

“Scaling up Experience in Improvement of Chemical Safety to  
Contribute to Poverty Reduction in Rural Armenia” project  
– Conference „10th Anniversary of the Stockholm Convention -  
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# POPs hot spots - evaluation of Arnika's research at 5 sites in Armenia

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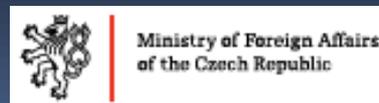
Arnika – Toxics and Waste Programme



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# Obsolete pesticides hot spots in Armenia

- Milieukontakt Oost Europa report „Obsolete pesticides in Armenia“ (2006) identified following obsolete pesticides hot spots:
  - **Landfill Ararat (Nubarashen)**
  - Gerandir farm
  - Gerandir forestry station
  - Garni shop
  - Garni farm
  - **Berriutyun LTD Masis (Masis)**
  - **Konstatin & Sisters LTD (Jrarat)**
  - Artashati Berriutyun

# Detailed sampling by Arnika/AWHHE

- Nubarashen – burial site (13 samples; passive air sampling, soil, sediment, eggs, cow milk, cream)
- Masis (9 samples; swept, soil, water, eggs, cow milk)
- Echmiadzin (between Echmiadzin and Griboyedov); (8 samples; swept, plaster, soil, water, eggs)
- Jrarat (17 samples, passive air sampling, swept, plaster, soil, sediment, water, eggs, fish)
- Alaverdi – landfill of industrial waste (9 samples; ash, slag, soil, water, eggs, fish)
- Analyses for:
  - 21 OCPs (organochlorine pesticides) and their metabolites
  - PCDD/Fs and DL PCBs (bioassay analyses in total TEQ – CALUX -TEQ), for chosen samples also congener specific analysis
  - 222 pesticides and their metabolites (other than obsolete OCPs) plus 8 fenoxalkane acid based pesticides for chosen samples
  - 7 PCB congeners
  - mercury and other heavy metals in fish

# Detailed sampling by Institute of Chemical Technology in Prague

- Nubarashen – burial site (9 surface soil, 8 depth samples)
- Masis (5 samples; mixed sample from bags, swept, soil)
- Echmiadzin (between Echmiadzin and Griboyedov) – (5 swept, sediment, soil samples)
- Jrarat (8 samples; pesticides, swept, plaster, soil)
- Alaverdi – landfill of industrial waste (3 samples; ash, slag, soil)
- Analyses for:
  - OCPs (organochlorine pesticides) and their metabolites
  - 6 heavy metals for samples from Alaverdi

# Reports

- Zuzana Honzajková, Marek Šír: **Pesticide monitoring in Armenia - final report (visit of the surroundings of Yerevan, July 22 – 28, 2010)**
- **Alice Dvorská: Final Report** on the results of environmental sampling conducted in Armenia in July - November 2010 as a part of the joint Czech-Armenian project "Scaling Up Experience in Improvement of Chemical Safety to Contribute to Poverty Reduction in Rural Armenia"
- Sampling of the sites
  - - soils, sediments, pesticides – July 2010
  - - passive air sampling – June – October 2010
  - - eggs, fish, milk – October – November 2010

# Results

(yellow = high levels/serious problem; grey = not analyzed; black = not sampled)

## Σ DDT

Site/Matrix	Materials inside the buildings/on the landfill	Soil	Water	Air	Eggs	Milk	Fish
<b>Nubarashen &amp; surrounding</b>	NA	DDT	NA	DDT			NA
<b>Jrarat</b>	DDT	DDT		DDT	DDT	NA	
<b>Echmiadzin</b>	DDT	DDT	DDT	NA	DDT	NA	NA
<b>Masis</b>	DDT	DDT	DDT	NA	NA		NA
<b>Alaverdi</b>				NA		NA	

# Results

## HCHs

Site/Matrix	Materials inside the buildings/on the landfill	Soil	Water	Air	Eggs	Milk	Fish
<b>Nubarashen &amp; surrounding</b>	NA	HCHs	NA	HCHs			NA
<b>Jrarat</b>						NA	
<b>Echmiadzin</b>		HCHs		NA		NA	NA
<b>Masis</b>	HCHs			NA	NA		NA
<b>Alaverdi</b>				NA		NA	

