



Research Project on Mercury (CENICA)

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Topics

- Sediments
- Urban Wastes
- Fishes
- Atmospheric Monitoring
- Wet Deposition
- Global Mercury Observation System (GMOS)
- Mexican Mercury Market Report (2008)
- National Inventory of Hg releases (2008)
- An assesment of primary and secondary Mercury supplies in Mexico
- North American Waste Management Options: Paper for Mercury-containing Wastes
- Participation in the negotiation of an International Legally Binding Instrument on Mercury



SEDIMENTS



Year	Sampling Sites
2009	<ul style="list-style-type: none"> • Coatzacoalcos River • “La Zacatecana” Damp
2010	<ul style="list-style-type: none"> • Coatzacoalcos River • Chapala Lake • Extóraz river • Pánuco river

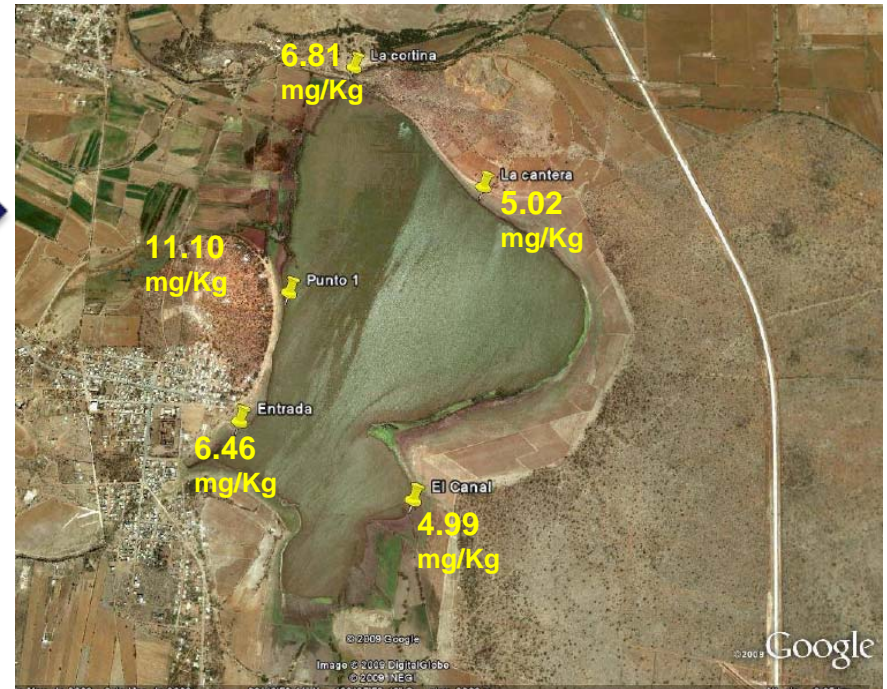
“LA ZACATECANA” DAMP

2009

Receives the runoff of the surrounding area where tailings were deposited during colonial times



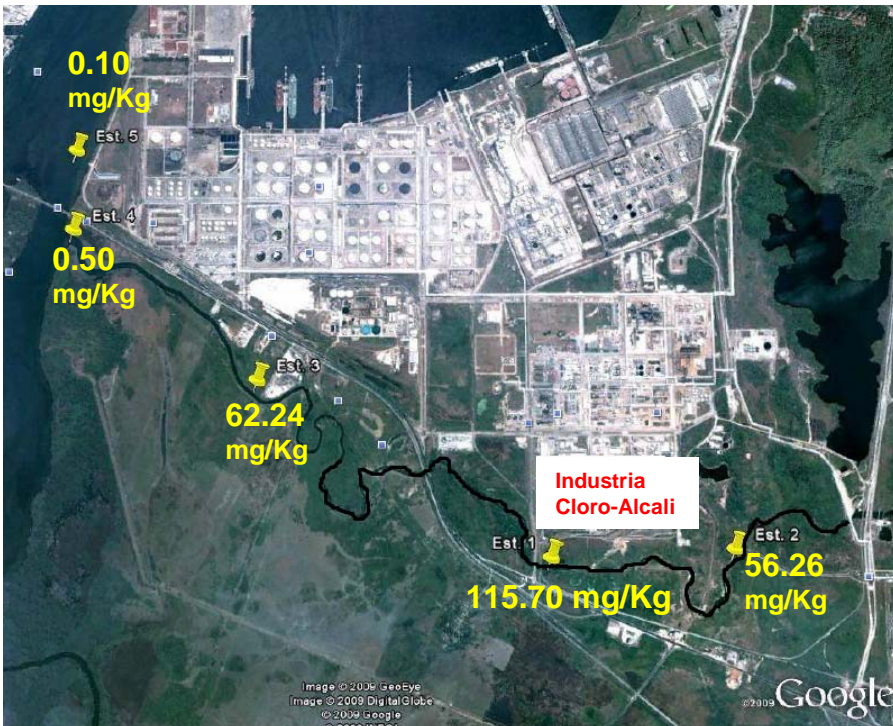
COATZACOALCOS RIVER



0.14 mg/Kg: Canadian Sediments guidelines for the protection of Aquatic Life. Mercury.

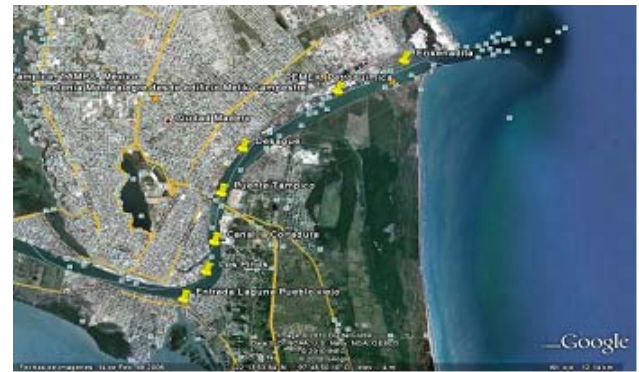
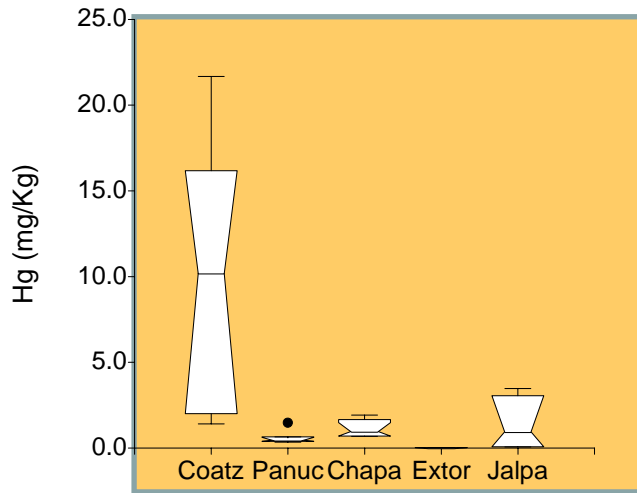
Ancillary data: OD, pH, Temperature

Hg in water

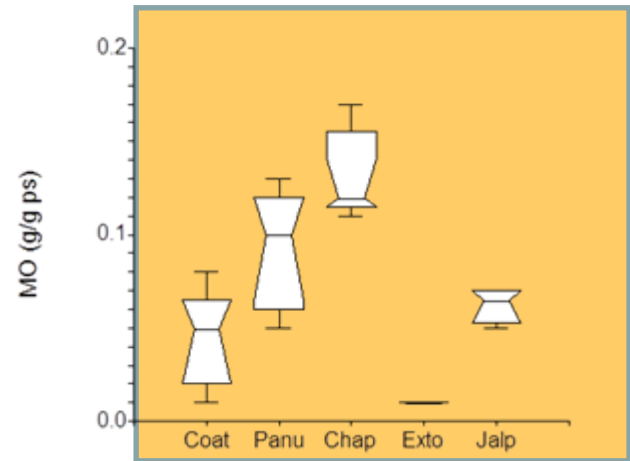




Coatzacoalcos River (Veracruz)



Panuco River (Tampico)



Chapala Lake (Jalisco)



