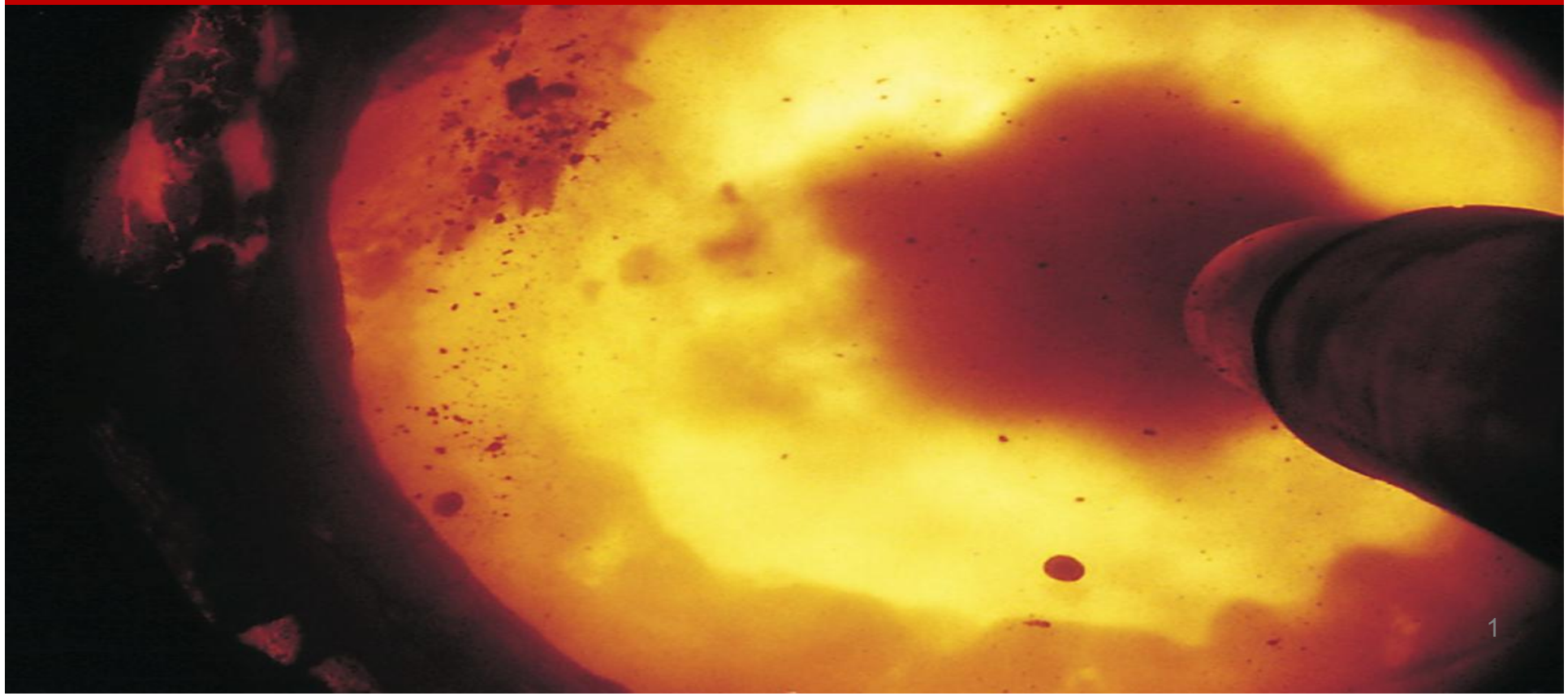
PCBs and other POPs Thermal treatment – Cement Kilns

Andrés Jensen V. – July 22, 2015



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ESCO MFG. CO.
Greenville, Texas USA
8
CAUTION
CONTAINS
PCBs
(Polychlorinated Biphenyls)
A toxic environmental contaminant requiring special handling and disposal in accordance with U.S. Environmental Protection Agency Regulations 40 CFR 761-For Disposal Information contact the nearest U.S. E.P.A. Office.
In case of accident or spill, call toll
Also contact:
Tel. No.


