



Report of the

**Expert Meeting to Further Develop the Standardized
Toolkit for Identification and Quantification of
Dioxin and Furan Releases**

Geneva, Switzerland

1-3 December 2009

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1 OPENING OF THE MEETING

1.1 Welcome and introduction of the participants

The fourth meeting of the Toolkit Expert Group was held at the International Environment House in Châtelaine, Geneva, from 1 to 3 December 2009. Ms. Heidelore Fiedler, UNEP Chemicals, welcomed the participants on behalf of UNEP Chemicals Branch and the Secretariat for the Stockholm Convention. The participants introduced themselves by stating their names, affiliation and interest in the Toolkit work. The list of participants is attached to this report as Annex I.

1.2 Adoption of the meeting agenda and programme

The agenda was adopted without further changes; it can be found as Annex II.

1.3 Objectives of the meeting

Ms. Katarina Magulova, Secretariat of the Stockholm Convention, introduced the objectives of the meeting. She informed that in addition to the Toolkit's Workplan, the Conference of the Parties has mandated the group to address pentachlorobenzene as a newly listed unintentional persistent organic pollutant (POP) and to propose options for the updating of the Guidelines on best available techniques (BAT) and best environmental practices (BEP).

2 PROGRESS REPORTS ON IMPLEMENTATION OF THE INTERSESSIONAL WORKPLAN (2008-2009)

2.1 Category 3: Fossil and biomass fuel power plants; household heating and cooking

Ms. Ute Karl, Germany, gave an overview on new information that has become available since the 3rd Toolkit Expert Meeting. She thanked Ms. Pat Costner for informing the group through e-mail when new publications have come out. Ms. Karl highlighted that the EMEP/CORINAIR Guidebook has been updated and that two reports have been published that summarize existing information. These are: 1. a report by BIPRO on domestic sources of

dioxins. The BIPRO report reviewed 90 literature references; most of the information was already included in the EMEP Guidebook and/or in the UNEP Toolkit. It was concluded that largely, the emissions factors were confirmed. The second report is authored by CITEPA and presents the national inventory report for France (1000 pages; English summary): Emission factors (EFs) for PCDD/PCDF, PCB, and HCB are presented; however, tailored for the French situation to allow their national reporting obligations. To conclude, synthesis reports for small and large fossil fuel and biomass fired installations are available; however, the focus is on Europe and advanced technologies and the gap on simple technologies remains open. The presentation is attached as Annex III.

2.2 Category 3: Simple stoves

Ms. Beatriz Cardenas, Mexico, reported about the pilot project for evaluation of improved stoves and open fire emissions from using wood as fuel; these stoves are for cooking and not for heating. The possibility to obtain these samples and analyze them for PCDD/PCDF and other unintentional POPs has come up within Mexico's efforts to meet the MDG and Kyoto Protocol obligations by implementing 500,000 improved stoves by 2012. Samples were taken in 2008 and analyzed in the dioxin laboratory of Mr. Gunther Umlauf (JRC). Three types of stoves (Citlalli-poor combustion, Mexalit, Onil, Patsari fija and Patsari portatil) were investigated and chimney emissions and indoor measurements were undertaken during the making of tortillas. The results can be briefly summarized that the average emission to air was 80-90 $\mu\text{g TEQ TJ}^{-1}$. These data are in very well agreement with the Toolkit proposed an EF_{Air} of 100 $\mu\text{g TEQ TJ}^{-1}$.

Ash data will be available in early 2010. It is planned to write a JRC report (anticipated to be available around April 2010) on these experiments and results to make them available for the updated Toolkit. The presentation is attached as Annex IV.

2.3 Category 6: Open burning of biomass

Carl Meyer, CSIRO, on behalf of the biomass project team presented the design and the results of a UNEP coordinated project on the open burning of biomass, which was undertaken in early 2009 by CSIRO, University of Queensland, and US-EPA. From earlier work, there were 100-fold differences in the air emission factors derived from similar biomass yet using field sampling and laboratory simulation burn sampling. This team attempted to resolve whether these differences were real or the result of distinctive measurement methods. In total, 26 burn tests were performed by using either laboratory simulations in a "burn hut" or field measurements. The fuels studied were sugarcane burned in the field in Florida (4) and transported to North Carolina (NC) as well as sugarcane burned in a pile or standing in the burn hut. A similar, narrow range of air EFs, spanning less than one order of magnitude, was obtained in these experiments. The results suggest that field sampling and laboratory simulations of open burning of biomass can result in consistent emission factors. The transport did not have an effect on the EF_{Air} . The expert judgment would propose an EF_{Air} of 4 $\mu\text{g TEQ t}^{-1}$ of sugarcane burned. The second set of experiments included prescribed burns in Duke Forest, NC, and complementary burn hut experiments using the same fuel. The air EFs ranged from 0.4 $\mu\text{g TEQ t}^{-1}$ to 1 $\mu\text{g TEQ t}^{-1}$ of biomass burned. The proposed EF_{Air} is 1 $\mu\text{g TEQ t}^{-1}$ biomass.

