UNITED
NATIONS

EP

Distr.
GENERAL

UNEP/POPS/EGB.1/INF/6
30 January 2003

ENGLISH ONLY

United Nations Environment Programme

EXPERT GROUP ON BEST AVAILABLE TECHNIQUES AND BEST ENVIRONMENTAL PRACTICES
First session
Research Triangle Park, 10-14 March 2003
Item 2 (d) of the provisional agenda[1]

REPORT BY THE SECRETARIAT ON PREPARATORY WORK FOR THE MEETING

Proceedings of the regional workshop on BAT and BEP in the context of the Stockholm and Basel Conventions held in Buenos Aires, Argentina, from 21 to 24 October 2002[2]

Subparagraph (a) of Section VI of the terms of reference for the Expert Group on Best Available Techniques and Best Environmental Practices contained in Annex VII of UNEP/POPS/INC.6/22 and also in Appendix 3 of UNEP/POPS/EGB.1/INF/7 lists as possible reference material for the first meeting of the Expert Group the proceedings of the regional workshop for South American Countries on BAT and BEP in the context of the Stockholm and Basel Conventions held in Buenos Aires, Argentina, from 21 to 24 October 2002. The proceedings are attached to the present note. They were prepared by United Nations Environment Programme (Chemicals).

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[1] UNEP/POPS/EGB.1/1.
[2] This document has not been formally edited.

UNITED NATIONS
ENVIRONMENT PROGRAMME

Chemicals

UNEP

PROCEEDINGS

of the UNEP Chemicals / Secretariat of the Basel Convention

Regional Workshop on BAT and BEP in the Context of the Stockholm and Basel Conventions

Buenos Aires, Argentina
21-24 October 2002

DRAFT

UNEP Chemicals
and
Canada POPs Fund

IOMC

INTER-ORGANIZATION PROGRAMME FOR THE SOUND MANAGEMENT OF CHEMICALS
A cooperative agreement among UNEP, ILO, FAO, WHO, UNIDO, UNITAR and OECD

This publication is produced within the framework of the Inter-Organization Programme for the Sound Management of Chemicals (IOMC).

The **Inter-Organization Programme for the Sound Management of Chemicals (IOMC)** was established in 1995 by UNEP, ILO, FAO, WHO, UNIDO and OECD (Participating Organizations), following recommendations made by the 1992 UN Conference on Environment and Development to strengthen cooperation and increase coordination in the field of chemical safety. In January 1998, UNITAR formally joined the IOMC as a Participating Organization. The purpose of the IOMC is to promote coordination of the policies and activities pursued by the Participating Organizations, jointly or separately, to achieve the sound management of chemicals in relation to human health and the environment.

Financial support for the workshop and proceedings was provided from the Canada POPs Fund.

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PROCEEDINGS

of the UNEP Chemicals / Secretariat of the Basel Convention
Regional Workshop on BAT and BEP in the Context of the Stockholm and Basel Conventions
Buenos Aires, Argentina, 21-24 October 2002

Introduction

In supporting countries in the implementation of the provisions under the Stockholm Convention on POPs, UNEP Chemicals has initiated a series of regional workshops addressing Best Available Techniques (BAT) and Best Environmental Practices (BEP). The Workshop in Buenos Aires was jointly organized by UNEP Chemicals / Secretariat of the Basel Convention and the Secretariat of Environment and Sustainable Development under the Ministry of Development as well as the Instituto Nacional de Tecnología Industrial, acting under the name of the Regional Center for the Basel Convention in South America (RCBC/South America). The workshop, which took place in Buenos Aires, Argentina, from 21 to 24 October 2002, was financed through the Canadian POPs Fund and by the Argentinean government.

The objective of the workshop was to bring together the implementation aspects of Article 5 and Annex C of the Stockholm Convention and the needs of environmental sound management of Persistent Organic Pollutants under the Basel Convention.

The workshop was attended by 65 government experts and decision-makers from 9 Spanish-speaking South-American countries and a number of observers.

National experts from the region presented to participants from neighboring countries and the international community their understanding of BAT and BEP in eliminating or preventing formation and release of polychlorinated dibenzo-*p*-dioxins and polychlorinated dibenzofurans. The second part of the workshop was dedicated to discussions and information exchange to assist in reaching a common understanding of these issues and to brief the regional delegates who will attend the 1st session of the Expert Group on BAT and BEP in March 2003. The Expert Group was established by the Stockholm Convention INC-6.

These proceedings contain the conclusions and recommendations from the workshop working groups, the country presentations, and other expert contributions. The proceedings are also available through the Internet at http://www.chem.unep.ch/pops. The conclusions and recommendations from the workshop are an information document for the 1st session of the Expert Group.

Table of Contents

Conclusions

GENERAL PRINCIPLES ON BAT/BEP

(Working Group under the coordination of J.C. Colombo, Argentina)

There was a general discussion on the main environmental problems that cause the generation of PCDD/F in the region. As an outcome, the following common problems – to be solved through BAT and implemented according to each country's priorities – were identified:

1- Untreated wastewater spills to water bodies (sewage, industrial effluents)

2- Solid waste, classification and treatment

3- Waste incineration, when unavoidable. Best (control) techniques (emissions, waste feed, operational conditions).

4- Capacity building to reconvert to cleaner technologies.

5- POPs stockpiles, treatment and destruction (including packaging).

6- Within the topic of POPs stockpiles, there is strong concern about PCB contaminated oils (source of PCDD/F; expensive treatment).

Within this context, due to the differences among the diverse countries that constitute the South-American region, the importance of cooperation in the following topics was recognized:

1- Education, capacity building in general and dissemination of information on POPs, including non intentional releases and their potential sources.

2- Training on monitoring and environmental analytical determinations. Harmonization of analysis protocols (for example, PCBs in oils), inter-laboratory comparative studies. An inventory on the analytical capacities of the region was recommended.

3- Cooperation in the field of polluted materials treatment techniques, especially PCBs in oils. The feasibility of local and regional treatment plants (through the coordination of countries and according to current legislation) was discussed as an alternative to the solution of exporting wastes which was seen as highly expensive.

PRIORITY ACTIONS:

1- PCBs and PCDD/F inventories through the application of UNEP's Toolkit (at the moment in different stages of implementation in the diverse countries of the region).

- There was discussion about the appropriateness of applying OECD countries' emission factors within the region, particularly in the case of vegetal biomass. Some participants suggested that those emission factors might overestimate the contribution from non-contaminated wood. For them, this is consistent with the Canadian experience (x10 times). The importance of acquiring empirical evidence from South-American biomass was stressed.

2- Personnel training.

3- Analytical effort.

4- Promotion of the public dissemination of the existing information on POPs both from the governmental and industrial sectors.

5- Quest for national and regional solutions on PCDD/F priorities as well as on POPs ones.

BAT/BEP WORKING GROUP (under the coordination of F. Morales, Venezuela).

The Working Group decided to base its discussion on BAT/BEP, on an analysis of the principal sources mentioned in the Stockholm Convention. Those sources were discussed beginning with the 4 mandatory ones contained in Annex C, Part II:

- Waste incinerators (including co-incinerators of municipal, hazardous and medical waste or of sewage sludge),
- Cement kilns firing hazardous waste,
- Production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching, and
- Metallurgical industry.

Each participant made a brief statement on the existing plans and facilities for each source in his/her country. It was agreed that after the Workshop the participants would make the necessary consultations in their respective countries to provide information to the regional representatives at the BAT/BEP Expert Group (Argentina, Chile, México, República Dominicana y Venezuela). The application of BAT/BEP will depend on the characteristics and capabilities of each country - taking into account the difficulties that presently affect the region.

1. **Incinerators**: their use for medical waste was recognized as a common problem for the region. The importance of adopting certain techniques in certain waste's management – for example, segregation – according to the existing conditions in each country was also recognized. The unusual practice of incinerating municipal waste was also identified as a regional characteristic in contrast with North America and Europe. The correct segregation of wastes - **minimizing the portion destined to incineration** - was recommended. It was agreed that the approval of new facilities should fulfill the highest standards to be defined by each country.

2. **Cement kilns firing hazardous waste:** the existence of various facilities within the region was mentioned. Everyone was aware of the need to control them under the current legal environmental regulations being enforced in each country, especially taking into account that some countries lack adequate emission control systems. The advantage of controlling the type of waste feeding the system was also recognized, since there is the possibility of generating PCDD/F that could be released and/or be incorporated to a product of ordinary human use.

3. **Production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching:** the existence of various production and recycling plants – under different technologies, from the oldest to the more modern - within the region - with scarce control in some cases, except for conventional parameters - was mentioned. In some countries only the existence of recycling facilities was mentioned.

4. **Metallurgical industry:** this subject was not thoroughly discussed by the participants.

During the second session, that dealt fundamentally with BEP the following issues were set forth:

1- The close link between BAT and BEP was recognized. The need of establishing definite strategies as a fundamental part of BAT was also underlined.

2- Technological solutions were considered as relatively well known, but their implementation according to the reality of each country was acknowledged as the critical phase (feasibility).

3- The importance of designing environmentally sound management plans that especially take into account the reduction of materials with high contents of chlorine in those activities identified as PCDD/F generators was recognized as a relevant issue in the prevention of PCDD/F generation.

4- Education, sensitisation and economical incentives were recognized as important issues for promoting BAT.

5- That was also the case for voluntary agreements and/or the application of environmental management tools and environmental regulations.

6- The strengthening of environmental control authorities was emphasized as a means of achieving an appropriate enforcement of agreements and regulations.

7- The promotion of society's participation in the implementation processes of the integrated plans designed within the objectives of the Stockholm Convention was considered relevant.

8- The establishment of national mechanisms leading to a progressive decrease of the uncontrolled burning of municipal and agricultural waste was considered important, too.

9- There was concern about the fact that BEP could be used as a commercial barrier.

10- The difficulties being faced by medium and small enterprises to adopt BAT was acknowledged.

11- The lack of regulations on non-intentional POPs management in certain countries was recognized.

12- A list of BAT considered at the fifth preparatory session of the Stockholm Convention INC was presented, though it could not be thoroughly discussed. Some points were nevertheless observed by certain countries. It was agreed that further analysis by the participating countries was necessary in order to provide an input to the BAT/BEP Expert Group's first meeting in March 2003.

Further Consideration

The lack of correspondence between the English and Spanish versions of the Stockholm Convention's article 5 (five) and/or Annex C - corresponding to BAT/BEP - was mentioned.

Agenda
UNEP Chemicals / Secretariat of the Basel Convention Regional Workshop on BAT and BEP in the Context of the Stockholm and Basel Conventions

Buenos Aires, 21-24 October 2002

Monday, 21 October 2002

8:00-9:00	Registration	
9:00-10:30	Welcome	
	- General Direction for International Cooperation (Ministry of Foreign Affairs, Economics and Culture)	Carlos Merenson, Secretary
	- UNEP Chemicals	John Whitelaw, Deputy Director
	- Secretariat of the Basel Convention	Nelson Sabogal Deputy Director
	- Secretariat of Environment and Sustainable Development,	Migugel Craviotto, Director
	Objectives of the workshop and expected results	John Whitelaw, Heidelore Fiedler UNEP Chemicals
	Relevant Aspects of the Stockholm Convention	John Whitelaw UNEP Chemicals
	Perspective of the Environmental NGOs	IPEN
10:30-11:00	*Coffee Break*	
11:00-13:00	Interrelationships between relevant Multi-lateral Environmental Agreements	John Whitelaw UNEP Chemicals
	Approach to Chemicals' International Conventions in Argentina	Lorenzo Gonzalez Videla and Victoria Rodriguez, Argentina
	First Steps towards the Development of Guidelines on Best Available Techniques (BAT) and Best Environmental Practices (BEP)	Sergio Vives, co-chair BAT/BEP Expert Group
13:00-14:30	*Lunch*	
14:30-18:00	**Experiences and Case Studies of BAT and BEP by Countries in the Region**	
	Analytical Determination of PCBs	Daniel Lupi and Silvia Oliviero, INTI, Argentina
	Provisional Inventory of Dioxins and Furans in Ecuador	Isabel Guerra, Ecuador
	Instruments to Reduce or Eliminate Undesired Substances – Peruvian Experience	Jorge Fernando Horna Arevalo, Peru
	Implementing Clean Production in Venezuela	Janin Mendoza, Venezuela

	Dioxins and Furans Emission Prevention in Incineration and Co-incineration Facilities	Joost Meijer, Chile
	Dioxin and Furan Analysis of Environmental Samples	Thomas Krauss, Fondacao Oswaldo Cruz
19:00-21:00	Reception hosted by the Secretariat of Environment and Sustainable Development (Dirección Nacional de Gestión Ambiental)	

Tuesday, 22 October 2002

9:00-13:00	**Principles of BAT and BEP**	
	Best Available Techniques and Best Environmental Practices for Eliminating Sources of Dioxins and Other Byproduct POPs	Pat Costner, Greenpeace
	Techniques for the Elimination or Reduction of Releases of Dioxins and Furans	Heidelore Fiedler, UNEP Chemicals
	Working Group on General Principles	
13:00-14:30	*Lunch*	
14:30-17:30	**Instruments for Reduction or Elimination of By-products**	
	<u>Experiences from OECD Countries</u>	
	The European Directive on integrated pollution prevention and control (IPPC): BAT and wider issues	Don Litten, EC-JRC; Spain
	Experiences with BAT in Germany	Wolf Drechsler; Germany
	Reduction of Dioxin and Furan Emissions in the Steel Industry	Dietmar Weis, Germany
	<u>Experiences from Countries in the Region</u>	
	Management of Hospital Wastes	José Luis Izquierdo, Chile
	Analytical Determination of PCBsCleaner Production	Carlos Gómez and Fernanda Lopolito, INA
	PCB Problems and PCB Treatment	Ryuchi Hirai, INA-JICA

Wednesday, 23 October 2002

9:00-13:00	**Working Group on BAT**	
13:00-14:30	*Lunch*	
14:30-17:30	**Working Group on BEP**	

Thursday, 24 October 2002

9:00-13:00	**Inventories and Implementation of BAT/BEP and Economic Aspects**	
	Inventory for Uruguay	Jacqueline Alvarez, Uruguay
	Experiences with the Implementation of Measures to Reduce Dioxins and Furans in the United States	Peter Lallas and Robert Kellam, USA
	Implementation of the Canada-Wide Standard for Dioxins	Ken Smith, Canada
	Handbook on Destruction, Decontamination, and Technologies for PCBs and Other POPs Wastes	Nelson Sabogal, SBC
13:00-14:30	*Lunch*	
14:30-17:30	Pan-American Network for the Environmental Management of Waste	Ana Lamas, AIDIS
	National Program to Promote Sustainable Production	Ariel Carbajal, SEySD
	Working Group on Implementation	
	Presentation of Reports from Working Groups	
	Final Discussion, Approval of Reports and Closure of the Workshop	

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Opening Remarks
by Ing. Carlos Merenson,
Secretary of Environment and Sustainable Development

The 1992 Summit on Environment and Development was, without any doubt, a fundamental landmark in Human History, since it constituted the starting point for a new, innovative, conception of the relationship between Mankind and its environment, whose outcome was ratified by the fact that economical growth should be directly related to social justice, mitigation of poverty, natural resources conservation and environmental protection.

Río de Janeiro Summit's outcome signified fundamental advances for Argentina's - as well as for any other country's - environmental history since from then on there have been relevant changes in the political, institutional, juridical and technological fields.

That is how the reform of our National Constitution performed in 1994 introduced the environmental issue within Argentina's juridical order establishing specific dispositions as regards the Nation's and the Provinces' regulating faculties on the subject.

Within that scheme, our National Parliament approved all the Earth Summit derived International Conventions, including their implementation Protocols.

On the other hand, Johanesburg's Summit took place in a globalized world where recent efforts of the international community to globalize social and development agenda through, for example, the Milennium Declaration and the Monterrey commitments, present a neat contrast.

One of the positive points of this latter Summit was that, through the increase of social and entrepreneurial support to sustainable development, it extended the concept on multilateralism impulsing it beyond a purely State-centered perspective.

Another important fact that must be emphasized is that at Johanesburg's Summit it was perceived that "sustainable development" is much more than a theoretical concept and that it is being diferentiated as an alternative model.

As also was the case with Stockholm's 1972 Conference and Rio's 1992 Summit, Johanesburg Summit's effects cannot be completely measured in immediate consequences. Its impact on the international process, as well as at the national, local and individual levels will only be visible along the passing of time.

However, we are convinced that the concept of Sustainable Development is not the same for everybody. For some highly industrialized countries of our planet, it means an improvement of its quality of life. For others, that quality of life does not consist yet in a priority.

Globalization is a reality we cannot deny. But we understand globalization not only as a generalization of commercial and financial ordinary rules, but as the standardization of the benefits emerging from civilization and democracy, richness and scientific advance that characterize our age as well.

We cannot conceive a globalization process that does not comprise equity and social justice.

At present, Argentina is going through one of the most serious economical and social crisis in its history, which causes originate both in external and internal factors.

We are embarked in a process that is characterized by an assymetrical world economical system that is becoming increasingly worse due to protectionist practices and distortions in the international trade, especially harmful for countries with a productive and exporting profile as that of Argentina.

National governments are actually facing a reality that obliges them to establish priorities, being the satisfaction of the population's basic needs, food, employment, appropriate housing, education and health the most relevant among all the issues involved.

In that sense, we are aware that one of the main factors that will contribute to Sustainable Development – fundamental to improve the Quality of Life of the Earth's population – is the one derived from the Modification of Production and Consumption Unsustainable Modalities.

We are also aware that the Best Available Techniques and the Best Environmental Practices in the management of chemicals subject to the Basel and Stockholm Conventions – to be discussed at the Workshop we are opening today – constitute aspects of the utmost importance to achieve the aforementioned modification of production and consumption unsustainable modalities.

All the countries in the region are already involved to achieve this kind of goal that not only affects the public sector but the private one as well.

That is why I invite you to invest all your possible efforts, through the activities to be developed at the Workshop opening today, to contribute to make real that Sustainable Development the World deserves and of which we are jointly liable for.

Opening Remarks
by John Whitelaw, UNEP Chemicals

Mr. Whitelaw thanked Mr. Carlos Merenson, Secretary of Environment and Sustainable Development for his welcoming remarks, and welcomed participants' on behalf of UNEP Chemicals. He expressed his appreciation to the Argentinean Government for its support in preparing this workshop. He referred also to the Canada POPs Fund that provided the funding. Mr. Whitelaw reminded participants that the workshop focused on the issue of BAT and BEP. He suggested that although this was an important concept in pollution prevention, waste management and general environmental management, it was often an elusive concept to translate to action. He explained that the Buenos Aires workshop was to deal with issue within the context of the Stockholm Convention. In doing so, UNEP Chemicals involved the Secretariat of the Basel Convention because that convention deals with hazardous wastes, and POPs when withdrawn are indeed hazardous wastes: a further reason was because in managing chemicals through their life cycle, it is important to address prevention, releases, and the wastes.

Mr. Whitelaw welcomed the presence of the Co-Chairs of the BAT/BEP Expert Group that had been established by the INC6 of the Stockholm Convention. He mentioned that the expert group would meet in March 2003 to work on guidelines.

In addressing the question of timing, Mr. Whitelaw suggested that the workshop was not premature, because there are principles and concepts relating to BAT and BEP that are universal, there is experience that can be shared, and it provides an opportunity for this region to develop its input and participation in the Expert Group. A further advantage was that many countries have started or will shortly start their National Implementation Plans (NIPs), and the NIPs need to reflect what governments are going to do about their POPs, and how they are going to do it.

In closing, Mr Whitelaw wished the participants a successful workshop.

Opening Remarks
by Mr. Nelson Sabogal, Secretariat of the Basel Convention

Dear Director of the National Direction of Environmental Management, Environment Secretariat and Sustainable Development, Mr. Miguel Angel Craviotto

dear Director of the International Cooperation of the Ministry for Foreign Affairs, Commerce, and Culture, Mr. Juan Garaguso,

dear Deputy of UNEP Chemicals, Mr. John Whitelaw,

dear Vice-President of the National Institute of Industrial Technology, Ing. Daniel Lupi,

dear Director of the Regional Centre in Argentina for South America for Capacity Building and Transfer of Technology under the Basel Convention, Mrs. Leila Devia

ladies and gentlemen,

This year many events by the United Nations, other international organizations, non-governmental organizations and the private sector related to environmental issues have taken place. These have called for attention, compromise, devotion and negotiation of governments like the Summit in Johannesburg and the Assembly of the GEF; these are only two examples which show that sustainable development can only take place through joint efforts and work by all sectors of the society.

This joint workshop about best available techniques and best environmental practices in the management of Persistent Organic Pollutants (POPs) organized by UNEP Chemicals, the Secretariat of the Basel Convention and the la Secretaría de Ambiente y Desarrollo Sustentable, followed by the regional consultation about the functioning on programme activities of the Regional Centre of South America for capacity building and technology transfer of the Basel Centre, jointly with the mentioned organizations is a step on the way of cooperation and joint work in the region represented by the countries present: Argentina, Brazil, Chile, Columbia, Ecuador, Paraguay, Peru, Uruguay, and Venezuela.

This process is also joined by Greenpeace, la Asociación de Conciencia de Prevención Ocupacional, the Copper Commission of Chile, the Environment Agencies of Germany, Canada, the United States of America, academia, and the private sector as well as Agencies for Environmental Cooperation like JICA

It is our wish that this way, which we initiate here today will result in actions at all countries of the region.

I would like to take that opportunity to invite all countries of the region to the sixth session of the Conference of the Parties of the Basel Convention, which will take place in Geneva from 9 to 13 December 2002.

Thank you very much.

Opening Remarks
by Miguel A. Craviotto,
National Director of Environmental Management

The Secretariat of Environment and Sustainable Development (SAyDS), through the National Direction of Environmental Management (DNGA), constitutes the competent authority of the Basel Convention on the Transboundary Movements of Hazardous Wastes and Their Disposal; acts as the Interim National Designated Authority of the Rotterdam Convention On The Prior Informed Consent Procedure For Certain Hazardous Chemicals and Pesticides In International Trade; and is the main office in charge of the environmental management of chemicals in general and, particularly, of POPs, acting as technical focal point of the Stockholm Convention on Persistent Organic Pollutants.

The DNGA, as competent authority of the Basel Convention, has implemented control and management actions, mechanisms and standards that are permanentely updated and has created a Transboudary Movements Unit that, together with the Hazardous Wastes Unit pre-existent in its organizational chart, aims at fulfilling the commitments emerging from the above mentioned Convention.

On the other hand, within the framework of a pre - existent Agreement between the Secretary of Environment and Sustainable Development and the National Institute for Industrial Technology (INTI), the Basel Convention Subregional Center for Training and Technology Transfer was created in Argentina. DNGA’s role as competent authority regarding this Center is to survey that training and technolgy transfer activities are adequately performed.

To keep pace with the increasing obligations derived from the three Chemicals’ aforementioned Conventions as well as to achieve a harmonized and synergic appliance of all of them, a Chemicals Unit was created within the DNGA.

It is expected that this Unit’s activities will not only achieve a “synergic performance” but an adequate interinstitutional integration with the national stakeholders at the Intergovermental Forum on Chemical Safety (IFCS) and the coordinated internalization of its recommendations as well.

Among Argentina’s commitments regarding the Stockholm Convention, SAyDS has planned to develop through DNGA’s Chemicals Unit a series of POPs enabling activities whose final objective is to elaborate a National Implementation Plan (NIP), as required under Article 7 of the Convention, including the strategies required under articles 5 and 6, identifying efficient national response mechanisms, processes and measures aiming at the release reduction of POPs.
That is how last July a proposal on “Enabling activities for the Stockholm Convention on Persistent Organic Pollutants (POPs): National Implementation Plan for Argentina” was submitted to UNEP Chemicals, who later on submitted it to GEF’s Secretariat, interim financial institution of the Stockholm Convention until the first meeting of the Conference of the Parties takes place.

Among the planified activities to achieve the above mentioned National Implementation Plan, the following may be quoted: updating of the Chemicals National Profile emphasized on POPs; inventories of production, distribution, use, import and export of intentionally produced POPs (pesticides, HCB and PCB); inventories of POPs obsolete sites and stockpiles; POPs containing articles in use and contaminated sites; evaluation of the possibility of eliminating obsolete stockpiles; preliminary inventory of unintentional production of PCBs and HCB; preliminary inventory of POPs releases to the environment and estimate of future releases; etc..

Within this enabling activities to support the Stockholm Convention planned by DNGA, the dioxins and furans (PCDD/PCDF) release inventory – that will be finished within the framework of a special activity, with technical assistance from UNEP, starting in the next few days – acquires particular relevance since it will be the first time that such an inventory will be performed at the national level.

Now, as it has already been said, Argentina is at present facing one of the worst social and economical crisis in its history, a crisis where poverty has reached unsuspected levels.

That is why one of the government's priorities is to achieve equity and social justice throughout all its range of activities aiming at fulfilling the population's basic needs.

On the other hand, taking into account that Sustainable Development is the main objective that has been priorized, all those activities leading to the modification of production and consumption unsustainable modalities must be faced without any delay.

And it is within these latter that we undoubtedly find the Best Available Techniques and the Best Environmental Practices that today you start discussing within the frame of the present Workshop, the determination and definition of which will contribute - to a great extent - to the achievement of the aforementioned goals.

The Basel, Rotterdam and Stockholm Conventions

John Whitelaw, UNEP Chemicals

The Basel, Rotterdam and Stockholm Conventions

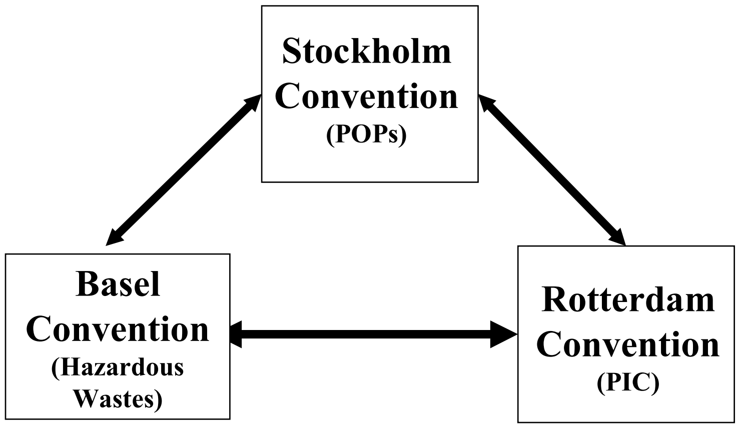
Overview (1)

- A framework for Life Cycle Management
  - The 3 treaties together cover elements of "cradle-to-grave" management
  - Common thread = POPs
- Interlocking scope and coverage
- Technical assistance
- "Clustering" and governance issues
- Related regional agreements

Santiago, Chile 8-11 October 2002

2

Overview (2)



Basel

- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal
- Adopted 1989 in response to concerns about developed country companies dumping hazardous wastes in developing countries.
- Entered into force in 1992
- Now has 150 Parties.
- Bamako Convention: a closely related regional agreement for Africa.

Rotterdam

- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade
- Adopted in 1998 in response to dramatic growth in chemicals trade, and vulnerability of developing countries to uncontrolled imports.
- Will enter into force after 50 ratifications. There have been 33 so far.

Santiago, Chile 8-11 October 2002 5

Stockholm

- Stockholm Convention on Persistent Organic Pollutants
- Adopted in 2001 in response to an urgent need for global action on "POPs" (chemicals that are "persistent, bioaccumulate in fatty tissues and biomagnify through the food chain").
- Will enter into force after 50 ratifications. There have been 21 so far.

Santiago, Chile 8-11 October 2002 6

Scope and coverage (1)

- Basel covers hazardous wastes that are explosive, flammable, poisonous, infectious, corrosive, toxic or ecotoxic.
- Rotterdam covers 22 pesticides and certain formulations of others, plus 5 industrial chemicals.
- Stockholm covers 9 pesticides, and 3 industrial chemicals and by-products.
- Most POPs are covered by all three Conventions.
- Many pesticides are subject to the three conventions.

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7

Scope and coverage (2)

- Evaluating/regulating new and existing chemicals (RC & SC)
- Import/export controls (BC, RC, SC)
- Waste management (BC & SC)
- Hazard communication (BC, RC, SC)
- Replacement (SC)
- Environmental releases (SC)

Santiago, Chile 8-11 October 2002

8

New and existing chemicals

- New Chemicals
  - Stockholm requires Parties with regulatory and assessment schemes to prevent production and use of new pesticides or new industrial chemicals that exhibit POPs characteristics
- Existing Chemicals
  - Rotterdam obliges Parties to notify final regulatory actions for banned or severely restricted chemicals.
  - Stockholm Parties must eliminate certain chemicals from production and use. The Convention lays down POPs screening criteria for assessing other chemicals.

Import/export (Basel)

- Basel originally drafted with a prior informed consent procedure.
- Strengthened by later Decisions to ban export of hazardous wastes from developed to developing countries.
- Decision III/1 of 1995 will have full legal force upon entry into force of "Ban Amendment" which it adopted
- Strict requirements for transboundary movements.
- Trade with non-Parties , including transit, generally not permitted (exception: Article 11 agreements).

Import/export (Rotterdam)

- Rotterdam will establish a compulsory Prior Informed Consent procedure
- Based on earlier voluntary guidelines
- Countries assisted by Decision Guidance Documents
- Will improve capacity to prevent unwanted imports and avoid future stockpiles of obsolete pesticides

Import/export (Stockholm)

- Stockholm restricts import/export of POPs
- Okay if for environmentally sound disposal or for an exempted use that is permitted for the importing Party

Waste management (Basel 1)

- Basel requires each Party:
  - to minimize waste generation and
  - to ensure, if possible, availability of disposal facilities within its own territory
- Environmentally sound management ("esm") of hazardous wastes the underlying objective
- Technical Working Group develops guidelines
  - now preparing guidelines on esm of POPs as wastes, as part of work programme and at request of Stockholm

Santiago, Chile 8-11 October 2002

13

Waste management (Basel 2)

Environmentally sound management: "taking all practical steps to minimize the generation of hazardous wastes and strictly controlling its storage, transport, treatment, reuse, recycling, recovery and final disposal, the purpose of which is to protect human health and the environment."

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14

Waste management (Stockholm)

- Parties must develop strategies to identify POPs wastes and manage them in an environmentally sound manner.
  - POPs content of wastes generally to be destroyed or irreversibly transformed
- Prevent the creation of POPs in waste management practices
  - Concepts of Best Available Techniques (BAT) and Best Environmental Practices (BEP)

Hazard communication and Replacement

- Hazard communication
  - All three Conventions require Parties to communicate hazard information to the secretariat, other Parties and/or the public
- Replacement
  - Stockholm requires information exchange and research on POPs alternatives. It obliges each Party using DDT to develop an action plan, including for implementation of alternative products.

Environmental releases

- Stockholm's principal articles aim to reduce or eliminate releases of POPs from
  - intentional production and use
  - unintentional production
  - stockpiles and wastes

Santiago, Chile 8-11 October 2002 17

Technical assistance (1)

- Basel Technical Cooperation Trust Fund
- Rotterdam acknowledges need for technical assistance
- Stockholm "financial mechanism"
  - principally GEF on interim basis
  - GEF-funded "enabling activities" focused on National Implementation Plans for those who have signed the Convention by 22 May 2002

Santiago, Chile 8-11 October 2002 18

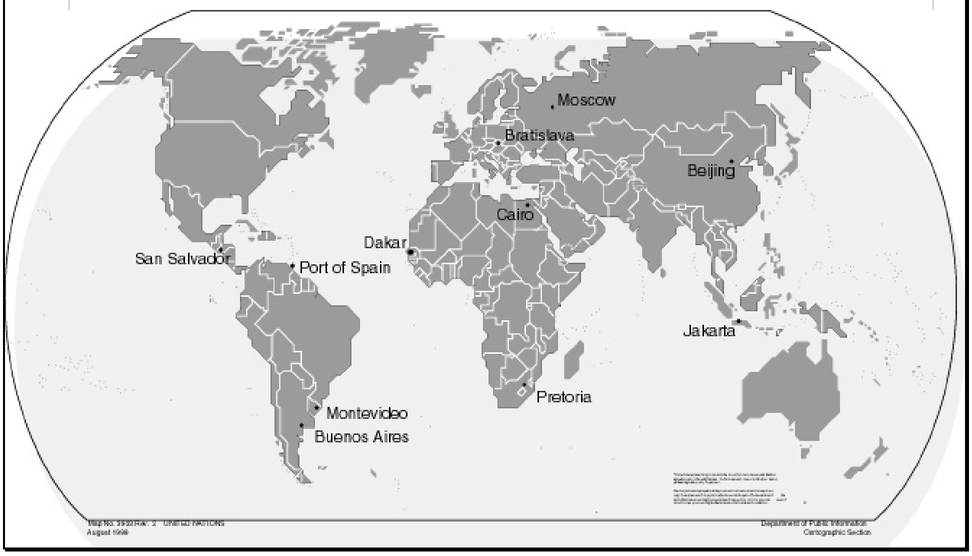
Technical assistance (2)

- Basel and Stockholm provide for regional centres for training and technology transfer
  - Basel Centres exist
  - Stockholm Centres a matter for decision by future Conference of the Parties
  - Potential for Stockholm to utilize Basel Centres in interim

Santiago, Chile 8-11 October 2002

19

Basel Regional Centres



Clustering

- UNEP International Environmental Governance process during 2001
- UNEP Governing Council adopted governance report recommending more consideration of clustering measures amongst chemicals and wastes Conventions
- Some measures will need approval by governing body of each Convention
- Joint utilization of Basel regional centres one possibility to explore

Related Regional Agreements

- LRTAP/Aarhus (Europe & North America)
- Barcelona/Izmir (Mediterranean)
- Waigani (South Pacific)
- Bamako (Africa)
- Cartagena (Caribbean)
- Central American Regional Agreement

Concluding thoughts

- A group of Conventions that complement and reinforce each other
- Together an internationally agreed framework for life cycle management of hazardous chemicals and wastes
- Potential for collaborative implementation
  - coordinated policy development (global, regional & national)
  - capacity-building
  - compliance & enforcement
- Building sustainable development in which environment and human health are protected

Santiago, Chile 8-11 October 2002

23

Stockholm Convention on Persistent Organic Pollutants (POPs)
John Whitelaw, UNEP Chemicals

Stockholm Convention on Persistent Organic Pollutants (POPs)

John Whitelaw
Deputy
UNEP Chemicals

Buenos Aires, Argentina 21-24 October 2002 1

Stockholm Convention-what is it?

- A legally binding treaty to protect human health and the environment from POPs

Buenos Aires, Argentina 21-24 October 2002 2

Background: What are POPs?

- organic (carbon-based) compounds
- natural or anthropogenic origin
- resist degradation in environment
- low water + high fat solubility
  - bioaccumulate in fatty tissues
- semi-volatile + occur in air, water & soil
  - regional and global distribution
- toxic to humans and wildlife
- continued release

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3

The Initial 12 POPs

Chemical	Pesticide	Industrial Chemical	By-Product
Aldrin	+		
Chlordane	+		
DDT	+		
Dieldrin	+		
Endrin	+		
Heptachlor	+		
Mirex	+		
Toxaphene	+		
Hexachlorobenzene	+	+	+
PCBs		+	+
Dioxins			+
Furans			+

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4

Convention Provisions

Four 4 main areas of Convention:

- General obligations
- Control provisions:
  - Intentionally Produced POPs
  - Unintentionally Produced POPs
  - Stockpiles and Wastes
- Procedure for adding new POPs
- Financial and technical assistance

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5

Intentionally Produced POPs

- **Goal** is the elimination of production and use of all intentionally produced POPs (industrial chemicals and pesticides)
- production and use eliminated or restricted and, in each case, trade will be restricted
- elimination (Annex A) - 9 chemicals listed :
  - aldrin, chlordane, dieldrin, endrin, heptachlor
  - hexachlorobenzene (HCB), mirex
  - polychlorinated biphenyls (PCBs), toxaphene
- restriction (Annex B)- DDT ("acceptable purpose" in disease vector control)

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6

Intentionally Produced POPs: PCBs

All Parties must:

- cease production of new PCBs *immediately* (entry into force)
- eliminate use of in-place PCB equipment *by 2025*
- achieve the ESM of PCB wastes ASAP and *by 2028*
- report to the COP every 5 years on their progress

The COP:

- will review progress on 2025 & 2028 targets every 5 years

Buenos Aires, Argentina 21-24 October 2002 7

Intentionally Produced POPs: DDT

All Parties shall:

- eliminate production and use *except* for disease vector control programs:
  - special public DDT register
  - reporting and other obligations
- promote research and development for DDT alternatives

The COP will:

- review at its first meeting, and every 3 years thereafter, the ongoing need for DDT for disease vector control (*i.e.,* are technically and economically feasible alternative products, practices or processes available?)

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Intentionally Produced POPs: Other Provisions

- trade will be restricted for all POPs in Annexes A and B
- early identification of possible POPs in assessment programs
- exemptions available for acceptable purposes identified in Annex A and B
  - 5 year period – renewable, subject to review by COP
  - Exemptions for small scale uses not time-limited (eg, laboratory-scale research, reference standards, unintentional trace contaminants

Unintentionally Produced POPs

Goal is continuing minimization and, where feasible, ultimate elimination of total releases of chemicals in Annex C derived from anthropogenic sources (dioxins, furans, HCB, PCBs)

Parties must:

- develop action plans within 2 years of entry into force, and implement their plans
- promote application of available, feasible and practical measures to achieve realistic and meaningful levels of release reduction or source elimination
- promote development and, where appropriate, require use of substitute or modified materials, products and processes to prevent formation and release of POPs

Unintentionally Produced POPs

For sources with the potential for comparatively high formation & release of POPs to the environment (including but not limited to the industrial source categories listed in Annex C Part II), Parties must:

- for new sources:
  - promote and, as provided for in an action plan, require use of best available techniques (BAT), and
  - phase in any BAT requirements as soon as practicable but no later than 4 years after Convention enters into force
  - promote use of best environmental practices (BEP)
- for existing sources, promote use of BAT & BEP

Unintentionally Produced POPs

For other industrial source categories listed in Annex C, Part III, Parties must promote use of BAT & BEP for new and existing sources:

- variety of combustion sources
- chemical production processes releasing unintentionally produced POPs
- waste recovery and disposal practices

High Priority Sectors of PCDD/PCDF Release (4 categories)

- Waste incinerators, including co-incineration of municipal, hazardous or medical waste or sewage sludge
- Cement kilns firing hazardous waste
- Production of pulp using elemental chlorine or chemicals generating elemental chlorine for bleaching
- The following thermal processes in the metallurgical industry
  (I) Secondary copper production;
  (ii) Sinter plants in the iron and steel industry;
  (iii) Secondary aluminum production;
  (iv) Secondary zinc production.

