

## Greenpeace Research Laboratories Analytical Results 2018-06

### Organic contaminants and metals in soil and ash samples from the scene of a fire at a hazardous waste dumpsite in Poland

October 2018

#### Introduction

9 samples (6 soil samples and 3 ash samples) were received from Greenpeace Poland for analysis at the Greenpeace Research Laboratories on 11.09.2018. According to documentation supplied, all samples were collected on 06.09.2018, from the grounds of a hazardous waste dumpsite located in Jakubów, Radwanice (Lower Silesia), Poland, after a large-scale fire (see photos below). The first fire, which official stated as being due to arson, took place on 24.07.2018, starting at 1pm and contained at around 8pm, though the firefighting operation took 48 hours in total to bring the fire to an end. Two acres of land/forest surrounding the dumpsite were affected. This dumpsite has caught fire at least 3 additional times between the initial fire on 24.07.2018 and 28.08.2018. According to media reports, one of these fires took place on 06.08.2018 and covered an area of about 10 m<sup>2</sup>. The two other fires covered smaller areas within the dumpsite.

According to information provided by Greenpeace Poland, the dumpsite operated without any permission since the second half of 2016, and in February 2017 a court refused to grant operational permission to the owner. The site stored an estimated number of 1700 pallet units of containers including DPPL containers (intermediate bulk containers – 1000 litres), metal barrels (200 litres) and other containers with a capacity of several to several dozen litres. In 2016, an inspection by the environmental protection services (EPS 2018) confirmed that the dumpsite was being used to storage a wide variety of wastes including paints and varnishes containing solvents or other dangerous substances, aqueous suspensions of paints/varnishes, printing toner, adhesives and sealants, sludges of printing inks, emulsions and solutions from metalworking, engine/gear/lubricating oils, packaging of hazardous substances, sorbents and plastics.





Details of the samples received are provided in Table 1a, together with GPS coordinates for the sample collection location in Table 1b.

Sample code	Sample type	Sampling location
PL18001	Soil & ash	soil washed with wastewater from fire suppression actions
PL18002	Soil & ash	bottom of the mound of earth (a hill that existed before the fire), just next to the firemen' wastewater flow
PL18003	Soil & ash	burnt area formerly covered in vegetation in central part of the dumpsite
PL18004	Soil & ash	soil from a flat ground opposite to a large mound of burnt down trash; area that was probably cleaned after fire
PL18005	Soil & ash	ground in the forest that remained in central part of the dumpsite, just next to the warehouse that was burnt to the ground
PL18006	Soil & slime	soil washed with wastewater from fire suppression actions, in the forest outside the dumpsite
PL18007	Ash	pile of ash taken from under burnt metal barrels
PL18008	Ash	pile of ash taken from under burnt/melted plastic canisters and dislocated burnt metal barrels
PL18009	Ash	pile of burnt/melted trash, possibly roofing felts or other kind of construction material

Table 1a: details of samples from Chemical dumpsite, Jakubów, Radwanice (Lower Silesia) received and analysed at the Greenpeace Research Laboratories.

Sample code	N	E
	degree (°)	degree (°)
PL18001	51.59652	16.00472
PL18002	51.59669	16.0051
PL18003	51.59637	16.00534
PL18004	51.59622	16.00475
PL18005	51.59589	16.00566
PL18006	51.59716	16.00371
PL18007	51.59665	16.00548
PL18008	51.59661	16.00575
PL18009	51.59601	16.00663

Table 1b: GPS coordinates of sample collection locations.

## **Materials and methods**

Concentrations of metals and metalloids were determined for all samples by ICP mass spectrometry (MS) following acid digestion and using appropriate certified reference samples and laboratory reference samples.

Semi-volatile organic compounds (sVOCs) were isolated from samples using Accelerated Solvent Extraction (ASE) system with a mixture of pentane and acetone. After the separation of the extracted compounds between organic (e.g., pentane) and aqueous phases, the latter was further extracted into methanol using Solid Phase Extraction (SPE) technique. Extracted compounds were subsequently identified as far as possible using gas chromatography/mass spectrometry (GC/MS) operated in SCAN mode and liquid chromatography-Orbitrap-mass spectrometry (LC-Orbitrap-MS).