Ash was analyzed as well and lower concentrations than in proposed the UNEP Toolkit were determined. Proposed EFs for releases to land are 0.15 $\mu\text{g TEQ t}^{-1}$ of biomass burned in forest fires and grassland and moor fires; 0.05 $\mu\text{g TEQ t}^{-1}$ of biomass in sugar cane burning and agricultural residue, cereal crop burning (in field) not impacted; and 1 $\mu\text{g TEQ t}^{-1}$ of biomass burned in agricultural residue burning (in field), impacted, poor combustion conditions.

Mr. Meyer also reviewed the existing emission factors and highlighted the importance of the reference unit. He recommended using as a basis for the EF the mass of biomass burned (consumed in the fire) and therefore, to introduce a burning efficiency factor as follows:

Burning efficiency: for	sugarcane leaves:	BurnEff = 0.95 (<i>i.e.</i> , 5% is left as ash)
	forest leaves:	BurnEff = 0.85

The presentation is attached as Annex V.

2.4 Category 6: Open burning of waste

Mr. Gustavo Solórzano, CENICA/Mexico, on behalf of the Open Waste Burn project summarized the results from the 20 field experiments undertaken in Mexico and China and presented the results. The presentation included information on waste characterization in these two countries and the process on how to convert these results into the basis of total waste mass. The project has developed a new high volume air sampler to allow determination of emission factors. The primary results were given in ng TEQ kg^{-1} carbon burned. The data range over two orders of magnitude. It was highlighted that denominations such as “urban” or “rural” waste were arbitrary and that all results consisted of one large “continuum”. For the determination of one proposed emission factor, all results were taken into account assuming 40% of burning efficiency and a carbon oxidation factor of 58%. Based on such assumptions the new EF_{Air} would be 40 $\mu\text{g TEQ t}^{-1}$ of total waste mass. The presentation is attached as Annex VI.

2.5 Category 2: Metal industry

Emmanuel Fiani, France, reported on new data in the metals sector. There was new information for a number of sources including dioxin emissions from primary metals production. However, no new significant information has been published on lead production. Nearly all the information forwarded by the panel has been published in the scientific literature or was presented at DIOXIN2009. It was noted that in some instances the EFs were reported on the basis of feedstock or fuel what will make the direct use in the Toolkit difficult. In general, it was noted that today there are better descriptions of technologies, some of the new EFs were lower than in the Toolkit, others where higher, and some were confirmed. Classification issues were raised such as where to place e-waste recycling (open burning or category 2). The evaluation of about a dozen publications provided useful and new information; nearly all subcategories of the metals sector were addressed; however, some shortcomings still exist, *e.g.*, diffuse emissions. The presentation also included some suggestions for continuation of this task team; which was discussed during the meeting; the final workplan is shown in section 3. The presentation is attached as Annex VII.

2.6 Category 4: Brick production

Gunther Umlauf, EC, presented the results from the emission measurements undertaken on brick kilns in Mexico. In a pre-campaign, ashes from brick kilns using different fuels, *e.g.*, tar or waste oils, were analyzed and the report published. Emission measurements were undertaken at two brick kilns in Leon and Salamanca, Mexico. Analyses for unintentional POPs were undertaken in the JRC laboratory. The EFs were reported on the basis of brick produced and did fit well with the Toolkit proposed EF_{Air} for kilns without air pollution control of $200 \text{ ng TEQ t}^{-1} \text{ brick}$. However, it was noted that the description of the technology needs to be adjusted to the developing country situation and it was proposed to rename the class to “basic brick making”. The results including the emission factors will be compiled and published in a report by the JRC/EC. The presentation is attached as Annex VII.

2.7 Charcoal production

J. de Assuncao, Brazil, presented updated information on charcoal and highlighted that Brazil is considered as the largest charcoal producer in the world. Most is produced from eucalyptus and in rudimentary kilns. In some of the installations also pyroligneous oil, also known as wood vinegar, is collected as by-product, for use mainly as an insecticide and agriculture plague control. Charcoal production has implications also on climate change and IPCS; improved kiln (ICPS) experiment (retort-type kiln) in Kenya was mentioned. The presentation is attached as Annex IX

