PRELIMINARY RESULTS OF THE 1ST, 2ND AND 3RD ROUND INTERLABORATORY COMPARISON EXERCISES FOR CHINA ENVIRONMENTAL DIOXIN LABORATORIES

Ting ZHANG[1]*, Aimin Liu[1],Nan Li[1],Li QI[1],Zhiguang Zhou[1],Pengjun XU[1],Yue REN[1] and Yeru HUANG[1]

[1]State Environmental Protection Key Laboratory for Dioxin Pollution Control, National Research Center for Environmental Analysis and Measurement, No.1 Yuhui South Road, Beijing, China

Introduction

The numbers of dioxin laboratories which provide environmental sample measurement service in the mainland of China have rapidly grown theses years, for the increasing demand from the government supervision and self-check for dioxin emission sources according to the regulations of MEP, China, from the environmental impact assessment and monitoring, and from the effect assessment of Stockholm Convention implement, and so on. There are about 20 dioxin laboratories are involving in the environmental dioxin measurements at present in mainland, some new dioxin laboratories are still under construction. These differently oriented laboratories include labs affiliated to MEP, university lab, labs from Chinese Academy of Sciences, labs in other industries and the commercial labs. Although all the laboratories engaged in these measurement have been accredited by China Metrology Accreditation(CMA) according to Chinese law， More quality control and quality assurance (QA/QC)is still needed because of the factors as the special techniques required in the dioxin emission source sampling and the trace dioxin existence in the environmental matrices.

In 2012, National Research Center for Environmental Analysis and Measurement (CNEAC) attempted to carry out an environmental dioxin measurement QA/QC study by organizing the 1st round environmental dioxin interlaboratory comparison activity in China. 14 dioxin laboratories participated in and 2 fly ash samples were prepared and distributed to participants by CNEAC. In 2013 and 2014, the number of participant lab increase to 16 and 22, respectively.
The preliminary results of the three round interlaboratory comparisons are firstly reported here, more discussion on the result and the lessons drawn from the three year experience can be expected in the future.

Materials and methods

Sample preparations

As shown in Table1, standard solution, soil or fly ash samples were prepared for every year's exercise. The standard solution samples were subscribed from Wellington Laboratories Inc. (Guelph, Canada).
Soil samples were collected from the surface soil of an area adjacent to a municipal solid waste incinerator. Fly ash samples were come from municipal solid waste incinerators. After collection, soil and fly ash samples were dry at room temperature after the removal of impurity as stone and root. Then the samples resorted to grinding, homogenizing and bottling in turn. The homogeneity and stability test were carried out and abided by the rule of ISO[1], the samples were distributed to the participant laboratories only after the tests passed.

Result description and evaluation

Raw data treatment, result description and evaluation were performed by the robust statistical method following the rule of China National Accreditation Service for Conformity Assessment (CNAS)[2]. 7 parameters for result description are: number of result, median, Interquartil range, coefficient of variability, maximum, minimum and range. Z scores act as the indicator to evaluate the performance of the individual laboratory.

Table 1 Samples for the three round China environmental dioxin interlaboratory comparison

year	Sample description
2012	1 standard solution, 2 fly ash samples with different PCDD/Fs concentration
2013	1 standard solution, 1 fly ash samples and 1 soil sample
2014	1 standard solution, 2 fly ash samples with different PCDD/Fs concentration

Results and discussion:
Both in 2012 and 2014, 2 fly ashes were selected as the interlaboratory comparison samples, these samples were collected from the bag-filtering dust precipitators of the different municipal solid waste incinerator and with different concentration levels.

Results of the total toxic equivalent quantity (TEQ) concentration for a sample and the mass concentration for 17 individual congeners are calculated and evaluated.

General results for 2012

14 labs registered for the comparison exercise in 2012. 14 results reported for standard solution sample and 13 results reported for the fly ash samples. The Z score of TEQ results for 3 samples are shown in Fig.1.

