewardship • Regulation • Implementation of policies • Surveillance • Control • Transparency • Consult with civil society and private companies • In some cases invest in treatment systems and final disposal 	<ul style="list-style-type: none"> • The Ministry of Health has all the responsibilities • The National Environmental Authority has all responsibilities except to invest in treatment systems and final disposal
Private enterprise	<ul style="list-style-type: none"> • Invest • Operating systems for treatment and disposal • Comply with legal requirements • Environmentally sound management • Involve civil society • Join national management policies 	<ul style="list-style-type: none"> • Private companies that generate hazardous waste in general which are interested • Private companies that provide services for the collection, transportation, treatment and/or disposal of mercury waste • Other private companies interested in providing this service
Civil society and NGOs	<ul style="list-style-type: none"> • Storage and adequate final disposal • Comply with legal requirements • Surveillance • Join programs for environmentally sound management • Join national management policies 	<ul style="list-style-type: none"> • NGO's related to hazardous waste management • Other NGOs that are not related to hazardous waste management, but express an interest in the initiative

7.3 Identification of stakeholders involved in the management of mercury in Panama

Annex 7, page 43, presents a list of the main stakeholders related to the management of wastes consisting of elemental mercury and wastes containing or contaminated with mercury, as well as their responsibilities in this matter.

7.4 Working Group for the development of the project Storage and Disposal of Mercury in Mexico and Panama

A working group was established according to Country Work Plan, which was developed in order to organize activities, tasks, stakeholders, timeframes, and resources and responsible for the development of the project: Storage and Disposal of Mercury in the Republic of Panama. Stakeholders defined in the Work Plan were consulted about whether or not they were interested in participating in the Working Group responsible for the development the project. The members of the working group and the entity to which they belong are listed in Table 4.

Table 4. List of Working Group members

Entity	Name of representative
Ministry of Health	María Inés Esquivel
Ministry of Health	Niurka Gonzalez
Ministry of Health	Jaime Velez
National Environmental Authority	Lineth Arcia
National Environmental Authority	Olmedo Perez
National Assembly	Lidia Gonzalez
Authority of Urban and Household Sanitation	Virgilio Solis
Authority of Urban and Household Sanitation	Patricia Perez
Technological University of Panama	Elsa Flores
Ministry of Commerce and Industry	Miguel Martinez
Ministry of Commerce and Industry	Anibal Ortega
Ministry of Agricultural Development	Cintia Cerrud
National Customs Authority	Marisol Bartnes
National Police	Porfirio Ureña
Zero Pollution Alliance (NGO)	Jorge Conte
Tommy Guardia National Geographic Institute	No one designated
National Security Council	No one designated
Panama Canal Authority	No one designated
Energy Secretariat	No one designated
Association of Municipalities of Panama	No one designated
Panamanian Dental Association	No one designated
Social Security Fund	No one designated
Public Services Authority	No one designated
Mining Chamber of Panama	No one designated
National Consultant	Augusto Mendoza

7.5 Objectives and operation of the Working Group

7.5.1 Overall objective of the Working Group

- Assisting the implementation of the project: Storage and Disposal of Mercury in the Republic of Panama.

7.5.2 Specific objectives of the Working Group

The specific objectives of the Working Group are:

1. Validate the information processed by the national consultant for the following topics:
 - a. Mercury inventory update,
 - b. Legal framework update,
 - c. Evaluation and analysis of potential sites for temporary storage in the country,
 - d. Basic management options,
 - e. Process for decision making,
 - f. National Action Plan for storage and disposal of mercury, and
 - g. Project progress reports and Final report.
2. Contributing to the following activities:
 - a. Location and visit of potential sites for temporary storage in the country,
 - b. Prepare the basic management options,
 - c. Develop the process for decision making, and
 - d. Prepare the National Action Plan for the storage and disposal of mercury
3. Participate in meetings of the various subgroups

7.6 Functioning of the Working Group

Subgroups were formed for each activity in order to carry out an organized work. However, there were activities in which all members of the Working Group participated.

Each participant of the subgroups has the following functions:

1. Meet to support the implementation of the assigned activities and thus achieve the proposed objectives.
2. Obtaining relevant information necessary for the project, either by direct access from the institution to which he/she belongs or from other contacts within it.
3. Submit the information obtained to the national consultant for processing.
4. Participating in the validation meetings of the progress reports.
5. Identify and visit potential sites for temporary storage of elemental mercury and waste contaminated with mercury.
6. Participating in the validation meeting of the final report.

Working subgroups were formed as detailed in Annex 8, pages 45 and 46.

7.7 Activities

As part of project development and considering the provisions of the Country Work Plan, the following activities were conducted:

7.7.1 Meetings held

There were five working meetings with the different subgroups and a site visit to obtain the results of the project.

1. The first meeting was with the working group responsible for updating the legal framework and was held on December 27, 2012. The subgroup proposed a methodology for the review of the regulatory framework and among other tasks were included the presentation of the document as well as its revision and correction. Similarly, conclusions of the document were discussed and drafted. In Section 1.3 findings of the analysis of the regulatory framework are detailed. At the meeting were representatives of the National Assembly and the Ministry of Health.
2. The second meeting was held on April 3, 2013, with the working group responsible for the identification and analysis of potential sites for temporary storage of mercury in the country. In the meeting, the work methodology was established, which consisted of a brainstorming of possible sites for temporary storage according to the following criteria:
 - a. Proximity to the largest generation of waste;
 - b. Availability of space;
 - c. Compliance with environmental standards;
 - d. Proximity to nearest populated place (near, far);
 - e. Adequate security to prevent access to outsiders;
 - f. Accessibility (highways, roads);
 - g. Zoning (urban, semi-urban, rural);
 - h. Land use (commercial, industrial, agricultural);
 - i. Location in an seismic zone;
 - j. Location in geological faults;
 - k. Flood area;
 - l. Nearby water sources;
 - m. Local aquifer;
 - n. Nearby vulnerabilities (cultural heritage, schools, hospitals);
 - o. Waste handling in the area;
 - p. Mercury waste handling in the area.

First, the working group identified the need to select two sites instead of one. One for temporary storage of elemental mercury and the other for the temporary storage of mercury waste. The decision was based on two important aspects: first is related to a commercial aspect, since there is a company interested in the management of waste contaminated with mercury. The second is the improper and unsecure manner in which elemental mercury is being stored currently, so it must be stored temporarily in the safest way possible.

The activity concluded with the potential sites described in Section 7 and detailed in Tables 5 and 6. The meeting was attended by representatives of the Ministry of Health, the National Environmental Authority, National Police, Technological University of Panama

and Zero Pollution Alliance. It is relevant to note that the matrix corresponding to the identification of sites for the temporary storage of mercury-contaminated waste and waste of elemental mercury is being prepared.