Costa Rica


DANGER! POISON


Costa Rica


El Salvador


Chile


El Salvador

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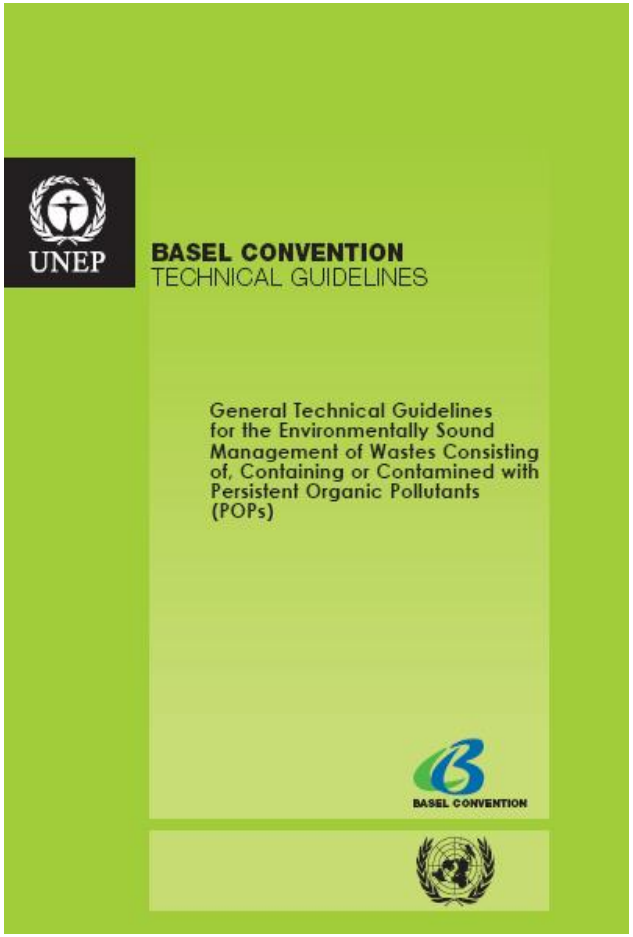
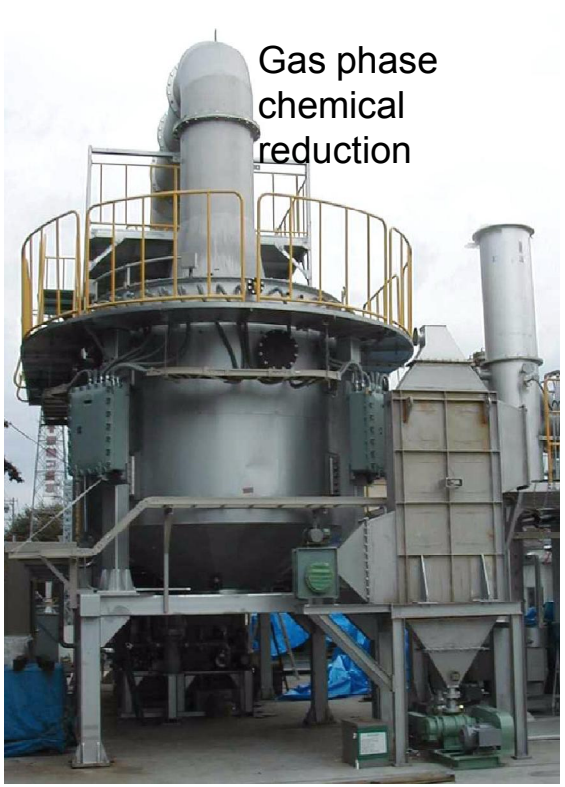
Basel Convention and its general guidelines



Technical Guidelines for POPs management available (under update process).

- Complementary with Stockholm Convention BAT and BEP.
- Promotion of “proximity” principle for POPs management and disposal (priority country of origin).
- Definition of minimum destruction and removal efficiency, to be accredited through test protocols.
- Indication of acceptable emission levels for dioxins.
- General guidelines for handling, sampling, analysis, collection, packing, labeling, transport and storage.
- Indication of adequate treatment and disposal technologies (in principle).