More detailed descriptions of the sample preparation and analytical procedures are presented in Appendix 1.

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## Results and Discussion

The results for the samples are outlined in the following sections. The concentrations of metals and metalloids in solid samples are reported in Table 2a and 2b for soil samples and ash samples, respectively. The organic chemicals identified in individual samples are summarised in Table 3.

Chromatograms and detailed lists of organic chemicals that were identified in each sample using GC-MS analysis are provided in Appendix 2. Full results of LC-Orbitrap-MS analysis are presented in Appendix 3. A selection of additional photos from the dumpsite is provided in Appendix 4.

### 3.1 Metals

The data show that all soil samples had high concentrations of copper, and all samples except PO18001 had concentrations of zinc higher than typically found in uncontaminated soil, especially for PO18003. Similarly, four soil samples (PO18001-PO18004) had concentrations of lead notably higher than those typically found in uncontaminated soil. One of the soil samples (PO18003) also contained notably high concentrations of other metals including antimony, chromium and lead. In addition, sample PO18005 contained chromium at a concentration higher than most other samples.

Sample code	PO18001	PO18002	PO18003	PO18004	PO18005	PO18006	Dutch Intervention values for soil	Average abundance, continental crust	Average abundance, shale
Aluminium	4390	6190	18050	12000	9810	4810	-	81300	80000
Antimony	0.29	0.40	102	0.47	0.65	1.50	15	0.2	1.5
Arsenic	6.55	9.63	23.3	20.4	8.92	3.73	55	1.8	13
Barium	135	349	406	222	109	181	625	425	580
Cadmium	0.33	0.47	1.29	0.52	1.38	0.52	12	0.2	0.3
Chromium	59.4	80.5	317	60.6	249	57.3	380	100	90
Cobalt	8.62	38.5	89.3	29.3	12.7	7.32	240	25	19
Copper	594	441	800	919	346	1420	190	55	45
Iron	11100	14800	78950	10400	8230	2800	-	50000	47200
Lead	454	625	843	652	130	85	530	13	20
Manganese	328	330	855	417	754	117	-	950	850
Mercury	<0.08	0.47	<0.08	<0.08	<0.08	0.34	10	0.08	0.4
Nickel	26.9	40.2	48.1	34.4	9.28	29.4	210	75	68
Vanadium	15.9	57.5	94.8	58.9	20.0	11.4	250	135	130
Zinc	183	784	10450	415	848	658	720	70	95

Table 2a: Concentrations of metals and metalloids (mg/kg DW) in soil samples, together with intervention values for soil remediation in the Netherlands (NMHSPE 2000) and the average abundances in continental crust and in shale (Krauskopf & Bird 1994)

Though not directly comparable, historic threshold levels deemed to be indicative of serious contamination for soil in the Netherlands are included for comparison (NMHSPE 2000). These threshold levels are no longer currently in force in the Netherlands. Similarly, average concentrations of metals and metalloids in continental crust and in shale are included for comparison (Krauskopf & Bird 1994).



All three ash samples (PO18007-PO18009) contained high concentrations of copper, lead, zinc and, to a lesser extent, cadmium. Each ash sample also contained a selection of other metals or metalloids at high concentrations, namely PO18007 (barium, chromium and mercury), PO18008 (barium, chromium and nickel) and PO18009 (antimony and arsenic).

