

FORMATION AND SOURCES - POSTERS

THE DG XI EUROPEAN DIOXIN EMISSION INVENTORY - STAGE II: CONCEPT, SCOPE, EXPERIENCES

U. Quaß, M. Fermann, G. Bröker

LUA NRW; PO Box 10 23 63; D-45023 Essen, Germany

Introduction

In 1995 the European Commission implemented the project „Identification of Relevant Industrial Sources of Dioxins and Furans; Quantification of their Emissions and Evaluation of Abatement Technologies“. The State Environment Agency of North Rhine-Westphalia, Germany (LUA NRW), located in the center of one of the most industrialised European regions (Rhine-Ruhr area) was committed to carry out this project. Starting in 1995, Stage I of the project was finished in November 1997 with release of a 900 page report covering the information on dioxin emissions available from 17 European Countries and an evaluation of these data to estimate the annual emissions of these countries on a comparable basis¹.

From this study which reflected the emission situation of the period 1993 to 1995 it became obvious that considerable data gaps still existed for a number of potential and relevant dioxin emission sources and with respect to several countries which had no or few own related information up to that date. To reduce these uncertainties and to „catalyse“ the implementation of corresponding national actions the Commission prolonged the project for a 3-year “Stage II” to be carried out from 1998 until end of 2000.

Stage II comprises a number of different sub-projects which have been carried out in various European countries. Some results of these sub-project are also presented at Dioxin 2000 in separate contributions (see cross links in Table 1). Here, the concept, development, general experiences and preliminary conclusions of the Stage II project will be discussed.

Concept and approach

According to the Stage I study uncertainties of emission factors and/or sector activity rates exist with regard to all mentioned relevant sources to a variable extent which gave rise to question the estimated values. Furthermore, the Stage I report stated that there was much less information available on emissions associated with waste water or production residues than for air emissions. It was therefore decided to establish various emission testing sub projects as well as to commit another literature study on the topic “dioxin emissions to land and water”.

To initiate the emission testing programs a workshop was held in late 1997 with participation of European measuring institutes and environmental authorities, respectively. This workshop, being supervised by DG Environment, was attended by experts from 12 European Countries including Poland, Estonia and Latvia. Unfortunately no or negative response was received from Italy, Portugal and Greece at that time. The workshop participants agreed that despite municipal solid

FORMATION AND SOURCES - POSTERS

waste incineration had been assessed to be the most important dioxin emission source no project should be focused on these facilities because an EC-wide limit value will be implemented within a few years. Regarding the other potential emission source types a priority list and a preliminary list of projects to be carried out was set up. Besides doing its own measurement activities (including cross-check analyses of samples taken by sub-contractors). LUA NRW took up the role of fund management, sub-contracting, co-ordination and reporting for the entire Stage II project. Experiences made with these projects are discussed in the following.

Experiences

As the co-ordinator of the entire project LUA was faced with a number of difficulties during contract negotiations and performance of the projects. These problems were due on the one hand to the financial construction which prescribed a maximum 50% funding of the entire project. This condition had to be accepted by all sub-contractors, too. As non-public companies, which in some cases were the only institutions available for the scheduled sub-project, in general are not able to work for a payment less than their own costs, the 50% restriction frequently led to lengthy negotiations and in some cases to final cancellation of the scheduled project.

On the other hand, plant operators sometimes did not agree with the requested emission measurements. This was not unexpected and additional support by the respective environmental authorities was asked for in these cases. It was an interesting experience to see that apparently in some countries there was no possibility for the environmental authorities to overcome the resistance of plant operators. As a result, emission measurements which had already been agreed on between LUA and sub-contractors had to be cancelled after lengthy but unsuccessful efforts to convince the involved parties. Due to these difficulties the list of projects agreed on the workshop was subjected to changes; the final list of projects actually been carried out is shown in **Table 1**.

Preliminary results

Stage II of the project presented here will be finalised by end of 2000 and the final report is likely to be available by early springtime 2001. As some of the measurement programs will be completed by mid of the year only, no results from these sub-projects can be presented at the time being. However, a number of projects have already been finished and the permit to present results was given by DG Environment. Of these results some are presented in detail in related contributions to Dioxin 2000 by the institutes which have carried out the measurements. Here, only a brief survey on the results of all projects yet completed is presented in **Table 1**.

Update of the European emission inventory

Based on the information obtained from the projects carried within Stage II as well as from other related activities in the European Countries the Stage II final report will comprise an updated air emission inventory for Western European countries. Main improvements of the state of information were made in France² where a comprehensive emission testing program took place in the recent years, and also Italy has set-up a preliminary inventory and started to investigate the emissions from some industrial branches^{3, 4}. Both activities affect the overall emission estimate for waste incineration, the French results also have impact on the inventory in the metallurgical sector. For instance, secondary zinc production must be considered to have been a considerable

FORMATION AND SOURCES - POSTERS

French emission source in the mid 90's whereas nowadays the levels being only a few percent of the former emissions. As a consequence from Stage II measurements, the annual emission from hospital waste incinerators is likely to have been overestimated in the Stage I report. Additional questions must also be asked concerning the role of domestic coal combustion. Being assessed in the Stage I report to be of low relevance, the measurements made by the Austrian UBA⁵ revealed surprisingly high emissions (13-90 ng TE/m³ at 0% O₂) from single-stove heating. Comparative measurements recently carried out by LUA indeed revealed a considerable trend of elevated PCDD/F concentrations in single stove stack gas; however, they did not confirm the high Austrian levels (c.f. table 1).

