



UNITED NATIONS
ENVIRONMENT PROGRAMME
DTIE - CHEMICALS BRANCH



ASIA MERCURY INVENTORY TOOLKIT PILOT PROJECT RESULTS WORKSHOP REPORT

TOKYO, JAPAN

11-13 MARCH 2008



IOMC



INTER-ORGANIZATION PROGRAMME FOR THE SOUND MANAGEMENT OF CHEMICALS

A cooperative agreement among UNEP, ILO, FAO, WHO, UNIDO, UNITAR and OECD



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APRIL 2008

GENEVA

SWITZERLAND

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INTRODUCTION

UNEP Governing Council Decisions 23/9 and 24/3 call for work to be facilitated on the promotion and development of inventories of mercury uses and releases. A key training and guidance document that supports countries efforts to take action on mercury is the 'Toolkit for identification and quantification of mercury releases'.

The Toolkit pilot was finalized in November 2005. The Asian Mercury Inventory Pilot Project is providing a start in identifying and quantifying mercury use and release in the pilot countries while pilot testing the methodologies outlined within the toolkit. Cambodia, Pakistan, Philippines, Syria, Yemen have been participating in the pilot project with financial support of the Governments of the United States and Sweden. The results workshop was hosted with financial support of the Government of Japan.

As part of the project, countries are applying inventory results to develop associated action plans on mercury to assist in communicating results nationally and setting priorities on next steps with regard to mercury pollution.

Final results of the pilot project are expected to be available by August 2008.

WORKSHOP REPORT

The Results Workshop for the ‘Asia Mercury Inventory Toolkit Pilot Project’ took place from 11-13 March 2008 in Tokyo, Japan. The workshop was attended by participants from Cambodia, Pakistan, the Philippines, Syria, Yemen (pilot countries) as well as China, Japan, India, Mongolia, and UNEP staff. For a complete list of participants see Appendix 1. The Workshop was hosted by the Japan Ministry of Environment.

The programme of the workshop is available in Appendix 2.

11 March 2008

The five pilot project countries (Cambodia, Pakistan, the Philippines, Syria and Yemen) participated in the workshop on Day 1. The purpose was to share experiences on using the toolkit and share results amongst pilot project participants.

1. Opening

The workshop was opened by Dr. Hirotugu Kimura, Environmental Health and Safety Division, Japan Ministry of the Environment. Mr. John Whitelaw, UNEP Chemicals, provided welcoming remarks.

2. Workshop Objectives

Workshop objectives were presented by Brenda Koekkoek, UNEP Chemicals namely:

- To bring together pilot project countries to promote exchange of information amongst project participants.
 - Share and strengthen project results in individual countries.
 - UNEP to receive feedback from countries on the usability of the toolkit.
- To promote action, both immediate and long-term, at both national, regional levels to protect human health and environment.
- To provide an overview of the ‘Toolkit for identification and quantification of mercury releases’ to new countries (on 13 March).

3. Country Overview

Countries gave status reports on their national inventories. In addition, Yves Guibert, UNEP Technical Consultant, provided information using the toolkit on experiences working with Burkina Faso. Pilot project national presentations are attached in Appendix 3.

4. Timeline to finalize inventories

Technical working sessions for Syria and Pakistan:	April 2008
Final Draft Inventory and Action Plan to UNEP*:	15 June 2008
Comments back from UNEP:	15 July 2008
Final Clearance from country:	15 August 2008
Pilot Project Inventory Compilation by UNEP:	August 2008
Compilation available at OEWGII:	October 2008

* Early submission from countries is encouraged. This timeline represents final deadlines to UNEP.

5. Discussion on usability of the toolkit

Understanding, Structure and Language

- Overall feedback on the understanding and structure of the toolkit was positive.
- It was noted that it would be helpful to have brief sector specific information to communicate with sectors in information gathering.
- Arabic translation needs improvement. Countries will provide feedback to UNEP on this.
- Better linkage from data collection to the toolkit spreadsheet would assist in the data tracking.
- Definition of mercury containing batteries is difficult to understand at the country level. Simplifying this definition would help with data collection.

Toolkit Categories

- The sub-categories sometimes do not relate to national situations.
- Emission of mercury during the production of charcoal should be added to the toolkit. The production and use of charcoal is significant in developing countries.
- The question of including methyl mercury in fish was raised. It was noted that the cost of this would be high and that learning the source of mercury contributing to methyl mercury in fish is appropriate in an inventory exercise, and it was preferable to focus on mercury before release to environment

Action: Countries to provide additional information to improve emission factors by 15 June 2008.

Data

- Accessing data is difficult
- Customs level: limited product description is a challenge for customs officials to help provide information for this purpose. The Prior Informed Consent Procedure of the Rotterdam Convention could assist in providing information on mercury and its compounds used as pesticides, but currently, industrial uses of mercury are not covered under the Rotterdam Convention.
- Obtaining data on illegal import is challenging.
- Section 5.5: need better description and labeling for mercury in products, such as batteries, skin products, lighting, electronic devices.
- Extrapolating from a small sample for data collection (for example, in artisanal mining) can skew the project results.
- In some cases (eg, fever thermometers) import data has to be used because information on actual breakage/disposal of products cannot be found.
- Questionnaires: sector specific sample questionnaires with simple wording would be helpful. A basic structure of the questionnaire should be included.
- Questionnaires for certain mercury containing products can be overwhelming; a market analysis may be a better starting point.

Emission factors & Activity Indices

- In general, emission factors should be more relevant for developing countries.
- Reducing the emission factor range would improve usefulness of results.
- Need to improve the emission factors for batteries – currently thought to be too high
- Estimating activity is challenging at the national level.

Action Item:

Further, additional country input requested to be submitted to UNEP by 15 June 2008.

Action Item: UNEP to issue update of the toolkit in August 2008.

6. Lessons learned on Project Design

- Administrative process in setting up the project is long (in particular the gap between signing the MOUs and the transfer funds is too long).
- It was generally felt 10 months to one year is sufficient time to start and complete inventory process at the national level.

- The assigned budget for the national projects should reflect the size of the country, ie the budgets should not be all the same

12 March 2008

Three new countries participated in the workshop from China, Mongolia and India in addition to the pilot countries. The purpose was to share experiences on using the toolkit and results as well as build momentum in the region.

7. Policy context - initiatives and activities

A brief policy context of the Overall UNEP Mercury Programme was delivered by Mr. John Whitelaw, noting the enhanced mandate for mercury following UNEP Governing Council 24. The presentation is included in Appendix 4.

In particular, it was emphasized that a large decision on mercury is likely to be brought to Governing Council in February 2008. This will influence projects in moving forward, to some extent. Also, the UNEP Global Mercury Partnership was noted as an excellent opportunity to collaborate regionally on projects.

8. Presentation of National Inventories

Countries provided summaries of their inventories and their next steps. Presentations are available in Appendix 3. In general, countries have found the inventory pilot project useful, feel the resources have been useful in identifying the largest sources of mercury and will improve capacity to address mercury pollution.

9. National Overview from China, India and Mongolia

Countries provided summaries of their national situation. A summary of the discussion is included in Appendix 5.

10. Discussion on Regional Mercury Issues

A general discussion on regional mercury issues followed. It was noted that national inventories play an important role in identifying regional issues. Of particular note was the life cycle of mercury in products, such as batteries and light bulbs.

11. Closing of meeting for Pilot Project Countries

Mr. John Whitelaw expressed UNEP gratitude for pilot project country participation and enthusiasm in the pilot project and the results workshop.

