出國報告（出國類別：開會）

參加第 29 屆國際有機鹵化環境污染物及持久性有機污染物研討會（2009 戴奧辛年會）報告

服務機關：行政院環境保護署環境檢驗所

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派赴國家：中國

出國期間：98 年 8 月 22 日至 98 年 8 月 29 日

報告日期：98 年 11 月 19 日

摘要

爲能與國際接軌、了解國際研究趨勢、分析技術交流及收集最新研究成果，本所派員參加本（98）年於中國北京舉行第 29 屆國際有機鹵化環境污染物及持久性有機污染物研討會（通稱 2009 戴奧辛年會），除發表二篇論文分享本所工作成果外，亦期望藉此大會吸取先進國家之經驗，以提升本所分析技術使達國際水準。

參加本次大會之重要心得及建議如下：

一、 Thermo 的 DFS HRGC/HRMS 在感度上優於其他高解析度質譜儀，若本所未來有新機採購計畫時可將其納入考量。

二、 FMS 公司的 Total-Rapid-Prep 系統，可大幅縮短樣品前處理時間。但因售價與耗材昂貴，且無溶劑自動混合系統，仍有改善空間，故可持續觀察其發展。

三、 加壓溶劑萃取裝置近年來可以看到並聯式的設計，如 Büchi 公司的 SpeedExtractor 和 FMS 公司的 PLE 系統，除本次大會有相關的應用論文發表，也可用在一般有機污染物的萃取上，適合本所發展應用。

四、 溴化阻燃劑和全氟化物是今年大會熱門的有機鹵化環境污染物，本所已經針對多溴二苯醚類、全氟辛酸和全氟辛烷磺酸等化合物進行檢測分析，建議本所持續關切相關分析技術之發展趨勢與流布調查。

五、 第 30 屆戴奧辛年會預定於 2010 年 9 月 12~17 日在美國德州 San Antonio 舉行，期望所內同仁有機會參與盛會，發表論文及吸收先進經驗。

目次

壹、目的

持久性有機污染物（persistent organic pollutants， POPs）爲具有不易分解與生物累積性，且會對人體及環境產生不可逆反應的化學物質，依據證據顯示這些物質可長距離傳播到其他從未使用或生產的地區，而威脅到這些地區的生態，故國際間呼籲以全球運動來減少和消除環境中的POPs。在聯合國環境規劃署的推動下，約有一百多個國家已經簽署了斯德哥爾摩公約，並已於2004年5月17日正式生效。斯德哥爾摩公約明定涵概生產、進口、出口、處理和使用POPs之各種管制措施。該公約將12種人爲產製之難分解有機污染物，包括DDT、Aldrin、Dieldrin、Endrin、Hexachlorobenzene、Cholrdane、Heptachlor、Toxaphene、Mirex 、PCBs、Dioxins、Furans等，列爲管制對象。目的是通過採取有效措施，減少和/或消除最初確定的12種持久性有機污染物釋放與排放，以保護人類的健康和生活環境。

國際有機鹵化環境污染物及持久性有機污染物研討會（通稱戴奧辛年會）是一個重要的國際研討會，於1980年約百餘位科學家在義大利羅馬舉辦第一屆，當時的會議名稱是“International Symposium on Chlorinated Dioxins and Related Compounds”，主要是因爲當時有許多重大的污染事件，如發生在台灣和日本的米糠油事件、越南的橘劑和2,4,5-T殺蟲劑污染，以及義大利Seveso農藥廠戴奧辛外洩事件，此後每年定期舉辦研討會。隨著國際上對於持有性有機污染物的關注與認識，大會的名稱從2006年起改爲“International Symposium on Halogenated Persistent Organic Pollutants”，所討論的議題，也從戴奧辛增加到多種有機鹵化物如殺蟲劑、溴化阻燃劑與全氟化學品等等。

爲持續了解國際研究趨勢、分析技術之發展及收集最新研究資料，本所乃派員參加本（98）年於中國北京舉行第 29 屆國際有機鹵化環境污染物及持久性有機污染物研討會（2009 戴奧辛年會），除發表論文分享本所工作成果外，亦期望藉此大會吸取先進國家之經驗，以提升本所分析技術使達國際水準。

貳、過程

一、 行程紀要

第 29 屆「國際鹵化持久性有機污染物研討會 (29th International Symposium on Halogenated Persistent Organic Pollutants)」，於中國北京之北京國際會議中心（如圖 1）舉行，會期自 98 年 8 月 23 日至 28 日，共計 6 日。

日期	地點	工作紀要
98.8.22	台北-中國北京	啓程
98.8.23-8.28	中國北京	參加「第 29 屆國際鹵化持久性有機污染物研討會」
98.8.29	中國北京-台北	返程

大會會場位於 2008 北京奧運會的主場館-國家體育場，也就是“鳥巢”附近，只有數百公尺之遙。步行約 10 分鐘可以來到北京地鐵 8 號線的「奧林匹克中心站」。由於剛舉辦完奧運之故，附近的道路與交通建設相當新穎，而會場所在位處於北京市中心北端，交通尚稱便利。

圖 1 大會會場-北京國際會議中心

二、 會議紀要

本屆大會包含約近千人與會，大會借用北京國際會議中心一至三樓的大部份會議室與大廳，由於地利之便，會場工作人員皆能以英語或中文給予與會者必要的協助與指引。

本次研討會發表之論文總數達 692 篇，分成口頭論文宣讀及壁報論文展示二種，其中口頭宣讀 260 篇，壁報展示有 432 篇。口頭論文宣讀部分共分 6 個場地同時進行，每天每個場地可發表約 15 篇論文，進行方式是使用 Power Point 簡報軟體進行 15 分鐘簡報，然後接受 5 分鐘提問；壁報論文部分因數量較多，雖然是全部共同展出，但分爲兩個時段作者必須於在論文旁邊接收提問。此次大會將儀器展示安排與壁報展示在一樓展示廳且相鄰的場地，讓參觀者可以在口頭論文宣讀的休息時間同時參觀兩種展示。

大會於 8 月 23 日上午開始受理報到；而 8 月 24 至 27 日是論文及演講發表時間，大會議程與各主題論文宣讀(包括大會專題演講)之篇名及作者如附件一 I。整個大會於 8 月 28 日中午劃下完美的句點。

圖 2 大會演講廳

參、心得

一、此次參加第 29 屆戴奧辛年會，聆聽並觀看與本所業務相關之論文發表，包括目前世界各國對於各種持久性有機污染物的分析技術與污染物於環境之流布、來源、人體暴露及風險評估等，這些資訊將可提供本所目前及未來執行有關鹵化持久性污染物研究之參考依據。

一、本次戴奧辛年會論文內容涵蓋八大主題。各主題及所涵蓋之副主題如下：

1. Analysis

- Sampling: strategy, theory and practice
- New instrumental techniques for POPs analysis
- High speed bioassay, screening techniques and methods
- Quality assurance and quality control (QA/QC)
- Sample preparation and clean up
- Analysis of BFRs, PFCs and other emerging contaminants– Analytical approaches and new developments

2. Environment levels and fate

- BFRs, PFCs and other emerging contaminants– environmental levels, distributions and transformation
- Global fate & long range transport
- POPs in soil and sediments (levels and processes)
- POPs in air & indoor atmospheres (levels and processes)
- POPs in marine mammals: levels, effects, trends
- POPs monitoring in polar areas and high plateau
- Temporal Trends and Spatial Variation of POPs

3. Exposure (human and environmental exposure)

- POPs in humans (pattern, levels and trends)
- Environmental exposure of POPs
- Industrial, occupational, and indoor exposure
- BFRs, PFCs and other POPs: public health and exposure

4. Food and feed safety, drinking water

- POPs in food and feed (levels and trends)
- Food contamination sources and transport
- Decontamination and cooking process
- Dietary intake of POPs

- POPs in drinking water
- Food regulations and guideline (legal and other measures)

5. Toxicology & Risk Assessment

- The AhR and mechanisms of toxicity
- Field studies and ecotoxicology
- Toxicology of dioxins, PCBs and other POPs
- Dioxins and risk assessment
- Cancer risk and dioxin exposure estimated from serum evaluation
- Epidemiology of POPs
- Neurotoxicity, reproduction and immunotoxicity of POPs
- Integrating Toxicology and Epidemiology for Risk Assessment

6. Sources, formation and control measures

- Metallurgy process
- Source control technologies
- Laboratory and field studies of formation and sources
- Incineration and thermal processes
- Non-thermal sources

7. Control technologies and policies

- Destruction and degradation technologies
- Catalysis & photolysis
- Nanomaterials and related technologies.
- Remediation & elimination
- Environmental consulting and regulations
- Environmental policy and management

8. Hot issues and related areas

- Emerging POPs and new development
- Chiral Xenobiotics and natural Halogenated Compounds
- Asia (Vietnam et al) and other regional contamination of dioxins and POPs
- Identification of unresolved complex mixtures (UCMs)
- Dioxin Exposure study
- All other unmentioned topics

在報名時必須依照論文的研究方向與論文的發表方式選擇適當的主題，由大會委員進行篩選決定論文是否被接受及是否能夠以口頭宣讀進行發表。

二、本次戴奧辛年會，本所發表了口頭與壁報論文各1篇，這是繼2007年大會後第2次以口頭宣讀論文，題目爲「AN EFFICIENT AND GREEN CLEANUP SYSTEM FOR

ANALYSIS OF DIOXIN/FURANS, DIOXIN-LIKE PCBS AND PBDES」，本篇介紹本所目前利用CAPE公司所發展的矽膠-活性碳複合管柱，可同時進行Dioxins、DLPCBs 與 PBDEs 的淨化步驟，雖然不是全自動化的儀器，但是所需時間與自動淨化的儀器相當，但耗材的花費接近於傳統淨化方式，亦不用另外購買昂貴的機器設備，在會場中發表後引起多位與會者的興趣，提出許多問題並詢問有關於此技術的細節。另一篇壁報論文題目爲「LEVELS OF PCDDS, PCDFS, DIOXIN-LIKE PCBS, AND PBDES IN FISH SAMPLES FROM RIVERS AND ESTUARIES IN TAIWAN」，本篇論文係將本所近年來執行河川調查計畫中，對於魚體中Dioxins、DLPCBs 與 PBDEs的濃度進行整理分析。此兩篇論文的內容詳如附件二。

三、若以論文主題歸類區分，本次大會發表最多的是關於「Environment levels and fate」，總共有231篇論文，其次是「Analysis」，共有97篇論文發表。表示目前世界各國最關心的還是持久性有機污染物在環境中的含量，這與本所除了發展各項檢測技術外，持續對污染物在各種環境基質中濃度進行流布調查的工作趨勢相同，也和本次所發表的論文方向一致。

四、由於本所目前之工作重點爲環境中污染物之檢驗分析，因此針對這些相關主題爲參與重點，茲將其內容整理如下：

(一) 分析技術 （儀器）

日本 Takasuga 等人評估以 GC-HR-TOFMS 在環境分析上的應用，結合高解析度質譜（Resol. 7000、LODs：<5 pg/g、mass deviations：< 2 mDa）的高感度和精確度和 TOF 快速且大範圍的質譜掃描，如在土壤中戴奧辛的分析上，除了可以進行例行性 PCDD/Fs 的定量分析，也可以在同一次上機過程中得到其他污染物的資訊（如 PAHs），如此便可作爲在污染物的篩選方法。

Zhou 等人研究以 LC-APCI-MS-MS 分析 26 種鹵化阻燃劑，以往以大氣壓化學游離法（Atmospheric pressure chemical ionization，APCI）的方式較適用於較高極性如 HBCD 和 TBBP-A 這一類阻燃劑的分析，此篇研究中探討溫度和 LC 沖提液的組成對離子化效率的影響，並對 LC、APCI 與 MS 分析條件進行最佳化，對於真實底泥

和生物樣品中的 PBDEs 的分析，可以得到與 GC-HRMS 相當的結果。

Focant 等人則嘗試以 GCxGC 結合低解析度的四極柱質譜進行 dioxins 與 PCBs 的分析，分別以 EI 和 NCI 的方式進行離子化並以同位素稀釋法進行定量，這樣的方式會比 GCxGC-TOFMS 或 GC-HRMS 成本低。初步得到的結果 GCxGC-qMS 符合同位素稀釋法定量的 QA/QC，以 NCI 的方式可以得到較高的感度，但是低氯數的污染物還是有定量上的困難，需要進一步地將分析條件再優化。

日本九州大學 Yuka 等人發展以 Ti-Sapphire 紫外光飛秒(femtosecond)雷射作爲離子化源，此多光子離子化（Multiphoton ionization，MPI）技術可以提昇選擇性，結合 GC-MPI/TOF-MS 作爲新的戴奧辛分析技術（如圖 3），並以五氯呋喃標準品進行定量分析，偵測極限可達 0.2 pg，在檢量線的 RRF 相對標準偏差結果也可以符合日本工業規格（JIS）的規範。此外在此篇論文中亦同時利用此技術分析其他 PCDF 的同源物，這是第一篇以 GC-MPI/TOF-MS 分析 PCDD/Fs 的論文。

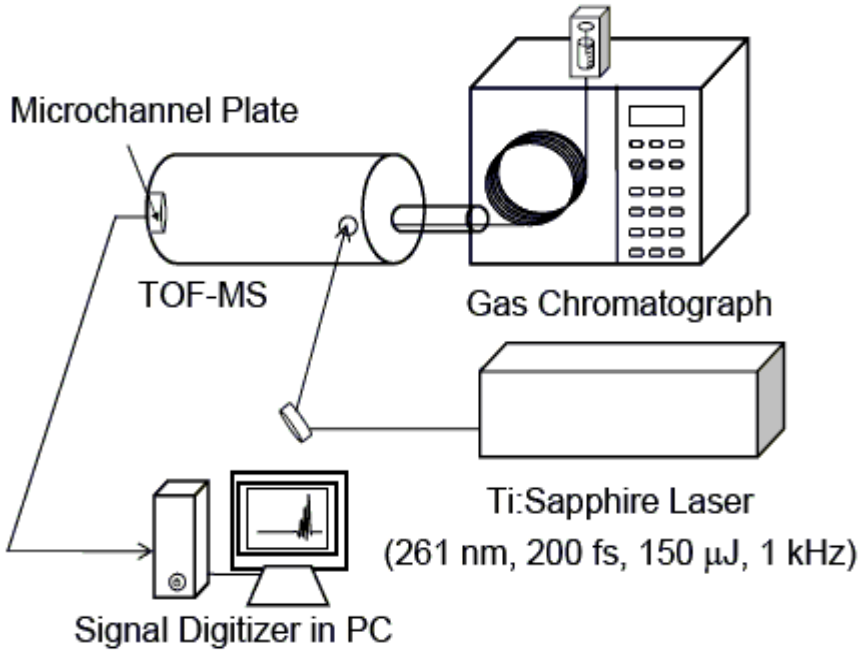

圖 3 GC-MPI/TOF-MS 示意圖

Sueper 等人利用 Thermo 的 DFS HRGC/HRMS 分析戴奧辛樣品。此儀器配置了 PTV 進樣器可以進行大體積進樣（large volume injection，LVI）和雙資料處理系統，縮短了戴奧辛樣品處理分析的時間。使用大體積注射的方式在樣品淨化步驟後只要將

溶液濃縮至 1 mL，注射量爲 50 μL，如此可以減少一般檢測方法必須置換溶劑與濃縮到 20 μL 所需要的時間。DFS 的 HRMS 還可以同時配置兩套 GC 系統，利用閥門的切換控制待測物進入質譜離子源，交錯地注射兩台 GC 上的樣品於同一台質譜系統中，如此可縮短每次分析時等待的時間。

(二) 分析技術（前處理）

Li 等人對以基質固相分散(Matrix Solid Phase Dispersion，MSPD)法萃取胎盤中的 PBDEs，測試以不同的研磨方式，吸附劑的性質、沖提液的種類等進行最佳化的研究，並以標準參考物質和真實樣品，與傳統索氏方法比較確認其有效性。以 florisil 作爲吸附劑，與經過冷凍乾燥後的樣品量 1 比 2 的方式，以 100mL 的 hexane-DCM 混合液（8：2）進行一次萃取爲最佳條件，可以得到與索氏萃取相當的結果。