3. The third meeting was held on April 30 and attended by the working subgroup responsible for validating the project progress report. Using a similar methodology to the one used for the first meeting, a presentation of the deliverables completed to date was made, while the document was corrected simultaneously to obtain a first draft. This draft report was sent forward for consideration and review by UNEP.
4. The fourth meeting was held on 20 June. The following working subgroups were invited to participate:
 - a. Evaluation and analysis of potential sites for temporary storage of mercury in the country,
 - b. Evaluation of basic management options and stakeholders,
 - c. Establishment of processes for decision making and entities involved, and
 - d. Development of the National Action Plan for storage and disposal of mercury

While not all the guests attended the event, participants made substantial contributions in the different discussions, achieving all objectives of this meeting:

- Enhance the understanding of the objectives and scope of the project Storage and Disposal of Mercury in Panama.
- Illustrate members of the working subgroups, belonging to government institutions, universities and NGOs on the progress and results of each project phase.
- Evaluate, improve and validate proposed basic management options for mercury in the Republic of Panama.
- Evaluate and validate decision making process and stakeholders.
- Evaluate and improve the proposed National Action Plan for the Management of Mercury.

The meeting was attended by representatives of the Ministry of Health, the National Environmental Authority, the National Customs Authority, NGOs and the national consultant.

Note that results related to the proposed basic management options for mercury, process of decision making and stakeholders and the proposed National Action Plan for The Management of Mercury were presented at the Regional Workshop on Project Results, held in Mexico on 3 and 4 July, 2013.

5. The fifth meeting was held on July 16, 2013, with the participation of representatives from the Ministry of Health, the National Environmental Authority, NGOs and the national consultant. The purpose of the meeting was to improve and validate the proposed National Action Plan for the Management of Mercury, which initial version was corrected in the Mexico meeting. Finally, the Working Group reached a consensus and validated the National Action Plan, which is described in Section 9.

7.7.2 Potential Sites Field visits

On June 27, 2013 two potential sites for temporary storage of mercury contaminated waste were visited for inspection.

1. The first site inspected counts with an incineration plant and is located in the district of La Chorrera. It has the following features:
 - a. Relatively close to the largest generation of mercury waste
 - b. Enough space for the construction of a temporary storage
 - c. Environmental Impact Assessment approved to carry out incineration activities
 - d. Relatively far from the nearest town
 - e. Personnel in a security checkpoint that prevents access to outsiders.
 - f. Access roads are of select material but with irregular features
 - g. Rural zone
 - h. Land use: agricultural
 - i. According to Uniform Building Code, 1997 (UBC), site is located in Seismic Zone 3. The UBC includes values 0-4, where 4 represents the largest area of seismic activity
 - j. No evidence of geological faults
 - k. Non flood areas
 - l. Nearest water surface source: Agua Buena Creek, a Caimito River tributary, which is approximately 2.5 miles away
 - m. According to studies in the area, existence of aquifers in these deposits is of low power and extension, with a variable permeability, depending on the type of matrix from which are formed
 - n. Rural area with no nearby cultural heritage, schools or hospitals
 - o. Environmental Impact Assessment approved to handle (incinerate) hazardous waste
 - p. No handling of mercury waste in the area
2. The second site inspected has an approved Environmental Impact Assessment for the development of activities related to construction and operation of a landfill for non-hazardous solid waste, very close to the first site. It complies with the following features:
 - a. Relatively close to the largest generation of mercury waste
 - b. Enough space for the construction of a temporary storage
 - c. Environmental Impact Assessment approved to develop the construction and operation of a landfill for non-hazardous solid waste

- d. Relatively far from the nearest town
 - e. There is a watchman that prevents access to outsiders, since there is no construction nor operation in the area
 - f. Access roads are of select material but with irregular features
 - g. Rural zone
 - h. Land use: agricultural
 - i. According to Uniform Building Code, 1997 (UBC), site is located in Seismic Zone 3. The UBC includes values 0-4, where 4 represents the largest area of seismic activity
 - j. No evidence of geological faults
 - k. Non flood area
 - l. Nearest water surface source: Agua Buena Creek, a Caimito River tributary, which is approximately 2.5 miles away
 - m. According to studies in the area, existence of aquifers in these deposits is of low power and extension, with a variable permeability, depending on the type of matrix from which are formed
 - n. Rural area with no nearby cultural heritage, schools or hospitals
 - o. Environmental Impact Assessment for handling non-hazardous waste
 - p. No handling of mercury waste in the area
3. The third inspection visit was to the facilities of a company dedicated to the treatment of mercury-contaminated waste, located in the district of Panama. It has the following features:
- a. Close to the largest generation of mercury waste
 - b. Not enough space for the construction of a temporary storage
 - c. No Environmental Impact Assessment approved for the activity
 - d. Relatively far from the nearest town
 - e. Located in a populated area
 - f. Excellent security that prevents entry of outsiders
 - g. Access roads are of concrete and very accessible
 - h. Urban zone
 - i. Land use: commercial
 - j. No evidence of seismic activity
 - k. No evidence of geological faults
 - l. Non flood area
 - m. Nearest water surface source: Juan Diaz river, which is approximately 2 miles away
 - n. No information on existence of local aquifers
 - o. Near cultural heritage, nearest school at approximately 1.2 miles and hospital center at 1 miles
 - p. Hazardous wastes are handled in the area
 - q. Mercury waste is handled in the area

Note that these facilities are used on a provisional basis, as the company is interested in providing service for treating mercury contaminated waste to manage subsequently their export. The company is currently processing the respective studies requested by the applicable legal standards

7.7.3 Results of analysis of other potential sites identified

1. The Working Group in charge of the study and analysis of potential sites for the temporary storage of mercury in the country evaluated the bunkers located in the reverted areas of the Panama Canal Zone. These bunkers currently have no specific use and have the following characteristics:
 - a. Close to the largest generation of mercury waste
 - b. There is not enough space for temporary storage of elemental mercury waste
 - c. No Environmental Impact Assessment approved for the activity
 - d. Located outside populated areas
 - e. Excellent security that prevents entry of outsiders
 - f. Access roads are of concrete and are very accessible
 - g. Some of the bunkers are classified as urban and others as rural
 - h. Land use: military
 - i. No evidence of seismic activity
 - j. No evidence of geological faults
 - k. Non flood area
 - l. Some of the bunkers are near water sources and others are not
 - m. There is no information of the local aquifer
 - n. There is only one bunker located within the premises of a school. The rest are not close to cultural heritage, hospital or schools.
 - o. No hazardous wastes are handled
 - p. No mercury wastes are handled

A bunker¹ (plural bunkers, from German *bunker*) is a construction made of iron and concrete, used in warfare as protection against both artillery and aircraft shelling. Bunkers have a military use, although sometimes can be civilian or mixed. There are various types of bunkers, such as trenches, pillbox, gunner and industrial. In Panama one could say that bunkers were built of the industrial types which are used as food storage areas, data storage, control rooms of dangerous activities, experimental explosives testing or as storage for radioactive elements, explosives and other dangerous items, which could be of military or civilian nature.