2.8 Releases of PCDD/PCDF from pesticide use

Mr. Roland Weber, IHPA (www.iHPA.info), presented a study on PCDD/PCDF concentrations in pesticides currently used in Australia (a study by the National Research Centre for Environmental Toxicology (EnTox), Australia; Holt *et al.*, Organohalogen Compounds 71, 302-305, 2009). The screening of 21 current-use pesticide formulations (their active ingredients mostly imported from overseas) included, *e.g.*, phenoxy herbicides (*e.g.*, 2,4-D, 2,4-DB), other herbicides (*e.g.*, Trichlopyr – the pyridine analogue of 2,4,5-T, Chlorthal, and Imazomox Picloram, Dicamba), and a number of fungicides and insecticides. All investigated pesticides contained quantifiable concentrations of PCDD/PCDF. Highest PCDD/PCDF concentrations were detected in pentachloronitrobenzene (PCNB, Quintozene) where the average of three different PCNB formulations had a concentration of $4,000 \mu\text{g TEQ ton}^{-1}$. For Australia, PCNB usage could be the single largest PCDD/PCDF source when considering upper bound usage rates, and among the top 15 priority sources listed in the inventory when considering lower bound estimates. Table 1 contains suggested emission factors for pesticides not yet listed in the Toolkit and analysed in two or more individual formulations in this study. Table 2 lists emission factors of for pesticides not yet listed in the Toolkit and analysed in the study.

Table 1: Suggested emission factors for pesticides not yet listed in the Toolkit and analysed in two or more individual formulations (Organohalogen Compounds 71, 302-305, 2009)

Cat.	Subcat.	Sub-categories Products	Release to land ($\mu\text{g TEQ t}^{-1}$)	New
7 b		Chemical Industry		
		<i>Chlorinated Pesticides</i>		
		PCNB		4.000
		Lindane		270
		Chlorothalonil		180
		MCPA		31

Table 2: Suggested emission factors for pesticides not yet listed in the Toolkit and analysed in the study of Holt *et al.* (Organohalogen Compounds 71, 302-305, 2009)

Cat.	Subcat.	Sub-categories Products	Release to land ($\mu\text{g TEQ t}^{-1}$)	New
7 b		Chemical Industry		
		<i>Chlorinated Pesticides</i>		
		PCNB		4.000
		Lindane		270
		Chlorothalonil		180
		Heptachlor		90
		Chlorthal		60
		Triclopyr/picloram		56
		MCPA		31
		Fluroxypyr		27
		Prochloraz		9,4
		Imazamox		5,5
		Chlorpyrifos		5,4
		Flumetsulam		4,9
		Mecoprop		4,2
		Fenamiphos		1,7

The findings of PCDD/PCDF in current used pesticides may have significant impacts on present emission inventories. Furthermore, it should be mentioned that upon exposure to sunlight, formation of PCDD/PCDF from pesticides containing PCDD/PCDF precursors may further increase the TEQ after release into the environment. The presentation is attached as Annex X.

2.9 Screening of new sources

Ms. Patsy Costner, IPEN, gave a proposal for the newly established task team on screening for new sources. The team had not met or consulted over the year, although newly published studies that identify new sources were circulated to the task team. She presented a simple screening matrix/scheme for identifying new PCDD/PCDF sources following a Y/N scheme that is followed by proposed technical/informational support to screen potential new sources

and sources for which no EFs are given in the Toolkit. After presenting tables of chemicals, including pesticides that are recently reported as dioxin-contaminated, she noted lack of EFs especially in the Toolkit Category 7 – production and use of chemicals. In this context, she raised awareness on the artisan pesticide production, *e.g.*, for 2,4-D, in India, as well as conventional production where appropriate waste management is lacking. She proposed a new organizational chart for the set-up of category 7 (which would include expansion of the sub-categories of chemical production and elimination of textile and leather production). Some other issues, such as the need to limit activity data for forest fires to fires of anthropogenic origin. The presentation is attached as Annex XI.

2.10 Preliminary data on PCDD/PCDF, PeCBz/HCB, and PCB

Adam Grochowalski, Cracow University, presented new data from various sectors, *e.g.*, biomass cofiring with hard-coal for power generation in Poland from two power plants, and for unintentional POPs other than PCDD/PCDF. He mentioned that in Cracow it is forbidden to use coal with a coal content >0.1% chlorine in private households. Brickets are used for household heating; they have a high calorific value. Recently performed measurements at cement kilns in Poland gave new data of PeCBz and HCB in stack gas. He presented results of 413 ng I-TEQ kg⁻¹ in skimmings from secondary aluminium plants. The presentation is attached as Annex XII.

Further, a new source of dioxin is documented from the use of so called "soot removal catalyst" that is commonly used in Poland. Preliminary study performed in Cracow University of Technology shown elevated concentration of dioxins (range of ng I-TEQ/g of bottom ash) formed in fireplaces when the catalyst is used. The catalyst is commercially available and contains copper salts as an catalytic active component.

2.11 Discussion on new information according to sector

Each presentation was followed by discussions in plenary including the group members of the various projects or task teams. Discussions included technical aspects such as sampling, units for reference in reporting and relevant conversion steps as well as synergistic effects with other pollutant reduction measures and programs. The discussions in plenary continued in smaller working groups that worked in parallel and one after the other. The outcomes of these discussions and the final conclusions were summarized by the chairs of the task team on Thursday and are presented in chapter 3.

3 REPORTS FROM THEMATIC AREAS AND WORK PLANS

The chairs of the working group or task teams, respectively, presented the reports from their group work including already agreed new emission factors and workplans for the next year.