Yeung 等人爲了分析全血（whole blood）中的全氟化物，進行了萃取溶液、淨化與分析條件的最佳化研究。以甲酸或 ion pair 溶液萃取對於短鏈的 PFCs 回收率較差，乙腈進行萃取並使用 5% 或 15% 的陰離子交換 SPE 淨化可以得到 70% -120% 的回收率。使用 C18 管柱作爲 HPLC 管柱對 PFOS(80)會有共流物的產生，此干擾可以藉著以離子交換管柱取代 C18 管柱排除。在最佳化的條件之下可以分析動物或人體血液中超過 28 種的 PFCs。

Manni 等人利用此 J2 公司的 PrepLinc^{TM} 自動淨化系統分析排放管道中的到戴奧辛和毒性多氯聯苯，以 GPC 淨化除去不純物，再利用適當的流洗條件進行線上酸性氧化鋁 SPE 淨化將 PCDD/Fs 與毒性多氯聯苯分離，如此縮短了樣品前處理的時間。

德國 Cleres S. 等人利用 Büchi 公司的 SpeedExtractor 與 Dionex 公司的 ASE 裝置進行了兩篇萃取效率驗證與比較的研究。其中一篇是針對土壤中的多氯戴奧辛/呋喃、土壤和污泥中的全氟化物與底泥中的多溴二苯醚；另一篇則是檢測聚合物廢棄物中多氯聯苯和鄰苯二甲酸酯類。此兩篇研究結果都顯示在適當的條件下，SpeedExtractor 和 ASE 對於內標準品都有很好的回收率，而且 SpeedExtractor 也呈現良好的再現性，針對高污染濃度的樣品也不會有交叉污染的情況，證明了 SpeedExtractor 也可以像 ASE 一樣，應用在某些環境基質中 POPs 的萃取上。

(三) 人體與環境暴露

除了分析技術外的研究之外，POPs 對於生物體的影響也有非常多研究資料，本次大會關於對人體與環境 POPs 的暴露研究總計有 68 篇，包含 31 篇口頭宣讀論文和 37 篇海報論文。

美國 Sonya 等人研究在加州母親與幼童血清中 PBDEs 的暴露評估研究，因爲文獻中提出在北美人體中的 PBDEs 濃度遠高於世界上其他地方，結果顯示在 20 對母親與其第一個子女的血清中，幾乎都含有從二溴的 BDE-28 到十溴的 BDE-209 共 11 種 PBDEs 化合物，其中以 BDE-47 的濃度爲最高，在小孩血清中的濃度中位數爲 30.6 ng/g lipid weight，在母親中的中位數濃度爲 8.8 ng/g lipid weight。此研究還提出了在此 20 對母子中，19 位小孩血清中的 PBDEs 濃度皆高於其母親，主要的原因是因爲幼童面臨比成人更嚴重的 PBDEs 暴露情境，在室內的家具、地毯和電子產品所釋放出的 PBDEs，讓幼童更容易經由攝食或吸入室內的灰塵或微粒而增加了體內的 PBDEs。此研究也提到另一個重要的結論，那就是 PBDEs 和 PCBs 對於人體的暴露情況是不同的，幼童在離乳後對 PCBs 的暴露主要來自於飲食，但對 PBDEs 就是吸入或攝食灰塵爲主。

(四) POPs monitoring in polar areas and high plateau

第一天大會演講中 Dr. Wania 針對喜瑪拉雅山區與青藏高原 POPs 的冷卻捕集（cold trapping）發表演說，這是一個由加拿大和中國學術機構共同合作的研究計畫。因爲 POPs 可以長時間存在於環境中，藉由大氣的流動沉降在離污染源很遠的區域。溫度梯度和其對氣/濃縮相比例的影響，對於高緯度或高海拔地區有機污染物的冷卻捕集扮演重要的腳色。喜瑪拉雅山區和青藏高原由於高海拔以及夾在兩個世界上人口最稠密與大量污染物排放的地區（中國、印度）之間。而青藏高原除了南部和東部邊緣有豐沛的降水量，其本身是一個高海拔的荒漠，如此特殊的地形也許會有不同的冷卻捕集機制。

Guibin Jiang 等人爲了調查西藏自治區中 PCBs 和 PBDEs 的空間分布情形，採集了不同地點生產的酥油（Tibetan butter），分析的 25 種 PCBs 總濃度在 137.3 至 2518

pg/g 之間，平均值爲 518.5 pg/g；12 種 PBDEs 總濃度平均值爲 124.6 pg/g，都比世界上其他地方的奶油測值低很多。經由逆軌跡模式和主成分分析指出，在這個區域的這兩種 POPs 的來源主要是由全球長程傳輸的冷卻捕集而來。

由中國科學院生生態環境研究中心調查西藏高原上表土中的 PCBs、PBDEs，發現這兩種 POPs 的濃度都很低，而且是以低分子量的同源物爲主要的特徵物種。由 TOC 濃度與採樣點海拔高度的回歸分析，可以歸納出不同地形的特徵會影響 POPs 濃度與海拔高度的關聯性，如在海拔 4,500 公尺以上 PCBs 與 PBDEs 的濃度會隨著高度而增加，而當地和人爲活動和降雨都非常稀少，所以污染物濃度的增加與當地污染源沒有關係，而是與全球性的蚱蜢效應有關，而且雖然低分子量的同源物爲主要成分，但是低揮發性（高分子量）的污染物比高揮發性（低分子量的）更容易在高海拔地區累積。

這些論文顯示 POPs 污染的監測調查和消減並不只是一個國家或污染區域內的問題，而是一個全球共同面臨的問題。

(五) BFRs，PFCs，和其他新興污染物

本次大會中關於溴化阻燃劑（Brominated flame retardants，BFRs）、全氟化物（Perfluorocarbons，PFCs）和其他新興污染物的研究比例持續增加中，如在 260 篇口頭發表的論文當中，BFRs 就有 23% ，PFCs 有 6% ，新興污染物有 5% ；在 432 篇海報論文當中 BFRs 就有 16% ，PFCs 有 7% ，新興污染物有 4% 。這些論文當中主要是來自中國和其他亞洲地區。而所有 BFRs 和 PFCs 等論文當中，又以 PBDEs 和 PFOS/PFOA 爲最多。Loganathan 博士在大會總結報告中提出，隨著法規的管制和禁用，PCBs 和有機氯農藥等含氯的 POPs 在大部分的地區的環境濃度都在下降當中，而含溴和含氟以及藥品和個人保健用品（Pharmaceuticals and Personal Care Products，PPCPs）卻是更直接的對人類和環境有更直接的影響（如圖 4）。

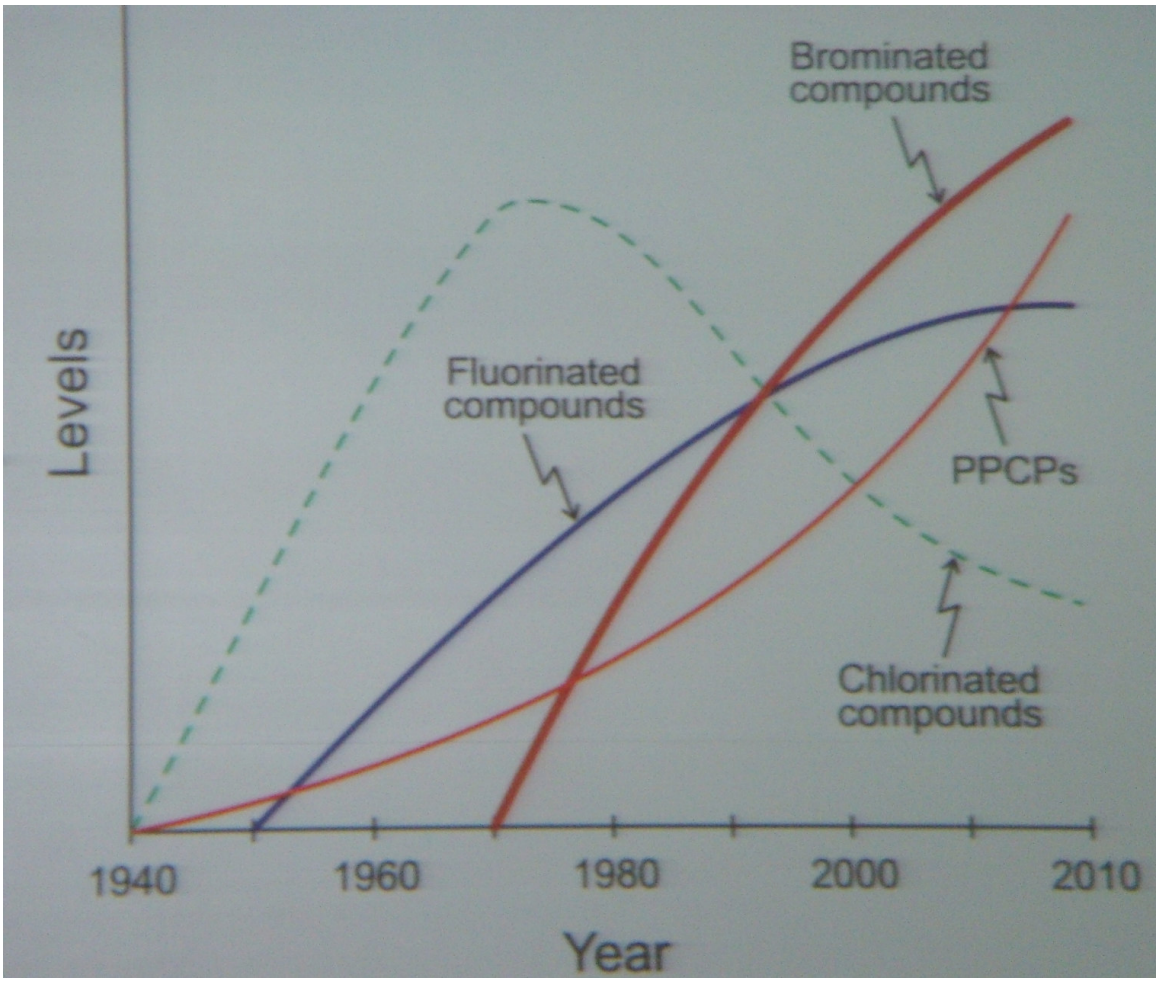

圖 4 Schematic representation of global environmental contamination trends of organohalogen compounds

值得注意的是廢電子設備回收場的土壤、灰塵爲排放 BFRs 和類戴奧辛污染物的重要來源，而世界上 50% 以上工業化國家的廢電子產品都在中國、印度、越南等亞洲國家進行最終處置，這些廣大的場址進行處理時因爲露天焚燒或悶燒所產生的重金屬、BFRs 和其他污染物很容易進入到附近的大氣、土壤或水域當中，變成污染物對於環境或是人體的暴露途徑。如 Tue 等人研究兩個在越南的廢電子回收場的室內灰塵中的 PCBs、PBDEs 和 HBCDs，並與一個在都市區的控制場址做比較，結果顯示總 PCBs 濃度與都市地區的值無明顯差異，但是 PBDEs 與 HBCDs 的值都明顯比都市地區高，分別爲 110 – 10000 到 5.4 – 400 ng/g。以 DR-CALUX 方式測得的戴奧辛毒性也顯示相似的結果。

(六) 新興污染物

氯化石蠟（chlorinated paraffins, CPs），廣泛應用於橡膠塑膠的耐燃添加劑與金屬工業的潤滑劑上，在中國每年消耗約 60 萬噸並持續增加中。氯化石蠟並且已經在第三屆斯德哥爾摩公約締約國大會上列入附件 E（風險簡介程序）上，相關的論文如 Mehmet Coelhan 檢測廢水處理廠進水排水和附近河川水體中的 CPs，發現 CPs 並不會出現在過濾後的水樣，而是存在於進水的懸浮物質上，短/中鏈氯化石蠟濃度約在 ND 到 4.6 ppb。Matsukami 等人以高解析度氣相層析質譜儀分析條紋海豚脂肪中的 CPs 以及 DDTs、PCBs、HCBs 等 POPs，SCCPs 濃度 57-602 ng/g lipid wt. 大約是比 DDTs 和 PCBs 少 100 倍而與 HCB 和 PBDEs 同等級。Kim woo-il 等人比較了以多種淨化方式和兩種 GC/MS-MS（NCI 與 tendem MS）和檢測 SCCPs 的方法。

其他新興污染物的研究，較不常見的如大會開幕演講中 Guibin Jiang 有提到關於溴化阻燃劑 TBC（Tris(2,3 bromo)-isocyanurate）在中國 Liuyang River 中底泥和生物體的污染研究。Ma 等人分別研究在中國某電子廢棄物回收場的灰塵、土壤與植體氯化 PAHs 的濃度。Roard 等人研究 PAHs 氯化生成戴奧辛機制。Yli-Pirilä 等人則是研究發生在固化衍生燃料和廢紙回收場的一場大火中所排放的氯化 PAHs 等氯化 POPs 的濃度。

(七) 現場儀器展示

高解析氣相層析質譜儀（HRGC/HRMS）由於靈敏度要求高、技術難度高且價格昂貴，故全世界只有 Micromass、JEOL 及 Thermo 三個廠牌的產品。今年大會各廠家並沒有的全新機種發表，Thermo 的 DFS HRGC/HRMS（如圖 5）在 60m 管柱時 TCDD 100 fg 的 S/N 比可輕易達到 100：1 以上，因爲降低了儀器的偵測極限，對於環境或複雜基質中超微量污染物的定量與新興污染物的鑑別分析有很大的幫助。另外 DFS 質譜儀可以搭配兩台 GC 進行分析，節省了儀器上機的時間，因此在會場當中受到許多與會者的注目與詢問。

圖 5 Thermo 公司的 DFS High Resolution GC/MS

在食品、血液或環境等複雜的基質中分析戴奧辛或其他持久性有機污染物，需要一連串繁複的萃取與淨化等前處理步驟，所耗費的人力、時間與金錢常常也是許多實驗室一直面臨的問題。因此如何節省前處理的步驟，減少使用的溶劑與藥品，縮短樣品萃取與淨化的時間，在本次大會中也可以見到不少在前處理方面新技術的發表：

J2 公司的 PrepLinc™ 系統（如圖 6）以模組化的方式結合了自動進樣器（autosampler）、固相萃取管柱（Solid Phase Extraction, SPE）、膠滲透淨化（Gel Permeation Chromatography, GPC） 與 濃縮裝置，以全自動的方式進行樣品的萃取、淨化、濃縮甚至溶劑置換與定容。

圖 6 J2 公司的 PrepLinc™ 系統

FMS 公司也展示了同樣是自動化的前處理設備，本所在 2005 年曾購置了該公司的自動淨化系統 Power-Pre™，該系統爲並聯式的設計，可以同時進行多個樣品的管柱淨化步驟。而本次 FMS 公司展示的是 Total-Rapid-Prep™系統（如圖 7），除了原有的管柱淨化，更加上了加壓溶劑萃取（Pressurized Liquid Extraction, PLE）與濃縮裝置，因爲其模組化的設計也可再結合 GPC 與 SPE，形成一套從萃取、淨化到濃縮的全自動化裝置。本次大會中也有相關的論文發表，如 Focant JF 等人利用此自動化裝置，針對魚肉和魚油進行 PCDDs、PCDFs 與共平面 PCBs 的分析，除了得到良好的回收率與低變異係數之外，文章中也特別強調利用這樣的自動化裝置，能夠在一個工作天之內完成樣品的前處理與得到分析報告，並且對於不熟悉戴奧辛分析技術的實驗室，也可以進行戴奧辛的檢測分析。

圖 7 FMS 公司的 Total-Rapid-Prep™系統

加壓溶劑萃取法（PLE）廣泛地被用在環境基質中對各種污染物的萃取，利用高溫高壓的萃取條件下，能有效的降低萃取所需的時間與減少溶劑的使用量。一般進行 PLE 所使用的裝置爲 Dionex 公司所生產的 Accelerated Solvent Extraction（ASE®），但是此裝置在設計上一次只能萃取一個樣品，而且因爲萃取時溶劑的經過的管路都相同，對於高污染的樣品會有殘留或交叉污染的疑慮。

Büchi 公司新的加速溶劑萃取裝置 SpeedExtractor（如圖 8）採用一種並聯式的設計，視機型可以同時進行四到六個樣品的萃取。不同於傳統的 ASE，這些樣品的管路各自獨立，較不會阻塞或有交叉污染的情形發生。

