INTERIM MERCURY STORAGE IN COLOMBIA

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• In 2018, the U.S. Department of State’s Mercury Program awarded a grant to Pure Earth to work on various aspects of recovering mercury from artisanal and small-scale gold mining (ASGM) tailings such as feasibility, economics, and regulatory frameworks.

• The following year, the Mercury Program engaged the U.S. EPA to work with the Colombian Government and Pure Earth to look at issues around setting up interim storage facilities.
INITIAL OBSTACLES FOR INTERIM STORAGE

• Finding the right ministry to take responsibility: Should it be the Army, the Policia Nacional, the Environmental Ministry, Fiscalia?

• There seemed to be concerns regarding the security of the facility, potential diversion of the mercury to the ASGM sector, sources of funding for the expense of operating the facility with no end date.

• Finding the right site for the storage facility

• Arranging for training in safe handling, chain-of-custody, transportation, etc.
STEPS FORWARD

• In early 2019, with the collaboration from the Ministry of Environment and Sustainable Development (MinAmbiente), a schematic of the storage facility and proposed standard of operation (i.e. chain of custody, spill management plan, etc.) were developed.

• In 2022, a joint project between PNUD (United Nations Development Program) and MinAmbiente successfully piloted stabilization of metallic mercury with a private company, Innova, in Cali. The stabilized mercury will be placed in a hazardous materials landfill operated by Veolia.

• With the assistance of the Inspector General’s office (Procuraduria), a small fridge was installed within the Corporación Autónoma Regional para la Defensa de la Meseta de Bucaramanga (CDMB) laboratory in June, 2023
SOME SOURCES OF MERCURY

- Confiscated mercury
- Mercury recovered from tailings & mining waste before further processing with cyanide
- Medical Devices
CONTINUED CHALLENGES

• Limited capacity – the storage facility has a capacity of 300 liters of liquid. Due to the density of mercury, realistically it can only hold approximately 20 liters of mercury.

• Financial and human resources – the current funding from the U.S. Department of State covers supplies and operating costs (including transportation to Innova and costs for stabilization and disposal) until October, 2024.

• Because of limitations on capacity and resources, CDMB can only accept mercury from Santander and not other departments in Colombia. In September 2023, Fiscalia was looking to store and dispose of 45 kg of mercury originating from Antioquia but CDMB was unable to help.
LESSONS LEARNED

- Clarifying governmental authorities – which ministry is responsible for what.
- Training workers on appropriate handling, transfer, storage, and emergency response for spills
- Developing regulations that incentivize the recovery and storage of mercury
  - Clear guidelines on what the process is for interim storage of mercury
  - Removing regulatory obstacles to recovering mercury
  - Incentivizing recovery of mercury – e.g. tax breaks to miners recovering mercury from contaminated tailings
  - Identifying a revenue stream for the interim storage of mercury – e.g. regulations that use a percentage of the tax received from miners working on tailings to fund the interim storage unit(s).
SMALL STEPS WITH LARGE IMPACT

• It’s important to have a temporary storage facility, but it’s also important to:
  • Start the process of placing confiscated mercury into temporary storage,
  • Introduce the concept of chain of custody,
  • Train Colombian personnel on health and safety procedures in handling mercury and spill cleanup.

Protecting people from workplace exposures: shifting storage of mercury from the top of a desk in an office to proper storage

• While CDMB was unable to accept 45 kg of mercury, a flask containing approximately 10 ml of mercury was retrieved from an office on September 14, 2023. It had been in a file folder on top of a desk for two years. At some areas of the desk the level of mercury vapor reached 5 µg per cubic meter of air. The EPA guideline for office setting is 3 µg per cubic meter of air. It was a very small action but protected many office workers from further exposure to an unacceptable level of mercury vapor.
ACKNOWLEDGMENT

• MS. SHUN-PING CHAU, U.S. EPA
  • PURE EARTH
  • U.S. EMBASSY BOGOTA
• MANY PEOPLE IN THE COLOMBIA GOVERNMENT
THANK YOU!