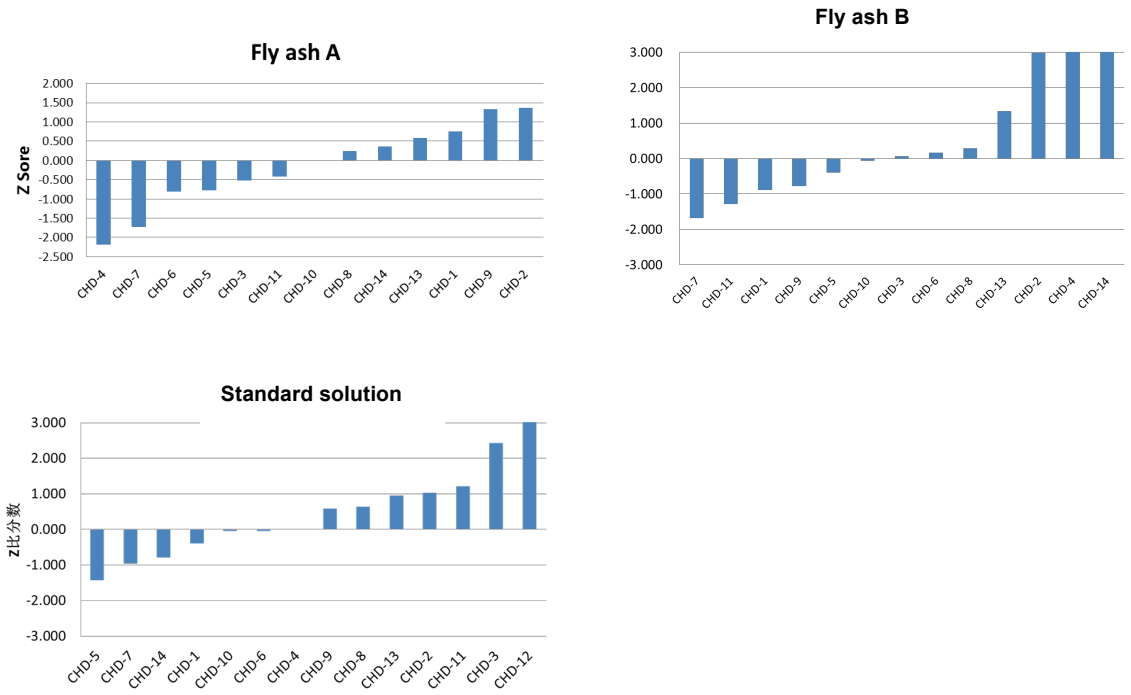


Fig.1 Z score for TEQ of the three samples in 2012

General results for 2013

16 labs registered for the comparison exercise in 2013. All participant laboratories reported the results for 3 samples as shown in Fig.2.