# Results

## OCPs (other than DDT and HCHs)

Site/Matrix	Materials inside the buildings/on the landfill	Soil	Water	Air	Eggs	Milk	Fish
<b>Nubarashen &amp; surrounding</b>	NA		NA				NA
<b>Jrarat</b>	OCPs	OCPs				NA	
<b>Echmiadzin</b>	OCPs			NA		NA	NA
<b>Masis</b>	OCPs			NA	NA		NA
<b>Alaverdi</b>				NA		NA	

# Results

## Dioxins and furans (PCDD/F) and dioxin-like PCBs

Site/Matrix	Materials inside the buildings/on the landfill	Soil	Water	Air	Eggs	Milk	Fish
<b>Nubarashen &amp; surrounding</b>	NA	PCDD/F + PCB	NA	NA	PCDD/F + PCB		NA
<b>Jrarat</b>			NA	NA	NA	NA	
<b>Echmiadzin</b>	PCDD/F + DL PCB		NA	NA	PCDD/F + PCB	NA	NA
<b>Masis</b>		NA	NA	NA	NA		NA
<b>Alaverdi</b>	PCDD/F + DL PCB		NA	NA	PCDD/F + PCB	NA	

# Results

## Other pesticides

Site/Matrix	Materials inside the buildings/on the landfill	Soil	Water	Air	Eggs	Milk	Fish
<b>Nubarashen &amp; surrounding</b>	NA	Other	NA	NA	NA	NA	NA
<b>Jrarat</b>	Other			NA	NA	NA	NA
<b>Echmiadzin</b>	Other	Other		NA	HA	NA	NA
<b>Masis</b>	Other			NA	NA	NA	NA
<b>Alaverdi</b>				NA	NA	NA	NA

# Results – Nubarashen - summary



- Down the slope the soil has been found to be heavily contaminated by DDT, HCHs, some **non-chlorinated pesticides (mainly simazine) and PCDD/Fs.**
- The levels found may pose a risk to human health and animals when present in this area.

# Results – Nubarashen - summary



- The very high air contamination determined at the fence of the burial site is significantly decreasing by distance, however, OCP concentrations are still significantly elevated up to 2 km distance from the site.

- Although the level of PCDD/Fs and dioxin-like PCB toxicity found in eggs sampled in Mushavan cannot be directly compared to legal standards, the high levels of TEQ suggest that these eggs are not suitable for consumption.

# Results – Jrrarat - summary

- The floor in the preserved big storage room in this area exhibits levels of OCPs which may pose a risk to human health. The situation is extremely serious in the small demolished storage building which is characterised by an extremely strong smell (inappropriate storage of methyl mercaptophos).