3.1 Category 3: Fossil and biomass fuel power plans; household heating and cooking

Ms. Ute Karl as the lead for the Category 3 task team presented the outcome of the working group's discussions. She presented a revised table containing new emission factors as shown below.

As can be seen, some new classes were introduced such as peat as a fuel and some information including lignite, bagasse, and rice husk from Thailand and Mauritius has been incorporated. The information will be circulated and intersessionally agreed on new or additional EFs; if no agreement can be reached, then the subcategory/class will be skipped. Mr. Dahman Touati, USA, announced that new information from four US heaters will become available soon and will be made available to the Toolkit Expert Group. In subcategory 6e, the information on the simple stoves from Mexico will be included; a simple stoves line should also be added in the fossil fuels for simple stoves. Through extrapolation from other information will also address the 3-stone fireplaces. Also co-firing of waste in wood heaters will be included.

Table showing old and newly proposed emission factors for Category 3:

PCDD/PCDF			Potential Release Route					
Cat.	Subcat.	Class	Facility	Fuel	Air		Residue	
			Type	Type	µg TEQ/TJ		µg TEQ/t residue	
					Mixed ash			
3			Heat and Power Generation		revised	current	revised	current
	a		Non-residential fossil fuel combustion					
		1	Power boilers	Coal/waste/biomass co-fired power boilers	35	35		ND
		2	Power boilers	Coal	10	10		4
			Power boilers	Peat				
		3	Power boilers	High-chlorine coal --> Footnote	(200)?			
		4	Power boilers	Heavy fuel	2.5	2.5		ND
		5	Power boilers	Shale oil	1.5	1.5		1.2
		6	Power boilers	Light fuel oil/natural gas	0.5	0.5		ND
	b		Non-residential biomass combustion					
		1	Power plants	Herbaceous biomass --> specify	50		70	ND
				Bagasse, Rice husk, other residues	information from Thailand			
		2	Power plants	Wood	5???	50		45
		3	Power plants	Contaminated Wood	500	500	100	
	c		Landfill and biogas combustion					
		1	Boilers, motors/turbines, flaring	Biogas-landfill gas		8		NA
	d		Residential heating and cooking with biomass					
			Advanced Stoves	Contaminated wood/biomass	1500	1500	1000	1000
			Advanced Stoves	Virgin Wood	100	100	10	10
			Simple Stoves	Charcoal				
			Open fire 3-stone	Virgin Wood				
			Simple Stoves	Virgin Wood	Results from Mexico			
	e		Residential heating and cooking with fossil fuel					
			Advanced Stoves	High-chlorine coal	15000	15000	30000	30000
			Advanced Stoves	Coal/coke	100	100	5000	5000
			All Stoves	Oil	10	10		
			All Stoves	Gas	1.5	1.5		
			Simple Stoves	Coal/coke	???			
			All Stoves	Coal/waste/biomass co-fired furnaces	500			

The Workplan was agreed and presented as follows:

- After the meeting: ASAP input from Thailand and Mauritius
- January 2010: Circulation of the Table for comments
- End of February 2010: Circulation of the Draft EF Table for final revision
- End of April 2010: Circulation of the final EF Table for adoption
- End of April 2010: Collection of proposals for Tier 2 structure
- Proposal of a text on activity assessment - Link to GHG inventories

3.2 Category 6: Open burning of waste and biomass

Ms. Heidi Fiedler, coordinator of the Category 6 task team and working group, presented the revised EFs and the Workplan. It was concluded that the priority should be with the activity estimate, *e.g.*, usability of information and algorithms from GHG/IPPC. Based on the results from the Biomass open burning project and the Waste open burning project and the newly defined basis for estimating the national activity, the emission factors to air for grass/savannah fires, dump fires and the emission factors to land in class 6(a)4 as well as in the ashes for 6(b)1 were changed as per expert judgment and analogy.

Table showing old and newly proposed emission factors for Category 6:

Cat.	Subcat.	Class	Sub-categories	Potential Release Route ($\mu\text{g TEQ}\cdot\text{t}^{-1}$)			
				Air		Land	
				New	Old	New	Old
6			Open Burning Processes				
	a		Fires/burnings - biomass				
		1	Forest fires	1	5	0.15	4
		2	Grassland and moor fires	0.5	5	0.15	4
		3	Sugar cane	4		0.05	
		4	Agricultural residue burning (in field), impacted, poor combustion conditions	30	30	1	10
		5	Agricultural residue, cereal crop burning (in field) not impacted	0.5	0.5	0.05	10
	b		Fires, waste burning, landfill fires, industrial fires, accidental fires				
		1	Waste dump fires	100	1000	300	600
		2	Accidental fires in houses, factories	400	400	400	400
		3	Uncontrolled domestic waste burning	40	300	300	600
		4	Accidental fires in vehicles (per vehicle)	94	94	18	18
		5	Open burning of wood (construction/demolition)	60	60	10	10

It has to be noted that the EFs for biomass and for waste have a different basis for reference:

- Emission factors for 6(a) biomass: they are based on mass burned (in an additional table, these will also be converted to area reference)
- Emission factors for 6(b) waste: they are based on total mass of waste present at site (and not on combustible fraction).