<b>Sample code</b>	PO18007	PO18008	PO18009
Aluminium	13900	23100	10700
Antimony	0.42	1.53	14.6
Arsenic	7.47	9.19	89.4
Barium	6060	12650	386
Cadmium	3.47	2.06	2.73
Chromium	219	471	40.6
Cobalt	79.1	61.8	42.3
Copper	1480	2025	8870
Iron	62200	77200	33500
Lead	2520	1130	1500
Manganese	1010	3125	438
Mercury	18.1	1.36	0.88
Nickel	72.2	271	34.0
Vanadium	40.2	50.0	57.7
Zinc	19700	15100	28700

Table 2a: Concentrations of metals and metalloids (mg/kg DW) in ash samples

### **3.2 Organic contaminants**

#### **3.2.1 Semi-volatile organic compounds (sVOCs, determined by GC-MS)**

Table 3 presents summary of the organic compounds reliably identified in samples, more detailed information for individual samples is presented in Appendix 2.

The highest number of organic compounds was isolated from soil sample PL18004 (455 compounds) followed by soil sample PL18006 (399 compounds) and ash sample PL18009 (357 compounds). Soil sample PL18001 had the lowest number of organic compounds (97 compounds) among all investigated samples. It was not possible to identify reliably all isolated compounds as these were highly contaminated samples containing complex mixtures of organic compounds often at high abundances, such that chromatographic peaks for individual compounds tended to overlap frequently (see Fig. 1).

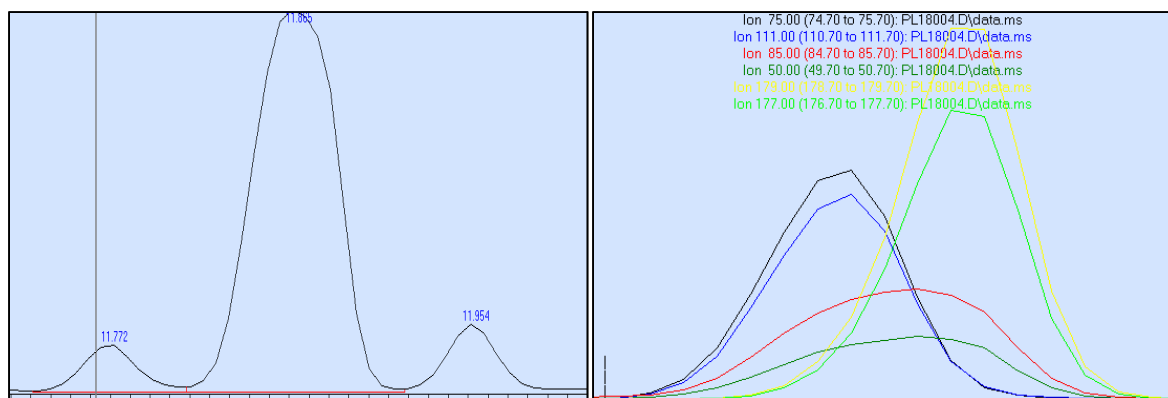


Fig. 1 Part of the GC/MS chromatogram for sample PL18004 (left) and fragmentation of three overlapping individual compounds (right) that formed one peak shown on left chromatogram at 11.865 min.

Sample Code	PL18001	PL18002	PL18003	PL18004	PL18005	PL18006	PL18007	PL18008	PL18009
Sample type	soil	soil	soil	soil	soil	soil	ash	ash	ash
Volume of analysed extract, ml	1	1	1	50	1	50	50	50	1
Number of sVOCs isolated	97	194	114	455	159	399	341	251	357
Number of sVOCs identified to >90%	39	67	39	125	62	120	104	89	108
Percentage of sVOCs identified to > 90% (%)	40	35	34	27	39	30	30	35	30
Chlorinated compounds	11	20	6	89	22	16	2	10	11
Nitrogen-containing chlorinated compounds	nd	2	nd	3	nd	1	1	nd	nd
Nitrogen-containing compounds	nd	4	1	1	nd	5	2	5	7
Phosphorus-containing chlorinated compounds	nd	3	nd	2	nd	3	3	2	nd
Phosphorus-containing compounds	nd	2	1	nd	2	2	nd	nd	nd
Phthalates, adipates & relative compounds	3	7	1	1	2	1	30	7	nd
Carboxylic/fatty acids and derivatives	1	6	2	9	8	15	17	15	8
Phenol and its derivatives	nd	6	nd	2	1	7	4	8	2
PAHs and their derivatives	nd	2	1	nd	4	1	1	nd	15
Alcohols & their derivatives	nd	1	1	2	1	9	5	3	nd
Aldehydes & ketones	nd	2	nd	2	3	7	6	3	2
Alkylated benzenes	7	2	4	nd	3	21	2	2	19
Linear & branched aliphatic hydrocarbons	15	7	19	8	13	18	24	27	31
Indane/Indene and derivatives	2	nd	2	nd	1	3	1	2	2
1,1'-Biphenyl and its derivatives	nd	1	nd	1	nd	4	1	1	9
Cholestane and derivatives	nd	1	nd	2	1	1	1	1	nd
Other compounds	nd	3	1	3	1	9	5	2	1