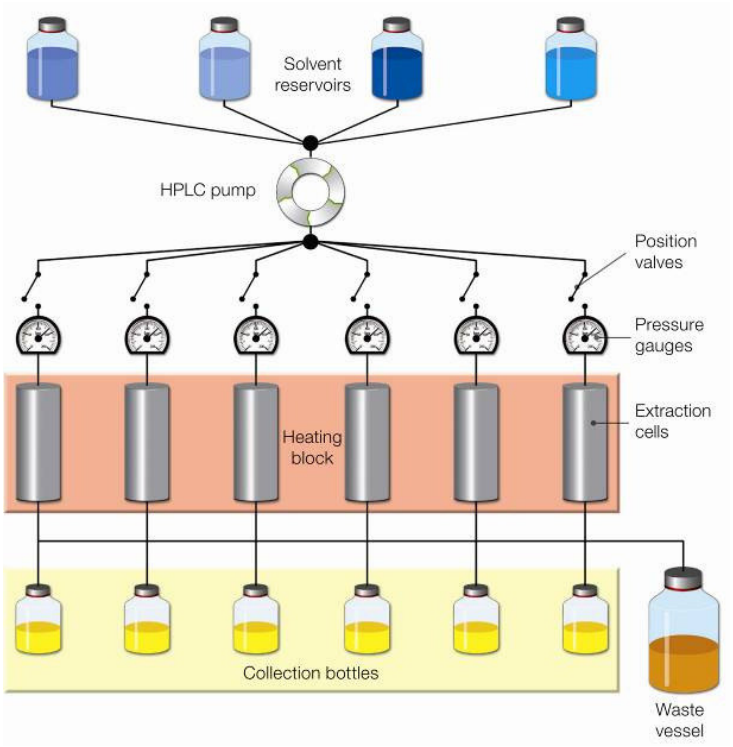

圖 8 SpeedExtraction 示意圖

本次年會中，Büchi 公司還展示了一套固液萃取裝置 B-811（如圖 9），除了可以進行傳統索氏方法外，利用萃取管也有加熱裝置與玻璃閥門的設計，還可以進行連續的熱萃取，以提高萃取效率，降低萃取時間；並可以將溶劑蒸發收集於萃取管中，不回流至溶劑杯內，縮短後續濃縮的時間。此外，樣品除了放置於於圓筒濾紙之外，此裝置也提供了玻璃樣品管或是大容量的萃取管，方便放入泡棉或其他大體積的吸附材質。

圖 9 Büchi Extraction System B-811

(八) 2010 戴奧辛年會

第 30 屆國際有機鹵化環境污染物及持久性有機污染物研討會議預定於 2010 年 9 月 12~17 日在美國德州 San Antonio 舉行，相關網址資料爲 http://www.dioxin2010.org/index.cfm。期望所內同仁有機會參與盛會，發表論文及吸收先進經驗。主辦單位網頁中的邀請函如下：

Welcome

Dear Friends and Colleagues,

On behalf of the Local Organizing and National Scientific Committee members, as well as the International Advisory Board, it is with great pleasure that we welcome you to San Antonio for the 30th International Symposium on Halogenated Persistent Organic Pollutants (POPs) - Dioxin 2010.

The symposium will return to the United States, after six exciting years around the globe, and we know that San Antonio, deep in the heart of Texas, will prove to be a world-class host for the 30th anniversary of the Dioxin Conferences. With its advanced meeting facilities and central location, the Marriott Rivercenter will be the conference headquarters, serving as both the official Dioxin 2010 hotel and scientific program venue.

Dioxin 2010 will offer a diverse scientific program, encompassing many of the traditional topics and also addressing new and emerging ones. In addition to the full scientific program, we will offer many social events and tours for delegates and their guests.

We look forward to seeing you in San Antonio, Texas, in September 2010,

Laurie Haws, Ph.D., DABT
Symposium Chair

肆、建議

一、 今（2009）年斯德哥爾摩公約第四次締約國大會（COP4），首次決議擴充公約原有的 12 種 POPs，納入 9 種化學物質於持久性有機污染物的名單之中，包含 α - 六氯環己烷 (Alpha hexachlorocyclohexane)、β - 六氯環己烷 (Beta hexachlorocyclohexane)、十氯酮(Chlordecone)、六溴聯苯(Hexabromobiphenyl)、靈丹(Lindane)、五氯苯(Pentachlorobenzene)；全氟辛基磺酸及其鹽類與全氟辛基磺醯氟(Perfluorooctane sulfonic acid, salts and perfluorooctane sulfonyl fluoride)、商用八溴二苯醚(Commercial octabromodiphenyl ether)與商用五溴二苯醚(Commercial pentabromodiphenyl ether)。本所對於這些污染物，大部分皆已有對應的檢測方法或技術，然而應配合國內的管制策略，提昇檢測技術能力，確保對於新興污染物的檢測數據品質。

二、 Thermo 的 DFS HRGC/HRMS 在感度上優於其他高解析度質譜儀，它在 60m 管柱時 TCDD 100 fg 的 S/N 比可輕易達到 100：1 以上，對低濃度樣品如食品、血液、環境空氣樣品分析因爲偵測極限可大幅下降，且樣品取樣量減少，前處理及淨化步驟均可簡化。若本所未來有新機採購計畫時可將其納入考量

三、 FMS 公司發展的全自動高壓萃取系統（PLE）和 Büchi 公司新的加速溶劑萃取裝置 SpeedExtractor 都是採併聯式萃取，可大幅縮短萃取時間，且每組皆是獨立管線，所以並無樣品交叉污染問題。但 PLE 缺點是無溶劑自動混合系統，仍有改善空間；SpeedExtractor 則是驗證資料較少，故可持續觀察其發展。

四、 第 30 屆國際有機鹵化環境污染物及持久性有機污染物研討會議預定於 2010 年 9 月 12~17 日在美國德州 San Antonio 舉行，參與本研討會除吸收相關領域之新知外，亦可與會中專家學者員彼此交換相關資訊，亦可讓他國專業人士了解我國對於相關議題之重視程度及所做的努力，期望所內同仁有機會參與盛會，發表論文及吸收先進經驗。

伍、參考資料

第 29 屆「國際有機鹵化環境污染物及持久性有機污染物研討會」論文集

第 29 屆「國際有機鹵化環境污染物及持久性有機污染物研討會」大會網站，

http://www.dioxin2009.org

第 30 屆「國際有機鹵化環境污染物及持久性有機污染物研討會」大會網站，

http://www.dioxin2010.org/index.cfm

附錄一 大會議程

Monday August 24

09:00-10:00	Welcome Address Opening Ceremony	Convention Hall 1			
10:00-10:40	Coffee Break	Exhibition Hall			
10:40-12:10	Plenary Session 1	Convention Hall 1			
	Listing of Emerging Organic Contaminants Into the Stockholm Convention: Research Progress, Challenges and Future Perspectives in China - Guibin Jiang, Research Center for Eco-Environmental Sciences, CAS, China Cold Trapping of Persistent Organic Pollutants in the Himalayas and on the Qinghai-Tibetan Plateau - Frank Wania, University of Toronto Scarborough, Canada				
12:10-13:00	Lunch (Buffet at Banquet Hall, Continental Grand Hotel)				
13:00-14:00	Poster Session 1	Exhibition Hall	(P001-200 Require to be in Attendance)		
	Room 201-ABC	Meeting Room 305-ABC	Convention Hall 2A	Convention Hall 2B	Convention Hall 2C
14:00-15:40	Remediation & Elimination	BFRs, PFCs and other Emerging Contaminants - Environmental Levels, Distributions and Transformation	POPs in Marine Mammals: Levels, Effects, Trends	Laboratory and Field Studies of Formation and Sources	Food Contamination Sources and Transport
15:40-16:10	Coffee Break	Exhibition Hall			
16:10-17:50	Industrial, Occupational, and Indoor Exposure	BFRs, PFCs and other Emerging Contaminants - Environmental Levels, Distributions and Transformation	High Speed Bioassay, Screening Techniques and Methods	Laboratory and Field Studies of Formation and Sources	POPs Monitoring in Polar Areas and High Plateau
19:00-21:00	Welcome Reception	Convention Hall 1			

Monday August 24

9:00 Opening Ceremony — **Convention Hall 1**

Welcome Address

10:00 Coffee Break — **Exhibition Hall**

10:40 Plenary Session 1 — **Convention Hall 1**

Chairs: Heidelore Fiedler, Zhifang Chai

10:40 Listing of Emerging Organic Contaminants Into the Stockholm Convention: Research Progress, Challenges and Future Perspectives in China
Guibin Jiang, Research Center for Eco-Environmental Sciences, CAS, China

11:25 Cold Trapping of Persistent Organic Pollutants in the Himalayas and on the Qinghai-Tibetan Plateau
Frank Wania *A10763*
University of Toronto Scarborough, Canada

12:10 Lunch (Buffet at Banquet Hall, Continental Grand Hotel)

13:00 Poster Session 1 — **Exhibition Hall**

Presenting Authors with number P(001-200) require to be in attendance

Remediation & Elimination — **Room 201-ABC**

Chairs: Jerald L. Schnoor, Chih C. Chao

14:00 Reductive Dechlorination of Polychlorinated Biphenyl by an Anaerobic Sediment-Free Culture
Jianzhong He *A10345*

14:20 Promotive Excretion of Polychlorinated Dibenzofurans and Polychlorinated Dibenzo-*p*-Dioxins by FBRA in Patients with Yusho
Junya Nagayama *A10108*

14:40 Enrichment of Anaerobic Bio-Dechlorination Activity of Chlorinated Aromatics from Paddy Soil for Bioremediation Technology
Arata Katayama *A10699*

15:00 Fenton-like Oxidation of Trichloroethylene in the Presence of Natural Pyrite
Hyeongsu Che *A10092*

15:20 Degradation of PBDE by Lignin Peroxidase from White Rot Fungi
Yijun Chen *A10620*

Industrial, Occupational, and Indoor Exposure — **Room 201-ABC**

Chairs: Jochen Mueller, Aiqian Zhang

16:10 A Temporal Trend Study of Human Exposure to Fluorinated Ski Wax
Helena Nilsson *A10286*

16:30 Levels of Polychlorinated Biphenyls, Brominated Flame Retardants and Dioxin-like Activities Associated with E-Waste Recycling in Vietnamese House Dust
Tue Nguyen Minh *A10099*

16:50 Brominated Flame Retardants in House Dust from the Philippines: Levels, Profiles and Fate
Malarvannan Govindan *A10115*

17:10 Airborne Concentrations of Polybrominated Diphenyl Ethers in Private Cars
Sadegh Hazrati *A10646*

17:30 Emission Rate of Hexabromocyclododecane (HBCD) from the Surface of A Flame Retarded Curtain in Japan
Yuichi Miyake *A10193*

BFRs, PFCs and other Emerging Contaminants - Environmental Levels, Distributions and Transformation — Room 305-ABC

Chairs: Gary Hunt, Jingwen Chen

14:00 Methoxylated and Hydroxylated Polybrominated Diphenyl Ethers in Brown Bullhead (*Ameiurus Nebulosus*) Plasma from Lake Ontario
Adrián de la Torre *A10498*

14:20 Polybrominated Diphenyl Ethers in the Environment of E-Waste Recycling
Qian Luo *A10723*

14:40 Debrominated and Hydroxylated Metabolites of Individual Polybrominated Diphenyl Ethers (PBDEs) in Juvenile Common Sole (*Solea Solea*)
Catherine Munschy *A10037*

15:00 Particle-Bound Dechlorane Plus in the Atmosphere of Harbin, China
Wanli Ma *A10053*

15:20 Occurrences of Perfluorinated Compounds in Eastern Thailand
Chinagarn Kunacheva *A10059*

BFRs, PFCs and other Emerging Contaminants - Environmental Levels, Distributions and Transformation — Room 305-ABC

Chairs: An Li, Yeru Huang

16:10 Fluxes of Perfluorinated Chemicals through Precipitation in Japan, USA and Several Other Countries
Karen Kwok Ying *A10299*

16:30 Concentration Profiles of Perfluorinated Organic Compounds in Groundwater Bodies Influenced by Rainwater or Infiltrated River Water in the Netherlands
Pim de Voogt *A10146*

16:50 PBDEs and HBCD in Sewage Sludge and River Sediments in the Czech Republic: A 3-Year Survey (2006–2008)
Monika Stavelova *A10164*

17:10 Time Trends of Perfluorinated Compounds in the Sediment Core of Tokyo Bay, Japan (1950s-2004)
Yasuyuki Zushi *A10190*

17:30 Exposure of California Peregrine Falcon (Falco Peregrinus) to BFRs (PBDEs and New Alternatives) and PCBs: Different Profiles of PBDEs, Prey, and Isotope Patterns Between Coastal and Big City Nesting Birds
June-Soo Park *A10205*

POPs in Marine Mammals: Levels, Effects, Trends — Convention Hall 2A

Chairs: Shinsuke Tanabe, Susan D. Shaw

14:00 Hexabromocyclododecanes, Polybrominated Diphenyl Ethers and New Organobrominated Compounds in Marine Mammals from Hong Kong, China
James Lam *A10273*

14:20 Specific Accumulation of Polybrominated Diphenyl Ethers Including Deca-BDE in Tissues of Harbor Seals from the Northwest Atlantic
Susan D. Shaw *A10597*

14:40 Comprehensive Study on Hydroxylated Polychlorinated Biphenyls in the Blood of Cetaceans, Including Toothed Whales and Baleen Whales Stranded at the Japanese Coast
Kei Nomiyama *A10019*

15:00 A Lifetime Physiologically Based Pharmacokinetic Model for CB 153 in Harbour Porpoises: in Silico Tool for Predicting Concentrations of Future Lipophilic Pollutants?
Liesbeth Weijs *A10334*

15:20 A Twenty Year (1987-2007) Trend of PBDEs in Beluga
Michel Lebeuf *A10100*

High Speed Bioassay, Screening Techniques and Methods — Convention Hall 2A

Chairs: Bin Zhao, Haowen Yin

16:10 Species-Specific Third Generation (G3) Luciferase Cell Bioassays Show Dramatically Increased Sensitivity and Magnitude of Response to TCDD and Other Ah Receptor Agonists
Guochun He *A10567*

16:30 Bioassay Directed Detection of Brominated Dioxins in the Feed Additive Cholin Chloride
Wim Traag *A10516*

16:50 Usage of DR Calux Method in Crisis Situation Ana National Monitoring Programs: Experiences in Different Countries with Different Food and Feed Matrices
Peter A. Behnisch *A10234*

17:10 Applicability of the TH Promoter Activation Assay (TH Assay) for Screening of Dioxin-like Compounds
Saeko Uruno *A10017*

17:30 Robustness of the Calux Bioassay: Statistical Analysis of the Between-Well Variability for the H1l6.1c3 Mouse Hepatoma Cell Line
Kim Croes *A10149*

Monday August 24

Laboratory and Field Studies of Formation and Sources — Convention Hall 2B

Chairs: Gerhard Thanner, Pingan Peng

14:00 Source Inventories of HCB and PCB and Uncertainty of Their Air Emission Factors
Shin-ichi Sakai *A10259*

14:20 PCDDs/DFs and PBDDs/DFs Emissions from Crematory
Masaki Takaoka *A10211*

14:40 Assessing Pesticides as a Source of Dioxins to the Australian Environment
Eva Holt *A10078*

15:00 Dioxin and Furan Emission Evaluation in Automotive Diesel Engines
Joao Vicente De Assuncao *A10144*

15:20 Sources of Dioxins to the Baltic Sea - Identification and Apportionment Using Pattern Analysis and Receptor Modeling
Kristina L Sundqvist *A10180*

Laboratory and Field Studies of Formation and Sources — Convention Hall 2B

Chairs: Ute Karl, Honghai Tian

16:10 Evaluation of PBDD/Fs and PCDD/Fs Emissions from Metallurgical Processes
Bing Du *A10373*

16:30 Current Status of Polybrominated Dibenzo-*p*-Dioxins and Furans (PBDD/DFs) Emissions in Japan
Shizuko Ota *A10313*

16:50 Effect of Temperature and Oxygen on the Formation of PCDD/Fs Surrogate
Mi Yan *A10338*

17:10 Effect of Chloride on the Formation of Polychlorinated Dibenzo-*p*-Dioxins During Phototransformation of Pentachlorophenol
Xie Quan *A10446*

17:30 The Fingerprint of Chlorinated Aromatic Compounds in Contaminated Sites from Chloralkali Processes and A Historic Chlorine Production Using GC-HR-TOF-MS Screening
Roland Weber *A10522*

Food Contamination Sources and Transport — Convention Hall 2C

Chairs: Peter Fürst, Yongning Wu

14:00 Influence of Dioxin Contaminated Feed and Its Effect Upon the Content in Adipose Tissue of Pigs
Karl-Werner Schramm *A10186*

14:20 Dioxin Contamination of Chilean Pork from Zinc Oxide in Feed
MeeKyung Kim *A10045*

14:40 Enantioselectivity in Environmental Safety of Chiral Halogen- Containing Insecticides
Weiping Liu *A10577*

15:00 PFOS, PFOA and Other Fluorinated Organic Chemicals in Food
David Mortimer *A10317*

15:20 Polybrominated Diphenyl Ethers, Organochlorine Pesticides, Polychlorinated Biphenyls and Perfluorinated Compounds in Composite Samples of United States Food
Arnold Schecter *A10236*

POPs Monitoring in Polar Areas and High Plateau — Convention Hall 2C

Chairs: Frank Wania, Karl-Werner Schramm

16:10 Observation of POPs in Tibetan Plateau
Tong Zhu

16:30 History Repeats Itself: Persistent Organic Pollutants in the Glacier-Fed Lake Oberaar, Switzerland
Christian Bogdal *A10087*

16:50 Persistent Organic Pollutants in Feathers and Blood from Nestling Raptors of Northern Norway: Differences Among Species and Relation to Stable Isotopes
Veerle Jaspers *A10251*

17:10 Altitude Dependence of Polychlorinated Biphenyls (PCBs) and Polybrominated Diphenyl Ethers (PBDEs) in Surface Soil from Tibetan Plateau, China
Pu Wang *A10425*

17:30 Persistent Organic Pollutants in the Atmosphere of the Mountains of Western Sichuan, China
Xiande Liu *A10542*

19:00 Welcome Reception at Convention Hall 1, BICC. Please wear your name badge and take the ticket.

