

# Storage and Final Disposal of Mercury in Argentina and Uruguay - Project

**Workshop on Problems of Mercury Management in Latin America  
and the Caribbean Region  
May 21st – 22nd, 2012  
Brasilia, Brazil**



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Basel Convention  
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# Uruguay General Information



- Area: 176.215 km<sup>2</sup>
- Inhabitants: aprox. 3.500.000
- Capital: Montevideo

Brasilia, May 22<sup>nd</sup>, 2012

# Project Background

Based on the recommendations made at the meeting of the Executive Committee of the Mercury Storage Project in LAC, October 2010, Santiago de Chile, the United Nations Program for Environment (UNEP), through the Chemical Branch of the Division of Technology, Industry and Economics (DTIE Chemical Branch) and the Coordinating Center for Basel Convention for Latin America and the Caribbean, located in Uruguay (CCCB), agreed to the realization of this binational project Argentina-Uruguay.

At the meeting was pointed the need of interim storage facilities for the storage of elemental mercury, largely from chlor-alkali processes, and co-products of non-ferrous metal smelting and waste products containing mercury at the end of its useful life.

Brasilia, May 22<sup>nd</sup>, 2012

# Project's Outputs

- A List of potential temporary storage sites in the country and its use, an inventory of mercury treatment facilities and / or hazardous wastes and their management practices.
- A review of the regulatory framework, including national or regional policy on hazardous substances and waste management.
- An evaluation of the basic options of management and the state of technology in national and regional context.
- A national action plan in the environmentally safe management of excess mercury in the country.

Brasilia, May 22<sup>nd</sup>, 2012

## **Specific Aim:**

To design a national action plan that allows both transient storage, such as a suitable disposal of surplus mercury (commodity or residue).

Considering the need for definitions for trade Hg waste at their national, regional and international levels. Legal necessary. Requirements for storage areas of waste liquid mercury or mercury.

## **Execution Period: 2011 – 2012**

- Inception Workshop was held on 28<sup>th</sup> and 29<sup>th</sup> of June, 2011 in Montevideo, Uruguay.
- Final Workshop was held on 25<sup>th</sup> and 26<sup>th</sup> of April, 2012, in Buenos Aires, Argentina.

## **-Uruguayan Team:**

-MVOTMA – DINAMA: Hazardous Substance Department, I.Q. Judith Torres.

-National Consultant: Q.F. Beatriz Olivet.

-International Consultant: Gustavo Solórzano.

-BCCC-SCRC: Q.F. Gabriela Medina, I.Q. Alejandra Torre y Qca. Virginia Santana

Brasilia, May 22<sup>nd</sup>, 2012

# Pre-Implementation Progress

- Were surveyed inventory data held in Uruguay based on the "Toolkit for identification and Quantification of mercury releases", UNEP 2010.
  1. "Inventory of mercury releases in Uruguay in the industrial sector", Project: "Environmentally sound management and minimization of waste containing mercury, that affect populations exposed, in various economic sectors, including the health sector in several countries in Latin America and the Caribbean" , USEP/UNEP/BCCC-SCRC LAC and DINAMA.
  2. "Inventory of mercury releases - Pilot in **Health Sector**", the same project as above.
  3. "National Inventory of Releases of Mercury **Products**," Project: "Sound Management of Mercury Products", UNEP – SAICM/UNIDO/BCCC-SCRC LAC/DINAMA.
  4. "National inventory of mercury releases," reflects and complements 1 and 3, held under the latest SAICM Project.

Brasilia, May 22<sup>nd</sup>, 2012

# Pre-Implementation Progress

- Feasibility Study and Options Analysis for Long Term Storage of Mercury in Latin America and the Caribbean, UNEP - LATU (Uruguay) 2010.
- Good Practices Guide for Chlorine Alkali Industry , PNUMA – BCCC-SCRC, 2011.

