PCBs, dioxins, and PAHs in sediments of River Labe, River Bílina, and Klíšský water stream in Ústí nad Labem metropolitan area

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Introduction

- PCBs, PCDDs, PCDFs, and PAHs - POPs
- POPs: bioaccumulation, omnipresent around the world, persistence in nature, toxic, Stockholm Convention
- PCBs: 209 congeners, produced intentionally (coolants, transformer oil, plasticizers in paints, pesticide extenders, lubricating oil and more) former Czechoslovakia – Chemko in Střážské 20 000 t PCBs, production terminated in 1984
- PCDDs and PCDFs: together 210 congeners, produced only unintentionally – chlorine production, waste incineration
- PAHs: 150 homologues, natural and anthropogenic production, produced mostly unintentionally – combustion and heating of organic materials, from coal-tar and asphalt
- our aims: 1) monitoring of POPs in area, 2) help to detect of PCBs source in River Labe
Sampling and analysis

- content in river sediments
- 4 sampling sites in Ústí nad Labem metropolitan area: River Bílina in Trmice, Klíšský water stream at the mouth, the confluence of River Bílina and River Labe, and River Labe in Valtířov
- on 28th of August 2015
- analysis in accredited laboratory using HR-GC-MS
- 6 PCB indicator congeners, 12 PCBs dioxin like congeners, 17 PCDDs/PCDFs congeners, and 16 PAHs homologues
- calculating I-TEQ and WHO-TEQ
PCBs concentrations

- elevated in spring 2015 by state company Labe Watershed and by Czech Environmental Inspection
- 6 PCBs congeners exceeded Czech limit value for agricultural soil (10 μg PCB/kg DW) at all sampling sites
- the average concentration of river sediments in Czech Republic (14.6 μg PCB/kg DW)
- the background concentration in Czech Republic (2 μg PCB/kg DW)
- the highest on confluence of rivers, the second on Labe in Valtířov than on other two localities (for both indicator and dioxin like PCBs)
- the source of contamination: not located on River Bílina and Klíšský water stream
PCBs congener

- difference between localities (Bílina River in Trmice and Klíšský water stream X the confluence of rivers and Labe River in Valtířov) – congener PCB 28
- different profiles of dioxin like PCBs at all
- corroborate - source of contamination is not located on River Bílina or Klíšský water stream
- the source of contamination is not Spolchemie (a chlorine production plant)
- we can not identify the source of PCBs
- Czech Environemntal Inspection: the source is located upstream of River Labe – channel dredging and remobilisation of PCBs accumulated in sediments
- but is it the only source?
**Dioxins (PCDDs/PCDFs)**

- the highest concentrations: Klíšský water stream and the second highest on the confluence of rivers
- River Bílína in Trmice and Labe in Valtířov: lower concentration similar to background
- the background concentration in Czech Republic (1 ng I-TEQ/kg DW)
- source of dioxins to River Bílína: Klíšský water stream
- potential source on the water stream: Spolchemie (chlorine production plant)
PAHs

- similar pattern of concentrations like for dioxins
- high concentrations at Klíšský water stream and the confluence of rivers, lower for River Bílina in Trmice and River Labe in Valtířov
- criterion for soil by Ministry of the Environment of the Czech Republic for soils (1 000 μg/kg DW)
- benzo(a)pyren at the Klíšský water stream: 1 g of sediment - 20 cigarettes
- homologue profile: Klíšský water stream and confluence of rivers are similar – the same source of PAHs
- the source of PAHs located on Klíšský water stream (usual suspect Spolchemie?)
Conclusion

- the source of PCBs - not only channel dredging, but also paint from a bridge in Ústí nad Labem (we get to know surprisingly at a press conference)
- the source of dioxins and PAHs is located on Klíšský water stream (we are going to submit our results to Czech Environmental Inspection)
- the most probably source of dioxins and PAHs is Spolchemie
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Thank you for your attention

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