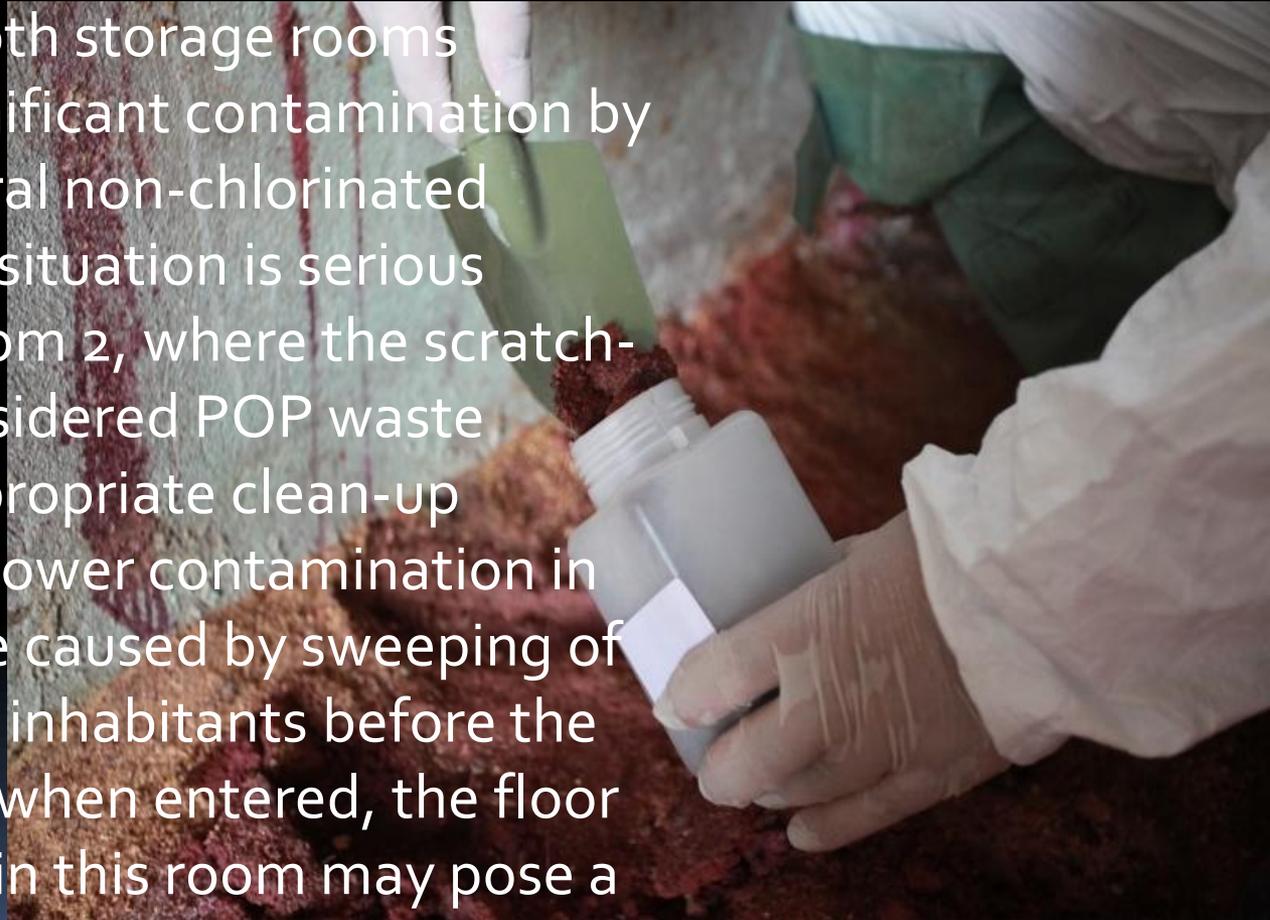
# Results – Jrrarat - summary



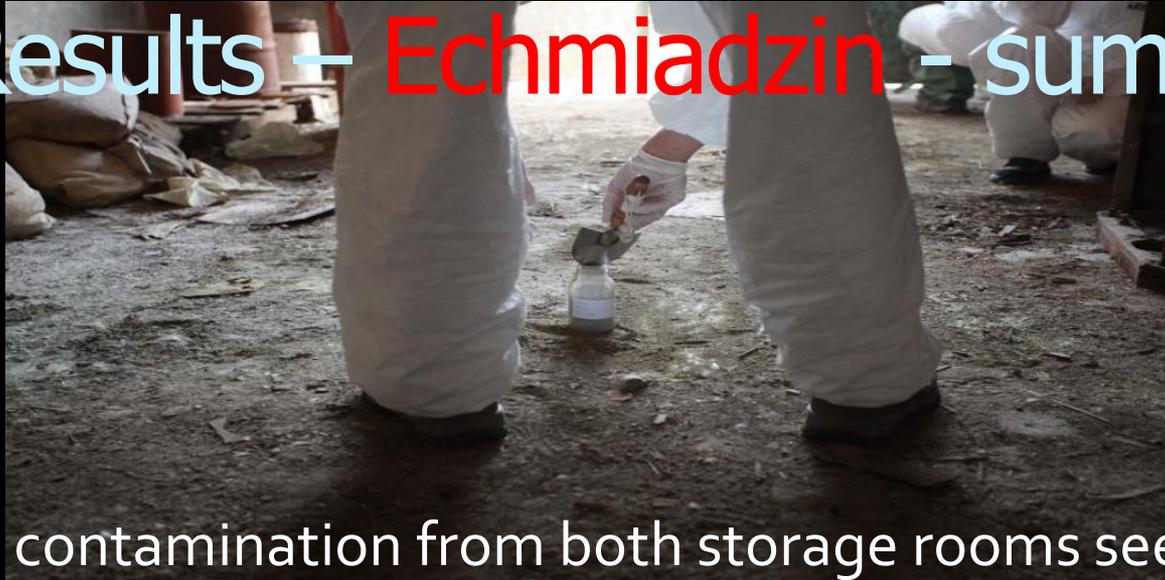
- The soil between two demolished buildings is heavily contaminated by DDT as well as other OCPs and can be considered POP waste demanding appropriate clean-up measures.
- The spread of OCPs to the wider surroundings is reflected in the concentration gradient determined by passive air sampling and elevated DDT levels in free range chicken eggs sampled nearby.