Tuesday August 25

08:45-09:30	**Plenary Session 2**	**Convention Hall 1**				
	Biological and Toxicological Consequences of Ah Receptor Activation: Just How Complicated Can One Receptor Get? - Michael S. Denison, University of California, USA					
09:30-10:00	Coffee Break	Exhibition Hall				
	Room201-ABC		**Room305-ABC**	**Convention Hall 2A**	**Convention Hall 2B**	**Convention Hall 2C**
10:00-12:20	Environmental Policy and Management		BFRs, PFCs and other Emerging Contaminants - Environmental Levels, Distributions and Transformation	Temporal and Spatial Trends of POPs	New Instrumental Techniques for POPs Analysis	POPs in Humans (Pattern, Levels and Trends)
12:20-13:00	Lunch (Buffet at Banquet Hall, Continental Grand Hotel)					
13:00-14:00	Poster Session 2	Exhibition Hall	(P201-437 Require to be in Attendance)			
	Room201-A	**Room201-BC**	**Room305-ABC**	**Convention Hall 2A**	**Convention Hall 2B**	**Convention Hall 2C**
14:00-15:20	POPs in Soil and Sediments (Levels and Processes)	Asia (Vietnam et al.) and other Regional Contamination of Dioxins and POPs	BFRs, PFCs and other Emerging Contaminants - Environmental Levels, Distributions and Transformation	Integrating Toxicology and Epidemiology for Risk Assessment	Sample Preparation and Clean up	POPs in Humans (Pattern, Levels and Trends)
15:20-15:50	Coffee Break	Exhibition Hall				
15:50-17:30	POPs in soil and sediments	Asia (Vietnam et al.) and other Regional Contamination of Cioxins and POPs	BFRs, PFCs and other Emerging Contaminants - Environmental Levels, Distributions and Transformation	Integrating Toxicology and Epidemiology for Risk Assessment	Environmental Exposure of POPs	POPs in Humans (Pattern, Levels and Trends)

Tuesday August 25

8:45 Plenary Session 2 — **Convention Hall 1**

Chairs: Martin Van den Berg, Zhixiong Zhuang

8:45 Biological and Toxicological Consequences of Ah Receptor Activation: Just How Complicated Can One Receptor Get?
Michael S. Denison — *A10761*
University of California, USA

9:30 Coffee Break — **Exhibition Hall**

Environmental Policy and Management — **Room 201-ABC**

Chairs: Heidelore Fiedler, Xiaoling Yang

10:00 The Needs of Listing New POPs For Developing Countries
Jianxin Hu — *A10754*

10:20 Study on Countermeasures For Emission Reduction of PFDD/PCDFs under the Framework of Implementation of POPs Convention in China
Yang Chen

10:40 Simultaneous Reduction of Dioxins and Carbon Dioxide in Fossil fuel-fired Power Station
Carmela R. Centeno

11:00 Benefits and Trade-Offs Between Reductions of Greenhouse Gases and Unintentionally Produced Persistent Organic Pollutants
Ute Karl — *A10355*

11:20 Cost-Benefit Analysis of Environmental Sound Management Project for Obsolete POPs Stockpile and Associated Wastes in China
Jianxin Zhu — *A10131*

11:40 Assessment of the Technology Needs on POPs Reduction and Disposal
Q. Ding

12:00 Flame Retardants, Health, and Environment: How Peer-Reviewed Science Can Impact Regulatory Decision-Making
Arlene Blum — *A10545*

12:20 Lunch (Buffet at Banquet Hall, Continental Grand Hotel)

13:00 Poster Session 2 — **Exhibition Hall**

Presenting Authors with number P(201-437) require to be in attendance.

BFRs, PFCs and other Emerging Contaminants - Environmental Levels, Distributions and Transformation — **Room 305-ABC**

Chairs: Heinrich Hühnerfuss, Stuart Harrad

10:00 Bioaccumulation of β- and γ-Hexabromocyclododecane in Lower Aquatic Food Web
Sami Huhtala — *A10596*

10:20 Patitioning Behaviour and Trophic Transfer of Perfluorinated Compounds in Hong Kong Mai Po Tidal Shrimp Ponds, China
Eva I Ha LOI — *A10264*

10:40 Concentrations of PBDEs, HBCDs, TBBP-A, PAH, and PCBs in English Lake Water: First Report from the Opal Project
Stuart Harrad — *A10170*

11:00 Assessment of Brominated Flame Retardants in Fish from Asian Countries: Levels, Distribution, Profiles and Health Risk
Agus Sudaryanto — *A10267*

11:20 High Prevalence of BDE 209 and Other High Brominated Diphenyl Ethers in White Storks (*Ciconia Ciconia*) from Two Areas of Spain
Juan Munoz-Arnanz — *A10290*

11:40 PBDEs and HBCDs in Flemish Eels: Levels and Isomeric Patterns
Laurence Roosens — *A10293*

12:00 Spatial and Vertical Distribution of Brominated Flame Retardants in Sediments from Manila Bay, the Philippines
Tomohiko Isobe — *A10322*

Tuesday August 25

Temporal and Spatial Trends of POPs — Convention Hall 2A

Chairs: Bommanna Loganathan, Paul K.S. Lam

10:00 Dioxins and Other POPs in the Baltic Sea – Trends and Current Status
Karin Wiberg *A10223*

10:20 Temporal Trends of Polybrominated Diphenyl Ethers and Hexabromocyclododecane in Swedish Peregrine Falcon (*Falco Peregrinus*) Eggs
Anna-Karin Johansson *A10481*

10:40 Thirty Year Monitoring of PCBs and Organochlorine Pesticides in Eel from the Netherlands
Jacob de Boer *A10314*

11:00 Regional Versus Local Variations of DDTs, HCHs, HCB, Chlordanes and Endosulfans in the
Paromita Chakraborty *A10311*

11:20 Study on Natural Formation of Dioxins: Dioxins in Kaolin Clays from Asia and Several Other
Yuichi Horii *A10588*

11:40 Spatial and Temporal Trends of Persistent Toxic Substances in India
Annamalai Subramanian *A10166*

12:00 Modeling the Effects of a Climate Change Scenario on the Distribution of Organic Pollutants
Antonio Marcomini *A10137*

New Instrumental Techniques for POPs Analysis — Convention Hall 2B

Chairs: Eric Reiner, Jianwen She

10:00 High Through-Put Mass Spectrometry, Laboratory Automation
Jianwen She *A10513*

10:20 Analysis of Highly Chlorinated Dibenzofurans Using Gas Chromatography/Multiphoton Ionization/Time-of-Flight Mass Spectrometry
Yuka Watanabe-Ezoe *A10070*

10:40 The Use of Combined High Volume Injection/ Dual Data Acquisition to Reduce the Analysis Time of Polychlorinated Dibenzo-*p*-Dioxins and Polychlorinated Dibenzofurans
Chuck Sueper *A10145*

11:00 Measurement of Triclosan and Pentachlorophenol in Serum from the Historic Cohort of California Women (1960s, 1980s, 2000s): A Pilot Study
June-Soo Park *A10241*

11:20 Evaluation of GC-HR-TOFMS Techniques Applied For Environmental Analysis
Takumi Takasuga *A10450*

11:40 GCXGC Coupled to Fast Scanning Quadrupole MS for Trace Analysis of POPs
J. F. Focant *A10587*

12:00 An Improved Derivatization Method with N,O-Bis(Trimethylsilyl)Trifluoroacetamide (BSTFA) for Simultaneous Determination of Steroid Estrogens by Gas Chromatography-Mass Spectrometry
Xuejun Pan *A10665*

Tuesday August 25

POPs in Humans (Pattern, Levels and Trends) — Convention Hall 2C

Chairs: Larry Needham, Chunxia Wang

10:00 Reference Ranges For PCDDs, PCDFs, PCBs, Persistent Pesticides, and PCNs for the U.S. Population 2003-2004
Donald Patterson *A10725*

10:20 Preliminary Exposure Assessment of Lindane in the General Population of Ghana
Sam Adu-Kumi *A10549*

10:40 Halogenated Persistent Organic Pollutants in Human Blood Plasma from Sanming, Southeastern China
Qiuquan Wang *A10123*

11:00 Brominated Flame Retardants in Serum from General Population in North China
Lingyan Zhu *A10129*

11:20 Concentrations of Dioxin-like Compounds in the U.S. Population: an Evaluation of Data Trends and the Effects of Demographic Characteristics on Referent Total TEQ Levels
Laura Scott *A10154*

11:40 Time Trends of Persistent Chemicals in Humans – Quantifying Exposure Trends and Elimination Half-Lives from Population Biomonitoring Data
Roland Ritter *A10156*

12:00 Persistent Organochlorine Pollutants: A Risk Factor for Type 2 Diabetes
Anna Rignell-Hydbom *A10187*

Tuesday August 25

POPs in Soil and Sediments (Levels and Processes) — Room 201-A

Chairs: Xiangdong Li, Dongxing Yuan

14:00 Levels and Mass Inventory of DDTs in Sediments from Fishing Harbors:the Importance of DDT-Containing Antifouling Paint to the Coastal Environment of China
Tian Lin *A10038*

14:20 Distribution of Herbicides and Pesticides (Organochlorine Andorganophosphate) in Agricultural Soils from Northern India
C. S. Sharma *A10051*

14:40 HRGC/HRMS Analysis of Mirex in Soil in Liyang, China
Bin Wang *A10208*

15:00 Substantial Migration of Dioxins in Agrochemical Formulations
Sharon Grant *A10661*

POPs in Soil and Sediments (Levels and Processes) — Room 201-A

Chairs: Stefano Raccanelli, Lizhong Zhu

15:50 Occurrence of PCDD/Fs in Environmental Media in the Vicinity of a Municipal Solid Waste Incinerator in Eastern China
Mengxia Xu *A10343*

16:10 Release of PCBs and PBDEs from Different Depths in Contaminated Sediments Due to Bioturbation
Sarah Josefsson *A10453*

16:30 Reevaluation of the Monitoring Data of Trans-Chlordane in Sediment of Japan to Conferm and Evaluate the Effects of Different Kinds of Data Culculating Methods
Yoshitoku Yoshida *A10230*

16:50 Endocrine-Disrupting Chemicals in Waters, Suspended Particulate Materials, and Sediments of the Pearl River Delta, South China: Spatial Distribution, Flux, and Risk
Yong Ran

17:10 Organochlorine Pesticides in Sediment Cores from Balat – A Major Estuary of Red River, Northern Vietnam: Spatial Distribution and Depth Profiles
V. H. Pham *A10568*

Asia (Vietnam et al.) and other Regional Contamination of Dioxins — Room 201- BC

Chairs: Takeshi Nakano, Vu Chien Thang

14:00 Overcoming of the Consequence of Agent Orange/ Dioxin
Vu Chien Thang *A10397*

14:20 Restoration of the War-Ravaged Environment: A Serious Challenge to Vietnam's Sustainable Development
Vo Quy *A10021*

14:40 Assesment the Environment of Area Under Spread Toxic Chemicals After War in M'drak District, Dak Lak Province and Suggestions Solutions
Nguyen Huu Ngoan *A10024*

15:00 Time-Line Observation of Emvironmental Impacts Scrached by Herbicide Splay During Vietnam War
Nobuhiro Sawano *A10482*

Asia (Vietnam et al.) and other Regional Contamination of Dioxins — Room 201- BC

Chairs: Takeshi Nakano, Vu Chien Thang

15:50 Proteomic Analysis of Poultry Liver in Region Exposed to Dioxin at Mada District, Dongnai Province, Vietnam
Trinh Hong Thai *A10026*

16:10 Present Impact Assessment of Herbicides/Dioxin to Tri an Reservoir Environment
Luong Van Thanh *A10036*

16:30 The Environmental and Human Health Issues at the "Dioxin Hotspots" of Vietnam
Le Thi Hai Le *A10058*

16:50 Organohalogen Compounds in Yellowfin Tuna (Thunnus Albacares) from the Western Indian Ocean
Joao Paulo M. Torres *A10452*

Tuesday August 25

BFRs, PFCs and other Emerging Contaminants - Environmental Levels, Distributions and Transformation — Room 305-ABC

Chairs: YongSeok Chang, Jianxin Hu

14:00 Evaluation of Perfluoroalkyl Compouns in Korean Wastewater Treatments Plants
Guo Rui *A10367*

14:20 Occurrence and Distribution of Perfluoroalkyl Acids in Snow and Rain in Shenyang and Dalian, China
Wei Liu *A10417*

14:40 Occurrence of Synthetic Musk Compounds (SMCs) As Emerging Contaminants in Nakdong River Basin, Korea
Chang-Dong Seo *A10433*

15:00 Distrubution of PBDEs in Surface Sediments from the Bering Sea, Chukchi Sea and Chukchi Plateau
Minggang Cai *A10562*

BFRs, PFCs and other Emerging Contaminants - Environmental Levels, Distributions and Transformation — Room 305-ABC

Chairs: Hongwen Sun, Gang Yu

15:50 Polychlorinated Biphenyls (PCBs) and Brominated Flame Retardants (BFRs) in Surface Sediments of Surabaya City, Indonesia: A Comparison Between Rivers and Coastal Waters
Muhammad Ilyas *A10604*

16:10 The Analysis of Pharmaceuticals in Sewage and Livestock Sludge Samples
Ji-Woo Lee *A10605*

16:30 A Survey of Perfluorinated Compounds in Surface Water and Ganges River Dolphins from the Ganges River and in Other Waterbodies in India
Leo Yeung *A10610*

16:50 Polybrominated Diphenyl Ethers in Seawater Cage-Farmed Fish from Two Estuarine Bays in South China: Implications For Source Inputs and Biotransformation
Ying Guo *A10664*

17:10 Effect of Prenatal Exposure to PFOS on Gene Expression in Developing Rat Brain
Faqi Wang *A10395*

Integrating Toxicology and Epidemiology for Risk Assessment — Convention Hall 2A

Chairs: Tom Muir, Paolo Mocarelli

14:00 Integrating Toxicology and Epidemiology for Risk Assessment
Tom Muir *A10254*

14:20 Developmental Exposure to POPs Alters the Susceptibility of the Cholinergic System – Implications for Neurodevelopmental Disorders and Diseases
Per Eriksson *A10470*

14:40 Chemical Mixtures:Validation of Weight of Evidence Predictions for Interactions
Hana Pohl *A10488*

15:00 Effects of Dioxins, PCBs and PBDEs on Immunology and Haematology in Adolescents
Marike Leijs *A10228*