Gas phase
chemical
reduction


Base catalyzed decomposition


Cement
kilns

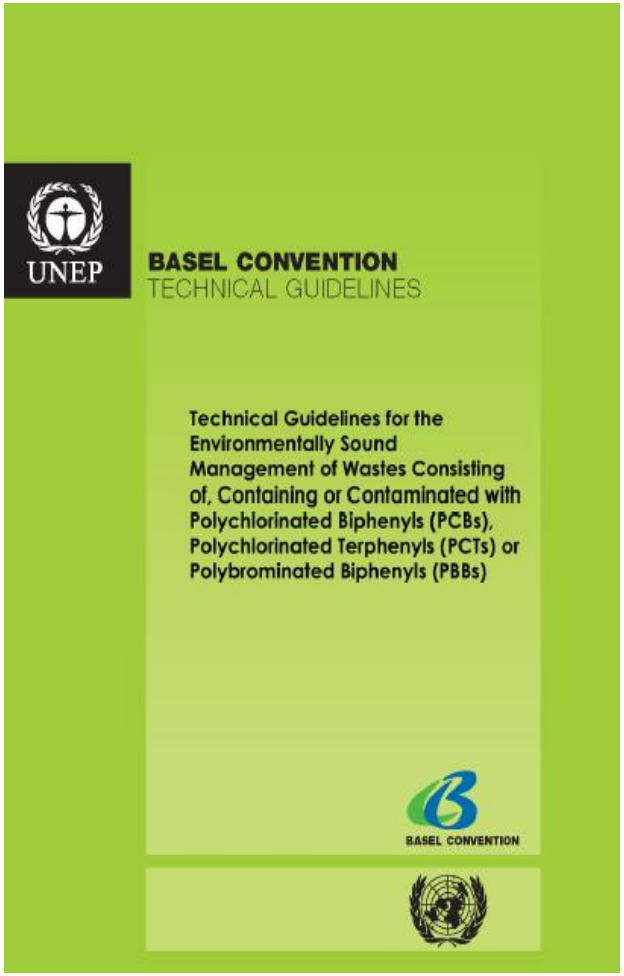

Alkali metal reduction


Plasma ark


Hazardous waste incinerator


Autoclaving

Basel Convention Guidelines for PCBs

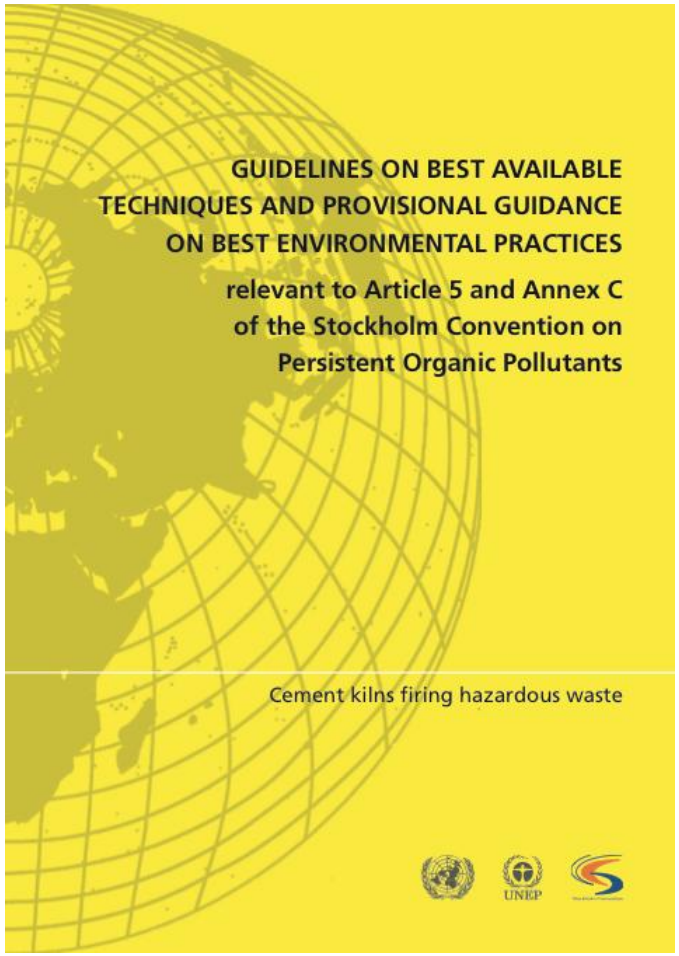


Technical Guidelines for PCBs, PCTs and PBBs management

- Under update process
- Inclusion of PCTs y PBBs
- Based on general guidelines for POPs

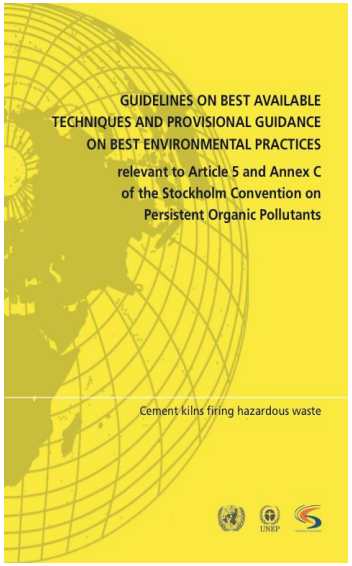
- Mix (blending) of PCBs with other substances is allowed, only if that mix facilitates efficient treatment.

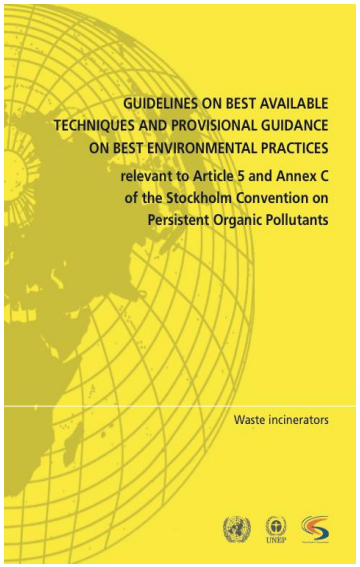
BAT and BEP already defined by Stockholm Convention