Buenos Aires, Argentina 21-24 October 2002 13

2nd Priority Sectors of PCDD/PCDF Release (13 categories)

- open burning of wastes (including landfill sites)
- thermal processes in metallurgical industry not specified in Part II
- residential combustion sources
- fossil-fuel fired utility and industrial boilers
- firing installations for wood and other biomass fuels
- chemical production processes releasing unintentionally produced POPs *(e.g.,* production of chlorophenols and chloranil)
- motor vehicles, especially those burning leaded gasoline

Buenos Aires, Argentina 21-24 October 2002 14

2^{nd} Priority Sectors (cont.)

- textile and leather dying and finishing
- shredder plants for the treatment of end-of life vehicles
- destruction of animal carcasses
- crematoria
- smouldering of copper cables
- waste oil refineries

BAT and BEP

"**Best available techniques**" means the most effective and advanced stage in the development of activities and their methods of operation which indicate the practical suitability of particular techniques for providing in principle the basis for release limitations designed to prevent and, where that is not practicable, generally to reduce releases of chemicals listed in Part I of Annex C and their impact on the environment as a whole

"**Best environmental practices**" means the application of the most appropriate combination of environmental control measures and strategies

Definition of Goals and BAT

- the Convention does not set any numeric emission limits nor reduction requirements (in percent)
- release limit values or performance standards may be used by a Party to fulfill its commitments for best available techniques

BAT: Prevention Methods

- use of low-waste technology;
- use of less hazardous substances;
- promotion of recovery/recycling of waste and of substances;
- replacement of POPs feed materials or where there is a direct link between the materials and releases of POPs from the source;
- good housekeeping and preventive maintenance programmes;
- improvements in waste management with the aim of cessation of open and other uncontrolled burning of wastes, landfill sites.;
- minimization of these chemicals as contaminants in products;
- avoiding elemental chlorine or chemicals generating elemental chlorine for bleaching.

BAT and BEP

When applying best available techniques and best environmental practices, Parties should take into consideration the general guidance on prevention and release reduction measures in that Annex and guidelines on best available techniques and best environmental practices to be adopted by decision of the Conference of the Parties (Art 5 (d))

POPs in Stockpiles & Wastes

Goal is environmentally sound management (ESM) of stockpiles, wastes, and products and articles upon becoming wastes that consist of, contain or are contaminated by POPs

Parties must:

- develop and implement strategies to identify stockpiles, products and articles in use, and wastes containing POPs
- manage stockpiles in a safe, efficient and ESM until they are deemed to be wastes
- take measures to handle, collect, transport and store wastes in ESM and dispose of wastes in a way that destroys POP content, or otherwise in ESM taking into account international rules, standards and guidelines

POPS in Stockpiles & Wastes

Parties must:

- *not* allow recovery, recycle, reclamation, direct reuse or alternative uses of POPs
- *not* transport these materials across international boundaries without taking into account international rules (e.g., Basel Convention)
- develop strategies for identifying contaminated sites and, if remediation is attempted, do it in an environmentally sound manner

Adding New POPs

Agreed process will be used to evaluate candidates nominated by Parties

- application of scientific criteria
- "precaution" is incorporated
- all Parties have the opportunity for full hearing on any nominated candidate
- Transparent process.

General Obligations

- Develop, implement and update an implementation plan
- Designate a National Focal Point
- Promote and facilitate a wide range of public information, awareness and education measures
- Encourage/undertake research, development, monitoring and cooperation on all aspects of POPs and their alternatives
- Report to the COP on:
  - measures taken by Party and their effectiveness
  - data/estimates for total quantities of POPs in Annex A and B that are traded, and list of States involved

Buenos Aires, Argentina 21-24 October 2002 23

Article 7: Implementation Plans

Parties shall:

- develop & endeavour to implement an implementation plan
- submit plan to COP within 2 years of entry into force of Convention for the Party
- review and update plan on a periodic basis, in a manner to be specified by COP
- cooperate with other Parties directly, or through intergovernmental organizations, and consult stakeholders in all these actions
- endeavour to utilize and integrate these plans in national sustainable development strategies

Buenos Aires, Argentina 21-24 October 2002 24

Article 7: Implementation Plans

As part of its implementation plan under Article 7:

- Party in the DDT Register shall develop national DDT action plan to: [Annex B Part II]
    - confine use of DDT to disease vector control
    - explore alternatives to DDT, and
    - take measures to strengthen health care and reduce incidence of disease
- Party shall develop an action plan within 2 years of entry into force to identify, characterize and address releases of unintentionally produced POPs in Annex C and facilitate implementation of the requirements of Article 5

Buenos Aires, Argentina 21-24 October 2002 25

Financial & Technical Assistance

Developing countries and countries with economies in transition will need technical and financial assistance

- Regional and subregional centres will be established for capacity building and transfer of technology to assist countries in need
- Developed countries have undertaken to provide technical assistance and new and additional financial resources to meet agreed full incremental implementation costs
- Global Environment Facility (GEF) has been named as the principal entity of the interim financial mechanism to fund capacity building and other related activities

Buenos Aires, Argentina 21-24 October 2002 26

Other Provisions

- Enters into force 90 days after 50th ratification
- COP must review effectiveness 4 years after entry into force
- UNEP to provide Secretariat

Convention Provisions

Life Cycle of a POP

• Production (by-products & intentional)	Art 3(1)+5
• Storage (stockpiles)	Art 6
• Transport (Import/Export)	Art 3(2)+6
• Processing (Unintentional)	Art 3(1)+5
• Final use	Art 3(1)+5
• Recycling	Art 3(1)+5
• Waste	Art 6

Related MEAs

Basel covers hazardous wastes that are explosive, flammable, poisonous, infectious, corrosive, toxic or ecotoxic

- listed in annexes that can be amended by Decision
- role of Technical Working Group

Rotterdam covers 22 pesticides and certain formulations of others, plus 5 industrial chemicals

- Chemical Review Committee will advise on additions

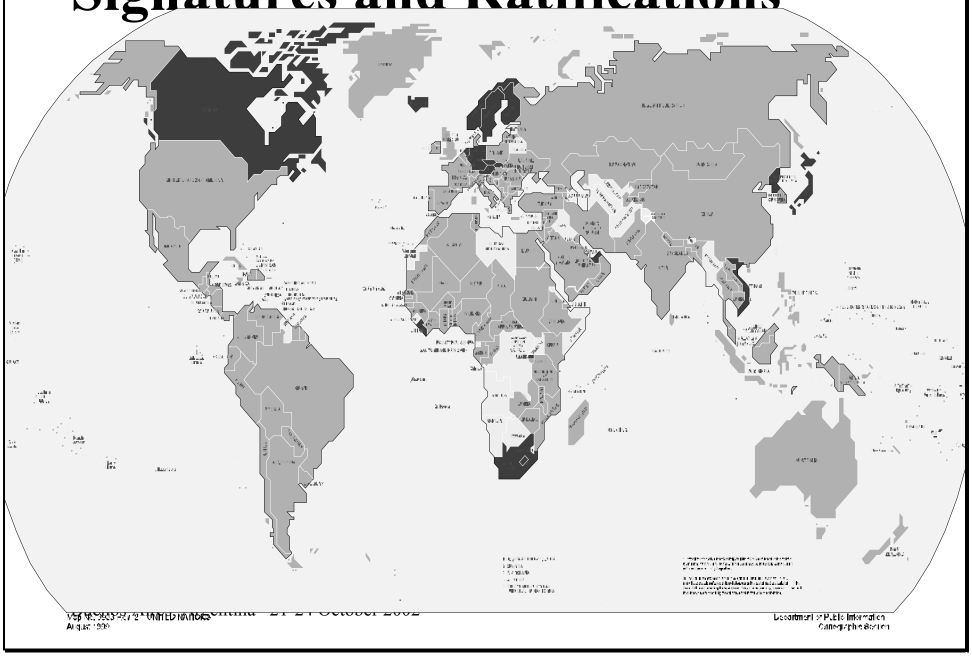
Stockholm covers 9 pesticides, and 3 industrial chemicals and by-products

- POPs Review Committee will advise on additions

Stockholm Convention

- Adopted in Stockholm on 22 May 2001
- As of 30 September 2002,
    - 151 signatories
    - 21 Parties

Signatures and Ratifications



Implementation Action

Resolutions of the DipCon include:

- Preparation for "fast start"
- Development of guidance (including for by-products)
- Work with Basel re wastes

Buenos Aires, Argentina 21-24 October 2002

32

Implementation Action

Decisions and outcomes of INC.6 include:

- Updating toolkit for D/F source inventory
- Establish an expert group to develop guidance on BAT & BEP for by-products
- Developing guidelines re stockpiles and waste management (with Basel)
- Interim guidance for development of NIPs
- Feasibility study on regional and sub-regional centres
- Case studies of technology transfer and capacity building through regional & sub-regional centres

Buenos Aires, Argentina 21-24 October 2002

33

Available Funds

- GEF will provide funds to cover the agreed full cost, for enabling activities
- Expedited procedure up to US$500,000 per country .
- Requests for more than US$500,000 will be considered on a case-by-case basis

Buenos Aires, Argentina 21-24 October 2002

34

Financial & Technical Assistance

Period prior to ratification:

- Projects to enable developing countries to prepare to meet their future convention requirements
- UNEP-World Bank MOU
- Canada Fund and other sources

Stockholm Convention

Further information:

www.chem.unep.ch
www.pops.int

chemicals@unep.ch
ssc@chemicals.unep.ch

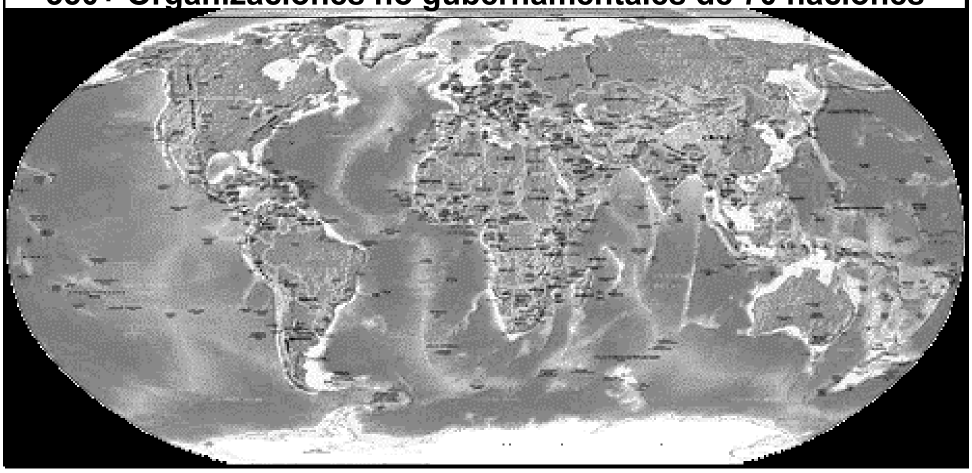
The International POPs Elimination Network (IPEN)

Verónica Odriozola, IPEN

IPEN The International POPs Elimination Network

RIEC La Red Internacional de Eliminación de los COPs

350+ Organizaciones no gubernamentales de 70 naciones



IPEN International POPs Elimination Network

IPEN PLATFORM FOR THE ELIMINATION OF POPs, Article 17(c)

Once a substance is listed as a POP, it is inappropriate to accept its continued generation and release into the environment.

We reject the claim that emissions and releases of POPs can be effectively managed and controlled.

When a substance is listed as a POP, the plan of action set out by the agreement should set out a timetable to stop all its uses and all its releases.

The elimination of a POP should not be gauged by its measured presence in the environment.

A POP has

- no acceptable emission limit,
- no acceptable daily intake, and
- no acceptable level in the environment.

IPEN La Red Internacional de Eliminación de los COPS

IPEN PLATFORM FOR THE ELIMINATION OF POPs, Article 17(d)

For POPs identified as UNEP action targets -- the twelve already identified as well as others that may be added at a later date -- the legally binding instrument should mandate a rapid, but orderly and responsible global Programme of Action that will:

ii) **for those POPs that are generated as unwanted contaminants, by-products and combustion products, identify and phase-out significant anthropogenic sources. In identifying sources, consideration should be given to industrial processes, waste disposal technologies, and anthropogenic products and materials routinely associated with the generation of POPs during their ordinary life-cycle;**

IPEN La Red Internacional de Eliminación de los COPS

IPEN Stockholm Declaration, 22 May 2001

To accomplish our shared vision, IPEN's Participating Organizations affirm our intention to work to:

- **Phase-out materials, products, and processes that generate and release dioxins and other unwanted byproduct POPs, and promote cleaner products, materials, processes and activities that avoid generation and release of toxic byproducts;**

- **Halt combustion and other environmentally inappropriate methods of treating wastes and contaminated soils and sediments;**

- **Reduce and aim to eliminate the generation of wastes, including municipal solid waste, medical waste, and hazardous waste; and encourage waste prevention, resource recovery, re-use and recycling;**

IPEN **La Red Internacional de Eliminación de los COPS**

IPEN Recommendations on POPs Byproducts

•Total releases must include all sources of dioxins, furans, PCBs, and HCB derived from human activity, whether introduced to air, water or land;

•Continuing minimization of total releases requires ongoing, long-term commitments by authorities and polluting sources;

•Substitution of alternative processes, techniques, or practices that are not likely to generate dioxins and other POPs should receive priority consideration over end-of-pipe, release-reduction measures;

• The ease of calculating incremental costs associated with end-of-pipe measures should not favor their adoption compared to preventive measures;

• Best available techniques should include activities to prevent the creation of dioxins and other POPs, not only capital-intensive pollution control and complex regulatory approaches.

IPEN **La Red Internacional de Eliminación de los COPS**

For more information …

http://www.ipen.org

Approach to Chemicals' International Conventions in Argentina

Lorenzo Gonzalez Videla,
Dirección Nacional de Gestión Ambiental

Secretaria de Ambiente y Desarrollo Sustentable

Dirección Nacional de Gestión Ambiental

"Approach to Chemicals' International Conventions in Argentina"

Ing. Lorenzo J. Gonzalez Videla
Coordinator Chemicals Unit

Chemicals' International Conventions in Argentina

BASEL:	**Approved through National Law Nº 23.922 - published in the Official Bulletin (B.O.) dated April 24, 1991 - and ratified before the United Nations a few months later.**
ROTTERDAM:	**Approved through National Law Nº 25.278, published in B.O. dated August 3, 2000. It has not yet been ratified before United Nations.**
STOCKHOLM:	**Signed by Argentina on May 23, 2001. It has been approved by all sectors of the Executive branch of the National Government and is actually under the approval process at the National Congress.**

The Secretariat of Environment and Sustainable Development, through the National Direction of Environmental Management (DNGA):

- **Constitutes the competent authority of the Basel Convention on the Transboundary Movements of Hazardous Wastes and Their Disposal;**
- **Acts as the Interim National Designated Authority of the Rotterdam Convention On The Prior Informed Consent Procedure For Certain Hazardous Chemicals And Pesticides In International Trade; and**
- **Constitutes the main office in charge of the environmental management of chemicals in general and, particularly, of POPs, acting as technical focal point of the Stockholm Convention on Persistent Organic Pollutants.**

To facilitate the ***Basel Convention's compliance***, the DNGA:

- **Has implemented control and management actions, mechanisms and standards, that are permanentely updated through the Transboudary Movements Unit. This Unit has authorized up to now:**
  - **A total *IMPORT* of 424.400 tons of *non hazardous wastes* during the period 1995 - 2002 (of those, 60% corresponds to paper trimmings and the rest to steel, aluminium, glass and plastic scraps).**
  - **A total *EXPORT* of 2.759 tons of *hazardous wastes* during the period 1996 – 2002 (of those, 90% corresponds to PCBs and the rest to pesticides and Ni - Cd batteries).**
- **Has signed a Complementary Agreement – within a pre - existent Framework Agreement - with the National Institute for Industrial Technology (INTI) to create the Subregional Center for Training and Technology Transfer in Argentina.**
- **DNGA's rol as regards this Center is that of surveying that training and technolgy transfer activities are adequately performed, as well as collaborating with it.**

DNGA has aimed at keeping pace with the increasing obligations derived from the aforementioned Conventions as well as to achieve a harmonized and synergic appliance of all of them. In order to do that, DNGA has taken into account certain aspects considered at an international level as is the case of:

"Together, the three Conventions (Stockholm, Rotterdam and Basel) provide a coherent legal framework to support environmentally sound management of hazardous chemicals and wastes through their whole life - cycle, including production, use, trade and disposal." Fourth Meeting of the Open-ended Intergovernmental Group of Ministers - or their Representatives - on International Environmental Governance, November – December, 2001.

"One approach that has emerged from the debate is that of enhancing synergies and linkages between multilateral environmental agreements with comparable areas of focus or of a regional character with due regard to their respective mandates. In particular, there is support for enhancing collaboration among multilateral environmental agreement secretariats in specific areas where common issues arise, ***such as current work among the chemicals and waste multilateral environmental agreement secretariats and including the interim secretariats .... In this regard the study on chemicals-and-wastes-related conventions... (is a step) in the right direction. ....*** UNEP should continue, in close cooperation with the secretariats of the multilateral environmental agreements, to enhance such synergies and linkages including on issues related to scientific assessments on matters of common concern." Seventh Special Session of UNEP's Governing Council, February 2002.

To adequately respond to the needs emerging from the compliance of the three Conventions in a synergic and harmonized way, a Chemicals Unit was created within the DNGA.

One of the main tasks of this Unit was to plan POPs Enabling Activities in Argentina, whose objective is to obtain a National Implementation Plan according to Article 7 of the Stockholm Convention, including the strategies in Articles 5 and 6 that identify national response mechanisms, processes and measures to reduce or eliminate POPs releases.

That is how a proposal on "Enabling activities for the Stockholm Convention on Persistent Organic Pollutants (POPs): National Implementation Plan for Argentina" was submitted to UNEP Chemicals.

Among the planified activities to achieve the above mentioned National Implementation Plan, the following may be quoted:

Step I

Determination of co-ordinating mechanisms and organization of the process

Establishment of a Co-ordination Unit and a National Co-ordinating Committee and definition of the roles of the various stakeholders involved (public service, universities, NGOs, Entrepreneurial Chambers, unions, etc.)

Development of an agreed Work Plan and its associated timetable.

Step II

Establishment of a POPs inventory and assessment of infrastructure and capacity

Updating of the National Profile for Chemicals Management emphasized on POPs.

Establishment and updating of inventories

- **Inventories of production, distribution, use, import and export of POPs intentionally produced (pesticides, HCB and PCB)**
- **Inventories of obsolete POPs stocks, POPs containing articles in use and contaminated sites.**
- **Evaluation of the possibility of eliminating obsolete stockpiles.**
- **Preliminary inventory of unintentional production of PCBs and HCB. The dioxin and furan release inventory (PCDD/PCDF) will be finished within the framework of a special activity with technical assistance of UNEP starting in the next few days.**
- **Preliminary inventory of POPs releases to the environment and estimate of future releases.**

Step II (continued)

Establishment of a POPs inventory and assessment of infrastructure and capacity

Analysis, validation and widespread dissemination of the inventory

Establishment of an electronic POPs database (data on inventories and emission factors) and an integrated POPs information network

Assessment of:

· the needs for strengthening institutional capacities.
· the economic and social implications of POPs use, use reduction and the dissemination and promotion of alternative technologies / products.
· the national capacity to assess POPs risks.

Step III

Priority setting and determination of objectives

Elaboration of criteria for priority assignment

Determination of National Objectives in relation to priority POPs issues

Step IV

Formulation of a National Implementation Plan (NIP) and Action Plans on specific POPs

Identification and Evaluation of POPs Management Options

- Identify management alternatives
- Identify alternatives for the reduction and elimination of risks for human health and the environment.
- Determine the need to introduce alternative technologies, including any requirements for technology transfer.
- Evaluation of the costs and benefits of the identified management options.

Development of a Draft NIP

- Elaboration of elements of the NIP and relevant action plans
- Evaluation of costs related to the NIP's implementation.
- Elaboration of a portfolio of projects for submission to decision-makers and to potential funding agencies and donor bodies.
- Development of a national strategy for information exchange, education, communication and awareness raising, taking into account risk perceptions regarding POPs among the public.

Step V

Endorsement of the National Implementation Plan by stakeholders

The National Implementation Plan is agreed upon at the highest level and commitments of various stakeholders to its implementation secured.

Stakeholders identification and participation (public service, universities, NGOs, Entrepreneurial chambers, unions, etc.

Information dissemination

POSSIBLE TOPICS TO BE DEALT WITH REGARDING SYNERGIES

CONVENTION / TOPICS	POPs	PIC	BASEL	OZONE VC: Viena Conv. MP: Montreal Protoc.
Information exchange	Article 9	Art. 14	Art. 10 Parag.2	Art. 5 (VC) Art. 9 (VC)
Technical assistance	Article 12	Art. 16	Art. 10 Parag.3	Art. 10ª (MP)
Amendments \ Approval	Articles 21 and 22	Arts. 21 and 22	Arts. 17 and 18	Art. 9 (VC)
Reporting	Article 15	Art. 12	Art. 13	Art. 7 (MP)
Settlement of disputes	Article 18	Art. 20	Art. 20	Art. 11 (VC)
Inclusion of chemicals \ wastes	Article 8	Arts. 7 y8	Art. 3 Parags.2, 3 and 4	Art. 9 (VC)

Approach to Chemicals' International Conventions in Argentina

Victoria Rodriguez,
Dirección Nacional de Gestión Ambiental

REPUBLICA ARGENTINA

Secretaria de Ambiente y Desarrollo Sustentable (SAyDS)

Dirección Nacional de Gestión Ambiental (DNGA)-

UNEP Chemicals / Secretariat of the Basel Convention

Regional Workshop on BAT and BEP in the context of the Stockholm and Basel Conventions and Regional Consultation on the Business Plan and Institutional Arrangements for the South-American Basel Subregional Center in Argentina

Buenos Aires, October 21-26, 2002

Organic chart and synergies in the application of the Chemicals and Hazardous Wastes International Conventions within the SAyDS

Título del organigrama

SECRETARIAT OF ENVIRONMENT AND SUSTAINABLE DEVELOPMENT

National Direction of Environmental Management

Wastes Global Management	Transboundary Movements Unit	Chemicals Unit
National Law 25.612 (GIRIAS 2002) National Law 24.051 Hazardous Wastes (1992)	Basel Convention Law 23.922 (1991)	Stockholm Convention Rotterdam Convention Law 25.278 (2000)

Argentina
Identification of key points

Elaboration of elimination plans. Inventories

- Analysis of the national situation: regulatory aspects
- Model Plans in other countries. Degree of compliance and advance.
- Priorities
- Working on a Pilot Plan,with POPs as priority
- Inventories. Updating mechanisms
- Periodically updating of the Pilot Plan (dynamic plan)
- Regulations based upon the Pilot Plan's feasibility
- Developing of treatment technologies and identification and control capacities able to be transferred to future elimination and minimization plans for other POPs and toxic persistent substances
- Capacity building
- **Promotion of clean technologies. Prevention.**

Identified priorities for the National Implementation Plan

I.-PCBs

- **Widely distributed**
  - » Without prohibition before 2001
  - » Exports due to voluntary technology changes (approximately 2400 tons)
  - » Use prohibitions in certain jurisdictions since mid 2001
  - » Existence of contaminated mineral oils
  - » High elimination and recharging costs
- **COMMUNITY DEMAND**

II.- Organochlorinated Pesticides

III.- Dioxins and Furans

EXISTENT LEGISLATION

- **National Law 23.922 (Basel Convention)**
- **National Law 24.051 (Hazardous Wastes)**
- **Resolution MTSS 369/91 Standards for the safe handling of PCBs and their wastes**
- **Resolution ENRE 655/2000**
- **Joint Resolution 437/2001 y 209/2001 (Ministries of Labor and Health)**
- **Resolution SADS 249/2002 (import of equipment containing dielectric and transfer fluids control)**
- **Others: Control mechanisms of the Customs Authority, Province of Buenos Aires, City of Buenos Aires, etc.**

National Plan for the Environmentally Sound Minimization and Elimination of PCBs and PCBs contaminated material

Objectives

- Progressive and responsible elimination of the Identified Sources. Establishment of deadlines for contaminants, trade-off and import.
- Inventories of Identifiable Sources. First stage.
- Inventories of contaminated sites. Remediation Program. Second Stage.

Principal Items

- Scope: The whole national territory (art. 41, National Constitution)
- Aspects to be regulated
  - data collecting or register
  - labeling
  - recovery treatments
  - final disposal and decontamination treatments
  - import and elaboration prohibitions
  - transitory storage

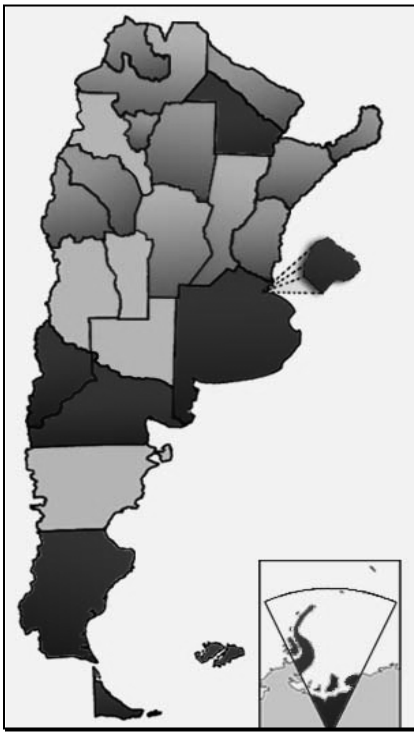
The Plan includes:

- polychlorinated biphenyls
- polychlorinated terphenyls (PCT)
- polybrominated biphenyls (PBB)
- [monomethyl-dichlorine-diphenyl methane (UGILEC 121 or 21)]
- [monomethyl-dibromine-diphenyl methane (DBBT)]
- [monomethyl-tetrachlorine-diphenyl methane (UGILEC 141)]
- [polychlorinated naphthalenes (PCN)]
- any of their mixtures
- others

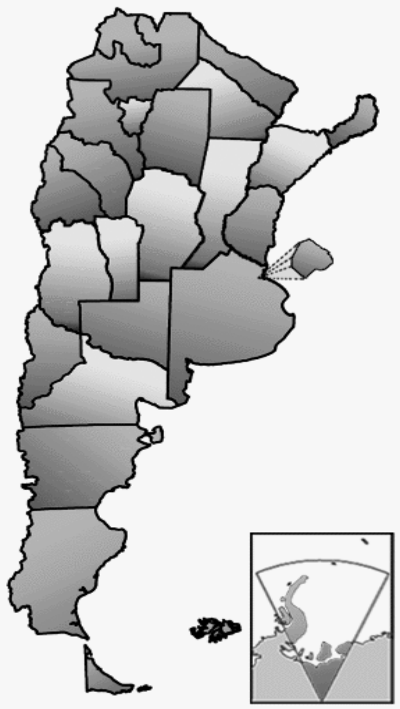
- Control:
  - Application Authorities
  - Inspections
  - Penalties
  - Control rates / taxes (in case they are administratively required)
- Inventories
- Other aspects

Application difficulties

- Lack of a common and harmonized legislation in all the regions in the country.
- Scarce budget to implement Regional Data Bases.
- High final disposal and replacement of contaminated equipment costs.
- Infrastructure limitations, scarce human and economical resources to identify contaminated sites and their remediation needs.



- 3,700 km between 22° and 55° south latitude (3,7 millions square kilometers)
- 23 provinces and the City of Buenos Aires, environmentally autonomous with their own Constitutions
- A National Hazardous Wastes Law (Nº 24.051) adhered by provincial governments (1991)
- A National Wastes Integral Management Law (2002) (minimum premises, that is being regulated at the moment)



Provinces prohibiting hazardous wastes entrance to their jurisdictions

- **Provinces WITH prohibition**
- **Provinces WITHOUT prohibition**

Positive aspects in the plan's development

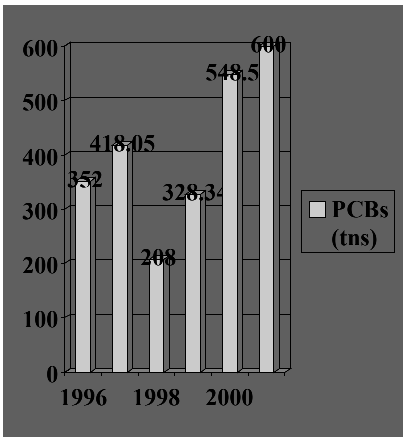
- **Increase of elimination and control regulations in the diverse jurisdictions**
- **Creation of owners' registers in certain jurisdictions**
- **Treatment technologies development Projects**
- **Interlaboratories control to assess the quality of results when determining contamination**
- **Inventories of contaminated oils at electrical facilities (distribution, transport and generation), through the regulating institutions control activities.**
- **Work with each one of all the members of the community involved in each of the jurisdictions**
- **Joint work with other control authorities and officials training (Customs Authority, National Frontier Authority, Coastguard, Aeronautical Police)**

DNGA's Hazardous Waste Register Unit

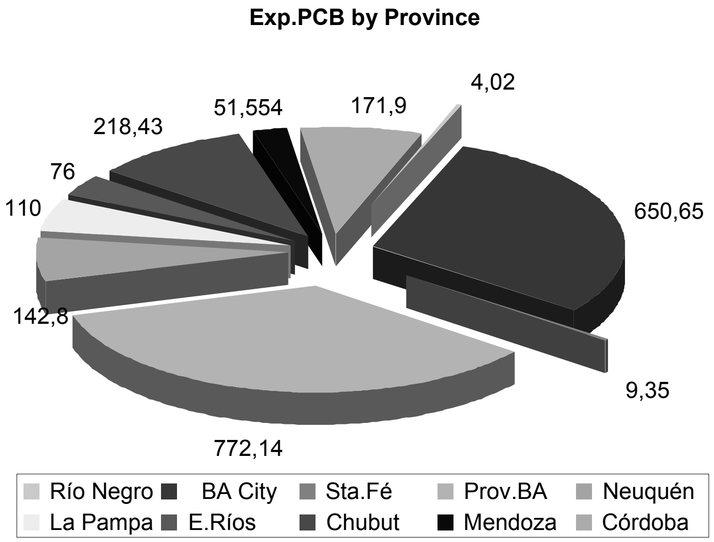
- Category Y10 and support contaminated material authorizations
  - 5 Transporters.
  - 3 Operators / Exporters.
  - 1 Firm authorized with CAA to decontaminate oils (reduction by alkaline metal) containing 5.000ppm PCBs up to 20 ppm.
  - 1 Decontamination equipment for electrical devices casings contaminated with PCBs. Certificate in way of being renewed

DNGA
Transboundary Movements

- **Application of the Basel Convention in all Hazardous Wastes Export Movements**
- Approximately 2,400 tons of PCB wastes exported (liquids and casings)



Exports of PCB by province



The main observed difficulty: <u>Inventories Development</u>

Provincial Authorities will develop provincial inventories through local registers

Summing provincial inventories the NATIONAL INVENTORY will be obtained.

The contamination and contaminated sites NATIONAL PROFILE will be then elaborated. From then on, the focus will be centered in developing solutions promoting the local development of BAT and BEP at an ACCESIBLE COST, COMPATIBLE WITH ARGENTINA's ECONOMICAL STATUS.

PCBs Minimization and Elimination Regional Plan

Annex to the Document submitted at the XVII Meeting of the GT 6- MERCOSUR

⇨ Each authority will develop national inventories through their respective local registers

⇨ Summing the national inventories the REGIONAL INVENTORY will be obtained

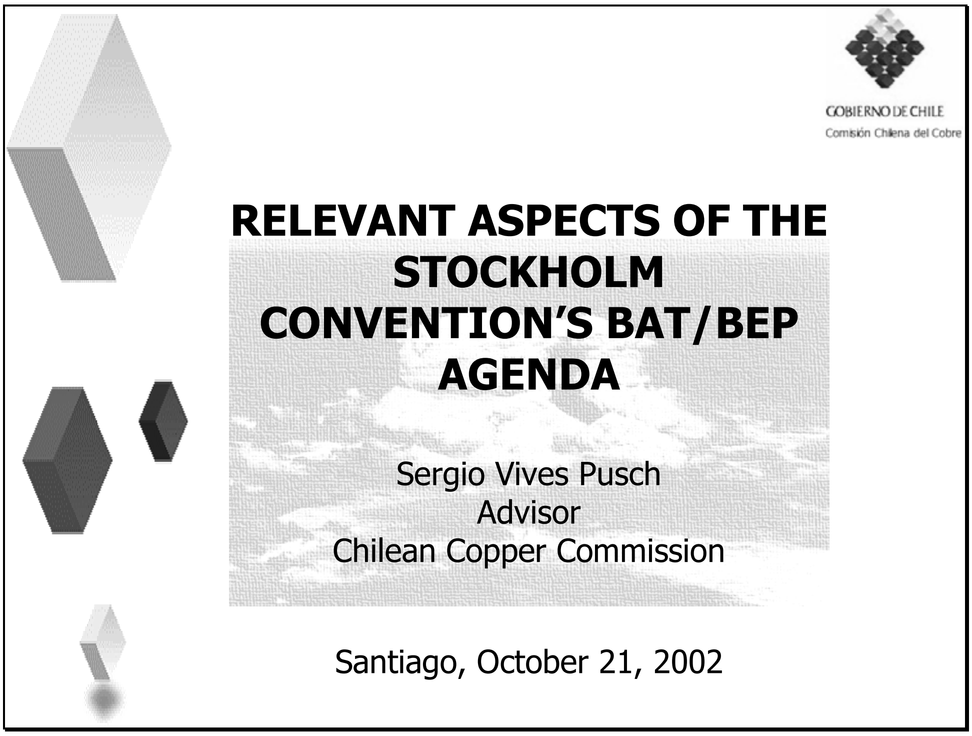
⇨ The contamination and contaminated sites REGIONAL PROFILE will be elaborated. Hence, difficulties and solutions will be identified.

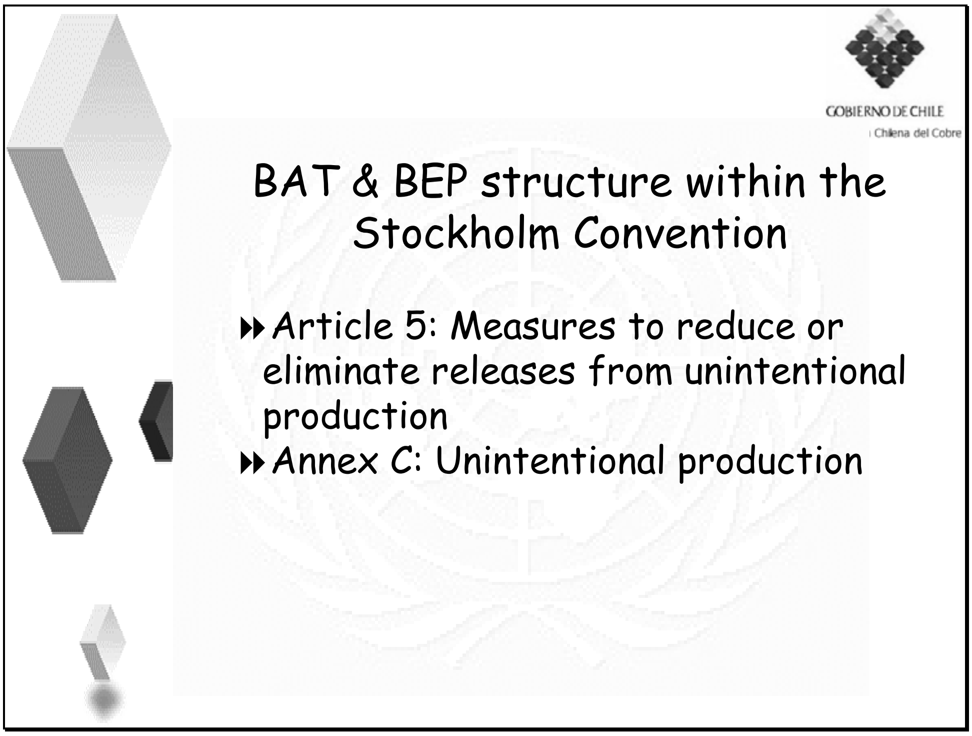
DISEMINATION OF INFORMATION AND CAPACITY BUILDING

Fundamental Role of the Basel Regional and Sub-Regional Centers (CSS-CB)

- Training Program for customs officials and frontier control agents (illegal traffic prevention)
- Training on mixtures and contaminated materials identification (inter-laboratories control)
- Capacity Building and Technology Transfer ("BAT/BEP", "AVOIDANCE")
- Capacity Building on the Environmentally Sound Management of Hazardous Substances and Wastes. Minimization of waste generation. RISK MINIMIZATION.

Relevant Aspects of the Stockholm Convention's BAT/BEP Agenda
Sergio Vives Pusch, Chilean Copper Commission





Article 5: Measures to reduce or eliminate releases from unintentional production

- Measures to reduce to a minimum total releases derived from anthropogenic sources of each of the chemicals listed in Annex C, with the goal of their continuing minimization and, where feasible, ultimate elimination, are established.
- The development of an Action Plan within 2 years of the date of entry into force of the Convention for each Party is requested.

Article 5: Measures to reduce or eliminate releases from unintentional production, cont….

- The use, as soon as practicable and according to the action plan, of BAT for new sources included in Part II of Annex C no later than 4 years after the entry into force of the Convention for each Party is required.
- BEP must be promoted too.
- In order to do so, the guidelines to be elaborated within the Convention must be taken into account, among others.

Annex C: Unintentional production

GOBIERNO DE CHILE
Comisión Chilena del Cobre

- Part I: Persistent organic pollutants subject to the requirements of Article 5
- Part II: Source categories (priority sources)
- Part III: Source categories

Best Available Techniques

GOBIERNO DE CHILE
Comisión Chilena del Cobre

- Article 5 f) i): BEP means the most effective and advanced stage in the development of activities and their methods of operation which indicate the practical suitability of particular techniques for providing in principle the basis for release limitations designed to prevent and, where that is not practicable, generally to reduce releases of chemicals listed in Part I of Annex C and their impact on the environment as a whole.
- Annex C letter B: Development of BAT

Best Environmental Practices

GOBIERNO DE CHILE
Comisión Chilena del Cobre

- Article 5 f) v): BEP means the application of the most appropriate combination of environmental control measures and strategies
- Annex C letter C: The Conference of the Parties may develop guidelines with regard to BEP

BAT/BEP Expert Group

GOBIERNO DE CHILE
Comisión Chilena del Cobre

- Objective: Elaboration of technical guidelines for Parts II and III of Annex C sources
- Conformation: Closed group, balanced between developed and developing countries
- First meeting: March 2003
- Operative until the first COP when its continuity will be assessed

National legislation and the Stockholm Convention

GOBIERNO DE CHILE
Comisión Chilena del Cobre

- Possible conflicts in the implementation of BAT and BEP:
  - Requirement of determined techniques and technologies
  - Outcome based legislation
  - Command and control vs. Flexibility mechanisms
  - BEP sometimes alien to developing countries reality

National legislation and the Stockholm Convention, cont...