13 March 2008

Introduction to the toolkit for China, Mongolia and India.

12. Overview of Situation in Japan

A presentation on the national situation in Japan was presented. The presentation is included in Appendix 3. It was specifically noted that dry cell battery mercury recycling recovery data in Japan could provide insight for the Toolkit emission factors.

13. Toolkit Methodology - overview

An overview of the toolkit methodology was presented by Ms. Brenda Koekkoek, UNEP Chemicals. The presentation is available in Appendix 6. Mr. Yves Guibert, UNEP Technical Consultant proceeded with a practical electronic exercise to demonstrate application of the toolkit, using Mongolia as the example country.

14. Feedback from the countries

- India has just initiated a national inventory and finds the toolkit valuable and interesting. India is in the process of developing a national inventory and will get back to UNEP on how the toolkit methodology may be applicable for them.
- Mongolia is preparing a chemicals management plan over the next two years. Mercury is an important issue for Mongolia and will be considered within the chemicals management plan.
- China will participate in the UNEP Global Mercury Partnership Meeting in April 2008 and hopes to present its mercury needs at this meeting, including for national inventories.

John Whitelaw indicated that UNEP stands ready to assist countries to develop inventories and work on mercury related initiatives generally. UNEP invites the participants to continue to dialogue with UNEP in the development of projects.

15. Closing of the Meeting

Mr. John Whitelaw, UNEP Chemicals, expressed UNEP's gratitude for the hospitality and organization of the Government of Japan and AsiaSEED in hosting the workshop. Mr. Whitelaw also thanked all the participants for their enthusiasm and active participation in the workshop. The meeting was concluded at 16:30 on 13 March 2008.

APPENDIX 1 : LIST OF PARTICIPANTS
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APPENDIX 2 : PROGRAM 11-13 MARCH 2008
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Asia Mercury Inventory Pilot Project Results Workshop
Location: Tokyo, Japan

TUESDAY 11 MARCH 2008 (PILOT COUNTRIES ONLY)

9:00–9:15	Registration	
9:30-10:30	Welcome Introduction of Participants	<ul style="list-style-type: none"> - Japan Government - John Whitelaw, UNEP - All
10.30-12.30	Objectives and Outputs of the Workshop Status Report on National Inventory Development (10 minutes each, status report and current challenges) Introduction (UNEP) Cambodia Pakistan The Philippines Syria Yemen	Brenda Koekkoek, UNEP Countries
LUNCH		
14.00-17.30	Discussion Common Lessons Learned through application of toolkit methodology. Needs in finalizing National Inventories Development of National Action Plans Development of workplan timeline	

Please note:

Coffee breaks will be included in both morning and afternoon sessions on the three days. We will aim for 10.30 and 15.30 for these breaks.

WEDNESDAY 12 MARCH (ALL PARTICIPANTS)		
9.30	Welcome to new participants	UNEP
	Current International Actions on Mercury Overview of the Pilot Project	UNEP
	Presentation of National Inventories (30 minutes each) - Experience with the toolkit - Results, status and next steps with National Inventory	Cambodia Pakistan The Philippines
12.30	LUNCH	
14.00	Presentation of National Inventories (continued)	Syria Yemen
15.00	Discussion Lessons Learned through application of toolkit methodology. Finalization of National Inventories	Discussion
16.30-17.15	Approval of follow-up workplan timeline (with pilot countries) Initial Introduction to toolkit (with new countries)	
17.15	Day Wrap-up	

THURSDAY 13 MARCH (NEW COUNTRIES ONLY)		
9.30	Brief country presentations on mercury (20 minutes): <ul style="list-style-type: none"> - Country overview with respect to mercury pollution. - Overview of existing knowledge on identified and/or quantified mercury uses and release sources. - Identified data gaps on mercury. - Experience with release inventory work (ex. previously with mercury, and others such as green house gases, dioxin/furans, PCB, pesticides or others). 	Countries
	Introduction to the UNEP Toolkit for identification and quantification of mercury releases. <ul style="list-style-type: none"> o What is the toolkit? How is it useful? 	UNEP
	Mercury Releases, Sources and Pathways	
	Exercise #1	
12.30	LUNCH	
14.00	Methodology of the Toolkit <ul style="list-style-type: none"> - Technical possibilities / limitations - Toolkit Inventory Steps - Overview of Mercury Source Categories 	UNEP
	Quantification Principles <ul style="list-style-type: none"> - Approach, calculation and data needs - Toolkit descriptions – examples: mobilization sources, products, waste treatment - Data sources (general guidance and discussion) - Data collection strategies 	
	Presentation and Discussion of data source categories	
	Summary Report of the workshop	
17.15	Wrap-up of Day	

APPENDIX 3 : STATUS OF NATIONAL INVENTORIES

Cambodia

Slide 1

Asia Mercury Inventory Pilot Project
Results Workshop
11-12 March 2008, Tokyo, Japan

**Status Report on National
Inventory Development**

Prepared by : Mr. SARUN Sambo
Team Leader of Mercury Inventory Project
Chief Office of Solid Waste and Hazardous Substance
Management, DoPC, MoE

Slide 4

2. Status Report of Mercury Inventory

- In inventory on mercury use and release, There are 9 staffs: team leader, reporter, administrator and 6 member of survey group.
- Selected areas: 12 provinces and cities of the 24 provinces and cities.
- Source of mercury release:
 - Mineral oils - extraction, refining and use
 - Natural gas - extraction, refining and use
 - Biomass fired power and heat production
 - Gold and silver extraction with mercury amalgamation processes
 - Production of lime and light weight aggregates

Slide 2

Content

1. Introduction
2. Status Report of Mercury Inventory
3. Current Challenge

Slide 5

2. Status Report of Mercury Inventory con.

- **Source of mercury release: cont..**
 - Thermometers with mercury
 - Batteries with mercury
 - Dental mercury-amalgam fillings
 - Production of recycled ferrous metals (iron and steel)
 - Production of other recycled metals
 - Incineration of municipal/general waste
 - Incineration of medical waste
 - Controlled landfills/deposits
 - Informal dumping of general waste
 - Waste water system/treatment
 - Crematoria

Slide 3

1. Introduction

- Cambodia signed MOU agreement in July 2007 on mercury inventory and action plan
- Project started implement at early Augusts and will be finished at April 2008
- We finished the Cambodia inventory report end February 2008 and submitted it to UNEP Chemicals Branch.
- Action Plan will be finished April 2008

Slide 6

2. Status Report of Mercury Inventory con.

Based on the Toolkit calculation of mercury release and use from field of survey and desk study we can conclude that the total release of mercury in Cambodia is approximately **769 kg per year minimum** and **14845 kg per year in maximum**. The main sources of maximum mercury release are considered high potential level as following:

1. consumer products with intentional use:	8485.362 Kg/year
2. Disposal of wastes	: 4665.56 Kg/year
3. Gold extraction	: 1182 Kg/year

Slide 7

3. Current Challenge

Based on the result of survey from data collection team we faced some difficulties such as:

- ☞ The figure of maximum mercury release is reasonable amount because it was calculated use assumed activity rates and input factor.
- ☞ Utilization Toolkit calculation could cause total figure of maximum of mercury release is high by using input factor of from Toolkit, in case of Cambodia, if compare to some countries which use their standard regulation.
- ☞ Data collected from source owner or interviewee of the field of survey is still reasonable or limited or estimated amount.
- ☞ The total amount of maximum mercury release was concerned and recommended in the consulting workshop on mercury inventory report.