Table 3: Summary of results of organic compounds analysis in samples determined by GC/MS. nd – not detected

The percentage of the organic compounds present that could be reliably identified varied from sample to sample, in the range from only 25% (sample PL18004) to 40% (sample PL18001). In all cases, therefore,

the identity of the majority of organic compounds isolated could not be reliably determined, even through application of advanced environmental forensic screening techniques.

Those organic compounds that could be identified were represented by a diverse range of toxic chemicals, with chlorinated compounds being the most dominant; for example, sample PL18004 contained 89 organochlorine compounds, 3 nitrogen-containing organochlorine compounds, and 2 phosphorous-containing organochlorine compounds, which represented 74% of all reliably identified compounds in this sample. Contamination of soil by such a variety of organochlorine compounds is of great concern, as most of these chemicals, if not all, may be expected to possess significant toxic properties, thus posing a substantial hazard to human health or the environment. It is important to note that organic chemicals detected in samples in this study most probably arose not only from the waste stocks localised at this dump site, but also as a result of thermal degradation and incomplete combustion of toxic wastes during the fires. For example, burning of PVC plastics inevitably releases a number of highly toxic substances including chlorinated benzenes, chlorinated phenols, chlorinated toluenes, chlorinated butanes and propanes, and chlorinated butadienes, among others (Stringer & Johnston 2001; Yu et al. 2016). Two or more representatives of these classes of chemicals have been detected in all samples with sample PL18004 once again being the most contaminated. It is important to note that highly toxic, persistent and bioaccumulative chlorinated dioxins and furans may also be formed during burning of PVC plastics and other chlorinated compounds (Stringer & Johnston 2001). Further investigation of this dumpsite and the contaminants it contains in soils and ashes remaining after the fires should be an urgent priority, such that substantive hazards can be identified and properly contained rather than being left with the potential to contaminate the environment around and beneath the site.

Other groups of chemicals that were frequently detected in most of the samples were:

- Phthalates, adipates and related compounds – chemicals that mainly used as plasticizers. One or more compounds from this class (up to 30 in sample PL18007 that contained diisononyl phthalate isomers) were detected in all but sample PL18009;
- Phosphorous-containing compounds including chlorinated derivatives– were present in 7 samples (excluding sample PL18001 and PL18009). In most cases, alkyl or aryl esters of phosphoric acid predominated. These chemicals are used as flame retardants and plasticizers in a variety of products including plastics;
- Carboxylic/fatty acids and their derivatives – these chemicals were detected in all samples; they have a variety of uses including as organic solvents as well as in the manufacture of plastics and detergents;
- Phenol and phenolic compounds - seven samples (excluding PL18001 & PL18003) contained from one to eight representatives of this chemical class including Phenol, 4,4'-(1-methylethylidene)bis, commonly known as Bisphenol A or BPA (detected in 5 samples in this study). BPA is mainly used in synthesis of plastics such as polycarbonates and epoxy resins;
- Linear and branched aliphatic hydrocarbons - these chemicals, which were detected in all samples, are the main constituents of gasoline; various solvents may contain a blend of different aliphatic hydrocarbons; some aliphatic hydrocarbons are used in organic synthesis;

