

PCDDs/FS CONTAMINATION OF THE SURROUNDINGS OF SPOLANA NERATOVICE BEFORE AND AFTER FLOODS 2002

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Introduction

The Spolana Neratovice factory is in this time probably the most known source of POPs contamination in the Czech Republic. The chemical factory of Spolana Neratovice is situated approximately 25 km north of Prague at the Elbe River. It produced in the period of 1965-68 the chlorine herbicide 2,4,5-T and chlorinated phenols. A part of 2,4,5-T was even exported to the USA and was applied as the component of "Agent Orange" within the Vietnam war. During the production due to breaking technological conditions, a huge amount of dioxins (in particular, the most toxic 2,3,7,8-TCDD) was formed and former factory buildings containing products, intermediates, installations, etc. belong currently to the most dioxin-contaminated sites on the globe. Moreover, soil in the factory is highly contaminated with organochlorine pesticides produced there, as well. The 2,4,5-T and chlorophenols production was stopped in 1968 when about 80 cases of occupational diseases developed (55 workers were hospitalized mainly with severe chloracne manifestations and porphyria) (Pazderova-Vejlupkova et al., 1981, Pelclova et al., 2001; Zemek and Kocan, 1991, Kocan et al., 1991).

The production was stopped in 1968 and former producing building were closed, but unfortunately did not decontaminated or destroyed up to date. This site is still a big potential source of contamination of Elbe river by OCPs and PCDDs/Fs.

Chemical analysis proved an extremely a high degree of the contamination of waste products stored in production buildings, building walls and floors, air, soil and ground water. The highest concentration of dioxins (over 24 ppm of 2378-TCDD) was measured in the residues of chemical substances. It is assumed that there are tons of that waste stored in the buildings.

The Spolana factory including some of the dioxin-contaminated buildings were flooded in 2002 and one can expect dioxin release into agricultural fields and Elbe River and its sediment. An extend of environmental contamination were given as well as to start with the definitive solution of dioxin-contaminated buildings and soil in their vicinity in Spolana Neratovice .

The main goal the very broad set of chemical analysis, which were done after floods , was to determine the level of environmental compartments contamination in the vicinity of company by PCDDs/Fs, DL PCBs and other chlorinated POPs and evaluate the potential risk for human population in this area.

Materials and Methods

More than 100 samples (21 soils, 33 sediment, 27 waters, 2 wastes, 21 biotic and food samples) were analyzed for the PCDDs/Fs contents before and after floods from the surroundings of company. Additional 14 samples of

sediments from other sampling sites of Elbe basin were collected and analyzed. Totally 118 samples were analyzed (19 before and the the rest after floods).

Results and Discussion

The samples of soil, sediment and water were collected for the analysis of PCDDs/Fs, PCBs and OCPs. The sampling sites include localities within the chemical factory of Spolana Neratovice and localities from the surroundings (Neratovice, Mlékojedy, Libiš, Obříství, Větrušice). Besides these samples they were collected samples from other parts of the Czech Republic. They include both samples from background localities and samples from urbane localities as well.

Figures 1 and 2 show the comparison of 2,3,7,8-substituted congeners of PCDDs/Fs from reference soil and sediment samples collected in the Czech Republic before and after floods 2002 and from the samples collected in the surrounding of Spolana Neratovice

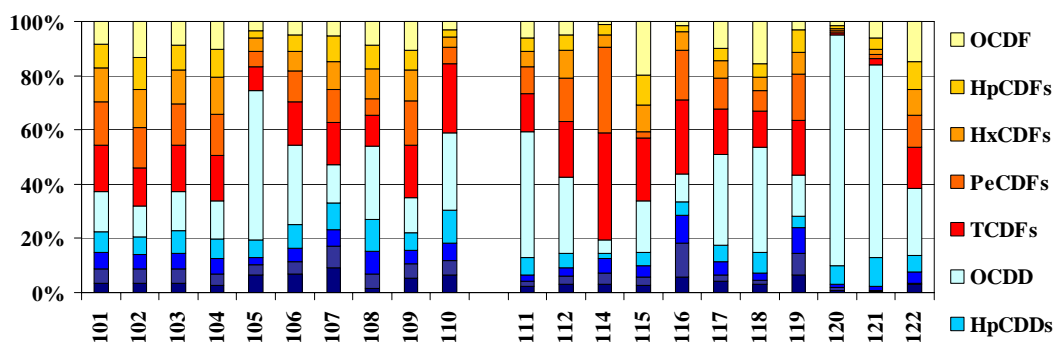


Figure 1: The comparison of 2,3,7,8-substituted congeners of PCDDs/Fs from reference soil samples collected in the Czech Republic before and after floods 2002 and from the samples collected in the surrounding of Spolana Neratovice