Brasilia, May 22<sup>nd</sup>, 2012

# Uruguayan Mercury Releases

- Estimation of the total releases of mercury to the environment :
  - Max. = 3.616 kg Hg/year.
  - Min. = 2.201 kg Hg/year.
- Main category
  - Plants of chlor-alkali with mercury technology (1.140 kg Hg/year).
- Second category
  - Dental amalgam with mercury (550 kg Hg/year).
- Third category
  - Thermometers (185 kg Hg/year, mostly clinical).

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# Uruguayan Mercury Releases

- Electrical switches
  - Max. = 836 kg    Min. = 66.9kg (based on Toolkit)
- Fluorescent Lamps: Imports at 2010
  - 3.267.000 compacts lamps,
  - 1.231.000 fluorescent tubes,
  - 268.000 sodium and mercury vapor lamps, and metallic halides .

Based on the estimated breakage was estimated to be released 63kg Hg/year from this source.

The rest of the categories present annual releases less than 5% of the total.

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# Uruguayan Mercury Releases

Sub category	Description	Maximum Estimated (kg Hg/año)	Eminimum Estimated (kg Hg/año)
5.1.2	Otros usos del carbón	0,12	
5.1.4	Extracción, refinación y uso de gas natural	0,01	
5.1.3	Extracción, refinación y uso de petróleo	31,2	
5.1.6	Energía obtenida por la quema de biomasa	17,6	
5.2.6	Extracción de oro y procesamiento inicial por métodos distintos que el amalgamamiento con mercurio	29,5	
5.3.1	Producción de cemento	86,6	15,7
5.3.2	Producción de pulpa y papel	59,6	13,9
5.3.3	Producción de cal y hornos de agregados ligeros	4,6	1,9
5.4.1	Plantas de producción de cloro-álcali con tecnología de mercurio	1140	
5.5.1	Termómetros con mercurio	185	57,5
5.5.2	Interruptores eléctricos y relés con mercurio	836	66,9
5.5.3	Fuentes lumínicas con mercurio	59,2	9,8
5.5.4	Pilas y baterías con mercurio	70,8	
5.5.5	Poliuretano con uso de catalizador con mercurio	167	33,4
5.5.8	Productos farmacéuticos para uso humano y veterinario	15,1	
5.6.1	Amalgamas dentales de mercurio	550	
5.6.2	Manómetros y medidores con mercurio	138	116,5
5.6.3	Productos químicos de laboratorio y equipamiento con mercurio	11,9	
5.7.2	Producción de metales ferrosos reciclados	3,2	
5.8.3	Incineración de desechos médicos	17,4	3,5
5.8.5	Quema informal de desechos	60,3	
5.10.1	Crematorios	13,1	3,3
5.10.2	Cementerios	119	29,8

# Waste Streams

## Process

- Chlor-alkali Plant

## Product

- Domestic
- Others industrial wastes
- Public and Private Institutions. Malls...
- Laboratories (no from health)
- Health Sector

## Others

- Lighthouseing

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# Uruguayan Regulatory Framework

- General Environmental Protection Law, N° 17.283/000. Framework Law.
- Hazardous Substances Law, N° 16.221/991, Basel Convention.
- Law N° 17.593/002, Rotterdam Convention.
- Specific Waste Decrees:
  - Lead Acid Batteries, N° 373/003.
  - Medical Waste N° 135/999, modified by N° 586/009.
  - Packaging Waste N° 260/007.

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# Responsibilities

- Ministry of Housing, Land Planning and Environment (MVOTMA), through the National Environmental Directorate (DINAMA).
  - responsible for the implementation of environmental policy as determined by the Executive Power (Law N° 16.112/990, creation of MVOTMA).
- Municipal Governments:
  - responsible for street cleaning and household waste (Municipal Act, 1935).

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# Present

- Uruguay is going through a crucial stage in regard to Waste Legislation, as it has formed a working group to develop a specific Waste Law.

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# Inventory on Possible Storage Sites

- Methodology

- It was evaluated the sub-categories of the "Toolkit for the identification and Quantification of mercury releases."
- It was revised all the inventories releases made in the country.
- Supplemental information was added.
- Potential sites were evaluated.