- Alcohols and their derivatives – this class was mainly represented by alcohol alkoxylates and phenoxyates that are commonly used in surfactants formulations, including in firefighting and cooling compositions. 9 representatives of this class were detected in sample PL18006, which was collected from an area of the site that had been washed by firefighters using such foam compositions. Other samples (excluding PL18001 and PL18009) contained from 1 to 5 representatives of this class;
- Nitrogen-containing compounds, including chlorinated forms – those were detected in seven samples (excluding samples PL18001 and PL18005). Two fungicides belonging to this class were identified, as Chlorotalonil in sample PL18004 and Metalaxyl in samples PL18006 and PL18008. The neonicotinoid insecticide Imidacloprid was detected in three samples (PL18002, PL18006 and PL18007). Two ash samples (PL18007 and PL18009) contained dicyanobenzene, also known as phthalonitrile, which is used in manufacture of pigments, fluorescent brighteners, and photographic sensitizers. Ethylmethyl derivatives of benzenesulfonamide were detected in two samples (PL18002 and PL18006); these chemicals are used as plasticizers as well as in formulations of ink, toner, and colorants.

### ***3.2.2 Organic compounds determined by LC-Orbitrap-MS in aqueous phase of the samples' extracts***

Additional targeted screening using LC-MS to complement the GC-MS analyses described above identified eleven different substances across the nine analysed samples. These are listed in Tables A3 and A4 provided in Appendix 3. Two polyfluorinated surfactants were found, including PFBS in sample PL18006 and PFOS in samples PL18002, PL18006, PL18007 and PL18008. Five different phthalate plasticizers were also identified through the LC-MS analysis, including BBP, DMEP, DPP, DIHP and TCEP, the latter one being present in all the samples. Benzotriazole and tolyltriazole, used as corrosion inhibitors, were also found in all the samples. In addition, two derivatives of benzotriazole, XTri (another corrosion inhibitor), and UV P (a photodegradation inhibitor), were present in samples PL18006 and PL18007, and in samples PL18002, PL18006 and PL18007, respectively.

In parallel, another set of sixteen substances was found following the non-targeted screening approach using the LC-MS system, to complement further the analyses described above. Results from this part of the analysis are shown in Tables A3 and A4 provided in Appendix 3. Four pesticides were identified in this way as contaminants in the group of samples, including imidacloprid (found in eight of the samples), thiamethoxam, DMST and DEET, the latter being present in all the samples. Nine components of industrial products, including triphenylphosphine oxide, used in paints and coatings, abietic acid, applied for ships caulking, DEHA, a plasticiser and ingredient of hydraulic fluids like aircraft lubricants, the plasticizer Ciproflex A4 and five chemicals used for the production of polymers, including caprolactam, PPG n7, PPG, n8, PPG, n9 and PPG n10. The four latter compounds were present in 8 of the samples. One personal care product ingredient used as a sunscreen (7-Hydroxycoumarine), and a metabolite of palmitic acid, which is used to produce soaps and cosmetics, were present in 7 and 4 of the samples, respectively. Finally, the endogenous lipid oleoyl ethanolamide was present in some of the samples. One compound, benzotriazole, was detected by both complementary LC-MS methods, i.e. both the targeted and the non-targeted screening.

In total, the samples containing highest number of substances in the aqueous phase of the samples' extracts was PL18007, with 25, followed by sample PL18006, with 24, and samples PL18002 and PL18008, with 22 substances.

## **Conclusion**

The current study has shown that soils at chemical dumpsite located in Jakubów, Radwanice (Lower Silesia), Poland, and surrounding grounds that have been affected by a multiple large-scale fires in July-August 2018 are highly contaminated by a diverse range of toxic organic contaminants that either were stored on the site or formed as a result of the stored waste burning. High concentrations of several heavy metals have been detected in samples. The majority of the detected contaminants may pose human health and environmental hazards. This site must be subject to urgent more detailed investigations in order to determine the precise nature, extent and severity of chemical contamination in the soils and residues on site, as well as looking for the spread of contamination to the surrounding area. Steps must also be taken to contain hazardous residues until they can be properly dealt with, and to compile documentation on wastes stored at the site prior to the fire.