GOBIERNO DE CHILE
Comisión Chilena del Cobre

- Clean Production Agreements
  - Agreements productive sector / Government
  - Possibility of increasing environmental standards
  - Voluntary agreements
  - Agreements that consider each sector's and each country's reality
  - Principle of gradual adjustment

Conclusions

GOBIERNO DE CHILE
Comisión Chilena del Cobre

- Arising of possible conflicts and impossibility of fulfilling the Convention's dispositions
- BAT and BEP must take into account developing countries' realities
- Possibility of a slow ratification of the Convention
- Promote gradual adjustments through the encouragement of national voluntary agreements

CONCLUSIONS, cont.

GOBIERNO DE CHILE
Comisión Chilena del Cobre

- Greater participation of the private sector
- Act according to prevention criteria
- Improve the means of communication among all the actors involved

Analytical Determination of PCBs
Daniel Lupi and Silvia Oliviero, INTI, Argentina.

ANALYTICAL DETERMINATION OF PCBs

Regional Workshop on BAT / BEP in the context of the Stockholm and Basel Conventions

Regional Consultation on the Business Plan and Institutional Arrangements of the BSC for South America

in Argentina

Presentation by Silvia Oliviero - CISCOE / INTI

Buenos Aires, October 21- 26 2002

SCHEME TO SELECT ANALYTICAL METHODS TO DETECT PCBs (1)

1) ANALYSIS AND ASSESSMENT OF GENERATION SOURCES

- Materials
- Products
- Technologies / Processes (emissions and wastes)

2) ANALYSIS OF THE REGULATORY FRAME

- Scope
- Established standards
- Specified methods

3) INTERNATIONAL BACKGROUND

- Available new methods and techniques
- New materials, products and processes
- New regulatory trends
- Interlaboratory control

SCHEME TO SELECT ANALYTICAL METHODS TO DETECT PCBs (2)

4) Performed determinations

- Lubricant oils, Transformers oils, Oils from heating equipment, phone cables (ASTM 4059/ EPA 9079)
- Cardboard packaging in contact with food (ISO 15318/99)
- Solid, semi - solid and liquid waste (EPA 3510/ EPA 8082)
- Internal procedure for hazardous wastes management

PCBs GENERATION SOURCES

- CLOSED APPLICATIONS: Dielectric fluids used in transformers, capacitors, electric engines, illumination devices ballast, etc.
- SEMI - OPENED APPLICATIONS: Hydraulic fluids, heat transference fluids, voltage regulators, vacuum pumps, electrical wires, etc.
- OPENED APPLICATIONS: Lubricants, adhesives, plastifiers, isolating materials, paintings, varnishes, flame retardants, etc.
- WASTES: Buildings demolition, spills, out of use electric equipment, isolating materials wastes, etc.
- RECYCLING OPERATIONS: Mineral oils, non carbon copying paper, plastics.

INTERNATIONAL REGULATORY FRAMEWORK

– INTERNACIONAL CONVENTIONS

– EUROPEAN UNION REGULATIONS

– MERCOSUR REGULATIONS

INTERNATIONAL CONVENTIONS

- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal. NATIONAL LAW Nº 23.922/91
- AGENDA 21 - CHAPTER 19: Environmentally sound management of toxic chemicals, including the prevention of international illicit transit of toxic and hazardous chemicals (1992).
- Rotterdam Convention on On The Prior Informed Consent Procedure For Certain Hazardous Chemicals And Pesticides In International Trade. NATIONAL LAW Nº 25.278/00
- Stockholm Convention on Persistent Organic Pollutants (POPs) (2001).

EUROPEAN UNION

- 96/59 EC Council Directive on the elimination of Polichlorinated Bifenils and Polichlorinated Terfenils (1996).

MERCOSUR

- XVII Ordinary Session of SGT Nº6 Environment. Annex 7 (Argentinean proposal on a Regional Plan for the Environmentally Sound Minimization and Elimination of PCBs) (2001)

- XXII Ordinary Session of SGT Nº6 Environment. Annex 3a (Basic Questionnaire for a PCBs Inventory) (2002)

NATIONAL REGULATIONS

- NATIONAL CONSTITUTION – ART. 41
  - "The entrance of radioactive wastes as well as that of actual or potentially hazardous wastes to argentinean national territory is forbidden."
- NATIONAL LAW Nº 24.051/92 - Reglamentary Decree 831/93 - Hazardous Wastes
- NATIONAL LAW Nº 25.612 – Reglamentary Decree 1.343/02 – Global Management of Industrial and Service's activities wastes
- NATIONAL LAW Nº 24.449/95 - Reglamentary Decree 779/95 Annex S - General regulations on the transport of hazardous merchandises / goods by highway

NATIONAL REGULATIONS

- Resolution (Ministry of Labor and Social Security) Nº 369/91 - Regulations concerning the safe use, handling and disposal of polichlorinated bifenils and derived products
- Disposition (National Direction of Hygiene and Labor Security) Nº 1/95 - List of carcinogenic agents
- Resolution (Ministry of Health and Social Action) Nº 364/99 – It forbids the production, import and use of persistent organic pesticides for sanitation purposes
- Resolution (National Entity for Electricity Regulation) Nº 655/00 – Inventory of operating, stored or under repair transformers
- Joint resolution Ministry of Health Nº 437/01 and Ministry of Labor Nº 209/01 – It forbids the production, import and trade off of PCBs or PCB containing equipment in argentinean territory

NATIONAL REGULATIONS

- National PCBs Minimization and Elimination Plan (2000) (Secretariat of Sustainable Development and Environmental Policy)
- Resolution (Secretariat of Environment and Sustainable Development) Nº 249/02 – Regime to adequately regulate the use of substances, products or machinery containing PCBs

LOCAL REGULATIONS

- Province of Buenos Aires Law Nº 11.720 – Special wastes
- Province of Buenos Aires Resolution Nº 1.118/02 – It forbids PCBs production, entrance to the territory and instalation
- Government of Buenos Aires City Resolution Nº 293/00 – Mandatory statement on PCBs posession within the boundaries of Buenos Aires City

CONCLUSIONS

- Harmonize criteria among control authorities in order to homogenize technical and regulatory demands
- Strengthen existing national capacities as regards human resources and infrastructure (incorporating the scientific - technological community)
- Perform national, regional and international interlaboratory controls in order to monitor the validity of essays and ensure the outcomes quality
- Information exchange and access to funding through international cooperation

Dioxins and Furans Provisional Inventory in Ecuador
Isabel Guerra, Ministry of Environment

ministerio del ambiente

DIOXINS AND FURANS PROVISIONAL INVENTORY IN ECUADOR

Ministery of Environment

Isabel Guerra

October - 2002

Ecuador: the most little of the megadiverse

- **Surface: 256.500 km2.**
- **Population: 12 million inhabitants**
- **Principal cities: Quito, Guayaquil and Cuenca**
- **The seventh among the 17 most diverse countries in the planet**
- **The world's most diverse country according to its surface**

Legal Environmental Framework

- Republic’s Constitution
- Health Code
- Environmental Management Law
- Pollution Prevention and Control Law
  - Regulation for the prevention and control of water resources pollution
  - Regulation for the prevention and control of soil pollution
  - Regulation for the prevention and control of solid wastes derived pollution
  - Regulation establishing air quality indexes
  - Regulation establishing stationary sources combustion emission levels and measurement methods
  - National Regime for Hazardous Chemicals Management

Legal Environmental Frameworks

- Mining Law and its environmental regulation
- Hydrocarbons Law and its environmental regulation
- Law regulating pesticides and veterinary products import, formulation, fabrication, storage and use
- INEN Standards: Hazardous Chemicals transport, storage and handling. Labeling standards.

- POP RELATED INTERNATIONAL CONVENTIONS
  - Basel Convention (Ratified in 1993)
    - Focal point: Ministry of the Environment
  - Rotterdam Convention: (in process of ratification)
    - Focal point: Ministry of the Environment and Ministry of Agriculture and Stockbreeding

DIOXINS AND FURANS

PROVISIONAL INVENTORY YEAR 2000

ECUADOR

INFORMATION SOURCES

- Ministry of Urban Development and Housing
- Ministry of Industry, Integration and Fisheries
- Ministry of Energy and Mining
- Ministry of Public Health
- Construction Chamber
- Industry Chamber
- Superintendence of Companies
- Natura Foundation
- Petroindustrial

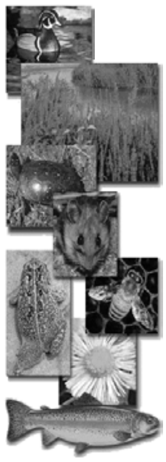
INFORMATION SOURCES

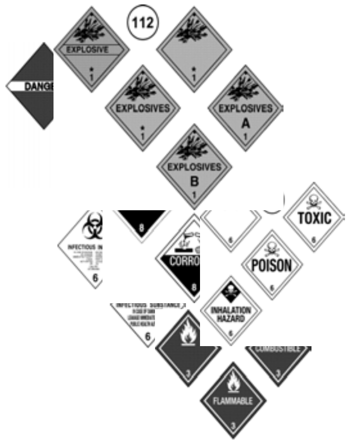
- La Cemento Nacional
- Cemento Selva Alegre
- Cemento Guapán
- Juan el Juri CIA
- National Direction of Traffic
- Tabacalera Nacional
- Solid Wastes Sectorial Analysis. Ecuador 2001.
- National Inventory of Greenhouse Effect Gases, 2000.

Instruments to reduce or eliminate undesired Substances – Peruvian Experiences
Jorge Fernando Horna Arevalo, Ministry of Health

INSTRUMENTS TO REDUCE OR ELIMINATE UNDESIRED SUBSTANCES – PERUVIAN EXPERIENCES

REGIONAL WORKSHOP ON BAT/BEP – Stockholm and Basel Conventions-Oct. 2002





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- Perú -

NATIONAL LEGAL FRAMEWORK

- Political Constitution of Perú (31.10.93)
- Code of Environment and Natural Resources D. Leg. N° 613 (8.09.90)
- Penal Code - D. Leg. N° 635 (04.08.91)
- Framework Law on Private Investment Growth - D. Leg. N° 757 (13.11.91)
- Solid Wastes General Law – Ley N° 27314

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NATIONAL LEGAL FRAMEWORK

SECTORIAL

- Ministry of Health Law. Law N° 27657 (29.01.02)
  General Health Law - Law N° 26842
  ROF – DIGESA R.M. N° 002-92-SA
  TUPA – MINSA D.S. N° 001-2002-SA
- Ministry of Agriculture Organic Law. D.L. N° 25902 (29. 11.92)
  ROF - SENASA. D.S. N° 24-95-AG
  TUPA - SENASA D.S. N° 047-2001/AG

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NATIONAL LEGAL FRAMEWORK

SECTORIAL

- Ministry of Production Organizational and Operational Law – Law N° 27789
- Industry General Law. Law N° 23407
- D.L. N° 25623. (22 de setiembre de 1992)
  Control of chemicals that participate in drug production.

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NATIONAL LEGAL FRAMEWORK

SECTORIAL

- Energy and Mining Organic Law. D.L. N° 25962
  ROF-D.S.N°027-93-EM,
  D.S.N°016-93-EM, Regulations for Environmental Protection in mining and metallurgical activities.
  D.S.Nº046-93-EM, Regulations for Environmental Protection in hydrocarbon related activities.
  D.S.N°29-94-EM, Regulations for Environmental Protection in electrical activities (wastewater derived from electric energy generation, transmission and distribution activities).

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NATIONAL LEGAL FRAMEWORK

SECTORIAL

- Organic Law for the Transport, Communications, Housing and Construction Sectors. D.L. N° 25862
- Ministry of Foreign Affairs Organic Law.D.L. N° 26117.
- Ministry of Economy and Finances Organic Law. D.L. N°
  D.S. N° 060-91-EF goods and substances control

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NATIONAL LEGAL FRAMEWORK

- D.S. N° 023-91-AG (29.05.91) – Prohibits the internment and record of organochlorinated pesticides as well as that of their by products and compounds, : Aldrin, Endrin, Dieldrin, BHC/HCH and its isomers alfa, beta y delta, Heptachlor, Canphechlor/Toxafene and DDT
- R.J. N° 177-96-AG-SENASA (11.11.96) Restrictive measures for commercial formulations of Methyl Parathion, ethyl parathion, aldicarb, lindane (only in potato and cotton cultures)

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NATIONAL LEGAL FRAMEWORK

- R.J. N° 036-99-AG-SENASA(03.04.99) – prohibits the record, import, local formulation, distribution and commercialization of Captafol, Chlorobenzilate, Hexachlorobenzene, Pentachlorophenol, Chlordane, Chlordimeform, Ethylene Dibromide and Mercury Compounds and their by products.
- R.J. N°043-2000-AG-SENASA (10.03.2000) Prohibits the record, import, local formulation, distribution, commercialization and use of Lindane.
- D.S 033-2000-ITINCI. Status of Methyl Bromide: Restricted for quarantine use. Subject to the Montreal al Protocol.

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INTERNATIONAL LEGAL FRAMEWORK

- Basel Convention, endorsed by R. Leg. N° 26234, in force since 21.02.94.
- Montreal Protocolo - R. Leg. N° 24931 ratification of the Viena Convention (SAO)
- Kyoto Protocolo, ratified by D.S. N° 080-2002-RE (Climate Change).
- FAO International Code of Conduct on the Distribution and Use of Pesticides (1985).
- Rio Summit, Agenda 21 – Chap. 19 (1992)
- Rotterdam Convention (1998)
- Stockholm Convention (2001)

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INTERNATIONAL LEGAL FRAMEWORK

- Decision Nº 436 of the Andes Community on Chemical Pesticides of Agricultural Use Record and Control. Approved on 11.06.98 in Lima, Perú. In force since 25.06.2002 with the approval of the Andes Technical Handbook.

  This regulation aims at establishing harmonized requirements and procedures to record and control chemical pesticides used in agriculture, as well as to steer its appropriate use and handling, in order to prevent and minimize damages to health and the environment within authorized conditions and to facilitate its trade off within the Subregion.

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MANAGEMENT OF UNDESIRED SUBSTANCES REDUCTION OR ELIMINATION

- DIGESA, within MINSA, according to Articles 96° 97°, 98° and 99° of Health General Law - Law N° 26842, must rule,control and establish measures enhancing protection and prevention in chemicals and hazardous wastes management.
- Chapters VII and VIII of Health General Law refer to Hygiene and Security in labor environments as well as to Environmental Protection as far as health is concerned.

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MANAGEMENT OF UNDESIRED SUBSTANCES REDUCTION OR ELIMINATION

To fulfill its objectives, DIGESA has procedures regarding:

- Household and Public Health Pesticides Record.
- Sanitary Authorization for the import and export of Chemicals subject to the PIC procedure
- Sanitary Authorization for Hazardous Wastes Storing, Collection, Transport and Treatment Systems.
- Notification on Hazardous Wastes export (Basel Convention).
- Sanitary Authorization for the import of wastes.

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PRINCIPAL OFFICIAL SECTORS INVOLVED IN MANAGEMENT

- **MINPRODUCE**

  Ozone Technical Office – SAO Application

  Direction of Industrial Products, Controlled Inputs and Inspected Products (Dirección de Productos Industriales, Insumos Controlados y Productos fiscalizados)

- **MEM – OSINERG**
- **Environmental audits (PCB´s detection)**

- **AGRICULTURE**

  National designated authority in charge of POPs together with DIGESA. Focal Application Point of the Andes regulation

- **FOREIGN AFFAIRS**

  Minister of Environmental Affairs in charge of Chemicals related International Conventions (Chemical Weapons)

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PRINCIPAL INDUSTRIAL ACTIVITIES GENERATING PTS

DESCRIPTION	PRODUCTION JAN-DEC 2001/MT
Paper and paper products elaboration	694057.2
Precious metals primary products elaboration	423824.16
Metal casting	56109.6
Plastic products elaboration	115169779.2
Iron and steel basic industtries	580721.76

Production data involving the principal products that participate in the physical volume per C.I.I.U type index
Source and elaboration: MITINCI/SG/OGIER-STATISTICS OFFICE

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DIOXINS AND FURANS SOURCES

- Cement factories: 7 at the national level.
- Hospital Wastes: 224 Hospitals. 85% of them have kilns with gas washers;11% take their wastes to sanitary landfills;4% have double chamber incinerators with emissions control.

  Source: Sanitary Infrastructure Census-MINSA. 1996
- Domestic Wastes: 3334 Ton/day are generated.51% is dumped in the open air.

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USE OF CHEMICALS PER CATEGORY AT THE NATIONAL LEVEL

CHEMICALS	TONS USED PER YEAR
PESTICIDES	7982
FERTILIZERS	447335
OIL PRODUCTS	9354.239
INDUSTRIAL	188148

SOURCE: MITINCI 1999

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PESTICIDES AND DISINFECTANTS FOR DOMESTIC AND PUBLIC HEALTH USE REGISTER

Pesticides and Disinfectants Register from1997 to July 2001

ORIGIN	PESTICIDES	DISINFECTANTS
NATIONAL	68	59
IMPORTED	200	144
TOTAL	268	203

SOURCE: DIGESA 2001

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PESTICIDES FOR DOMESTIC AND PUBLIC HEALTH USE REGISTER

Pesticides Register per chemical group

Pesticides	Piretroids	Carbamates	Organofos forinated	Others	Products Total
National	34	5	10	19	68
Imported	106	9	23	62	200
Total	**140**	**14**	**33**	**81**	**268**

SOURCE: DIGESA 2001

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COUNTRY	NET WEIGHT (Kg)	
	1999	2000
GERMANY	25 093,35	24 947,88
ARGENTINA	4 703,50	34 491,20
BELGIUM	36 008,00	18 000,00
BRAZIL	1 517,10	1 084,48
CHILE	13 462,00	16 206,26
CHINA	199 029,92	344 347,11
COLOMBIA	84 323,57	136 248,50
DENMARK	15 357,00	5 250,00
UNITED STATES	75 309,19	106 009,05
GUATEMALA	24 394,00	13 940,00
ISRAEL	7 300,00	24 000,00
JAPAN	15 961,00	25 323,60
MEXICO	43 986,75	114 151,11
NETHERLANDS	1 020,00	1 020,00
SWITZERLAND	11 988,00	4 364,00
SOUTH AFRICA	21 283,00	42 682,00
TAIWAN, PROVINC	102 510,10	29 987,80
UNITED KINGDON	4 266,00	11 198,00

IMPORTED INSECTICIDES QUANTITIES PER COUNTRY OF ORIGIN (Small scale sales)

Source: CUSTOMS 2002

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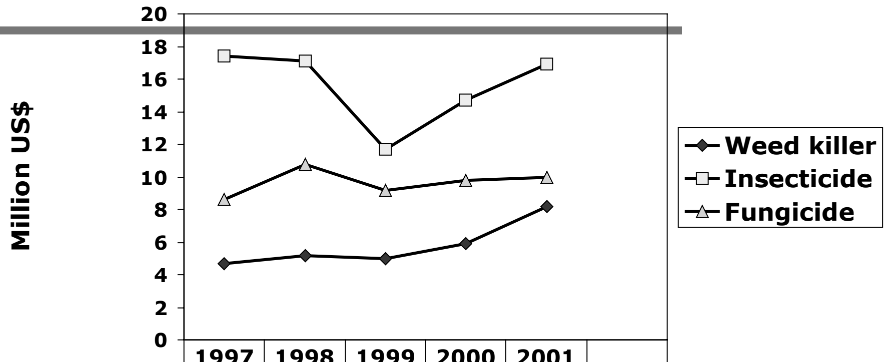
Pesticides Import per type



	1997	1998	1999	2000	2001
Weed killer	4.7	5.2	5	5.9	8.2
Insecticide	17.4	17.1	11.7	14.7	16.9
Fungicide	8.6	10.8	9.2	9.8	10

Years

Source: SENASA, 2002

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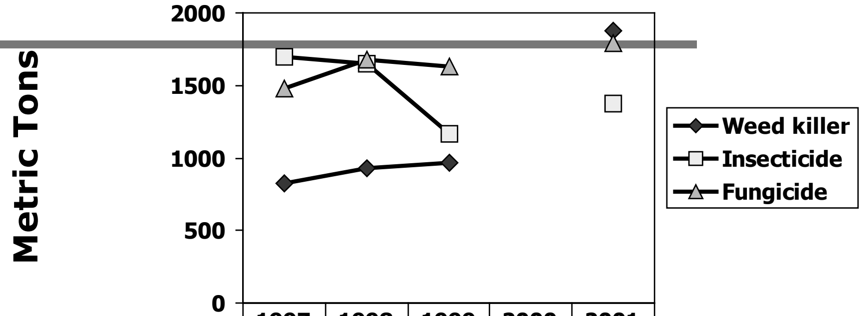
Total volume of Imported Pesticides in MT



	1997	1998	1999	2000	2001
Weed killer	827.3	924.2	965.6		1877
Insecticide	1692	1653	1169		1374
Fungicide	1478	1676	1632		1791

Years

Source: SENASA, 2002

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DIOXINS, FURANS AND PCBs IN FISH FLOUR AND OIL

- **Samples in 25 export plants were taken.**
- **Fish flour and oil samples (processed through direct heat, indirect heat, vacuum and indirect heat)**
- **Plankton samples (zoo and phitoplankton in fishing areas, 200gr).**
- **Fresh fish samples (anchovetes, sardines and jurel)**

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DIOXINS, FURANS AND PCBs IN FISH FLOUR AND OIL

COUNTRY	SPECIE	PRODUCT	DIOXINS AND FURANS TEQ (pg/g of fat)	PCBs (pg/g of fat)	TOTAL On the total and on fatl* **
PERU	Anchovete	FLOUR	<0.3	<2	0.09-3.32* 0.45-4.69**
	Anchovete	OIL	0.1<0.2		
	Sardine	FISH	3.4	0.42	3.82
	Anchovete	FISH	0.9	0.7	1.6
	Jurel	FISH	0.2	Not detec Table	0.2
	Phito and Zoop Jurel	PLANKTON	<0.2	Not detec table.	<0.2

* The total modal value in flour is <0.2
** The total modal value in fat is <2

Allowable Dioxins Standards in marine species:
CEE:2 pg TEQ/g of fat
Norway: 10 pg/g of fat (interim)

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DIOXINS, FURANS AND PCBs IN FISH FLOUR AND OIL

Allowable Dioxins Standards in marine species:CEE:2 pg TEQ/g of fat; Norway: 10 pg/g of fat (interim)

COUNTRY	SPECIES	PRODUCT	DIOXINS AND FURANS TEQ (pg/g of fat) &	PCBs (pg/g of fat)	TOTAL On the total and On fat
NORWAY	Norway pour	FLOUR	0.3		
	Herring	Flour	0.86		
	Capelan	OIL	1.56		
	Herring	OIL	2.32		
	Crab	FISH	31		
	Red fish	FISH	16	42	58
	Eglefino	LIVER	7.8		
	Codfish	LIVER	4.8 - 9.4		

& (Only 2,3,7,8 - TCDD)

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DIOXINS, FURANS AND PCBs IN FISH FLOUR AND OIL

Allowable Dioxins Standards in marine species:CEE:2 pg TEQ/g of fat; Norway: 10 pg/g of fat (interim)

COUNTRY	SPECIEs	PRODUCT	DIOXINS AND FURANS TEQ (pg/g of fat)	PCBs (pg/g of fat)	TOTAL On the total and on fat
UNITED KINGDOM	Codfish	FISH	3,9 – 22	5,6 – 76	9 – 98
	Plaice	FISH	4	9	13
DENMARK	Codfish	FISH	4,3 – 18	4,8 – 32	9,4 – 50
	Eglefino	FISH	4,1	3,9	8
ICELAND	Codfish	FISH	1,4 – 6,6	5,9 – 8,7	7,3 – 13
	Eglefino	FISH	4,8	2,2	7
NETHERLAND	Plaice	FISH	16 – 18	21 – 23	37 – 41
SHETLAND Islands	Mackerel	FISH	1 – 3,4	2,5 – 9	3,4 – 12

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DIOXINS IN ASHES FROM INCINERATORS AND SANITARY LANDFILLS

- RAAA, RAPAL Y JOF
- COLLECTION POINTS
  1. ZAPALLAL SANITARY LANDFILL
  2. LA CUCARACHA SANITARY LANDFILL
  3. JORGE CHAVEZ AIRPORT INCINERATOR
- ANALYTICAL METHODS I-TEF Y OMS-TEF
- RESULTS

POINT	CONCENTRATION ng/g	I-TEQ ng/g	OMS-TEQ ng/g
1	1100	13.0	14.0
2	24	0.17	0.19
3	21	0.35	0.36

OMS Allowable Standard: 3 ng/g of ash

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DIOXINS POLLUTION

BACKGROUND

PCBs polluted animal feed from January 18 to June 12, 1999, from Belgium.

Import of dioxins polluted powder milk destined to the Feed Support Program. It was immobilized by DIGESA / MINSA in order to analytically detect and identify the pollutant before reexporting it to its country of origin.

POLLUTION SOURCE

Oil and fat processing belgian firm.

Milk samples were analyzed to determine PCBs qualitatively.

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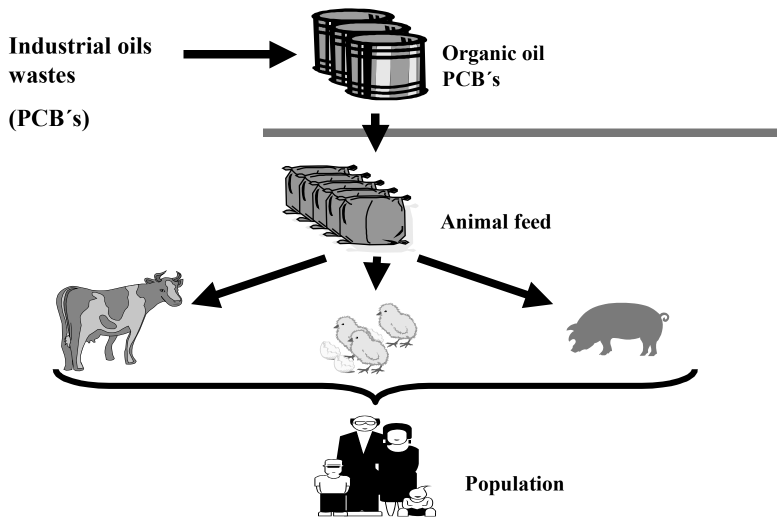
PCB´s POLLUTION ROUTE



RIMAC RIVER ENVIRONMENTAL POLLUTANTS

- DIGESA/ Taniyama Laboratory - Mie University - JAPAN
- COLLECTING POINTS: Rimac River Basin(15 monitoring stations)
- SUBSTRATUM: Water
- PARAMETERS TO BE ANALIZED: Lindane, Alfa, beta, gamma-BHC, Aldrin, DDT, p,p'-DDD
- ANALYTICAL METHODS: Gas Chromatographer
- RESULTS

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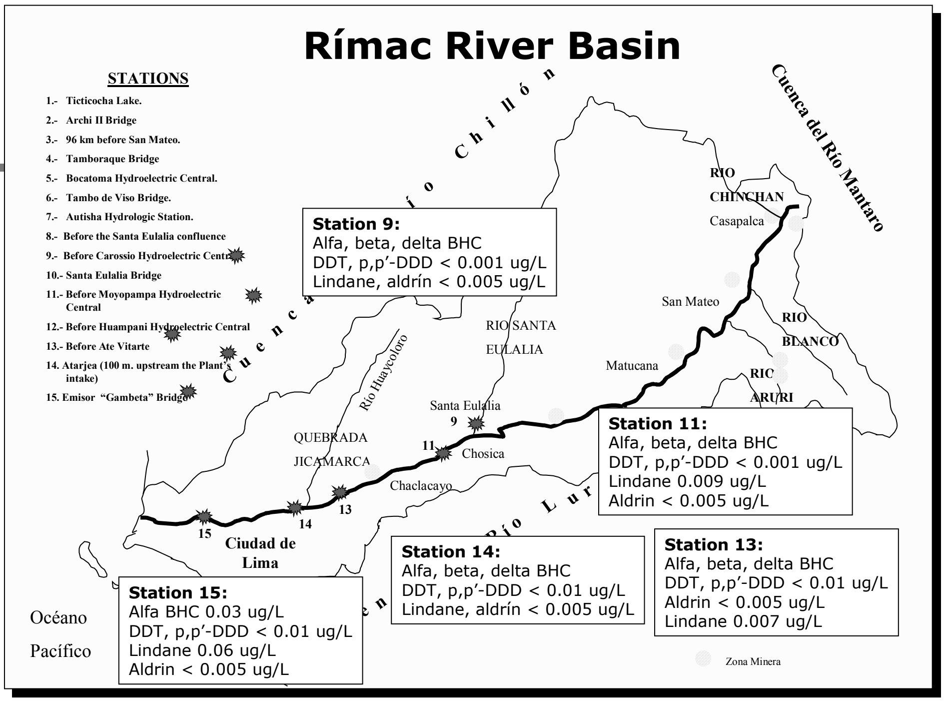
- Perú -



ORGANOCHLORINATED PESTICIDES AND PCB's

- IMARPE
- COLLECTION POINTS: Tumbes, Piura, Mollendo, Ite (in front of River Locumba) y Pisco
- SUBSTRATUM: Sediments
- PARAMETERS TO BE ANALYZED: Dieldrin, Lindane, Aldrin, DDT, p,p'-DDD and Aroclor
- ANALYTICAL METHODS: Gas Chromatography
- YEAR: 1996 - 1997
- RESULTS

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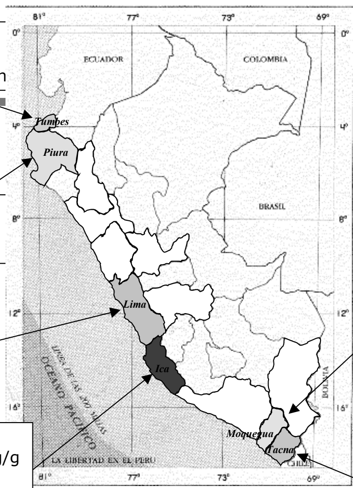
ORGANOCHLORINATED PESTICIDES AND PCB's 1996-1997

Tumbes:
PCB's (Aloclor) 52,571 ng/g
DDT traces, Aldrin and Dieldrin

Piura:
PCB's (Aloclor) 70,032 ng/g
DDT traces, Aldrin and Dieldrin

Lima-Callao:
DDE 0.201 ng/g
Dieldrin 0.108 ng/g
Aroclor 0.633 ng/g

Ica-Pisco:
Hexaclororbenzene 0.174 ng/g
Dieldrin 0.111 ng/g
Aroclor 7.488 ng/g



Moquegua-Mollendo:
Dieldrin 1,463 ng/g
DDD 1,887 ng/g
DDE 1,122 ng/g
DDT 1,302 ng/g
HCB 0.293 ng/g

Tacna-Ite:
DDD 0.216 ng/g
Lindane 0.237 ng/g
Aldrin 3.0 ng/g
PCB's 2.142 ng/g
Aroclor 7.0 ng/g

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EPS-RS NUMBER ACCORDING TO THE WASTES BEING HANDLED

Waste	N° of registered EPS-RS
Industrial (including hazardous wastes)	**10**
Municipal	**12**
Health facilities (including hazardous wastes)	**8**

Total registered firms up to now: 30

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INDUSTRIAL WASTES DISPOSAL

CIIU	Type	Wastewater Treatment	No Wastewater Treatment	Wastes Recycling	Disposal Landfill	Disposal Open Air Dumps	Others
3211	Textiles	21,3%	19,7%	47,4%	4,9%	4,9%	1,8%
3214	Carpets	No	No	28,6%	71,4%	No	No
3231 3232	Tanneries	20,0%	30,0%	10,0%	20,0%	20,0%	No
3411	Paper / Cardboard	25,0%	37,5%	12,5%	12,5%	12,5%	No
3420	Prints	No	17,6%	43,2%	25,5%	13,7%	No
3511	Basic Chemical	14,0%	26,6%	42,2%	3,2%	14,0%	No
3512	Fertilizers and Pesticides	18,8%	18,8%	31,3%	No	25,0%	6,1%
3513	Resines and Plastics	3,3%	56,7%	26,6%	6,7%	6,7%	No
3521	Paints, Varnishes and Lacquers	5,1%	12,8%	43,6%	10,3%	28,2%	No
3522	Drugs and Medicines	6,9%	24,15	6,9%	34,5%	27,6%	No
3530	Oil Refineries	21,0%	44,7%	10,5%	2,6%	21,2%	No
3540	Oil and Carbon by - products	No	33,3%	No	33,3%	33,4%	No
3710	Iron and Steel	No	23,1%	61,5%	7,7%	7,7%	No
3720	Non Ferrous Metals	No	23,1%	61,5%	No	15,4%	No
3819	Metal Products	No	No	54,5%	18,2%	27,3%	No

Source :Report "Generation and Management of Hazardous Wastes in Perú - 1993"

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WASTE PRODUCTION IN METROPOLITAN LIMA

Code	Category	Unit	1999	2000
1865	!Urban waste generation	1000t	1381 980	1390 242
1926	!Discharges in dumps	1000t	724 494	1001 606

Code	Category	Unit	1994
1739	Industrial waste generation	1000t	1 874 746,37

! Disposal of urban wastes in sanitary landfills in Metropolitan Lima.
Source: Lima Municipal Cleaning Services Enterprise-ESMILL 1992-1994;
SUMSEL 1997-1999
Generation of industrial wastes in Metropolitan Lima.
Source: CEPIS/GTZ. Environmental Management of the Industrial Sector Project
Oscar Guillén - MITINCI

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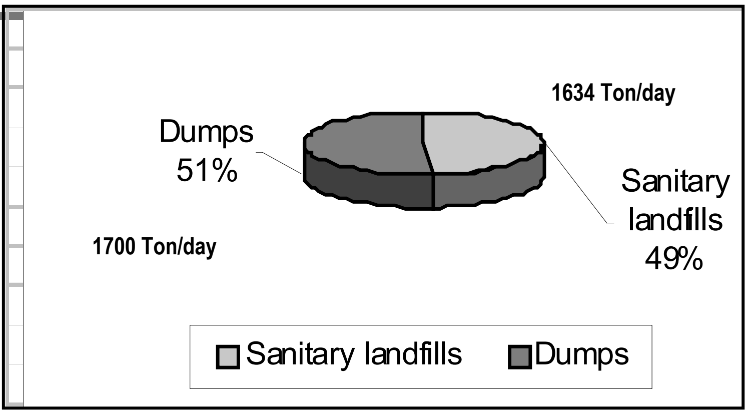
MUNICIPAL WASTE DISPOSAL



FINAL DISPOSAL	Solid Wastes (%)
SANITARY LANDFILL	48,78
DUMPS	51,22
(Controlled and uncontrolled)	
TOTAL	100

Available Technologies with Sanitary Authorization

1. Implementation of a Security Landfill located at the South of Lima Department (aproximately 70)

• R.D. N° 0905/2002/DIGESA/SA

• Treatment and Final Disposal of Hazardous Industrial Wastes: Security storage; physical, chemical and biological treatment plant; distillation and rectification plant; inertization and stabilizationplant; PCB´s storage facilty.

• Includes the approval of the Environmental Impact Assessment studies, taking into account community participation.

•Industrial Zones: 79% in Lima; 5% in Arequipa y 2% in Trujillo.

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...1. continued.

• Security storage with a progressive capacity of 60,000 ; 94,000 and 70,000 m3 and a lifetime of 12 years (processing), equivalent to 781,352 TM.

• Impermeabilization of geological and artificial barriers.

• Closure Plan subject to surveillance and control.

•Ph-Ch and biological Treatment Plant with an operational capacity of 11 000 m3 / year.

• Distillation / Rectification Plant with a treatment capacity of 38 000 m3 /year.

• Inertization / Stabilization Plant: 15 000 m3 / año.

• PCB´s Storage: 25 MT. If that quantity is surpassed, there will be exports to Spain.

• Emergency Plan.

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Available Technologies with Sanitary Authorization

2. Temporal Storage of PCB's polluted Oils and Transformers

- **Area = 110 m2**
- **Storage capacity: 25 MT in batch barrels with closed cover, located on steel trays over a concrete floor.**
- **PCB Storage not over 80% of the deposit's capacity.**

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Available Technologies in process of getting Sanitary Authorization

3. PCB treatment in mobile station Project.

- **Principle: Chemical Dechlorination**
- **Capacity: 1 000 L / h**
- **Operative Parameters: 100 – 120°C; P = 1,0 a 1,2 Bar; Residence time = 0,5 a 1,5 h.**
- **Mobile equipment with a 25 m2 area**
- **Strict Hygiene and Security system.**

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WE PROMOTE THE USE OF CLEAN TECHNOLOGIES WITH ENOUGH CAPACITY FOR INTRINSIC RISK CONTROL AND ABLE TO GRANT A SUSTAINABLE DEVELOPMENT, ENVIRONMENTALLY AND SOCIALLY ACCEPTABLE.

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Implementing Clean Production in Venezuela.
Janin Mendoza Morales, Ministry of Environment and Natural Resources

M.A.R.N.
D.G.C.A.

IMPLEMENTING CLEAN PRODUCTION IN VENEZUELA

PRESENTATION BY:

JANIN MENDOZA MORALES

DIRECTORA DE CALIDAD DE AGUAS

INTRODUCTION

- 1998. LAW APPROVING BASEL CONVENTION
- SINCE 1999: PROMOTION OF POLICIES ENCOURAGING THE USE OF PREVENTIVE TOOLS

GOVERNMENTAL SECTOR: RECTOR ENVIRONMENTAL, SCIENTIFIC, AND PRODUCTIVE.

PRIVATE SECTOR: INTEGRATED ENVIRONMENTAL MANAGEMENT.

OBJECTIVE

TO ACHIEVE THE INTEGRATION OF THE PUBLIC AND PRIVATE SECTORS IN ORDER TO DEFINE PRODUCTION POLICIES AND STRATEGIES AIMING AT THE MINIMIZATION OF CONTAMINANTS GENERATION AND AT INCREASING EFFICIENCY IN RAW MATERIALS USE AND, DOING SO. CONTRIBUTING TO INCREASE COMPETITIVENESS AMONG FIRMS BOTH IN NATIONAL AND INTERNATIONAL MARKETS.