# Results – Echmiadzin - summary

- The floors of both storage rooms exhibited a significant contamination by OCPs and several non-chlorinated pesticides. The situation is serious especially in room 2, where the scratch-offs can be considered POP waste demanding appropriate clean-up measures. The lower contamination in room 1 could be caused by sweeping of the floor by the inhabitants before the sampling. Still, when entered, the floor contamination in this room may pose a significant risk to human health especially due to a high PCDD/Fs-PCB TEQ.



# Results – Echmiadzin – summary



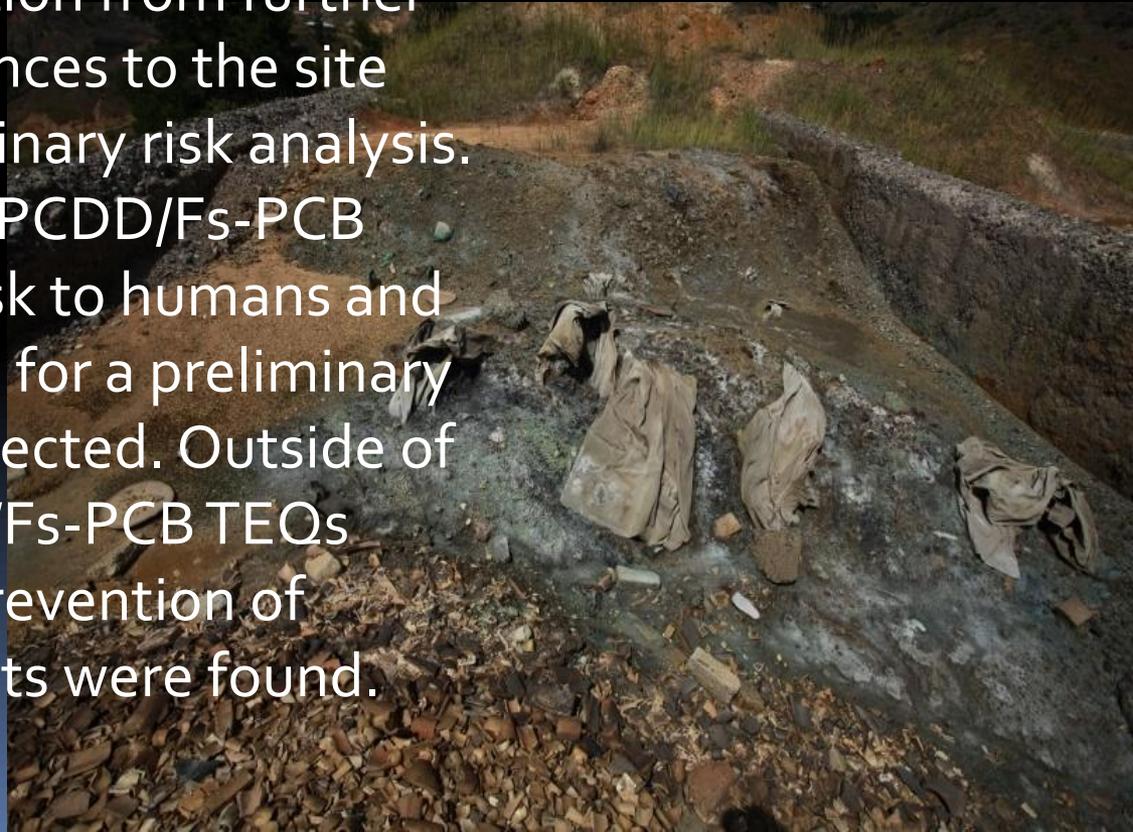
- The contamination from both storage rooms seems to spread out of the storage building (soil used to grow vegetable, the fish pond area cca 50 m far from the storage building is characterized by slightly elevated levels of DDT). The consumption of eggs sampled in close and wider surroundings of the storehouse which exhibited extremely high DDT concentrations is suspected to pose a significant health risk also due to high levels of PCDD/Fs and dioxin-like PCB toxicity.