BAT: Best Available Techniques
BEP: Best Environmental Practices

BAT and BEP already defined by Stockholm Convention

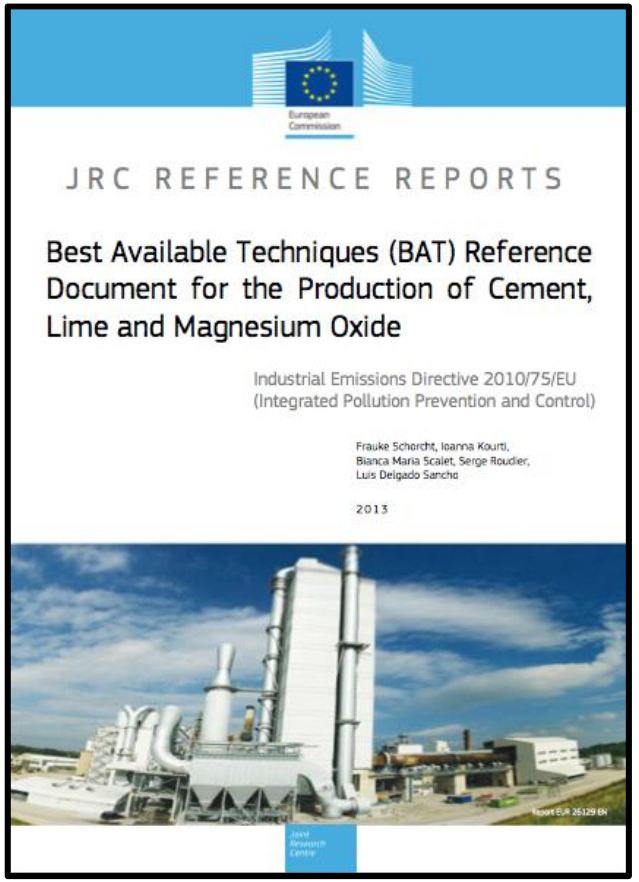




- Process temperatures
- Residence time
- Operational conditions
- Emission control equipment
- Primary measurements definition
- Secondary measurements definitions (in case of need)

Latest International references

2011



2013

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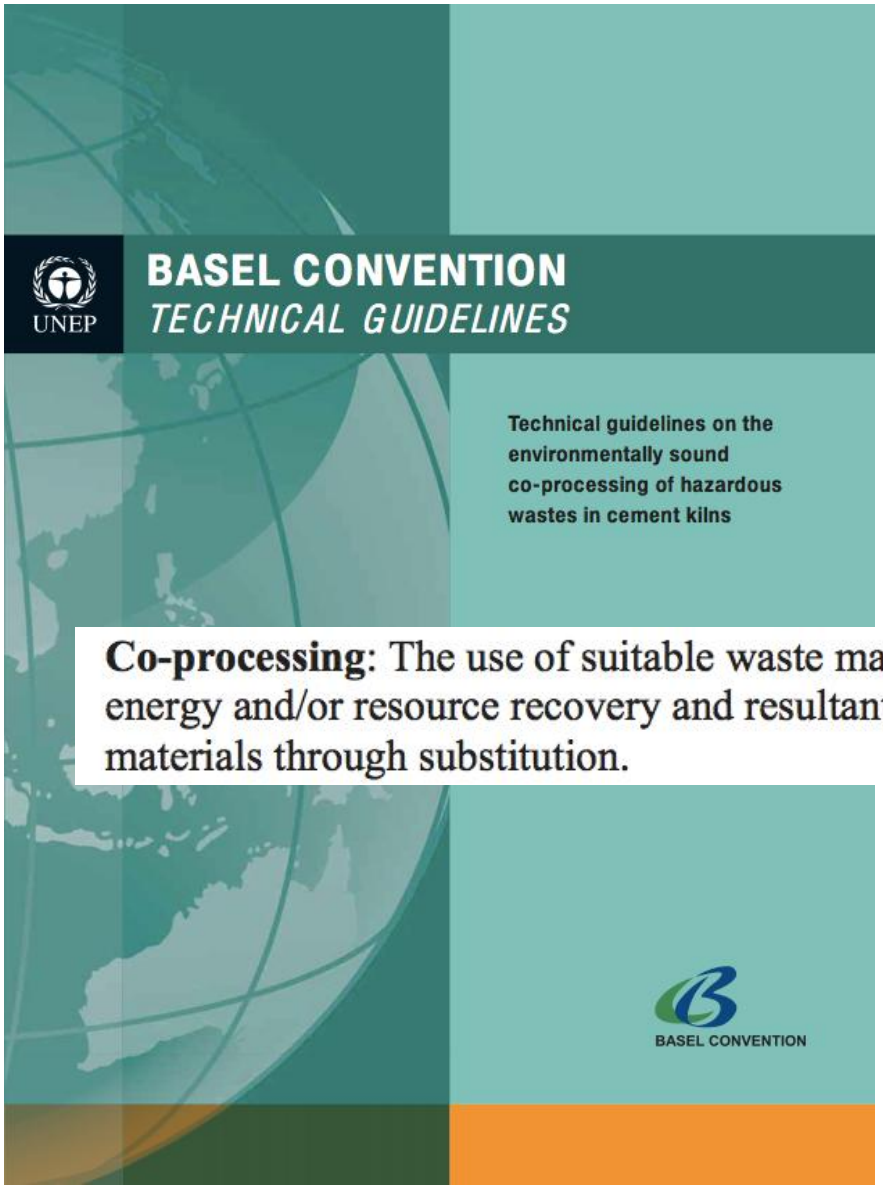
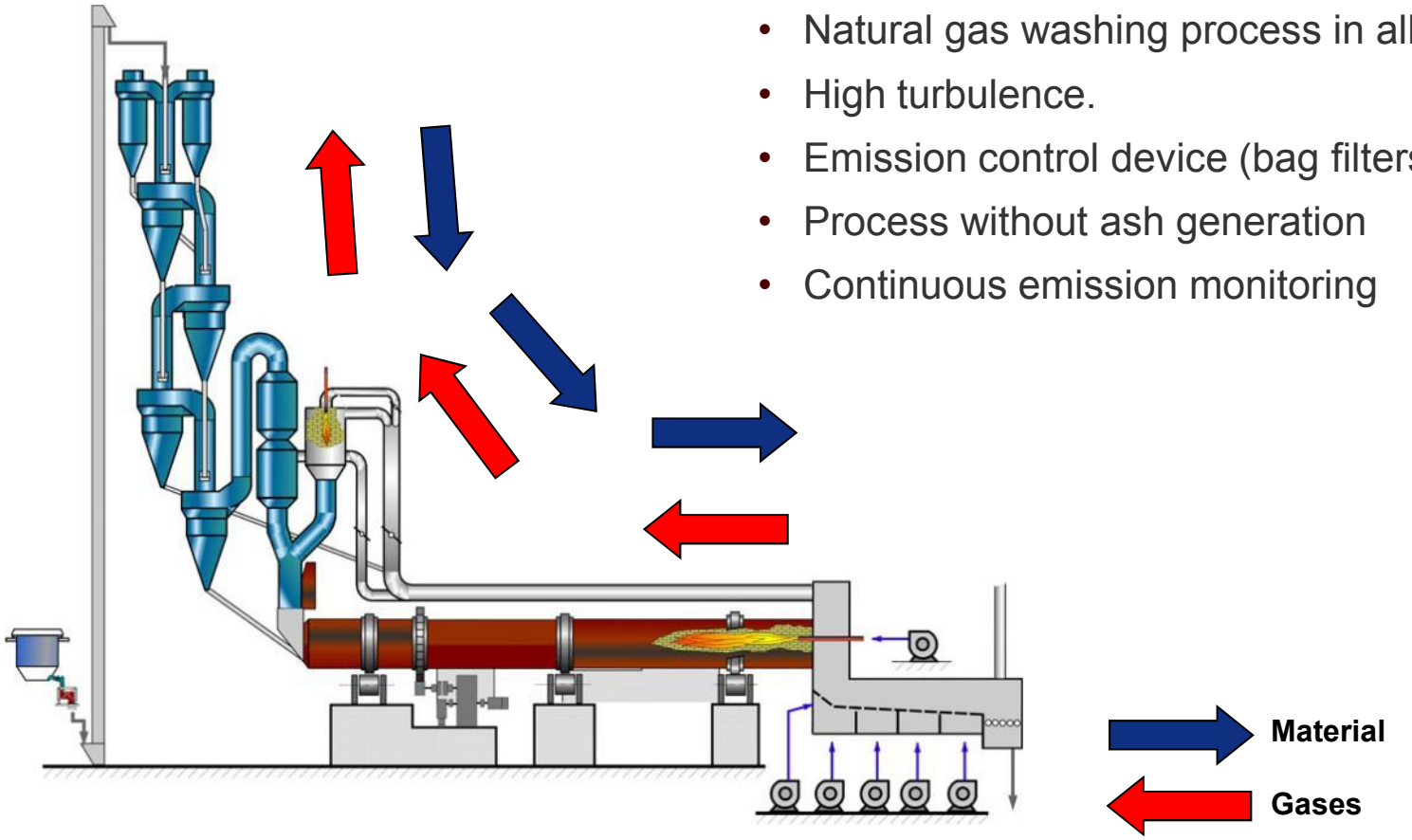