MINISTRY OF ENVIRONMENT AND NATURAL RESOURCES

1. ENVIRONMENT'S CONSERVATION, DEFENSE AND IMPROVEMENT.
2. INCOMPATIBILITY WITH POLITICAL, SOCIAL AND ECONOMICAL POLICIES AND TRENDS IN THE INTERNATIONAL CONTEXT (1996):

- DEFINITION OF A DECENTRALIZED INSTITUTIONAL STRUCTURE.
- PARTICIPATION OF ORGANIZED COMMUNITIES.
- DEFINITION OF A LEGAL FRAMEWORK RESPONDING TO THE NEW GUIDELINES.

MINISTRY OF ENVIRONMENT AND NATURAL RESOURCES

1. GUIDE (EDUCATIVE AND CULTURAL)
2. RECTOR (PLANIFICATION, ADMINISTRATION, ORIENTATION AND ADVISEMENT)
3. CONTROLLER (CONTROL, SURVEY, INTERVENTION, FISCALIZATION)

IT IS NOT A "PRODUCTION" MINISTRY IN THE STRICT SENSE, BUT A "PRODUCTION" GUIDE AND A CATHALYST OF PRODUCTION DYNAMICS.

VENEZUELAN INDUSTRY CLEAN PRODUCTION PROPOSAL CONSISTS IN A NATIONAL PROMOTION AND ENCOURAGEMENT POLICY THAT INCLUDES:

• DEVELOPMENT OF RESEARCH PROGRAMS (TECHNOLOGIES AND INDUSTRIAL ENVIRONMENTAL MANAGEMENT)

• ENVIRONMENTAL CONTROL AND MONITORING ORGANIZATIONAL MODEL FROM THE MINISTRY.

• ENCOURAGEMENT AND INCENTIVE MECHANISMS FOR ENVIRONMENTAL INDUSTRIAL TECHNOLOGICAL INNOVATION.

ACTUAL SITUATION IN VENEZUELA

WEAKNESSES

- INEXISTENCE OF SPECIF INSTRUMENTS TO ENCOURAGE CLEAN PRODUCTION
- LESSER DEGREE OF ENVIRONMENTAL MANAGEMENT IMPLEMENTATION WHEN COMPARED TO OTHER LATIN AMERICAN COUNTRIES
- A BADLY PUBLICIZED AND NOT FOCUSED ON BIG FIRMS ENVIRONMENTAL MANAGEMENT.
- LACK OF INFORMATION REGARDING THE BENEFITS OF CLEAN PRODUCTION
- LIMITED TRAINING ON CLEAN PRODUCTION
- WEAK SOCIAL PRESSURE
- MANAGEMENT CRITERIA FOCUSED ON REGULATORY COMPLIANCE AND NOT ON CONTINUOUS IMPROVEMENT.

ACTUAL SITUATION IN VENEZUELA

OPORTUNNITIES:

- EXTENSIVE AND PIONEERING NATIONAL ENVIRONMENTAL LEGISLATION
- POSIBILITY OF ENCOURAGING CLEAN PRODUCTION THROUGH NEW INSTRUMENTS, INITIATIVES AND SUPPORTING PLANS
- PRESSURE OF EXTERNAL MARKETS TO INTRODUCE CLEAN PRODUCTION AS A FACTOR FOR COMPETITIVENESS

THREATS:

- INDIFERENT ATTITUDE ON BEHALF OF A GREAT PART OF THE STAKEHOLDERS,
- LIMITED SURVEILLANCE POSSIBILITIES
- POSSIBILITY THAT CLEAN PRODUCTION COULD BECOME A COMMERCIAL EXCLUSION BARRIER
- ROOTED ENVIRONMENTAL STRATEGIES FOCUSED ON "END OF PIPE" SOLURTIONS AND NOT ON PREVENTION

ACTUAL SITUATION IN VENEZUELA

STRENGTHS:

- **INCREASING NUMBER OF FIRMS APPLYING ENVIRONMENTAL MANAGEMENT CRITERIA** (AT LEAST 18 HAVE CERTIFIED ISO 14001).
- **CERTAIN INDUSTRIAL SECTORS WITH A SOLID ENVIRONMENTAL PROTECTION INFRASTRUCTURE (CHEMICAL – PHARMACEUTICAL, ETC.).**
- **ENVIRONMENTAL MANAGEMENT ACTIVITIES DIRECTED TO MINIMIZATION AND SAVING IN THE USE OF RESOURCES.**
- **TRANSNATIONAL FIRMS THAT TRANSFER THEIR ENVIRONMENTAL PRACTICES TO VENEZUELA.**

ASPECTS

- ❖ **NATIONAL CENTER FOR THE PROMOTION OF CLEAN PRODUCTION.**
- ❖ **CLEAN PRODUCTION PROMOTION UNIT AT THE MINISTRY.**
- ❖ **CLEAN TECHNOLOGIES SUB-COMMISSION.**

NATIONAL CENTER FOR THE PROMOTION OF CLEAN PRODUCTION

MINISTRY OF PRODUCTION AND COMMERCE

MINISTRY OF SCIENCE AND TECHNOLOGY

MINISTRY OF ENVIRONMENT AND NATURAL RESOURCES

INDUSTRIAL SECTOR

NATIONAL CENTER FOR THE PROMOTION OF CLEAN PRODUCTION

OBJECTIVES:

· TO CONTRIBUTE WITH SUSTAINABLE DEVELOPMENT IN VENEZUELA.

· TO IMPROVE NATIONAL INDUSTRY'S ENVIRONMENTAL PERFORMANCE AND COMPETITIVE ADVANTAGES THROUGH CLEAN PRODUCTION INITIATIVES.

· TO DISSEMINATE INFORMATION ABOUT CLEAN PRODUCTION INITIATIVES AT THE NATIONAL LEVEL, ESPECIALLY IN THE CASE OF LITTLE AND MEDIUM SIZED FIRMS (PyMEs).

· TO ACHIEVE A CONSIDERABLE DECREASE OF ENVIRONMENTAL POLLUTION BY ADOPTING CLEAN PRODUCTION PRACTICES.

CLEAN PRODUCTION PROMOTION UNIT (UPPL)

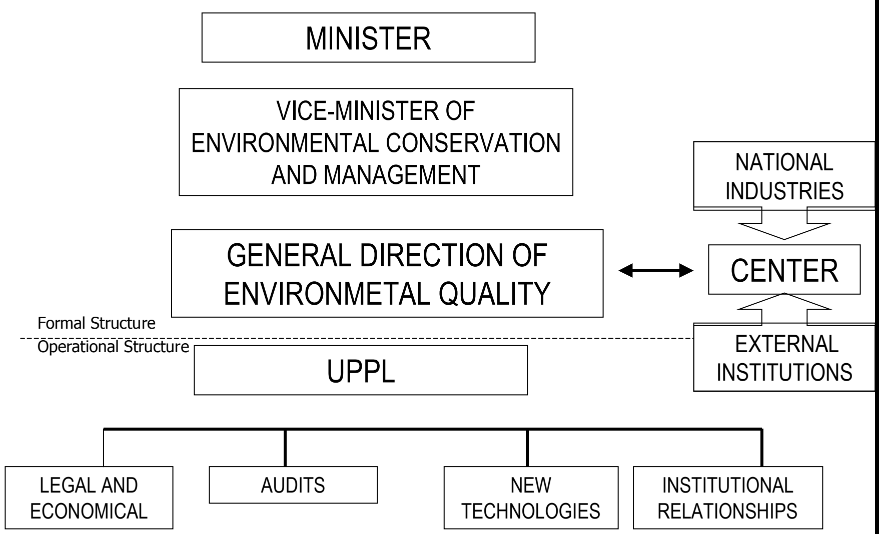
OBJECTIVE:

THE PROMOTION AND DISSEMINATION OF INFORMATION ON CLEAN PRODUCTION POLICIES, STRATEGIES AND ACTIVITIES ON BEHALF OF THE MINISTRY, AS A RESULT OF ITS DIRECT COMPETENCES.

SPECIFIC OBJECTIVES:

- **TO STRENGTHEN THE MINISTRY IN THE FIELD OF CLEAN PRODUCTION IN ORDER TO CONTRIBUTE TO IMPROVE ENVIRONMENTAL MANAGEMENT AT THE PRODUCTION AND SERVICES SECTORS**
- **TO ORGANIZE UPPL ACCORDING TO THE INSTITUTIONAL ORGANIZATION OF THE MINISTRY**
- **TO STEER UPPL'S PERFORMANCE IN THE DIRECTION OF NATIONAL ENVIRONMENTAL MANAGEMENT IMPROVEMENT, LINKING ACTIVITIES WITH THOSE OF THE NATIONAL CENTER FOR THE PROMOTION OF CLEAN PRODUCTION.**

CLEAN PRODUCTION PROMOTION UNIT



CLEAN TECHNOLOGIES SUB-COMMISSION

- MINISTRY OF ENVIRONMENT
- MINISTRY OF PRODUCTION AND COMMERCE
- MINISTRY OF SCIENCE AND TECHNOLOGY
- ASOQUIM
- FEDECÁMARAS
- PDVSA
- CONINDUSTRIA

Dioxins and Furans Emission Prevention in Incineration and Co-Incineration Facilities
Joost Meijer, CONAMA

GOBIERNO DE CHILE
COMISION NACIONAL
DEL MEDIO AMBIENTE

DIOXINS AND FURANS EMISSION PREVENTION IN INCINERATION AND CO-INCINERATION FACILITIES

PREVENTION

GOBIERNO DE CHILE
COMISION NACIONAL
DEL MEDIO AMBIENTE

⌘Minimize emissions according to technical possibilities and economical feasibilities

⌘Deadline to enforce standards in existing facilities: 3 years

OPERATIONAL CONDITIONS

- Temperature
  - 850 ºC
  - 1100 ºC
- Residence time
  - 2 seconds
- Turbulence
- Presence of oxygen
- Fast gas cooling

EMISSIONS TREATMENT

- Electrostatic precipitator
  - Particles
- Gas washing
  - Acids
- Treatment with ammonium
  - NOx

REGULATION PROJECT

- **TITLE I** — **GENERAL DISPOSITIONS**
- **TITLE II** — **MAXIMUM GAS AND PARTICLES QUANTITIES ALLOWED IN THE EFFLUENT**
- **TITLE III** — **OPERATIONAL CONDITIONS**
- **TITLE IV** — **MEASUREMENT AND STANDARD CONTROL METHODOLOGIES**
- **TITLE V** — **FISCALIZATION AND STANDARD VALIDITY**

INCINERATION

	Standard (mg/Nm^3)
Total Suspended Particles (TSP)	30
Sulfur Dioxide (SO_2)	50
Nitrogen Oxides (NO_X)	300
Total Organic Carbon	20
Carbon Monoxide	50
Cadmium (Cd)	0,1
Mercury (Hg)	0,1
Beryllium (Be)	0,1
Lead+Zinc (Pb+Zn)	1
As+Co+Ni+Se+Te	1
Sb+Cr+Mn+V	5

INCINERATION

	Standard (mg/Nm^3)
Hydrochloric Acid (HCl)	20
Hydrofluoric Acid (HF)	2
Benzo (a) pirene ($C_{20}H_{12}$)	0,1
Benzene (C_6H_6)	5
Dioxins and Furans TEQ	0,2 ng/Nm^3

CO-INCINERATION

	Standard (mg/Nm^3)
Total Suspended Particles (TSP)	100-50
Total Organic Carbon	20
Carbon Monoxide	50
Cadmium (Cd)	0,1
Mercury (Hg)	0,1
Beryllium (Be)	0,1
Lead (Pb)	1
As+Co+Ni+Se+Te	1
Sb+Cr+Mn+V	5

CO-INCINERATION

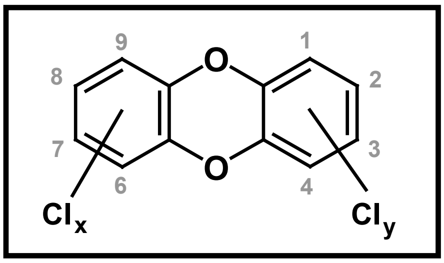
	Estándar (mg/Nm^3)
Hydrochloric Acid (HCl)	10-30
Hydrofluoric Acid (HF)	1-5
Benzo(a)pirene ($C_{20}H_{12}$)	0,1
Benzene (C_6H_6)	5
Dioxins and Furans TEQ	0,2 ng/Nm^3

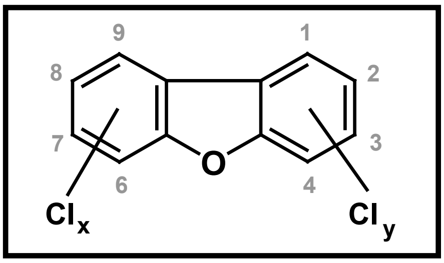
Dioxin and Furan Analysis of Environmental Samples in Brazil

Thomas Krauss, Fundação Oswaldo Cruz

Dioxin and Furan Analysis of Environmental Samples

Thomas Krauss



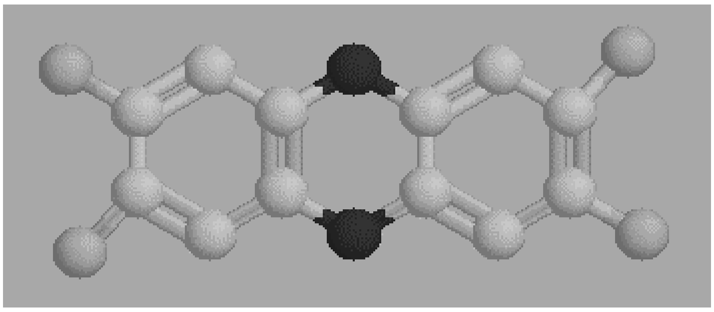


Polychlorinated Dibenzo-p-dioxins (PCDDs)

75 congeners

Polychlorinated Dibenzofurans (PCDFs)

135 congeners



2,3,7,8-Tetrachlorodibenzo-p-dioxin
(2,3,7,8-TCDD)

Congener	I-TEF	WHO-TEF
2,3,7,8-TCDD	1	1
1,2,3,7,8-PeCDD	0,5	1
1,2,3,4,7,8-HxCDD	0,1	0,1
1,2,3,6,7,8-HxCDD	0,1	0,1
1,2,3,7,8,9-HxCDD	0,1	0,1
1,2,3,4,6,7,8-HpCDD	0,01	0,01
OCDD	0,001	0,0001
2,3,7,8-TCDF	0,1	0,1
1,2,3,7,8-PeCDF	0,05	0,05
2,3,4,7,8-PeCDF	0,5	0,5
1,2,3,4,7,8-HxCDF	0,1	0,1
1,2,3,6,7,8-HxCDF	0,1	0,1
1,2,3,7,8,9-HxCDF	0,1	0,1
2,3,4,6,7,8-HxCDF	0,1	0,1
1,2,3,4,6,7,8-HpCDF	0,01	0,01
1,2,3,4,7,8,9-HpCDF	0,01	0,01
OCDF	0,001	0,0001

Sources

- Incineration, combustion and other thermic processes of organic materials
- Chemical processes involving chlorinated organic chemicals

Contamination of the Environment

- Principally via emissions from thermic sources
- Use of contaminated material

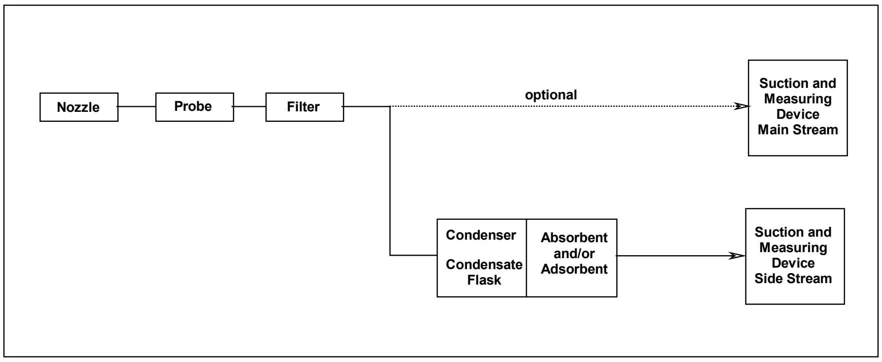
Determination of dioxins and furans

- ✓ **Sampling**
- ✓ **Extraction and clean-up**
- ✓ **Identification and quantification**

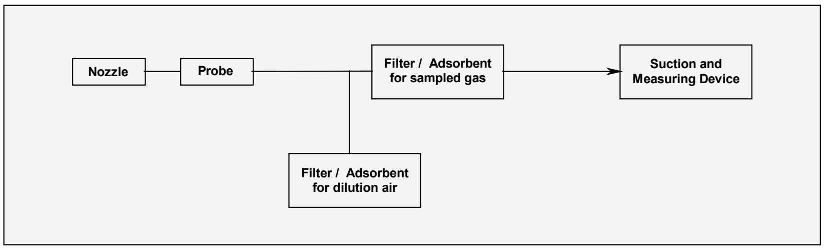
Emission Sampling

- ➢ **Isokinetic sampling**
- ➢ **Collecting PCDD/Fs in the gase phase and adsorbed on particles**
- ➢ **Choice of three methods:**
  - **filter/condenser method**
  - **dilution method**
  - **cooled probe method**

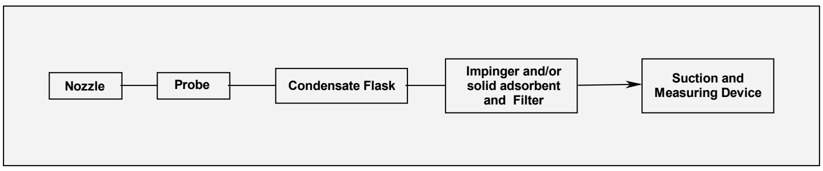
Filter/Condenser Method



Dilution Method



Cooled Probe Method



Minimum Requirements for sampling

- Control blanc
- Leak check
- Maximum sampling time: 8 hours
- Spiking of the sampling train with three defined sampling standards (^{13}C-labelled)
- Sampling shall be carried out at representative positions in the duct

Extraction

- Extraction of all sampling media and parts of the sampling train which contain PCDD/Fs
- Spiking of the samples with ^{13}C-labelled internal standards before extraction
- Soxhlet extraction of the solid parts of the sample with toluene or dichloromethane
- Liquid/liquid extraction of aqueous liquids with toluene or dichloromethane

Clean-up

Main purpose:

- **Removal of sample matrix components, which may overlaod the separation method, disturb the quantification or otherwise severely impact the performance of the identification and quantification method.**
- **Enrichment of the analytes in the final sample extract.**

The clean-up method must recover the analytes in sufficient quantities.

Clean-up steps

- **Gel permeation chromatography**
- **Multilayer column liquid chromatography using silica with different activity grades and surface modifications**
- **Column adsorption chromatography using activated carbon**
- **Column liquid chromatography on alumina of different activity grade and acidity/basicity**

Instrumental Analysis

- PCDD/F-congeners (tetra-octa) are separated by High Resolution Gas Chromatography (HRGC) on polar and non polar fused silica columns.
- Detection is carried out on High Resolution Mass Spectrometry (HRMS) using the multiple ion detection (MID) mode. Ionization is performed under electron impact (EI) conditions.
- Spiking of the final sample solution with ^{13}C-labelled recovery standard before injection.

Identification and Quantification

- PCDD/F isomers are identified by retention time and isotope ratio ($^{35}Cl/^{37}Cl$).
- The PCDD/F amount is quantified by comparing the responses of the internal standards with those of the native congeners.
- The recovery of sampling and clean-up is calculated by comparing the response of the recovery standard with those of the internal and sampling standards.

Minimum Requirements for Identification

- Resolution of greater or equal to 10 000
- At least two ions of the molecular isotope cluster shall be recorded (natives and labelled standards)
- Isotope ratio shall match the theoretical value within +/- 20%
- Signal-to-noise ratio shall be at least 3:1 for the signal used for quantification.

Minimum Requirements for Quantification

- Peak shape of the GC signal of a congener shall contain ten or more sampling points.
- Separation of the 2,3,7,8-congeners from interfering congeners with a 90% valley relative to highest peak.
- Recovery rate for the 2,3,7,8-congeners:
  - 50% to 130% for tetra- to hexa-congeners
  - 40% to 130% for hepta- and octa-congeners

Congeners ($^{13}C_{12}$)	Sampling (pg)	Extraction (pg)	Recovery (pg)
2,3,7,8-TCDF		400	
1,2,3,4-TCDD			400
2,3,7,8-TCDD		400	
1,2,3,7,8-PeCDF	400		
2,3,4,7,8-PeCDF		400	
1,2,3,7,8-PeCDD		400	
1,2,3,4,7,8-HxCDF		400	
1,2,3,6,7,8-HxCDF		400	
1,2,3,7,8,9-HxCDF	400		
2,3,4,6,7,8-HxCDF		400	
1,2,3,4,7,8-HxCDD		400	
1,2,3,6,7,8-HxCDD		400	
1,2,3,7,8,9-HxCDD			400
1,2,3,4,6,7,8-HpCDF		800	
1,2,3,4,7,8,9-HpCDF	800		
1,2,3,4,6,7,8-HpCDD		800	
OCDF		800	
OCDD		800	

Detection Limits

Matrix	Detection limit for 2,3,7,8-TCDD
Stack emissions	1 –5 pg/m^3
Ambient air	1 fg/m^3
Indoor air	10 fd/m^3
Drinking water	10 fg/l
Soil	0,1 ng/kg
Human blood	0,5 – 1 pg/g fat
Milk	0,1 pg/g fat

Best Environmental practices for achieving the Stockholm Treaty's Goal for Byproduct POPs
Pat Costner, Greenpeace

UNEP Chemicals / Secretariat of the Basel Convention
Regional Workshop on BAT and BEP , Buenos Aires,
21-26 October 2002

BEST ENVIRONMENTAL PRACTICES FOR ACHIEVING THE STOCKHOLM TREATY'S GOAL FOR BYPRODUCT POPs

Pat Costner

Senior Scientist, International Science Unit

STOCKHOLM TREATY'S GOAL FOR BYPRODUCT POPS:

"… *reduce the total releases*" of byproduct POPs "*with the goal of their continuing minimization and, where feasible, ultimate elimination*."

(taken from Article 5)

KEY TERMS IN THE CHAPEAU OF ARTICLE 5 OF THE STOCKHOLM TREATY

- ✓ "***total releases***" **means ALL byproducts in ALL forms – gaseous, liquid and solid.**
- ✓ "***continuing minimization***" **means that all byproduct releases must go LOWER and LOWER and LOWER yet again.**
- ✓ "***feasible***" **means possible.**
- ✓ **"ultimate elimination" means that releases are eventually to reach ZERO.**

Best Available Technique (BAT)

"Best available techniques" means the most effective and advanced stage in the development of activities and their methods of operation which indicate the practical suitability of particular techniques for providing in principle the basis for release limitations designed to prevent and, where that is not practicable, generally to reduce releases of chemicals listed in Part I of Annex C and their impact on the environment as a whole. (excerpted from Article 5)

KEY TERMS IN THE STOCKHOLM TREATY'S DEFINITION OF BEST AVAILABLE TECHNOLOGY

- ✓ "*most effective*" means most successful in achieving zero releases of POPs byproducts.
- ✓ "*to prevent*" means to avoid or to put a stop to releases of POPs byproducts.
- ✓ "*practicable*" means doable or possible.

In other words, Best Available Techniques are those techniques that are most successful in preventing the release of POPs byproducts. .

BEST AVAILABLE TECHNIQUES (BAT) AS DEFINED IN THE CONVENTION ON THE LONG RANGE TRANSBOUNDARY AIR POLLUTION ON PERSISTENT ORGANIC POLLUTANTS (LRTAP)

LRTAP: GENERAL APPROACHES TO CONTROLLING EMISSIONS OF POPs

There are several approaches to the control or prevention of POP emissions from stationary sources. These include the replacement of relevant feed materials, process modifications (including maintenance and operational control) and retrofitting existing plants. The following list provides a general indication of available measures, which may be implemented either separately or in combination:

(a) Replacement of feed materials which are POPs or where there is a direct link between the materials and POP emissions from the source;

Source: LRTAP, Annex V, Best Available Techniques to Control Emissions of Persistent Organic Pollutants from Major Stationary Sources, Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Persistent Organic Pollutants.

LRTAP's THREE BASIC STRATEGIES FOR THE CONTROL OR PREVENTION OF EMISSIONS OF POPs

- ✓ ***"replacement of relevant feed material"*** **entails substitution – changing the materials that take part in the process so that POPs are no longer created.**

- ✓ ***"process modifications (including maintenance and operational control)"*** **entails changing the process conditions so that they no longer favor the formation of POPs.**

- ✓ ***"retrofitting existing plants"*** **entails installing add-on processes for destroying the POPs in all products and residues of the original process.**

THE BAT FROM LRTAP THAT IS MOST CERTAIN TO PREVENT FORMATION AND RELEASE OF POPs

"Replacement of feed materials which are POPs or where there is a direct link between the materials and POP emissions from the source"

-- LRTAP

"Polychlorinated dibenzo-p-dioxins and dibenzofurans, hexachlorobenzene and polychlorinated biphenyls are unintentionally formed and released from thermal processes involving organic matter and chlorine …"

-- Stockholm Treaty Annex C, Part II

The currently targeted byproduct POPs are formed only when <u>chlorine</u> is present.

***

The Best Available Technique for preventing the formation of byproduct POPs is to avoid chlorine and chlorine-containing materials.

BAT FOR ROAD TRANSPORT MOTOR VEHICLES

Management Options

Avoiding adding halogenated compounds to fuels

- 1,2-dichloromethane
- 1,2-dichloromethane and corresponding bromo compounds as scavengers in leaded fuels for spark ignition engines
  (Bromo compounds may lead to the formation of brominated dioxins or furans.)

Avoiding halogenated additives in fuels and lubricants.

Source: LRTAP, Annex VII: Recommended Control Measures for Reducing Emissions of Persistent Organic Pollutants from Mobile Sources. Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Persistent Organic Pollutants.

BAT FOR POWER/ENERGY GENERATION

- It should be noted that PCDD/F emissions could increase significantly if waste material (sewage sludge, waste oil, rubber wastes, etc.) is added to the fuel. …

Source: LRTAP, ANNEX V, BEST AVAILABLE TECHNIQUES TO CONTROL EMISSIONS OF PERSISTENT ORGANIC POLLUTANTS FROM MAJOR STATIONARY SOURCES. Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Persistent Organic Pollutants.

BAT for Metallurgical Industries

MANAGEMENT OPTIONS	ESTIMATED COSTS
NON-FERROUS METALS PRODUCTION	
> Pre-sorting of scrap, avoidance of feed material like plastics and PVC-contaminated scrap, stripping of coatings and use of chlorine-free insulating materials	Low
SECONDARY ALUMINUM PRODUCTION	
> Avoidance of halogenated materials (hexachloroethane)	Low
> Avoidance of chlorine-containing lubricants (for instance, chlorinated paraffins); and	Low
> Clean-up and sorting of dirty scrap charges	Low

Source: LRTAP, Annex V, Best Available Techniques to Control Emissions of Persistent Organic Pollutants from Major Stationary Sources. Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Persistent Organic Pollutants

BAT FOR HOUSEHOLD STOVES

- The emissions from residential combustion appliances can be reduced by restricting the input materials to good-quality fuel and avoiding the burning of waste, halogenated plastics and other materials.

-Burning packing material added to solid fuels increases PCDD/F emissions. Even though it is prohibited in some countries, the burning of rubbish and packing material may occur in private households. Due to increasing disposal charges, it must be recognized that household waste materials are being burned in domestic firing installations.

-The use of wood with the addition of waste packing material can lead to an increase in PCDD/F emissions from 0.06 ng TE/m^3 (exclusively wood) to 8 ng TE/m^3 (relative to 11% O_2 by volume). These results have been confirmed by investigations in several countries in which up to 114 ng TE/m^3 (with respect to 13% oxygen by volume) was measured in waste gases from residential combustion appliances burning waste materials.

Source: LRTAP, ANNEX V, BEST AVAILABLE TECHNIQUES TO CONTROL EMISSIONS OF PERSISTENT ORGANIC POLLUTANTS FROM MAJOR STATIONARY SOURCES. Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Persistent Organic Pollutants.

"An important measure to reduce dioxin emissions is the reduction of chlorine in fuels used for small and smallest firing installations. Dioxin emissions of domestic households and the agriculture and forestry sector can be reduced primarily by the use of "clean" fuels such as untreated wood, oil and gas together with modern firing installations. Therefore, the joint combustion of different types of waste in such installations should be banned in the view of the Austrian Federal Environment Agency."

Hübner, C., Boos, R., Bohlmann, J., Burtscher, K., Wiesenberger, H., **2000** . State- of- the- art measures for dioxin reduction in Austria. (In Österreich eingesetzte Verfahren zur Dioxinminderung - Deutsche Zusammenfassung) Wien, 2000. (Monographien; Band 116)

BAT FOR LANDFILL FIRES AND OPEN BURNING

- Replace PVC in packaging and other products destined for landfills or possible open burning with chlorine-free materials. I.e., appropriate materials policies can be effective in preventing dioxin formation.
- Data presented in a recent study of PVC in landfills indicate that, in Europe, 97 percent of chlorine in municipal solid waste is contributed by PVC.

  Source: Mersiowsky, I., Stegmann, R., Ejlertsson, J., Svensson, B., 1999. Long-term behaviour of PVC products under soil-buried and landfill conditions: Final report of the research project. Hamburg: Technische Universitat.

BAT FOR MUNICIPAL AND MEDICAL WASTE INCINERATORS

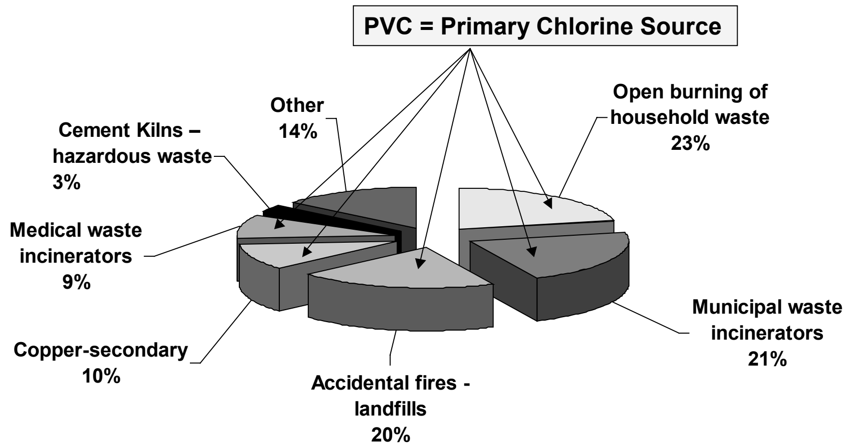
In 1997, the U.S. Environmental Protection Agency acknowledged that "[s]everal studies have identified strong correlations between chlorine content and CDD/CDF [dioxin] emissions during combustion tests." At the same time, the Agency confirmed that PVC is a dioxin precursor.

Source: U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Office of Air and Radiation, 1997. LOCATING AND ESTIMATING AIR EMISSIONS FROM SOURCES OF DIOXINS AND FURANS, EPA-454/R-97-003, Research Triangle Park, North Carolina, May 1997.

At the Bielefeld municipal waste incinerator in Germany, effective measures for reducing dioxin emissions included "exclusion of PVC and computer scrap in the input."

Source: Wilken, M.; Boske, J.; Jager, J.; Zeschmar-Lahl, B. 1994. PCDD/F, PCB, chlorobenzene and chlorophenol emissions of a municipal solid waste incineration plant (MSWI) - variation within a five day routine performance and influence of Mg(OH)2-addition. Chemosphere 29 (9-11): 2039-2050.

US: Sources of Dioxin Releases to Air, Relative Contributions

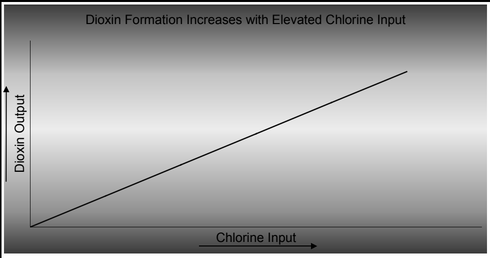


Total Dioxin Releases to Air = 5173 g TEQ/year

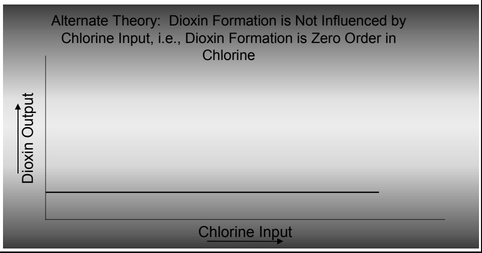
BAT FOR COMBUSTION PROCESSES: AVOID PVC, THE PRIMARY SOURCE OF CHLORINE FOR DIOXIN FORMATION

- MUNICIPAL WASTE INCINERATORS
- MEDICAL WASTE INCINERATORS
- SECONDARY COPPER PRODUCTION
- OPEN BURNING (HOUSEHOLD TRASH BURNING, DUMP FIRES, LANDFILL FIRES)
- ACCIDENTAL FIRES (CHEMICAL PRODUCTION FACILITIES, CHEMICAL& PVC STORAGE FACILITIES, BUILDINGS, VEHICLES, ETC.)

PVC



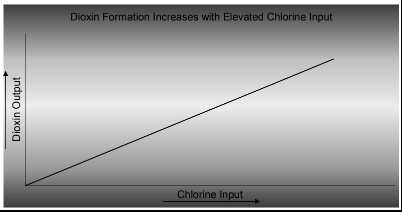
IF MORE CHLORINE GOES INTO AN INCINERATOR DOES MORE DIOXIN COME OUT?



The U.S. Environmental Protection Agency has acknowledged that, for laboratory- and pilot-scale studies, their *"review of experimental data clearly indicates an association between chlorine content of feed/fuels and the potential synthesis of CDDs and CDFs."*

Source: U.S. Environmental Protection Agency, 2000. Exposure and Human Health Reassessment of 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD) and Related Compounds. Washington, DC, September 2000.

<u>MANY</u> STUDIES WITH LABORATORY- AND PILOT-SCALE COMBUSTORS HAVE FOUND THAT INCREASED CHLORINE INPUT LEADS TO GREATER DIOXIN FORMATION



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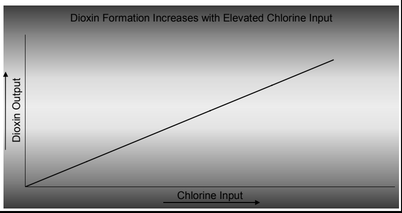
STUDIES OF SMALL-SCALE AND OTHER COMBUSTION SYSTEMS HAVE FOUND THAT INCREASED CHLORINE INPUT LEADS TO GREATER DIOXIN FORMATION



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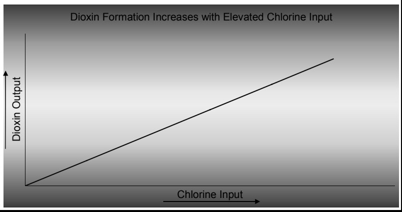

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No scientific theory has been advanced to explain how or why the chlorine/dioxin relationship in full-scale waste incinerators should differ from that in other combustion systems. However, a very practical explanation for the inconsistent findings among studies of waste incinerators can be found among the many factors that are known to weaken and confound the results of such studies (e.g., study design flaws; sampling and analytical methods that yield highly uncertain data; delayed release of dioxins (the so-called `memory' effect'), and high variability of waste contents and incinerator operating conditions).

Along with other extraneous elements, these factors create a background of experimental `noise' too great to allow consistent characterization of the relationship of chlorine input and dioxin formation in full-scale waste incinerators. Taking that background noise into account, the many studies that have been conducted in a variety of different combustion systems, including full-scale waste incinerators, constitute a compelling body of evidence that dioxin formation in waste incinerators decreases when chlorine input is reduced.

In the Convention on Long-Range Transboundary Air Pollution, the Parties have agreed that reducing inputs of plastics, e.g., PVC and other chlorine-containing materials, is an effective and often low-cost method for reducing dioxin formation in full-scale combustion systems including iron/steel production, sinter plants, primary and secondary copper production, aluminum production, utility and industrial boilers, motor vehicles and domestic appliances.

Source: Long Range Transport of Air Pollutants, Annex V, Best Available Techniques to Control Emissions of Persistent Organic Pollutants from Major Stationary Sources and Annex VII, Recommended Control Measures for Reducing Emissions of Persistent Organic Pollutants from Mobile Sources. Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Persistent Organic Pollutants.

Primary sources of dioxin and other by-product POPs are:

- **Processes in which chlorine or a chlorine-containing material is essential. In almost all cases these are chemical manufacturing processes. In some cases, the primary route of dioxin release to the environment is in products and materials. Most often, dioxins are concentrated in production wastes so that the wastes and/or the gaseous, liquid and solid residues from their treatment are the primary routes of dioxin release.**
- **Processes in which chlorine or a material containing chlorine is used for a specific purpose that can be fulfilled by a non-chlorinated material (e.g., the use of elemental chlorine or chlorine dioxide for bleaching wood pulp); and**
- **Processes in which chlorine or chlorine-containing materials are not introduced for any intended purpose but are only incidentally present (e.g., the burning of wastes, some metallurgical processes, power generation, accidental fires, etc.)**

Arndt, R., 2000. Measures to reduce or eliminate releases from unintentional production of by-products in the Stockholm Convention. Presented at Dioxin 2001 -- 21st International Symposium on Halogenated Environmental Organic Pollutants & POPs, Kyoung ju, Korea, Sept. 9-14, 2001.

In conclusion …

SUBSTITUTION is the agreed BAT for byproduct POPs

"When considering proposals to construct new facilities or significantly modify existing facilities using processes that release [byproduct POPs], priority consideration should be given to alternative processes, techniques or practices that have similar usefulness but which avoid the formation and release of such chemicals …"

-- Stockholm Treaty
Annex C, Part V
B. Best available techniques

BAT for byproduct POPs is SUBSTITUTION

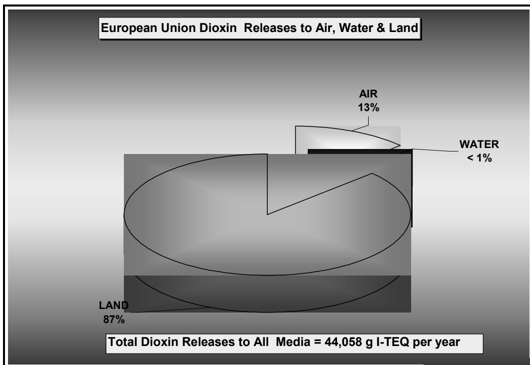
* Substitute those processes and products that require the use of chlorine and chlorine-containing materials with those that do not;
* For processes in which chlorine or a material containing chlorine is used for a specific purpose, substitute with a non-chlorinated material; and
* For processes in which chlorine or chlorine-containing materials are not introduced for any intended purpose but are only incidentally present, do not allow the introduction of such materials.