Slide 8

3. Current Challenge cont...

Relevant to Toolkit Calculation:

- ☞ Long table and complex
- ☞ Sub category for calculation some to detail and some too general that does not match or correspond to local context.
- ☞ Some release input factor does not available or fit to local context
- ☞ So many description of mercury release input factor with many examples from western or developed countries.
- ☞ Input factor seem to be inappropriate for least developing countries, where never have industrialized history, mean no putative sources of mercury release so far.

Slide 9



Pakistan

Slide 1



Slide 2

**STATUS REPORT ON NATIONAL INVENTORY
DEVELOPMENT ON MERCURY PROJECT
BY**

- 1. ZAIGHAM ABBAS
TECHNICAL OFFICER (CHEMICAL)**
- 2. MUHIB ALI PHULPOTO
SECTION OFFICER (CLIMATE CHANGE)**

**GOVERNMENT OF PAKISTAN
MINISTRY OF ENVIRONMENT**

11th MARCH 2008

Slide 3

Creation of Stakeholders team	
Mr. Sajjad Ahmad Joint Secretary (IC)/Project Manager	Ministry of Environment
Mr. Ahmad Rauf Secretary (Custom Tariff-I)	Revenue Division Federal Board of Revenue, Islamabad
Mr. Zulfikar Ali Senior Chemist, EMS – Project	Pak-EPA Islamabad
Dr. Muhammad Bashir Khan Director General	EPA – N.W.F.P, Peshawar
Mr. Ainuddin Agha Research Officer	EPA – Balochistan, Quetta
Mr. Jahangeer Asad Chemist – EMS	EPA – Sindh, Karachi
Muhammad Farooq Deputy Director	EPD – Punjab, Lahore
Prof. Dr. Ch. Jamil Anwar Director	Institute of Chemistry, University of the Punjab, Lahore
Mr. Zaigham Abbas Technical Officer (Chemical)/Project Coordinator	Ministry of Environment

Slide 4

Meetings

1. Meeting of Project Manager – Mercury Project with Director General EPA Sindh, Karachi

Decisions

- EPA Sindh will collect data and identify areas and will supervise the activities and coordinate with Ministry of Environment.
- A team of officers and official was formed in this respects to act as focal point in Sindh for mercury project.

Slide 5

Meetings

2. Meeting of Project Coordinator – Mercury Project with Director General EPD, Punjab, Lahore

Decisions

- EPA Punjab will collect data and identify areas and will supervise the activities and coordinate with Ministry of Environment.
- A team of officers and official was formed in this respects to act as focal point in Punjab for mercury project.

Slide 6

Meetings

3. Meeting of Project Coordinator – Mercury Project with Project Manager Kasur Tannery Waste Management Agency, Kasur

Decision

- Kasur Tannery Waste Management Agency , Kasur (Operating 2nd largest common tannery effluent treatment plant capacity 12700 M/day) will collect data and identify areas in solid waste disposal sites and 237 tanneries and coordinate with Ministry of Environment.

Slide 7

Meetings

4. First Technical Working Group Meeting of Stakeholders in office of Project Manager – Mercury Project, Ministry of Environment, Islamabad

Decisions

- DG, EPA, N.W.F.P & Director, Institute of Chemistry, Punjab University, Lahore will prepare sampling criteria.
- Secretary Customs Tariff-I, FBR will provide the list of importers.
- The EPA, Sindh, Punjab, N.W.F.P, Balochistan and Pak-EPA will identify 200, 200, 125, 125 and 50 sampling points respectively as per toolkit and will give in written form to this Ministry till March, 2008.
- Each EPA will open a new desk for this project.
- The analysis of samples will be conducted in the Institute of Chemistry, Punjab University, Lahore.

Slide 10



Slide 8

Data Collection

- Data collection from the markets of Lahore, Rawalpindi and Research Institutes like Institute of Chemistry, Pakistan Council for Scientific and Industrial Research (PCSIR) and Merck (Pvt.) Ltd.
- Data collection from different organizations / departments like Ministry of Industries, Ministry of Health, Ministry of Science & Technology etc.

Slide 9

Current Challenges

1. Deviation of data from FBR & Local Markets.
2. Exact quantification of data.
3. Proper identification of mercury releases.
4. Reluctance/hesitation in mercury based markets to give complete information.
5. Un awareness to the public about mercury and mercury products effects.
6. Identification of effected persons in industries, hospitals, dental clinics and mercury based markets.
7. Short duration of the project .
8. Lack of sufficient funds for this project.

Philippines

Slide 1

**Status Report for the
Mercury Inventory Toolkit
Project in the Philippines**

Engr. Teresita Tagoria
Co-coordinator, Philippines Mercury Inventory Toolkit Project

Tokyo, Japan
March 11-12, 2008

Slide 4

Update

- Finalization of the MOU between UNEP & DENR-EMB – **Signed October 2007**
- UNEP Funds available – **December 2008**
- Establishment of Lead Inventory Team for the project implementation – **Approved July 2007**
- Establishment of an Inter-agency Technical Working Group and Secretariat including specific tasks – **Prepared**
- Kick-off meetings, preparations & participation – **Feb 14, 2008; March 4, 2008**

Slide 2



Slide 5

Hiring of Personnel

- Drafting of TOR and posting the vacancy notice at EMB website - <http://www.emb.gov.ph/>
- Selection of independent local consultant and technical/administrative assistant
- Personnel hired end of February 2007

Slide 3

Update

- Philippines is part of the Asia Mercury Inventory Pilot Project
- **In-country visit of UNEP Inventory Expert – November 26-29, 2007**
Training Workshop of TWG members, Project Lead Team & EMB Central Office representatives & Secretariat

Slide 6

Revision of Chemical Control Order (CCO) for Mercury and Mercury Compounds

- Approved in 1997, this CCO is currently being revised along with the mercury initiatives in the country with support from UNEP
- Downloadable from EMB website: <http://www.emb.gov.ph/chemicals/hg.htm>
- DENR Administrative Order No. 38, Series of 1997 - Chemical Control Order for Mercury and Mercury Compounds

Slide 7

Coverage of the Chemical Control Order (CCO) for Mercury & Mercury Compounds

- This CCO applies to the **importation, manufacture, processing, use and distribution** of mercury and mercury compounds.
- It also addresses the **treatment, storage and disposal** of mercury-bearing or mercury contaminated wastes in the Philippines.
- This order covers the following sectors:
 - (1) Importers and distributors
 - (2) Manufacturers, processors and industrial users
 - (3) Transporters
 - (4) Treaters and disposers

Slide 8

Permitted End Users of Hg in the Philippines

- Chlor-alkali plants
- Mining and metallurgical industries
- Electrical apparatus (lamps, arc rectifiers, battery cells and others)
- Industrial and control instruments
- Pharmaceutical
- Paint manufacturing
- Pulp and paper manufacturing
- Dental amalgam
- Industrial catalyst
- Pesticides (fungicide) production or formulation

Slide 9

Future Activities

- **Data Gathering/Initial Inventory** – March/April 2008
- **Inventory Report** – **March/April/May 2008**
- **Preparation of Associated Mercury Action Plan** – **April/May 2008**
- **Final Deadlines to UNEP** – **early June 2008**

Syria

Slide 1

Syrian Short Status Report

Eng. Eyad Ibrahim
Syrian Contact Person of Global Mercury Programme
Asia Mercury Inventory Pilot Project Results Workshop
Tokyo, Japan 11-13 March 2008

Slide 4

Cooperation with the UNEP Chemicals

- In this frame and in response to the UNEP Chemicals exerted efforts to achieve the sound management of mercury and its compounds, Syria has signed a Memorandum of Understanding with the UNEP Chemicals, hereby Syria will create a national inventory of mercury uses and releases.

