



# 2nd Biomonitoring research on persistent organic pollutants (POPs) in the surrounding environment of the cement plant

**Cementárreň Turňa nad Bodvou, Slovakia | 2024**



## Executive Summary



This Slovakia Biomonitoring research 2023-2025 is conducted in coordination with Zero Waste Europe, Brussels. Gratitude for the support of the local citizens of the region near the cement plant Cementáreň Turňa nad Bodvou A special thanks to Ing. Lenka Šingovská, representative of the civil organisation Zelený živel o.z., representing environmentally concerned residents of Turnianska Kotlina.

## AUTHORS

A. ARKENBOUT - Head of research at ToxicoWatch Foundation  
K. J. A. M. BOUMAN - Research ToxicoWatch Foundation

**HARLINGEN, THE NETHERLANDS, TOXICOWATCH FOUNDATION, NOVEMBER 2024**  
**PUBLICATION NUMBER:** 2024-SK02  
**CLIENT:** Zero Waste Europe

## DISCLAIMER

ToxicoWatch accepts no liability or responsibility whatsoever for any third party for any loss or damage arising from any interpretation or use of the information contained in this biomonitoring report, or reliance on any views expressed therein.

## Copyright © 2024 TOXICOWATCH FOUNDATION

This publication contains content created and produced for public dissemination. Permission to copy or distribute any portion of this material is granted under the condition that it is not used for commercial purposes and that proper credit is given by referencing the title and crediting the ToxicoWatch Foundation. ToxicoWatch holds accreditation as a Public Benefit Organisation (PBO).

All photographs are made by ToxicoWatch during biomonitoring sampling May 8-11th 2024., Graphs and tables are designed by ToxicoWatch, except mentioned else as in references and links. The map pictured at the front: alamy.com. For the map location pictures in this study was used Google maps.

[www.toxicowatch.org](http://www.toxicowatch.org)



**THE  
SIGRID  
RAUSING  
TRUST**

Zero Waste Europe gratefully acknowledges financial assistance from the European Union and The Sigrid Rausing Trust. The sole responsibility for the content of this event materials lies with Zero Waste Europe. It does not necessarily reflect the opinion of the funders mentioned above. The funders cannot be held responsible for any use that may be made of the information contained therein.

## EXECUTIVE SUMMARY

In 2023, the civil organisation Zelený živel o.z. representing environmentally concerned residents of Turnianska kotlina, took the initiative to contact Zero Waste Europe in Belgium and ToxicoWatch (TW) in the Netherlands. The first TW research, started with initial biomonitoring on October 30-31, 2023, in the region of Turňa nad Bodvou, near the cement kiln. This second biomonitoring research, started on May 8-11<sup>th</sup> 2024, is a follow-up. The TW research aims to assess the deposition of persistent organic pollutants (POPs), such as dioxins (PCDD/F/dl-PCB), Polycyclic Aromatic Hydrocarbons (PAH), PFAS, and Heavy Metals (HM), in the surrounding area of the cement kiln.

For this multi-year study (2023-2025), the area around the cement plant Cementáreň Turňa nad Bodvou located in the Košice Region of Slovakia is the central location for biomonitoring research. Reference samples were from the Slovak Karst National Park (NP Slovenský kras), with the guidance of official park rangers. All analysis results were performed by accredited labs in the Netherlands.

From May 8-11, 2024, 63 samples were collected by the TW team, including eggs/eggshells of backyard chicken, wildlife meat of deer, Carp fish (*Cyprinus carpio*) wildlife bird eggshells of Heron (*Ardea*), mosses (Bryophyta), pine needles (*Picea abies*), water from natural water stream and wells, sediment from natural water streams and wells, and soil.

### Key Findings of the 2nd TW biomonitoring:

1. Exceeding values for dioxins of the EU limit of 3.3.pg BEQ/g/fat (Dr CALUX) and 5.0 TEQ/g fat (GC-MS) were found in the eggs of backyard chickens.
2. The results of dioxins in mosses (Bryophyta) and pine needles (*Picea abies*) were highly elevated compared to reference sites.
3. Dioxin patterns (congeners) indicate a source of co-incineration of alternative industrial fuel.
4. Analysis of 14 Heavy Metals (HM) - Silver (Ag), Aluminium (Al), Arsenic (As), Barium (Ba), Cadmium (Cd), Cobalt (Co), Chromium (Cr), Copper (Cu), Mercury (Hg), Manganese (Mn), Nickel (Ni), Lead (Pb), Tin (Sn) and Zinc (Zn) – showed elevated levels of all heavy metals in mosses (Bryophyta) compared to the references from the Slovak Karst National Park (NP Slovenský kras), EU-limits and average levels of heavy metals in vegetables.
5. Comparative studies by Danucem Slovensko a.s., (conducted by Ekotoxikologické centrum Bratislava, ECB) and the Košice Regional Government (conducted by Ekolive) confirm the findings of TW regarding increased dioxins in backyard chicken

eggs but underestimate the elevated presence of Heavy Metals (HM) in vegetation and soil this research area.