# Results – Masis - summary

- The biggest storage room may pose a risk to human health when entered and contains waste heavily contaminated by HCHs and other pesticides. The floor in the central small storage room is heavily contaminated by non-chlorinated pesticides and the scratch-offs from the last small storage rooms can be considered POP contaminated waste indicating a demand for appropriate clean-up measures. The contamination in the storage rooms seems to spread out of them (elevated levels of DDT were detected in soil along the outer walls and in groundwater taken from a tap cca 100 m far from the storage rooms).

# Results – Alaverdi - summary

- The production waste sediment in the middle concrete enclosure exhibited levels of concentrations of some OCPs demanding a prevention from further input of these substances to the site and a possible preliminary risk analysis. Inside the enclosure, PCDD/Fs-PCB TEQs suggesting a risk to humans and animals and the need for a preliminary risk analysis were detected. Outside of the enclosure, PCDD/Fs-PCB TEQs levels suggesting a prevention of further PCDD/Fs inputs were found.



# Major new findings

- Project called „Scaling up Experience in Improvement of Chemical Safety to Contribute to Poverty Reduction in Rural Armenia“ (started in December 2009 - funded mainly from EU Aid Fund) allowed us to carry out larger scale analyses of obsolete pesticides and other wastes storages in Armenia
- **In general:** 42 pesticides out of 222 other than OCPs were detected in measurable amounts; new data on dioxins from Armenian environment; new obsolete storage of obsolete DDT
- **Nubarashen:** high dioxin and dioxin-like substances and non-OCPs pesticides contamination outside the burial site; air transport of contaminants

# Major new findings

- **Jrarat:** very serious contamination by DDT and other OCPs; almost clean DDT in damaged bags; spread of the contamination via air and found in chicken eggs
- **Echmiadzin:** very serious contamination by DDT, OCPs as well as other pesticides and PCDD/F + DL PCB; spread of contamination (chicken eggs, water, soil)
- **Masis:** very serious contamination by HCHs and other than OCPs pesticides; spread of contamination (soil, water).
- **Alaverdi:** high levels of PCDD/F + DL PCB in industrial wastes; spread of contamination (soil).

# Major suggestions

- To take measure in order to prevent further spread of contamination:
- Repackage obsolete pesticides and store them at safer place (best option centralized safe storage – not necessary expensive)
- Put fences around contaminated areas
- Stop to use contaminated buildings as storage for currently used fertilizers and pesticides
- Where people have to enter these and the other sites and rooms, they should be consequently reminded to wear personal protection equipment
- Make an inventory of all such hot spots in Armenia
- To address their contamination requires centralized action

# POPs – Why to destroy them?

- POPs persist in the environment, bioaccumulate and travel long distances





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*This presentation has been produced as part of the project called „**Scaling up Experience in Improvement of Chemical Safety to Contribute to Poverty Reduction in Rural Armenia**“ with the financial assistance of the European Union. The contents of this presentation are sole responsibility of Arnika Association and can under no circumstances be regarded as reflecting the position of the European Union.*

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<http://www.awhhe.am>

<http://english.arnika.org/armenia>

**Thank you for your attention**