Bunkers located in the Special Economic Area, Panama Pacifico

2. The Working Group also evaluated the extension's grounds of the Technological University of Panama, located close to the Tocumen Airport in the district of Panama. It has the following characteristics:
 - a. Close to the largest generation of mercury waste
 - b. Enough space for the construction of a temporary storage
 - c. No Environmental Impact Assessment approved for the activity
 - d. Located about 3 miles from populated areas
 - e. Excellent security that prevents entry of outsiders
 - f. Access roads are of concrete and are very accessible
 - g. Located relatively far from the nearest town
 - h. Urban zone for university research purposes
 - i. Land use: urban
 - j. No evidence of seismic activity
 - q. No evidence of geological faults
 - r. Non flood area
 - s. Nearest water surface source: the Tocumen river.
 - t. There is no information of the local aquifer
 - u. No nearby cultural heritage or hospitals. The nearest school is located about 4 miles
 - v. No hazardous wastes are handled
 - w. No mercury wastes are handled

3. Cerro Patacón landfill was also evaluated, located in the district of Panama, which has the following characteristics:
 - a. Close to the largest generation of mercury waste
 - b. Enough space for the construction of a temporary storage
 - c. Environmental Impact Assessment approved to carry out construction and operation activities of a landfill for non-hazardous solid waste
 - d. No nearby populated areas
 - e. Security that prevents entry of outsiders
 - f. Access roads are of concrete and very accessible up to the entrance of the landfill facility, then it turns to one of select material
 - g. Urban zone for waste disposal purposes
 - h. Land use: urban
 - i. No evidence of seismic activity
 - j. No evidence of geological faults
 - k. Non flood area
 - l. Nearest water surface source: the Mocambo river.
 - m. There is no information of the local aquifer
 - n. No nearby cultural heritage, schools or hospitals
 - o. No hazardous wastes are handled
 - p. No mercury wastes are handled

7.7.4 Conclusions from the analysis of potential sites for the location of a temporary storage of mercury waste

It was decided to perform a qualitative rather than a quantitative analysis in order to have enough freedom, so that when the right time comes to implement actions relevant to mercury, an updated analysis could be done based on the reality of that moment. Since the country is showing a very dynamic economy it was considered to not qualify it quantitatively, as this could change in the future, thus leaving some freedom for a subsequent decision.

The working group responsible of this task concluded:

1. The best potential sites for temporary storage of elemental mercury waste are the bunkers, whatever their location.
2. The best locations for temporary storage of mercury-contaminated waste are the lands or facilities of the EMAS company's landfill, the Cerro Patacon landfill and the Tocumen extension of the Technological University of Panama, in that order of priority.
3. The initiative of the company Ecologic S. A. should be considered, regardless of current location is not the most appropriate, as their representative expressed an interest in considering another location that would meet environmental standards and site selection criteria regarded by this project.

8. National Action Plan

The meetings of the working group responsible for the National Action Plan for the storage and disposal of mercury in the country resulted in their development and validation. The National Action Plan is detailed in Table 5.

Table 5. National Action Plan for the Management of Mercury in Panama.

Components	Objectives	Activities	Assumptions	Responsible
Legal framework	<p>1. Implement the National Hazardous Waste Policy</p> <p>2. Ratify the Minamata Convention.</p> <p>3. Strengthen the regulatory framework on mercury and mercury-containing products, as well as the ability to control the flow of substances and products.</p>	<p>1.1 Creation of an intersectoral and interagency Committee for Waste and Hazardous Substances</p> <p>1.2 Identification of priorities of the National Hazardous Waste Policy applicable to elemental mercury and products containing mercury.</p> <p>2.1 Submission of the Minamata Convention by the National Assembly</p> <p>3.1 Development of the necessary regulations for the integrated management and control of elemental mercury and mercury-containing products.</p> <p>3.2 Development of standards or adequacy of existing guidelines for the management of mercury waste (selective collection, transportation, treatment, storage and disposal).</p> <p>3.3 Development of a legal provision to ensure that users of products that generate mercury-contaminated waste return them to the sellers/producers once these have no value to the users, thus ensuring recovery of most mercury waste.</p> <p>3.4 Development of a legal provision that makes it attractive to people who scrap equipment to release mercury-contaminated waste in exchange for monetary compensation.</p> <p>3.5 Development of a legal provision to establish requirements and procedures to control the importation of mercury-containing products by the appropriate authority.</p>	<p>1. Waste of mercury and mercury-containing products that deserve an environmentally sound management are generated annually.</p> <p>2. Most waste collection of elemental mercury and mercury-contaminated waste is not done selectively.</p> <p>3. In some cases, selective waste collection of elemental mercury and mercury-containing products is carried out voluntarily.</p> <p>4. There is a policy on hazardous waste that has not been implemented.</p> <p>5. There is not a recycling or reuse culture.</p> <p>6. There is little awareness of risks to health and the environment.</p>	<p>Ministry of Health and National Customs Authority, in coordination with other stakeholders.</p>

<p>Promotion and awareness of mercury management</p>	<p>1. Disseminate timely information on: a) current status of mercury, and b) the Minamata Convention draft, including its benefits and obligations.</p> <p>2. Support efforts for the differentiation and optimization of the management of elemental mercury and mercury-contaminated waste.</p> <p>3. Sensitize and train stakeholders about the risks and management of elemental mercury and mercury-contaminated waste.</p>	<p>1.1 Development and dissemination of informational materials to the relevant actors.</p> <p>1.2 Development of a dissemination plan to different media.</p> <p>1.3 Disclosure to the stakeholders on the results of potential sites for location, qualification and/or construction of the warehouses for temporary storage of waste contaminated with mercury and for elemental mercury waste.</p> <p>2.1 Evaluation of models applied in other countries.</p> <p>2.2 Feasibility study on implementation of any of the models used in other countries.</p> <p>2.3 Keeping updated information on the amount of mercury products entering the country.</p> <p>3.1 Definition of groups of interest and contents of awareness and training programs.</p> <p>3.2 Training of public officials and representatives of private sector.</p> <p>3.3 Design and implementation of a national awareness plan.</p> <p>3.4 Approaching authorities of Urban and Household Sanitation, National Police, Technological University of Panama and EMAS company to sensitize them about options and benefits of temporary storage of elemental mercury waste and waste contaminated with mercury.</p>	<p>1. There are companies and NGOs who may be interested or others that are actually working in the management of mercury-contaminated waste.</p> <p>2. The importation process of mercury products have deficiencies related to the classification of merchandise in the various tariff codes.</p> <p>3. There is not a recycling or reuse culture.</p> <p>4. Potential sites for the location of the temporary storage of elemental mercury and mercury-contaminated waste had been identified.</p>	<p>Ministry of Health and National Environmental Authority</p>
<p>Intersectoral partnerships</p>	<p>1. Promote public-private partnerships to implement solutions for the</p>	<p>1.1 Identification of potential stakeholders and strategic partners.</p>	<p>1. There is a Cleaner Production program.</p> <p>2. There is no a</p>	<p>Ministry of Health and National Environmental Authority.</p>

	<p>comprehensive management of elemental mercury and mercury-contaminated waste.</p> <p>2. Coordinate and encourage private sector and NGOs to identify options and interests for the management of mercury wastes.</p>	<p>1.2 Selective presentations of the information campaign.</p> <p>1.3 Establishment of the joint action plan with the participation of partners and stakeholders.</p> <p>2.1 Identification of NGOs and potential companies that are interested in the management of mercury waste.</p> <p>2.2 Encourage selective waste collection and pretreatment, in order to reduce the volume of waste contaminated with mercury as well as its temporary storage or disposal, with participation of private sector.</p>	<p>recycling or reuse culture.</p>	
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9. Conclusions and Recommendations

9.1 Conclusions

From evaluation and results analysis of the project "Storage and Disposal of Mercury in Mexico and Panama" can be concluded:

- Currently there is no specific regulatory framework for the comprehensive management of mercury waste. However, the country has a National Policy on Integrated Management of Hazardous Waste.
- The results of the updated national inventory of mercury in Panama indicate increased mercury releases, due to the sustainable economic growth experienced by the country. Consumer products of intentional use such as mercury batteries are highlighted in the inventory.
- For the environmentally sound storage of elemental mercury various bunkers were identified located across from the Canal. On the other hand, five sites were identified for construction of a temporary storage for waste contaminated with mercury. These sites are all located in the province of Panama, which has the highest concentration and generation of mercury waste.