The **WORKPLAN** was proposed as follows:

New proposed EFs for some 6a and 6b	done, Dec 2009
Text to support new EFs	COF ← Dahman Touati EFs biomass ← project group EFs waste ← project group until Feb 2010
Conversion biomass mass to hectare	Mick Meyer lead info to MM until Feb 2010 Draft available – Apr 2010
New text/table for biomass available	Draft for circulation Jun 2010 to be finalized at 5 th Toolkit Expert Mtg
Data collection	ongoing

PROJECT PROPOSALS:

Survey on parameters (*e.g.*, C) from GHG methodology for applicability to determine activity (biomass and waste)

Biomass burns:

High OC soils, peat burns	no data available, field study
High chlorine or savannah fuels	no data available, field study

More detailed study on sugarcane according to species, treatment, soil types (*e.g.*, volcanic)

Waste burns:

Ash data from field studies (field study)

Mobilization of ash after waste dump fires (combine with above, Lit. Greece)

Better characterization of burning conditions

Generation of activity data, how much waste is burned (IR, ...)

- on practices present, *e.g.*, barrel burn, small pits, spread-out

Guidance on determination of activity data biomass burn (combination of FAO vegetation map and MODIS satellite data)

3.3 Metal industry

Mr. Emmanuel Fiani, coordinator of the Category 2 task team on metals, presented the outcome of the discussions. He highlighted possible correlations to categories 1 and 6. The group also recommended establishing contact with the International Council on Metals and Mining (ICCM), especially with regard to mining sources. UNEP Chemicals will establish the contact and the Secretariat officially inform about the Toolkit updating activities in the metals sector.

With respect to the subcategories it was recommended to move titanium oxide production from Category 7 to Category 2 and also include e-waste recycling into this category rather than into Category 6. Further, establishing linkages with the Secretariat of the Basel Convention on e-waste recycling was encouraged.

The summary of the discussions in the metals task team is shown as follows:



2009 Progress report

- First attempt to synthesize new data for category 2 review
- A dozen publications provided by the panel members and used for comparison with current EFs in the toolkit
- At this stage, new and usable information on 11 out of the 12 sub-categories.
- Were identified: new emission data or possible significantly different emission data compared with EFs in the current toolkit
- Other recent publications or on-going studies are known. These need to be further collected and taken into account.
- Some classification questions raised. Eg: classes of sub-category (c), fuel approach, diffuse emissions.



4th TEG meeting – Discussion (1)

- Recycling of fly ashes on site = specificity of category 2.
- e-waste recycling installations / classification: badly operated vs state of the art installations + coordination with Basel.
- artisanal metallurgical sources = heterogeneous (within a country and between countries)
- fugitive U-POPs emissions need to be considered.
- some metallurgical activities may be a part of large integrated automobile production sites (eg: Al, Cu, ferrous). Rather small installations. No toolkit change foreseen but needs to be considered (eg identification, on site residue recycling).
- chlorine additive use / specific to metal sector (secondary aluminum, primary magnesium). Possible case where there is no correlation between HCB and PCDD/F emissions. Chlorine additive could be regarded as an activity data.



Discussion (2)

- Possible connections with category 1 (incineration) and category 6 (open burning)
- Indications are needed on how to identify primary / secondary production. Verification process for emission results.
- Specific secondary production technologies / developing countries
- Identification of different steps in the metallurgical production chain (different EFs), from mining to final product.
- Relevance of U-POPs from mining sites is to be explored. Suggestion to approach ICMM.
- Unit $\mu\text{g}/\text{t}$ input? Conversion between units ($\mu\text{g} / \text{t}$ metal produced) may be useful.



Discussion (3)

- Suggestion to differentiate EFs according to the feed, especially the scrap content of input.
- Regarding possible measurement projects dedicated to metallurgical sources which are developing countries specific. In 2010: two parallel actions. Project proposals and identification of gaps in EFs and categories/classes with a view to project proposals in 2011.
- Use of BAT/BEP content to identify gaps in toolkit.
- New possible sub-categories, if chlorine is present: Ni, Mn, precious metals (Pt, Pd, Au). Integration of TiO₂.
- No priorities are put on particular sub-categories



2010 workplan

- develop an excel sheet specific to category 2 to support data collection. Deadline: february 2010 (Emmanuel).
- collect more data from the expert panel. Deadline: september 2010 (reminder in june 2010).
- achieve a literature survey. Deadline: october 2010. Emmanuel (tentatively)
- continue to identify gaps in the current toolkit : sub-categories or classes which would be relevant for developing countries, EFs which would be questionable. With suggestions for modification. Deadline: june 2010. Objective: basis for R&D projects in 2010-2012 (national / international).
- propose measurement projects. Deadline?
- approaching ICMM. UNEP. June 2010.
- Objective = first proposal for revised EFs in 2011, agreed proposal for COP6 (2013?)