Slide 2

Introduction

- The Syrian Arab Republic locates on the eastern Mediterranean Coast, and it is 185,000 square kilometers in size. Its population is about 21,000,000. Arabic language is the official language, and the system of government is a republican rule.
- Geographically, Syria is divided into four regions: coast, mountains, inland and the desert. Administratively, it is divided into 14 governorates, including cities and villages.
- In respect of production sectors in Syria, they are mainly the public, private and common sectors.

Slide 5

Cooperation with the UNEP Chemicals

- The purpose of this project is to build capacity in Syria on mercury management while establishing a mercury use and release inventory, and to assist the Syrian Arab Republic in establishing priorities for mercury actions in Syria.
- With the objective of launching and executing of this project, we have identified the project activities and work plan as follows:

Slide 3

Cooperation with the UNEP Chemicals

- In accordance to the Syrian interests in the various environmental issues, Syrian Arab Republic has signed many of the international environmental conventions such as Basel, Rotterdam and Stockholm, which are concerned to the sound management of chemical substances.

Slide 6

Project activities

1-Identifying of the service and economic bodies which probably deal with mercury compounds or other substances which contain concentrations from these compounds or contaminated by them. These bodies are as follows:

- Ministry of Industry
- Ministry of Health
- Ministry of Oil
- General Directorate of Customs
- Ministry of Agriculture
- Craftsmen Union (Gold Formulating Association)
- Dentists Association
- Industry Chamber
- Trade Chamber

Slide 7

Project activities

- 2-Executing an inventory which shows the kinds, quantities and uses of mercuric compounds in our country.
- 3-Evaluating of the mercuric compounds releases which are obtained from the various service and economic activities in Syria, and that is through the inventory results and using of the UNEP Global Mercury Programme Toolkit

Slide 10

Difficulties

1. As for the training on the toolkit, due to the absence of the UNEP expert we have encountered some difficulties, so we need this training in order to save time for completing the project work plan.
2. There is a lack in the received information.
3. There are some difficulties in obtaining of information from the private sector.
4. The contracting with the national expert is not completed so far.

- **Note:** We are working right now on the spreadsheet of UNEP Chemicals' toolkit for identification and quantification of mercury releases, and we are encountering some difficulties.

Slide 8

Project activities

- 4-Making an environmental review for the chlore-alkali production unit in the Paper Industry Factory in Syria, which uses a mercury cells technique, and this factory is considered as a hot spot.
- 5-Preparing a report on the project results and the national needs to improve managing of these hazardous substances.

Slide 11

Thank you

Slide 9

Work plan

Yemen

Slide 1

Mercury Release Inventories - Asian Pilot Project

- **The Republic of Yemen**
- **Ministry of Water and Environment**
- **Environmental Protection Authority (EPA)**
- **Helal Al-raishi**

INVENTORY OF MERCURY RELEASES IN [Yemen]

Preliminary Inventory 2008

Slide 4

Screening Matrix - Main source categories and release pathways Table 1.1

Main Source Category	Air	Water	Land	Product
Extraction and use of fuels/energy sources	27.00	0.27	0.54	21.60
Primary (virgin) metal production	0.95	0.02	0.24	0.40
Production of other minerals and materials with mercury impurities	0.90	-	-	0.03
Intentional use of mercury in industrial processes cement	315.41	0.00	0.00	52.50
Consumer products with intentional use of mercury	144.56	2117.65	3401.15	4318.35
Other intentional products/process uses	24.30	168.90	240.00	720.00
Production of recycled				

Slide 2

1-1 Releases by main source categories

This summary includes a brief description of the significant releases to all relevant media for the main source categories as identified in the screening matrix. Include also a table showing the sum of quantified releases from each source main category according to the categorization presented in this Toolkit.

Slide 5

problem

- 1- Mercury is a big problem in Yemen, where there is no separate special system of operations including sorting, separation at source, collection, transport and treatment by ashing and incineration (or any other accredited way) followed by the final disposal of processed products.
- 2 - Lack of professional cadres with specialized knowledge and expertise to deal safely with these residues.
- 3- There is a lack of public awareness of the seriousness and effect of mercury when disposed of with other municipal wastes. All transferred waste is mixed with the hazardous waste.

Slide 3

Releases by main source categories

Identifications of main source categories present the first step in developing a standardized mercury source inventory is identification of main source categories present in Yemen investigated, and the main release routes for each category. The coarse screening matrix provided in table 1-1 below facilitates preliminary evaluation of activities (industries, product uses, domestic activities, etc.), which potentially release mercury to one or more of the output pathways as defined above. For each main source category, the presence or absence of the activity in is confirmed.

Slide 6

The Environmental Protection Authority is expected to soon restrict

Due to the emerging importance of this source category, the Environmental Protection Authority recently will published a rule requiring the removal of mercury some through legislation and others through voluntary agreements.

- The Environmental Protection Authority is expected to soon restrict mercury emissions from different sources; such a response could greatly slow measures that are already in place to reduce mercury consumption in products and processes,
- The issue of controlling mercury emissions from cement plants has not yet become a high priority, although plant operators are required to report them under the Toxic Release Inventory

Slide 7

requirement

Need for establishment of a national information center of Mercury • including a special section on education for Mercury.

- The need for a full and effective coordination between the popular and governmental actors in the field of Mercury.
- Exchange of experiences and information between the various stakeholders.
- The need to establish a center for Mercury poisons.
- The need for the establishment of a cleaner production center for Mercury.

Slide 10

recommendation

in order to prevent mercury from getting into the waste stream. There is a strong argument for embracing restrictions on the free trade of mercury in order to reduce eventual waste disposal costs, as well as health and environmental hazards.

Slide 8

proposal

it must be mentioned that there are a number of more general measures (implemented in virtually all successful industries) that can be extremely effective in greatly reducing mercury emissions of all kinds, and at very low cost:

Slide 11

recommendation

As previously noted, ongoing mercury oversupply could encourage additional consumption. More important, however, growing mercury oversupply, and the lack of international action to address them, could fuel the belief that the international community does not set mercury issues as a very high priority. Such a response could greatly slow measures that are already in place to reduce mercury consumption in products and processes, or cause various countries to put a lower priority on the enforcement of regulations that may already be on the books. In this case, the general reduction in mercury demand that is already underway could be significantly slowed.

Slide 9

proposal

1. **Training, education and motivation of staff and operators.** Industrial processes are overseen by people. Therefore, appropriate and focused training of staff can be a very cost-effective way of reducing discharges of harmful substances.
2. **Process control optimization.** To be able to reduce different pollutants simultaneously, and to maintain low emissions, strict attention to process control is required.
3. **Regular maintenance.** To maintain the efficiency of the technical units of industrial processes, and the keep the associated abatement systems operating at a high level, sufficient and routine maintenance has to be ensured.
4. **An operational awareness of the importance of environmental management.** An environmental management system that clearly defines the responsibilities for environmentally relevant operations is a necessary tool of responsible management. It raises awareness while including goals and measures, process and job instructions, check lists and other relevant documentation, as necessary.

