

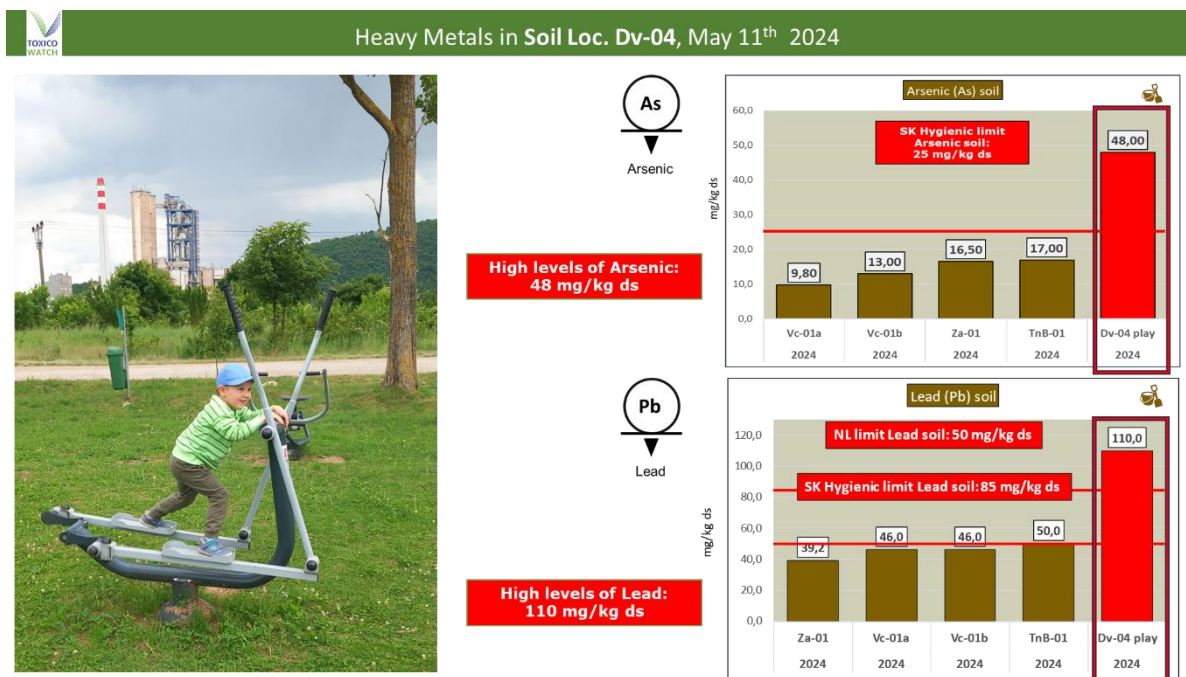
# Executive summary

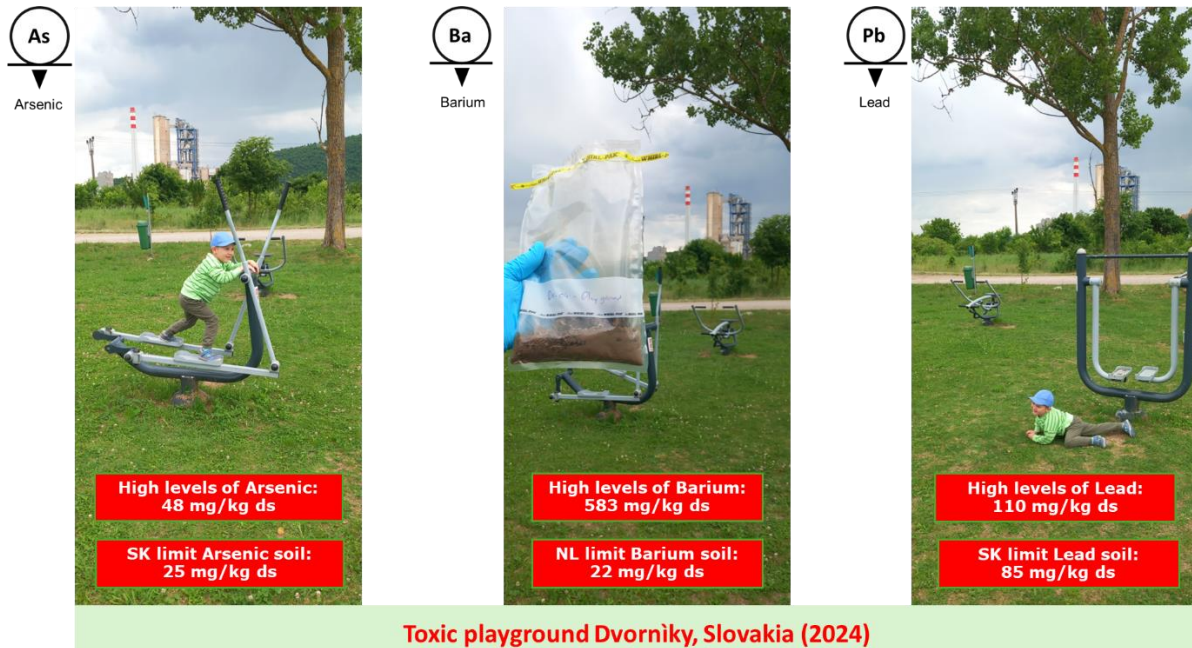
## 2<sup>nd</sup> TW-Biomonitoring in the region of the cement kiln Cementáreň Turňa nad Bodvou, Slovakia - May 2024