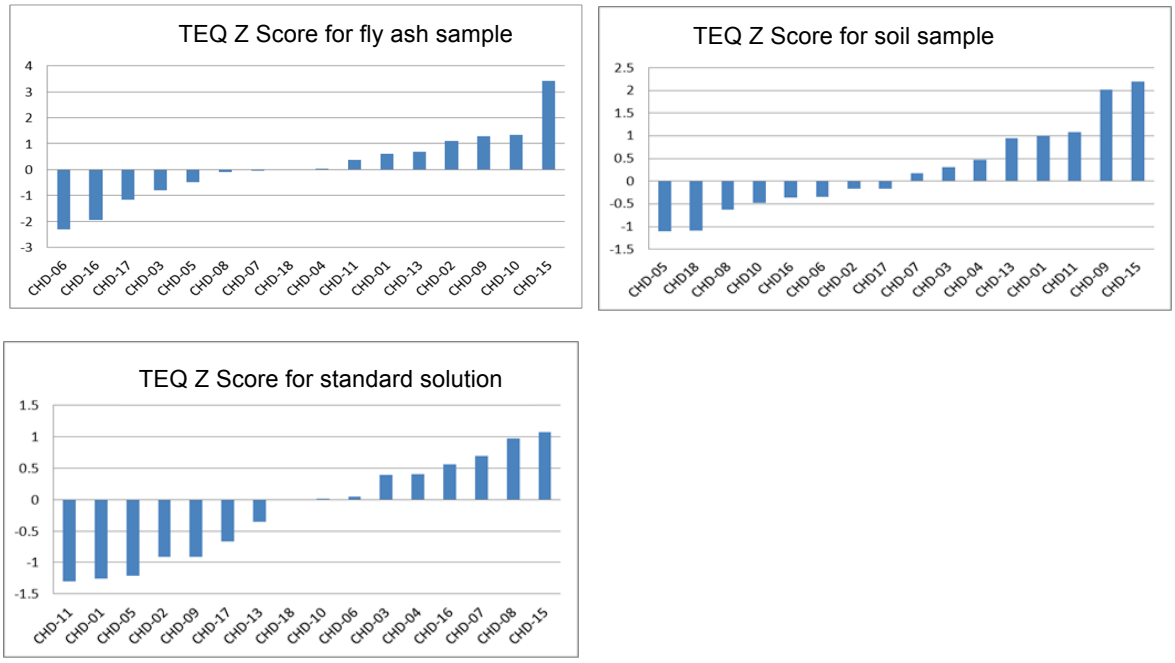
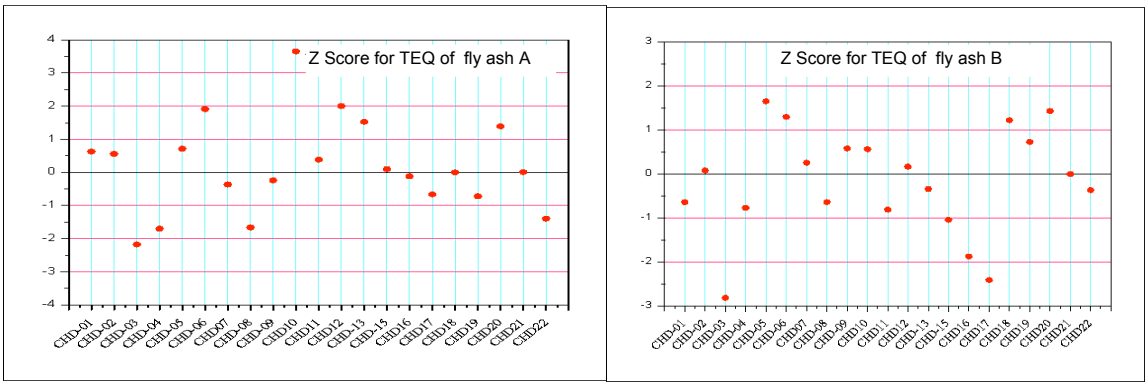


Fig.2 Z score for TEQ of the three samples in 2013

General results for 2014

24 labs registered for the comparison exercise in 2013. 22 participant laboratories reported the results for 3 samples as shown in Fig.3.



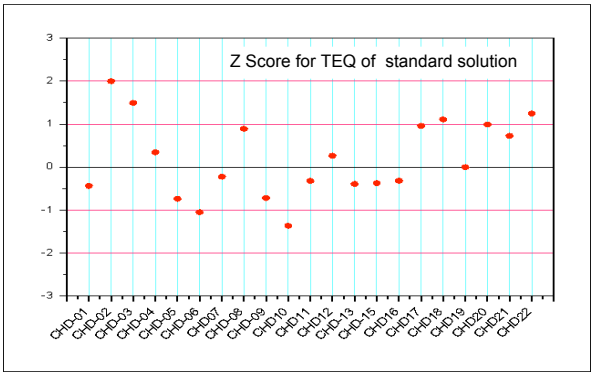


Fig.3 Z score for TEQ of the three samples in 2014

Acknowledgements:

The Authors is indebted to the project "Persistent organic pollutant monitoring" from MEP, China for its financial support on the interlaboratory comparison activities.

References:

1. International Organization for Standardization(ISO,2010).*ISO/IEC 17043: 2010 "Conformity assessment - General requirements for proficiency testing*". ISO,Geneva, Switzerland
2. China National Accreditation Service for Conformity Assessment (CNAS, 2006).*CNAS-CL03:2006 Accreditation Criteria for Proficiency Testing Providers.*CNAS,Beijing, China.