Integrating Toxicology and Epidemiology for Risk Assessment — Convention Hall 2A

Chairs: Tom Muir, Paolo Mocarelli

15:50 Toxicokinetics of the Diastereomer Specific Flame Retardant Hexabromocyclododecane (HBCD): Effect of Dose, Time, and Repeated Exposure
Linda Birnbaum *A10546*

16:10 Genomics-Based Assessment of Toxicity in Mice to Four Contaminants (2,3,7,8-TCDD, CB-153, BDE-47 and HBCD) Commonly Found in Seafood
Christer Hogstrand *A10543*

16:30 The Association Between Intrauterine Exposure to Persistent Organochlorine Pollutants and Type 1 Diabetes: A Case-Control Study
Lars Rylander *A10353*

16:50 Association Between Dioxin Concentrations in Breast Milk
Teruhhiko Kido *A10237*

17:10 An Oral (Gavage) Developmental Neurotoxicity
Robert Campbell

Tuesday August 25

Sample Preparation and Clean up — Convention Hall 2B

Chairs: Wolfgang Rotard, Jiping Chen

14:00 Formation of Polychlorinated Dibenzo-*p*-Dioxins During the Extraction of Pentachlorophenol-Contaminated Guar Gum
Yves Tondeur *A10292*

14:20 GPC/Alumina Automated Clean-Up Method For PCDD/Fs and DL-PCBs in Flue Gas Emissions
Andrea Manni *A10534*

14:40 One Step Closer to A 'Cook Book' Method For Dioxin Analysis. Part 1: the Procedure
J. F. Focant *A10579*

15:00 An Efficient and Green Cleanup System for Analysis of Dioxin/Furans, Dioxin-Like PCBs and PBDEs
Chung Ping Wu *A10714*

Environmental Exposure of POPs — Convention Hall 2B

Chairs: Rainer Malisch, Georg Becher

15:50 Prevalance of Diabetes and Cardiovascular Disease in Residents Living Near a Creosote Wood Treatment Plant

16:10 Exposure to PCBs and Hypertension in the Anniston Community Health Survey
Marian Pavuk *A10257*

16:30 Assessment of Human Exposure to PCBs in Anniston Health Survey
Steve Dearwent *A10258*

16:50 Analysis of Polychlorinated Dibenzo-*p*-Dioxins and Dibenzofurans in Various Aqueous Samples in Taiwan
Ngo Thi Thuan *A10466*

POPs in Humans (Pattern, Levels and Trends) — Convention Hall 2C

Chairs: Arnold Schecter, Zongwei Cai

14:00 Organic Pollutants in Human Hair from Brazilian Amazon
Joao Torres *A10195*

14:20 Changes of PCBs, PBDEs and HBCD in Breast Milk During up to Ten Months of Lactation
Cathrine Thomsen *A10280*

14:40 Importance of Dust and Diet for the Human Exposure to PBDEs and HBCDs
Laurence Roosens *A10294*

15:00 Natural AhR Agonists from Human Serum
Shunqing Xu *A10304*

POPs in Humans (Pattern, Levels and Trends) — Convention Hall 2C

Chairs: Arnold Schecter, Bingsheng Zhou

15:50 Polychlorinated Naphthalene Profiles in Human Serum and Flue Gas from the Metropolitan Area
Hyokeun Park *A10330*

(POPs) in Serum from Guinea-Bissau, Western Africa – A Time Trend Study
Linda Linderholm *A10478*

16:30 Synthesis and Identification of Hydroxylated Polybrominated Diphenyl Ethers in Human Blood
Andreas Rydén *A10479*

16:50 Polybrominated Diphenyl Ethers in Human Milk from Beijing, China
Lei Zhang *A10429*

17:10 Identification of Emerging Environmental Contaminants and Biomarkers in Human Body Fluid Using Accurate Mass Measurement by HRGC-HRMS
Jianwen She *A10504*

Wednesday August 26

08:45-09:30	Plenary Session 3 Convention Hall 1					
	Phytoremediation and Methods of Control for PCBs in Soils and Sediments - Jerald L. Schnoor, The University of Iowa, USA					
09:30-10:00	Coffee Break	Exhibition Hall				
	Room201-A	Room201-BC	Room305-ABC	Convention Hall 2A	Convention Hall 2B	Convention Hall 2C
10:00-12:20	The AhR and Mechanisms of Toxicity	BFRs, PFCs and other Emerging Contaminants - Environmental Levels, Distributions and Transformation	Quality Assurance and Quality Control (QA/QC)	Temporal and Spatial Trends of POPs	Analysis of BFRs, PFCs and other Emerging Contaminants - Analytical Approaches and New Developments	Incineration and Thermal Processes
12:20-13:00	Lunch (Distributed at Exhibition Hall)					
13:00-17:00	Optional Excursion to the Great Wall or Forbidden City. Coaches depart from outside venue at 13:00. Please wear your name badge and take the ticket					

Wednesday August 26

8:45 Plenary Session 3 — **Convention Hall 1**

Chairs: Stuart Harrad, Gang Yu

8:45 Phytoremediation and Methods of Control for PCBs in Soils and Sediments
Jerald L. Schnoor — *A10764*
The University of Iowa, USA

9:30 Coffee Break — **Exhibition Hall**

The AhR and Mechanisms of Toxicity — **Room 201-A**

Chairs: Daniele Staskal, Michael S. Denison

10:00 PPAR Gamma and ER Alpha Are Nuclear Receptors Targets of TBBPA, BPA and Related Halogenated Compounds
Daniel Zalko — *A10246*

10:20 Cloning, and Expression of Cytochrome P450 1A, 1C and 1B Genes in Liver, Brain, Gill, and Kidney from PCB 126-Exposed Three-Spined Stickleback *(Gasterosteus Aculeatus L.)*
Kai Gao — *A10590*

10:40 TEF Concept and Environment: Science Meets Policy
Marianne Rappolder — *A10701*

11:00 Cyclooxygenase-2 As A Critical Factor That Link Dioxin Exposure, AhR Signaling and Tocixity Phenotype in Newborn Mice
Chiharu Tohyama — *A10656*

11:20 Ligand and Nucleotide Specificity in Modulating Aryl Hydrocarbon Receptor DNA Binding and Functional Activity
Michael S. Denison — *A10566*

11:40 CH223191 is a Ligand-Specific Antagonist of the Ah Receptor
Bin Zhao — *A10536*

12:20 Lunch (Distributed at Exhibition Hall)

13:00-17:00 Optional excursion to the Great Wall or Forbidden City. Coaches depart from outside venue at 13:00. Please wear your name badge and take the ticket.

BFRs, PFCs and other Emerging Contaminants - Environmental Levels, Distributions and Transformation — **Conference Room 201-BC**

Chairs: Frans Verstraete, Xie Quan

10:00 Distribution of Polyfluoroalkyl Compounds and Mercury in Fish from High-Mountain Lakes in France Originating from Atmospheric Deposition
Lutz Ahrens — *A10141*

10:20 PBDEs in Water and Aquatic Biota of the Pearl River Estuary, South China
Bixian Mai — *A10206*

10:40 Emission Load of Hexabromocyclododecane in Japan Based on the Substance Flow Analysis
Satoshi Managaki — *A10580*

11:00 Levels and Spatial Distribution of Perfluorinated Compounds in Liver Samples from Wild Mink in Sweden
Anna Rotander — *A10582*

11:20 Occurence and Fate of Typical PPCPs in the Aquatic Environment of the Pearl River Delta, China
Xianzhi Peng — *A10734*

11:40 Detection of an "Emerging" Flame Retardant, Dechlorane Plus, in Spanish Sewage Sludge
Adrián de la Torre — *A10496*

12:00 New Halogenated Norborane Flame Retardants in the Laurentian Great Lakes: Dechloranes 602, 603 and 604
Li Shen — *A10537*

Quality Assurance and Quality Control (QA/QC) — Room 305-ABC

Chairs: Bert van Bavel, Takumi Takasuga

10:00 Results from the 8th Circuit Interlaboratory for Dioxins (CIND)
Stefano Raccanelli *A10091*

10:20 The First Japanese Inter-Laboratory Trial for Perfluorochemical Analysis in Water (JIL-PFOS-2008), Using the ISO Method 25101: Performance Verification
Nobuyoshi Yamashita *A10374*

10:40 Validation of Method EN 1948 Part 4: Determination of DL-PCB from Stationary Sources.
Bert van Bavel *A10529*

11:00 Studies on Lipid Extraction by Three Different Methods in the Serum and Whole Blood
Junya Nagayama *A10107*

11:20 Analytical Requirements for Determination of Non-Dioxin Like PCBs in Food
Rainer Malisch *A10502*

Temporal and Spatial Trends of POPs — Convention Hall 2A

Chairs: Weiping Liu, Shu Tao

10:00 The Vertical Trends of Polychlorinated Naphthalenes in a Dated Sediment Core from Qingdao Coastal Sea, China
Yongliang Yang *A10586*

10:20 Spatial Trends of PBDEs in Sediment of the Great Lakes
Sara B Gewurtz *A10535*

10:40 Dioxin Levels and Congener Patterns in Water, Sediment and Fish from A Coastal Estuary of the Baltic Sea
Magnus Karlsson *A10203*

11:00 Dioxin Concentrations in American Eel (*Anguilla Rostrata*) Captured in Eastern Canada
Jonathan Byer *A10096*

11:20 Contrasting Patterns of Spatial Autocorrelation of PCDD/Fs, Dioxin-Like PCBs and PBDEs in Sediments in Sydney Harbour, Australia
Anthony Roach *A10102*

11:40 High PCB and Low PBDE Exposure in Pelagic North Pacific
June-Soo Park *A10341*

12:00 Status and Trends of Persistent Organic Pollutants in the Global Environment
Bommanna Loganathan *A10151*

Analysis of BFRs, PFCs and other Emerging Contaminants - Analytical Approaches and New

Convention Hall 2B

Chairs: Jacob de Boer, Qinghua Zhang

10:00 Optimization of Matrix Solid Phase Dispersion Extraction Procedure for the Analysis of Polybrominated Diphenyl Ethers in Human Placenta
An Li *A10619*

10:20 Determination of Polybrominated Diphenyl Ethers (PBDEs) Using Liquid Chromatography Coupled to Negative Ionisation Atmospheric Pressure Photoionisation Tandem Mass Spectrometry (LC-NI-APPI-MS/MS): Validation and Application to House Dust.
Mohamed A.E. Abdallah *A10029*

10:40 Development of Atmospheric Pressure Chemical Ionization Technique for the Determination of Halogenated Flame Retardants
Simon Zhou *A10034*

11:00 Simultaneous Monitoring of Matrix Interferents During the Analysis of Perfluorinated Compounds in Environmental Waters and Biota by UPLC®/MS/MS with A Novel Dual Scan-MRM Approach.
Paul Silcock *A10287*

11:20 An Improved Method for the Determination of Perfluorinated Compounds in Whole Blood Using Acetonitrile and Solid Phase Extraction Methods and Separation of Taurodeoxycholic Acid from PFOS Using Ion Exchange Column
Leo Yeung *A10609*

11:40 Parallel Pressurized Solvent Extraction of PCDD/PCDF, PBDE and PFC from Soil, Sludge, and Sediment Samples
Sabine Cleres *A10249*

12:00 Determination of Decamethylcyclopentasiloxane (D5) in Background Air by the Use of Commercial ENV+ SPE-Cartridges
Amelie Kierkegaard *A10342*

Incineration and Thermal Processes

Convention Hall 2C

Chairs: Ole Schleicher, Jianhua Yan

10:00 Long Term Monitoring of PCDD/PCDF –Concepts and Case Studies from Europe
Juergen Reinmann *A10517*

10:20 Behavior of 2-(3,5-Di-Tert-Butyl-2-Hydroxyphenyl) Benzotriazole (DBHPBT) and Unintentionally Produced POPs During Incineration of Solid Waste Containing DBHPBT
Mafumi Watanabe *A10041*

10:40 Design and Operation of Low-PCDD/F Municipal Solid Waste Incineration
Hans Hunsinger *A10142*

11:00 Fingerprints of Chlorinated, Brominated and Mixed Halogenated Dioxins at Two E-Waste Recycling Sites in Guiyu/China
Markus Zennegg *A10527*

11:20 Reduction of Dioxin Emissions from Copper Smelting Plant for Sludge Recycling
Hong Pao-Chen *A10198*

11:40 Estimation and Congener Specific Characterization of PCNs Emission from Secondary Nonferrous Metallurgies in China
Te Ba *A10266*

12:00 DL-PCB and Marker PCB Emission from Shredder Plant Processing Mixed Scrap Measured According to EN 1948-4
Ole Schleicher *A10507*

Thursday August 27

08:45-09:30	**Plenary Session 4**	**Convention Hall 1**			
	Environmental Monitoring and Specimen Banking - POPs / New Pops Pollution in Japan and Asia-Pacific - Yasuyuki Shibata, National Institute for Environmental Studies, Japan				
09:30-10:00	Coffee Break	Exhibition Hall			
	Room 201-ABC	**Meeting Room 305-ABC**	**Convention Hall 2A**	**Convention Hall 2B**	**Convention Hall 2C**
10:00-12:20	POPs in Food and Feed (Levels and Trends)	Toxicology of Dioxins, PCBs and other POPs	BFRs, PFCs and other POPs: public health and exposure	POPs in Air & Indoor Atmospheres (Levels and Processes)	Destruction and Degradation Technologies
12:20-14:00	**Lunch, Poster Viewing (Buffet at Banquet Hall, Continental Grand Hotel)**				
14:00-15:20	POPs in Food and Feed (Levels and Trends)	Toxicology of Dioxins, PCBs and other POPs	Dioxin Exposure Study	POPs in Air & Indoor Atmospheres (Levels and Processes)	Global Fate & Long Range Transport
15:20-15:50	Coffee Break	Exhibition Hall			
15:50-17:30	Field Studies and Ecotoxicology	Emerging POPs and New Development	Dioxin Exposure Study	POPs in Air & Indoor Atmospheres (Levels and Processes)	Global Fate & Long Range Transport
19:00-20:30`	**Optional Symposium Banquet** Crowne Plaza Parkview Wuzhou (5 minutes walking distance) - Delegates with pre-purchased tickets only.				