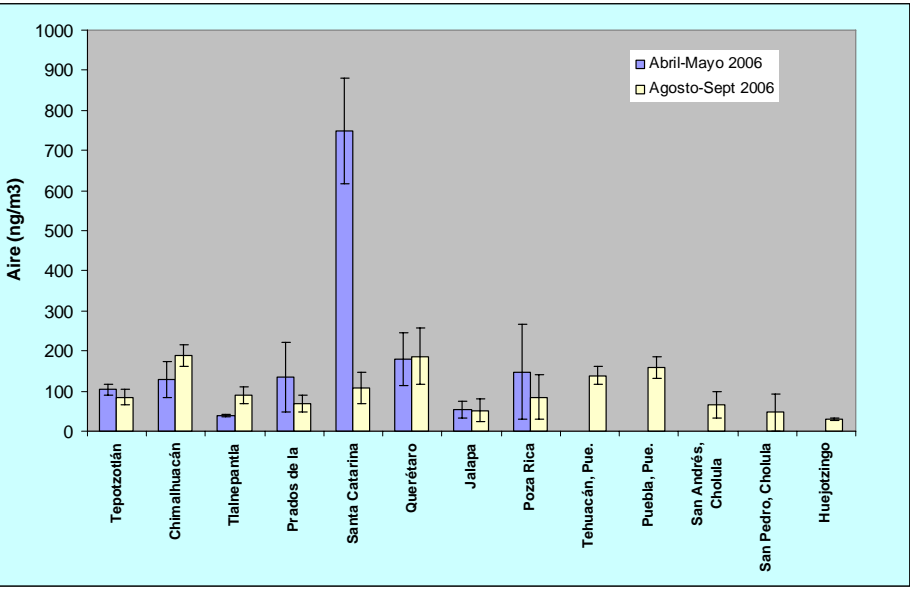
Extoraz River (Queretaro)