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# Inventory on Possible Storage Sites

- Aspects analyzed

- *Seismic Zone*
- *Geology*
- Potential Flood Zone
- Type of location: urban, semi-urban or rural.
- Land use: housing, commercial, agricultural, industrial.
- Type of property: private, public.
- Local aquifer: shallow, deep.
- Soil Type: permeable, waterproof.
- Vulnerable facilities in the immediate environment (hospitals, schools, etc.).
- Cultural sites in the environment near the facility (ruins, cultural heritage, etc.).
- Mercury management in the installation.
- Adequate access to the facility.

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533km

176.220 km<sup>2</sup>

Uruguay

# Use of Mercury in Processes

- Industrial establishment that uses mercury in its process: a chlor-alkali plant.
  - Installed in 1958.
  - Solid waste contaminated with mercury are stored since 1992, as DINAMA requirement.
  - Has planed a conversion to mercury free technology.
  - In 3-5 years, will have a significant amount of liquid mercury from the electrolytic cells.
  - Also contaminated waste arising from the dismantling of the plant will join existing ones.

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# Final Disposal Facilities

- Landfills in all departments. Are non-hazardous waste disposal.
- Security landfills who belongs to Industries
  - Only is allowed the entrance of its own waste.
  - MVOTMA current policy is not to authorize new deposits of hazardous waste companies.
- CIU security landfill project (agreement between the Chamber of Industries of Uruguay, Montevideo Municipality and DINAMA).

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# CIU Security Landfill Project

- CIU security landfill project (agreement between the Chamber of Industries of Uruguay, Montevideo Municipality and DINAMA.
  - Land owned by the Municipality of Montevideo.
  - Construction is expected in 2012.
  - Will have cells for industrial treatment sludge and other waste.
  - The cells for sludge will have a venting system with gas scrubbing, and subsequent treatment with hypochlorite and others cells will have passive venting. The leachate will be treated biologically and physicochemical or as needed.
  - Assumes no special provision for mercury waste.
  - Use horizon is 4 to 7 years.
  - Transitional solution to the disposal of industrial waste.
  - Is not a temporary deposit.

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# Evaluation and Comments

- Uruguay does not present in its territory seismic processes.
- The facilities are not located in flood zones.
- The locational characteristics, aquifer and soil define differences between them. Moreover, the current management of mercury and / or hazardous waste is considered highly relevant.

**Based on the analysis there are two potential sites that are considered most appropriate: the chlor-alkali plant and the security landfill designed by the CIU.**

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# Evaluation and Comments

- Chlor-alkali Plant:
  - Strengths
    - Knowledge management of mercury-containing materials by technicians and plant personnel.
    - Existence of mercury and mercury-containing waste at the site.
    - Deep aquifer.
  - Weaknesses
    - Near the coast.
    - vulnerable aquifer.
    - In the area of influence of the plant is projected a protected area.
  - It should be noted that the site is potentially contaminated as a result of past practices of control emission and waste management.
  - Although its location makes the place not suitable for final disposal, may be considered for temporary.

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# Evaluation and Comments

- CIU Security Landfill
  - Strengths
    - Area of municipal property.
    - Scheduled for the management of various waste.
  - Weaknesses
    - There is still no definition on logistics and infrastructure for waste treatment and conditioning.
    - It is a final disposal site, not intended to be for temporary storage.

It is possible that part of the waste collected in the chlor-alkali plant will be storage in this site.

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# Conclusions regarding potential storage sites

- Industrial Waste: chlorine-alkali Plant and the safety cell designed by the CIU are potential recipients of industrial wastes containing mercury.
- However, other residues such as those from general consumers products or wastes containing mercury from health sector require specific analysis.
- Furthermore, no waste treatment facilities for mercury, except for a partial process are present in Uruguay. There is an interest from DINAMA to establish a retorting facility. This implies a possible site for temporary storage, particularly of metallic mercury, as it will be a result of the operation of this kind of installation.