Thursday August 27

8:45 Plenary Session 4 — Convention Hall 1

Chairs: Georg Becher, Minghui Zheng

8:45 Environmental Monitoring and Specimen Banking – POPs / New POPs Pollution in Japan and Asia-Pacific
Yasuyuki Shibata *A10765*
National Institute for Environmental Studies, Japan

9:30 Coffee Break — Exhibition Hall

POPs in Food and Feed (Levels and Trends) — Room 201-ABC

Chairs: Olaf Paepke, Qiuquan Wang

10:00 Polybrominated Diphenyl Ethers in Food from the USA: Trends by Time and Location
Arnold Schecter *A10217*

10:20 Occurrence of Persistent Organic Pollutants (POPs) in Italian Wild and Farmed Fish in the Mediterranean Sea
Gianfranco Brambilla *A10255*

10:40 The Italian Buffalo Milk Case – Results and Discussion of PCDD/F- and DL-PCB Analysis in Milk, Feeding Stuff and Soil Samples from Campania, Italy
Frank Neugebauer *A10289*

11:00 The Dioxin Contamination Incident in Ireland 2008
Christina Tlustos *A10278*

11:20 Dioxins, PCBs, Polybrominated Diphenylethers and Organochlorine Pesticides in European Eels *(Anguilla Anguilla)*
Wim Traag *A10510*

11:40 Increased Levels of Dioxins in Irish Pig Meat; the Dutch Connection
Ron Hoogenboom *A10514*

12:00 PCDD/F and PCB Analysis of Drinking Water in the Attomole Range
Karl-Werner Schramm *A10185*

12:20 Lunch (Buffet at Banquet Hall, Continental Grand Hotel)

Toxicology of Dioxins, PCBs and other POPs — Room 305-ABC

Chairs: Jae-Ho Yang, Bin zhao

10:00 Dietary Composition Influences the Impacts of BDE-47 on Tissue Accumulation, Cerebral Gene Expression and Reflex Development in Perinatally-Exposed Mice Pups.
Anne-Katrine Lundebye *A10632*

10:20 Prediction of Dioxin Dechlorination and Toxicity Change
Yoon-Seok Chang *A10464*

10:40 Exacerbated Hemolytic Anemia with Exposure to Phenylhydrazine in HRI Deficiency
Sijin Liu *A10242*

11:00 Main Potential Sources of Dioxins/Furans Generation at the Territory of Armenia
Anahit Aleksandryan *A10008*

11:20 Nitric Oxide Mediates Dioxin-Induced Apoptosis of Chondrocyte in Culture
Jaeho Yang *A10074*

11:40 Identification of Human Metabolites of 2,3,7,8-TCDD
Markus Zennegg *A10124*

12:00 Impact of Chlorinated Dioxins and Furans on Japanese Quail, Ring-Necked Pheasant, and Domestic Chicken: Insights from in Ovo Studies
Yinfei Yang *A10183*

Thursday August 27

BFRs, PFCs and other POPs: Public Health and Exposure — Convention Hall 2A

Chairs: Åke Bergman, Arlene Blum

10:00 PBDE Exposure: Which Is More Important, Homes or Offices?
Thomas Webster — *A10565*

10:20 Preliminary Assessment of Bioaccessibility of HBCDs from Human Git Following Indoor Dust Ingestion Using A Physiologically Based Extraction Test (PBET)
Mohamed A.E. Abdallah — *A10030*

10:40 Dust from UK Primary School Classrooms and Daycare Centres: Its Significance as a Pathway of Exposure of Young Children to Perfluoroalkyl Compounds (PFCs) and Brominated Flame Retardants (BFRs)
Stuart Harrad — *A10125*

11:00 Concentrations of Perfluorinated Compounds in Serum Are Associated with Seafood Consumption in A Norwegian Cohort
Line S. Haug — *A10169*

11:20 Polybrominated Diphenyl Ethers in Serum from Californian Mother – Child Pairs
Åke *Bergman* — *A10650*

11:40 Levels of Hexabromocyclododecane and Tetrabromobisphenol-A in Foods and Human Milk from China
Yongning Wu — *A10042*

12:00 Bioaccumulation of Dechlorane Plus in Aquatic Food Web from an Electronic Waste Recycling Site, South China
Xiaojun Luo — *A10730*

POPs in Air & Indoor Atmospheres (Levels and Processes) — Convention Hall 2B

Chairs: Josep Rivera, Yongchien Ling

10:00 PCBs in Ambient Air – Method Evaluation and Background Monitoring – the Hudson River, NY Sediment Remediation Project
Gary Hunt — *A10235*

10:20 Air Concentration of Endosulfan in China: Comparing Modeling to Monitoring Results
Hongliang Jia — *A10321*

10:40 Behavior Analysis and Control of Brominated Flame Retardants from Household Products Using Model Rooms
Tomohiro Kose — *A10335*

11:00 DDTs, Chlordanes and Hexachlorobenzene in the Atmosphere of Chinese Cities
Xiang Liu — *A10047*

11:20 Identifying the Contributing Sources of PCDDs/PCDFs by Comparison of Congener Distribution Profiles Observed in Respirable Suspended Particulate Matter Sampled from Ambient Air of Delhi
Sanjay Kumar — *A10046*

11:40 Air Borne Particulate Bound Polychlorinated Dibenzodioxins and Dibenzofurans (PCDDs/Fs) Levels in Delhi, India
R. B. Lal — *A10048*

12:00 Indoor Air and Dust Concentrations of Neutral and Ionic Perfluoroalkyl Compounds (PFCs) in Vancouver, Canada
Mahiba Shoeib — *A10231*

Thursday August 27

Destruction and Degradation Technologies — Convention Hall 2C

Chairs: Roland Weber, Moo Been Chang

10:00 Enhancement of Reductive Dechlorination of Tetrachloroethene by Interaction between Nano-Sized Zero Valent Iron and Vitamin B12: Effect of Physicochemical Factor
Amir Amnorzahira A10111

10:20 Catalytic Hydrotreatment of Chlorinated Benzenes in Liquid Systems Under Mild Conditions Over Pd/C and Raney Ni
Chunhai Xia A10585

10:40 Dechlorination of Hexachlorobenzene in Contaminated Soils by Cu/Fe Mediated by Nonionic Surfactants
Songhu Yuan A10719

11:00 The Strategic Planning Framework for Contaminated Sites Regeneration
Chih C. Chao

11:20 Degradation of HCB Using the Synthesized Hierarchical Iron Oxide
Guijin Su A10644

11:40 Reduction of Dioxin Emissions from Waelz Process Operated in Acidic or Basic Mode
Moo Been Chang A10056

12:00 Enhanced Reductive Dechlorination of Carbon Tetrachloride in Acidic Soil Column Manipulated with Fe(LI) and HS?
Kyunghoon Choi A10085

POPs in Food and Feed (Levels and Trends) — Room 201-ABC

Chairs: Olaf Paepke, Qixing Zhou

14:00 An Investigation of Wild-Caught and Farm-Raised Shrimp Samples with High Concentrations of Polychlorinated Biphenyls
Dennis P. Luksemburg A10526

14:20 Dioxin Levels in Livestock and Grassland Near A Large Industrial Area in Taranto (Italy)
Giampiero Scortichini A10552

14:40 Levels of POPs in Spanish Commercial Fish Species
Jordi Parera A10694

15:00 Prediction of the PCDD/F, DL-PCB, and Total 2005-WHO-TEQ Values on the Basis of Six Congener Concentrations in Fish: Toward A New Screening Strategy for the Control?
Ronan Cariou A10226

Field Studies and Ecotoxicology — Room 201-ABC

Chairs: Martin van den Berg, Yongping Zeng

15:50 Persistent Organic Pollutants in Eggs of Brown Booby (*Sula Leucogaster, Aves: Sulidae*) from Three Reproductive Colonies along the Brazilian Coast
Larissa Cunha A10383

16:10 Dioxin-Like Activity in Water of Three Gorges Reservoir Sampled by Semipermeable Membrane Devices
Jingxian Wang A10018

16:30 Application of A Panel of Nuclear Receptor/Reporter Gene Bioassays to Marine Harbor Sediments in Asia
Hidetaka Takigami A10199

16:50 Ecotoxicological Effects of Pesticides Pollution: Studies on the Etiology of the Field Deformed Frogs
Qunfang Zhou

17:10 Occurrence and Risk Assessment of Pharmaceuticals in Wastewater from Hospitals and Pharmaceuticals Manufactures
Lee Eungsun A10361

Thursday August 27

Toxicology of Dioxins, PCBs and other POPs — Room 305-ABC

Chairs: Sijin Liu, Bixian Mai

14:00 TOF-SIMS Mass Spectrometry Imaging Demonstrates A Selective Tropism of BDE-209 Residues Location in Target Tissues of Rats
Daniel Zalko *A10233*

14:20 Genotoxicity and Development Toxicity of Pentachlorophenol in Zebrafish
Qingshun Zhao

14:40 Understanding the Estrogenic and Antiestrogenic Activities of Selected Hydroxylated Polybrominated Diphenyl Ethers Using Molecular Simulation
Aiqian Zhang *A10336*

15:00 Tissue Distribution of Polybrominated Diphenyl Ethers and Metabolites in Rainbow Trout (*Oncorhynchus Mykiss*) after Exposure to Decabromodiphenyl Ether (BDE209)
C. L. Feng *A10736*

Emerging POPs and New Development — Room 305-ABC

Chairs: Jerzy Falandysz, Mehran Alaee

15:50 Polybrominated Dioxins and Dibenzofurans: A Global Concern?
Peter Haglund *A10548*

16:10 Detection and Stereoselective Analysis of Three Metoprolol Metabolites in STP-Effluent Samples
Heinrich Hühnerfuss *A10127*

16:30 Polychloropinene - Toxaphene Analog Produced in the USSR Was Non-Racemic
Vladimir Nikiforov *A10668*

16:50 Determination of Co-Planar Polybrominated/ Chlorinated Biphenyls (Co-PXBS) in Thirty-Gight Mother's Milk of Japan and Estimation of Their Contamination Sources
Souichi Ohta *A10560*

17:10 Associations Between Maternal PBDE Serum Concentrations and Birth Weight and Duration of Gestation
Brenda Eskenazi *A10524*

Dioxin Exposure Study — Convention Hall 2A

Chairs: Linda Birnbaum, Chuanyong Jing

14:00 Public Health Impact of PCDDs, PCDFs, and PCBs in Midland, Michigan, USA
David Garabrant *A10492*

14:20 Serum Dioxin Concentrations and Time to Pregnancy
Brenda Eskenazi *A10521*

14:40 The University of Michigan Dioxin Exposure Study: Follow-up Investigation of Subjects with High Serum Concentrations of TEQ, 2,3,7,8-TCDD, 2,3,4,7,8-PECDF, and PCB-126
Alfred Franzblau *A10224*

15:00 Factors That Predict Serum Concentration of 2,3,7,8-TCDD in People from Michigan, USA
Biling Hong *A10229*

Dioxin Exposure Study — Convention Hall 2A

Chairs: Peter Adriaens, Benzhan Zhu

15:50 Using the Reverse Kaplan-Meier to Estimate Population Distributions with Data Below a Limit of Detection
Brenda Gillespie *A10207*

16:10 Validaton of the Aermod Air Dispersion Model: Application to Congener-Specific Dioxin Deposition from an Incinerator in Midland, Michigan
Peter Adriaens *A10243*

16:30 PCDD/Fs Levels in Human Blood of Different Flemish Populations: Sources and Effects
Willy Baeyens *A10191*

16:50 Logistic Regression Models of High Serum Dioxin Level in PEO-PLE from Michigan, USA
Xiaohui Jiang *A10295*

17:10 Chinese Mitten Crabs in European Rivers: Contamination with Dioxins, PCBs, PBBs and PBDEs and Implications For Human Consumption
Martin Rose *A10222*

Thursday August 27

POPs in Air & Indoor Atmospheres (Levels and Processes) — Convention Hall 2B

Chairs: Jean-François Focant, Zhengping Hao

14:00 Analysis of PCBs in Air Samples Collected at Facilities Related with PCB Containing Products or Wastes in South Korea
Guangzhu Jin — *A10506*

14:20 Characteristics of PCDDFs and PCBs in Ambient Air and Dust Around Industrial Parks at Coast and Inland Area
Bo-Chia Chen — *A10564*

14:40 PCDD/F Wind-Selective Sampling in Taranto Area
Roberto Giua — *A10570*

15:00 Spatial and Seasonal Variation of Atmospheric PCDD/Fs and Coplanar PCBs Around A Steel Plant Area, Northeast China
Yingming Li — *A10370*

POPs in Air & Indoor Atmospheres (Levels and Processes) — Convention Hall 2B

Chairs: Jean-François Focant, Shuzhen Zhang

15:50 Identification of Tris(1,3-Dichloro-2-Propyl) Phosphate and Other Organophosphate Flame Retardants in U.S. Indoor Environments
Thomas Webster — *A10369*

16:10 Investigation of Dioxins and Mercury in the Atmosphere Particulates and Rainwater Runoff from CPDC an-Shun Site and Surrounding Environment
Chih C. Chao — *A10140*

16:30 Long Term Measurement of I-Teq in Correlation to PM1, PM2,5 and PM10 Measurements
Gerhard Kahr — *A10135*

16:50 Does Precipitation Represent Air Pollution by Perfluorinated Chemicals?
Sachi Taniyasu — *A10376*

17:10 Investigation of Hydroxylated Polychlorinated Biphenyls (OH-PCBs) in the Air and the Sediments Around the Paper Recycling Plant
Motoharu Suzuki — *A10438*

Global Fate & Long Range Transport — Convention Hall 2C

Chairs: Hayley Hung, Hong He

14:00 Sources and Pathways of Polycyclic Aromatic Hydrocarbons Transported to Alert, the Arctic
Shu Tao — *10318*

14:20 PCDD/F Measurement at a High-Altitude Station in Central Taiwan: Evaluation of POPs via Long Range Transport
Kai Heisn Chi

14:40 Monitoring Long-Rang Atmospheic Transport (LRAT) of Organochlorine Pesticides (OCPs) at a Remote Background Site (Tengchong Mountain) in Southwestern China
Gan Zhang — *A10071*

15:00 Development of a Mathematical Model For 3D-Dynamics of Persistent Organic Pollutant in the East China Sea
Jun Ono — *A10308*

Global Fate & Long Range Transport — Convention Hall 2C

Chairs: Ramon Guardans, Gan Zhang

15:50 The Global Monitoring Plan and the Effectiveness Evaluation of the United Nations Environment Programme (Unep)/Stockholm Convention on Persistent Organic Pollutants (POPs)
Hayley Hung

16:10 The Rise of the Finely-Advanced Transboundary Environmental Model (Fate): A State-of-the -Art Model Prediction of the Global Sink of Persistent Organic Pollutants
Toru Kawai — *A10377*

16:30 The Dependence of Persistent Organic Pollutant (POP) Content in Atmospheric Air of the Russian Arctic on Ambient Temperature
Alexei Konoplev — *A10392*

16:50 The Spanish Monitoring Programme on POPs under the Stockholm Convention
Begona Jimenez — *A10702*

17:10 Spatial and Temporal Pattern of Organochlorine and Current-Use Pesticides in the Global Atmosphere
Frank Wania — *A10574*

19:00 **Optional Symposium Banquet at Banquet Hall, Crowne Plaza Parkview Wuzhou (5 minutes walking distance) - Delegates with pre-purchased tickets only.**

Friday August 28

08:45-09:30	**Plenary Convention Hall 1** **Session 5** Dioxins and Dioxin-Like PCB in Food and Feed - Still a Matter of Concern? - Peter Fürst, Chemisches und Veterinäruntersuchungsamt Münsterland-Emscher-Lippe (CVUA-MEL),Germany
10:00-10:40	Coffee Break Exhibition Hall
10:00-12:00	Session Summaries Students' Awards Presentation of Dioxin 2010
12:20-13:00	Lunch (Buffet at Banquet Hall, Continental Grand Hotel)

Friday August 28

8:45 Plenary Session 5 Convention Hall 1

Chairs: Mehran Alaee, Yongning Wu

8:45 Dioxins and Dioxin-Like PCB in Food and Feed - Still a Matter of Concern?

Peter Fürst *A10766*

Chemisches und Veterinäruntersuchungsamt Münsterland-Emscher-Lippe (CVUA-MEL),Germany

9:30 Coffee Break Exhibition Hall

10:00 Session Summaries Convention Hall 1

Students' awards

Presentation of Dioxin 2010

12:10 Lunch (Buffet at Banquet Hall, Continental Grand Hotel)

附件二

AN EFFICIENT AND GREEN CLEANUP SYSTEM FOR ANALYSIS DIOXIN, DIOXIN-LIKE PCBS AND PBDES

LEE T Y [1],Chen Y W [1], Wu C P[1], Peng J h [1],Weng Y M [1] and Robert O H[2]
[1] Environmental Analysis Laboratory (EAL), Environmental Protection Administration (EPA), Chung Li City, Taoyuan County, Taiwan 32024, R.O.C. ; [2] Ph.D. President CAPE Technologies, L.L.C., USA

Abstract
We use a fast and relatively cost effective method, the CAPE coupled carbon-acid silica column, to improve the efficiency for the analyses of PCDD/Fs, dioxin-like PCBs and PBDEs in environmental samples. The blank concentrations for Total 24 PBDEs (3-Br to 10-Br) only from 0.483 to 1.39 ng/column and the main congeners were BDE-47, BDE-209 and BDE-99. We had made the MDL for Total PBDEs was 4.47 ng/g by used the new cleanup processes. We have tested 64 real samples of different environmental matrices using this method from 2008 to 2009. The recovery range of the 13C12-PCDD/Fs is 65.7%~103%, 13C12-PCBs isotopes is 52.2~81.8% and the 13C12-PBDes isotopes is 36.7%~106%. It meets the QA/QC criteria of US EPA Methods 1613B, 1668A and 1614. We have successfully applied this technique in samples such as biological samples, sediment and dustfall matrices and will extend it to applications in other matrices.