Co-processing: The use of suitable waste materials in manufacturing processes for the purpose of energy and/or resource recovery and resultant reduction in the use of conventional fuels and/or raw materials through substitution.

Cement Kiln

BAT

- Preheater / precalciner kilns
- High temperatures, up to 2.000 ºC (main burner)
- Long residence time for gases(> 6 seg at Tº>1.200)
- Natural gas washing process in alkaline environment.
- High turbulence.
- Emission control device (bag filters)
- Process without ash generation
- Continuous emission monitoring



BAT Cement Kilns are present in Latin America

Example :
Cemex Caracolito Colombia

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The capacity for a sound POPs management has to be demonstrated through trial burns

- Protocols designed specially for each instalation / facility.
- Oriented to:
  - Destruction Efficiency (DE) demonstration (higher than 99,9999%)
  - Destruction and Removal Efficiency (DRE) demonstration (higher than 99,9999%)
  - No emission of other POPs to be demonstrated through DDFF emission analysis.

The capacity for a sound POPs management has to be demonstrated through trial burns

Design of trial burns must consider:

- Pre-assessment of installation (Technical, health, safety, environment)
- Training of involved employees.
- Health and safety aspects assurance, including emergency response.
- Assessment and selection of expert third party for material management and preparation.
- Assessment and selection of specialized laboratories for sampling and analysis.
- Stakeholder relation plan, including open communication and information. Emphasis in local communities and employees.

Not all stakeholders have same view....