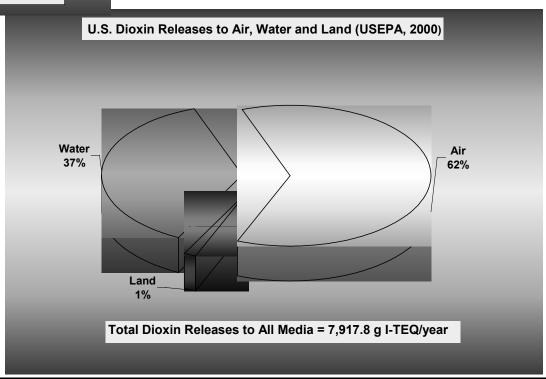
MAS VALE PREVENIR QUE CURAR

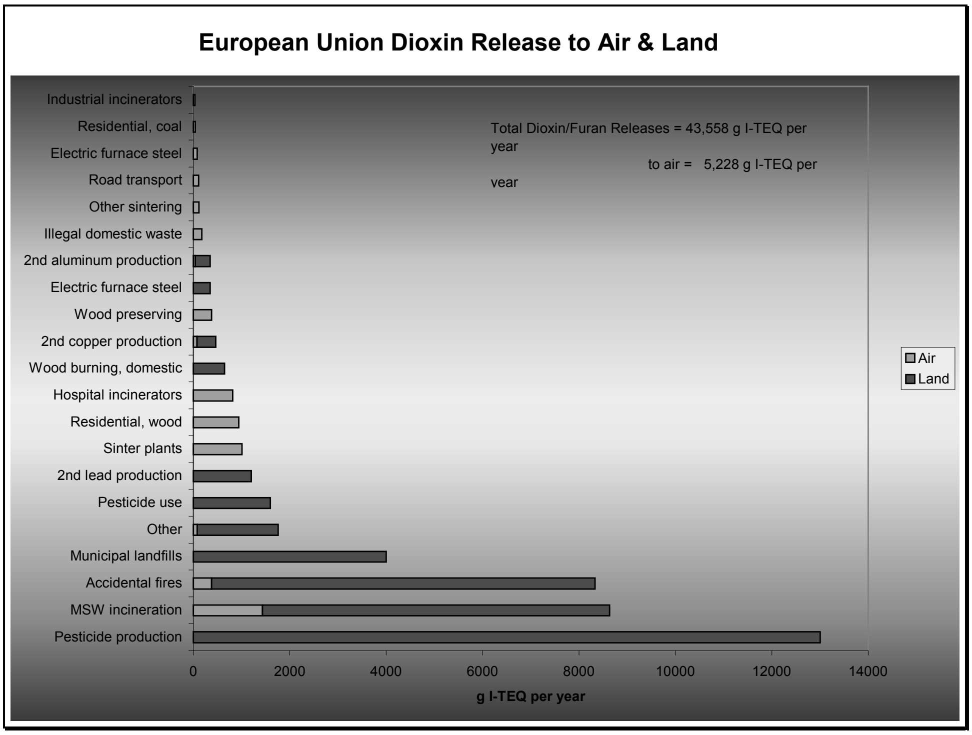
GREENPEACE

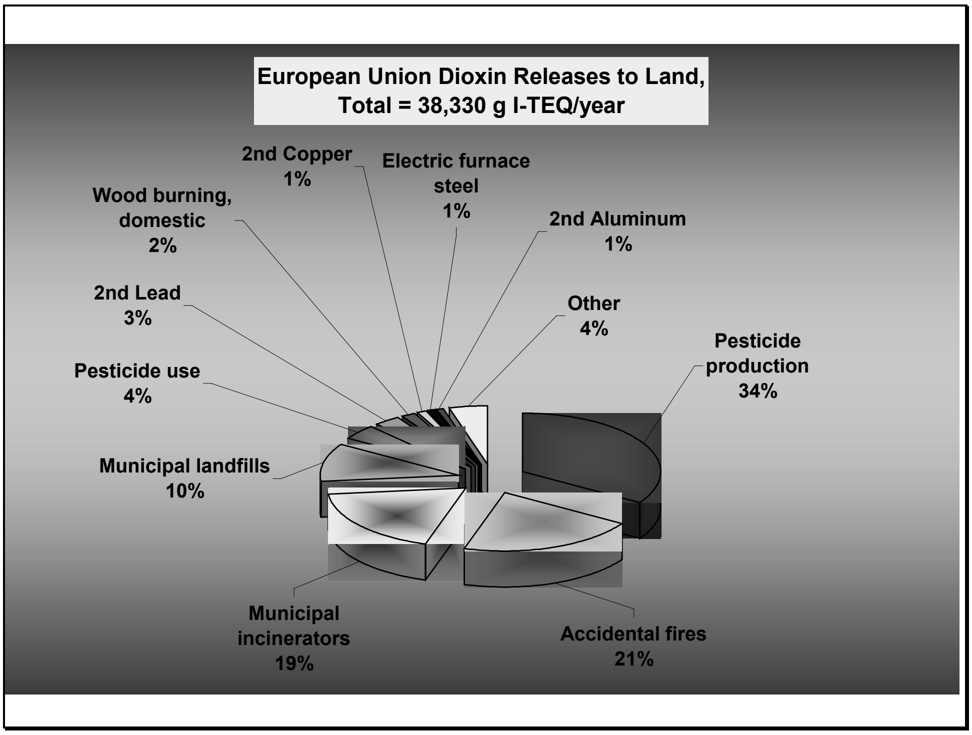
DOWN TO ZERO

DIOXIN INVENTORIES






European Union Dioxin Release to Air & Land
Industrial incinerators
Residential, coal
Electric furnace steel
Road transport
Other sintering
Illegal domestic waste
2nd aluminum production
Electric furnace steel
Wood preserving
2nd copper production
Wood burning, domestic
Hospital incinerators
Residential, wood
Sinter plants
2nd lead production
Pesticide use
Other
Municipal landfills
Accidental fires
MSW incineration
Pesticide production
Total Dioxin/Furan Releases = 43,558 g I-TEQ per year
to air = 5,228 g I-TEQ per year
Air
Land
0
2000
4000
6000
8000
10000
12000
14000
g I-TEQ per year


European Union Dioxin Releases to Land, Total = 38,330 g I-TEQ/year
2nd Copper 1%
Electric furnace steel 1%
Wood burning, domestic 2%
2nd Aluminum 1%
2nd Lead 3%
Other 4%
Pesticide production 34%
Pesticide use 4%
Municipal landfills 10%
Municipal incinerators 19%
Accidental fires 21%

IDENTIFY DIOXIN SOURCES

"FOLLOW THE CHLORINE"

ELIMINATE DIOXIN SOURCES

"GET THE CHLORINE OUT"

PRIMARY SOURCES

1) CHLORINE REQUIRED FOR PROCESS

   PHASE-OUT PROCESS

2) CHLORINE USED AS AGENT ONLY

   REPLACE WITH CHLORINE- FREE SUBSTITUTE

3) CHLORINE NOT USED OR NEEDED

   PROHIBIT OR REMOVE CHLORINE-CONTAINING MATERIALS

SECONDARY SOURCES

DESTROY BY APPROPRIATE MEANS

1) ~ 100% DESTRUCTION EFFICIENCY
2) COMPLETELY CONTAIN ALL RESIDUES (GAS, LIQUID & SOLID) FOR ASSAY AND, IF NEEDED, REPROCESSING
3) NO UNCONTROLLED RELEASES

FURTHER INFORMATION

http://www.greenpeace.org/

- **Chlorine, Combustion and Dioxin**
- **Incineration and Human Health**
- **Dioxin Elimination: A Global Imperative**
- **The Burning Question: Chlorine & Dioxin**
- **Technical Criteria for the Destruction of Stockpiled Persistent Organic Pollutants**

http://www.ipen.org

- **By-Products – the Challenge: Comments on the Stockholm Convention**

pat.costner@dialb.greenpeace.org

Some Effects of Burning Hazardous Waste in Cement Kilns

Dioxins in Stack Gas	⇧	80 times Higher
Dioxins in Cement kiln Dust	⇧	100 Times Higher
Cement Kiln Dust	⇧	75-104 Percent Higher
Airborne Particulates	⇧	66-203 Percent Increase
Metals in Stack Gas	⇧	Increased
Metals in Cement Kiln Dust	⇧	Increased
Metals in Product	⇧	Increased
Upsets	⇧	More Frequent

POPs By-products: Measures towards Elimination or Reduction
Heidelore Fiedler, UNEP Chemicals

UNEP

POPs By-products: Measures towards Elimination or Reduction

POPs By-products: Measures towards Elimination or Reduction

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CH-1219 Châtelaine (GE), Switzerland
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UNEP

POPs By-products: Measures towards Elimination or Reduction

Provision of Stockholm Convention on POPs

"Each Party shall at a minimum take the following measures to reduce the total releases derived from anthropogenic sources of each of the chemicals listed in Annex C, with the goal of their continuing minimization and, where feasible, ultimate elimination: "

(Stockholm Convention, Article 5)

Detoxification and Prevention Measures

(i) Use of improved methods for flue-gas cleaning such as thermal or catalytic oxidation, dust precipitation, or adsorption;

(ii) Treatment of residuals, wastewater, wastes and sewage sludge by, for example, thermal treatment or rendering them inert or chemical processes that detoxify them;

(iii) Process changes that lead to the reduction or elimination of releases, such as moving to closed systems;

(iv) Modification of process designs to improve combustion and prevent formation of the chemicals listed in this Annex, through the control of parameters such as incineration temperature or residence time.

(Stockholm Convention, Annex C, Part V)

Tiered Approach towards Reduction/ Elimination

(a) establish action plan

(b) promote measures to achieve realistic release reduction or source elimination

(c) Promote/require the use of substitute or modified materials, products and processes to prevent the formation and release of the chemicals in Annex C

(d) Promote/require the use of best available techniques for new sources and promote use of best environmental practices for identified source categories

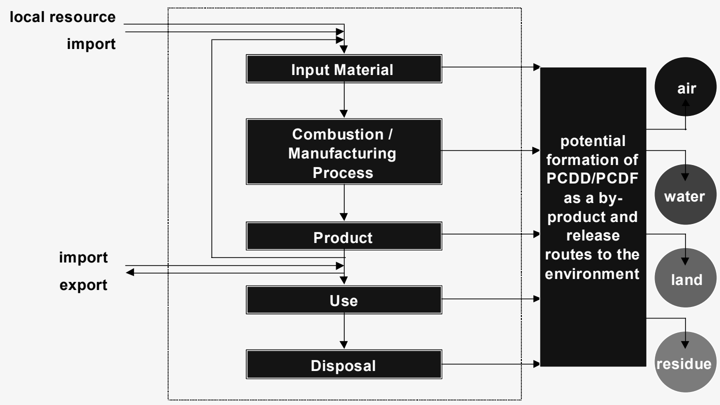
(e) Promote the use of BEP for existing sources and for sources not covered under (d)

(Stockholm Convention, Article 5 (a)-(e))

Dioxin/Furan
"Life Cycle"

POPs By-products: Measures towards Elimination or Reduction

PCDD/PCDF Release Routes



Schematic Product Lifecycle

Determination of Potential PCDD/PCDF Release Routes

PCDD/PCDF Reduction Measures

- Complete source elimination
- Optimization of process technology
- Change in production technology
- Application of PCDD/PCDF control and reduction techniques

Complete Source Elimination

All are indirect measures:

- Ban of chemicals known to be contaminated with PCDD/PCDF
- Examples are where countries have phased out production and use of:
  - 2,4,5-trichlorophenoxy acetic acid (2,4,5-T)
  - polychlorinated biphenyls (PCB)
  - pentachlorophenol (PCP)

POPs By-products: Measures towards Elimination or Reduction

Optimization of Process Technology

- Ensure adequate operation and maintenance of the equipment at all times
- Keep all equipment in good working order and as designed operating conditions
- Train personnel with respect to understanding the implications of operating procedures
- Closely monitor and control the process
- Modify the existing equipment
- Avoid spills and accidental releases

POPs By-products: Measures towards Elimination or Reduction

Change in Production Technology

- Ensure adequate operation and maintenance
- Minimize or eliminate inevitable releases
- Minimize or eliminate waste generated
- Modernize/upgrade the existing equipment
- Replace existing equipment and switch to a different, more efficient technology
- Switch to an entirely different production process

Apply Dioxin Reduction Techniques

- Ensure adequate operation and maintenance
- Protect the production facility from weather
- Contain the production facility in a concrete basin
- Apply a leachate collection and treatment system
- Collect and treat all liquid, sludge, and solid waste
- Remove particulate matter from flue gas
- Apply adsorption filters to flue gas

Cost and Transferability of Various PCDD/PCDF Reduction Techniques

POPs By-products: Measures towards Elimination or Reduction

Reduction Techniques - Generic Cost

Criteria	Mechan. (concentrat.)	Biolog. (concentrat. + destruct.)	Phys./Chem. (concentrat. + destruct.)
Cost	L	L	H
Performance	H	L	H
Availability	H	L	H
Experience	H	L	H
Infrastructure demands	L	M	H
Human resource capacity	L	H	H
Space requirements	M	H	L
Range of applicability	L	L	H

Prevention technology and storage are not included in this table
Evaluation according to L (Low), Medium (M) and H (High)

POPs By-products: Measures towards Elimination or Reduction

Transferability and Efficiency

	Transferability	Efficiency
Mechanical Techniques		
Easy to install Simple to operate Inexpensive to maintain	**High**	**Medium**
Biological Techniques		
Easy to install Simple to operate Difficult to maintain	**Medium**	**Low**
Physical/Chemical Techniques		
Difficult to install Difficult to operate Difficult to maintain	**Low**	**High**

Water

Contaminated Aqueous Effluents

- **Gravity: settling ponds, addition of clarifiers**
- **Filtration:**
  PCDD/PCDF are bound to particles
  - sand or gravel filters, membrane filters
  - adsorption to active carbon, charcoal, zeolites, ..
  - dispose of solid materials
  ⇒ contamination stays, moved to another matrix
- **UV-light irradiation (if no particles, turbidity)**
  ⇒ oxidative breakdown of PCDD/PCDF
  formation of toxic byproducts possible

Effluents/Products: Primary Measures

- Process modification, *e.g.*
  - change input materials: untreated wood, coal with low VOC content, degreased metals
  - change synthesis pathway (chloranil from hydroquinone)
  - avoid UV light, radicals, alkaline extraction steps
  - avoid high temperatures (> 130 °C)
  - exchange catalysts ($AlCl_3$, $FeCl_3$ not from scrap)
  - establish closed circles (effluent-free)

Pulp Mills: Substitution of Free Chlorine

- Chlorine bleach used for delignification of fibers
- Bleaching agents:
  - Cl_2 free/elemental chlorine
  - ClO_2 chlorine dioxide (ECF: Cl_2 free)
  - O_3, ethanol total chlorine free (= TCF)
- Chlorine bleaching → high PCDD/PCDF concentrations; chlorine pattern = 2,3,7,8-Cl_4DF, 2,3,7,8-Cl_4DD and 1,2,7,8-Cl_4DF
- Modern technologies: low in PCDD/PCDF, different pattern (Cl_4DD, Cl_4DF not dominating)

Chemical Processes

- **If chlorine is present, avoid:**
  - High process temperatures (>130 °C)
  - Alkaline extraction steps (purification)
  - Presence of radicals
  - Presence of UV light
- **Potential for PCDD/PCDF contamination:**
  Chlorophenols and derivatives (PCP, PCB, 2,4,5-T)
  Chlorobenzenes
- Manufacture of chlorine with graphite electrodes

UNEP
POPs By-products: Measures towards Elimination or Reduction

Land, Soil, and Sediment

Soil and Sediment

- Prevent erosion/movement with water stream
- Identify how much is contaminated (area, depth)
- Immobilization, encapsulation
- Excavation of soil/sediment
  - Thermal desorption + combustion of off-gases
  - Thermal treatment of soil/sediment (combustion, pyrolysis = in absence of oxygen)
  - Washing of soil with PCDD/PCDF absorbing scrubbing liquid, incineration of the liquid
- Bioremediation (see next slide)

Limitations to Bioremediation

- Low water solubility of PCDD/PCD
- Low mobility in soils and sediments
- High adsorption coefficients to organic matter (particles or organisms)
- Halogen, nitro and sulfonate substituents inhibit biodegradation (general rule)
- Bottom Line: low applicability and efficiency

Air

Formation in Thermal Processes

- PCDD/PCDF formation in gas-phase homogeneous, fast reactions
- PCDD/PCDF formation on particles heterogeneous phase, slow reactions
- Atmosphere: air/oxygen
  pyrolytic (without oxygen)
- Re-formation of PCDD/PCDF takes place at temperatures 200-450 °C

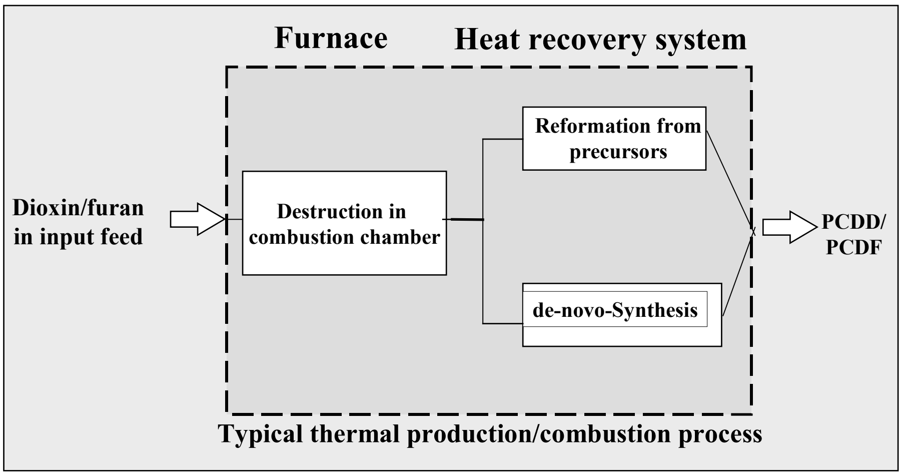
Pro´s and Con´s in Thermal Processes

- **Requirements for dioxin/furan formation:**
  Presence of: carbon, chlorine, oxygen, temperature
- **Favorable for dioxin/furan formation:**
  Presence of catalysts: **copper**, iron, aluminum
- **Prevention of dioxin/furan formation:**
  - equipment design
  - operation and maintenance
  - feed material

Prevention of PCDD/PCDF Formation

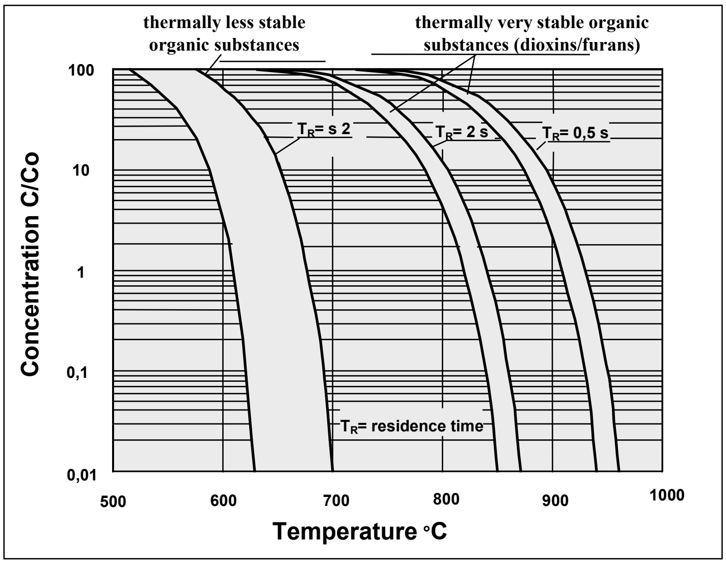
- **Adequate Equipment Design**
  - 3 Ts (temperature, time, turbulence)
  - no ash/soot deposits
- **Adequate Operation and Maintenance**
  - good combustion practice, operation as designed
  - continuous operation >> batch-wise/semi-contin.
- **Feed/Input Material**
  - Sulfur >> chlorine (Decon reaction)
  - Metals content (copper, iron, aluminum)

Thermal Formation



POPs By-products: Measures towards Elimination or Reduction

Thermal Destruction in Air



Combustion Related Issues

- **Uncontrolled burning** (*e.g.* accidents, open burn.) Material selection, practices, legislation
- **Controlled burning** (*e.g.* 3 T's)
  * **Small scale** (*e.g.,* domestic heating, cars, *etc.*)
  * **Large scale** (*e.g.,* waste, steel, non-ferrous metal)
    → **possibilities for intervention**
    a) feed materials
    b) operational conditions (formation mechanism ?)
    c) tertiary measures (APCS, decontamination of residues = slags, ashes)

Small Scale - *e.g.* Transportation

- **Use of leaded gasoline produces highest dioxin/furan emissions;**
- **Diesel engines produce lower dioxin/furan emissions (similar to unleaded gasoline);**
- **Heavy fuel oil fired engines yield higher dioxin/ furan emissions (similar to leaded gasoline);**
- **Very low dioxin/furan emissions from unleaded gasoline engines with catalytic converters.**

Large Scale - Stationary Sources

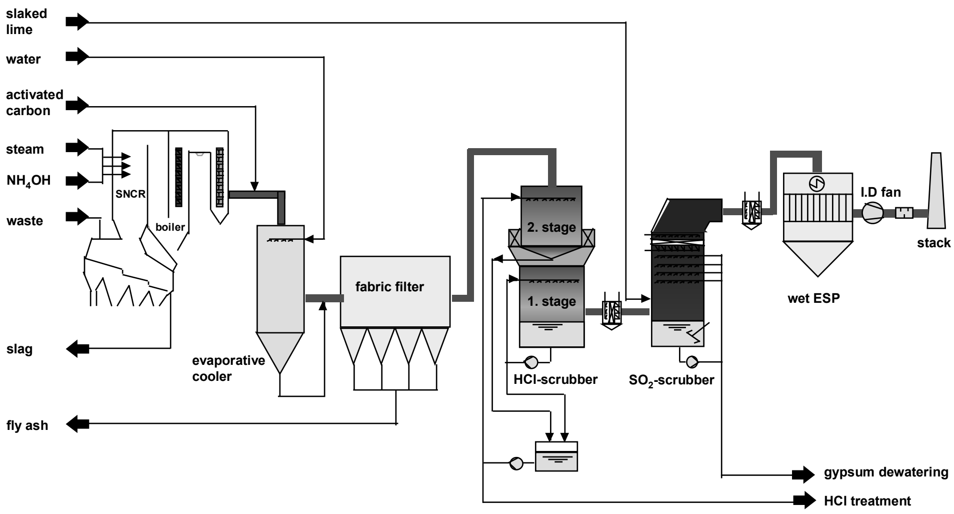
- **Waste Incineration**
- **Thermal Process Industries**
  - cement and mineral processing industry burning hazardous waste
  - chemical industry incl. pulp and paper
  - ferrous and non-ferrous metal industry
- **Fossil Fuel Fired Boilers**
  - utility industry
  - chemical industry incl. pulp and paper
- **Cremation**

Air Pollution Abatement Systems

• **Dry removal of particulate matter**	**- cyclone separators** **- electrostatic precipitators (ESP)** **- baghouses/fabric filters**
• **Wet removal of particulate matter and gases**	**- co-current spray scrubbers** **- counter-current spray scrubbers** **- packed bed scrubbers** **- wet ESP (aerosols only)**
• **Gas adsorption/aerosol removal**	**- entrained flow reactors** **- activated char reactors (ACR)**
• **Catalytic destruction/oxidation**	**- selective catalytic reaction SCR)**

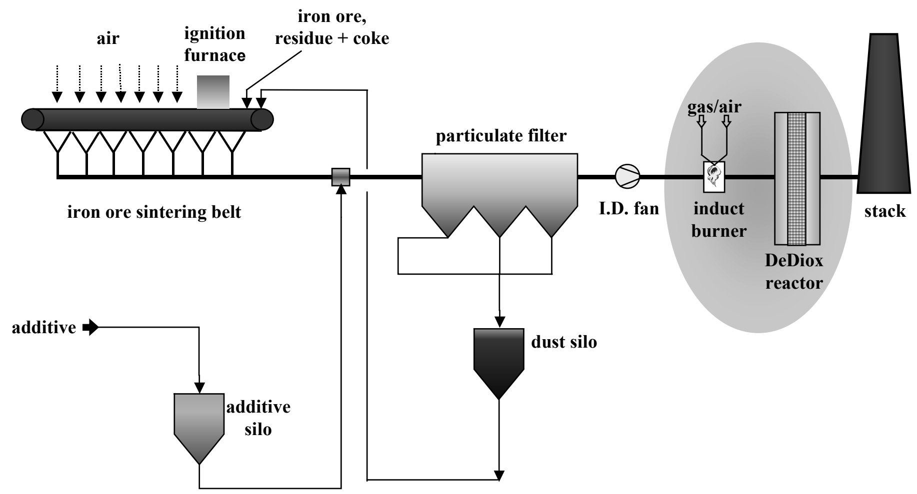
POPs By-products: Measures towards Elimination or Reduction

Principle Flow Scheme of a Modern European Municipal Waste Incineration Plant

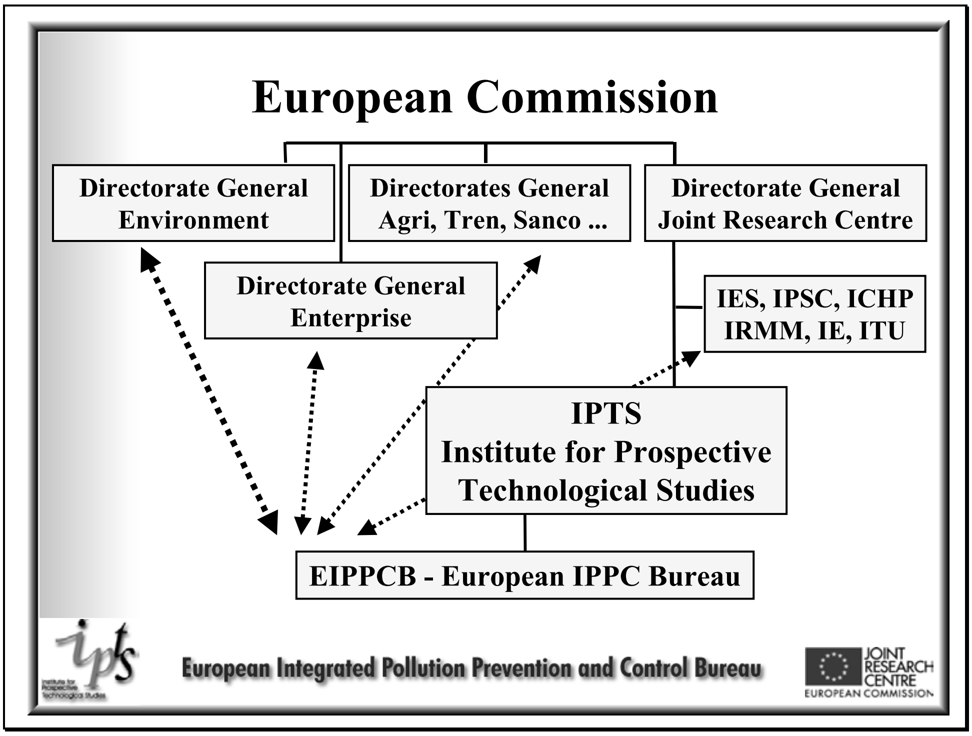


POPs By-products: Measures towards Elimination or Reduction

Iron Ore Sintering Plant Process Flow Scheme



BAT under the European IPPC Directive,
Don Litten, European IPPC Bureau



The European Union @ 2002
15 Member States

European Council Directive 96/61/EC

of 24 September 1996 concerning integrated pollution prevention and control (IPPC)

- **a framework directive aiming at a high level of protection for the environment as a whole - all environmental media**
- **operating permits for industry with conditions to be based on “best available techniques” (bat) - NB also to meet EQS**
- **provides for an exchange of information on bat - Article 16(2)**

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EUROPEAN COMMISSION

EU IPPC Directive Scope

- regulates emissions and consumption in industrial activities.
- does not regulate products.
- not all industry covered - applies to the activities listed in Annex 1.
- mostly manufacturing industry and some waste management activities.

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BAT under IPPC

Key elements :

- waste minimisation, re-use, recycle
- efficient use of energy & raw materials
- balance of costs and advantages
- best for environment as a whole
- focus on process integrated measures
- likely to be current practice somewhere

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IPPC and wider issues

Chlor-Alkali production,

- **clean technology of membrane cells agreed as BAT under IPPC framework.**
- **12000 t mercury inventory in existing European mercury cell plants.**
- **“demand” for mercury about 1000 t/y and falling ?**

Production of Iron & Steel

Sinter plants

- **PCDD/F up to 43 ng/Nm^3 I-TEQ detected (once)**
- **normally 0.5 - 5 ng/Nm^3 I-TEQ after good EP**
- **PCDD/F emission about 1 - 10 Tg I-TEQ/t sinter**
- **PCDF dominate over PCDD**
- **about 100 - 800 mg PAH (EPA16)/t sinter**
- **about 1 - 10 mg PCB (total)/t sinter**
- **de novo synthesis in sinter strand plus PCB detected in coke breeze and iron ores**

Production of Iron & Steel

PCDD/F emissions from EAF with BAT

- **"clean" scrap << 0.1 ng/Nm^3 I-TEQ**
- **"dirty" scrap up to 0.5 ng/Nm^3 I-TEQ**

PAH in Blast Furnace gas (burned as fuel)

- **Benzo(I)Pyrene 80 - 280 Tg/Nm^3**
- **Fluoranthene 150 - 560 Tg/Nm^3**

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Production of Pulp and Paper

Bleaching

- **Use of Chlorine leads to AOX.**
- **Hot debate - Elemental Chlorine Free (ECF) versus Total Chlorine Free (TCF).**
- **TCF generally results in lower AOX, but some ECF plants equally low - not all ECF are equal.**
- **Upstream pulp processing more important than simply ECF versus TCF bleaching.**
- **8 ways to produce ClO_2 - only 2 of which produce low "by-product" chlorine.**

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Production of Cement and Lime

- Cement produced at c 1500 ºC ; 900 ºC for Lime.
- Cement more complex chemistry than Lime (CaO).
- Primary flame temp in cement kiln c 2000 ºC.
- Inherent gas and solid residue time in kiln.
- High destruction of organics in primary zone.
- Counterflow process with volatiles from raw meal.
- BAT kiln - short dry preheater, precalciner - secondary firing < 2000 ºC - exit gas c 300 ºC.
- Some kilns observed with EP running at 400 ºC.

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Waste incineration and treatments

- Generally waste management activities regulated according to BAT have “low” emissions.
- Many “unregulated” waste management activities observed in practice - including incineration.
- Potential emission load (including POPs) from “unregulated” activities may exceed by many times the regulated (reported?) total load.
- Advantages vs disadvantages of “light” regulation or exemption of waste management activities.

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Conclusions

- IPPC BAT is by definition technically and economically viable in the sector.
- IPPC seeks to protect environment "taken as a whole" but is limited to installation boundary.
- Easy words to say, complex to deliver.
- Ultimately "one size fits all" solution to environmental issues may not exist.
- Best decisions are informed decisions.

European Integrated Pollution Prevention and Control Bureau

Conclusions

- IPPC BAT can deliver better environmental performance at EU industrial installations.
- BAT information exchange exposes some issues which cannot be resolved through site permits.
- "waste" management strategies (BEP?) may be as important to overall reductions as BAT.
- Beware the "green" label.

European Integrated Pollution Prevention and Control Bureau

Experience with BAT/BEP in Germany
Wolf Drechsler, Environmental Protection Agency

Presentation

Experience with BAT/BEP in Germany

-technical and legislative implementacion-

Dr. Wolf Drechsler
Federal Enviromental Agency, Berlin

•Introduction
•Technical Concept
•Legislation Concept

Introduction

•Reduce or eliminate the release of by-products (PCDD/F, HCB, PCB) from unintentional production worldwide

•Stockholm Convention on POPs, Article 5 and Annex C

•Release Inventories. Reduction Instruments (BAT/BE) & Implementation Measures

PCDD/F Sources

- **Combustion Processes**
  - Industrial
  - Residential
- **Industrial Production Processes**
  - Sinter-, Steel-, Non-Fe-Metal-plants
  - Pulp & Paper
- **Waste-/Backyard-Incineration**
- **Traffic**

PCDD/F Inventory, Germany

Source	Release 1994 (g TEQ/a)	Reduction Potential (g TEQ/a)
Iron & Steel	220	40
Non-Ferrous-Metal	91	3
Waste Incineration	30	< 0,5
Industrial Combustion	15	< 10
Residential Combustion	15	< 10
Traffic	4	< 1
Power Station	3	< 3
Crematories	2,3	< 2

Control Techniques

- Complete source elimination
- Optimization of process technologies
- Changes in production technologies
- End-of-pipe reduction technologies

Regulations for PCDD/F

- International
  - EU-IPPC/BREF (BAT-Documents for plants)
  - North Sea-Protection/OSPAR-Convention
  - UN ECE POP-Protocol
- National
  - Air Pollution & Wastewater Control
  - Products & Wastes

International Regulations

- **IPPC/BREF**
- **BAT-Documents for POP- relevant plants:**
- *Waste incineration*
  - Ferrous Metal
  - Non-Fe-Metal
  - Large Volume Organic Chemicals (LVOC)
  - *Waste recovery/disposal*
- Info:

- **North sea-Protection/OSPAR Decision 98/4**
  - Production of vinyl Clorid (EDC/VCM)
  - Emission values PCDD/F: air 0.1 ng/m3
    water 1 ug/t EDC

National Implementation

- **Air Pollution Control**
  Technical Regulation AIR (TA LUFT)
  Waste Incineration (17. BImSchV)
  Large Combustion Plants (13. BImSchV)

- **Water Pollution Control**
  Waste water ordinance, production of
  Non-Fe-Metal: HCB 0.003 mg/l, 0.3 mg/t
  Perchloroethylene: HCB 1.5g/t

Air Pollution Control

•Ordinances

Source	Ordinance	Emission value
Waste incineration	17. BImSchV	0.1 ng/TEQ/m^{33}
Traffic	19. BImSchV	Ban of scavengers
Crematories	27. BImSchV	0.1 ng/TEQ/m^3

•**Technical Regulation AIR (TA LUFT)**

- general emission value PCDD/F: 0.1 ng/m^3 or 0.25 ug/h
- Sinter-, Non-FE-plants PCDD/F: 0.4ng/m^3, aim: 0.1

BAT Steel Production

<u>Technical concept</u>

- Emission Limit Value: PCDD/F 0.1 ng TE/m^3
- Implemented for iron & steel producing industry
- Limit value for sinter plants: 0.4 ng TE/m^3>> 0.1

Reduction measures needed:

- More effective encapsulation of sinter belts
- More effective flue gas cleaning with adsorbents

BAT Waste incineration

Technical Concept

- Emission Limit Value (17. BImSchV)
  PCDD/F: 0.1 ng TE/m^3

  - Modification of the incineration process
  - keeping conditions for complete combustion

  - Additional flue gas cleaning systems

BAT Residential combustion

Technical Concept

- Residential Combustion Ordinance (1. BImSchV)
- Measures for fuel optimization
- Combustion conditions providing complete combustion
- flue gas cleaning

Future Actions

- Basis WHO recommended TDI-Value
- 1-4 pg TEQ/kg bw/d

- Stationary sources
  - Reducing PCCD/F emissions from
    - Metallurgical processes and
    - Residential/ backyard combustion

- Coplanar PCB
  - Identify and reduction of relevant sources

Conclusions

- Aim of worldwide reduction of by-products (e.g. PCDD/F) from unintentional production
- Obligation of release inventories

- Release reduction instruments with BAT & BEP
- National implementation measures

Reduction of Dioxin and Furan Emissions in the Steel Industry

Dietmar Weiss, Dipl.-Ing.
General Manager Engineering and Environmental Protection
Badische Stahlwerke GmbH, 77694 Kehl, Germany

1. Steel production in Germany

In 2001 44.8 million t of crude steel were produced in Germany.

Around 70% were produced using the blast furnace and converter process, 30% by electric arc furnaces (EAF).

Waste and consumption figures are significantly higher for the blast furnace process than for the EAF.

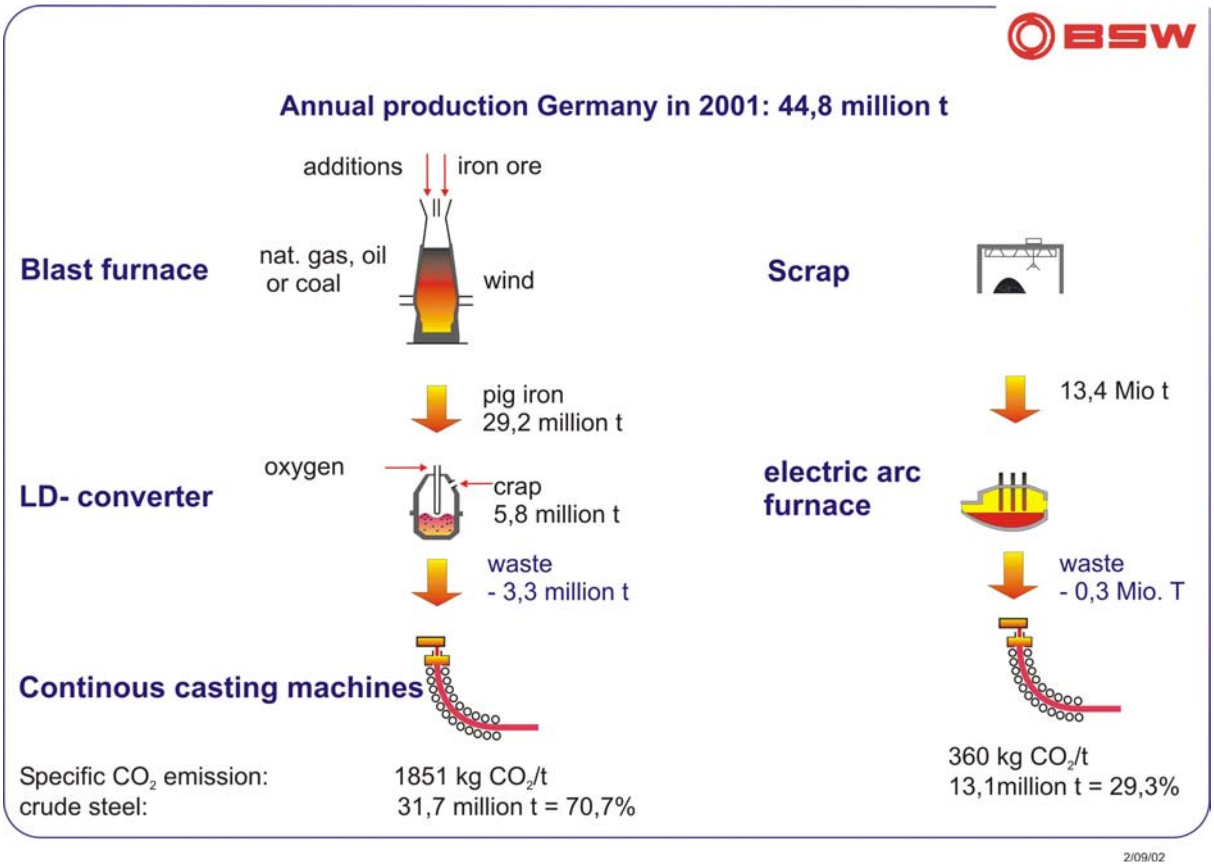


Fig.: 1.1 **Two ways of producing steel**

With reference to environmental protection the electric furnace certainly beats the blast furnace. 1851 kg of CO_2 per ton crude steel are produced in the blast furnace process and only 360 kg CO_2 by the EAF.