9.2 Recommendations

As part of the project development, and in order to improve the management of mercury in Panama, the working groups outlined a number of recommendations:

- Strengthen regulatory framework to an integrated management of mercury waste.

- Develop a dissemination program for the National Policy on Integrated Management of Hazardous Waste that facilitates its implementation.
- Raise awareness among authorities and National Assembly to approve the Minamata Convention.
- Implement an awareness program to actors involved and interested in the comprehensive management of mercury waste.
- Promote integration and encourage participation of sectors involved and interested in the management of mercury waste with the use of best available techniques and implementing best environmental practices.
- Sensitize and train government officials and representatives of private companies to support the project and give their consent to use or build temporary storages for elemental mercury waste and mercury-contaminated waste in their land or facilities.
- Implement an awareness campaign aimed at the general community about the use and disposal of mercury-contaminated waste.

10. Annexes

Annex 1. Legal provisions on land use.

Annex 2. Description of the Principles and Objectives of the National Policy on Integrated Management of Solid and Hazardous Waste.

Annex 3. Distribution by sector the identified categories.

Annex 4. Sources of release identified as present or absent and the mercury inputs in kg/year.

Annex 5. Summary of mercury releases from all identified categories.

Annex 6. Potential sites identified for the temporary storage of elemental mercury and mercury-contaminated waste.

Annex 7. Stakeholders and their responsibilities related to the management of wastes consisting of elemental mercury and wastes containing or contaminated with mercury.

Annex 8. Constitution of the working subgroups according to the scheduled activity.

Annex 9. Map of the Republic of Panama that shows the location of potential sites identified for temporary storage of elemental mercury and mercury-contaminated waste.

Annex 10. Legal framework for elemental mercury and contaminated waste with mercury.

Annex 1. Legal provisions on land use

NO.	Description
1	Decree N° 40 of June 24, 1976, which establishes the Volcan Baru National Park in the province of Chiriqui
1.a	Resolution N° AG-0295-2004, of August 2, 2004, which approves the Management Plan for the Volcan Baru National Park
2	Decree N° 35 of April 28, 1977, which modifies the Decree N° 153 of June 1966, which created the "Altos de Campana" National Park and Biological Reserve in the province of Panama, and issues other provisions
2.a	Resolution N° AG-0033-2004, of January 30, 2004, which approves the Management Plan for the Altos de Campana National Park and Biological Reserve
3	Decree N° 13 of May 27, 1980, which creates the Sovereignty National Park in the Panama Canal area
3.a	Resolution N° AG-0034-2004, of January 30, 2004, which approves the Management Plan for the Sovereignty National Park
4	Executive Decree N° 21 of August 7, 1980, which declares a certain area in the province of Darien as a National Park
4.a	Resolution N° AG-0800-2004, of December 30, 2004, which approves the Management Plan for the Darien National Park
5	Executive Decree N° 72 of October 2, 1984, which declares the Sarigua National Park in the province of Herrera
5.a	Resolution N° AG-040-93 of December 10, 1993, which approves the Use Zones Plan for the Sarigua National Park
6	Executive Decree N° 73 of October 2, 1984, which declares the Chagres National Park in the provinces of Panama and Colon
6.a	Resolution N° AG-0298-2004, of August 2, 2004, which approves the Management Plan for the Chagres National Park
7	Decree N° 74 of October 2, 1984, which declares the Cerro Hoya National Park encompassing the three hills area located in the Azuero Peninsula in the district of Montijo, in the province of Veraguas, and in the district of Tonosi, in the province of Los Santos
7.a	Resolution N° AG-0799-2004, of December 30, 2004, which approves the Management Plan for the Cerro Hoya National Park
8	Law N° 8 of July 5, 1985, which establishes the Metropolitan Natural Park
8.a	Resolution N° AG-0269-2007, of July 24, 2007, which approved the Management Plan for the Metropolitan Natural Park
9	Executive Decree N° 18 of July 31, 1986, which declares the Cerro Marta National Park, located in El Harino district of La Pintada, province of Coclé
9.a	Resolution N° AG-0301-2004, of August 2, 2004, which approves the Management Plan for the Major-General Omar Torrijos Herrera National Park
10	Law N° 30 of December 30, 1992, which establishes the Camino de Cruces National Park
10.a	Resolution N° AG-0303-2004, of August 2, 2004, which approves the Management Plan for the Camino de Cruces National Park
11	Resolution JD 021-88, of September 2, 1998, which establishes the La Amistad International Park in the provinces of Bocas del Toro and Chiriqui
11.a	Resolution N° AG-0304-2004, of August 2, 2004, which approves the Management Plan for the La Amistad International Park
12	Resolution N° 10-2007 of February 27, 2007, assigns as special superimposed treatment area, framed within areas of large projects, polygon N° 7, Lot P-BU03-03, located in the area known as Rodman Naval Base
13	Executive Decree N° 2 of January 14, 2009, which established the Soil Environmental Quality Standard for various uses

Annex 2. Description of the Principles and Objectives of the National Policy on Integrated Management of Solid and Hazardous Waste

Principles	Objective	Description of objectives
<ul style="list-style-type: none"> • Prevention principle • Equity principle • Public accountability principle • Principle of the use of best available techniques, best environmental practices and best technology • Principle of feasibility and practicality • Principle of participation and shared responsibility • Polluter Pays principle • Precautionary principle • Principle of minimization or reduction, reuse, segregation and recycling at the source. • Transparency of information principle • Principle of efficiency and effectiveness • Total product cycle principle • Flexibility principle • Principle of gradualness 	General Objective	Achieving an integrated management of hazardous and non-hazardous waste that is environmentally sound and sustainable, to ensure the conservation of the environment in the country and eliminate the negative effects on the environment and health of the population that is socially and economically efficient and viable.
	Objective 1. In the scope of waste management and hazardous and non-hazardous waste	Promote environmentally sound and sustainable management of hazardous and non-hazardous waste with a comprehensive approach, which incorporates the minimization, recovery, reuse, segregation, recycling, use of best available techniques, and the development of better environmental practices, cleaner production technologies and the use of effective, efficient and consistent with the national reality.
	Objective 2. At the institutional level	Strengthen the management capacities of public, private and municipal sectors having any competence, interference or intervention in the integrated management of non-hazardous waste and hazardous waste, at the central, sectoral and local levels.
	Objective 3. On the regulatory front	Strengthen legislation dictating a normative framework that integrally regulates the management of hazardous and non-hazardous waste.
	Objective 4. In the scope of training and research	Promote scientific and technological research as well as training of scientific and technical cadres for the development of programs related to the integrated management of hazardous and non-hazardous waste, and strengthen programs in formal and non-formal education in this area.
	Objective 5. In the scope of citizen participation	Promote participation, integration and accountability of all sectors of society in the integrated management of non-hazardous and hazardous waste.
	Objective 6. In the scope of environmental information.	Incorporate into the environmental information systems relevant information to decision-making processes around Integrated Management of non-hazardous and hazardous waste.