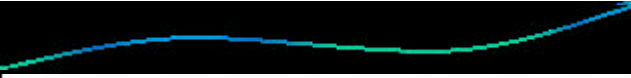
Slide 12

recommendation

There is a strong argument for embracing restrictions on the free trade of mercury in order to reduce eventual waste disposal costs, as well as health and environmental hazards.

mercury is exported to developing countries for re-use in gold recovery [and] for use in the production of cosmetics, paints and pesticides, in addition to application types shared with OECD countries, such as in measurement and electrical devices. In this respect, the effects of the continuing exports of mercury by European countries to developing countries, where its use may lead to pollution and adverse health effects, need to be given full consideration.

Slide 13




recommendation

Furthermore, a significant part of the mercury could return to Europe as long-range transboundary air pollution. With regard to free markets, there are numerous reasons for considering mercury a special case. It does not make economic or environmental sense for the European Commission to protect (or at least not distort) the free-functioning market for a toxic substance. EU governments already spend increasing amounts of money to collect mercury containing products that have been freely traded.

- in order to prevent mercury from getting into the waste stream. There is a strong argument for embracing restrictions on the free trade of mercury in order to reduce eventual waste disposal costs, as well as health and environmental hazards.
-

Slide 14



Thank you

APPENDIX 4 : MERCURY OVERVIEW PRESENTATION

Slide 1

UNEP Mercury Programme

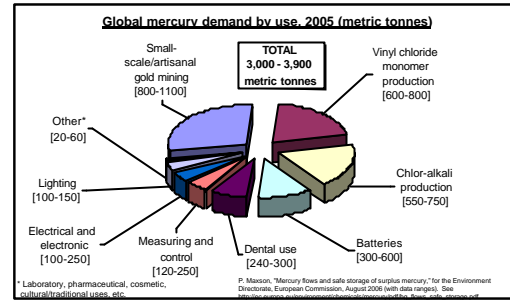
Asian Mercury Inventory Pilot Project

John Whitelaw, Deputy
United Nations Environment Program, Chemicals Branch

1

Slide 4

Mercury continues to be used in many countries...



4

Slide 2

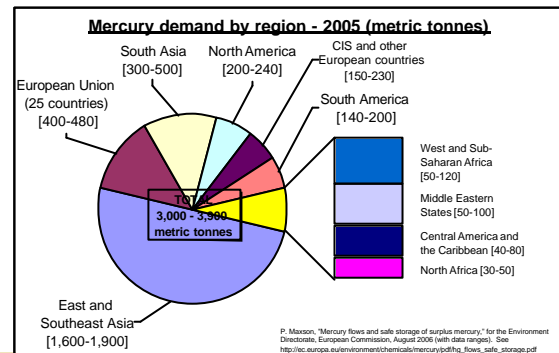
Overview of Presentation

- Why is mercury a concern?
- Overview of UNEP Mercury Programme

2

Slide 5

... and there is global demand.



5

Slide 3

Why is mercury a concern?

- Toxic with negative impacts on human health and the environment
- Persistent and cycles globally
- Due to long-range transport even nations with minimal releases may be adversely affected.

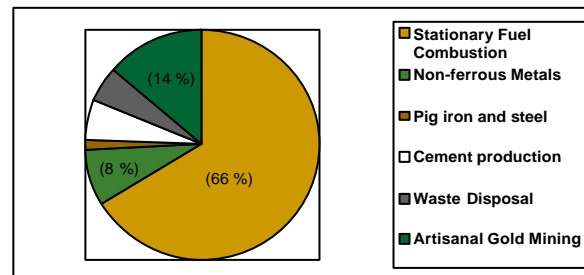


Coal-fired power plant

3

Slide 6

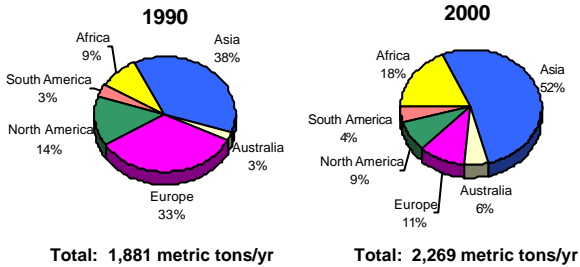
Global mercury releases to air, by source category, 1995



Pirrone, et al (2001), and Lacerda, 1997, from UNEP Global Mercury Assessment, Chapter 6.

Slide 7

**Anthropogenic Air Emissions of Mercury:
Distribution by Region in 1990 and 2000**



Source: Based on Pacyna, J., Munthe J., Presentation at Workshop on Mercury, Brussels, March 29/30, 2004

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Slide 10

**Key Outcomes of 24th UNEP
Governing Council 5-9 February 2007:**



- Strengthening of UNEP's mandate to work on international mercury actions:
 - Increased efforts on mercury partnerships
 - Establishment of an ad hoc open ended working group to examine a range of options for actions
 - Commits to increased efforts in a number of areas, including inventories

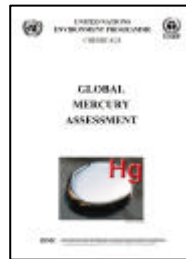
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Slide 8

**A global assessment of mercury was
initiated in 2001.**



- Concluded that sufficient evidence of significant global adverse impacts exist to warrant further international action
- In response to the conclusions, the UNEP Mercury Programme was established.
- Overall objective of the programme is to eliminate anthropogenic releases of mercury to the environment



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Slide 11

Partnerships



Working with a range of partners in specific sectors including:

- Manufacturing sector (chlor-alkali production, VCM manufacture)
- Mercury-containing products;
- Mining (artisanal/small-scale gold, other mining)
- Coal combustion; and
- Information management (primarily air transport and fate research, inventory development)

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Slide 9

**The main elements of the UNEP
mercury programme include:**



- Assisting countries to understand and address Hg problems, through
- Building inventories of uses and releases
- Identifying populations at risk
- Developing communication and outreach to at-risk populations
- Initiating actions to reduce uses and releases of Hg, including promoting Hg-free products, technologies and processes, using environmentally friendly alternatives

9

Slide 12

**Partnership framework under
development**



- Meeting of Partners to take place 1-3 April 2008 in Geneva. Goal is to consult upon the draft framework for the UNEP Global Mercury Partnership.
- Opportunity to coordinate and cooperate on activities and exchange information.
- Create opportunities to leverage funding.

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Slide 13

Ad hoc open ended working group



- First meeting took place 18-22 November 2007 in Bangkok.
- Second meeting to take place in October 2008. Venue to be confirmed.
- Report on the range of options to address mercury will be reported to UNEP Governing Council in February 2009.