3.4 Brick production

Mr. Gunther Umlauf, coordinator of the brick kiln task team, presented the outcome of the discussions by the Brick task team and the working group as follows:

Conclusions from the experiments conducted by the task team during 2008/2009

The 2005 Toolkit contains PCDD/F emission factors from brick production to air of **0.02 µg TEQ/ton bricks** (“*Brick production using dust abatement*”) and **0.2 µg TEQ/ton bricks** (“*No dust control or contaminated, poor fuels*”). No PCDD/PCDF EFs are given for residue (ashes) and products (bricks).

EFs for dioxin-like PCB and HCB are missing for all compartments.

- Experimentally derived EFs from brick making (PCDD/PCDF, dioxin-like PCB and HCB) were provided by the task team for air, ashes and bricks for wood fuel and heavy oil/waste oil fired kilns in Mexico.
 - EFs for PCDD/s to air fit well into the values proposed for brick production in the toolkit 2005 proposal of 0.2 µg TEQ/ton bricks.
 - EFs into air and ashes – when calculated on a fuel basis - fit well to the EFs of the categories heavy oil/waste oil fired engines in the 2005 Toolkit and the data presented for forest fires during the 2009 meeting.
Soil data around brick kilns in Mexico and South Africa did in no case exceed the soil data (13 ng TEQ/kg) around the Mexican kilns where EFs were obtained
- some evidence that the EFs describe the process in a reasonable way, **but**
- EFs to air restricted to results from two experiments (four samples)
 - EFs to ashes are based on a separate sampling, no data yet from the kilns where EFs were determined
 - EFs *via* bricks obtained for the emission experiments remain questionable since one brick from a similar installation 5 was 2 orders of magnitude higher in concentration.
- more soil and ash data (under evaluation) and explanation for high brick value are needed for a final conclusion

Intersessional follow up

- Supplementary brick and ash sampling in South Africa
- Finish analytical work at JRC, Vienna and Krakow
- Compile and review field sampling protocols from Mexico, Kenya, South Africa
- Data analysis
- Conclude whether more experiments are needed
- Reporting, split screening and emission
- Concluding meeting based on draft reports May 2010

Draft Recommendation for Toolkit revision:

- Use the experimentally derived EF from the kiln fired with used oils because DCs with significant activity in the brick sector will run out of wood anyway.
- Rename current wording “*No dust control or contaminated, poor fuel*” with “*basic brick making without emission abatement*”.

DRAFT EFs for “basic brick making”	air	water	product*	residue
PCDD/PCDF (µg TEQ/ton product)	0.2	NA	0.05	0.05
PCB (µg TEQ/ton product)	0.015	NA	< 0.01 [#]	0.005
HCB (µg/ton product)	200	NA	< 100 [#]	< 1

*Crunched bricks

[#] detection limit, we intend to get data on that!

3.5 Charcoal

Mr. Joao de Assunção, Brazil, informed and the Secretariat confirmed that a project proposal is under preparation to address releases of POPs and greenhouse gases from charcoal production in Brazil for possible funding by the Norwegian government.

3.6 Workgroups on screening for new sources and Toolkit restructuring

Ms. Pat Costner, coordinator for the task team on screening for new sources and co-chair of the working group on new Toolkit structure summarized the discussions in the working group.

The Task team to identify sources concluded as follows:

- Obtain and search existing inventories to determine whether new process/activities have identified and whether EFs have been developed for sources not yet given in Toolkit.
- Obtain country lists of chemicals that must be tested for PCDD/PCDF before marketing.
- Search information resources (scientific literature, government reports, etc.) to identify potential new PCDD/PCDF sources due to occurrence of PCDD/PCDF in products, air emissions, wastewater effluents, other residues or that are identified as contributing to PCDD/PCDF at “hot spots.”

The task team on Toolkit Restructuring reported as follows:

- The work group agreed that the Toolkit should be reformatted as a digital, multi-layer document to simplify and facilitate access to the information as it is needed. This will entail a first-pass through the Toolkit to determine how to prioritize and layer the information for identifying sources and related activity data and selecting appropriate emission factors.
- They also asked that groups working on emission factors address the issue of activity data acquisition in their deliberations.

The Secretariat will coordinate this task team, which will be jointly chaired by Ms. Patsy Costner and Mr. Youssef Benouna. Initial members of the task team include Beatriz Cardenas, Charles Mirikau, Nee Sun Choong Kwet Yive, Sergey Kakareka, and Heidi Fiedler.

With the restructuring and transfer to electronic version, options to look into the computerized datasheets and including linkages to UNECE methodology and GHG will be explored.

3.7 Additional comments

In addition to the sectoral items, it was recommended to assess options to utilize information from GHG discussions and methodologies.