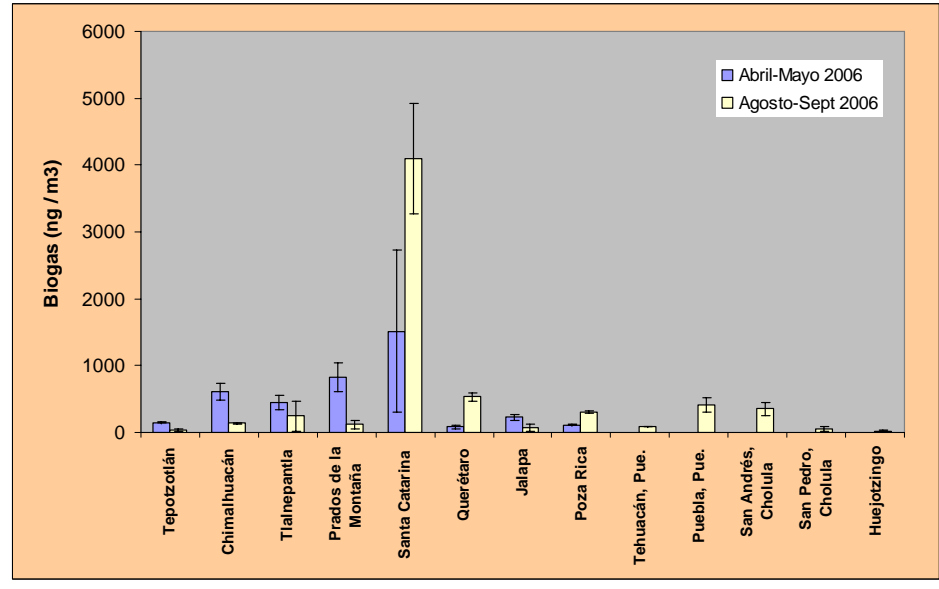
TOTAL GASEOUS MERCURY IN URBAN WASTES

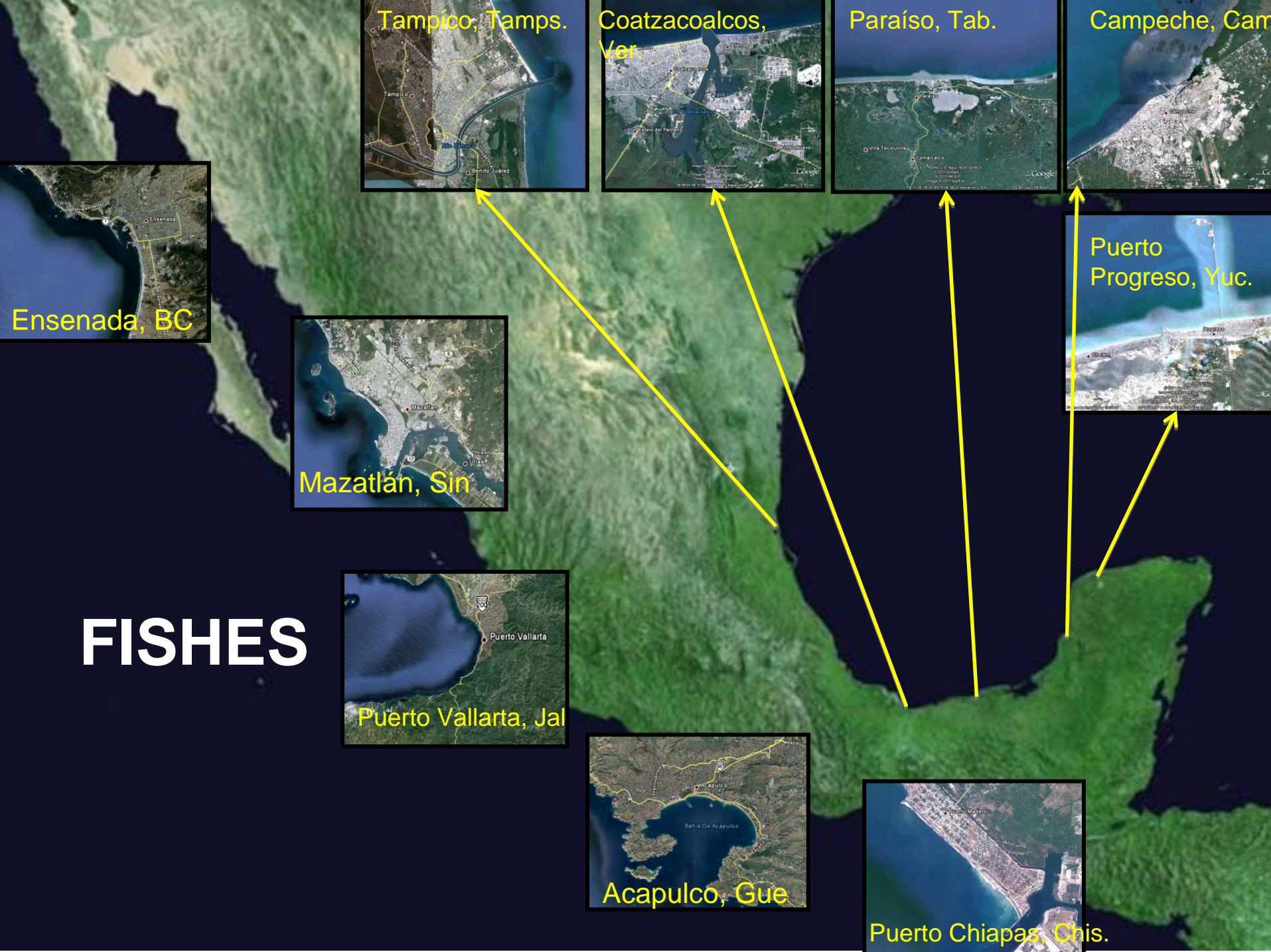
Landfills

Air



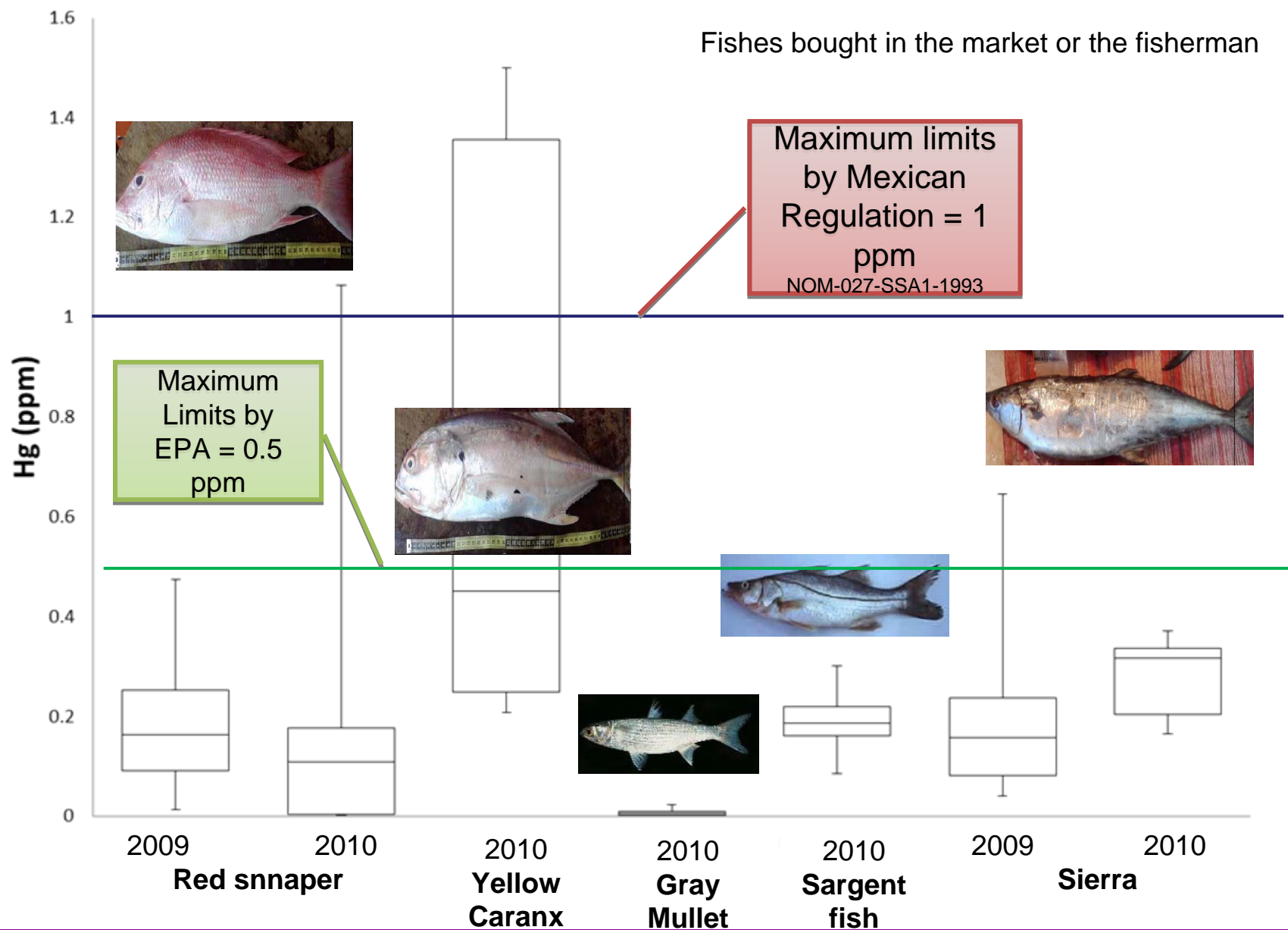
Biogas



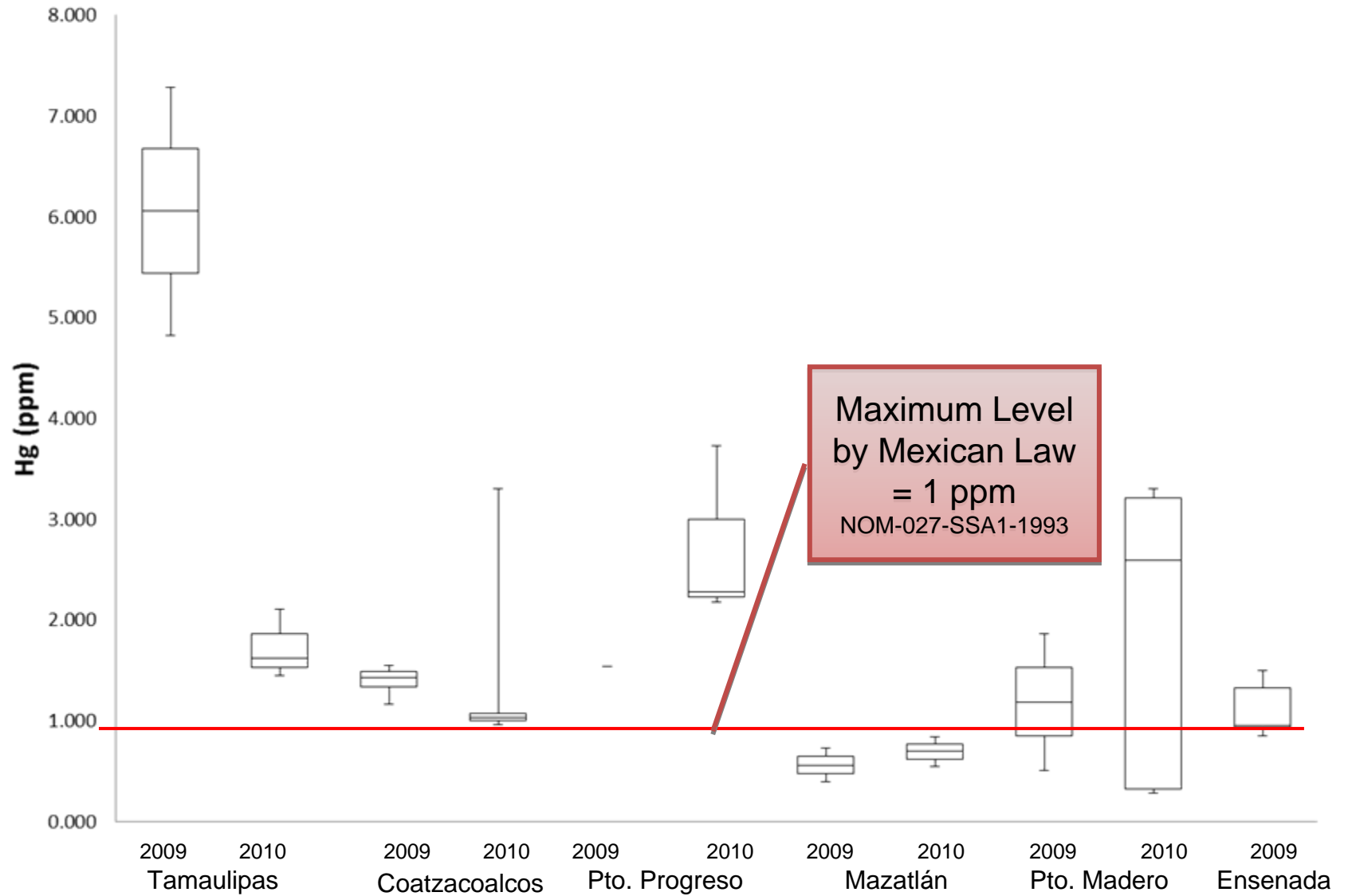


FISHES

Total Mercury in fish of Mexican Coasts 2009-2010



Total mercury in Shark 2009-2010



Total Mercury in canned tuna fish

Brand Marca	Total Mercury (ppm)	
	Hg total ppm canned in water enlatado en agua	Hg total ppm canned in oil enlatado en aceite
Herdez	0.46	0.18
Tuny	0.14	0.12
Dolores	0.11	0.43
El Dorado	0.08	0.22
Nair	0.24	0.27
Ancla	0.05	0.04
Marina Azul	0.12	0.17
Golden Hills	0.15	0.23
Great Value	0.25	0.45