The amount of water consumption is around 40% less, the energy comes to just 25%.

Emissions from the EAF process amount to approximate 15% compared to the blast furnace.

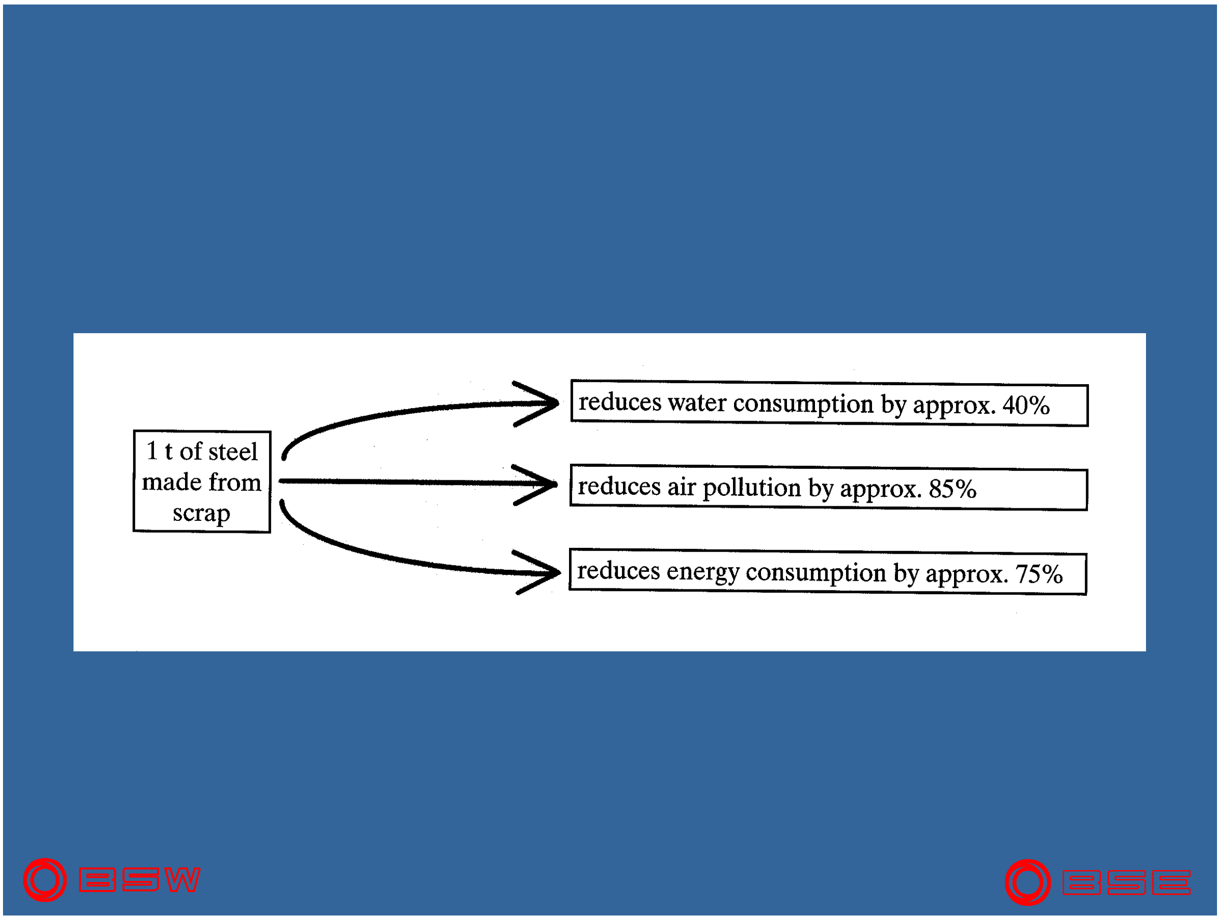


Fig.: 1.2 **Advantages of Scrap versus Iron Ore**

2. The Plant BSW

Badische Stahlwerke (BSW) is an electric steel mill in South Western Germany. The steel mill was built in the harbor of Kehl in 1968. The plant facilities cover an area of just 150,000 m^2. About 750 employees produce 1.8 million tons of steel per year.

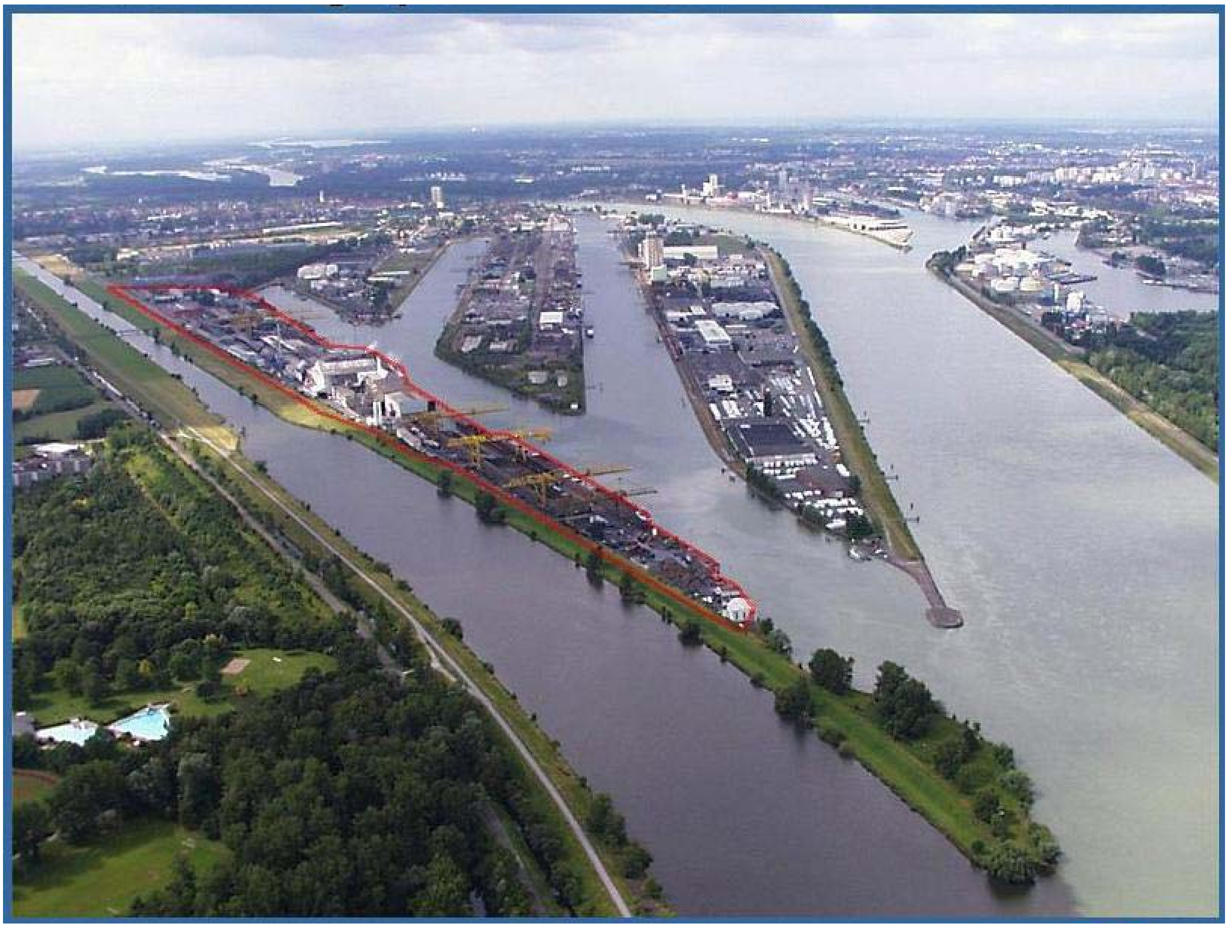
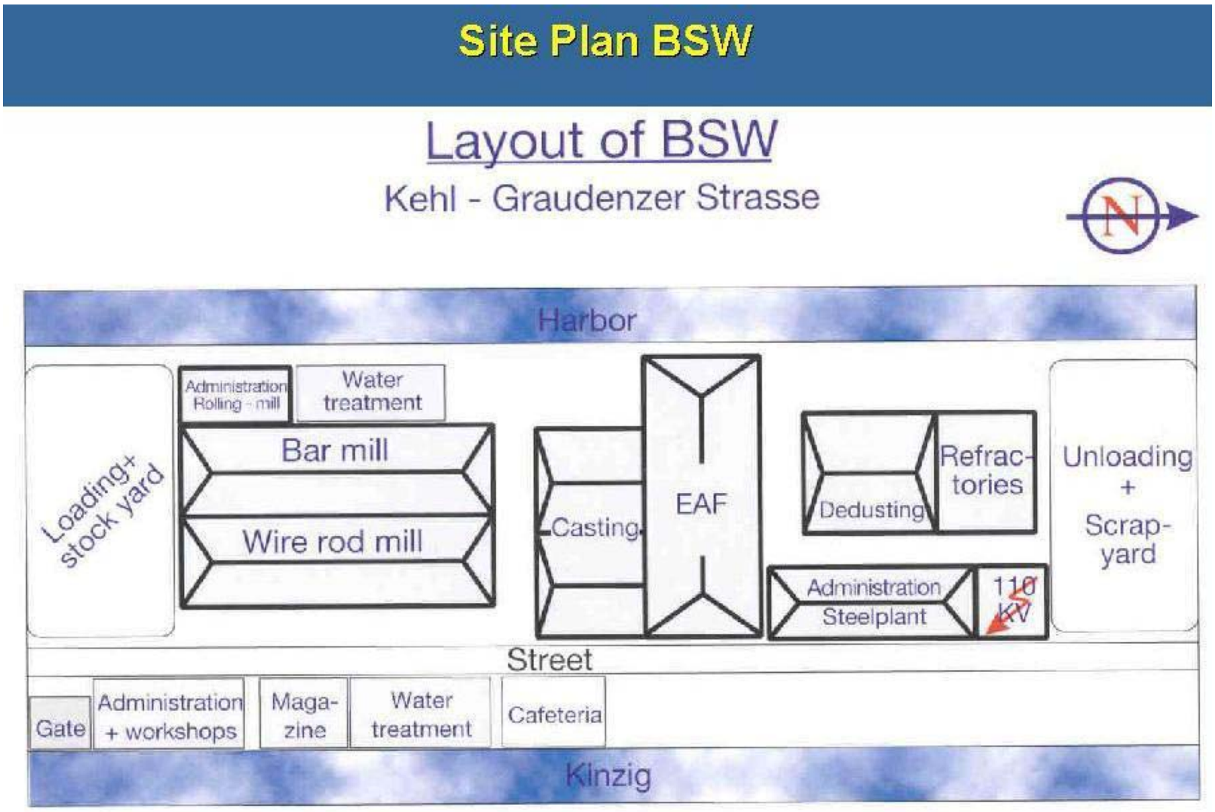


Fig.: 2.1 **Aerial photo of the harbor of Kehl with BSW**

Two electric arc furnaces melt scrap into steel which is treated in two ladle furnaces and casted into billets in two continuous casting machines.

The billets are rolled into wire rod and rebar in two rolling mills. Only reinforcing steel is produced.

The raw material is steel scrap. 70% of the two million tons of scrap required by BSW is delivered by Rhine barges and 30% by rail.



3. Plant's History

BSW is the only steel mill in South Western Germany, it was built in 1968. At the beginning it was considered as an exotic company in the Kehl harbor area where only clean and quiet businesses were located.

At the time of the plant´s erection dedusting technology was not as far developed as today and considerable dust emissions escaped from the steel mill´s roof. Therefore, we had to deal as quick as possible with the problem of avoiding emissions.

Together with the steel mill, which was planned for 250,000 tons steel/year, a wet dedusting unit was built with a capacity of 120,000 m^3/hour. The dust limit value was 75 mg/m^3. This plant was exchanged for a dry filter dedusting system with a capacity of 1.2 million m^3/hour in 1976. The limit value was reduced to 50 mg/m^3. 500,000 tons of steel/year were produced at that time.

Emissions in the clean gas duct of the bag filter dedusting plant were around 5 mg/m^3, equivalent to 50 tons/year during 8000 hours of operation.

4. Dioxin Situation

In 1986 we carried out the first dioxin measurements and found that 2 ng/m^3 dioxin and furan were contained in the clean gas of the dedusting plant. In 1986 the yearly production had increased to 750,000 tons.
At that time the scrap was preheated to approximately 400-500 °C in a preheating system.

In 1989 scrap preheating was stopped. The dioxin content was reduced to 1 ng/m^3.

5. Targets and Solutions for reducing Dust and Dioxin values

When BSW applied for a licence to reconstruct the direct suction of the electric furnaces all emission values were drastically reduced. The authority target value for dioxin was 0.5 ng/m^3. The limit value for dust was fixed at 5 mg/m^3.

In order to achieve these targets we had to do extensive development works on our dedusting unit and the bag filters. A so-called quenching system was installed to reduce dioxins and furans.

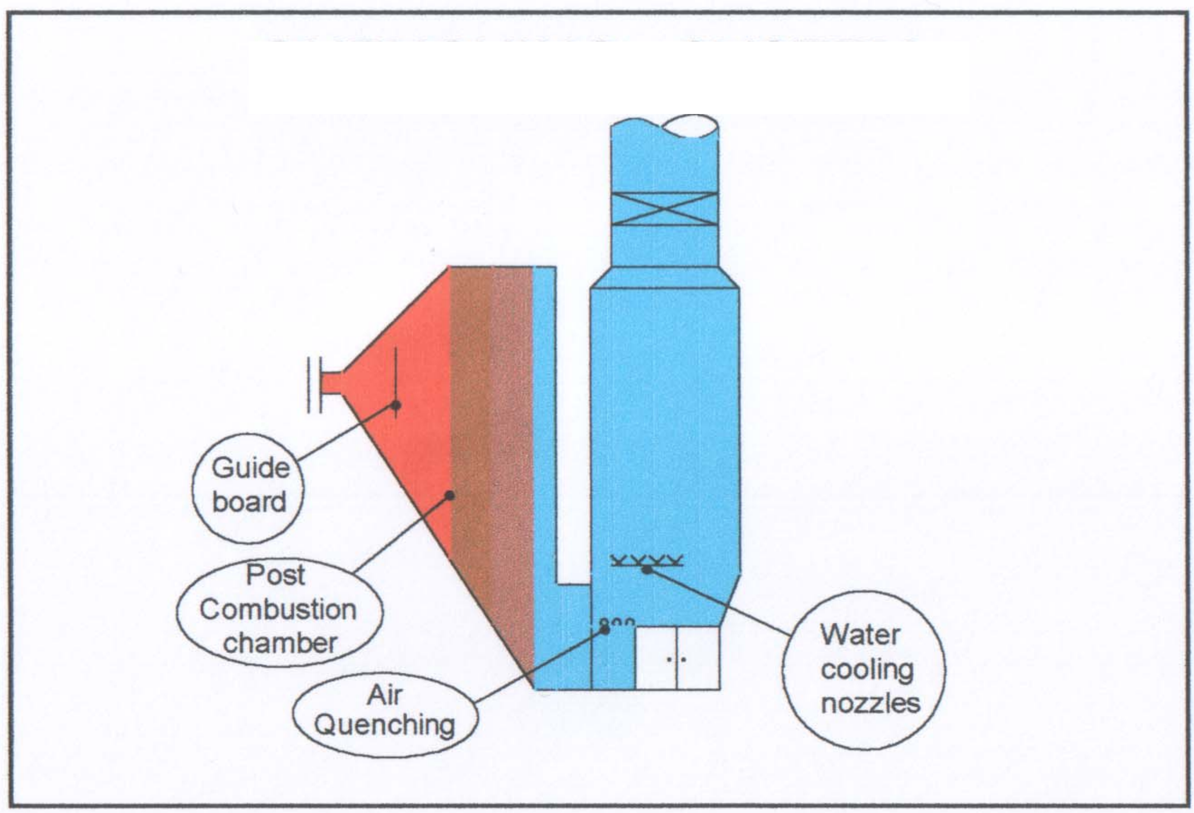


Fig.: 5.1 **Quenching - System**

After extensive research and development we were able to reduce the dioxin content continuously below 0.1 ng/m^3.

At the same time we also worked on the filter bags and the cleaning system of the filter plant so that filter emissions were reduced from 5 mg/m^3 to 0.8 mg/m^3 at present.

Production in 1998 increased to 1.5 million tons per year. Conditions inside the steel mill had deteriorated because the dedusting plant with a capacity of 1.2 million m^3/hour was no longer sufficient.

We decided to built an additional baghouse with a capacity 600,000 m^3/hour. To receive permission we had to commit ourselves to keep total emissions per hour below 2 kg. That means that we had to comply with maximum values of 4 mg/m^3 for the old dedusting plant and of 1.5 mg/m^3 for the new plant.

In order to comply with the maximum load value of 2 kg per hour. This is equivalent to an emission value of 1.1 mg/ m^3 at 1.8 million m^3/hour.

Extensive development work was carried out to achieve these values. The main activities focused on two things:

1. With reference to direct suction we had to make sure that flue gas temperatures stayed above 600°C (even during scrap charging) and that at the end of the direct suction it was below 200°C.

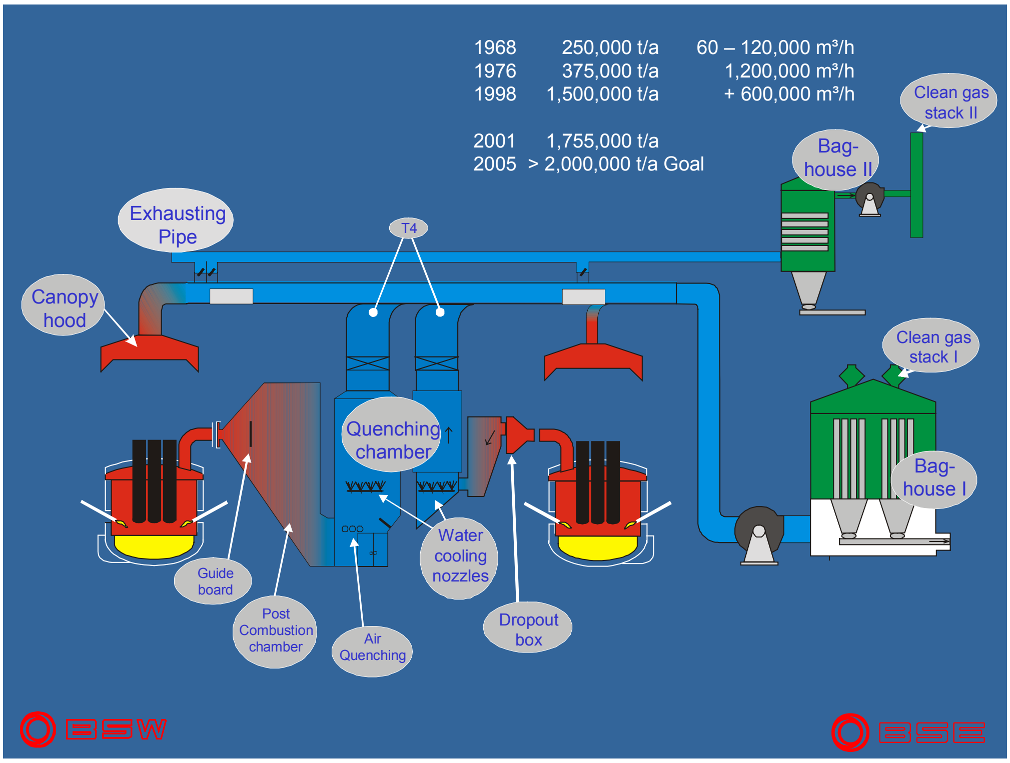


Fig.: 5.2 **EAF Evacuation System**

2. The filters are no longer cleaned according to a time schedule but by using pressure difference.

   By this method we make sure that filter always have a filter cake that provides good filtration.

   The raw gas contains more than 3 g/m^3 dust, the clean gas less than 1 mg/m^3. This quality of the cleaning process is only achievable if there is sufficient filter caking on the filter material.

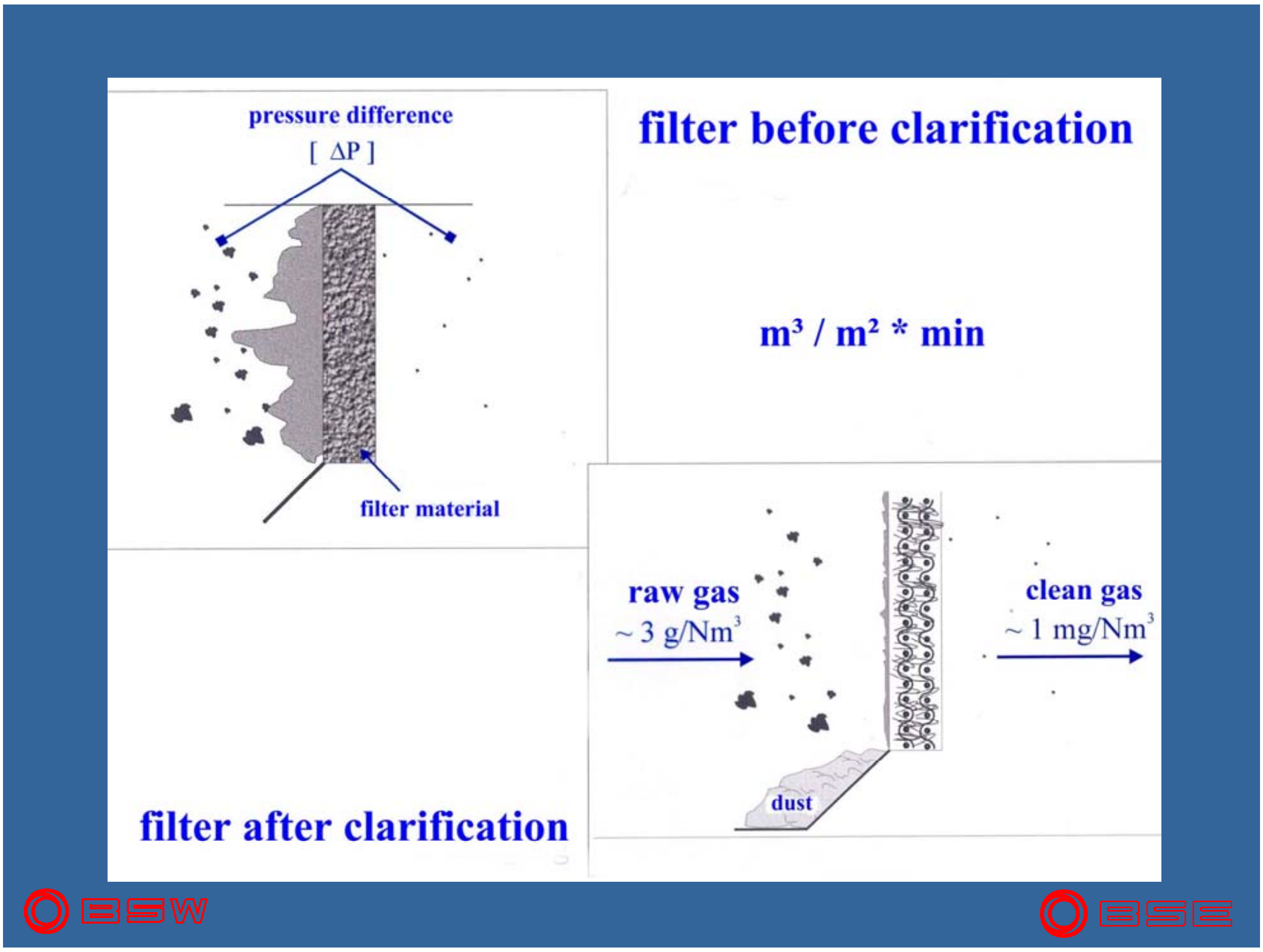


Fig.: 5.3 **BSW dedusting technology**

The result is here:

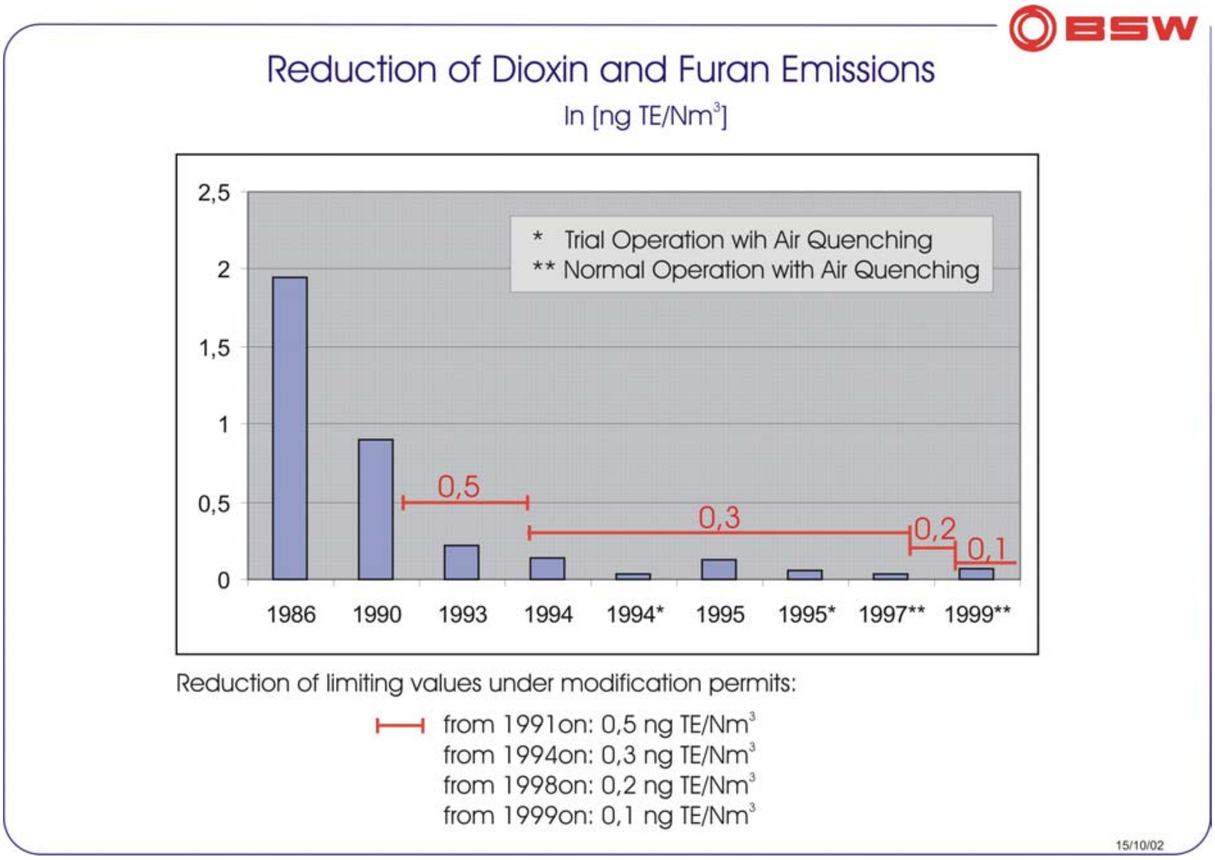


Fig.: 5.4 **Dioxin and Furan Emissions**

You can see that the purest material is not free from dioxin emissions, but correct cooling down will bring normal scrap and contaminated scrap down to the same dioxin and emission content provided quenching techniques are used properly.

We reached the actual target by using pyrometers in the post combustion chamber and by changing the water quenching regulation which can be operated in stages depending on the necessity of changes in flue gas temperature. As the use of water is limited, we carried out a constant cooling with air.

About 1-2% air were injected after the post combustion in order to achieve a cooling effect. Further cooling down to 200°C can be done by air/water quenching.

Through these techniques the first aim for permission was achieved.

In our case the filter bags are 10 meters long. But holes only appear on the first 1-1.5 meters. In the upper area no holes were found. This fact made us use a different material over 2.5 meters in the lower area. We tested several materials and used them in tests. At the moment we use a kind of glasfiber material. Thus holes are avoided.

The time related cleaning of bags was substituted by pressure related cleaning. The baghouse consists of 32 chambers. These chambers were equipped with differntial pressure meters which show at what point the differntial pressure has reached a sufficient level to start cleaning of a certain chamber. Hereby we make sure that a certain filter caking remains which provides a permeability of the filter for sucking operation of the furnace and cleaning of the bay. The dust particles are separated and only a very small part escapes into the cleangas.

In the following you can recognise the graphics which describe the success:

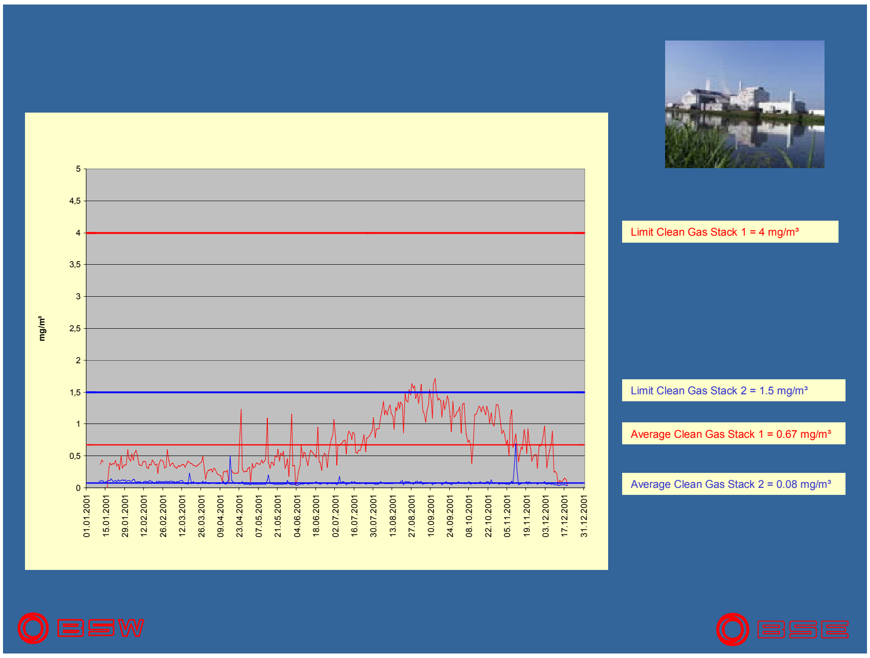


Fig.: 5.5 **Concentration of dust emissions in 2001**

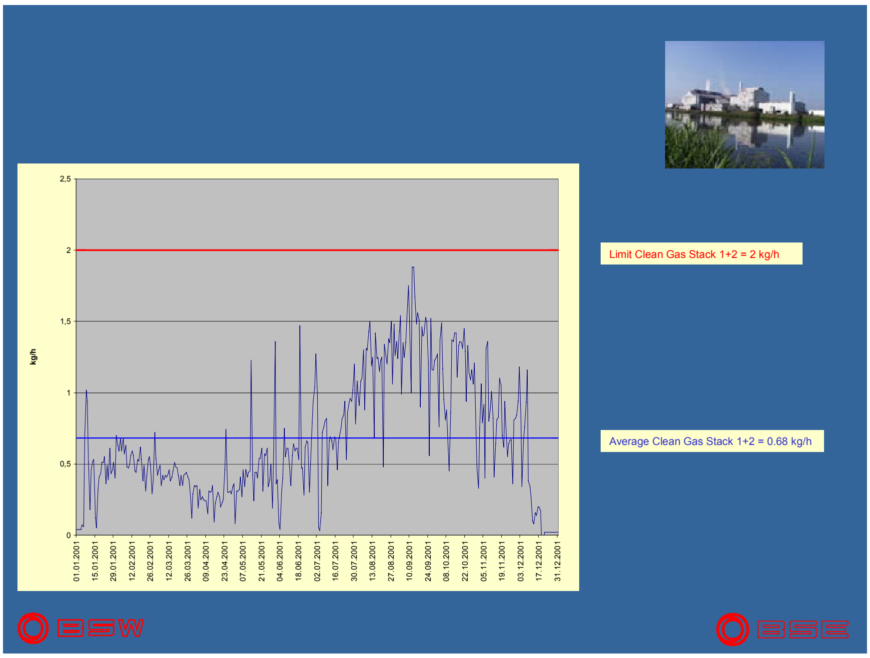
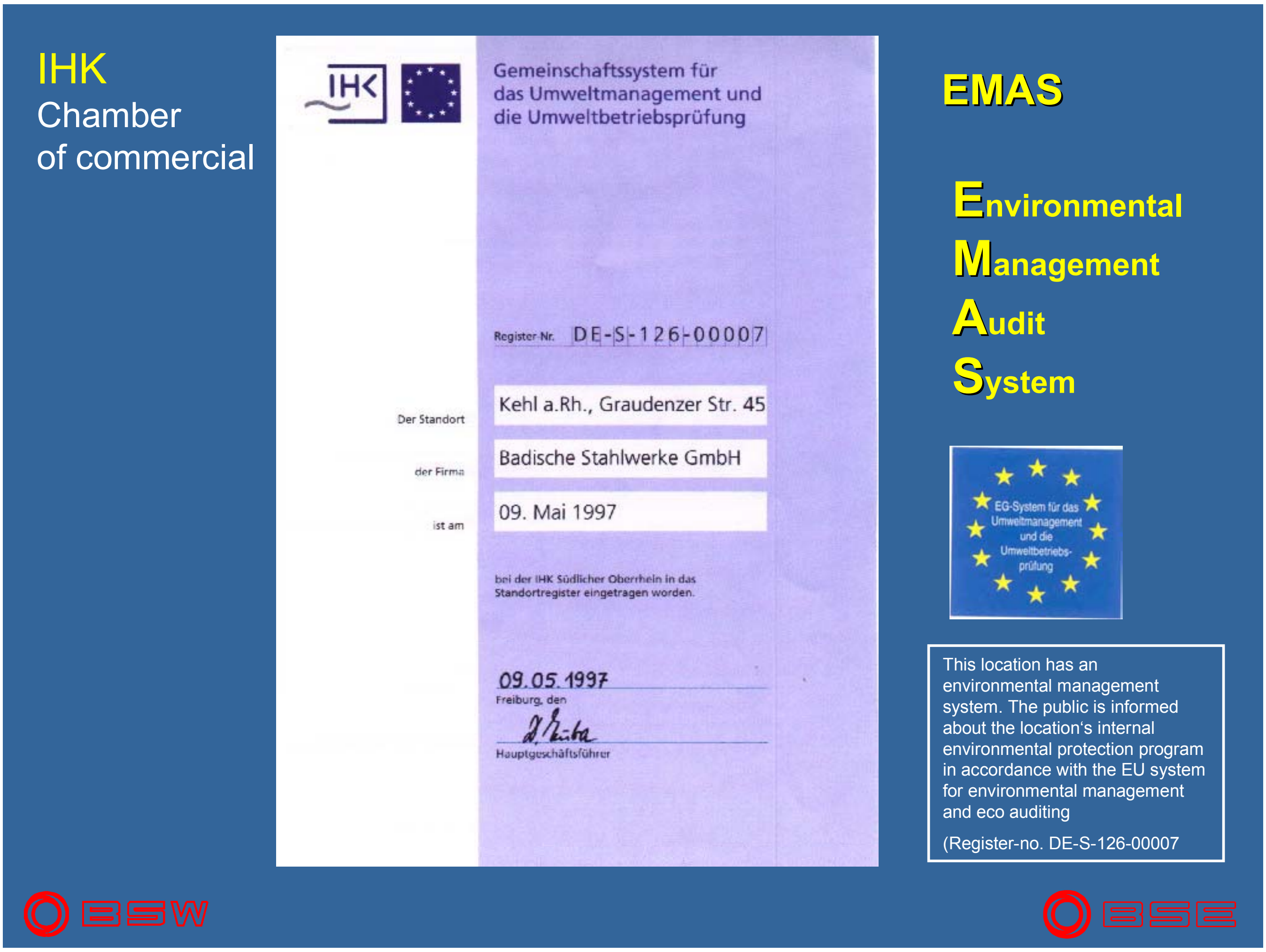


Fig.: 5.6 **Freights of dust emissions in 2001**

5. Summary

We have succeeded in complying with a value of 1 mg/m^3 in cleangas.

In the year 1997 BSW was the first steel mill in the European Union that was validated in accordance with EMAS (Environmental Management Audit System)



In the year 2000 BSW was the first steel mill in the world that was certificated in accordance with ISO 14001.