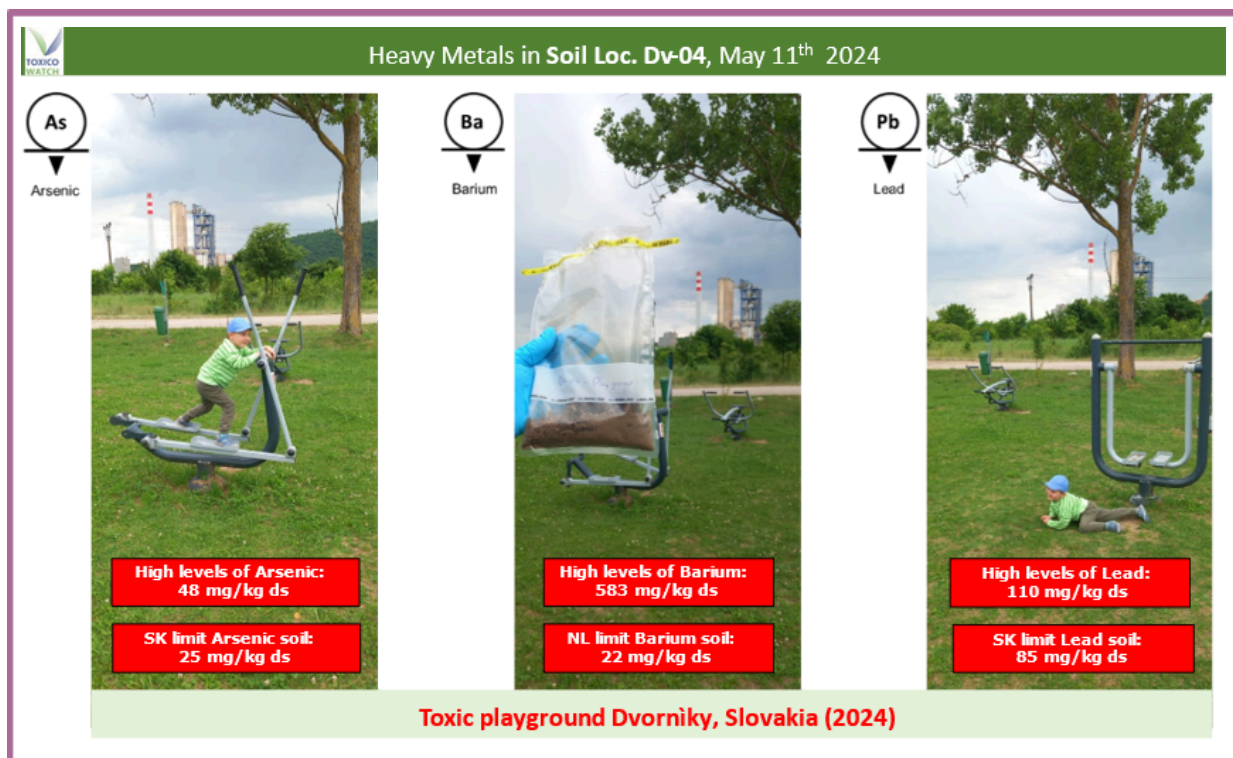
6. The analysis results in sediment at the reference sites in the Slovak Karst National Park > 20 km west of the cement kiln show significantly lower values than the results of fourteen (14) heavy metals in the soil at seven (7) sites within a radius of 3.5 km around the cement kiln.
7. A seriously contaminated children's playground in Dvorníky-Včeláre, located just 630 meters north of the cement kiln, was found to contain high levels of lead (Pb) and Arsenic (As).
8. High concentrations of Heavy Metals (HM14) were found in Mosses (Bryophyta), near the cement kiln, indicating a serious contamination of the soil in private vegetable gardens.
9. PFAS contamination, with chemical analysis LC-MS/MS on  $\Sigma$  24 PFAS substances, was found at all backyard chicken egg locations.
10. High values of PFAS with the PFAS CALUX assay were found in Brook Turňa (potok Turňa) water stream and sediment near the cement kiln, compared with the wells of Brook Turňa (potok Turňa) water wells at reference locations in the Slovak Karst National Park, Hrhov, Jablonov and Zádiel.
11. PFOS contamination was detected in the liver of Carp fish (*Cyprinus carpio*) from Lake Hrhov (Hrhovské rybníky), based on chemical PFAS analysis (LC-MS/MS  $\Sigma$  24).
12. Specific combustion-related PAH congeners (4- and 5-ring), such as Benzo[a]pyrene, were found in mosses (Bryophyta) and pine needles (*Picea abies*) in the surrounding area of the cement kiln, notably also in pine needles (*Picea abies*) at one location within the protected area of Slovak Karst National Park.
13. The specific congener patterns of dioxins (PCDD/F/dl-PCB) and polycyclic aromatic hydrocarbons (PAH  $\Sigma$  16) in the eggs of backyard chickens and vegetation showed elevated levels of combustion-related contamination.

These findings are a clear call for action for the responsible authorities to ensure that people living in the surrounding area of the cement kiln are provided with an environment free from industrial POP emissions. The precautionary principle should be applied as a guideline in this regard.

## ToxicoWatch strongly recommends:

1. A structural, yearly biomonitoring research programme on POP emissions, to monitor increases or decreases in POP contamination in the surrounding environment of the cement kiln in Turňa nad Bodvou.
2. The establishment of a Technical Working Group (TWG) involving all parties (independent research, representatives of concerned citizens, regional government, and the cement kiln industry), to work on technical improvements, such as filter systems, and a transparent monitoring system of for flue gas emissions of POPs and dust emissions from mining, production, transport, and waste. This initiative aims to stop the contamination of the area where people live and the surrounding natural environment of the Slovak Karst National Park.

**Figure 1 - Results heavy metals As, Ba, Pb on children's playground in Dvorníky, May 11th 2024**





# THE TRUE TOXIC TOLL

**To find out more, please visit**

**[www.zerowasteurope.eu](http://www.zerowasteurope.eu)**



Zero Waste Europe gratefully acknowledges financial assistance from the European Union. The sole responsibility for the content of this event materials lies with Zero Waste Europe. It does not necessarily reflect the opinion of the funder mentioned above. The funder cannot be held responsible for any use that may be made of the information contained therein.