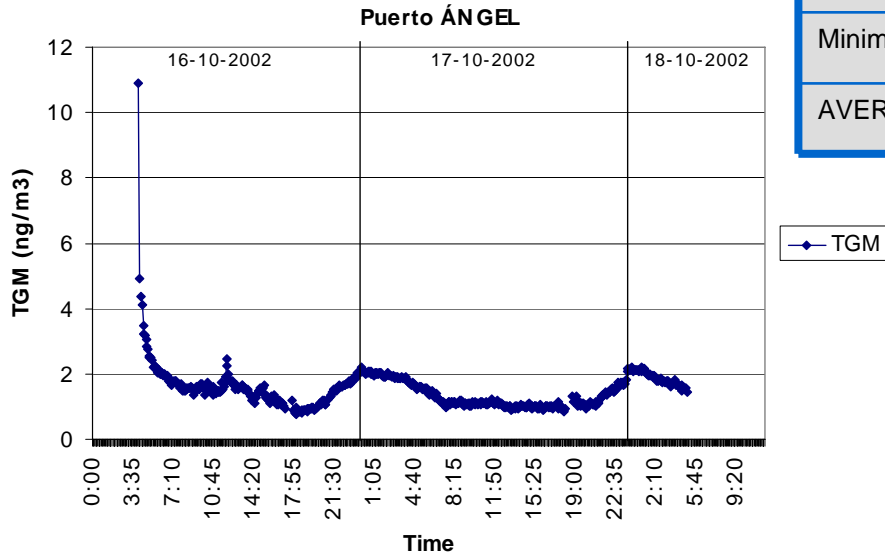
Concentration below
the maximum limits



Year	Sampling site
2002	Zacatecas City México City Huejutla, Hidalgo Puerto Angel, Oaxaca
2006	Zacatecas
2011	San Joaquín, Querétaro
2012	Celestún, Yucatán

PRISTINE SITES

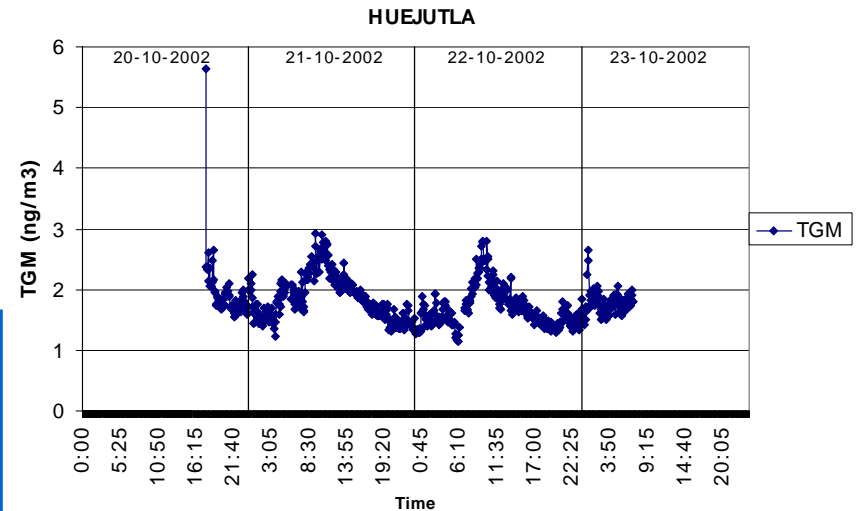
Puerto Angel, Oaxaca



Maximum	10.88
Minimum	00.76
AVERAGE	01.60

The TGM levels are correlated with the temperature and relative humidity

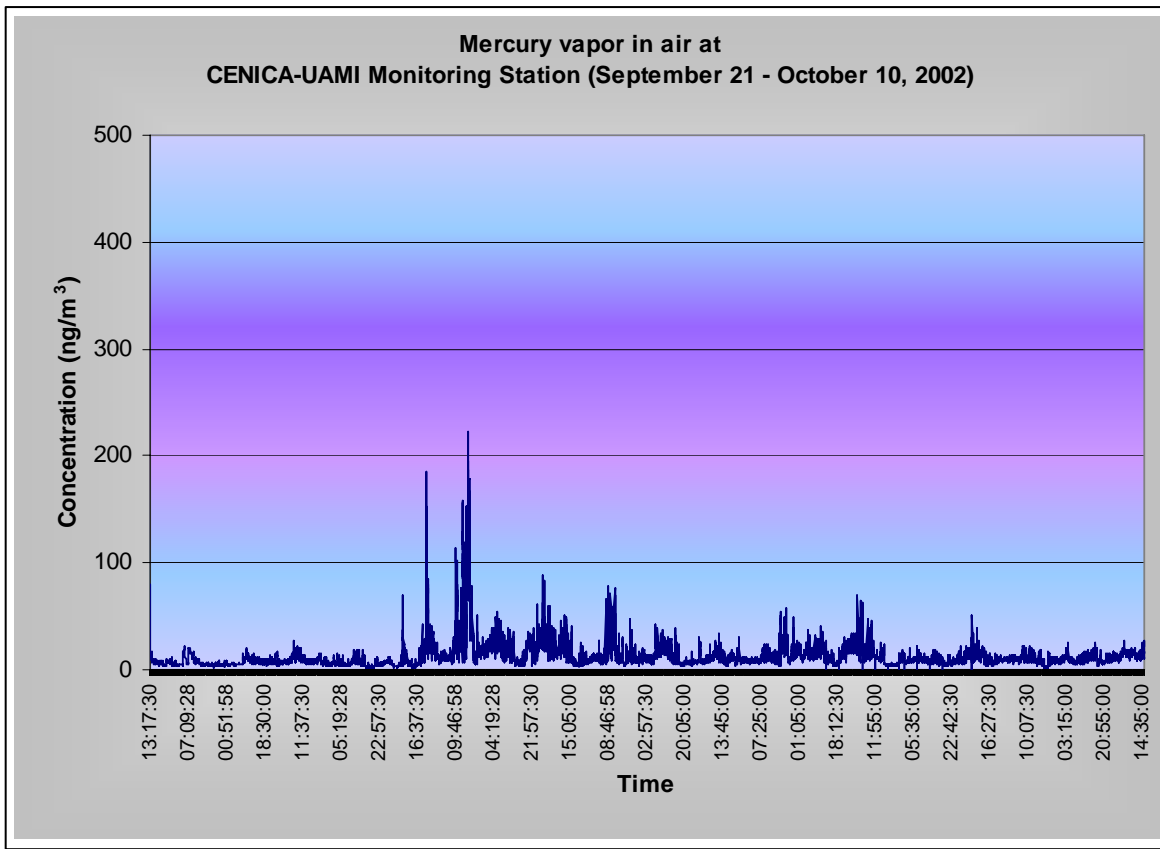
Huejutla, Hidalgo



Maximum	5.14
Minimum	1.13
AVERAGE	1.81

URBAN SITES

MEXICO CITY



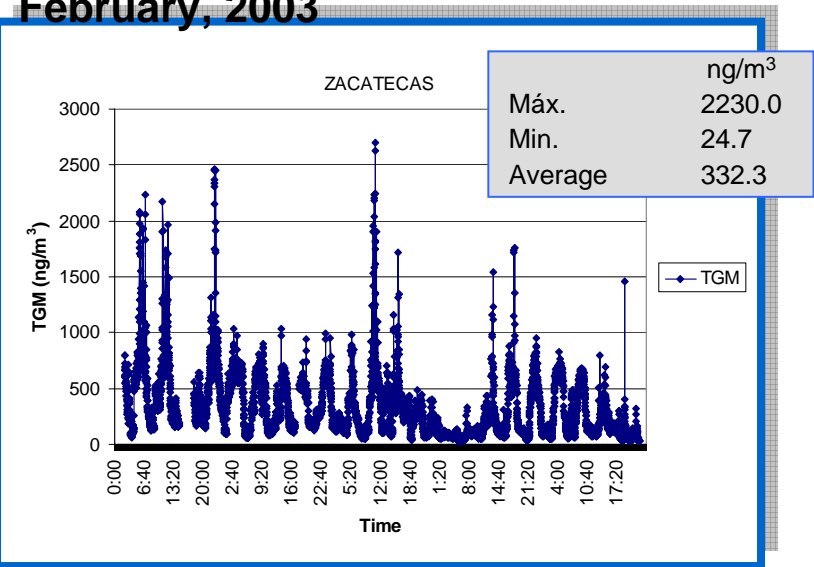
Average = 9.81 ng/m³

Polluted City making it a receptor of many still unidentified gaseous mercury sources.