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First Temporary Mercury Storage Unit and Protocol of Implementation in Colombia
Agenda

- Jane Dennison, *U.S. Department of State.*
- Alfonso Rodriguez, *Pure Earth*
- Andrea Corzo, *Ministry of Environment and Sustainable Development of Colombia*
- Daniel Gomez, *National Attorney for Environmental and Agrarian Affairs of Colombia*
- Víctor Alfonso Rey, *Ministry of Foreign Affairs of Colombia*
Dr. Dennison has been the Mercury Program Officer at the U.S. Department of State for more than 7 years, focusing primarily on artisanal and small-scale gold mining, overseeing the grant process for 12+ projects, and participating in the organization of workshops and conferences on ASGM.
First Temporary Mercury Storage
Unit and Protocol of Implementation in Colombia

Alfonso Rodriguez
Technical Manager
Global Mercury Strategy Coordinator
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Pillars

- Identify mercury recovery (capture) technology from contaminated tailings.
- Develop a business model for the tailings management (Gold Production).
- Develop technical protocols for tailings management.
- Bring the ASGM sector into the formal economy.
- Develop a regulatory framework for
  - Tailings management
  - Legal market for recovered gold,
  - Financial mechanisms for the mercury storage unit.

- Develop a technical protocol Mercury Management, Storage and final disposal.
Mercury - Colombia Context

- June 2018 – Banned for mining activities
- June 2023 – Banned for other activities
- December 2022 – Characterization of 140 tailings
- October 2023 - 86 Contaminated sites identified
- Illegal market - illegal use
Problem

There is no articulated national process between government agencies for the management of mercury when it is found. (even its final disposal)

What we have

- Mercury Law (2013)
- Mining Tailings Management Law (2022)

What is missing

- Definition of responsibility for mercury management (e.g. Prosecutor’s office)
- Specific protocol for the management of mercury, handling and its final disposal
- Storage unit for mercury
  - location
  - capacity
  - time
Identifying gaps & creating the process

Consultation meetings with government agencies:

- Ministry of Environment
- Ministry of Mining
- Mining Associations
- Regional Environmental Authorities
- Research institutes (Universities) *
- Prosecutor's Office
- Army / Police
Identifying gaps & creating the process

Mercury collection sources:
- Voluntary surrender
- Laboratory waste (Research Institutes)
- Recovery process (Tailings Cleanup)
- Seizure by military operation
  - No people involved
  - With people involved (Evidence)*

Mercury handling and transportation:
- PPE (HSE protocol)
- Containers
- Vehicles
- Official report format
Identifying gaps & creating the process

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Identified the order of the process:
- Mayor of the municipality \((\text{First Responsible})\)
- Chain of custody format
- Storage unit is required *
- Reduce time of delivery \((\text{Public security})^*\)
- Identified the final government agency responsible *

5

Nacional current status:
- No central information system
- There is no certainty of the amount of mercury collected
- No long-term / short-term storage unit
- No national budget for final disposal of mercury
- Only one licensed final disposal provider
Pilot Implementation

- Regulatory framework analysis
- Storage unit location analysis
  - Government agency
  - Access security
  - Mining area
  - Compliance with the technical requirements of the facilities
  - Easy transportation
  - Health & safety protocols
  - Monitoring process
- Joint work with the Attorney General's office in the development of The National Mercury Work Group *

Agreement with Local Environmental Authority in Santander Department
Pilot Implementation
Storage Unit – Technical Specifications

• ISO 17001 Compliance
• Temperature range - between +2°C and +12°C.
• Data logger - Electronic recording system of temperatures and alarms.
• External structure in hot-dip galvanised steel, anti-corrosion treated and PVC film coated.
• Stainless steel internal structure.
• Completely sealed, silent and highly efficient compressor.
• Proper containers
• Total capacity 240 Kg Hg (18 liters) *
• Maximum time of storage 1 year
Mercury management - Protocol

Mercury Reception

Registration Form

• Chain of Custody

HSE Protocol

• Use of PPE

Container verification

• Packaging and labeling *

Storage and monitoring

• Máximo 1 year

Delivery for final disposal

• Chain of Custody registration
Training

- Certificate Workshop
- Internal protocol of mercury management
- 20 Officials of Regional Environmental Authority and relevant agencies
- Occupational risk of handling mercury
- Emergency procedures to deal with mercury spills
- Monitoring process
Key achievements & Commitments

• First temporary storage unit for Mercury in Colombia for government agencies.
• One year of monitoring and control process
• Transportation and final disposal treatment of mercury already cover until October 2024
• Need to replicate the pilot in other mining departments of the country
• Case study for other countries with similar problems
Relevant Documents

**Review mercury recovery technologies**

**Tailings Management Protocol**

**Copper Plates Implementation - Economic model**

**Technical Report**

Mercury precipitation

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https://www.pureearth.org/columbia-proyecto-de-recuperacion-de-mercurio-en-relaves/
Project results

8
Technical documents for managing and storing recovered mercury.

2
New national frameworks for managing and storing recovered mercury.

2
Copper plate modules for processing of mercury recovery from tailings delivered.

1
Mercury Storage Unit for the temporary storage of mercury.

+300
Tons of contaminated tailings processed.