In 2023, the civil organisation Zelený živel o.z. representing environmentally concerned residents of Turnianska Kotlina, took the initiative to contact Zero Waste Europe and ToxicoWatch (TW). TW research, which began with an initial study in November 2023, followed by a second in May 2024, 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 surrounding the Cementáreň Turňa nad Bodvou cement kiln in the Košice Region in Slovakia. This interim report details the results from the second biomonitoring study in May 2024. All analysis are performed by accredited labs in the Netherlands: BioDetection Systems (BDS), Amsterdam and Normec, Groen Agro Control, Delfgauw. In the extended report of the SK biomonitoring May 2024, the full lab analysis will be published.

### Key Findings:

- Dioxins:** Dioxins were again detected in the environment of Dvorníky. The 2024 results showed an increase in dioxin levels found in the eggs of backyard chickens, while the levels in mosses (*Bryophyta*) and pine needles (*Picea abies*) decreased. The realistic picture is that incomplete combustion and pollutant formation occur even when a plant performs according to the designed conditions to achieve stoichiometric combustion. It shows that the deposition of POPs fluctuates according to plant performance. The report will discuss congener emissions during cement production in more detail. Dioxins were also detected in the meat of domestic cows in Včeláre but were not present in the samples of deer and Carp fish (*Cyprinus carpio*).
- PFAS:** PFAS contamination in water and sediment near the cement kiln was confirmed through bioassay PFAS CALUX and chemical analyses PFAS (LC-MS/MS). PFAS is detected in all samples of backyard chicken eggs and in the liver of Carp, from Lake Hrhovské rybníky by the LC-MS/MS method. No PFAS was found in samples of mosses (*Bryophyta*), though this analysis (LC-MS/MS) is limited to 24 PFAS substances. Further screening with the PFAS CALUX bioassay is recommended to address potential underestimated PFAS contamination in this area.
- Heavy metals:** Elevated heavy metal levels were found in areas surrounding the cement kiln, notably in soil, moss (*Bryophyta*), pine needles (*Picea abies*) and sediment samples compared to reference levels from the Slovak Karst National Park. An alarming level of the toxic heavy metal Arsenic (As) of 48 mg/kg was found at the playground/sports park in Dvorníky, exceeding the Dutch Safety limit of 20 mg/kg and the Slovak hygienic limit for Arsenic (As) of 25 mg/kg. Found concentrations of Lead (Pb) of 110 mg/kg at the same playground in the soil in Dvorníky exceed the Dutch Safety Limit of 50 mg/kg and the Slovak hygienic limit of 85 mg/kg. Research indicates that these neurotoxic metals can lead to issues like fatigue, anxiety, and reduced intelligence quotient (IQ) and intellectual function in children.





- ToxicoWatch analyzed 14 heavy metals (Ag, As, Al, Ba, Cd, Co, Cr, Cu, Hg, Mn, Ni, Pb, Sn, Zn) across various matrices, identifying a consistent pattern of elevated levels of heavy metals in the surrounding environment. Results from soil, moss, pine needles and eggshells highlight the underestimation of monitoring of heavy metal emissions in general and specific for this region.
- Comparative studies: both Danucem and the Kosice Regional Government launched biomonitoring studies in response to the findings. The results confirm the findings of TW of increased dioxins in the environment of the cement kiln. However, discrepancies emerged in the dioxins and PFAS between ToxicoWatch's results and those from the Ekotoxikologické centrum Bratislava (ECB). Likewise, heavy metals and PAH results from the study of Ekolive.

#### Conclusions:

The May 2024 TW biomonitoring report emphasises the critical need for structured biomonitoring of emissions from the cement industry. It is concerning that industrial emissions often receive minimum scrutiny, despite their harmful impact. Transforming the cement industry into a truly green industry requires a significant reduction in emissions, beginning with continuous monitoring across all pollutants –not limited to a few dioxin congeners or a small selection of heavy metals, but also including PFAS, the so-called “forever chemicals”.

Establishing independent biomonitoring would help restore public trust. Understanding the nature of toxic emissions represents a first step toward forward a cleaner environment - especially as the cement kiln increases production and begins using alternative fuels like car tyres and waste oil. Countries with major cement- production are already addressing these gaps by implementing technical and monitoring measures to reduce emissions. Slovakia, too, would benefit from taking additional steps towards a truly green practice, ensuring that we do not pass today's waste challenges onto future generations.

TW, November 13<sup>rd</sup>, 2024