## **For more information please contact:**

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## **References**

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## Appendix 1: Details of methodologies

### Analysis for extractable organic compounds

#### Preparation

20 µg of deuterated naphthalene was added as an Internal Standard (IS) to each portion of sample that was subject to extraction.

Soil and ash sample extraction: approximately 10 g of each sample (wet weight) was extracted employing an Accelerated Solvent Extraction (ASE) technique, using a Dionex ASE-350, with a mixture of pentane and acetone in a ratio of 3:1, and at a temperature of 100°C. Obtained extracts were concentrated to a volume of 3ml with a stream of clean nitrogen and cleaned up prior to analysis.

For the clean-up stage, each extract was vortexed for 1 min with 3 ml of concentrated sulfuric acid. After phases separation, organic phase was shaken with 3ml isopropyl alcohol and 3ml TBA-reagent (mixture of 3% tetrabutylammonium hydrogen sulphate and 20% sodium sulphite in deionised water) and left to stand until the aqueous and organic phases had separated.

A 20-mL fraction of the aqueous phase in the primary extracts, obtained from samples and blanks, was acidified at pH 4 with formic acid and re-extracted by solid-phase extraction (SPE), using Oasis HLB cartridges (Waters) in an AutoTrace system (Thermo Fisher Scientific). The extraction sorbent was firstly conditioned with 5 mL of methanol followed by 5 mL of ultrapure water. Then, 20 mL of each extract were loaded on a different cartridge, at a 5 mL min<sup>-1</sup> flow rate. Once the whole extract volume had passed through the HLB sorbent, another 5 mL of ultrapure water were passed through the cartridges in order to eliminate salts and poorly retained interferences. Then, the cartridges were dried under a gentle nitrogen flow and, finally, 4 mL of methanol were used to elute the substances retained by the sorbent.

This secondary extract, in methanol, was analysed by GC-MS. In the case of LC-MS analysis, this extract was diluted with ultrapure water (1:1) before analysis.

The pentane phase was collected and eluted through a Florisil column, using a 95:5 pentane:toluene mixed eluent resulting in about 50ml of the extract. The cleaned extract was concentrated to a final volume of 1ml in case of samples PL18001, PL18002, PL18003, PL18005, and PL18009. Due to a high load of organic compounds in samples PL18004, PL18006, PL18007, and PL18008, an aliquot of the original 50ml extract was analysed. 20 µg of bromonaphthalene was added to each extract as a second IS prior to GC-MS analysis.

#### Analysis

##### GC/MS analysis

For the total organic compounds screening, samples were analysed using an Agilent 6890 Series II GC with Restek Rtx-17Sil column (30m, 0.25mm ID, 0.25 µm film thickness) linked to an Agilent 5975B Inert MSD operated in EI mode and interfaced with an Agilent Enhanced Chem Station data system. The GC oven temperature program employed was as follows: an initial temperature of 40°C, raised to 260°C at 10°C/min, then to 295°C at 50°C/min (held for 5 min), then to 325°C at 50°C/min (held for 4 min), finally raised to 330°C at 50°C/min. The carrier gas was helium, supplied at 1ml/min. Identification of compounds

was carried out by matching spectra against both the Wiley W10N11 and Pesticides Libraries, using expert judgment as necessary in order to avoid misidentifications.

#### LC-Orbitrap-MS analysis

A targeted screening for an inventory of 75 emerging contaminants was performed. Table A1 shows the full list of chemicals searched in this investigation, together with the theoretical masses ( $m/z$ ) of their pseudo-molecular ions.

This list includes micropollutants frequently found in environmental matrices, such as alkyl-phenols, poly-fluoro alkyl carboxylic and sulfonic acids, phthalate esters and benzotriazoles, and pharmaceuticals and personal care product ingredients, among them hormones, biocides and antimycotic drugs.