Annex 3. Distribution by sector the identified categories

Main source category	Sector		
	Health	Trade	Mining
Extraction and uses of fuels and energy sources		X	
Primary metal production			X
Production of other minerals and materials with mercury impurities		X	
Consumer products with intentional use of mercury	X	X	
Other intentional uses of mercury in products/processes	X	X	
Waste incineration		X	
Waste disposal/landfills and sewage treatment	X	X	
Crematoria and cemeteries	X		

Annex 4. Sources of release identified as present or absent and the mercury inputs in kg/year

C	Sub-C	Sources category	Present (y/n?)	Mercury influx kg/year
5.1		Extraction and Uses of Fuels and Energy Sources	y	173.40
	5.1.1	Coal combustion in large power plants	n	0.00
	5.1.2	Other uses of coal	n	0.00
	5.1.3	Extraction, refining and use of mineral oil	y	17.98
	5.1.4	Extraction, refining and use of natural gas	y	9.77
	5.1.5	Extraction and use of other fossil fuels	y	135.76
	5.1.6	Energy obtained from biomass burning and heat production	y	9.88
	5.1.7	Geothermal power production	n	0.00
5.2		Primary metal production	y	0.16
	5.2.1	Mercury extraction and initial processing	n	0.00
	5.2.2	Extraction of gold and silver by amalgamation with mercury	n	0.00
	5.2.3	Zinc extraction and initial processing	n	0.00
	5.2.4	Copper extraction and initial processing	n	0.00
	5.2.5	Lead extraction and initial processing	n	0.00
	5.2.6	Gold extraction and initial processing by methods other than mercury amalgamation	y	0.16
	5.2.7	Aluminum extraction and initial processing	n	0.00
	5.2.8	Other non-ferrous metals extraction and initial processing	n	0.00
	5.2.9	Primary production of ferrous metals	n	0.00
5.3		Production of other minerals and materials with mercury impurities	y	609.76
	5.3.1	Cement production	y	608.84
	5.3.2	Pulp and paper production	y	0.79
	5.3.3	Production of lime and light weight aggregates kiln	y	0.54
5.4		Intentional use of mercury in industrial processes	n	0.00
	5.4.1	Chlor-alkali production plant with mercury technology	n	0.00
	5.4.2	Production of VCM (vinyl chloride monomer)	n	0.00
	5.4.3	Production of acetaldehyde with mercury catalyst	n	0.00
	5.4.4	Production of other chemicals and polymers with mercury	n	0.00
5.5		Consumer products with intentional use of mercury	y	18,182.34
	5.5.1	Thermometers with mercury	y	3.28
	5.5.2	Electrical switches and relays with mercury	y	1.58
	5.5.3	Light sources with mercury	y	62.34
	5.5.4	Batteries with mercury	y	18,278.71
	5.5.5	Polyurethane catalyst using mercury	n	0.00
	5.5.6	Biocides and pesticides with mercury	n	0.00
	5.5.7	Paints with mercury	n	0.00

	5.5.8	Pharmaceuticals for human and veterinary use	n	0.00
	5.5.9	Cosmetics and other products related to mercury	n	0.00
5.6		Other intentional uses in products and processes	y	2,043.98
	5.6.1	Mercury dental amalgams	y	1,532.62
	5.6.2	Manometers and gauges with mercury	y	511.12
	5.6.3	Chemicals and laboratory equipment with	y	0.23
	5.6.4	Use of mercury in religious rituals and folklore medicine	n	0.00
	5.6.5	Miscellaneous product use, use of metal mercury and other sources	y	0.01
5.7		Production of recycled metals (secondary production)	n	0.00
	5.7.1	Production of recycled mercury (secondary production)	n	0.00
	5.7.2	Production of recycled ferrous metals	n	0.00
	5.7.3	Production of other recycled metals	n	0.00
5.8		Waste Incineration	y	262.41
	5.8.1	Municipal or general waste incineration	y	3.54
	5.8.2	Hazardous waste incineration	y	10.80
	5.8.3	Incineration of medical waste	n	0.00
	5.8.4	Sewage sludge incineration	n	0.00
	5.8.5	Informal waste burning	y	248.07
5.9		Waste disposal/landfills/sewage treatment	y	6,215.38
	5.9.1	Landfills/controlled deposits	y	3,979.78
	5.9.2	Diffuse disposal with some degree of control	n	0.00
	5.9.3	Informal local disposal of industrial production waste	n	0.00
	5.9.4	Informal waste dumping sites	y	2,232.66
	5.9.5	Systems for sewage treatment	y	2.95
5.10		Cemeteries and Crematoria	y	40.92
	5.10.1	Crematoria	y	11.03
	5.10.2	Cemeteries	y	29.89

Annex 5. Summary of mercury releases from all identified categories								
	Source category	Present	Estimated mercury outputs, kg/year					
			Air	Water	Earth	Impurities in products	Waste	Treatment or specific sector
5.1	Extraction and Uses of Fuels and Energy Sources	Total	172.68	0.00	0.00	0.00	0.73	0.00
5.1.3	Extraction, refining and use of mineral oil	y	17.27	0.00	0.00	0.00	0.73	0.00
5.1.4	Extraction, refining and use of natural gas	y	9.77	0.00	0.00	0.00	0.00	0.00
5.1.5	Extraction, refining and use of other fossil fuels	y	135.76	0.00	0.00	0.00	0.00	0.00
5.1.6	Energy obtained from biomass burning and heat production	y	9.88	0.00	0.00	0.00	0.00	0.00
5.2	Primary metal production		0.01	0.00	0.14	0.01	0.00	0.00
5.2.6	Gold extraction and initial processing by methods other than mercury amalgamation	y	0.01	0.00	0.14	0.01	0.00	0.00
5.3	Production of other minerals and materials with mercury impurities	Total	317.094	0.00	0.00	146.023	146.103	0.00
5.3.1	Cement production	y	316.383	0.00	0.00	146.023	146.024	0.00
5.3.2	Production of pulp and paper	y	0.711	0.00	0.00	0.00	0.079	0.00
5.3.3	Production of lightweight lime aggregates	y	0.00	0.00	0.00	0.00	0.00	0.00
5.5	Consumer products with intentional use of mercury	Total	1,328.335	0.984	1,379.915	0.00	15,636.991	0.468
5.5.1	Thermometers with mercury	y	0.391	0.984	0.126	0.00	1.779	0.00
5.5.2	Electrical switches and relays with mercury	y	0.252	0.00	0.299	0.00	1.029	0.00
5.5.3	Light sources with mercury	y	6.994	0.00	4.605	0.00	51.063	0.47
5.5.4	Batteries with mercury	y	1,320.698	0.00	1,374.885	0.00	15,583.12	0.00