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Slide 14

Further information:



<http://www.chem.unep.ch/mercury/>



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APPENDIX 5 : JAPAN

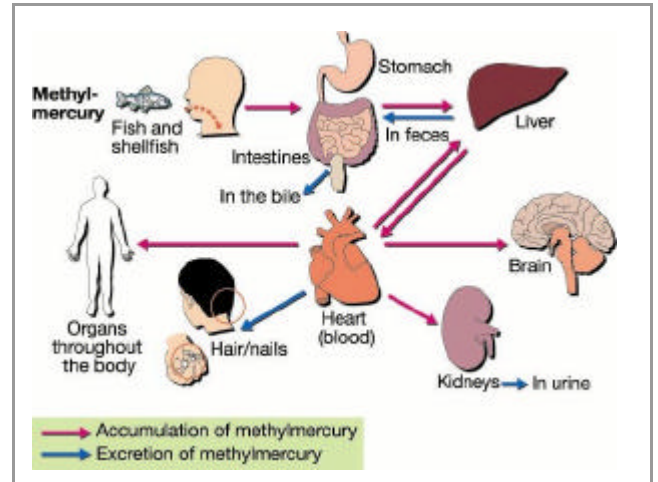
Slide 1

Mercury Issues in Japan

The Results Workshop on Mercury Inventory Toolkit Pilot Project
Tokyo, Japan, 11-13 March 2008

Keiko SEGAWA
Environmental Health and Safety Division
Ministry of the Environment, Japan

Slide 4



Slide 2

Mercury issues in Japan

- Minamata disease
- Mercury reduction in Products
- Related UNEP works
(OEWG, Partnership programme)

Slide 5

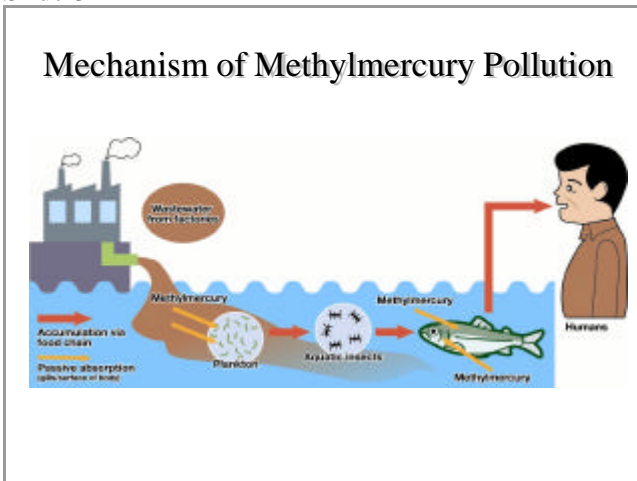
Tragedy of methyl mercury poisoning – Minamata Disease

1956: First official report of “extraordinary disease” in Minamata city
 1968: Government attributed the disease to methyl mercury originating from Chisso acetaldehyde plant

So far... about 3,000 patients eligible for compensation for health damage, and further 12,000 individuals certified for relief measures in a political settlement.

For an English brochure on the disease, see <http://www7.ocn.ne.jp/~mimuseum/rekisitokyukun/eng/rekisitokyukuneng.html>

Slide 3



Slide 6

- From instance of Minamata disease Japan has learned such lessons as the activities that give priority to economic goals but lack proper attention to the environment do various and serious damages such as health damage, and as it is not easy to recover from the damage later on.
- From the economic standpoint, it is clear that these activities are not economic choice because the measures against these damages take a large amount of cost and a great deal of time in comparison with the cost of the case that such measures as occurrence of the pollution is prevented could be taken.
-

Slide 7

Comparison of the Cost
(Source: Japan's Experience with Pollution (1991))

Cost for Pollution Control and Prevention Measures ^{*1}	123,000,000 yen/year
Damage amount	12,631,000,000 yen/year
Breakdown:	
Health damage ^{*2}	7,671,000,000 yen/year
Environmental pollution damage ^{*3}	4,271,000,000 yen/year
Fishery damage ^{*4}	689,000,000 yen/year

[Notes]

- *1: Yearly average paid by Chisso Co., Ltd., in the form of investments to prevent pollution damage.
- *2: Yearly average of compensation benefits paid to patients under the Compensation Agreement, etc.
- *3: Yearly average amount of expenditure for dredging work in Minamata Bay.
- *4: Compensation paid to the fishery industry computed as equal redemption of principal and interest prorated as yearly payment.

Slide 10



Slide 8

Minamata Disease

- Minamata disease is the starting point of the environmental administration in Japan.
- To promote the relief of the Minamata Disease victims and the rebirth of the ravaged local community.
- To learn the lessons humbly from the tragedy of Minamata Disease and to offer the information nationally and internationally.
- The year 2006 was the 50th anniversary of the official recognition of the Minamata disease.**

Slide 11

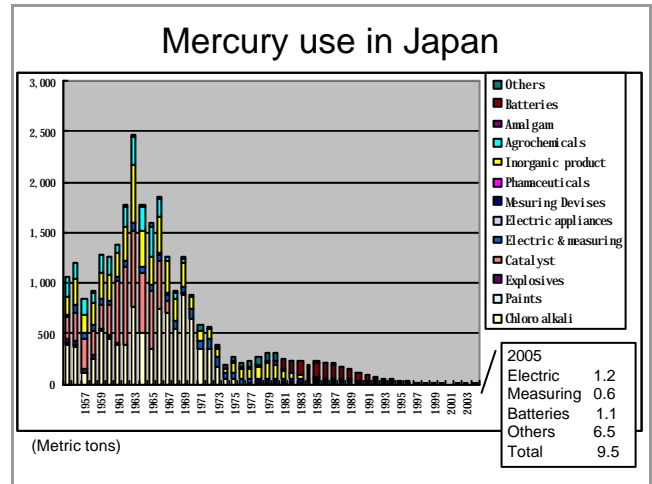
Mercury issues in Japan

- Mercury reduction in Products

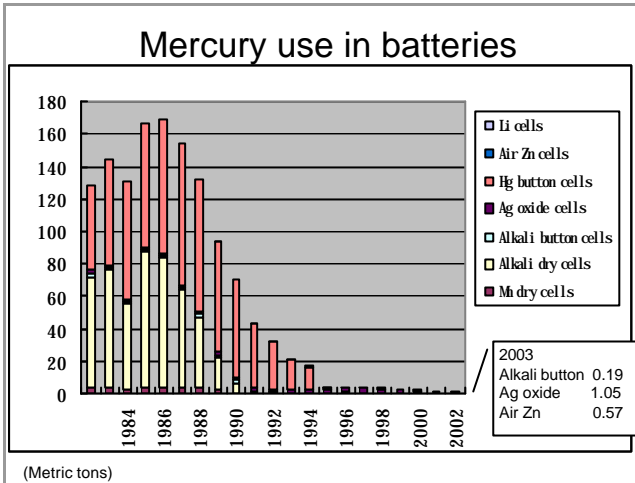
Slide 9



Slide 12



Slide 13

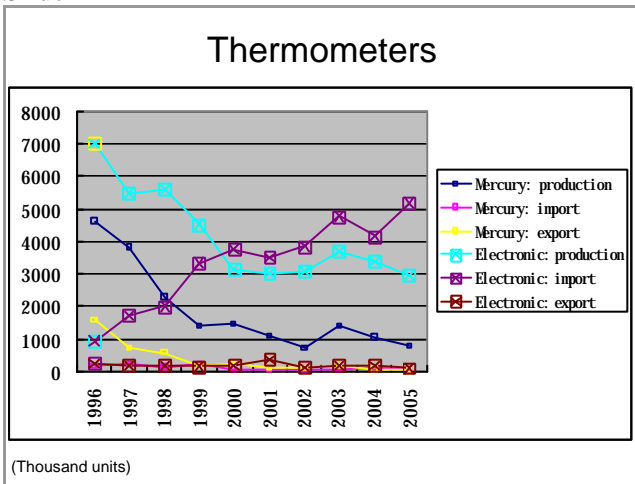


Slide 16

Mercury contents in fluorescent lamps

- Average mercury contents in 40W tubes 50mg/tube (1975) → 7.5mg/tube (2005)
- Government procurement guideline under the Green Procurement Act:
10mg/tube