84
Percent of mercury recovered, on average, in ideal conditions from tailings using the copper plates technology.

90
Percent of gold recovered from 200 tons of treated tailings.

+280
Miners trained in tailing management and storage of recovered mercury.

+63
National and international agencies at workshops to manage tailings.

5
Innovative mercury precipitating materials were tested in the cyanidation process.

https://www.pureearth.org/colombia-proyecto-de-recuperacion-de-mercurio-en-relaves/
Thank You

www.pureearth.org

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Lawyer, from the Sergio Arboleda University with a Master's Degree in Environment, Human and Socioeconomic Dimensions from the Complutense University and specialization in environmental consulting from the University of León.
Daniel Gomez Cure

Advisor on environmental, mining, energy, and agrarian matters for the Attorney General's Office.

Environmental Engineer, with specialization studies in Environmental Law, Environmental Management, and Disaster Prevention and Master in Environmental Management and Evaluation. Postgraduate and undergraduate teacher in environmental management at several universities in Colombia.
Victor Alfonso Rey Arismendy

Diplomatic officer of the Ministry of Foreign Affairs, assigned to the Directorate of Economic, Social and Environmental Affairs.

He is currently in charge of the chemical substances and waste unit, circular economy unit, and is a support officer in several processes related to plastics management and climate change. He also is National Focal Point to SAICM, the Basel, Rotterdam and Stockholm Conventions and the Minamata Convention.
Q & A
MERCURY MANAGEMENT: First Temporary Mercury Storage Unit and Protocol of Implementation in Colombia

Daniel Gómez Cure
Attorney General's Office of Colombia
**Chronology**

- **2013**
  - OCT. Minamata Contention on Mercury

- **2018**
  - MAY. Law 1892 Minamata
  - AUG. Single National Mercury Plan

- **2022**

- **2023**
  - ENE. Nacional Mercury Roundtable
  - MAY. Mercury Storage Unit
  - JUN. Pilot plant

- **2018**
  - JAN. Mercury Storage Unit
  - OCT. Minamata Contention on Mercury
  - AUG. Single National Mercury Plan

- **2022**
  - JAN. Mercury Storage Unit
  - MAY. Start Disciplinary investigation
  - JUN. 1° Regional Roundtable
  - AUG. 2° Regional Roundtable
  - DEC. 3° Regional Roundtable

- **2013**
  - MAY. Law 1658 - Elimination of Mercury
In this area of Santander, it is estimated that the process of illegal gold extraction uses, on average:

- **5 Grams of MERCURY**
- **1 gram of gold**
- **1 Kilo of GOLD per day**
- **5 Kilos of Hg per day**

According to the miners in the area, illegal mining produces:

would have the capacity to **CONTAMINATE** an area of **40,000 hectares**

**160 times above the allowable limit**
Emiten alerta por aumento de contaminación por mercurio en actividades de minería ilegal

La Procuraduría General de la Nación instó a las autoridades a tomar medidas para combatir la contaminación por mercurio que se produce en el Río Suratá. La entidad emitió una alerta por minería ilegal en diferentes zonas del país.

La concentración de mercurio en algunas zonas del Río Suratá ha provocado preocupación por la salud pública.

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For the first time, INSTITUTIONAL ARTICULATION was achieved for the solutions.

Regional roundtable for the Control of Mercury

- 63 Institutions
  - 30 National
  - 16 Regional
  - 3 International
  - 6 Social organizations
  - 8 Academy

- 3 Regional roundtable
- 122 participants
Mercury problems in Colombia

- 205 Tons of mercury released to soil and water
- 232 Contaminated water sources

- Largest polluter per capita
- Largest importer in LATAM
- Most Polluted Country in the World

75 Tons Anuales
National Roundtable for the Control of Mercury

130 Participants
65 Institutions

30 National
16 Regional
5 International
6 Social organizations
8 Academia
Pilot Plant
for decontamination of Sandy residues with mercury

Storage Unit
For temporary storage of mercury

Actions
Disciplinary proceedings for breach of functional duties
“it is necessary to adopt a zero tolerance attitude towards the use of mercury. It is not a matter of reducing it, but of putting an end to the practices that use this metal; which in our country are mainly due to illegal mining”

“The Colombian Attorney General's Office is an ally in the fight against the use of mercury…. We will not rest until the practices that contaminate our water sources and poison our planet.”
THANK YOU

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