Introduction
Many samples needed analysis Dioxins/Furans, Dioxin-Like PCBs and PBDEs For human health because PBDEs, PCBs and PCDD/Fs are recognized as three types of anthropogenic environmental pollutants with high toxicity 1. Nowadays, occurrence of PBDEs has caused the growing public concern, and thus has been included in monitoring program along with PCBs and dioxins. However, simultaneous analysis of these three toxic chemical families in one single sample has been seldom reported.2,3 Those are easy to extraction from sample together. So we want to find a fast, easy, cheap, environmental friendly, and efficiency cleanup procedure to treatment the sample. The best ideas are cleanup them together and separate before analysis.
The traditional time-consuming cleanup procedures such as silica, alumina and carbon column were widely adopted by analysis PCDD/Fs and DLPCBs. Many research projects endeavored to shorten the time of cleanup procedure. Automatic systems, such as Automatic Cleanup Robot and Power-Prep System4 were involved in these tests. Though these facilities exhibit outstanding performances, the cost of these equipments is generally too expensive for most commercial labs to afford. Therefore, we would like to apply an alternative method, the CAPE coupled carbon-acid silica column, which is design for ELISA cleanup system so it is fast, easy and more cost-effective.5 We have to improve the carbon contaminated by PBDEs and modify the cleanup procedure. Now the new CAPE coupled carbon-acid silica column can be used to cleanup for 17 PCDD/Fs, 12 DLPCB and 24 PBDEs (3-Br to 10-Br, include BDE-209) analysis.

Materials and Methods
All solvents were pesticide residue grade and were purchased from Merck, Tedia, Sigma–Aldrich. Silica gel (100-200 mesh) was obtained from Fisher. Cellulose and glass filber thimble was obtained from Sartorius. Standard solutions of PCDD/Fs (1613-LCS (Labeled Compound Stock Solution), 1613-ISS (13C-1, 2, 3, 4-TCDD and 13C-1, 2, 3, 7, 8, 9-HxCDD Internal Standard Spiking Solution), 1613-CSS (Cleanup Standard Spiking Solution), 1613-PAR (Native PCDD/Fs, Precision and Recovery Stock Solution), and 1613CVS (EPA Method 1613, Calibration and Verfication Solutions CS1-CS5)), PCBs (WP-LCS (WHO 13C-PCBs Surrogate Spiking Solution), WP-ISS (WHO 13C-PCBs, Internal Standard Solution), WP-STK (Native PCB Solution), WP-CVS ("Dioxin-Like" PCBs, Calibration and Verification Solutions CS1-CS7)), and PBDEs (MBDE-MXE (Mass-Labelled PBDE Solution/Mixture), BDE-CVS-EISS (Mass-Labelled PBDE Internal Standard Solution), BDE-MXE (Native PBDE Solution/Mixture), BDE-CVS-E (BDE-CVS-E, Calibration Solutions CS1-CS5)) were obtained from Wellington Laboratories.
All sample need add 3 different kinds internal standard before extration. When finished extraction sample need to condense to near dry and transfer for cleanup. PCDD/Fs analysis need add cleanup standard before cleanup.

CAPE coupled carbon-acid silica column
The coupled carbon-acid silica column is taken from the Dioxin/Furan Immunoassay Kit manufactured by the

CAPE Technologies. It is originally used for a biological screening method for the USEPA Method 4025. We developed this method in our lab as a backup method for the screening method DR-CALUX® that we established in 2004. Surprisingly, we found this coupled column can be applied in the chemical confirmation method too. In order to get better recovery of isotope standards and meet the QA/QC criteria of US EPA Methods 1613B, 1668A, and 1614. The new carbon column was labeled " product # CCXC-60，Ultra Clean Carbon Mini-Columns for Cleanup of PBDE Sample Extracts ". The original cleanup procedures6, 7 were modified to the procedure as cited in the followings: Pretreatment the extract by acid-silica column if needed. (Add copper to remove sulfur for sediment samples.) CAPE coupled carbon-acid silica column is set up as the picture in Figure 1. Use stopper/stopcock assembly and syringe to pressurize the column and maintain a drop-wise flow rate of 0.5-1.0mL per minute when eluted by solvent. Add 40mL n-hexane to prewash the acid-silica column, and add 10mL n-hexane for combine carbon column let no bubble. Add 2mL n-hexane /time x 3 times, to transfer sample extract to column. Add 10mL n-hexane to elute column remove the impurity. Add 10mL n-hexane /time x 2 times to elute column again and start to collect all solvent passed through column for dioxin-like PCBs and PBDEs fraction. Remove and transfer carbon mini-column to a clean empty column. Add 5-5.5mL of 1:1 toluene: n-hexane to elute column and combine all solvent passed through column for dioxin-like PCBs and PBDEs fraction. Reverse the direction of carbon mini-column. Add 20-30mL of toluene to elute column and collect all solvent passed through column for PCDD/Fs fraction. The two parts sample need condense to near dry and transfer to vial and add different kinds recovery standard for analysis. DLPCBs and PBDEs can be separate by HRGC/HRMS.

Fig. 1: CAPE coupled carbon-acid silica column

HRGC/HRMS

The analysis of samples was performed on a HRGC (HP 6890)/ HRMS (JEOL JMS-700). PCDD/Fs and DLPCB was using DB-5MS 60m column and PBDEs using DB5-HT 15m column. Operating at >10000 resolution for PCDD/Fs and DLPCB, and operating at >5000 resolution for PBDEs using EI ionization at 35 ev. All measurements were achieved in selective ion recording (SIR) mode, monitoring the two most abundant ions in the cluster.

Blank Test and Real Sample Testing

We have tested all the solvent and materials for PBDEs contaminations control. The last blank 12 carbon tests had recorders. 47 biological samples (include QA/QC sample) used CAPE coupled carbon-acid silica column cleanup and analysis 17 PCDD/Fs, 12 DLPCB and 24 PBDEs (3-Br to 10-Br, include BDE-209) in 2008. 18 sediment and dustfall samples (include QA/QC sample) used CAPE coupled carbon-acid silica column cleanup and analysis 17 PCDD/Fs, 12 DLPCB and 24 PBDEs (3-Br to 10-Br, include BDE-209) in 2009. Experimental results are shown in next paragraph.

Results and Discussion

CAPE coupled carbon-acid silica column cleanup process compare other cleanup processes

As we can see in Table 1, CAPE process used the fewer columns, less solvent, less cost and less time to operate it. CAPE coupled carbon-acid silica column cleanup process only needs n-hexane and Toluene to elute, because the column already packed so we can use it immediately. Columns supply from agency was easy control quality. Only needs dry boxes to preserve the columns so we don't need any energy for the process. Less solvent means less pollution. Less operation time mean less cost and easy to operate. So we think it was a 'green' cleanup process.

Improve CAPE carbon for PBDEs

We have already analyzed more than 1000 samples covering various environmental matrices using CAPE coupled carbon-acid silica column for PCDD/Fs and DLPCB. But nowadays we need analysis PBDEs together. When we used CAPE coupled carbon-acid silica column cleanup process to analysis PBDEs we found high background in carbon. The blank carbon contents the PBDEs concentrations from 0.9 to 56.3 ng/column. It was too high to environmental sample. So we cooperator to CAPE Technologies try to solve the problem. Finally we found the main contamination was from package – a PUF to prevent knots. CAPE Technologies try to change the different package and make the new carbon column named "Ultra Clean Carbon Mini-Columns for Cleanup of PBDE Sample Extracts". The last 12 test data as shown in fig 2, we can found the blank concentrations for total PBDEs only from 0.483 to 1.39 ng/column and the main congeners were BDE-47, BDE-209 and BDE-99. Those main congeners same as environmental samples so we hope that can be control in lower levels. We had made the MDL for Total PBDEs was 4.47 ng/g by used the new cleanup processes. Although the PBDEs standards were included 1-Br and 2-Br but they were easy loss by N2 purge and acid-silica cleanup that would bad recovery and they won't the main congeners in sample. So we had rejected the 1-Br and 2-Br data from the total PBDEs only calculate 24 congeners from 3-Br to 10-Br (include BDE-209).

The real sample analysis

For real sample testing, the recovery of the $^{13}C_{12}$-PCDD/Fs, $^{13}C_{12}$-DLPCBs and $^{13}C_{12}$-PBDEs isotopes are shown in Table 2 and Figure 3 to Figure 5. In Table 2, it is shown that different matrices sample recovery in $^{13}C_{12}$-PCDD/Fs isotopes from 65.7% to 103%, the recovery of $^{13}C_{12}$-DLPCBs isotopes from 52.2% to 81.8%, and the recovery of $^{13}C_{12}$-PBDes isotopes from 36.7% to 106%. In Figure 3, It is shown that TCDD/Fs isotopes had lower recovery than others. In Figure 4, It is shown that average isotopes recovery for DLPCB. But in Figure 5, It is shown that BDE-209 isotope had lower recovery than others because the HRMS programs not very stable for it. As told by CAPE Technologies, the materials used mini-carbon column is very similar to AX-21 and will tend to trap PCDD/Fs, DLPCBs and PBDEs congeners. All the data were finished by our lab from 6 analysts and had similar results.

These results are not as good as those using the Power-Prep System[4], but are good enough to meet the QA/QC criteria of US EPA Methods 1613B, 1668A and 1614. CAPE coupled carbon-acid silica column is much less costly as the column of Power-Prep System. The cleanup procedure is simple, user-friendly and need much less amount of solvent. The total operation time of 8-10 samples is about 3 hours. As each coupled carbon-acid silica column can be operated independently, it allows several analysts to operate the clean-up procedure in the same time. And the recovery would stable with several analysts. This will enhance the productivity substantially in the analysis of PCDD/Fs, DLPCBs and PBDEs.

Before this study we had enough data to support that CAPE coupled carbon-acid silica column can be used to other enviroment matrices, such as stack gas, ambient air, water, waste, plant, and so on5. Now we add the new function for PBDEs. We hope the efficient and green cleanup system for analysis Dioxin, Dioxin-Like PCBs and PBDEs could be applied in the future.

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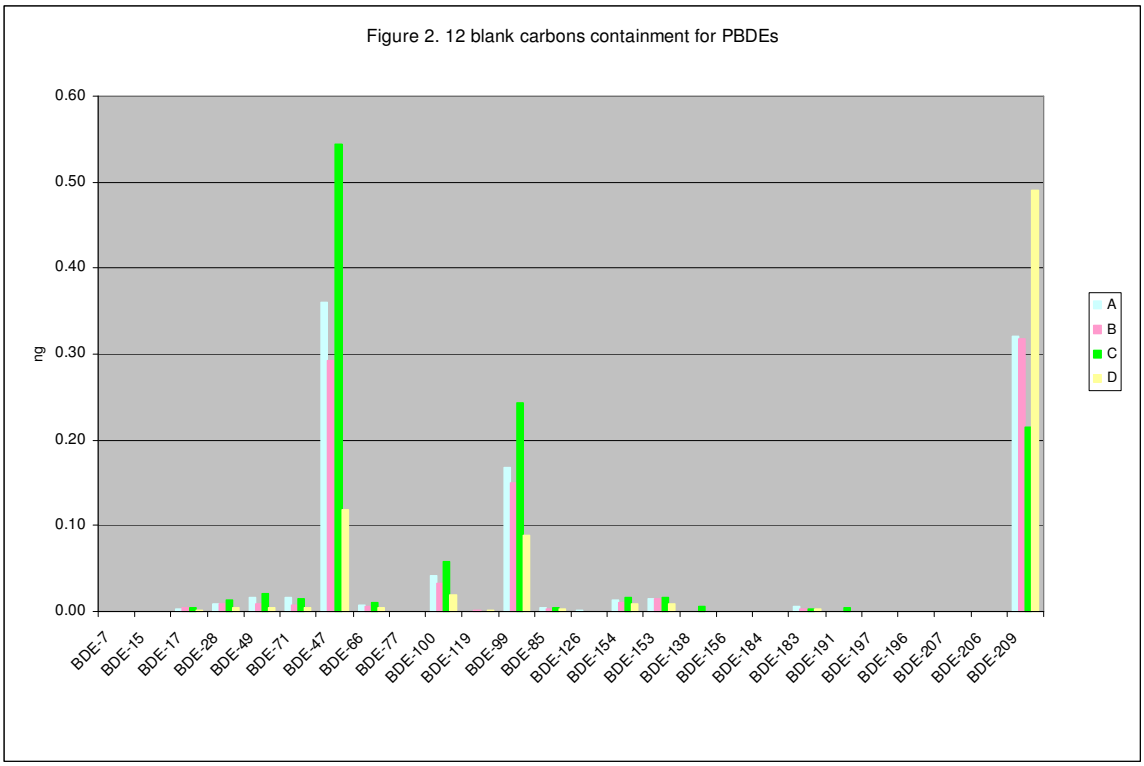
Table 1. Compare CAPE coupled carbon-acid silica column cleanup process with other cleanup processes

Cleanup process	Used column	Used solvent type	Total used Solvent amount for a sample	Apparatus cost	Column cost for a sample	Operation time for a batch	Operation Energy
Traditional Cleanup[8]	Silica Alumina Carbon	n-hexane DCM Toluene	~350 mL	lower	~$25	~24 hr	oven
Power-Prep System	Silica Alumina Carbon	n-hexane DCM Toluene Benzene	~720 mL	More than $180000	~$60	~5 hr	Computer Pump Control unit
CAPE column	Silica Carbon	n-hexane Toluene	~140 mL	lower	~$25	~3 hr	no

Note 1.all cleanup processes had not consider pretreatment processes for special matrices.

2. Total used Solvent amount include all solvent used to pre-clean column, and elute cleanup for sample.
3. Operation time for a batch include setup columns, pre-clean columns, and real elute samples time for 8-10 samples.



Biotic / TW EPA PBDE test columns and solvent sample

A-D = sets of 3 columns in 40 mL vial

A = stored tightly wrapped in green PUF in a clean 40 mL vial (no LDPE bag)

B = stored in small LDPE bag in a clean 40 mL vial (no green PUF)

C = stored in a clean 40 mL vial with recycled desiccants (no PUF or LDPE bag)

D = stored in a clean 40 mL vial with new desiccants (no PUF or LDPE bag)

Table 2. The real samples IS recovery used CAPE columns cleanup processes to analysis PCDD/Fs, DLPCBs, and PBDEs

	biological samples analysis in 2008					sediment and dustfall samples analysis in 2009				
congeners	average(%)	min(%)	max(%)	numbers	SD(%)	average(%)	min(%)	max(%)	numbers	SD(%)
13C-2,3,7,8-TeCDF	65.7	30.2	94.1	47	17.5	79.3	64.9	101.7	17	9.84
13C-1,2,3,7,8-PeCDF	85.7	57.0	109	47	14.6	92.7	70.0	111.4	17	11.8
13C-2,3,4,7,8-PeCDF	87.5	60.5	116	47	15.0	94.4	70.9	116	17	13.1
13C-1,2,3,4,7,8-HxCDF	91.7	68.5	111	47	11.1	101	80.6	121.1	17	11.7
13C-1,2,3,6,7,8-HxCDF	96.0	70.5	113	47	9.69	99.7	84.0	115	17	10.0
13C-2,3,4,6,7,8-HxCDF	92.7	70.3	110	47	9.59	98.5	81.8	113.9	17	10.0
13C-1,2,3,7,8,9-HxCDF	84.7	58.4	111	47	14.0	103	86.3	120.4	17	8.70
13C-1,2,3,4,6,7,8-HpCDF	89.4	69.8	103	47	10.9	95.3	66.2	113.4	17	12.2
13C-1,2,3,4,7,8,9-HpCDF	76.4	47.4	96.2	47	13.9	86.6	68.4	109.7	17	12.0
13C-2,3,7,8-TeCDD	68.9	33.8	95.9	47	14.5	89.4	68.4	105	17	10.1
13C-1,2,3,7,8-PeCDD	85.0	62.6	107	47	13.9	93.1	73.3	109.2	17	11.0
13C-1,2,3,4,7,8-HxCDD	83.1	53.0	102	47	11.5	91.9	72.6	110.1	17	11.7
13C-1,2,3,6,7,8-HxCDD	92.5	67.6	115	47	10.8	98.8	71.8	117.9	17	12.1
13C-1,2,3,4,6,7,8-HpCDD	81.0	53.7	103	47	12.4	90.5	65.9	109.3	17	11.2
13C-OCDD	69.5	41.4	96.0	47	13.6	77.2	46.7	96.1	17	11.7
37Cl-2,3,7,8-TCDD	67.9	34.8	87.7	47	12.9	93.5	74.4	116.2	17	11.5
Total average for PCDD/Fs	82.4				12.9	92.8				11.2
13C-PCB #81	52.8	29.7	88.7	47	15.7	67.5	25.5	104	17	17.8
13C-PCB #77	56.1	29.7	96.9	47	16.3	69.8	27.4	105	17	17.7
13C-PCB #123	52.2	26.6	80.6	47	12.8	62.3	25.2	86.8	17	18.0
13C-PCB #118	54.2	27.1	81.3	47	12.3	65.4	25.3	88.2	17	18.2
13C-PCB #114	52.2	26.8	77.9	47	12.2	59.6	25.5	82.8	17	18.2
13C-PCB #105	55.2	27.0	85.4	47	12.6	68.4	29.2	88.3	17	15.2
13C-PCB #126	57.7	28.7	88.4	47	13.1	74.4	33.1	93.4	17	15.3
13C-PCB #167	66.7	30.1	83.2	47	10.2	70.8	39.0	92.5	17	17.8
13C-PCB #156	66.4	30.4	89.0	47	10.0	74.0	45.0	99.7	17	16.4
13C-PCB #157	66.6	30.5	89.8	47	9.8	77.3	46.9	104	17	15.2
13C-PCB #169	64.7	31.6	103	47	11.9	81.8	54.5	102	17	12.4
13C-PCB #189	74.1	30.7	95.8	47	11.6	79.4	48.3	121	17	17.8
Total average for DLPCBs	59.9				12.4	70.9				16.7
BDE-28L	106	26.4	147	47	35.7	79.0	27.2	148	17	34.7
BDE-47L	119	60.6	150	47	26.1	87.7	38.8	150	17	32.0
BDE-99L	119	72.4	146	47	20.0	91.8	53.8	126	17	21.0
BDE-154L	102	58.3	148	47	18.8	76.9	54.5	93.5	17	9.94
BDE-153L	99.0	65.6	146	47	14.1	85.3	66.0	101	17	9.14
BDE-183L	90.9	64.3	145	47	16.2	75.0	60.4	88.9	17	7.57
BDE-197L	86.4	55.6	140	47	19.8	94.2	56.3	130	17	22.2
BDE-207L	56.7	36.0	101	47	13.1	73.2	38.6	113	17	22.9
BDE-209L	36.7	21.0	61.7	47	10.6	67.9	20.1	144	17	30.0
Total average for PBDEs	88.3				19.9	77.7				22.5