It was also highlighted that intersessional meetings for some of the task team would be recommendable to move the work forward, especially for the bricks and simple stoves task teams. It was also stressed that most of the work undertaken so far has been voluntarily and in-kind and some funds would be welcome.

4 PROPOSAL FOR REVISION OF TOOLKIT FORMAT

Since the last version of the Standardized Toolkit dates from the year 2005, a general discussion was held on how to incorporate the revisions of the Toolkit and what would be the best format for the Toolkit. Discussions centered about the question of the best set-up of the Toolkit to make it handier and to address all unintentional POPs. Proposals included the organization of the Toolkit according to different Tiers reflecting the different levels of detail. The present organization of the Toolkit would constitute the default level, preceded by a level on general organization of the inventory work at national level. A higher Tier would include further splits into sub-classes where detailed information would be available. At these levels, EFs for the other unintentional POPs could be included as well as a compendium of all information available. The preferred form for the new Toolkit would be fully electronic allowing hyperlinks where desirable or necessary.

Further, it was proposed to expand the electronic database and include a checklist to allow users to verify their results. Finally, the database should highlight changes in the EFs to allow the updating of earlier inventories in order to establish time trends.

It was mentioned that the new Toolkit and its database should remain handy and not develop into monstrous databases as is for GHG reporting. There, it took many years to develop and to maintain the databank. Presently, the EXCEL spreadsheets seem to be the best option.

It was noted that the reporting instructions *via* the Secretariat's Clearinghouse mechanisms and the EXCEL sheets being kept apart.

5 IMPLICATIONS OF LISTING PENTACHLOROBENZENE IN ANNEX C OF THE STOCKHOLM CONVENTION

The Secretariat introduced the item by presenting the relevant parts of the POPRC report on PeCBz (UNEP/POPs/PRPRC.4/14/ADD.2) and para 5 of the POPRC decision, which "recommends to the Toolkit expert group that it consider reviewing at its next meeting possible implications of listing PeCBz in Annex C to the Convention with regard to an inventory of sources and an estimation of releases of unintentional persistent organic pollutants".

The Expert Group started the discussion on the issue on how to address PeCBz as an additional unintentional POP by stating that also dioxin-like PCB, indicator PCB, and HCB are Annex C unintentional POPs. The group emphasized that any recommendation should be manageable by the countries/parties and that prioritization of sources of releases of unintentional POPs should be the main objective. For PCB and HCB, it was assumed that the intentional production and use was by far higher than the unintentional formation and release. Further, it was questioned if a (full) quantitative inventory for PeCBz would be necessary or if highlighting of the sources where these unintentional POPs play a role would be sufficient. For PeCBz, such a special source is not listed in the POPRC document.

After all deliberations, the Toolkit Expert Meeting recommended to concentrate on PCDD/PCDF and the reduction of releases from sources but encouraged to identify processes that may be new sources. In research or other projects, it is encouraged to analyze for these unintentional POPs as a point-check. In other words, EFs should be generated where possible but Parties would not have to make efforts to compile a full inventory of unintentional PeCBz

(HCB, PCB releases) since the purpose of the Convention is to identify sources, prioritize them and undertake measures to reduce them being aware that also other unintentional POPs are formed and released and could be controlled by the same measures.

6 POSSIBLE ELEMENTS OF A REVIEW AND UPDATING PROCESS OF THE GUIDELINES ON BAT AND GUIDANCE ON BEP

Katarina Magulova, Secretariat, introduced the decision of COP-4 to initiate a review and updating process for the BAT/BEP guidance document. The Expert Group recommended to work towards an integrated Toolkit-BAT/BEP Expert Group by updating and amending where necessary the Toolkit roster. Annual meetings of an integrated Toolkit-BAT/BEP Expert Group should be held; the proposal will go to the 5th Meeting of the Conference of the Parties in 2011. Linkages to the development of guidelines on BAT/BEP for the future mercury convention should be followed in order to integrate information and avoid duplication of work. It was highlighted that financial resources are necessary to convene the annual meetings, and these have to come from additional contributions/voluntary contributions. The full document with the agreed elements of a process to update the guidelines on BAT&BEP is attached as Annex XIII. A draft proposal (COP-5 document) will be presented for comments to the Toolkit experts at their meeting in 2010.

7 FINALIZATION OF REPORT AND CLOSURE OF THE EXPERT MEETING

The Toolkit Experts agreed that the draft meeting report will be prepared by UNEP Chemicals and circulated by the Secretariat for comments and amendments before publishing. The presentations will be made available *via* the Secretariat's clearinghouse and the UNEP Chemicals Webpage.

After exchange of the usual complements and wishes for safe travel, the Fourth Toolkit Expert Meeting was closed on Thursday, 3 December 2009, at 14:00 hours.

