Application of Environmental Forensics in soil contamination

Carlo Monti

Senior Managing Scientist
Exponent International Ltd
Aeschenvorstadt 57
4051 Basel, CH
cmonti@exponent.com

Keywords: Soil; Forensic; Dioxin; PCB; Fingerprint

The scope of this project was to apportion, in an old industrial area in North Italy, the responsibilities of the pollution of the soils and of the sediments of the net of the irrigation canals of the area to different companies. The industrial area has been exploited by different industries since the beginning of the last century. The most important companies became from the chemical and from the metallurgical industry. The chemical company started the production of chlorine compounds since 1900; the production of chlorine has been done by the use of a chloroalkali plant. Since 1935 the company started the production of PCBs that has been discontinued in 1984. A big area outside the industrial area has been identified polluted by PCBs and PCDD/F since the beginning of 2000. Many studies have been conducted to identify:

- The fonts of the PCDD/F and PCBs and the relative apportion
- Study the fingerprint of PCDD/F to identify the responsibilities and the extent of the pollution in the soils to be reported to each font
- Study the pollution of food as related to humans or to animals
- Study the level of PCDD/F and PCBs in different compounds (blood, serum and breast milk) in human body
- Perform an health risk assessment

The fingerprint analysis has been carried on by using all the PCDD/F data gathered on the different matrix analyzed including soils, sediments, emission sources (dusts and ashes) and atmospheric data. The data have been analyzed using the multivariate statistical approach (Schelds at al. 200...) and then for each cluster a characteristic PCDD/F profile has been identified and compared with profiles taken by the literature. With this methodology we were able to identify the origins of the PCDD/F found in the different media analyzed and in the different areas of the site.

Figure 1. Area of the Caffaro's industrial site.

References

Shields WJ, Tondeur Y, Benton L, Edwards MR. Dioxins and furans (2006). **Chapter 14. In: Environmental Forensics: Contaminant Specific Guide**. Morrison R and Murphy B (eds), Academic Press, San Diego, 576 pp, 2006.

UNEP (United Nations Environmental Program (2005). **Standardized toolkit for identification and quantification of dioxin and furan relesase. Edition 2.1, December 2005.** UNEP Chemicals, Geneva, Switzerland, 253 pp)