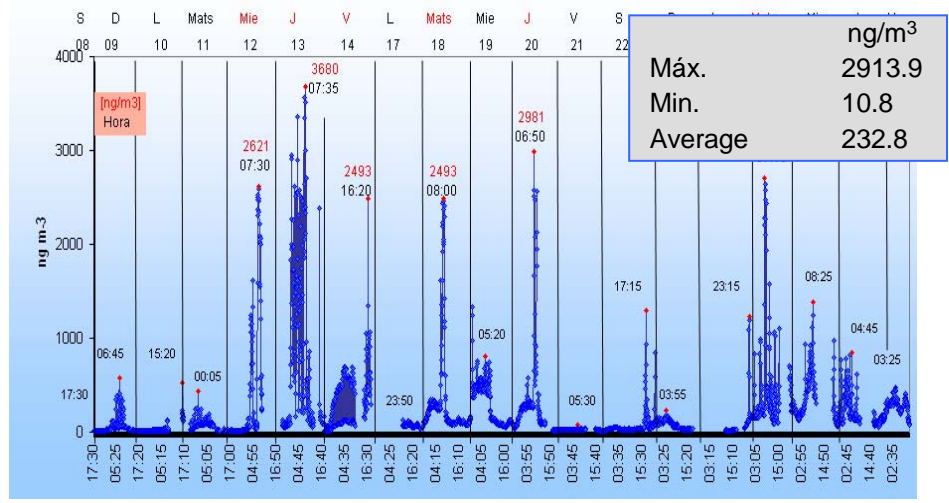
SITES WITH ANTHROPOGENIC ACTIVITIES RELATED TO MERCURY

ZACATECAS

February, 2003



July, 2006



Mining waste disposal



Secondary metal extraction



Brick Kilns

Total Gaseous Mercury in some sites of Mexico

Sitio	IZTAPALAPA			XAL Seca fría	XAL Seca caliente	TEC Seca fría	SAG Seca caliente	HUE J lluvia s	PA lluvia s	ZACATECAS	
	lluvia s	sec a fría	Seca Cali en te							lluvia s	Seca calien te
Promedio (ng/m ³)	10.7	8.46	34.2	27.17	37.51	49.46	11.48	1.80	1.60	72.97	332.94
Máximo	147.78	21.08	503.8	157	154.2	93.48	35.03	2.62	3.64	328.94	1644
Mínimo	2.21	2.11	3.66	3.91	7.94	21.39	4.17	1.38	0.85	7.61	29.81

Fuente: DGCENICA, 2004

Table 3-1
 Summary of Measured Mercury Concentration
 in Air (U.S. EPA, 1993)

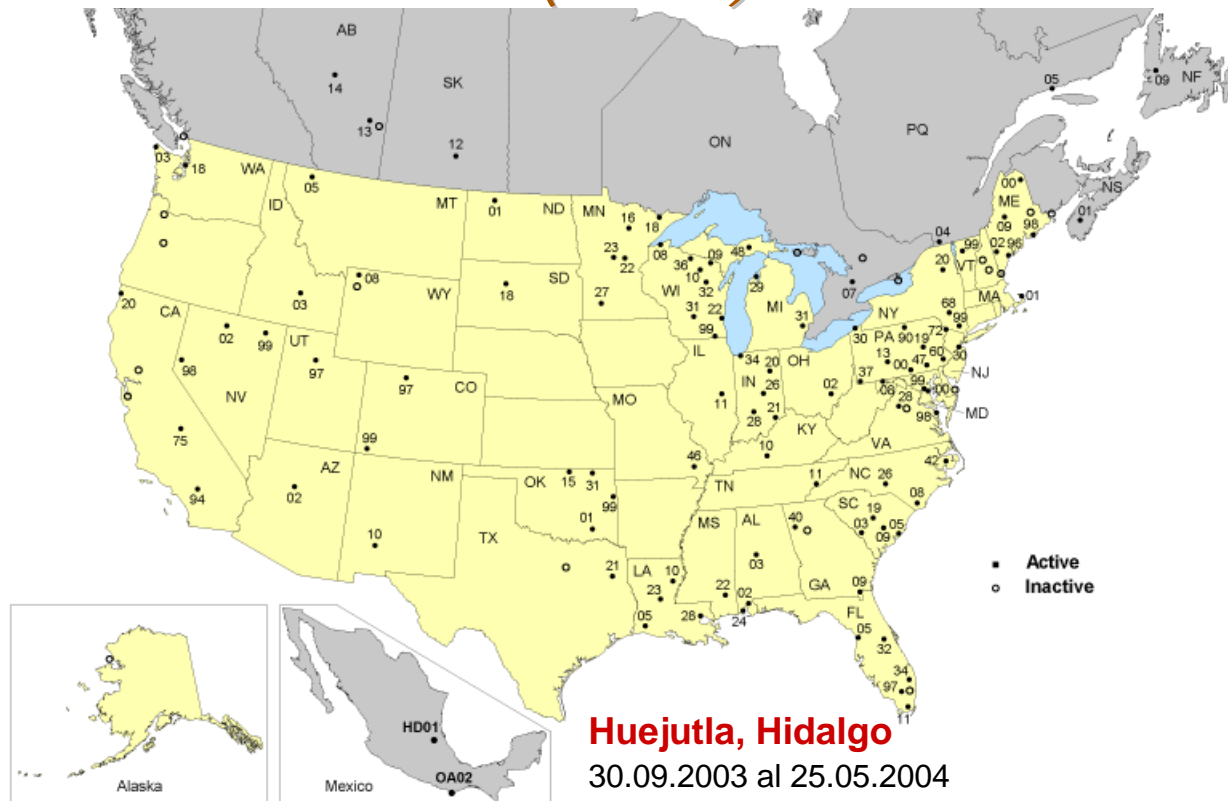
Total Atmospheric Mercury (ng/m ³)	%Hg(II)	% Methylmercury
Rural areas: 1 - 4	1-25% ^a	0-21% ^b
Urban areas: 10 - 170		

^a Higher fractions in urban areas

^b Generally % methylmercury on low end of this range

Wet Deposition of Hg

Hg Wet Deposition Network of North America (2003)



<http://nadp.sws.uiuc.edu/mdn/>

Hg Wet Deposition Network of North America (2003)



- First subcontinental Mercury Monitoring Network. Three countries are involved: Canada, USA and Mexico.



Huejutla (MX01) 0-
1347.8 ng/m²week

Pto. Angel (MX02)
0 y 974.2
ng/m²week

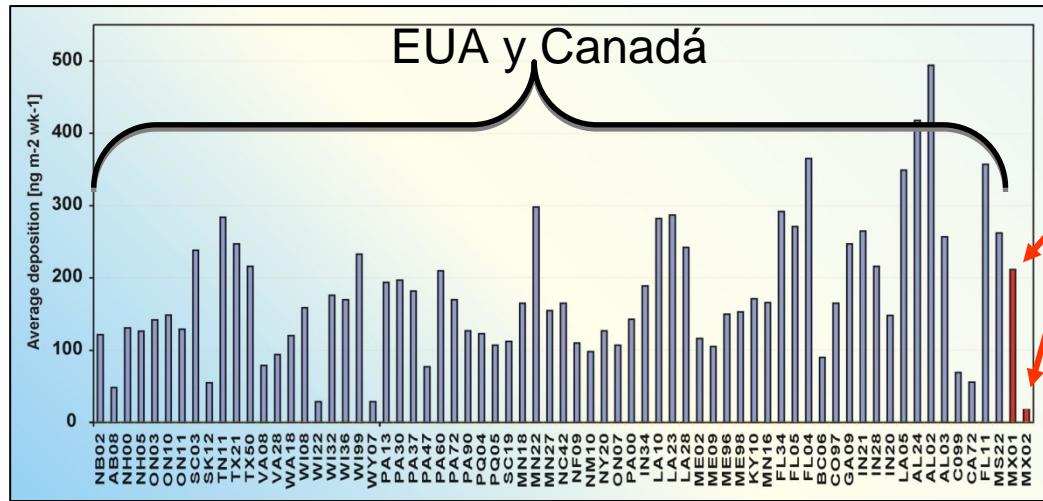
Hansen A.M., Afferden M.V. 2004. Monitoring pilot project for wet deposition of mercury in Mexico, phase II. IMTA

Proyec
carried out
by:



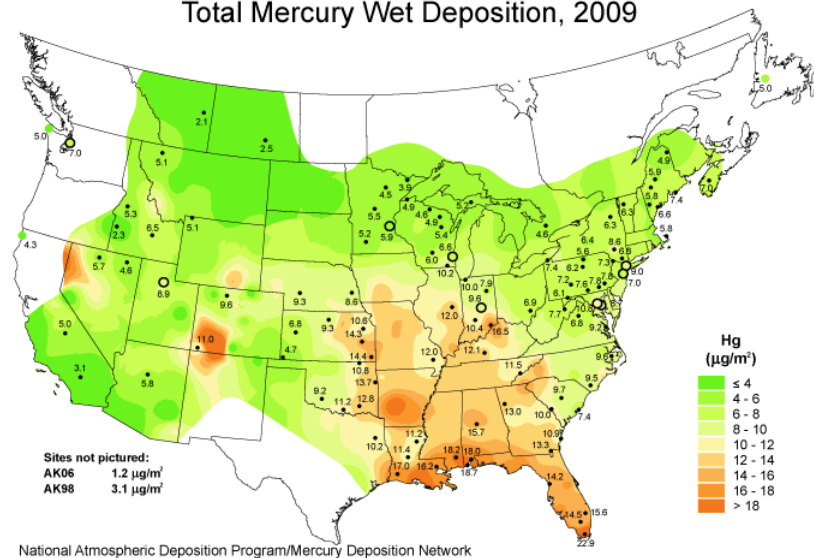
Anne Hansen
ahansen@tlaloc.imta.mx

Average of 69 sites of the region



México

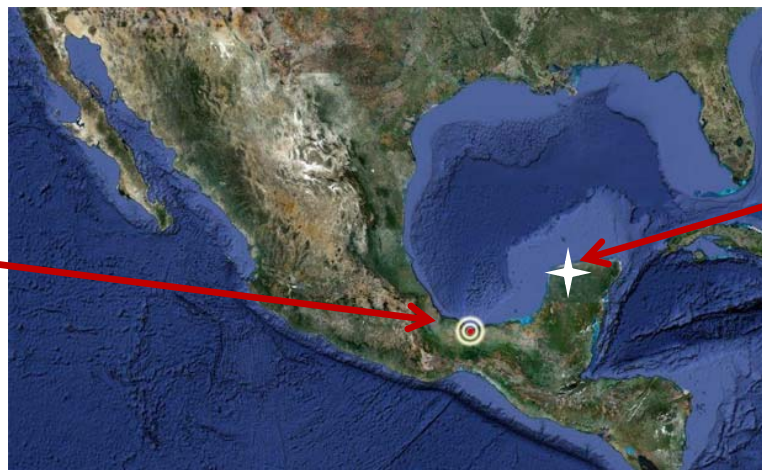
Total Mercury Wet Deposition, 2009



National Atmospheric Deposition Program/Mercury Deposition Network

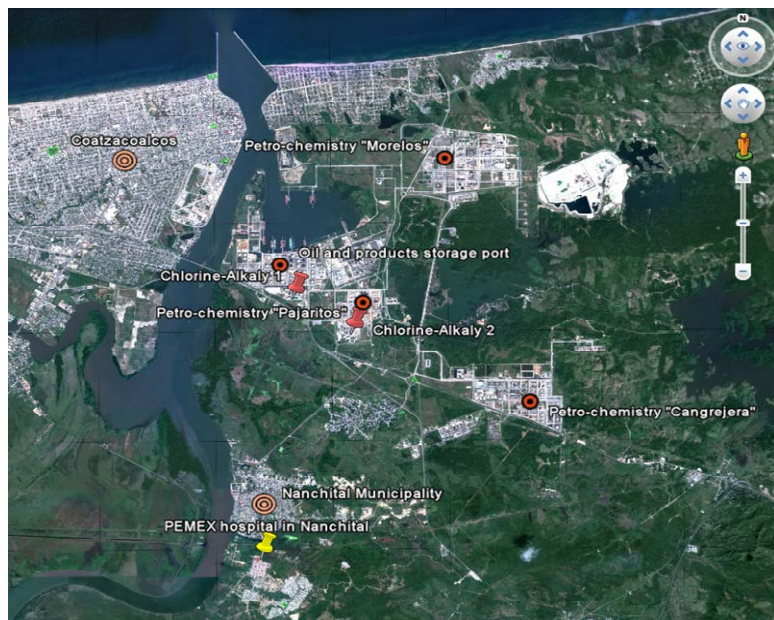
NEW SITES 2012 Hg WET DEPOSITION

Coatzacoalcos,
Veracruz



Celestún,
Yucatán

IMPACTED SITE

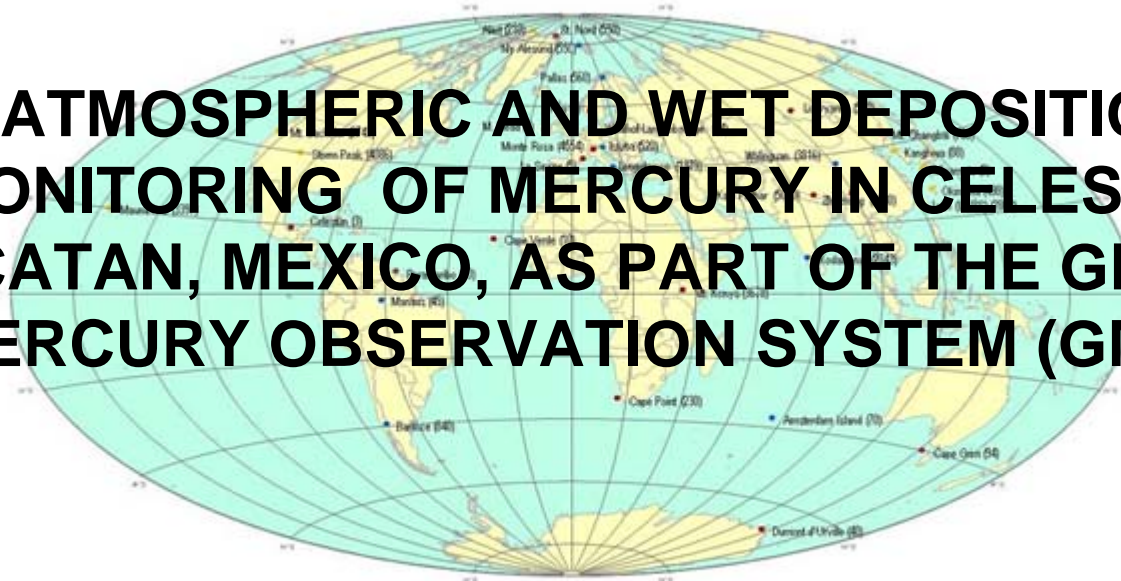


PRISTINE SITE





ATMOSPHERIC AND WET DEPOSITION MONITORING OF MERCURY IN CELESTUN, YUCATAN, MEXICO, AS PART OF THE GLOBAL MERCURY OBSERVATION SYSTEM (GMOS)



- Master station managed by GMOS partner (in a.s.l.)
- Master station managed by external partner (in a.s.l.)
- Secondary station managed by GMOS partner (in a.s.l.)

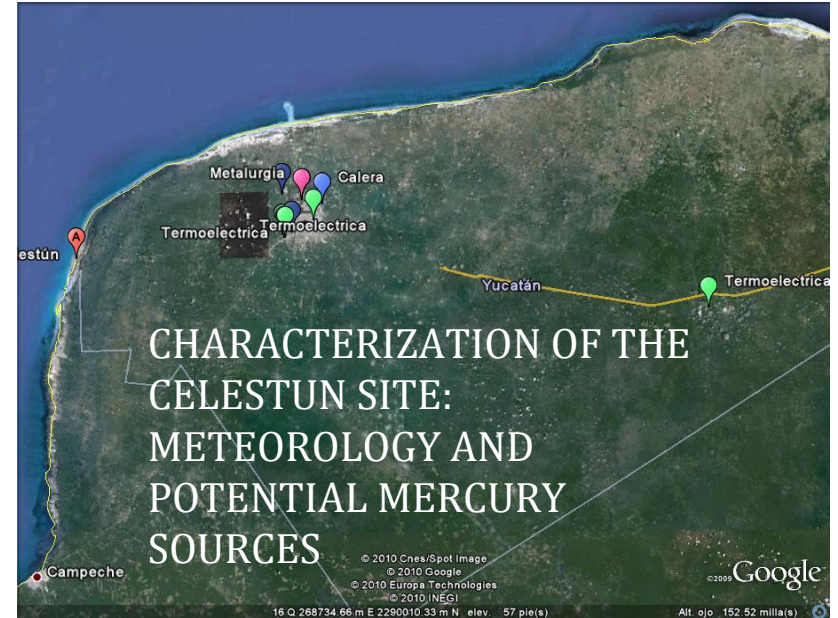
Atmospheric and Wet Deposition Monitoring of Hg in Celestún, Yucatán (2011-2015)

GMOS- GLOBAL MERCURY OBSERVATION SYSTEM.
Five years project (2010-2015), supported by the
Eduropean Comission.