Slide 14



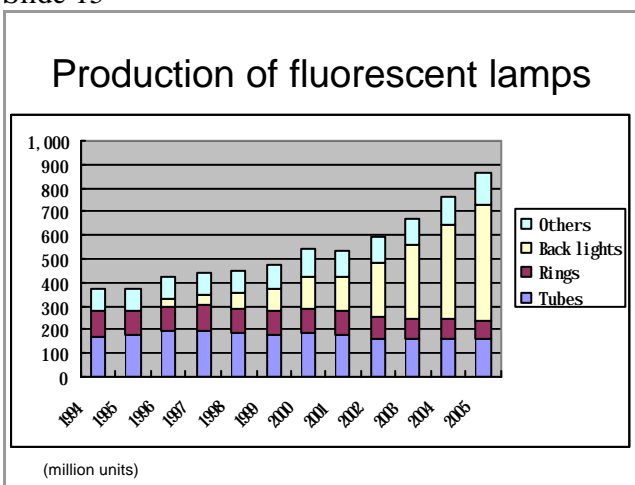
Slide 17

Batteries in municipal waste

- In 1986, the Ministry of Health and Welfare issued a guidance to municipalities on separating batteries in waste collection and recovery of mercury

	1992	1998	2005
Dry cells collected	7,600t	12,000t	11,300t
Mercury recovered	1,100kg	300kg	170kg

Slide 15



Slide 18

Fluorescent lamps in municipal waste

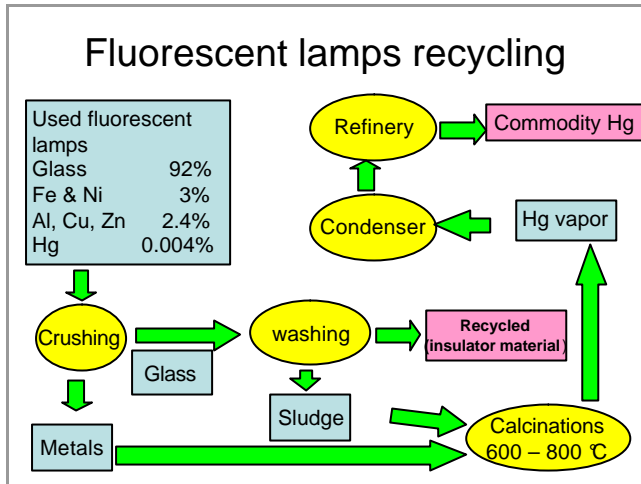
- In 1999, the Japan Waste Management Association started a collaborative collection and recovery initiative.

	1999	2001	2003	2005
Lamps collected	2,800t	4,300t	4,800t	5,000t
Mercury recovered	90kg	172kg	192kg	200kg

Figures Total volume collected by the association. The amount of total collection would be much bigger, because some private companies convey the collection and recovery individually.

- Total collection amount of Lamps in Japan (2006)
: 15,000 ton (estimated by Japan Electric Lamps Manufacturers Association)
- Percentage recovery (calculation): 20-25 %

Slide 19



Slide 22

Mercury issues in Japan

Related UNEP works

- Ad-hoc Open ended working group
Feasibility and effectiveness of voluntary and legally binding approaches
- Partnership Programme

Slide 20



Slide 23

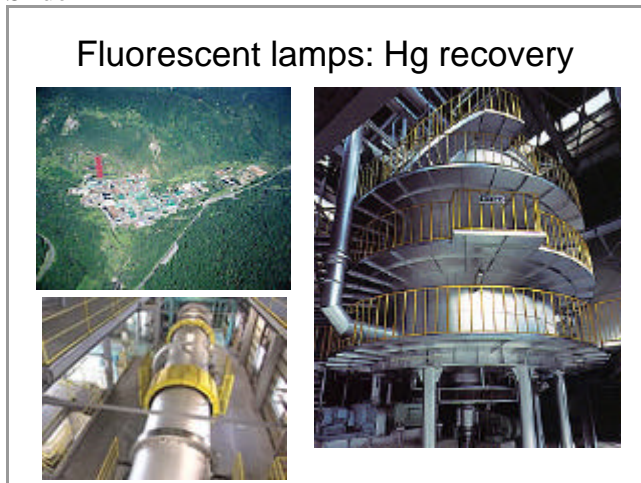
Ad-hoc Open ended working group

- 1st Meeting : November 2007, Bangkok
- 2nd Meeting : October 2008

Progress report

Governing Council 25th regular session
:February 2009, Nairobi?

Slide 21



Slide 24

Mercury partnerships were established in
2005 : existing area

- mercury releases from coal combustion
- mercury cell chlor alkali production
- mercury in products
- mercury air transport and fate research
- artisanal and small scale gold mining

Slide 25**Further areas to be considered**

- vinyl chloride monomer production
- non-ferrous metals mining
- cement production
- reducing global mercury supply
- mercury waste management
- environmentally sound, long-term storage solutions

APPENDIX 6 : OVERVIEW OF THE TOOLKIT

Slide 1

UNEP Toolkit for Identification & Quantification of Mercury Releases

United Nations Environment Program, Chemicals Branch

1

Slide 4

Why is the toolkit useful?

- Intended to simplify inventory development and reduce workload at the country level:
 - Guides inventory makers through the 4 stages.
 - Has a pre-prepared database developed for use.
- Outcome can be supplemented as experience is gained.
- Will provide a basis for country level associated action plans for mercury.
- Development of comparable data-sets assists in regional and global decision making.



4

Slide 2

What is the toolkit?

- The toolkit is a 250 page document with associated Excel Spreadsheets.
- Pilot Draft completed in Nov 2005 and translated into the UN languages

www.chem.unep.ch/mercury/toolkit/default.htm



2

Slide 5

About the toolkit...

- Follows a similar approach to the UNEP dioxin and furan toolkit.
- It is a methodology where countries compile data into a developed database.
- Data gathering... requires detective work!



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Slide 3

The toolkit is an important UNEP guidance document:

- Assists countries in building the knowledge base for mercury inventory development:
 - stepwise approach from gathering simple qualitative information to developing a detailed quantitative inventory
 - Provides detailed descriptions of source categories, including example data, input factors, and output distribution factors

3

Slide 6

What can the Toolkit help us with?

- Description of mercury release sources
 - Including factors that determine the occurrence and quantities of mercury releases
- Guidance on quantification of mercury releases, generally and source specific
 - data types to look for
 - describes calculation principles
 - provides calculation spreadsheet
 - default factors for first estimation, for some sources
- General guidance on collection, selection and documentation of data
- Reporting principles and standard outline



6

Slide 7

What does the Toolkit NOT help us with?

- Actual "detective work" of data collection in national settings
 - Diverse (from time to time, country to country)
 - Learning process
- Basic unit conversion and data conversion
- Working with calculations and reporting



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Slide 10

Output pathways considered in Toolkit:

- Direct releases to the atmosphere (air);
- Direct releases to aquatic environments (water)*1;
- Direct releases to land (terrestrial environment, including ground water);
- Flows of mercury as an impurity in by-products;
- Flows of mercury to the public waste water system*1;
- Flows of mercury to the general waste treatment system;
- Flows of mercury to sectors specific waste treatment or disposal systems*2.