Efficient socialization is key…

- Team work authority – private sector, with the authority as leader.
- Stakeholders Identification and assessment
- Messages and communication tools definition.
- Transparency and proactivity.
- Education about risks of inadequate PCBs (POPs) management, I comparison with technology to be used.
- Trial burs with participation (as observers) of interested stakeholders.
- Results sharing process

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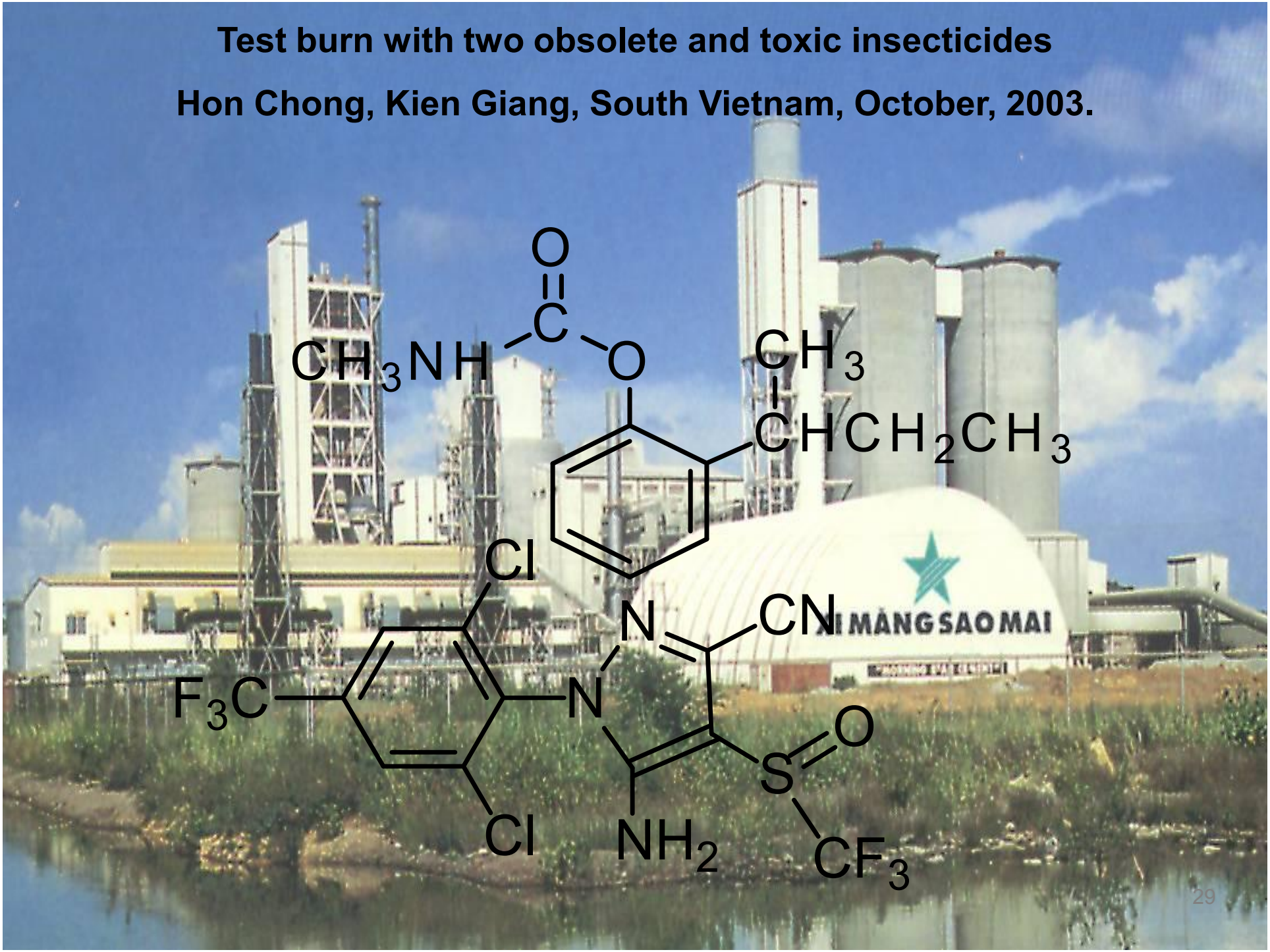
Norway: Cement Kilns used for co-processing of organic hazardous waste (PCBs) for more than 25 years. Is the only one available option locally.


Vietnam - 2003

Test burn with two obsolete and toxic insecticides

Hon Chong, Kien Giang, South Vietnam, October, 2003.




Bayer

ENVIRONMENTAL SCIENCE & POLICY 9 (2006) 577–586

available at www.sciencedirect.com

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Review

Environmentally sound destruction of obsolete pesticides in developing countries using cement kilns

39,500 liters of high toxic insecticides were destroyed.

The destruction efficiency (DE) was measured to be better than 99.9999969% for **fenobucarb** and better than 99.9999832% for **fipronil** and demonstrated that the hazardous chemicals had been destroyed in an irreversible and environmentally sound manner.