8 [ANNEXES](#)

- Annex I. List of Participants
- Annex II. Agenda
- Annex III. Ute Karl – Progress Report on Category 3
- Annex IV. Beatriz Cardenas – Category 3: Progress Report on Basic Stoves
- Annex V. Carl Meyer – Progress Report on Category 6: Results of Project on Open Burning of Biomass
- Annex VI. Gustavo Solórzano – Progress Report on Category 6: Results of Project on Open Burning of Waste
- Annex VII. Emmanuel Fiani – Progress Report on Category 2
- Annex VIII. Gunther Umlauf – Progress Report on Brick Kilns
- Annex IX. Jose de Asunção – Progress Report on Charcoal
- Annex X. Roland Weber – Report on Presence of Unintentional POPs from Recent Pesticide Use
- Annex XI. Pat Costner – Progress Report on Identification of Sources
- Annex XII. Adam Grochowalski – Report on Emission Measurements in Poland
- Annex XIII. Terms of reference for a BAT/BEP Expert Group

ANNEX I**4TH TOOLKIT EXPERT MEETING
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Stockholm Convention on Persistent Organic Pollutants

التفاقية استكهولم بشأن الملوثات العضوية الثابتة • 关于持久性有机污染物的斯德哥尔摩公约 • Convention de Stockholm sur les polluants organiques persistants
 Convenio de Estocolmo sobre Contaminantes Orgánicos Persistentes • Стокгольмская конвенция о стойких органических загрязнителях



**Expert meeting to further develop the
 Standardized Toolkit for Identification
 and Quantification of Dioxin and Furan
 releases**

Geneva, Switzerland, 1-3 December 2009

Program of the meeting

Venue: International Environment House; Meeting room D-215 in second floor

Tuesday 1 December 2009		
10:00-11:00	Registration Participants sponsored by the Secretariat shall pick up their DSA cheques in office B-310 in third floor between 10:00-10:45 am	
10:30-11:00	<i>Coffee break</i>	
11:00-11:30	Opening of the meeting <ul style="list-style-type: none"> - Welcome and introduction of the participants - Adoption of the meeting agenda and programme - Objectives of the meeting - Organizational matters 	Secretariat Chemicals All participants
11:30-12:30	Progress reports on implementation of the intersessional workplan (2008-2009) <ul style="list-style-type: none"> - Category 3: Fossil and biomass fuel power plants; household heating and cooking - Simple stoves 	U. Karl, Germany B. Cardenas, Mexico
12:30-14:00	<i>Lunch break</i>	
14:00-15:00	Category 6: Open burning of waste and biomass <ul style="list-style-type: none"> (i) Presentation of the results, incl. proposed emission factors from open burning of waste project (ii) Presentation of the results, incl. proposed emission factors from open burning of biomass project 	H. Fiedler, Chemicals S. Marklund, Sweden W. Carroll, CCD, Gang Yu, Tsinghua University, Carl Meyer, CSIRO, Dahman Touati (EPA)
15:00-16:00	Category 2: Metal industry Other issues of concern: (i) Brick production	E. Fiani, France G. Umlauf, EC B. Cardenas, Mexico, A. Grochowalski, Poland
16:00-16:30	<i>Coffee break</i>	
16:30-18:00	Other issues of concern (continue): <ul style="list-style-type: none"> (ii) Charcoal production (iii) Screening of new sources (iv) Releases of PCDD/PCDF from pesticide use Discussion on all of above contributions	J. de Asunçao, Brazil P. Costner, IPEN R. Weber

Wednesday, 2 December 2009		
9:00-10:30	Group work: Conclusions and proposals for Toolkit revisions and updates: - Category 3: Fossil and biomass fuel power plans; household heating and cooking - Category 6: Open burning of waste and biomass	Chairs/rapporteurs All participants
<i>10:30-11:00</i>	<i>Coffee break</i>	
11:00-12:30	Conclusions and proposals (continued): - Category 3: Fossil and biomass fuel power plans; household heating and cooking - Category 6: Open burning of waste and biomass	Chairs/rapporteurs All participants
<i>12:30-14:00</i>	<i>Lunch break</i>	
14:00-15:30	Group work: Workplan for the intersessional period: Group work: (i) Brick production (ii) Simple stoves (iii) Charcoal production (iv) Metal industry	Chairs/rapporteurs All participants
<i>15:30-16:00</i>	<i>Coffee break</i>	
16:00-18:00	Implications of listing pentachlorobenzene in Annex C of the Stockholm Convention;	Secretariat All participants
Thursday, 3 December 2009		
9:00-10:30	Possible elements of a review and updating process of the Guidelines on Best Available Techniques and Guidance on Best Environment Practices relevant to Article 5 of the Stockholm Convention	Secretariat All participants
<i>10:30-11:00</i>	<i>Coffee break</i>	
11:00-13:00	Reports from thematic areas; synthesis - Workplan for intersessional period (2009-2010)	Chairs/rapporteurs All participants Secretariat Chemicals
<i>12:30-14:00</i>	<i>Lunch break</i>	
	Finalization of report -Closure of the meeting	Chairs/rapporteurs All participants Secretariat Chemicals