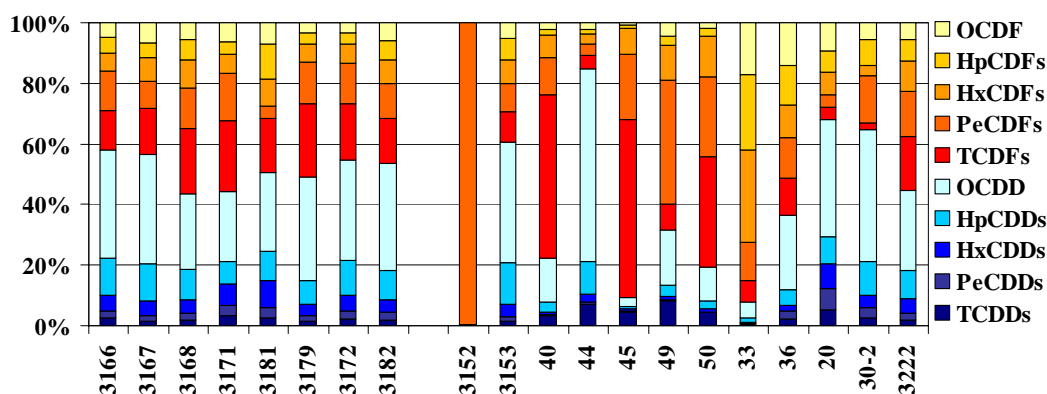


Figure 2: The comparison of 2,3,7,8-substituted congeners of PCDDs/Fs from reference sediment samples collected in the Czech Republic before and after floods 2002 and from the samples collected in the surrounding of Spolana Neratovice

Figure 3 and 4 show the sediment and soil sample location and results of PCDDs/Fs determination in sediment (Fig. 3) and soil (Fig. 4) samples

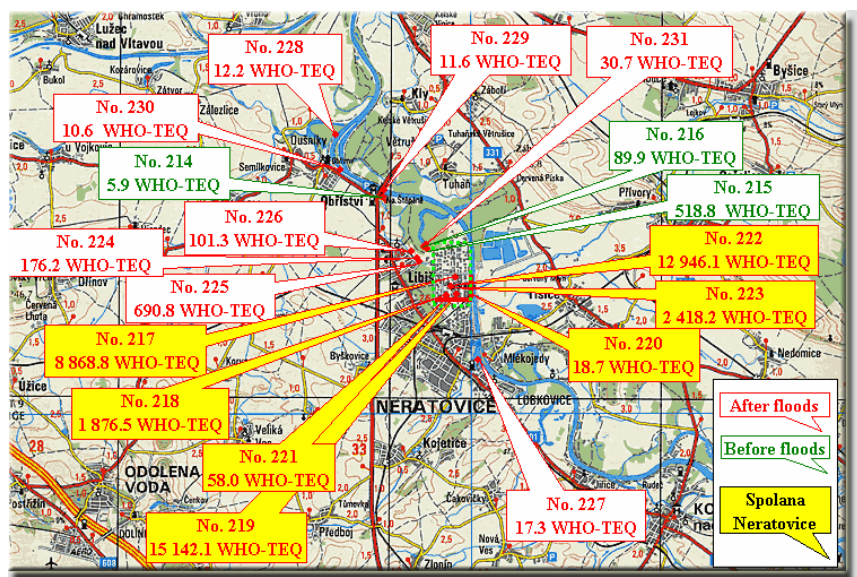


Figure 3: The contents of PCDDs/Fs in sediment samples before and after floods from the vicinity of company and from the area of company

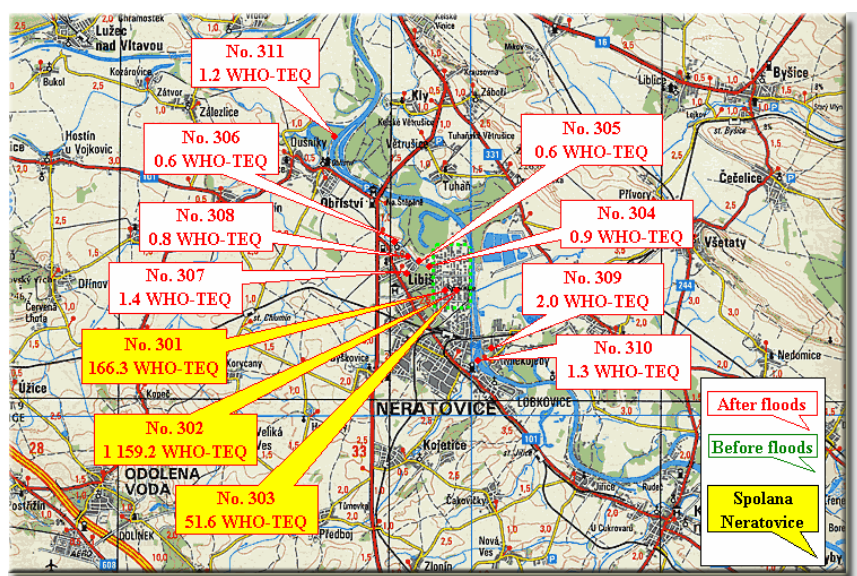


Figure 4: The contents of PCDDs/Fs in soil samples before and after floods from the vicinity of company and from the area of company

Conclusions

- Observed contents of PCDDs/PCDFs in Elbe sediments are not higher with comparison with the levels of PCDDs/Fs in industrial regions of the Czech Republic or Europe.
- Similarly the soil contents of PCDDs/Fs are slowly higher than the mean level of contamination in the Czech Republic.
- This investigation confirmed high contamination of some parts of area inside factory and also the existence of other source of PCDDs/Fs contamination. It can be connected with old chlorine production which was stopped in 1975. The congener pattern which is a typical for former production of chlorinated pesticides with the predominance of 2378-TCDD is easily recognized in the case of samples from the area of company (for example sample 3152, Fig. 2). For former chlorine production is typical congener pattern with higher contents of penta and hexa chlorinated furans).
- Beside the PCDDs/Fs contamination, the contamination of environmental matrices by OCPs in the vicinity of the company was detected (soils from the surroundings, water from the area of company and some biotic samples).
- The determined PCDDs/Fs concentrations in abiotic matrices do not represent acute health risk for human population.

Acknowledgements

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