Hospital Waste Management

José Luis Izquierdo, PROCESAN

Presentation to follow

Analytical Determination of PCBs
Carlos Gómez and María Fernanda Lopolito, INA

REGIONAL WORKSHOP ON BAT/BEP WITHIN THE CONTEXT OF THE STOCKHOLM AND BASEL CONVENTIONS

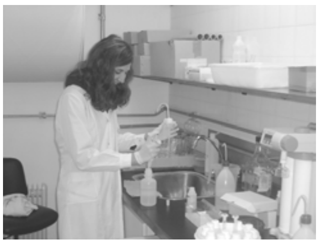
October 2002

ANALYTICAL DETERMINATION OF PCB´s

EXPERIMENTAL LABORATORY OF SUSTAINABLE TECHNOLOGIES - LETS

INA CTUA Instituto Nacional del Agua, Centro de Tecnología del Uso del Agua

SAMPLE TREATMENT



- DILUTION
  - Hexane
- PATTERNS
  - Aroclors Mix
    - *1016*
    - *1221*
    - *1248*
    - *1254*
    - *1260*
    - *1242*
- WASHING
  - Florisil ⇨ EPA 3620B
    - *Aliphatic HC*
    - *Fats*
  - Sulfuric Acid **1:1**
  - Potassium permanganate **5%**
  - ⇨ EPA 3665A
    - *Color*

INA CTUA Instituto Nacional del Agua, Centro de Tecnología del Uso del Agua

MEASUREMENT

- EQUIPMENT
  - Gas Chromatographer
  - Detectors
    - *Electronic microcapture - MECD*
    - *Mass Spectrometry - MS*
  - Capillary column

- TECHNIQUE ⇨ ASTM D 4059
- MATRIX
  - *Transformers oils*
- OTHER MATRIXES
  - *Water*
  - *Air*
  - *Soils*
  - *Sludges*

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OUTCOMES REPORT

- TOTAL PCBs
- IDENTIFICATION OF AROCLORS PRESENCE
  - *Equipment* ⇨ *GC - MECD*
- CONGENERS STUDIES
- IDENTIFICATION OF COMPOUNDS ACCORDING TO THEIR CHLORINE CONTENT
  - *Equipment* ⇨ *GC - MS*

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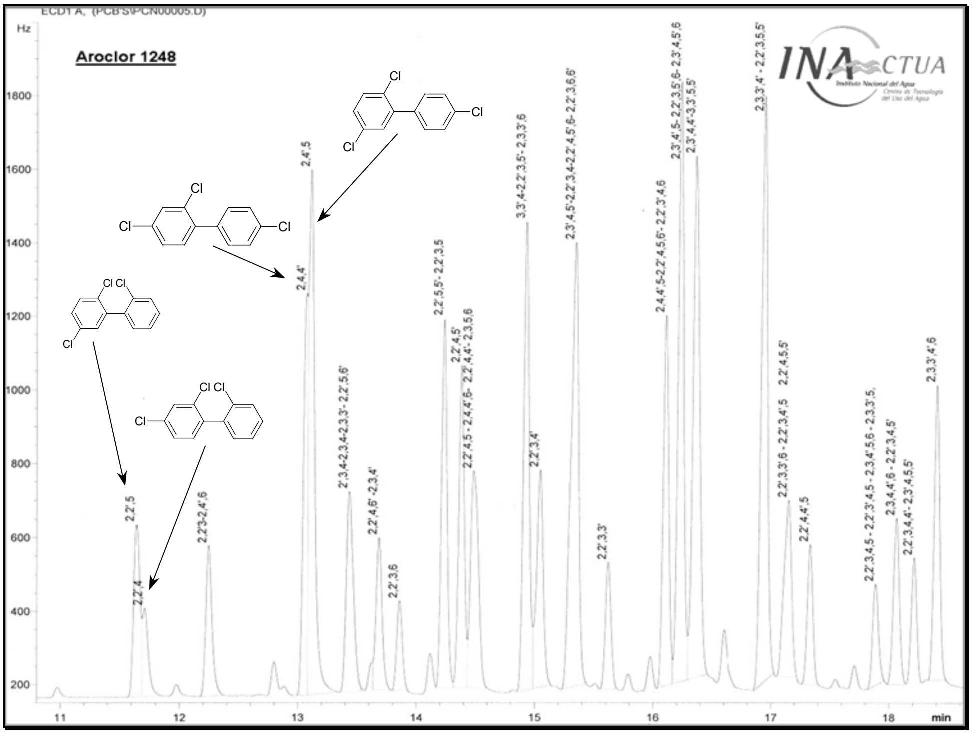

ECD1 A, (PCB'S\PCN00005.D)
Hz
Aroclor 1248
1800
1600
1400
1200
1000
800
600
400
200
11
12
13
14
15
16
17
18
min
2,2',5
2,2',4
2,2'3-2,4',6
2,4,4'
2,4',5
2',3,4-2,3,4-2,3,3'- 2,2',5,6'
2,2',4,6' -2,3,4'
2,2',3,6
2,2',5,5'- 2,2',3,5
2,2',4,5'
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3,3',4-2,2',3,5'- 2,3,3',6
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Centro de Tecnología del Uso del Agua

PCB Problems and PCB Treatment.

Ryuchi Hirai, Japan International Cooperation Agency within the INA - JICA Agreement.

PCB problems

&

PCB treatment

1

Preface

PCB problem is one of the most serious environmental problems. Japan has experienced serious problems caused by PCB and has much information on PCB and PCB problems.

Much amount of PCB is held in storage still now in many countries. And so we must treat PCB as early as possible.

We would like to introduce these information and technogies to solve the problems of PCB, and also this may contibute to Cleaner Production.

2

1. Problems caused by PCB

3

Food oil contamination by PCB

- Kanemi Oil accident occurred in Japan in 1968

  This is the starting point of PCB problem
  Food oil was contaminated by PCB

- Similar accident occurred in Taiwan in 1979

4

Symptoms of both accident

There were about 2,000 of patients in both accidents

- poor eyesight
- numbness at waist , hands and feet
- nail changing its shape and color
- black spot like pimple
- skin changing to black

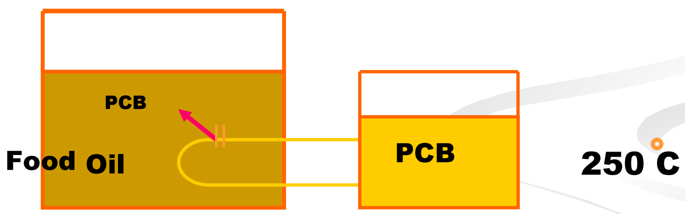
- the death rate were twice as much as ordinary people

(confirmed in case of accident in Taiwan)

5

Kanemi Oil Accident in 1968

This company produced food oil.
Food oil was contaminated by PCB



Food Oil PCB (KC- 400)

correspond to (Aroclor. 1248)

6

Regulation or law for PCB

- Enacted new law in 1974
  prohibited : production, import and use of PCB

  * exception : closed systems

7

PCB usually contains coplanar PCB
(from 0.1 to 0.8 %)

PCB's

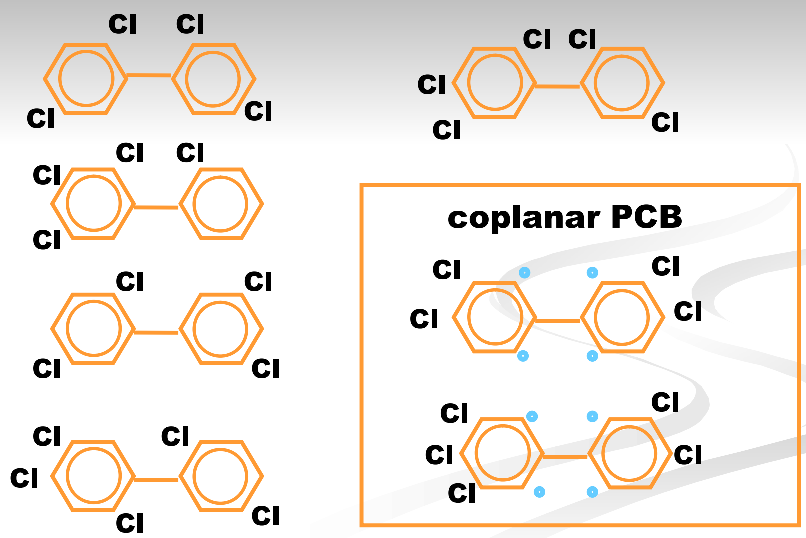
KC-400

tetrachloro	51%
pentachloro	28 %
hexaachloro	3 %

coplanar PCB's

8

Structure of coplanar PCB



9

Reaction of coplanar PCB

coplanar PCB

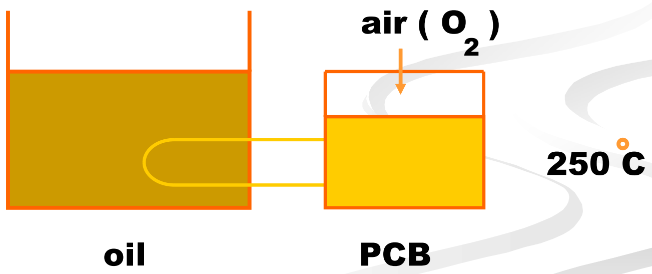
pc dibenzofuran

(PCDF)

10

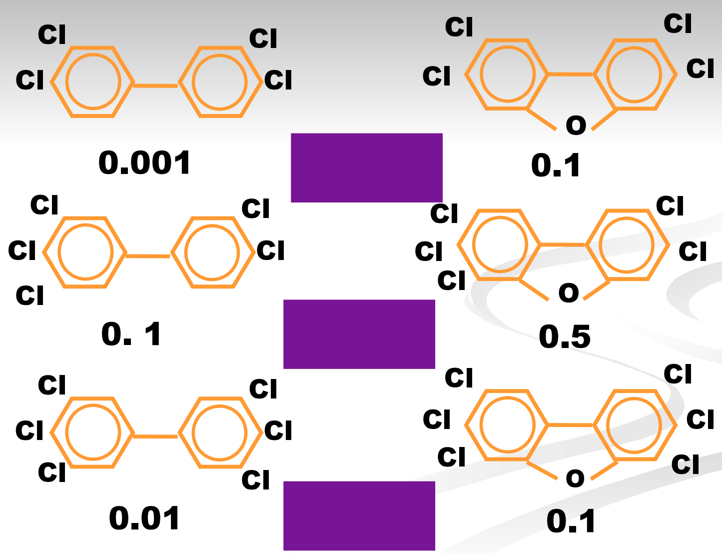
Kanemi Oil accident

(Coplanar PCB changed to PCDF)



Toxicity of coplanar PCB and PCDF

unit : TEF



Now it is believed that the cause of Kanemi oil symptoms is

85% due to PCDF (pc benzofuran)
15% due to coplanar PCB

A : Dibenzofuran in KC-400 (PCB)

B : Dibenzofuran in Kanemi PCB

B / A = 250

13

Stability test of PCB (KC-400)

(%)

	PCDF / PCB	PCQ / PCB [a]	remarks	
unused	0.0033	0.021		
used 1	0.0040	0.071	250°C x 5days	b)
used 2	0.0085	0.75	360°C x 2days	b)
used 3	0.019	1.3	360°C x 2days	c)
Kanemi	0.76	89		

a) dimer of PCB
b) sample of used 1,2 were heated in sealed glass tube
c) same condition with a) but in the presence of steel

14

Stability of PCB

- PCB is not stable
- PCDF formation is accelerated by oxygen, steel, water at high temperature
- PCB dimerizes to form PCQ
- We must pay attention to the presence of PCDF and PCQ in case of used PCB
- toxicity of PCB depends not only on coplanar PCB but also on PCDF

15

16

- PCB has been stocked without treatment in Japan for about 30 years

- Some accidents occurred during these years

  a fire accident of PCB storage in Canada

  a fire accident of transformer in the U.S.A

17

- law for promoting PCB treatment was enacted in 2001 in Japan

- PCB must be treated within 15 years according to this law

- 4 companies started treatment of their own PCB already in 2000

- Osaka city decided to treat all PCB until 2007

18

Capacity of PCB treatment
(approved technology)

Nihon soda (SD)	600 kg	(high concentration)
Sumitomo (OSD)	40ℓ /day 3,000ℓ/day	(high concentration) (low concentration)
Toden (Extract)	1,000ℓ / day	(low concentration)
Ebara (BCD)	10kg / day 600kg / year	(high concentration) (high concentration)
Mitsubishi (hot W)	12kg / day	(100%PCB)

19

Technology for PCB treatment
(approved technology)

- Combustion
- Chemical treatment

20

PCB combustion

- PCB combustion at 1150°C
  (technology of Kaneka Co. : 99.99999%)
- difficult to control combustion conditions
- evolution of PCDF or PCDD (dioxin)
- ash contains PCB not decomposed
- local residents' campaign
  opposing to the combustion technology

21

Chemical treatment

- alkali decomposition
  (NaOH)
- alkali decomposition
  (Sodium metal)
- catalytic reduction method
  (Ni catalyst - H_2 reduction)
- decomposition by super heated water
- extracton by organic solvent
- removal at high temp. and in vacuum

22

Chemical treatment

(alkali decomposition)

- no evolution of dioxin
- no evolution of waste gas
- system is compact and conditions are mild

PCB

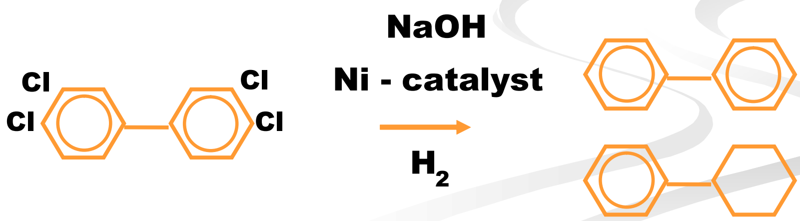
K > Na > KOH > NaOH > Na_2CO_3

23

Chemical treatment

(Catalytic reduction)

- no evolution of dioxin
- no evolution of waste gas
- system is compact and conditions are mild



24

Chemical treatment
(decomposition by super heated water)

- conditions : high temperature and high press.

PCB

$$\text{PCB} \xrightarrow[\text{Na}_2\text{CO}_3,\ +\ \text{O}_2]{380\ ^\circ\text{C},\ 270\ \text{atm, alkali, catalyst}} CO_2,\ H_2O,\ NaCl$$

Process for chemical treatment

Transformer or Condenser

oil ↓ vessel

- chemical treatment
  - ↓ purification ↓ reuse (fuel)
  - ↓ residue ↓ treatment
- washing or vacuum T
  - ↓ metal ↓ recycling
  - ↓ wood, paper ↓ storage

Technology of Nihon Soda Co.

- dispersion sodium metal method
  using micro particle of sodium metal
  having diameter of 10 micron

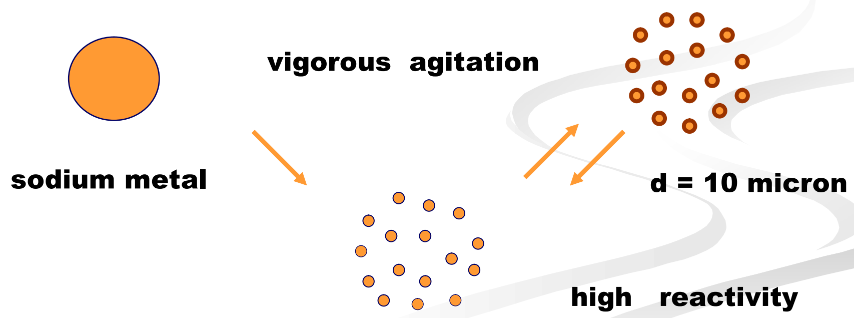
- decrease PCB from 500 ppm to 0.002 ppm at room temperature

- criteria required by Japanese law is 0.5 ppm of PCB in oil
  severe compared to the other countries

27

Treatment by sodium metal

- Sodium metal becomes like liquid
  at temperature higher than 100°C



28

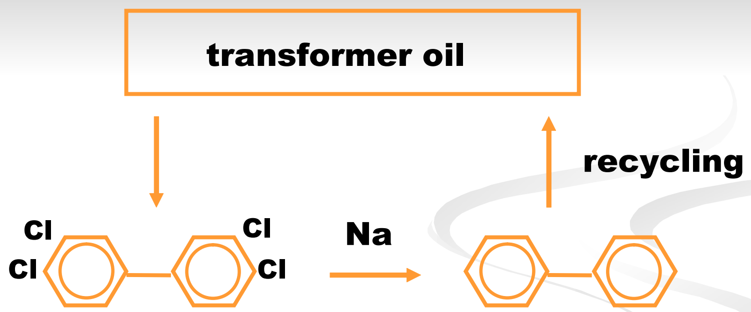
- **Technology of sodium metal is promising**

- **already applied in several countries**
- **no evolution of dioxin or benzofuran**
- **treating system is compact**
- **treating condition is mild**
- **(though sodium metal is difficult to handle)**

29

Technologies for PCB treatment

(Cleaner Production)



PCB **biphenyl etc.**

No evolution of PCDF or PCDD

30

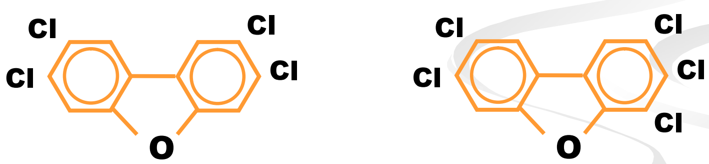
References

- H. Miyata, " Dioxin " , 1999, published by Iwanami Co.
- J. Nagayama, " Contamination by dioxin " , 1998, published by Kodansha Co.
- Information by using internet

31

PCDF in Kanemi OIl

- It was found that PCDF was included in the sample of Kanemi Oil accident in 1986
- Why PCDF was included in PCB sample?



(PCDF)

(PCDF : polychlorodibenzofuran)

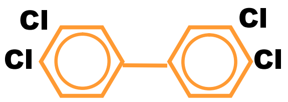
34

1. Outline of PCB

- PCB was first produced commercially by Swan company in 1921
- Swan company → Monsanto
- properties of PCB

  chemical stability
  heat resistibility
  insulating ability
  inflammability

35



PCB

Sodium carbonate ↓

$\xrightarrow{\text{water, oxygen, } Na_2CO_3}$

carbon dioxide, salts, water

36

- new law was enacted in Japan in 1974
  prohibited : production, import and use of PCB

  *exception : use in closed systems

- PCB has been stocked without treatment
  for about 30 years

37

PCB production

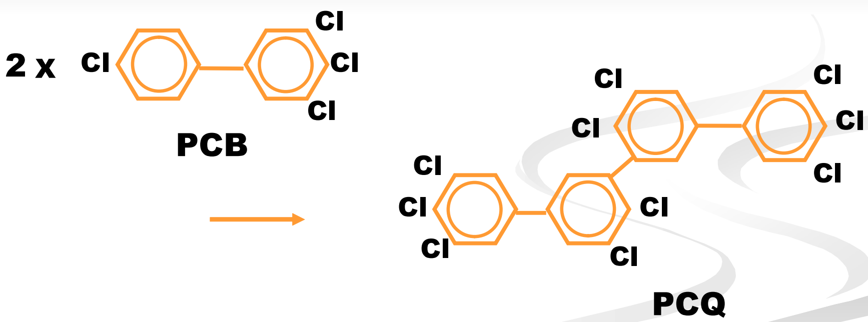
1,200,000 t : in the world
60,000 t : in Japan (1954~1974)

Properties and application of PCB

Properties	Use
chemical stability	transformer oil
heat resistibility	heating oil
inflammability	condenser
insulating ability	insulation oil

38

PCB to PCQ



* PCQ was proved to be not toxic

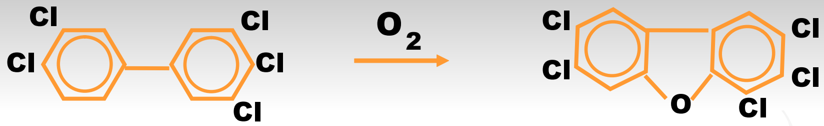
39

Production and use of PCB in Japan

	(t)
Production amount	**59,900**
Import amount	**1,100**
Use	
electricity	**37,000**
heating media	**8,600**
paper	**5,400**
others	**3,000**
total	**54,000**

* 17,000 ton of PCB cannot be recovered

40

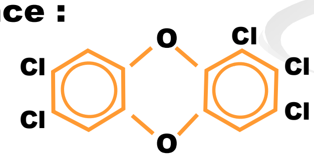


coplanar PCB

pc dibeozofuran

(PCDF)

reference :



Dioxin

(PCDD)

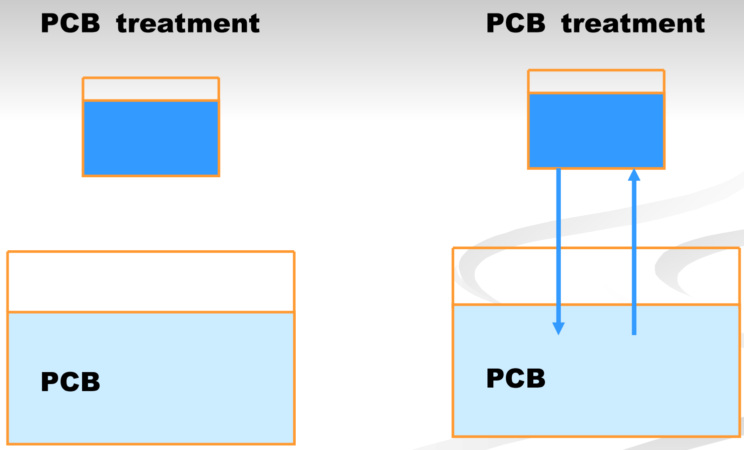
41

Situations of PCB treatment

- law for promoting PCB treatment
- time limit for PCB treatment
- quantity of PCB stocked now
- quantity of PCB treatment
- technology for combustion of PCB
- PCB content in waste (oil)
- to get approval for the technology

42

PCB treatment



43

Outline

- PCB was used in various fields
- PCB was proved to be not stable but toxic
- PCB was prohibited to produce, use …
- PCB is proved to be source of PCDF & PCDD
- Accidents caused by PCB occurred while it is stocked
- Law to promote to treat PCB
- Combustion of PCB produces PCDD
- It is necessary to know situation of PCB

44

National Program to Promote Sustainable Production.
Ariel Carbajal, Secretariat of Environment and Sustainable Development

Ministerio de Desarrollo Social

Secretaría de Ambiente y Desarrollo Sustentable

National Program to Promote Sustainable Production

Ing. Ariel Gustavo Carbajal

English

Dirección Nacional de Gestión Ambiental

Dirección de Ordenamiento Ambiental

Sustainable Production & Consumption

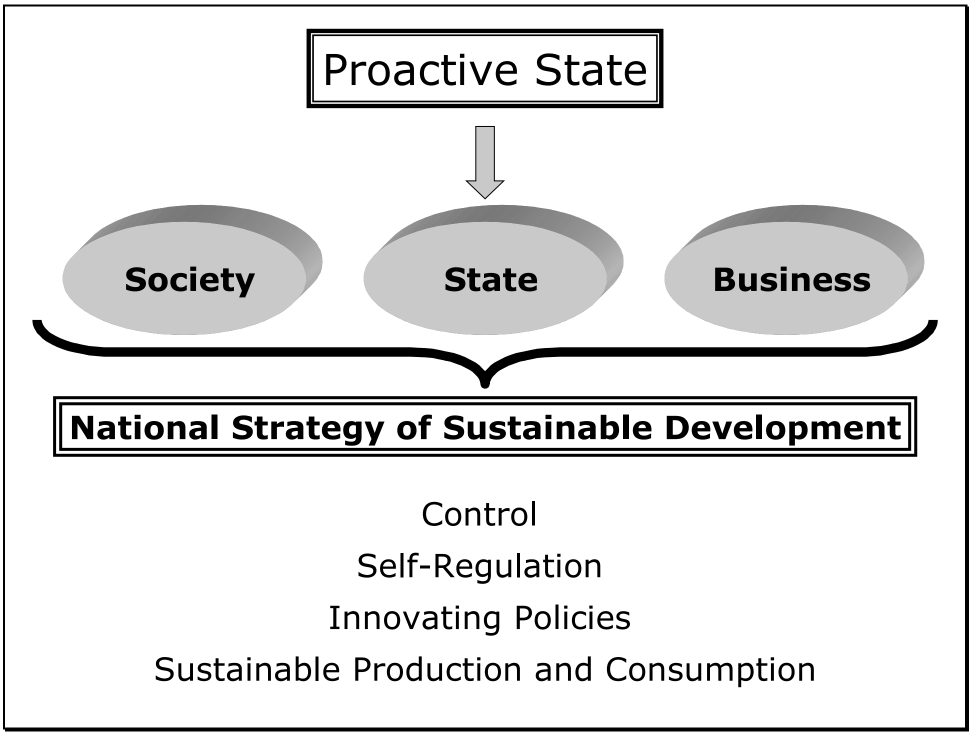
Supply ⟷ **Demand**

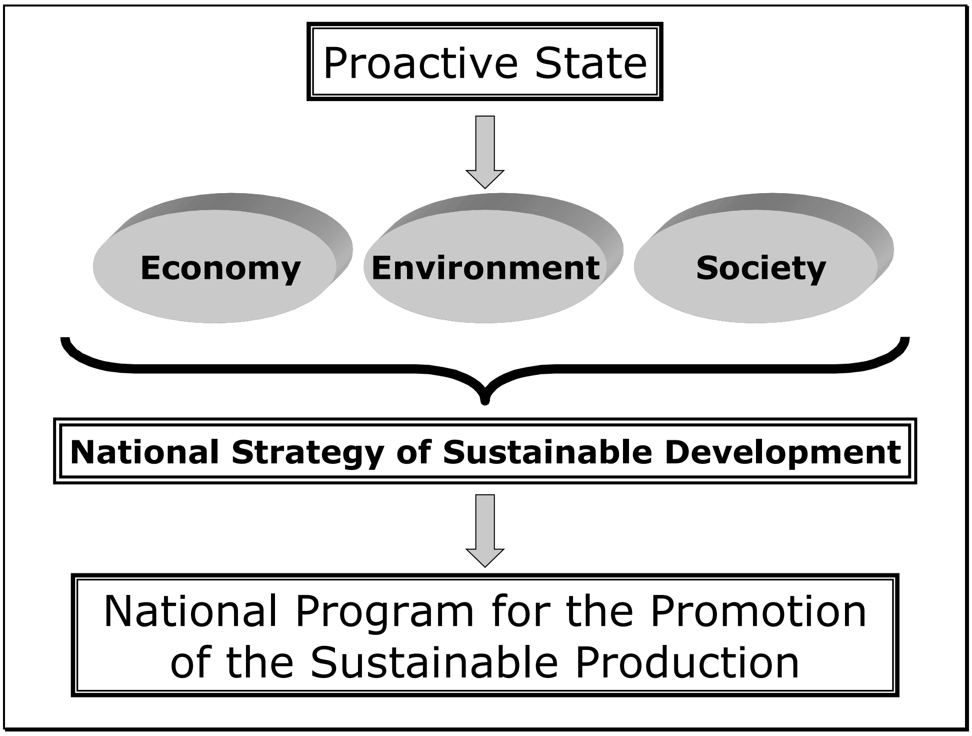
Environmentally Responsible

- Cleaner Production (CP)
- Eco-Efficiency
- IntegratedManagement Systems
- Social Responsibility
- Sustainable Consumption Patterns
- Improvement of Competitiveness

Environmentally Informed

- Suppliers Development
- Quality Requirements
- Sustainable Consumption Patterns
- Information
- Education


Proactive State
Society
State
Business
National Strategy of Sustainable Development
Control
Self-Regulation
Innovating Policies
Sustainable Production and Consumption


Proactive State
Economy
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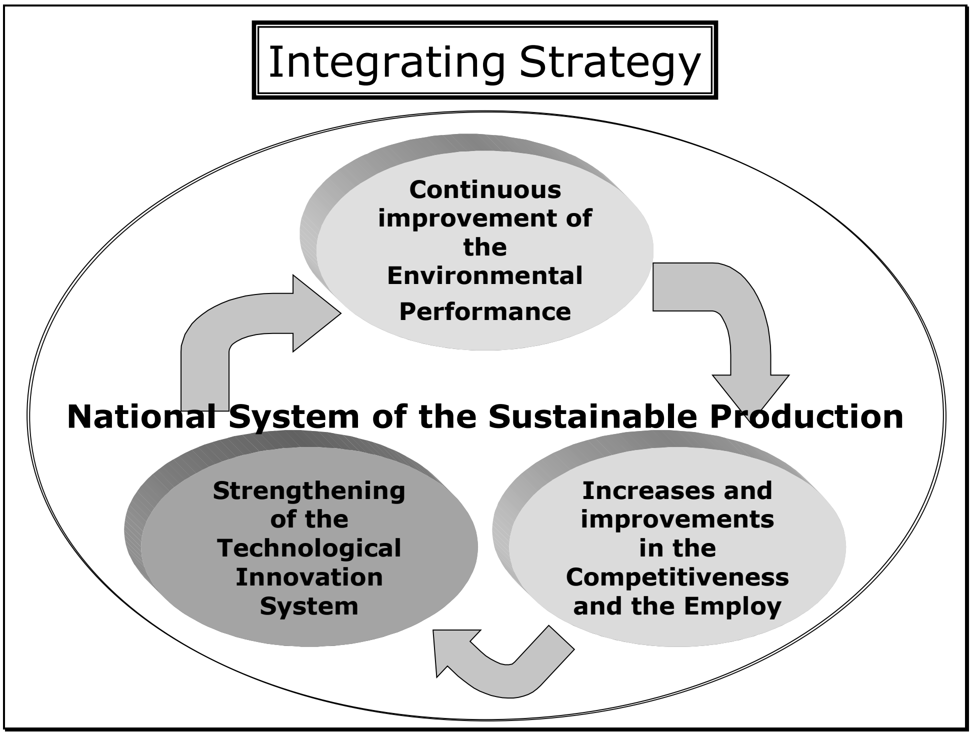
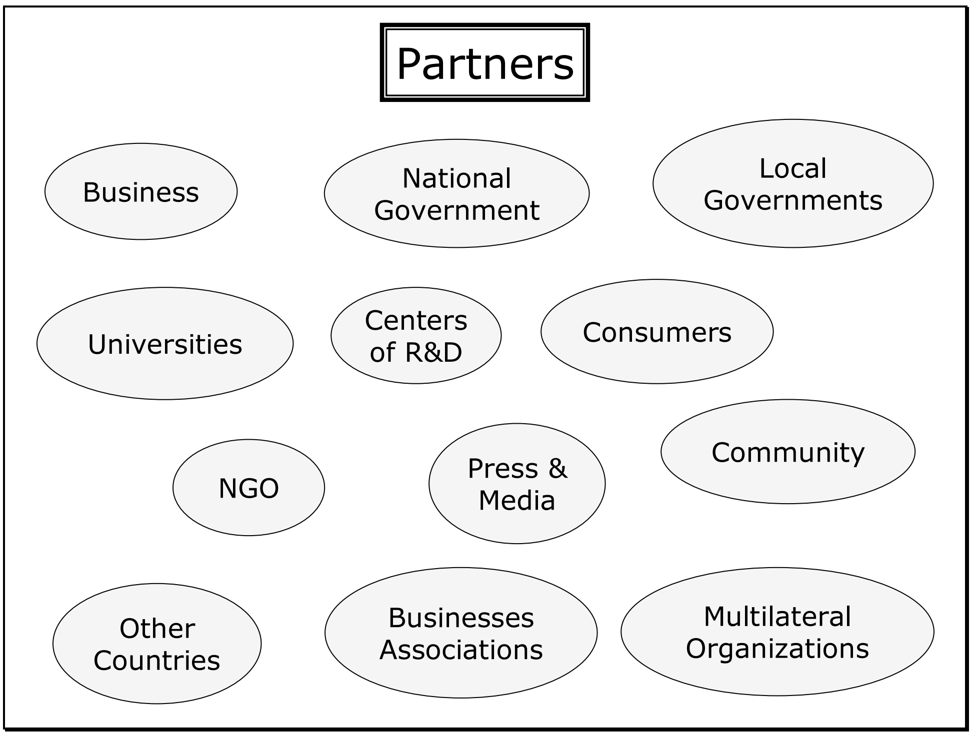
National Strategy of Sustainable Development
National Program for the Promotion of the Sustainable Production


Integrating Strategy
Continuous improvement of the Environmental Performance
National System of the Sustainable Production
Strengthening of the Technological Innovation System
Increases and improvements in the Competitiveness and the Employ


Partners
Business
National Government
Local Governments
Universities
Centers of R&D
Consumers
NGO
Press & Media
Community
Other Countries
Businesses Associations
Multilateral Organizations

National Program for the Promotion of the Sustainable Production

Guidelines

⇩ Integrate programs for promotion of cleaner technologies

⇩ Impel the cooperation with other organisms

⇩ Strengthen the supply system of environmental technologies

⇩ Propose the creation of economic and financial instruments

⇩ Contribute to the development of the environmental market

⇩ Contribute to the employ generation

⇩ Train to build the management capacity to facilitate its adoption

National Program for the Promotion of the Sustainable Production

Specific Aims

1. To develop to a suitable capacity of management for the promotion and adoption of environmental technologies, processes and services and the use and consumption of environmentally friendly products.

2. To initiate the operation of demonstrative programs for its implementation

National Program for the Promotion of the Sustainable Production

Strategies

1° Development of ideas, exchange of information and made aware of the CP concept.

2° Building of the capacities and aptitudes to promote the CP practices.

3° Development projects to apply CP in a company (or group of companies), to evaluate its results and of spreading them.

4° Creation of the legal framework and promotion instruments for CP, that allow to generalize their application.

National Inventory on Dioxin and Furan Releases Uruguay
Jacqueline Alvarez, Ministry of Housing, Territorial Planning and Environment

MINISTERIO DE VIVIENDA, ORDENAMIENTO TERRITORIAL Y MEDIO AMBIENTE
DIRECCIÓN NACIONAL DE MEDIO AMBIENTE
DIVISIÓN EVALUACIÓN DE LA CALIDAD AMBIENTAL

NATIONAL INVENTORY ON DIOXIN AND FURAN RELEASES URUGUAY - 2000

AGREEMENT
UNEP CHEMICALS - MINISTERY OF HOUSING, TERRITORIAL PLANNING AND ENVIRONMENT

MINISTERIO DE VIVIENDA ORDENAMIENTO TERRITORIAL Y MEDIO AMBIENTE
DI.NA.M.A.

PNUMA

Background

- Stockholm Convention on Persistent Organic Pollutants
- International Workshop on PCBs, Dioxins and Furans (Montevideo, September 2000)
- Standardized Toolkit for the Identification and Quantification of Dioxin and Furan (D&F) Releases
- Inventory of Industrial Waste Generation in Uruguay, 2000 (DINAMA – School of Engineering)

Objective

Identify the main sources generating Dioxins and Furans and estimate the magnitude of emissions to the different media (water, air, land, products and residues).

The adverse impact on health and the environment is not assessed.

Standardized Toolkit

- It gathers the activities generating D&F in 10 Main Source Categories. Each one of these latter is divided into subcategories.
- It identifies the different ways of release.
- It provides emission factors for each activity (mass of TEQ per quantity / unit of processed material, product or waste generated).

Categories

1. Waste Incineration
2. Ferrous and Non-Ferrous Metal Production
3. Power Generation and Heating
4. Production of Mineral Products
5. Transport
6. Uncontrolled Combustion Processes
7. Production and Use of Chemicals and Consumer Goods
8. Miscellaneous
9. Disposal
10. Identification of Potential Hot-Spots

Ex. Subcategories

Production of Mineral Products:

- Cement production
- Lime production
- Brick production
- Glass production
- Ceramics production
- Asphalt mixing

Ex. Classification of Processes

Cement production, emissions to air:

CLASSIFICATION	Emission factor µgTEQ/ton
Wet kilns, PES, temp > 300 ºC	5.0
Wet kilns, PES / fabric filter, temp 200 – 300 ºC	0.6
Wet kilns, PES/fabric filter, temp < 200 ºC Dry kilns with CCA (all type)	0.15

Methodology

1. Identify Main Source Categories present in the country
2. Use subcategory list to identify specific activities within the country's Main Source Categories
3. Collect and assess information on processes to classify them in similar groups
4. Quantify emissions using the recommended factors
5. Establish full inventory

Information sources

- Database (National Power Balance, Fuel Production, Imports /Exports)
- Solid Wastes Industrial Poll
- Centralizing institutions (DINAMA, MIE, MTOP, MGAP, ANCAP, UTE, School of Engineering, Firemen, Unions)
- Industries
- Publications
- Estimations

Aproximately 300 contacts

Resultads

TOTAL EMISSION:	**28 g TEQ/year**
Air:	61 %
Residues:	29 %
Land:	6 %
Products:	2 %
Water:	2 %

Emissions to air (17.1 g TEQ/year)

- UNCONTROLLED COMBUSTION: 45 %
  (Agricultural waste, urban waste, forestry firing)
- WASTE CONTROLLED INCINERATION: 28 %
  (Medical waste)
- TRANSPORT: 8%
  (Ship engines and leaded gasoline)
- FERROUS AND NON - FERROUS METAL PRODUCTION: 7%
  (Iron and steel, cable recovery, copper and aluminium)
- POWER GENERATION AND HEATING: 7%
  (Firewood and biomass)
- PRODUCTION OF MINERAL PRODUCTS: 5%
  (Cement and lime)

Emissions with residues (8.1 g TEQ/year)

- UNCONTROLLED COMBUSTION: 76 %
  (Urban waste)
- FERROUS AND NON - FERROUS METAL PRODUCTION: 20%
  (Aluminium, iron and steel, copper)
- POWER GENERATION AND HEATING: 2 %
  (Firewood and biomass)
- PRODUCTION OF MINERAL PRODUCTS: 2 %
  (Cement and lime)

Uncertainties

- Quantification of generating activities
- Emission factors

Measures to reduce emissions

Strategy:

Concentrate in the more contributing activities; eliminate inconvenient practices; use alternative technologies and improve treatment systems.

Measures to recuce emissions

Proposal:

1. Establish measures to discourage agricultural waste and uncontrolled urban waste burning practices.
2. Deepen existing knowledge on the formation mechanisms in medical waste and industrial processes incineration systems to improve operation, control and treatment.
3. Encourage the elimination of leaded gasoline production.
4. Keep incineration only for waste with special characteristics.

Management indicators

Periodical inventory updating, incorporation of more accurate information = Indicator of minimization measures.

Experiences on the Implementation of POPs Prevention and Reduction in the United States of America.

Peter Lallas and Robert Kellam, US-EPA

Unintentional POPs:

Experiences on the implementation of POPs prevention and reduction in the United States of America

Regional Workshop on BAT and BEP in the context of the Stockholm and Basel Conventions, October 21-26, 2002

The Experience in U.S.A.

- Legislative Authority
- Regulation Examples
- Strategic Considerations; Lessons for the Future.

Dioxins and Furans

- **Releases from unintentional production**
- **In little quantities**
- **Very toxic**
- **Persistent and omnipresent**

Key Stipulations in the Convention

- Reduction of the total releases derived from anthropogenic sources with the goal of their continuing minimization and, where feasible, ultimate elimination.
- Action Plans: national or regional; important sources.
- Prevention enforcement through the use of substitute or modified materials, products and processes.
- BAT and BEP; Annex C
  - Obligation of using BAT for new sources within source categories listed in Annex C.II (4 years) and other categories which a Party has identified as warranting such action in its action plan.
  - Promotion of BAT and BEP for other sources.