Conclusions

Stage II of the DG XI European Dioxin Emission Inventory can be considered a unique project on the European scale. Within the framework of this project the very first emission measurements at plants in Greece and Portugal could be achieved which hopefully will catalyse further activities in direction of emission reduction in these countries. Unfortunately, the aim to obtain measurement data from all sintering plants not yet investigated could not be reached due to operators resistance and the apparent insufficient power of the respective environmental administrations. This experience indicates that with respect to emission control a harmonisation of EC legislation to enforce public authorities is necessary. Further, those plants not agreeing with emission testing must be suspected to be considerable PCDD/F sources and shall remain in the focus of local, national and EC abatement policy.

Acknowledgement

Financial contribution by the European Commission, DG Environment, and by the Portuguese ministry of environment (for sub-project in Portugal) is gratefully acknowledged. Special thanks to all participating institutes for their valuable engagement in spite of difficult circumstances.

References

1. U. Quaß, M. Fermann and G. Bröker, Identification of Relevant Industrial Sources of Dioxins and Furans in Europe, LUA Materialien Nr. 43, 936 pp., Landesumweltamt NRW (1997).
2. Ministère du l'Aménagement du territoire et de l'Environnement: <http://www.environnement.gouv.fr/actua/cominfos/dosdir/DIRPPR/dioxine/tabdioxines.htm#s>.
3. C. Martines, R. Fanelli, G. Pastorelli and P. L., Development of dioxin and furan air emission factors from municipal solid waste incinerators in Regione Lombardia (Italy), *Dioxin '99*, Venice, 12.-17.09.1999. *Organohalogen Compounds* 41, pp. 247-250 (1999).
4. R. De Lauretis, Dioxins and Furans Italian National and Local Emission Inventories, *Dioxin '99*, Venice, 12.-17.09.1999. *Organohalogen Compounds* 41, pp. 487-489 (1999).
5. W. Moche and G. Thanner, PCDD/F-Emissions from Coal Combustion in Small Residential Plants, *Dioxin '98*, Stockholm, *Organohalogen Compounds* 36, pp. 329-332 (1998).
6. A. Grochowalski, PCDDs and PCDFs Concentration in Combustion Gases and Bottom Ash From Incineration of Hospital Wastes in Poland, *Chemosphere* 37, 2279-2291 (1998).

Country	Institute(s)	Topic	No of measurements	results	Dioxin 2000 Presentation
A, PL, N, NL	FTU, Cracow Univers., NILU, TNO	Development of a concept for a research program on domestic wood combustion in Europe	None	Research proposal submitted to DG Environment	NO
D/EE	LUA/MoE	Oil shale power plant	2 (raw oil shale, filter dust)	No indication for dioxin emission	NO
D	LUA	Iron foundries (cold air cupola	>30 filter dust, 6 x 3 emission samplings	Large variation of PCDD/F in filter dust (< 0.1 up to 12 µg TE/kg dm); stack gas conc. Up to 0.2 ng TE/m ³	NO
D	LUA	Domestic coal combustion	36 emission samplings (6 fuels, 2 stoves)	Between 0.1 and 10 ng I-TEQ/m ³ at 0% O ₂ , depending on fuel and stove type	YES
D	LUA	TiO ₂ -prod.	3 emission samplings	No PCDD/F emission found	NO
D	LUA	Comb. Of sulfur containing wastes for SO ₂ -prod.	3 process material analyses; 3 emission samples	No significant indication for emission of PCDD/F or their sulfur analogues	NO
B	ISScP	Sinter plants	6 emission samplings	Project still ongoing	NO
DK	NERI/Dk-Teknik	Hospital waste co-combustion	6 emission samplings	No difference in PCDD/F emission with/without co-combustion at level 0.4 ng TE/m ³	YES
E	CID-CSIC, Barcelona	Hospital waste incineration, sinter plants	6 emission samplings	Project still ongoing	NO
GR	GSF (D)	Various plants (see table ??)	10 emission samplings	???	NO
P	ERGO/IDA D	Various plants	13 emission samplings	Very high emission (~ 80 ng TE/m ³) at hospital waste incinerator; other plants below 1 ng TE/m ³	YES
PL	Cracow University	Hospital waste incineration	None	Survey on specific situation in Poland ⁶	NO
UK	AEA Technology	Study on dioxins to land and water	None	Large range of emission estimates; probably most important source: pesticide production	NO

Table 1: Survey and preliminary results of projects carried out within Stage II of the DG Environment European Emission Inventory Project