Goal: To establish a global mercury observation system
for measure the atmospheric mercury in air and
precipitation sampling

<http://gmos.eu/>

Site selection



Emission sources

- 4 Thermoelectrics
- 2 limestone factories
- 1 medical waste incinerator
- 2 Metallurgy plants
- 1 cement plant
- 1 crematory

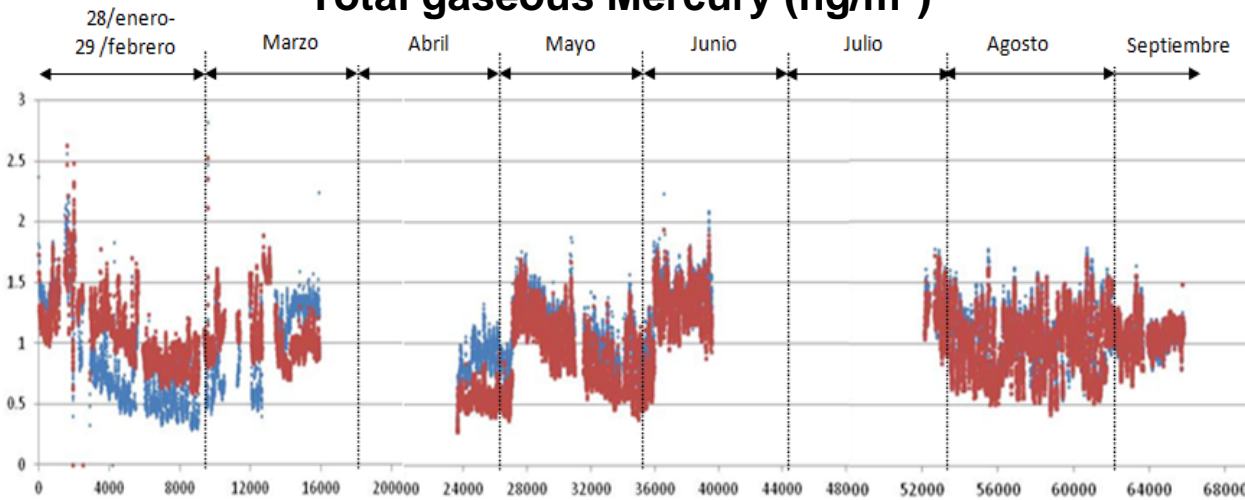
DIST. A CELESTUN

- 72,73, 84 Y 221 KM
- 7 7 y 88 KM
- 82 KM
- 74 y 83 KM
- 76 KM
- 70 KM

ATMOSPHERIC



Total gaseous Mercury (ng/m³)



Start date: February 4th, 2012

WET DEPOSITION



Start date: August, 2012



The purpose of this market report is to collect and analyze available information from Mexico in order to describe supply, demand, trade, market characteristics, and trends of elemental mercury and mercury containing products in commerce. The report also identifies market stakeholders, consumers, producers and institutions. Data on production, imports, exports, supply and demand are presented.

2001–2007 (metric tons)

Importation	193.46
Export	58.25
Secondary Production	81.25
Apparent consumption (production plus import minus export)	216.46
Annual average	30.86

Consumption of Mercury in Mexico (metric tons)		Nationally produced products	Imported products	Total
Sectors and Products				
Dental and Health sector	Amalgams	5.5	3.6	17.3
	Thermometers	---	2.4	
	Sphyngomanometers	2.9	2.9	
Electric equipment	Lighting and neon signals	1.0	0.5	14.0
	Batteries, relays and switches	---	12.5	
Miscellaneous	Fluxometers, manometers and thermostats	---	1.4	1.4
Computers	LCD displays, laptops, video camera	---	0.1	0.1
Professional, scientific and technical services	Barometers, non-medical thermometers, psychrometers	---	1.6	1.6
Total sector		9.4	25	34.4
PROCESS SECTOR				
Chlor-alkali process		4.8	---	4.8
Basic inorganic chemical production		9.1	---	9.1
Biopharmaceutical and laboratory uses		3.9	---	3.9
Net imports of unknown Hg compounds (40% of 122.8 metric tons)		---	49	49
Total sector		17.8	49	66.8
TOTAL		27.2	74	101.2