Legislative Authorities in the U.S.A.

- **There are several laws dealing with the reduction / elimination of unintentional POPs: f.ex., air, water, wastes and EIA laws. Under EPA's management.**
- **Regulations and programs are used to elaborate key elements and to ensure implementation.**
- **There are also non regulated initiatives (f.ex., EPA has signed a voluntary agreement with the American Hospital Association in order to reduce medical wastes sent to incineration for their disposal)**

Releases to the Atmosphere: Clean Air Act

- Since 1990, the Act includes dioxins, furans and HCB in the list of controlled toxic pollutants.
- It establishes an emission standard based on the application of **Maximum Achievable Control Technology (MACT)** to the principal categories of industrial sources. Later on, there comes an assessment of residual risks and - - if necessary - - the development of further regulations to protect public health.
- The MACT concept goes in parallel to that of BAT in the Stockholm Convention.

Principal Source Categories

- Some categories are identified within the Act.
- Others are identified during the regulating process, following the guidelines of the Act.

Processes and Criteria to Determine MACT/BAT

- **General.** MACT means the maximum level of releases reduction "achievable" through the application of measures, processes, methods, systems or techniques, including measures to reduce or eliminate emissions through processes changes, substitute or modified materials, or closed systems.
- **New sources**: its performance must fulfill requirements not less stricter than those of the best controlled similar source (the minimum standard must be harmonized with the "general" obligation)
- **Existing sources**: its performance must fulfill requirements not less stricter than those corresponding to the medium performance of the best performing 12 % sources (minimum standard)

MACT/BAT (continued)

- Though a specific process or technology is not established, a performance standard based on MACT/MTD is stipulated (innovation)
- Public information and opportunity to make comments.
- Need to update MACT/BAT
- Economical considerations: what is available or "achievable"
- All this is complex and requires technical knowledge. It emphasizes the task of the BAT/BEP Expert Group.

MACT/BAT and Prevention

- One of the goals of the Act is to prevent pollution.
- In MACT determination, the Authority must consider processes changes and substitute or modified materials.
- This concept is also included in the definition of BAT within the context of the Stockholm Convention.
- Key point: it is not necessary that BAT be focused only on "end-of-pipe" technology. It includes considerations on materials, processes and prevention.

Discharges to Water: Clean Water Act)

- **Performance standards based on BAT.** The Act imposes discharges standards based on the “best available technology economically achievable” (BAT). They are applied on a sector by sector basis.

- **Water quality standards.** When performance standards are not enough to comply with water quality standards, the Authority imposes more stricter ones.
  - To assign additional requirements among sources is complex.

- **Dredged materials: bio-solids strip**

Discharges to Water - - Prevention

- The Act creates authority to integrate prevention in BAT determination, f.ex., processes changes.

- Example: Emission standards for paper paste production result by the substitution of “elemental chlorine” for “chlorine dioxide”.

- Example: in copper’s secondary production, separation of organic materials before casting.

Pollution Prevention Law

- It establishes a national policy to prevent pollution and to use other methods (f.ex., treatment, discharge) only if prevention is not feasible.
- It requires that EPA establishes a program to reduce pollution sources.
- It refers to source reduction through technologies, processes or products modifications as well as through materials substitution.
- Example: EPA has negotiated voluntary agreements with industry to promote toxic or polluted materials separation in wastes destined to incineration (f.ex., with the American Hospital Association)

Drinking Water: "The Safe Drinking Water Act"

- 1986: obligation to develop drinking water standards for 83 pollutants, including 2,3,7,8-TCDD
- The primary national regulation must achieve a contamination level as close as feasible to the maximum contamination level ("Maximum Contaminant Level Goal" o MCLG)
- The MCLG reflects the level where there are no known negative impacts to human health, with an adequate "margin of safety".

Wastes Management and Disposal: "RCRA"

- A life cycle system ("cradle to grave") is used in order to regulate hazardous wastes management.
- Since1984 dioxins and furans must specifically be considered.
- Several dioxin contaminated wastes have been designed as severely hazardous or toxic wastes.

Cleaning Contaminated Sites: Superfund

- It applies to contaminated sites or to respond to contamination episodes.
- The most important sites are included in a national priority sites list ("National Priority List"). There is a system to assess the ("Hazard Ranking System")
- Up to now, EPA has generally designed 1 ppb of dioxin as the clean level for residential areas, and 5-20 ppb as that for industrial / commercial ones.

Examples of Regulations to Prevent or Reduce Unintentional POPs

- **Municipal Waste Combustion**
- **Pulp and Paper Manufacturing**
- **Secondary Aluminum Production**

Municipal Waste Combustion:

- The problem of dioxin and furan releases from municipal waste incinerators was recognized in the mid 1980's
- The 1990 amendments to the Clean Air Act (Section 129) require:
  - the establishment of numerical emission limits for nine pollutants including dioxins and furans
  - the development of State plans to implement and enforce the guidelines for existing sources
  - the application of maximum achievable control technology (MACT) to new and existing sources
- 1995 – Emission standards for large incinerators (>250 tons per day)

Municipal Waste Combustion:

MWC Unit Size	MWC Category	Emission Limit (ng/dscm)
>250 tons/day	New (NSPS)	13
	Existing (EG)	30/60*
35 to 250 tons/day	New (NSPS)	13
	Existing (EG)	30/60/125**

*30 ng/dscm for spray dryer/fabric filter
60 ng/dscm for spray dryer/electrostatic precipitator

** 120 ng/dscm for dry sorbent injection/fabric filter

Municipal Waste Combustion:

How is compliance with the standards ensured?

- **Initial stack test to certify compliance**
- **Annual stack test for all pollutants**
- **Continuous parameter monitoring (activated carbon, temperature of control device)**

Pulp and Paper Manufacturing:

- **The Problem:** the use of elemental chlorine in pulp bleaching operations
- **The Solution:** a combined air and water rule that establishes limits based on best technology
- To achieve these limits, sources must shift away from elemental chlorine
- The rules are projected to reduce dioxin releases by 96%

Secondary Aluminum Production:

- Recovery of aluminum from scrap, beverage cans, siding, etc.
- Sizes range from backyard sweat furnaces to large, consolidated re-cyclers
- Rule (3/2000) establishes dioxin limits that will lead to the retirement of older sweat furnaces.
- New sources can achieve standards through the use of afterburners, lime-injected fabric filters, or a combination of these.

Strategic Considerations:

- Avoiding past mistakes
- The uneasy partnership of technology-based and risk management/ambient quality paradigms
- “Continuing minimization”, “virtual elimination”, “ultimate elimination” of “anthropogenic” releases
- Non-end-of-pipe and non-regulatory approaches

Avoiding the Mistakes We Made:

- **Hot-sided ESPs**
- **Elemental chlorine bleaching**
- **Leaded gasoline**
- **Poor combustion**
- **Indiscriminate Incineration**

How far can technology take us?

	1987	1995	2002/4
Municipal Solid Waste Incinerators	8877	1250	12
Backyard Barrel Burning	604	628	628
Medical Waste Incineration	2590	488	7
Secondary Copper Smelting	983	271	5
Cement Kilns	118	156	8
Sewage Sludge	77	77	77
Residential Wood Burning	90	63	63
Coal Fired Utilities	51	60	60
Diesel Trucks	28	36	36
Secondary Aluminum	16	29	29
Iron Ore Sintering	33	28	28
Bleached Pulp and Paper Mills	356	20	12

How far can technology take us?

	1987	1995	2002/4
Backyard Barrel Burning	604	628	628
Sewage Sludge	77	77	77
Residential Wood Burning	90	63	63
Coal Fired Utilities	51	60	60
Diesel Trucks	28	36	36
Secondary Aluminum	16	29	29
Iron Ore Sintering	33	28	28
Industrial Wood Burning	26	28	28
Cement Kilns (non-haz)	14	18	18
Sewage Sludge Incineration	6	15	15
Municipal Solid Waste Incineration	8877	1250	12
Bleached Pulp and Paper Mills	356	20	12

How far can technology take us?

	1987	1995	2002/4
EDC/Vinyl Chloride	NA	11	11
Oil-fired Utilities	18	11	11
Crematoria	5.5	9.1	9.1
Cement Kilns (haz)	118	156	7.7
Medical Waste Incineration	2590	488	7
Unleaded Gasoline	3.6	5.9	5.9
Secondary Copper Smelting	938	271	5
Hazardous Waste Incineration	5	5.8	3.5
Kraft Black Liquor Boilers	2	2.3	2.3
Petroleum Refinery Catalyst	2.2	2.2	2.2
Leaded Gasoline	37.5	2.0	2.0
Secondary Lead Smelting	1.2	1.7	1.7

The "R", "M", and "E" Words:

- **Reduction**
- **Continuing Minimization**
- **Virtual Elimination**
- **Ultimate Elimination**

Non-end-of-pipe/Non-regulatory Approaches:

- Recycling and re-use
- Source Separation
- Process/Material/Product Modifications
- Alternative Disposal Methods

Resources:

- Air Regulations
  - http://www.epa.gov/ttn/atw/eparules.html
- Pulp and Paper (water)
  - http://www.epa.gov/OST/pulppaper/
- Dioxin Reassessment
  - http:cfpub.epa.gov/ncea/cfm/dioxin.cfm?ActType=default
- Large Municipal Waste Combustors
  - http://www.epa.gov/ttn/uatw/129/mwc/rimwc.html
- Bob Kellam (1-919-541-5647), kellam.bob@epa.gov
- Peter Lallas (202-564-5407), lallas.peter@epa.gov

Development of Canada-wide Standards for Dioxins and Furans.

Kenneth E. Smith, Ontario Ministry of the Environment

Development of Canada-wide Standards for Dioxins and Furans

Kenneth E. Smith, Ontario Ministry of the Environment (Canada)

United Nations Environment Program Workshop

Best Available Techniques and Best Environmental Practices for Persistent Organic Pollutants

October 21-24,2002 Buenos Aires, Argentina

Dioxins and Furans Slated for Virtual Elimination in Canada

- Designated as "Track 1" under both *Canadian Environmental Protection Act (CEPA)*, Canadian Council of Ministers of the Environment (CCME) *Policy on the Management of Toxic Substances (PMTS)*; as such, slated for Virtual Elimination (VE)
- Achievement of VE has occurred when releases to the environment are below the Level of Quantification (LOQ) under *CEPA* or the Limit of Measurable Concentrations (LOMC) under the CCME's *PMTS*
- Environment Canada has set LOQ for air emission sources at 32 pg I-TEQ/Rm^3; CCME using as LOMC

January 28, 2003 2

Canada-wide Standards (CWS) Development Process

- CCME formed Development Committee (representatives from each jurisdiction - provincial, territorial, federal environment Ministries)
- One jurisdiction (British Columbia) assumed responsibility to be "Champion" for development process
- Development Committee started from 1999 inventory prepared by federal/provincial task force
  - water discharges considered to have achieved VE
  - limited data on releases to soil
  - significant emissions to air identified
- Focus: 6 "priority sectors" gave 80% of air emissions

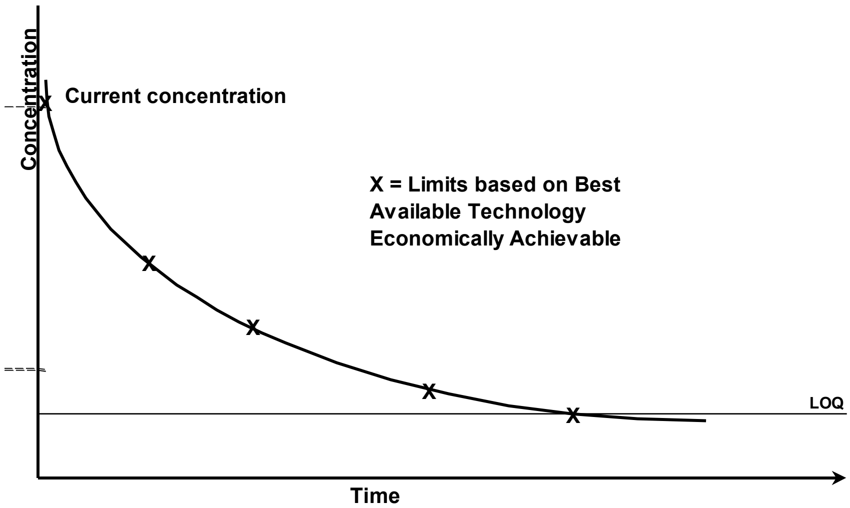
January 28, 2003 3

Development Committee Objectives

- CWS for dioxins and furans must:
  - result in short-term reductions in releases; and
  - make a significant contribution to the ultimate goal of virtual elimination
- The LOQ is the ultimate, longer term goal; the CWS are not expected to achieve this goal in a single step
- Process to be open, transparent, inclusive
- Address priority sectors and establish plan to move forward on other identified sectors
- Take into account linkages to other pollutants of concern
- Take advantage of existing stakeholder engagement processes

January 28, 2003 4

Towards Virtual Elimination in Releases



Working towards virtual elimination from the environment

Achieving Openness, Transparency & Inclusiveness

- Core Advisory Committee
  - Individuals from cross-section of stakeholder groups invited to provide personal input on consultation activities; participate in planning
- Sector-specific multi-stakeholder advisory groups (MAGs)
  - Individuals chosen to represent interests of stakeholder groups and provide recommendations to the Development Committee on content of CWS
  - Consultative nature stressed; consensus to be sought but if not achievable, record of positions and rationale acceptable
- National Consultation Workshops
  - Forums for wider consultation, presentation of progress reports and discussion of issues raised in MAGs

January 28, 2003 6

Risk Management Implications of Virtual Elimination Goal

- Risk assessment was performed in the process of declaring these pollutants "Track 1" substances
- Technical feasibility of given level of control primary; the first question is "How far can we go towards VE?"
- Cost effectiveness evaluated primarily as reality check; a high cost option with little incremental effectiveness would not be a good basis for a standard
- However, if only one known option for significant reduction, cost may serve as basis for setting appropriate phase-in period for existing sources - cost not an excuse for inaction

January 28, 2003 7

Development Proceeded on Six Priority Sectors

- Conical waste combustors
- Municipal waste incineration
- Residential wood combustion
- Coastal pulp & paper mill (CPPM) boilers
- Iron sintering
- Steel electric arc furnaces

January 28, 2003 8

Required Elements for Canada-wide Standards

- A numerical limit or target,
- A timeframe for achievement of the target,
- A set of initial actions, and
- A monitoring and reporting protocol.

Approach

- Identification of abatement technologies or approaches and evaluation of options
- Stakeholder involvement in (but not limited to):
  - setting numerical value and timeframe
  - developing initial set of actions
  - monitoring and reporting protocol
- CCME approval
- Jurisdictional implementation

Priority Sector Inventory Status

Source Type		1999 Inventory (grams I-TEQ/year)		2001 Inventory (grams I-TEQ/year)	
Incineration		11.9		41.5	
	Municipal Solid Waste		8.3		8.4
	Medical Waste		2.5		25.1
	Hazardous Waste		0.8		7.9
	Sewage Sludge		0.3		0.1
Coastal pulp mill boilers		10.5		5.1	
Conical waste combustors		74.5		44.1	
Res. wood combustion		36		3.3	
Iron sintering		23		6.0	
Steel electric arc furnaces		10		12	
Subtotal		166		112	
Total Inventory (air)		199		164	
Contribution to air total		~83%		~68%	

January 28, 2003 11

Common Elements to Date for Dioxin & Furan CWS

- Emission limits (stack conc.) with timeframe for achievement by existing sources,
- Pollution prevention strategy,
- Review of standard,
- Proposed jurisdictional initial actions, and
- Monitoring and reporting requirements.

January 28, 2003 12

Canada-wide Standards Endorsed by Ministers May 1, 2001

- New source emission limits set:
  - Apply to new sources of any size
- Incinerators (all 4 types):
  - **80 pg I-TEQ/Rm^3**
- Coastal Pulp & Paper Mill Boilers:
  - **100 pg I-TEQ/Rm^3**
- R = reference conditions: 25° C, 1 atm, dry, corrected to 11% O_2

Canada-wide Standards Endorsed by Ministers May 1, 2001

Source Type	Emission Limit (pg I-TEQ/Rm^3)	Effective Date	I-TEQ Removed (grams/year)
Existing Incinerators			
Municipal Solid Waste	80	2006	20.1
Medical Waste	80	2006	4.5
Hazardous Waste	80	2006	7.9
Sewage Sludge	100	2005	0.01
Existing Coastal Pulp & Paper Mill Boilers	500	2006	3.9
Total Reduction Expected by 2006			36.4 (~73%)

Canada-wide Standards to be Endorsed by Ministers Dec. 2002

- Iron Sintering Plants:
  - New: 200 pg I-TEQ/Rm^3
  - Existing:
    - 2002: 1350 pg I-TEQ/Rm^3
    - 2005: 500 pg I-TEQ/Rm^3
    - 2010: 200 pg I-TEQ/Rm^3
- Steel Industry Electric Arc Furnaces:
  - New: 100 pg I-TEQ/Rm^3
  - Existing:
    - 2006: 150 pg I-TEQ/Rm^3
    - 2010: 100 pg I-TEQ/Rm^3

January 28, 2003 15

Two Remaining Priority Sectors

- Conical waste combustors:
  - Province of Newfoundland & Labrador developing phase out plan for existing units along with waste management master plan; details being finalized
- Residential wood combustion:
  - Expect additional work needed to support path forward
  - Development of path forward to be assigned to intergovernmental (federal interdepartmental, provincial & territorial) working group addressing particulate matter emissions

January 28, 2003 16

Pollution Prevention Strategies

- Result of stakeholder input
- Multistakeholder processes mandated
- Incineration: strategy to take a multipollutant approach to achieve reductions of all air emissions and ash discharges
- Coastal Pulp & Paper Mill Boilers: strategy to focus on avoiding formation of dioxins and furans; emphasis on reducing chloride content of fired hog fuel

January 28, 2003 17

Review of Standards

- CPPM Boilers: 2003, based on evaluation of semi-annual test results & pollution prevention options identified
- Evaluation of all CWS for Dioxins and Furans to be presented to Ministers in Spring 2006
- Spring 2006 review to consider new scientific, technical, economic information; provide assessment of need to develop next set of CWS targets & timelines to continue progress toward virtual elimination

January 28, 2003 18

Monitoring and Reporting Requirements

- Annual stack testing required (twice annually until 2003 for CPPM Boilers; for incinerators, requirement begins in year of implementation)
- Compliance based on average of stack test results generally (some jurisdictional variation allowed)
- "Not detected" isomers to be reported as if present at the detection limit
- Reduction from annual testing possible (to biennial) if consistently below "Level of Quantification" (32 pg I-TEQ/Rm^3) after 5 years

Smaller Medical & Municipal Solid Waste Incinerators

- To achieve significant step toward virtual elimination, smaller facilities needed to be addressed
- Emission factor for small medical waste incinerators much larger than 1999 inventory used
- Units burning <26 tonnes per year excused from annual stack testing requirement but still required to make "determined efforts" to meet emission limit
- Need for ongoing review of opportunities to achieve reductions from small sources

Reporting on Progress

- 2004: to reflect interim progress on achieving the CWSs; progress on both implementation of numeric targets & activities applied as part of "determined efforts" provisions for smaller medical waste & municipal solid waste facilities to be documented

- 2008: to evaluate whether targets have been met & effectiveness of "determined efforts" with respect to smaller facilities

Overview of CWS Endorsed to Date

- Reductions aimed for are significant steps toward virtual elimination

- Incineration emission limits will be most stringent in the world when adopted, applying to very small units

- Emission limits not the solution for every situation; phase-out of conical waste combustors, "burn barrels" cases in point

Additional Points of Note

- Stakeholder concerns go beyond emission limits, into reduction of overall impact (loading per source, cumulative airshed loading, transfers to other media)

- Virtual elimination mandates continuous improvement philosophy for these standards; ongoing review part of the standard

Dealing With Other Sectors

- One new significant sector; barrel burning
  - 2001 inventory estimates 20 grams I-TEQ/year; likely low based on new activity estimates
  - Coordinating with Bi-National Strategy working group on same topic
- Partnering with federal activity on base metal smelting, wood preservation; PM CWS activity on electric power generation
- Still leaves ~12 sectors requiring path forward; possibly more

Categorizing Remaining Sectors

- Emission levels known/believed low
  - e.g., less than incineration CWS level, near LOQ
- Non-point sources
  - e.g., barrel burning, diesel (on or off road)
  - emission limits may not be applicable/best
- Significant levels known/expected, few sources (cement kilns burning hazardous waste) or many small (crematoria)
  - MAGs or similar consultation needed
  - possible role for best management practices
  - CWS not necessarily best fit for all sources

January 28, 2003 25

Other Releases, Reservoirs & Residues

- Cross-media transfer concerns raised for two MAGs to date (salt-laden wood, sintering)
  - need better data on amounts going to landfills
  - better understanding of fate once landfilled also
- Application of biosolids (sewage sludge) to agricultural lands
  - need to ensure compatibility of approaches across Canada; currently different directions underway
- Options for disposal of PCP treated wood

January 28, 2003 26

Responding to the Challenges

- Continuing to work with all stakeholders to develop innovative, effective responses
- Identifying Best Environmental Practices to manage small point source and non-point source releases
- Working with sectors (e.g., base metal smelting) to obtain test results to confirm concentrations and total releases

January 28, 2003 27

Other Canadian Initiatives on Dioxins and Furans

- CCME Guideline on use of Hazardous Waste as fuel in Cement Kilns
- Federal and provincial regulations on dioxins and furans in effluents from pulp and paper mills using chlorine bleaching processes
- Federal Priority Substances List assessment performed for secondary copper and secondary zinc production; Strategic Options Process for base metal smelters includes some secondary smelters of both types (multipollutant initiative including consideration of dioxins and furans)

January 28, 2003 28

More Canadian Initiatives on Dioxins and Furans

- Open burning of household refuse – pilot strategy developed in conjunction with Great Lakes Binational Toxics Strategy and the Canada-wide Standards process
- Residential wood combustion – in collaboration with equipment manufacturers' association, conducted emission characterization; strategy for emission reduction to be coordinated with intergovernmental working group addressing particulate matter and ozone concerns with these sources

Other Article V, Annex C POPs

- Hexachlorobenzene (HCB) and polychlorinated biphenyls (PCBs)
- Initiatives on dioxins and furans expected to achieve similar reductions in HCB and PCB emissions
- Source testing results to date support these expectations

Basel Convention: Control of Transboundary Movements of Hazardous Wastes and their Disposal
Nelson Sabogal, Secretariat of the Basel Convention

BASEL CONVENTION

Control of Transboundary Movements of Hazardous Wastes and their Disposal

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Destruction and Decontamination Technologies for PCBs and Other POPs Wastes

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Geneva, Switzerland
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* **The Training Manual can help with**

* **Planning**
* • understanding background and principles
* • correct inventory collation
* • inventory analysis

* **Writing project Plans**
* • produce an overall plan for disposal or decontamination

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* **Technology Decision making**
* • appraisal of appropriate technology
* • selection of technology for destruction or
* decontamination

* **Writing tender documents**
* • produce tender documents for destruction or decontamination

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* **Hazardous waste project Implementation**
* • produce implementation plans

* **Project manual**
* • produce comprehensive destruction or decontamination manual

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Structure of the Training Manual

* **I BASIC PRINCIPLES AND BACKGROUND**

* This section covers the background to the POP's problem and the actions of international organisations to deal with the toxic waste problems.

* **II POPs PROJECT STRATEGIES**
* The formulation of strategies for destruction and decontamination
* depends on the inventory analysis. When the information is
* available then the strategy selection process commences.

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Scope of the Training Manual

- • The Training Manual can be used to prepare plans and strategies for the project management of hazardous waste projects involving intractable chemicals such as PCBs and other POP's.
- • The scope is such that any organisation can use it to prepare simple plans for a small scale waste problem involving less than 5 tonnes of material or for a large scale operation involving say 5000 tonnes of material.
- • In the final Part of the Training Manual there are planning guides so that large projects that demand a high standard of quality assurance are available.

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Structure of the Training Manual

- I BASIC PRINCIPLES AND BACKGROUND
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Structure of the Training Manual

- II POPs PROJECT STRATEGIES

- The formulation of strategies for destruction and decontamination depends on the inventory analysis.
- When the information is available then the strategy selection process commences.

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Structure of the Training Manual

- III TECHNOLOGY SELECTION PROCESS

- When the destruction and decontamination strategy is in place then the specific technology decisions can be made and the appropriate technology selected. several destruction and decontamination technologies are presented in this section

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Structure of the Training Manual

- IV IMPLEMENTATION PROCESS
- Tendering and project management documentation and plans.
- This section provides design guidance for site appraisals, packaging of hazardous wastes, storage, transportation as well as
- guidance for the destruction and econtamination processes.

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PART I : BASIC PRINCIPLES AND BACKGROUND

- **BACKGROUND**
- **Persistent Organic Pollutants (POPs) are chemical substances which are extremely stable, and are known to accumulate in biological tissue thereby posing a risk of adverse effects to human health and the environment.**
- **A growing body of scientific evidence indicates that exposure to very low doses of certain POPs - which are among the most toxic substances ever created - can lead to cancer, damage to the central and peripheral nervous systems, diseases of the immune system, reproductive disorders, and interference with normal infant and child development.**

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BACKGROUND

* With the further evidence of the long-range transport of these substances to regions where they have never been used or produced and the consequent threats they now pose to the environment worldwide, the international community has called for urgent global action to reduce and eliminate their release into the environment.
* The result was the adoption of the Stockholm Convention on Persistent Organic Pollutants in May 2001.

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PART II PROJECT STRATEGIES

* The process to developing an Environmentally Sound Management Project strategy for destruction and decontamination is essentially the same for all POPs, PCBs and unwanted and obsolete pesticides.
* There are seven steps involved and these steps are the same for all. The Training Manual deals with each separately but follows the same seven steps.

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PART II PROJECT STRATEGIES

Step one
Declaration to dispose PCBs and POPs
The decision to dispose is where the whole process starts. When a country or organisation decides that a POP or PCBs will be collected and disposed of and this is declared the entire process commences at the point of declaration.
The important key issues at the point of declaration are:
To state the boundaries of the disposal.
Will it be only government agencies that have stock of PCBs or POPs or will it also cover private or public companies.
Will stocks without owners be included and who will pay for the disposal.
To state the rules about end of service life for equipment contaminated with PCBs.
The declaration needs to be short, clear and concise as to the boundaries of the project.
Once the declaration has been published then the project follows specific steps.

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PART II PROJECT STRATEGIES

- Step two
- Inventory data collection POPs (PCBs)
- The process involved with determining and selecting an appropriate destruction or decontamination technique begins with the inventory stage.
- The whole process is entirely dependent on the quality and quantity of the information obtained during the inventory phase.
- It is not possible to correctly select an appropriate technology unless the inventory stage is rigorous and detailed.
- The range of concentration and disposition of PCB for instance is so vast that is is unacceptable to determine the destruction or decontamination technology without the inventory analysis being in place.

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PART II PROJECT STRATEGIES

When the inventory analysis is complete and the stock's size, concentration and disposition is known then and only then can the process begin in order to establish the appropriate technology or combination of technologies that will deal with the waste in a sustainable manner.

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Compiling a National PCB inventory

Scope

- determine the regions to be inventoried
- locate areas where PCBs are likely to be found
- divide areas into logical units to be inventoried

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<u>Compiling a National PCB inventory</u>
Selection of facilities to inventory

• select those facilities that are likely to have significant quantities of PCBs

• also consider facilities that may have disposed of PCBs inadequately

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Compiling a National PCB inventory

- **Facilities that may have PCBs**
- • electric utilities • research labs
- • industrial facilities • manufacturing plants
- • railroad systems • mining operations
- • military installations • landfills

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Compiling a National PCB inventory

- **Priority facilities**

- electric utilities, power companies
- electronic manufacturing plants
- petrochemical plants
- railroad systems
- transformer repair
- mining operations

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PART II PROJECT STRATEGIES

- **Step two**
- **Inventory data collection POPs (PCBs)**

- When collecting data for PCB inventory there are four fundamental questions to be asked.

- What is it?
- Where is it?
- How much is there?
- Who owns it?

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PART II PROJECT STRATEGIES

- **Step two**
- **Inventory data collection POPs (PCBs)**

- These questions are answered, for example, by the provision of the following data:
- In service transformers
- Out of service transformers
- In service capacitors
- Out of service capacitors
- Bulk storage tanks, drums and containers

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Step two Inventory data collection POPs (PCBs) In service transformers

- KVA rating
- Fluid quantity
- Number (EPA)
- Year of manufacture
- Weight
- Brand name
- Location
- PCB concentration
- Scheduled year of replacement
- Status/owner

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PART II PROJECT STRATEGIES

- **Step two**
- **Inventory data collection POPs and unwanted and**
- **obsolete pesticides**

- Very similar to PCB inventory.The four questions are the same:

- What is it?
- Where is it?
- How much is there?
- Who owns it?

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PART II PROJECT STRATEGIES

- **Step two**
- **Inventory data collection**
- **POPs and unwanted and obsolete pesticides**

- Whereas the testing and sampling of PCB is a relative straight forward exercise, in the field of pesticides it is a different matter.
- Unlike PCB the segregation of the various unwanted agri-chemicals classes is very important when the material is to be transported.

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Step two
Inventory data collection
POPs and unwanted and obsolete pesticides

- Location
- Classes and type of material
- Weight and volumes of each material
- Owner information
- Storage situation
- Leakage and contamination information
- Product information-active ingredient, formulation, concentration
- Product age and condition
- Leakage and contamination information

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PART II PROJECT STRATEGIES

- **Step three**
- **Inventory analysis POPs (PCBs)**
- There are seven stages in the inventory analysis:
- Data analysis
- Data breakdown
- Establish groupings
- Estimate quantities
- Summarize Data info Groups
- Summarize Data for decontamination
- Summarize Data for destruction

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PART II PROJECT STRATEGIES

- **Step four**
- **Strategy selection POPs (PCBs)**
- The quality of the inventory analysis becomes important at this stage. So that the correct technology is selected that data contained in the matrix from steps 1,2 and 3 must be accurate.
- The actual grouping make up will also have a bearing on the combination of technology selection.

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PART II PROJECT STRATEGIES

- **Step five**
- **Rationalization**
- **PCBs**
- Given the amount of PCB oil to be disposed of, should the country import the technology to incinerate the oil using a mobile incinerator or due to the low quantities should it be exported to another country that is set up with incineration facilities.
- Would it be feasible to import Plasma Arc technology and dispose within the country. What are the issues of dioxins and furans that impinge on this decision and are they managed by the chosen technology.

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Step five
Rationalization PCBs

- The stages involved in the rationalization activity are as follows:
- • After the basic strategy selection has been performed the matrix is updated to show the reality of the chosen strategies and thus the quantities of materials that will be available to each part of the chosen strategies.
- • It is then appropriate to rationalize the process by examining the matrix to see where the bulk of the material lies and determine where a particular group may be combined with another group as far as treatment is concerned.

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Step five
Rationalization PCBs

- • Major decisions are made at this point based on the
- reality of the country situation and the disposition and size of the waste to be disposed. It is during this stage that the requirements of environmentally sound management are delivered.
- • export all or part of the PCBs
- • Construct or import PCBs destruction or decontamination technology
- • remove PCB contaminated equipment from service or
- leave in site and treat

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PART III TECHNOLOGY SELECTION PROCESS

- **Step six**
- **Technology selection**
- After the rationalization strategy (Step 5) is complete and the basic areas of destruction and decontamination are known then the technology selection can commence.
- When the amount and nature of the contaminated material to be decontaminated on shore is known then the work can begin to look at what technologies are available and then select the appropriate technology from an environmental and economic point of view.

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Step six Technology selection

- There are many technologies to choose from either, on shore or off shore:

- **Established**
- Incineration (High Temperature Incineration) (Destruction)
- Thermal desorption (Decontamination)
- Dechlorination (Decontamination)
- Solvent Extraction (Decontamination)

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Step six
Technology selection

- **Emerging**
- Bioremediation (Decontamination and Destruction)
- Vitrification (Destruction)
- Solidification (Decontamination and Destruction)
- Stabilisation (Decontamination and Destruction)
- Soil washing (Decontamination and Destruction)
- Supercritical water oxidation (Decontamination and Destruction)
- Gasification (Decontamination and Destruction)
- Chemical oxidation
- Electro chemical oxidation
- Steam reforming
- Wet air oxidation
- Ball Milling

Step six
Technology selection

- The decision to go offshore is of course dependent on the rationalization strategy (Step 5) and this decision is based on the best environmentally sound management approach which best meets the amount and nature of the POPs involved.
- For destruction of POPs there are also many options and the selection must be made on similar grounds to the decontamination requirements.

PART IV IMPLEMENTATION PROCESS

- **Step seven**
- **Implementation**
- **See Volume B of the Manual**
- After the technology selection (Part III) is complete then the process of implementation commences.
- This involves writing specifications and tenders for the various parts of the project.
- There should be separate tenders for the various parts of the project especially if there are off shore and on shore components and separate destruction and decontamination parts.

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PART IV IMPLEMENTATION PROCESS

- **Step seven**
- **Implementation**

- Implementation Part IV comprises three main sections
- Section One - Operating Document
- Section Two - Tender document
- Section Three - Contract Document

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Regional Centres for Training and Technology Transfer (BCRCs)

- Provide guidance on technical, technological issues, legal issues as well as advice on enforcement aspects of the Basel Convention and related Conventions like Stockholm, Rotterdam and Montreal Protocol.
- Encourage the introduction of cleaner production technologies
- Encourage the use of environmentally sound management practices
- Enhancement of information exchange, education and awareness-raising

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Regional Centres for Training and Technology Transfer (BCRCs)

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Regional Centres for Training and Technology Transfer (BCRCs)

For the African region:
Egypt, Nigeria, Senegal and South Africa

For the Asia and Pacific region:
China and Indonesia

For the Central and Eastern European region:
the Slovak Republic and the Russian Federation

For Latin America and the Caribbean region:
Argentina, El Salvador, Trinidad and Tobago and Uruguay

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BCRCs

- BCRCs-Trinidad and Tobago
- **Joint UNEP Chemicals/SBC Regional Training Workshop on Pesticides from 22-25 April 2002 in Trinidad and Tobago.**

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For Further Information

Visit the
Basel Convention's Website:

www.basel.int

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Panamerican Network for the Environmental Management of Wastes
Ana Lamas, AIDIS

REPAMAR

PANAMERICAN NETWORK FOR THE ENVIRONMENTAL MANAGEMENT OF WASTES

Dra. Ana LAMAS
Inter-American Association of Sanitary Engineering and Environmental Sciences-Argentinian Division

REPAMAR

- **REPAMAR is a regional initiative within Latin America. Their objectives include wastes production minimization and wastes management improvement, thus contributing to an economic sustainable development.**

REPAMAR

- REPAMAR is the outcome of a Mutual Cooperation Agreement between the Government of Germany - through GTZ - and the Pan-American Health Organization (OPS), through the Health and Environment Division of CEPIS.

REPAMAR

General Objective

- Strengthen waste management capacity in Latin América
- Increase information and experiences exchange, technical advising, capacity building and support to national and regional projects
- Share a vision and orientation towards wastes environmental management

REPAMAR

Objectives

- **Reduce wastes derived pollution in order to minimize its undesired effects on human health and the environment.**
- **Promote and adapt the approach to wastes minimization and recycling through the integration of all actors involved.**
- **Support the institutions that coordinate REPAMAR in the diverse countries as well as those regulating toxic and/or hazardous chemicals management.**

REPAMAR

- **Develop harmonization programs among waste generators, pollution controllers and the community at large.**
- **Assess and control occupational risks derived from toxic and hazardous chemicals.**
- **Collect and disseminate information, through their own centers and information networks, related to waste management.**

REPAMAR

Phases of REPAMAR

- Phase I: Strengthening of the OPS Sanitary Engineering and Environmental Sciences Pan-American Center (1989-1993)
- Phase II: Creation of REPAMAR National Networks in Argentina, Brazil, Colombia, Costa Rica, Ecuador, México, Panamá and Perú (1994-1999)
- Phase III: Consolidation of the National Networks. Training for cooperation arrangements. Creation of the Regional Coordinator Committee (RCC). Development of National Action Plans and Projects (1999-2002)

REPAMAR

- The RCC/REPAMAR is conformed by a representative of each one of the eight participant countries (coordinators of the National Committees), one representative from the GTZ and one from CEPIS.

REPAMAR

National Networks

- Argentina – REMAR
- Brazil – REBRAMAR
- Colombia – REPAMAR
- Costa Rica - REPAMAR
- Ecuador – RECUAMAR
- México – REMEXMAR
- Panamá – REPAMAR
- Perú - REPEMAR

REPAMAR

Work experiences in the Network

- Domestic and Hospital Hazardous Wastes (Costa Rica, Panamá and Perú)

- Environmental handling of batteries, used lubricants and agrochemical packagings (Argentina, Brazil, Colombia, Ecuador and México)

REPAMAR

- The regional projects now being performed were planned and decided during national and regional workshops where topics of common interest were identified among national networks, finally adopting operational plans financially supported by GTZ and CEPIS.

REPAMAR

Regional Projects:

Stage I: National Diagnosis.

- Legal and economical iInstruments, technologies, social participation and capacity building.

Stage II: study by type of waste

- Argentina - Pesticides packaging
- Brasil – Used lubricants
- México – Piles and batteries
- Costa Rica - Hospital wastes
- Perú – Domestic hazardous wastes

REPAMAR

Phase II

- Performed works
- Technical advisories

REPAMAR

- Methodologies to identify and assess risks for human health at contaminated sites.
- General guidelines for industrial solid wastes management in Perú.
- Pilot Project on fishing wastes. Perú
- Environmental Impact of ancillary chemicals used in the textile industry. Argentina
- Rational use of water in industrial dyeing facilities. Argentina

- Appraisal of solid wastes in the tanning industry. Argentina
- Selective collection of urban solid wastes in a city. Brazil
- Entrepreunerial ecological alphabetization. Colombia
- Technical advisory on hospital wastes incinerators. Ecuador
- Composting Projects. Ecuador
- Environmentally Sound Management of sludges derived from treartment plants. Ecuador

Phase III

- Presentation of outcomes and conclusions.
- Discussion and suggestions for a further Action Plan where REPAMAR may support national actions - generated by national governments, the society at large, private companies, universities and research centers - to promote wastes environmental management.

REPAMAR

Thank you very much!!

Arq. Carlos A. Bolsinger
President
REPAMAR

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