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# Action Plans – Chlorine Alkali Plant

Generador	Residuo	Indicador de desempeño / meta	Plazo	Recursos requeridos	Responsabilidades
Sector cloro-álcali	Lodos de salmuera	Cantidad de residuos actualmente acopiados tratados y/o dispuestos adecuadamente	2014	Tecnológicos Económicos	DINAMA Empresa Responsable del sitio de almacenamiento transitorio Responsable de la futura instalación de tratamiento
	Retenido filtros de soda				
	Masas desmercurizantes				
	Grafito desamalgamadores				
	Filtrado del tratamiento				
	Recuperado de regeneración de resinas				
	EPP				
	Residuos futuros de desmantelamiento	Plan de acción acordado	2013	Asistencia técnica	
	Pasivo en terreno	Caracterización realizada	2013	Asistencia técnica Económicos	DINAMA Empresa
Plan de remediación y/o aislamiento elaborado		2014			

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# Action Plans – Products Waste

Generador / sector	Residuo	Indicador de desempeño / meta	Plazo	Recursos requeridos	Responsabilidades
Domiciliarios	Lámparas, termómetros, pilas, interruptores, etc.	Proyecto de instalación de retorta elaborado	2013	Asistencia técnica Coordinación interagencias	DINAMA Intendencias Importadores, distribuidores, comercio Gestores de residuos ONGs.
		Plan de segregación y recolección selectiva	2013		
		Implementación piloto del plan en el área metropolitana	2014	Concientización Coordinación interagencias Económicos Legales	
Industrial asimilable a domiciliarios	Lámparas, termómetros, pilas, interruptores, etc.	Piloto de segregación y recolección selectiva	2014	Concientización Coordinación interagencias Económicos Legales	DINAMA Intendencias Cámara de industrias Cámara de comercio y servicios ONGs.
Instituciones, centros comerciales					

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# Action Plans– Health Sector

Generador	Residuo	Indicador de desempeño / meta	Plazo	Recursos requeridos	Responsabilidades
Sector salud	Termómetros, esfigmomanómetros Productos químicos Mercurio metálico	Relevamiento de los residuos de mercurio acopiados	2013	Concientización, información Asistencia técnica	DINAMA MSP ASSE-servicios de salud pública Sector privado UDELAR-Hospital Universitario
		Piloto de segregación y recolección selectiva	2014		
	Termómetros, esfigmomanómetros	Restricción a la importación y uso	2014	Económicos Coordinación interagencias	DINAMA MSP ASSE-servicios de salud pública Sector privado UDELAR-Hospital Universitario
	Amalgamas	Elaboración de un plan para la sustitución gradual	2013	Asistencia técnica Coordinación interagencias Concientización, información Económicos	DINAMA MSP ASSE-servicios de salud pública Sector privado UDELAR-Hospital Universitario UDELAR-Facultad de Odontología UCUDAL-Facultad de Odontología

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# Action Plans – Laboratories not from Health Sector

Generador	Residuo	Indicador de desempeño / meta	Plazo	Recursos requeridos	Responsabilidades
Laboratorios	Kits análisis cloro, compuestos de mercurio, reactivos DQO, efluentes de los laboratorios, mercurio metálico, termómetros, manómetros, ...	Relevamiento de los residuos de mercurio acopiados	2014	Concientización, información Asistencia técnica Económicos Coordinación interagencias	DINAMA Ministerios LATU Dir. Nac. de Meteorología ALADU (asoc. Laboratorios Ambientales) OSE-agua potable UTE-energía eléctrica Intendencias Laboratorios privados de análisis Otros

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# Action Plans – Lighthousing

Generador	Residuo	Indicador de desempeño / meta	Plazo	Recursos requeridos	Responsabilidades
Balizamiento	Mercurio contenido en faros Mercurio de reposición	Relevamiento de faros con cubas de mercurio y de mercurio realizado	2014	Coordinación interagencias	DINAMA Ministerio de Defensa

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# Concluding Remarks

- Internalization of the Basel Convention in the countries of the region has resulted in the prohibition on introduction of hazardous waste, limiting the regional treatment, making each country responsible for the treatment of its own waste, with the associated costs.

Brasilia, May 22<sup>nd</sup>, 2012

# Thank you

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