Products 34%

50% Health and dental sector

40% Electric sector

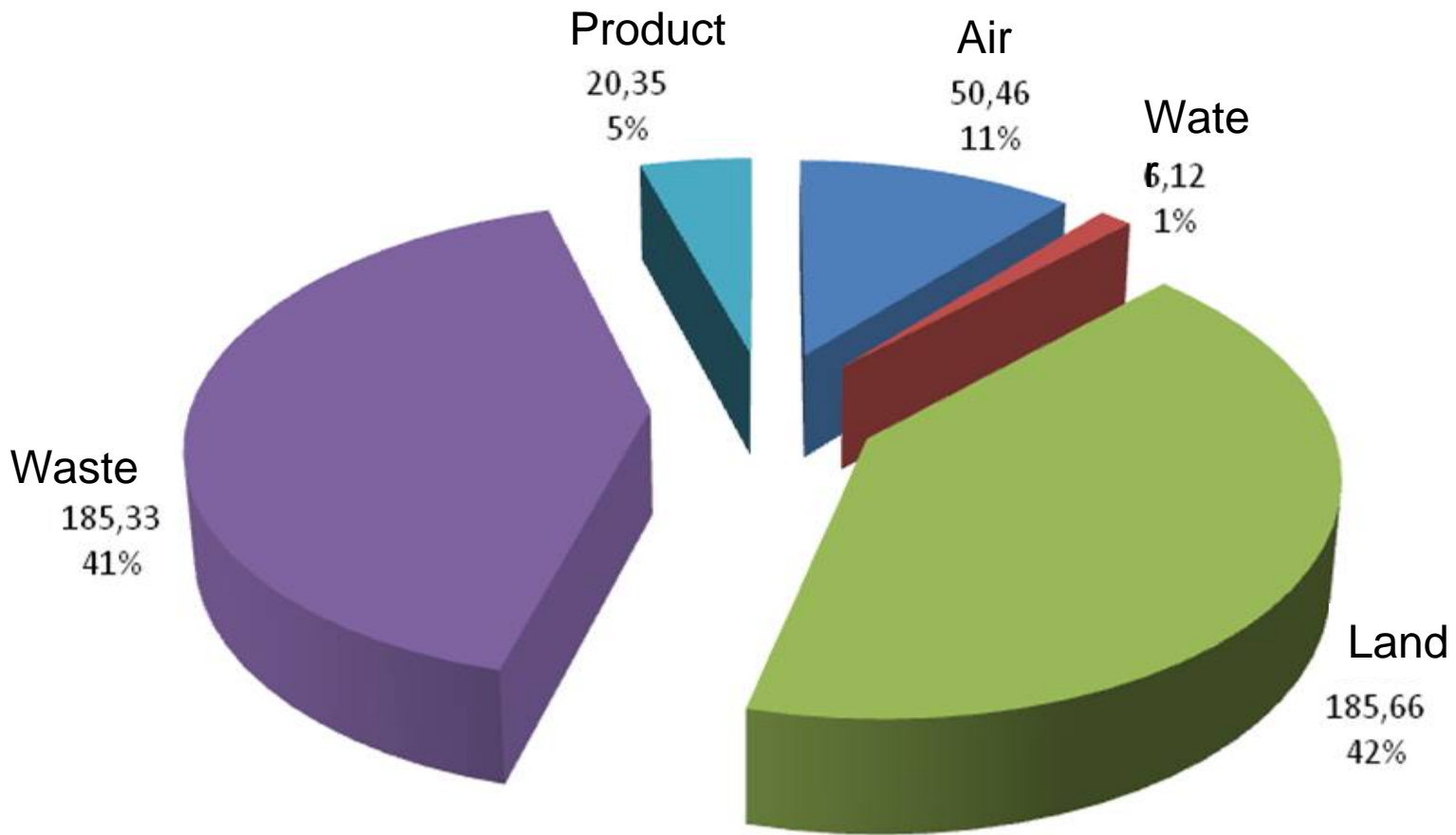
Process 66%

73% imported Hg compounds

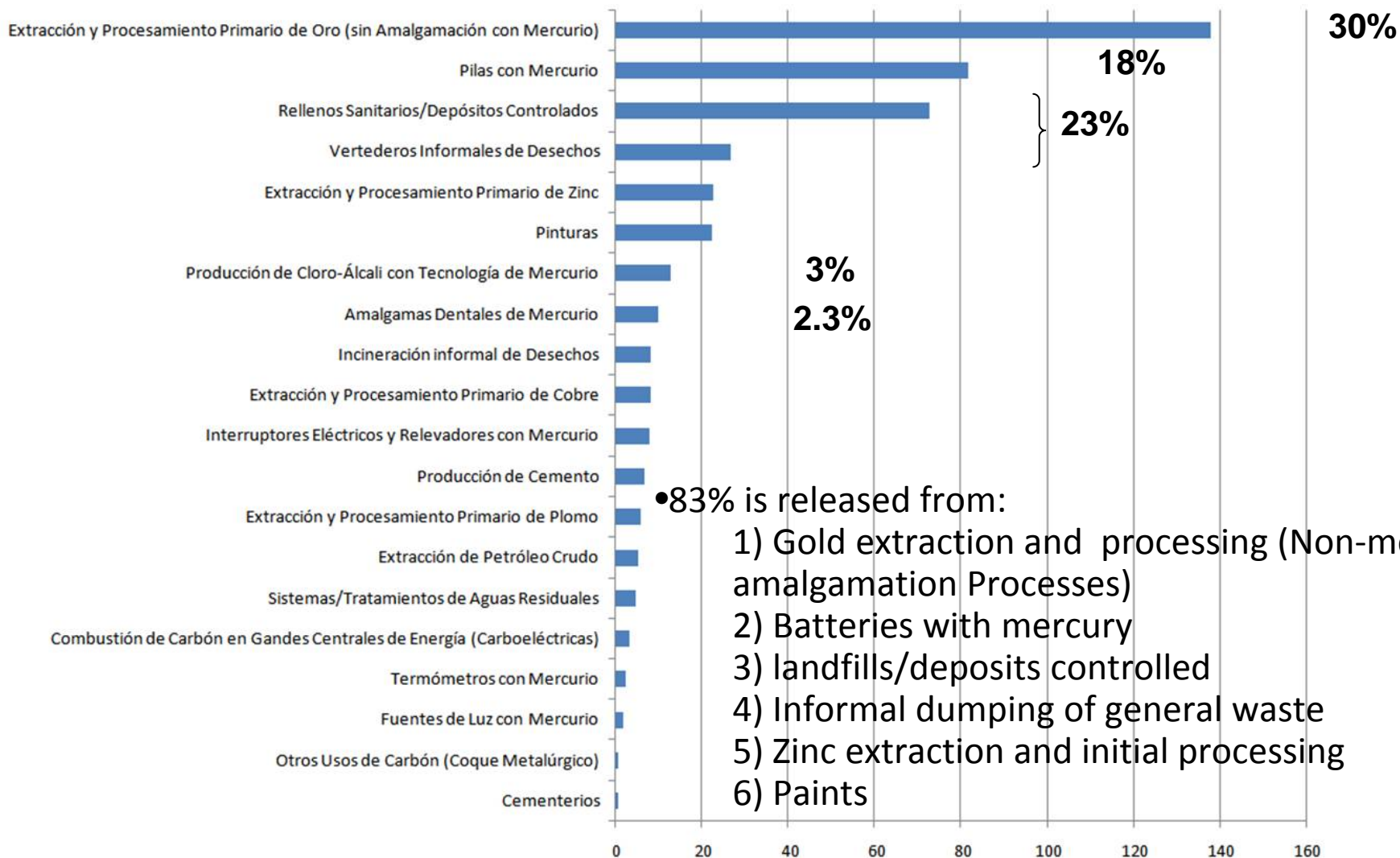


Emission Inventory in Mexico, PNUMA toolkit 2008

- Year: 2004
- Air, water, soil, wastes and products estimated emissions.
- 37 sources release about 448 Mg of Hg



Mercury releases per Source



•83% is released from:

- 1) Gold extraction and processing (Non-mercury amalgamation Processes)
- 2) Batteries with mercury
- 3) landfills/deposits controlled
- 4) Informal dumping of general waste
- 5) Zinc extraction and initial processing
- 6) Paints



The objective is to estimate primary and secondary mercury supplies generated from different sources, and provide an analysis of the potential for Mexico to become an unintended but significant source of global mercury supply following the implementation of elemental mercury bans in the US in 2013, and the European Union in 2011.



Potential Primary and Secondary Mercury Supply in Mexico

	Metric Tons	Confidence Rating*
Probable primary Hg reserves	42,000	Medium
Secondary Hg reserves from mining wastes	7,000-14,000	Medium
Chlor-alkali mercury reserves	265	High
By-product mercury from the metal production sector	8	Low
Secondary production from Recycling programs of Products	14	Low
Total	49,287- 56,287	

The possibility that these quantities are available at the international market will greatly depend on Hg global market conditions compared to extraction costs and technological feasibility.

*See disclaimer note on page 10 above.



The objective is to provide to the stakeholders from Canada, United States and Mexico with information and analysis about the current flow and management practices of wastes containing mercury in North America on current and future issues and options with mercury waste management in the region.

The report also support the role of the CEC in the efforts of UNEP. The report is in part an extension of two recent reports developed by the CEC: Mexican Mercury Market Report (2011) and an assessment of the primary and secondary mercury supplies in Mexico

A summary of existing information on mercury supply, production, infrastructure for treatment or disposal, waste management and legal or regulatory requirements in Canada, United States and Mexico.

A screening of material flow analysis of mercury waste and waste containing mercury, the characterization of the mercury concentration in the current waste streams.

Identification of current issues and prospects (including short and long term storage issues) related to waste management of mercury and waste containing or contaminated with mercury in North America (including consideration of the impact of EU and U.S. prohibitions and the implications of the international agreement for the management of mercury in Mexico and Canada).

Summary of technical options for the management of mercury waste in North America to support decision makers in Canada, U.S. and Mexico, taking into account the legal, political and economic drivers of the waste management options.

Participation in the negotiation of an International Legally Binding Instrument on Mercury

- CIN-1 Stockholm, Sweden, Jun 2010.
- CIN-2 Chiba, Japan, January 2011
- CIN3-Nairobi, Kenya, 30 Oct – 4 Nov 2011
- Regional consultation (LAC) in preparation for the CIN-4, in Brasilia, Brazil, 21-25 May 2012
- CIN4 Punta del Este, Uruguay, 27 Jun – 2 Jul 2012



Mexico's approach in the negotiation

- Realistic and applicable approach, in consideration of experiences with other chemical conventions.
- National Implementation plans should be reflect different countries capabilities for management of chemicals including mercury, and consider the different priorities of each country.
- The instrument should be flexible and allow to the countries implement measures suited for their situation: for example, exemptions that allow the parties to transition of the use of mercury.
- Mexico's priorities: storage and phase out of products and processes





Sitios - matriz	Rango de concentraciones
Ladrilleras <i>Aire (VM)</i> <i>Suelo (MT)</i> <i>Lodo - materia prima (MT)</i> <i>Ladrillo (MT)</i>	216.4 a 5074 ng m ⁻³ < 0.1 mg kg ⁻¹ a 35.7mg kg ⁻¹ < 0.1 mg kg ⁻¹ a 300.6 mg kg ⁻¹ < 0.1 mg kg ⁻¹ a 69.4 mg kg ⁻¹
Disposición de residuos mineros <small>(La Zacatecana, Lampotal, Vetagrande, Sombrerete, Noria de Angeles)</small> <i>Aire (VM)</i> <i>Suelo (MT)</i> <i>Jales (MT)</i> <i>Sedimentos (MT)</i>	74.1 a 458.7 ng m ⁻³ 0.99 a 140.5 mg kg ⁻¹ < 0,2 mg kg ⁻¹ a 2.9 mg kg ⁻¹ 7.6 a 23.4 mg kg ⁻¹
Plantas de Beneficio <i>Aire (VM)</i> <i>Jales y Lameros (MT)</i>	402.7 a 3730 ng m ⁻³ 8.8 a 220.1 mg kg ⁻¹