	Source category	Present	Estimated mercury outputs, kg/year					
			Air	Water	Earth	Impurities in products	Waste	Treatment or specific sector
5.6	Other intentional uses in products and processes	Total	76.66	388.41	30.66	30.65	383.37	122.69
5.6.1	Mercury dental amalgams	y	10.22	235.00	0.00	30.65	122.61	122.61
5.6.2	Manometers and gauges with mercury	y	66.44	153.33	30.66	0.00	260.68	0.00
5.6.3	Chemicals and laboratory equipment with mercury	y	0.00	0.08	0.00	0.00	0.08	0.08
5.6.5	Products for various uses, use of metal mercury and other sources	y	0.00	0.00	0.00	0.00	0.00	0.00
5.8	Waste Incineration		255.53	0.00	0.00	0.00	0.00	6.88
5.8.1	Municipal or general waste incineration	y	2.06	0.00	0.00	0.00	0.00	1.48
5.8.2	Hazardous waste incineration	y	5.40	0.00	0.00	0.00	0.00	5.40
5.8.5	Informal waste burning	y	248.07	0.00	0.00	0.00	0.00	0.00
5.9	Waste disposal/landfills /sewage treatment		263.063	226.321	1,786.179	0.00	0.162	0.074
5.9.1	Landfills/controlle d deposits	y	39.798	0.398	0.00	0.00	0.00	0.00
5.9.4	Informal waste dumping sites	y	223.265	223.265	1,786.120	0.00	0.00	0.00
5.9.5	Systems for sewage treatment	y	0.00	2.658	0.059	0.00	0.162	0.074
5.10	Cemeteries and Crematoria		11.03	0.00	29.89	0.00	0.00	0.00
5.10.1	Crematoria	y	11.03	0.00	0.00	0.00	0.00	0.00
5.10.2	Cemeteries	y	0.00	0.00	29.89	0.00	0.00	0.00
Total of quantified releases			2,424.39	615.72	3,226.79	176.68	16,167.35	130.11

Annex 6. Potential sites identified for the temporary storage of elemental mercury and mercury-contaminated waste

Site	Possible use	Current use	Location/comments
Bunkers	Storage of existing elemental mercury	No current use	Provinces of Panama and Colon. Note that there are about 100 bunkers in these two (2) provinces, with an area of at least 100 square meters.
Cerro Patacon sanitary landfill	Storage of waste contaminated with mercury	Disposal of municipal solid waste and some hazardous waste using landfill technique. It treats solid waste generated in the municipalities of Panama, San Miguelito and part of that generated in the municipality of Arraijan	Province of Panama. It has an area of 132 hectares.
EMAS future landfill	Treatment and temporary storage of waste contaminated with mercury	To remove cover material to be used in the Playa Leona landfill. It is not yet being used as a disposal site for municipal solid waste from the municipalities of La Chorrera, Capiro and part of that generated in the municipality of Arraijan	Private company that submitted six (6) years ago for consideration by the National Environmental Authority an Environmental Impact Assessment , which was approved , for the construction and operation of a landfill in an area very close to the current controlled dump. The site in question has an area large enough for a temporary storage location for the storage of waste contaminated with mercury.
Grounds of the Tocumen extension of the Technological University of Panama	Storage of waste contaminated with mercury	University research and workshop facility	Province of Panama. It has a fairly large area
Ecologic S,A	Treatment of mercury-contaminated waste and batteries and cells contaminated with mercury	Treatment of fluorescent lamps and used/damaged cells and batteries.	Province of Panama, lacks sufficient space to accommodate all waste contaminated with mercury, but it has an interest in acquiring another site.

Annex 7. Stakeholders and their responsibilities related to the management of wastes consisting of elemental mercury and wastes containing or contaminated with mercury

Entity	Stakeholders	Area of Interest/competencies
Government	Ministry of Health (MINSa)	The area of interest is public health. The competencies include the governance and regulation (issuing policies, standards, surveillance and control) of hazardous wastes in order to protect human health and the environment. Must develop and implement policies on hazardous wastes in coordination with the National Environmental Authority.
	National Environmental Authority (ANAM)	The area of interest is the environment and its competencies include establishing of principles and rules for the protection, conservation and recovery of the environment, thus promoting sustainable use of natural resources. In addition, it regulates environmental management, integrating it to social and economic objectives in order to achieve sustainable human development in the country. This is done through the development of standards for the management of hazardous waste as well as the monitoring of its implementation and the control of environmental pollution. In coordination with MINSa it develops and implements policies on hazardous wastes.
	Ministry of Commerce and Industry (MICI)	The area of interest is the international and domestic trade and its competencies are related to the development and implementation of policies to facilitate trade in accordance with international guidelines; likewise, it has the authority to establish technical standards through the General Directorate of Technical Standards (DGNTI) in coordination with relevant institutions.
	National Customs Authority (ANA)	In charge of the exchange and foreign trade relations of the Republic of Panama. Its responsibilities are to enforce customs duties, regimes and customs procedures and to implement policies related to customs control, and protection of health, environment, intellectual property, national heritage and others that are applicable to foreign trade, including rules on customs provided by international trade agreements or treaties, either bilateral or multilateral. All that in compliance with national laws and in coordination with the competent authorities or authorizing agencies.
	Ministry of Public Security	Its mission is to determine the country's security policies, as well as plan, coordinate, monitor and support the efforts of all security and intelligence agencies that integrate the Ministry. Its responsibilities include maintaining and defending national sovereignty, ensure security, peace and public order in the country and protect the life, honor and property of their nationals and foreigners under their jurisdiction.
	National Assembly	The area of interest is the benefit of the Nation. Their responsibilities are to issue the necessary laws for fulfillment of the purposes and exercise of the State functions declared in the Constitution.
	Authority of Urban and Household Sanitation (AAUD)	In charge of the urban and household sanitation. Its responsibilities are to manage, plan, explore, exploit, investigate, inspect and audit services related to urban sanitation, commercial and household as well as landfills. It is also responsible for the comprehensive management of solid wastes, including its handling, exploitation, utilization and disposal; and the development of a waste policy as a guideline for the prevention and control of pollution of the environment and the protection of public health.
	University of Panama (UP)	The interest of the UP is to generate and disseminate knowledge, research, comprehensive training, scientific, technological and humanistic. Its responsibility is the academic management of the university studies.