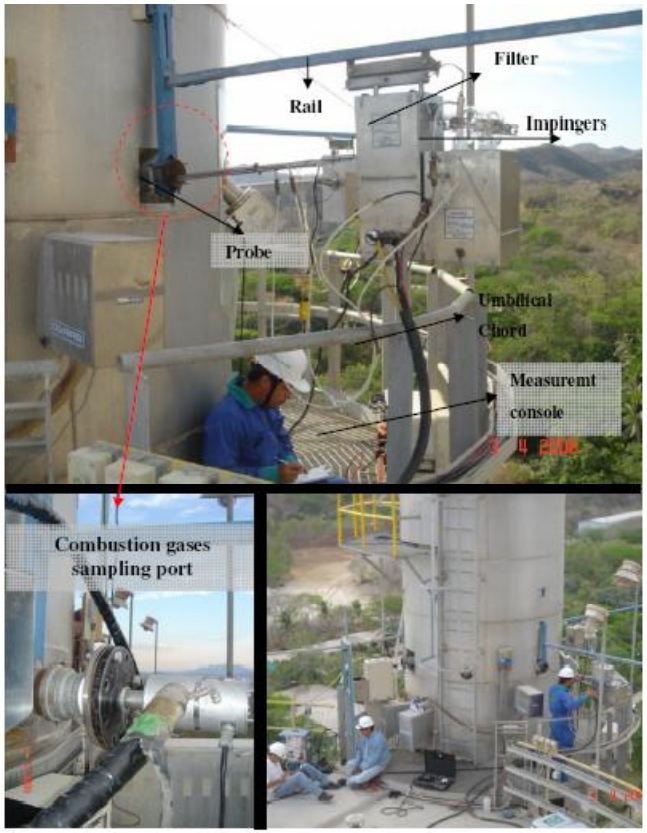
2006


EL SALVADOR
2000
P 71 345
CENTRO AMERICA
TOWING CAPACITY 900kg

2006: Trial burn to destroy 0,65 ton of Tetrachloroethylene

(pure substance)


TRUPER



DRE = 99.99998%

PCDD/PCDF = 0.0398 ng I-TEQ/m^3

UNIVERSIDAD CENTROAMERICANA
"JOSÉ SIMEÓN CAÑAS"

Coprocessing of

Alternative Fuels and Raw Materials and

a Principal Organic Hazardous

Constituent

Test Protocol (Trial Burn) Report

Prepared by Universidad Centroamericana José Simeón Cañas
(UCA) by request of Cemento de El Salvador, S.A. de C.V. (CESSA)

August, 2006

Sri Lanka, 2006

2006, Trial burn for PCBs Co-processing (Pyralene)

59% of PCB, 36% trichlorobenzene and 5% tetrachlorobenzene.


462-2U1
Confined Spac
Entry Permi


SICK

	Test Burn 1 3 August 2006	Test Burn 2 4 August 2006
Feeding l/h	500	1000
PCB concentration mg/l	14,000	10,050
DRE	99.9999999900254	99.999999995278
DE	99.9999926620254	99.999991503337

Chemosphere xxx (2009) xxx–xxx

Contents lists available at ScienceDirect

Chemosphere

journal homepage: www.elsevier.com/locate/chemosphere

Test burn with PCB–oil in a local cement kiln in Sri Lanka

Kåre Helge Karstensen [a,*], Azeez M. Mubarak [b], H.N. Gunadasa [b], Bandulasoma Wijagunasekara [b], Niranjanie Ratnayake [b], Ajith De Alwis [c], Jayavilal Fernando [d]

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[b] Industrial Technology Institute, 363 Bauddhaloka Mawatha, Colombo 7, Sri Lanka
[c] Department of Civil Engineering, University of Moratuwa, Katubedda, Moratuwa, Sri Lanka
[d] Hazardous Waste Unit, Central Environmental Authority, Sri Lanka

Test Burn with PCBs in

Holcim Puttalam Cement Kiln,

Sri Lanka

Daft Test Burn Report

23 January 2007

Other experiences….

PCBs:

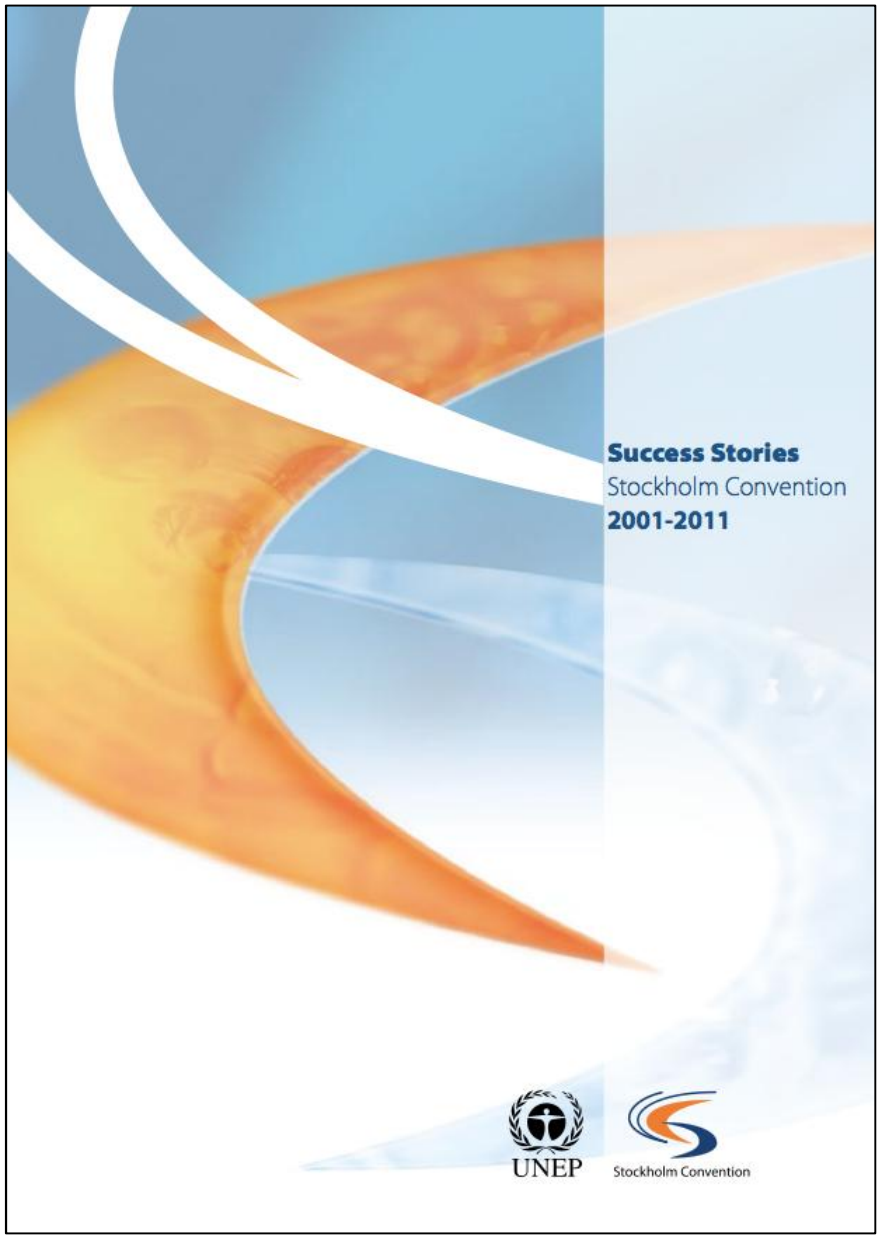
- 2009: Trial Burn Holcim El Salvador (DE/DRE >99,9999 %)

Other POPs

- 2007: Trial burn co-processing contaminated soil ALDRIN Venezuela (DRE 99,9994 %)*
- 2010: Trial burn DDT contaminated soil China (DRE 99,999%)*

* Trial burn in kiln inlet

Details….


Success Stories
Stockholm Convention
2001-2011
UNEP
Stockholm Convention

Today in Latam…. Trial Burns under planning Colombia….

DISEÑO PRUEBA QUEMADO

JULIO
-Planeación y ejecución Proyecto
-Monitoreo de Emisiones (Parámetros solicitados) en Hornos cementeros
-Análisis de Cloro
-Definición de criterios y requisitos solicitados
-Elaboración Informe planeación de mejoras

SEPTIEMBRE
-Diseño y estructura técnica de la prueba piloto
-Implementación y estrategia de socialización con comunidades
-Programación de las pruebas

NOVIEMBRE
-Cronograma de ejecución prueba de quemada
Identificación de las mejoras realizadas en las áreas de la prueba de quemado
-Ejecución de prueba de quemado

AGOSTO
-Modificación y mejoras a infraestructura para desarrollo prueba piloto en Planta
-Diseño/ estrategia de comunicación
-Diseño de protocolo de seguridad y salud ocupacional
-Entrega Informe de Resultados Monitoreo de Emisiones
-Entrega de Resultados de laboratorio Cloro
-Elaboración Informe ejecución N°1

OCTUBRE
-Comunicación y presentación ante la Autoridad Ambiental CORTOLIMA
- Implementación y estrategia de socialización con comunidades
-Capacitación en protocolos de seguridad para Planta
Programación de las pruebas
- Elaboración Informe ejecución N°2

CEMEX MINAMBIENTE TODOS POR UN NUEVO PAÍS PAZ EQUIDAD EDUCACIÓN

OBJETIVO

Desarrollar un proyecto piloto de tratamiento térmico de aceites contaminados con PCB en las instalaciones de la Planta Caracolito (CEMEX – Ibagué) mediante la implementación de pruebas de quemado, con el fin de fortalecer la capacidad del país para el tratamiento térmico de residuos contaminados con PCB con el apoyo del Programa de las Naciones Unidas para el Desarrollo - PNUD, liderado por el Ministerio de Medio Ambiente y Desarrollo Sostenible – MADS.

PNUD Al servicio de las personas y las naciones

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Conclusions

- PCBs sound management is a challenge for developing countries.
- Basel and Stockholm conventions recognize thermal treatment in cement kilns (co-processing) as option for sound management of PCBs and other POPs.
- BAT/BEP Cement Kilns are available locally in most of Latin America countries.
- Trial burns following international standards must be performed in each cement kiln prior to normal operation (trial burn is kiln specific). Target must be to demonstrate DE and DRE.
- Cumulated experience shows that co-processing in cement kilns is a proven technology for PCBs and other POPs treatment/destruction.
- Environmental, health, safety and mainly stakeholder relations aspects must be considered for trial burns and future operations design.
- Public-private collaboration is a key success factor.

Muchas Gracias.

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