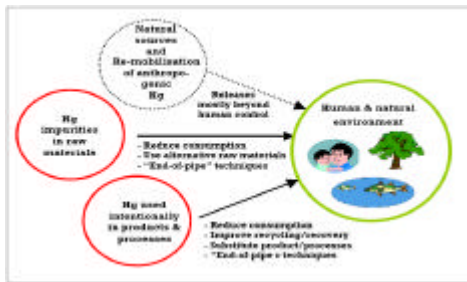
*1: Pooled in inventory, specify. *2: Specify for sub-cat.



10

Slide 8

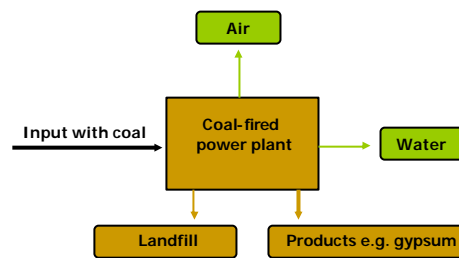
Basics of mercury release sources and pathways



8

Slide 11

The mass balance principle: Coal Combustion example



11

Slide 9

The mass balance principle

- Mercury is an element
 - Not degradable
 - Not generated in processes
 - Only fed into process or "society" and released via process outputs (including waste deposits)
 - Total inputs = total outputs
- "What goes in - must come out"
 - only the output pathways differ



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Slide 12

Follows a 4-step methodology...

1. A coarse screening matrix used to identify main mercury sources categories present in a country.
2. Further classification of the source categories into sub-categories.
3. Development of a quantitative inventory.
4. Compilation of the standardized inventory. (page 269)



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Slide 13

Step 1: Identify major mercury source categories and pathways (page 20)

Chapter	Main Source Category	Air	Water	Land	Products	Waste/residue	
5.1	Extraction and use of fuels/energy sources	X	X	x	x	X	
5.2	Primary (virgin) metal production	X	X	X	X	X	
5.3	Production of other minerals and materials with mercury impurities	X	x	x	x	x	
5.4	Intentional use of mercury in industrial processes	X	X	X	X	X	
5.5	Consumer products with intentional use of mercury	X	X	X	X	X	
5.6	Other intentional products/process uses	X	X	X	X	X	
5.7	Production of recycled metals ("secondary" metal production)	X	X	X	X	X	
5.8	Waste incineration	X	X	X	x	X	
5.9	Waste deposition/landfilling and waste water treatment	X	X	X		X	
5.10	Crematoria and cemeteries	X		X		x	
5.11	Identification of potential hot-spots	Probably registration only, to be followed by site-specific evaluation					

Notes: X - Release pathway expected to be predominant for the individual main source category; x - Additional release pathways to be considered, depending on specific source and national situation.

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Slide 16

Quantification principles, activity rates and input factors

- Activity rates:
 - Always specific (country or point source)
- Input factors:
 - Best: Specific data
 - Proximation: Default factors provided
 - (secondarily: Literature examples)

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Slide 14

Step 2: Identify sub-categories present

Table 4.2 Extraction and use of fuels/energy sources: sub-categories with main pathways of releases of mercury and recommended inventory approach

Chapter	Sub-category	Air	Water	Land	Product	Waste/residue	Main inventory approach
5.1.1	Coal combustion in large power plants	X	x	x	x	X	PS
5.1.2	Other coal combustion	X		x	x	x	OW
5.1.3	Extraction, refining and use of mineral oil	X	X	x	x	x	OW/PS
5.1.4	Extraction, refining and use of natural gas	X	X	X	x	X	OW/PS
5.1.5	Extraction and use of other fossil fuels	X	x	x		x	OW
5.1.6	Biomass fired power and heat production	X	x	x		x	OW
5.1.7	Geothermal power production	X					PS

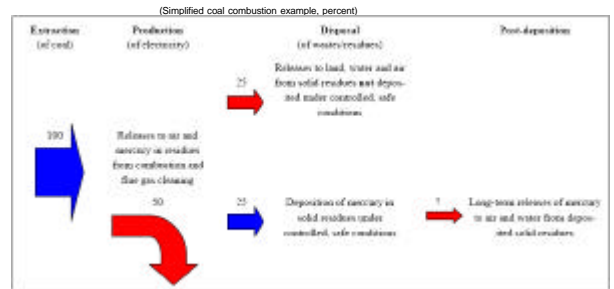
Notes: PS = Point source by point source approach; OW = National overview approach; X = Release pathway expected to be predominant for the sub-category; x = Additional release pathways to be considered, depending on specific source and national situation.

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Slide 17

Quantification principles, output distribution factors

- Share of total outputs that follow each output pathway



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Slide 15

Quantification principles, key equation

$$\text{Mercury release by pathway } x = \text{activity rate} * \text{input factor} * \text{output distribution factor } x$$

Amount of feed material processed or product produced per unit of time (e.g. tons or pieces per year)

Fraction or part (unit-less) of the mercury input that is re-released through the particular pathway: Air, water, land, product, general waste, or sector specific waste treatment (specific data or defaults)

Mercury content (e.g., in grams of Hg) per unit of feed material processed or product produced (specific data or defaults)

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Slide 18

Quantification principles, output distribution factors

- Specific output data better than Toolkit defaults
- Example: Output distribution factors for large coal combustion facilities (here default factors)

Emission reduction device	Distribution factors, share of Hg input *4					
	Air	Water *1	Land *3	Products *3	General waste *5	Sector specific treatment /disposal *5
None	1					
Coal wash *1	0.8 (via combustion)	?	?		0.2	
PM control with general ESP, or PS	0.9		?	?	0.1	
PM control with FF, or other with highly efficient PM retention	0.5		?	?	0.5	
PM control and SDA	0.4		?	?	0.6	
PM control and wet FGD	0.5		?	?	0.5	

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Quantification principles, default factors



- Default input factors and output distribution factors developed for some sources (depend. data/complexity)
- Default factors enable rough estimates, but
 - They are associated with uncertainty;
 - They should be considered preliminary
- Never implement profound changes without verification through source/country specific investigation!

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Data sources: Public statistics, resource centres, literature



- Commodity statistics: Import and export, production (overview level)
- Detailed customs statistics (may be restricted)
- Production statistics (if available)
- Tax/VAT registers (may be restricted)
- Energy statistics, by sector and fuel type (national, or international = IEA)
- Pesticide statistics: Use of mercury-containing pesticides, if any
- Waste statistics:
 - Waste of Hg containing products (batteries, lamps, etc.), amount of total MSW and waste incinerated, obsolete pesticides, etc

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Quantification principles, uncertainties



- All inventory data are associated with uncertainty - always!
 - Also source specific data
- So, whenever feasible: Calculate uncertainty ranges using min. and max. values
- Report uncertainty ranges of input data and calculated results
 - Gives strength to inventory, not weakness

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Data sources: Literature and resource centres



- Toolkit report and other UNEP Chemicals publications
- Dioxins/furans inventories, other POP's inventories
- National literature
- Internationally, much on Internet; many documents and links available at e.g.
 - <http://www.chem.unep.ch/mercury/>
 - <http://europa.eu.int/comm/environment/chemicals/mercury/index.htm>
 - <http://www.epa.gov/mercury/>
- Universities
- Other research and development centres (technical or economical)

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Data sources: The market



- Trade associations
- Industry associations
- Public service providers, or their associations
- Large producers or users
- Suppliers of release reduction equipment
- Retailer chains
- Shop surveys (preferably in large chains)
- Existing trade surveys/registers on Internet and in books, journals

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