	Technological University of Panama (UTP)	The interest of the UTP is scientific and technological higher education. Its competency is to organize and implement careers for the formation of professionals of technical levels, undergraduate, graduate and any other that is characteristic of higher education, adjusting their plans, programs and activities for the purposes and needs of the Panamanian social reality.
Private enterprise	Industrial Union of Panama	It represents and defends the interests of national industry. Its competency is to provide communication, information and education among and to its affiliates, facilitating orientation of the national industry to today's changing world, and improving their competitive advantages.
	Chamber of Commerce, Industry and Agriculture of Panama	The interest is to unify efforts in an organized manner in order to achieve the improvement of commercial and service activities in the country. Its responsibility is to provide various services to its members that contribute to the full development of their business activities. Among other services, the Chamber defends the interests of members in relation to measures affecting the principle of free enterprise and entrepreneurship.
	National Council of Private Enterprise	The interest is to unite, coordinate and represent business organizations to strengthen the private sector. Its responsibilities are to boost the economy and promote social, economic and political transformation in the country and its international projection.
	Mercury waste generators	The interest is to provide services to the community, which may be commercial or industrial. As generators of hazardous wastes, its competency is to manage waste in an environmentally sound manner, using the services of a company engaged in the business of collection, transportation, treatment and/or disposal.
Civil society and NGOs	Panamanian Dental Association	Nonprofit association that regulates private and institutional practice and represents the interests of organized dentistry nationally. Its aims are a) betterment of the dentistry profession in all its aspects, b) promote the oral health of the community and c) encourage professional and guild relations among all the dentists in the country.
	NGOs	Nonprofit civil organizations, usually of environmental and social nature. Among their responsibilities are the promotion of information, training, and partnerships with private companies and communities, including partnerships with other NGOs, with the aim of instilling a comprehensive management of solid, hazardous and toxic waste and recyclable materials and serve as reference point wherever possible for similar initiatives in other countries.
	Associations, environmental organizations and civil society in general	They typically are of a social nature. They can review and be consulted on projects that may affect human health and the environment based on the authority granted by the General Environmental Law.

Annex 8. Constitution of the working subgroups according to the scheduled activity

Activity	Working subgroups
1 - Updating the existing mercury inventory	Ministry of Health National Environmental Authority National Assembly Technological University of Panama Authority of Urban and Household Sanitation National Customs Authority Ministry of Agricultural Development Zero Pollution Alliance (NGO) National Consultant
2 - Updating the legal framework	Ministry of Health National Environmental Authority National Assembly National Consultant
3 - Evaluation and analysis of potential sites for temporary storage of mercury in the country	Ministry of Health National Environmental Authority Technological University of Panama Authority of Urban and Household Sanitation Zero Pollution Alliance (NGO) National Police National Security Council National Consultant
4 - Evaluation of basic management options and stakeholders	Ministry of Health National Environmental Authority Technological University of Panama Zero Pollution Alliance (NGO) Panama Canal Authority National Consultant
5 - Establishment of processes for decision making and entities involved	Ministry of Health National Environmental Authority National Assembly Technological University of Panama Authority of Urban and Household Sanitation National Customs Authority Ministry of Agricultural Development Zero Pollution Alliance (NGO) National Police National Security Council Panama Canal Authority Ministry of Commerce and Industry Energy Secretariat Association of Municipalities of Panama Panamanian Dental Association Tommy Guardia National Geographic Institute Social Security Fund

	Public Services Authority Mining Chamber of Panama National Consultant
6 - Development of National Action Plan for storage and disposal of mercury	Ministry of Health National Environmental Authority National Assembly Technological University of Panama Authority of Urban and Household Sanitation National Customs Authority Ministry of Agricultural Development Zero Pollution Alliance (NGO) National Police National Security Council Panama Canal Authority Ministry of Commerce and Industry Energy Secretariat Association of Municipalities of Panama Panamanian Dental Association Tommy Guardia National Geographic Institute Social Security Fund Public Services Authority Mining Chamber of Panama National Consultant
7 - Preparation of project progress report	Ministry of Health National Environmental Authority National Assembly Technological University of Panama Authority of Urban and Household Sanitation National Customs Authority Ministry of Agricultural Development Zero Pollution Alliance (NGO) National Police National Security Council Panama Canal Authority Ministry of Commerce and Industry Energy Secretariat Association of Municipalities of Panama Panamanian Dental Association Tommy Guardia National Geographic Institute Social Security Fund Public Services Authority Mining Chamber of Panama National Consultant
8 - Preparation of final project report	Ministry of Health National Environmental Authority National Consultant

Annex 9. Map of the Republic of Panama that shows the location of potential sites identified for temporary storage of elemental mercury and mercury-contaminated waste



1 - Bunkers
de la extensión de la Universidad Tecnológica de Panamá

2 – Cerro Patacon Landfill Relleno Sanitario de Cerro Patacón

4 – Lands of the Technological University of Panama extension Terrenos

5 - Ecologic S,A.

3 – EMAS Controlled Dump Vertedero Controlado de EMAS

Annex 10 Legal framework for Elemental mercury and Contaminated waste with mercury

Level	Instrument	A. Environmental standards	B. Mercury/products-wastes/processes									C. Facilities				
		Water, air, soil, biota	Sources inventory	Import / export	Trade	PRTR	Treatment / recycling	Transport	Storage	Final Disposal	Elimination	Releases	Land Use	Authorization	Inspection	EIA / Risk
International	Law No. 21 of December 6, 1990 , which approves the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.			X												
	Law 38 of June 4, 1995 , which approves the United Nations Convention on the Law of the Sea, adopted at Montego Bay on December 10, 1982.							X								
	Law No. 12 of June 14, 2000 , which approves the Rotterdam Convention for the application of the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, adopted at Rotterdam, Netherlands, 10 September 1998.			X												
	Law 3 of January 20, 2003 , which ratifies the Stockholm Convention						X									
Regional	Law No. 13 of April 21, 1995 , which approves the Regional Agreement on Transboundary Movement of Hazardous Waste, signed at Panama on December 11, 1992.			X												
National	Resolution No. AG-0295-2004, of August 2, 2004 , which approves the management plan of Volcan Baru National Park.												X			

Level	Instrument	A. Environmental standards	B. Mercury/products-wastes/processes									C. Facilities				
		Water, air, soil, biota	Sources inventory	Import / export	Trade	PRTR	Treatment / recycling	Transport	Storage	Final Disposal	Elimination	Releases	Land Use	Authorization	Inspection	EIA / Risk
National	Resolution No. AG-0033-2004, of January 30, 2004 , which approves the management plan for the Altos de Campana National Park and Biological Reserve.												X			
	Resolution No. AG-0034-2004, of January 30, 2004 , which approves the management plan for the Soberania National Park.												X			
	Resolution No. AG-0800-2004, of December 30, 2004 , which approves the management plan for the Darien National Park .												X			
	Resolution No. AG-040-93 of December 10, 1993 , which approves the use zones plan for the Sarigua National Park.												X			
	Resolution No. AG-0298-2004, of August 2, 2004 , which approves the management plan for the Chagres National Park.												X			
	Resolution No. AG-0799-2004, of December 30, 2004 , which approves the management plan for the Cerro Hoya National Park.												X			
	Resolution N° AG-0301-2004, of August 2, 2004 , which approves the management plan for the Major-General Omar Torrijos Herrera National Park.												X			