Figure 3. Isotopes for PCDD/Fs IS recovery

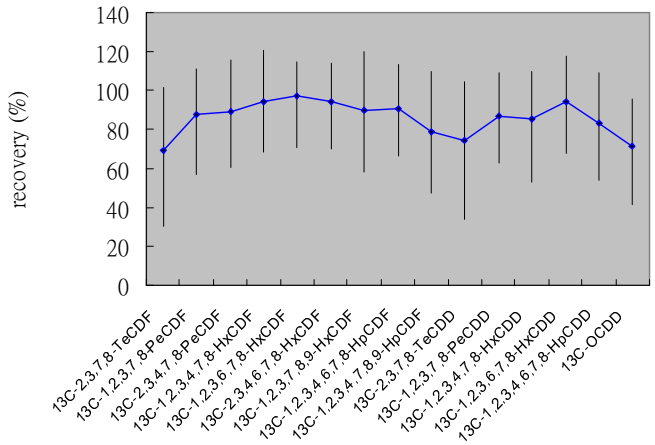


Figure 4. Isotopes for DLPCBs IS recovery

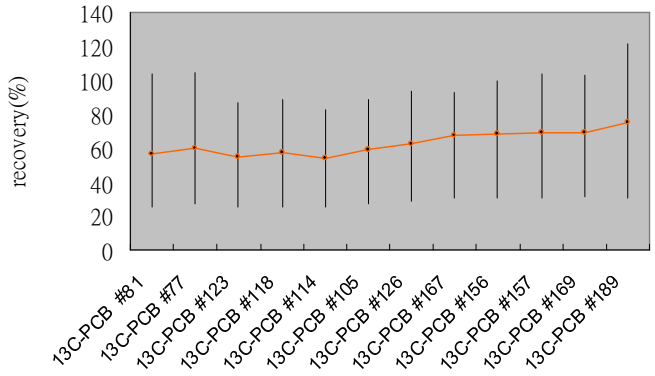
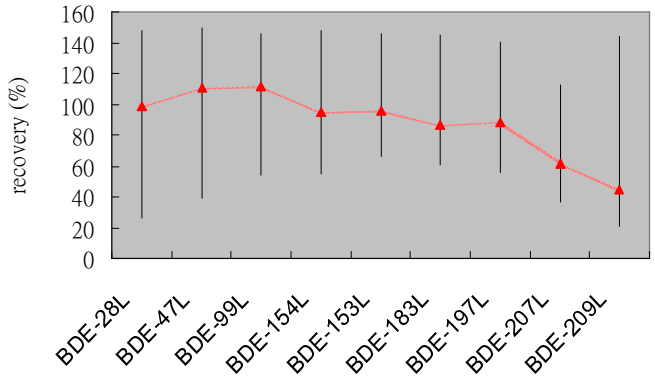


Figure 5. Isotopes for PBDEs IS recovery



LEVELS OF PCDDS, PCDFS, DIOXIN-LIKE PCBS, AND PBDES IN FISH SAMPLES FROM RIVERS AND ESTUARIES IN TAIWAN

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Abstract

The concentrations of polychlorinated dibenzo-p-dioxin (PCDDs), polychlorinated dibenzo- p-furan (PCDFs), dioxin-like polychlorinated biphenyls (DLPCBs), and polybrominated diphenyl ethers (PBDEs) were measured in fifty-nine fish samples collected from rivers and estuaries in Taiwan. Determination of PCDDs/PCDFs/ DLPCBs and PBDEs was carried out using HRGC/HRMS. For all fish of all species from all sampling areas, the concentration range for PCDDs/PCDFs and DLPCBs World Health Organization Toxic Equivalent (WHO-TEF) were 0.024 ~ 1.02 pg WHO-TEQ/g wet weight and 0.023 ~ 14.1 pg WHO-TEQ/g wet weight respectively. The concentration range for PBDEs were 12.1 ~ 380 ng/g lipid weight, with BDE-47＞BDE-154＞BDE-100 ~ BDE-99＞BDE-153＞BDE-183。The highest concentrations of both PCDDs/PCDFs and PBDEs were found in the area of Erren river and the highest concentrations of DLPCBs was found in Dahan river. The average recoveries of the 13C-labelled internal standards for PCDDs/PCDFs, Dioxin-like PCBs and PBDEs were in the range of 63 ~ 95 %, 54 ~ 78 % and 37 ~ 126 % respectively. The average recoveries of the method blank spike samples for PCDDs/PCDFs, Dioxin-like PCBs and PBDEs were in the range of 86 ~ 99 %, 105 ~ 112 % and 86 ~ 119 % (133% for BDE-209) respectively.

Introduction

Polychlorinated dibenzo-p-dioxin (PCDDs), polychlorinated dibenzo- p-furan (PCDFs), dioxin-like polychlorinated biphenyls (DLPCBs) are a group of toxic and highly persistent organic compounds that consist of 75, 135 and 209 congeners, respectively. Due to its chemical stability, their lipid solubility, and its ubiquitous prevalence in environmental, PCDDs, PCDFs and PCBs constitute which is called persistent organic pollutants (POPs). Polybrominated diphenyl ethers (PBDEs) are one of several types of brominated flame retardants and are also bioaccumulative, lipophilic, and persistent1-4. Human chronic exposure to those highly lipophilic and persistent compounds via food chain has led to the accumulation of both parent compounds and its metabolites in lipid rich tissues such as adipose tissues and human breast milk5,6. One possible exposure pathway by which humans and other upper trophic level species can be exposed to POPs is through consumption of dietary fish, This paper presented the analytical results of 17 PCDDs/PCDFs, 12 DLPCBs and 25 PBDEs congeners in all the samples. The purpose of the current study was to evaluate the distribution of PCDDS/PCDFs, DLPCBs and PBDEs in fish samples from eight rivers and estuaries in Taiwan. These data will be used to evaluate temporal and spatial trends of these POPs, and may also be used in health risk assessment.

Materials and Methods

PCDDs/PCDFs/Dioxin-like PCBs and PBDEs standards were purchased from Wellington Laboratories. 10 g of freeze-dried muscle and tissue samples were extracted with Soxhlet extraction. Before extraction, the sample was fortified with internal standards (6 13C-PCDDs, 9 13C- PCDFs, 12 13C-Dioxin-like PCBs and 10 13C-PBDEs). The lipid extracts were removed by mixing with 30 g acidified silica gel in hexane. A CAPE carbon column was used to separate interferences, PCDDs/PCDFs/Dioxin-like PCBs and PBDEs. Dioxin-like PCBs and PBDEs portion were collected using 5 mL of hexane/toluene eluent in forward direction of carbon column, and then reverse carbon column and PCDDs/PCDFs fraction was eluted by 30 mL toluene. Before instrument analysis, 13C-labeled injection standards were added and the vials were vortexed to mix completely. All analyses were performed with the isotope dilution method. Quantification of PCDDs/PCDFs/Dioxin-like PCBs and PBDEs were performed by GC-HRMS using a JMS-700 high resolution mass spectrometer (JEOL, Tokyo, Japan) equipped with a Hewlett-Packard (HP) model 6890 series gas chromatograph and a CTC PAL autosampler. The instrument operates at 10,000 resolution for PCDDs/PCDFs/Dioxin-like PCBs analysis and at 8,000 resolution for PBDEs analysis, The details of the MS analysis and quality control are described in the EPA method 1613B, 1668A and method 1614.

Results and Discussion

A total of 59 composite fish samples were analyzed. Table 1 shows the sampling location, no.of samples and average concentrations (min ~ max concentration) for each river site. The column headed “WHO-TEQ” refers to the total toxicity from all 17 2,3,7,8-substituted PCDDs/PCDFs congeners based on the World Health Organization Toxic Equivalents’ method. The column headed “PCB-TEQ” refers to the Dioxin-like toxicity, using the WHO-TEF method, containing 4 non-ortho PCBs and 8 mono-ortho PCBs. For PBDEs, there is no analogous concept to WHO-TEQ. Thus, we report the concentrations of the individual congeners, BDE-47, -99, -100, -153, -154 and -183, and their sum. For the purpose of calculating WHO-TEQ for PCDDs/PCDFs/ DLPCBs and total level of PBDEs, a concentration of 1/2 of the detection limit was used for each nondetect. The concentration of total PCDDs/PCDFs ranged from 0.024 ~ 1.02 pg-WHO-TEQ/g ww. The highest level of PCDDs/PCDFs occurring at Ye-cu-jia Bridge, downstream of Erh-Jen River and the main congeners of the *Nematalosa come* species are 2,3,7,8-TCDF(26.1%), 2,3,4,7,8-PeCDF(22.9%), OCDD(7.8%) and 1,2,3,7,8-PeCDF(7,5%). As might be expected, Erh-Jen River is in southwestern Taiwan and is considered among one of the most polluted rivers in Taiwan. Decades ago, a number of metal reclamation activities including acid washing, open-air incineration of waste computer components and scrap electrical wires/cables, disposal of waste motors and electrical transformers/capacitors, as well as numerous of municipal and agricultural activities, are believed to have discharged waste water effluent containing large amounts of heavy metals, polychlorinated biphenyls (PCBs), polychlorinated dibenzo-*p*-dioxin and dibenzofurans (PCDD/Fs) into this river. In Taiwan, fish in rivers is not the primary protein source in the diet of resident. Judging from the European Union regulation limit of fish products (4.0 pg TEQ/g ww), all the concentrations in this study were lower than that of the criteria.

The levels of PCB-TEQ ranged from 0.023 ~ 14.1 pg-WHO-TEQ/g ww. The highest level of PCB-TEQ was

found at midstream of Dahan River. The average toxicity of DLPCBs collected from 3 sampling sites were exceed 1.0 pg-WHO-TEQ/g ww including Erren River, Dahan River and Houjin Creek. Houjin Creek. flows through several industrial zones in southern part of Taiwan. Contamination of DLPCBs may come from factories from that area. Dahan River in midstream is the most contaminated in the Tamsui River Basin. The main pollution sources of water quality may come from domestic sewage and industrial wasted water. Seven fish samples were collected from Dahan River, and there is only one *Oreochromis sp.* was in 14.1 pg-WHO-TEQ/g ww., 10 times higher than other sampling points. Due to the wide dispersion of PCB-TEQ (0.069 ~ 14.1 pg-WHO-TEQ/g ww.) in Dahan River, further investigation should be continued. The main congeners of DLPCBs in fish samples are PCB-118>PCB-105 > PCB-156. The sum concentrations of PCB-118, PCB-105 and PCB-156 constituted 79 ~ 99 % of the total of DLPCBs in all fish samples collected from the different sites. Considering toxicity of dioxin-like compounds, DLPCBs accounted for 74 % (a the range of 33 ~ 97%) of total TEQ in fish samples.

The table 1 gives the concentration for all congeners in ng/g on lipid weight basis for PBDEs. At most sites, individual PBDE congeners were present at detectable levels in fish tissue, with the mean ∑ PBDE concentration ranging from 69.1 to 230 ng/g lipid. The highest average levels of PBDEs were measured from Houjin Creek, while the lowest levels were measured from Laojie River. The highest value of PBDEs was 380 ng/g lipid and was measured in Chongde Bridge from Erren River. These data are mostly in good agreement with data published by other investigators[7-9]. The highest values are found for samples originating from the San Francisco Bay Area[7] and San Francisco Estuary[8]。The average concentration of major PBDEs congeners in each rivers are presented in Figure1. As already reported in literature[9] BDE 47 was the dominant congeners in tissue followed by BDE 154、BDE 99 and BDE 100. The PBDE profile was similar in all fish species.

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Table 1. Concentrations of PCDD/Fs, PCB and PBDE in fish samples from rivers and estuaries

Location	n	PCDD/F-TEQ (pg/g w.w.)	PCB-TEQ (pg/g w.w.)	PBDE (ng/g lipid)
Laojie River	3	0.275 (0.099 ~ 0.618)	0.395 (0.067 ~ 0.935)	69.1 (40.7 ~ 85.2)
Tung-shan River	7	0.234 (0.058 ~ 0.646)	0.541 (0.071 ~ 1.20)	89.2 (51.2 ~ 182)
Wu River	5	0.136 (0.033 ~ 0.416)	0.260 (0.023 ~ 0.442)	124 (37.0 ~ 216)
Houjin Creek	5	0.248 (0.071 ~ 0.552)	1.20 (0.247 ~ 2.0)	230 (103~ 366)
Erren River	14	0.291 (0.057 ~ 1.02)	3.31 (0.089 ~ 10.4)	187 (40.2 ~ 380)
Niouchou River	5	0.117 (0.057 ~ 0.179)	0.144 (0.034 ~ 0.328)	104 (57.2 ~ 147)
Dahan River	7	0.337 (0.034 ~ 0.584)	2.91 (0.069 ~ 14.1)	74.3 (12.1 ~ 148)
Keelung River	13	0.111 (0.024 ~ 0.407)	0.449 (0.028 ~ 1.63)	152 (25.1 ~ 287)

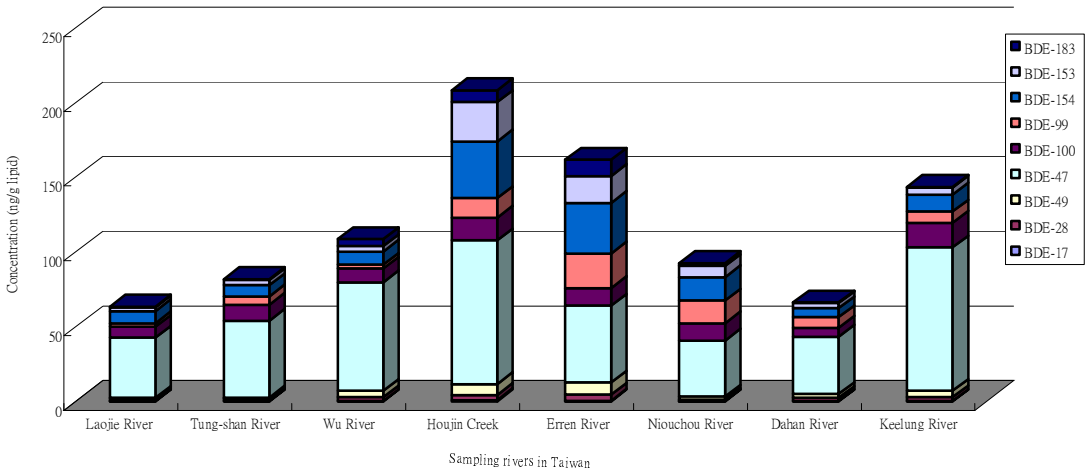

Figure 1. The average concentration profile of major PBDEs congener in fish samples.