Level	Instrument	A. Environmental standards	B. Mercury/products-wastes/processes									C. Facilities					
		Water, air, soil, biota	Sources inventory	Import / export	Trade	PRTR	Treatment / recycling	Transport	Storage	Final Disposal	Elimination	Releases	Land Use	Authorization	Inspection	EIA / Risk	
National	Resolution No. AG-0304-2004, of August 2, 2004 , which approves the management plan for the La Amistad International Park.												X				
	Resolution No. AG-0303-2004, of August 2, 2004 , which approves the management plan for the Camino de Cruces National Park.												X				
	Resolution N° 10-2007 of February 27, 2007 , assigns as special superimposed treatment area, framed within areas of large projects, polygon N° 7, Lot P-BU03-03, located in the area known as Rodman Naval Base.													X			
	Resolution No. AG-0269-2007, of July 24, 2007 , which approves the management plan for the Metropolitan Natural Park													X			
	Law No. 8 of June 7, 1991 , which prohibits the importation of toxic waste or pollutants into the territory of the Republic of Panama.			X													
	Resolution No. 074-ADM of September 18, 1997 , which defines and lists banned pesticides for use in the Republic of Panama.			X	X												
	Law No. 41 of 1 July 1998 , General Environmental Law of the Republic of Panama		X		X											X	X

Level	Instrument	A. Environmental standards	B. Mercury/products-wastes/processes									C. Facilities					
		Water, air, soil, biota	Sources inventory	Import / export	Trade	PRTR	Treatment / recycling	Transport	Storage	Final Disposal	Elimination	Releases	Land Use	Authorization	Inspection	EIA / Risk	
National	Executive Decree No. 111 of June 23, 1999 , which establishes the rules for the management and handling of solid waste from health facilities						X	X	X	X					x		
	Resolution No. 49 of February 2, 2000 , which approves the DGNTI-COPANIT Technical Regulation 24-99, Water, Water Quality, Reuse of Treated Water	X										x					
	DGNTI-COPANIT Technical Regulation 24-99 , Water, Water Quality, Reuse of treated wastewater.											x					
	Resolution No. 350 of July 26, 2000 , which approves the DGNTI-COPANIT Technical Regulation 39-2000, liquid effluent discharges directly to the wastewater collection systems	X											x				
	DGNTI-COPANIT Technical Regulation 39-2000 , water, liquid effluent discharge directly to wastewater collection systems.												x				
	Resolution No. 351 of July 26, 2000 , which approves DGNTI-COPANIT Technical Regulation 35-2000, Water, Liquid Effluent Discharge Directly to Surface Water Bodies and Groundwater	X															
	DGNTI-COPANIT Technical Regulation 35-2000 , water, liquid effluent discharge directly into bodies of surface																

Level	Instrument	A. Environmental standards	B. Mercury/products-wastes/processes									C. Facilities				
		Water, air, soil, biota	Sources inventory	Import / export	Trade	PRTR	Treatment / recycling	Transport	Storage	Final Disposal	Elimination	Releases	Land Use	Authorization	Inspection	EIA / Risk
National	water and groundwater.															
	Resolution No. 352 of July 26, 2000, which approves DGNTI-COPANIT Technical Regulation 47-2000, Water, Uses and sludge disposal	X														
	DGNTI-COPANIT Technical Regulation 47-2000, water, uses and sludge disposal.															
	Law No. 1 of January 10, 2001, on Drugs and Other Products for Human Health				X											X
	Resolution No. 124 of March 20, 2001, which approves DGNTI-COPANIT Technical Regulation 43-2000, Hygiene and Safety for Air Pollution Control in Working Environments Produced by Chemicals.															
	Executive Decree No. 305 of 2002, which establishes prior non-automatic licensing to regulate the import of certain potentially hazardous chemicals as controlled substances or hazardous materials, and introducing other provisions.		X	X	X											
	Executive Decree No. 156 of May 28, 2004, "Establishing health standards for approval of projects for the construction and operation of safety landfills, and introducing other provisions"									X					X	X

Level	Instrument	A. Environmental standards	B. Mercury/products-wastes/processes									C. Facilities				
		Water, air, soil, biota	Sources inventory	Import / export	Trade	PRTR	Treatment / recycling	Transport	Storage	Final Disposal	Elimination	Releases	Land Use	Authorization	Inspection	EIA / Risk
National	Executive Decree No. 293 of August 23, 2004 , which sets health rules for obtaining construction and operation permits, as well as monitoring, for incineration and co-incineration systems.	X										x		X	X	
	Law No. 5 of January 11, 2007 , which streamlines the process of starting a business and establishes other provisions.						X	X						x		
	Executive Decree No. 249 of June 3, 2008 , "which dictates the rules concerning sanitary disposal of pharmaceuticals and chemicals waste "			X			X			X	X					
	Executive Decree No. 2 of January 14, 2009 , which establishes the environmental standard of soil quality for various uses												X			
	Resolution No. 455 of June 9, 2009 , which establishes a registry for firms engaging in the collection and transportation of hazardous medical waste originating from health facilities.							X							x	
	Executive Decree N° 123 of August 14, 2009 , "which regulates Chapter II of Title IV of Law 41 of July 1, 1998, General Environmental Law of the Republic of Panama, and repeals Executive Decree N° 209 of September 5, 2006".						X								x	X

Level	Instrument	A. Environmental standards	B. Mercury/products-wastes/processes									C. Facilities					
		Water, air, soil, biota	Sources inventory	Import / export	Trade	PRTR	Treatment / recycling	Transport	Storage	Final Disposal	Elimination	Releases	Land Use	Authorization	Inspection	EIA / Risk	
National	Executive Decree N° 40 of January 26, 2010 , which establishes the activities related to high-risk situations for their implications to public health or the environment, the types of establishment that are of health interest due to their line of business, and introduces other provisions.						X	X		X	X			X	X	X	
	Resolution N° 1029 of November 8, 2011 , which establishes the requirements and procedures for obtaining a Health Operating Permit, for all the operators engaged or wishing to engage in activities related to the classification, packaging, packing, collection, transportation, temporary storage, treatment, grinding, neutralization, recycling, encapsulation, recovery, reuse and disposal of hazardous wastes.						X	X						X	X	X	
	Cabinet Decree No. 49 of December 28, 2011 , which approves the Fifth Amendment to the nomenclature of the Harmonized Commodity Description and Coding System, as recommended by the World Customs Organization, of June 26, 2009, in its sole Spanish version.			X													
	Resolution No. 011 of January 11, 2013 , whereby the Ministry of Health, by hiring duly authorized companies, will be responsible for the collection, transportation, treatment and disposal of hazardous hospital waste of						X	X		X					X		

Level	Instrument	A. Environmental standards	B. Mercury/products-wastes/processes										C. Facilities				
		<i>Water, air, soil, biota</i>	<i>Sources inventory</i>	<i>Import / export</i>	<i>Trade</i>	<i>PRTR</i>	<i>Treatment / recycling</i>	<i>Transport</i>	<i>Storage</i>	<i>Final Disposal</i>	<i>Elimination</i>	<i>Releases</i>	<i>Land Use</i>	<i>Authorization</i>	<i>Inspection</i>	<i>EIA / Risk</i>	
National	its health facilities nationwide.																
Local																	