Compounds were separated chromatographically in an Accucore aQ C18 column (100 x 2.1 mm, 2.6  $\mu\text{m}$ ), connected to a C18 guard cartridge (10 x 2.1 mm, 2.6  $\mu\text{m}$ ), both provided by Thermo Fisher Scientific. The column oven temperature was set at 25° C. The mobile phase consisted of a gradient mixture of two solutions: A, water containing 2% methanol, 0.1% formic acid and 5 mM ammonium formate and B, methanol containing 2% water, 0.1% formic acid and 5 mM ammonium formate. The following gradient was applied: 0 - 0.5 min 2% B, 2 min 15% B, 20 - 30 min 100% B. The injection volume was 4  $\mu\text{L}$ .

A first injection of all the extracts and blanks was done, acquiring full-scan high-resolution (70,000) data in the 100-1000 Da  $m/z$  range, with ionisation polarity switching. Then, chromatograms were searched for the ions contained in Table A1 and an inclusion list was created with the masses and the retention times found. In a second injection, a data-dependent MS/MS (dd-MS2) experiment was conducted, using this inclusion list to trigger the fragmentation of the selected ions, at a resolution of 17,500 and with stepped collision energy: 15, 30 and 45 eV.

In addition, a non-targeted screening was conducted on the same extracts. Outstanding large chromatographic peaks present in the total ion-current (TIC) chromatograms (positive and negative) were selected from the full-scan LC-MS files already acquired for the targeted screening. Next, those entities ( $m/z$  plus retention time) that were not present in the blanks were included in a secondary inclusion list for a new set of dd-MS2 experiments.

The Xcalibur and FreeStyle 1.3 packages (Thermo fisher Scientific) were used for data acquisition and visualization, and for database searching. The  $m/z$ Cloud ([www.mzcloud.org](http://www.mzcloud.org)), MassBank ([www.massbank.jp](http://www.massbank.jp)) and Metlin ([metlin.scripps.edu](http://metlin.scripps.edu)) databases were employed to identify the substances.

In both screening strategies, a substance was considered identified when: 1) in the full-scan spectrum the pseudo-molecular ion was present with a mass error below 5 ppm, 2) in the full-scan spectrum the cluster of isotopes for the formula were present with a mass error below 5 ppm and with their theoretic relative abundance, 3) in the MS2 spectrum there were at least two fragments present with a mass error below 5 ppm, 4) in the extracted chromatogram the signal-noise ratio of the peak was above 10 times.



Group	Substance	[M-H]-	[M+H]+
Alkyl-phenols	Bisphenol A	227.1078	
	Bisphenol B	241.1234	
	Bisphenol AP	289.1234	
	Bisphenol S		251.0368
	Bisphenol F		201.0910
	4-n-Nonylphenol	219.1754	
	4-n-octylphenol	205.1598	
	4-t-octylphenol	205.1598	
Poly-fluoroalkyls	Trifluoroacetic acid	112.9856	
	Perfluoro butanoic acid	212.9792	
	Perfluoro pentanoic acid	262.9760	
	Perfluoro hexanoic acid	312.9728	
	Perfluoro heptanoic acid	362.9696	
	Perfluoro octanoic acid	412.9664	
	Perfluoro nonanoic acid	462.9632	
	Perfluoro decanoic acid	512.9600	
	Perfluoro undecanoic acid	562.9714	
	Perfluoro dodecanoic acid	612.9536	
	Perfluoro tridecanoic acid	662.9504	
	Perfluoro tetradecanoic acid	712.9472	
	Perfluoro hexadecanoic acid	812.9409	
	Perfluoro octadecanoic acid	912.9345	
	Trifluoro methane sulfonic acid	148.9526	
	Perfluoro butane sulfonic acid	298.9430	
	Perfluoro hexane sulfonic acid	398.9366	
	Perfluoro heptane sulfonic acid	448.9334	
	Perfluoro octane sulfonic acid	498.9302	
	Perfluoro decane sulfonic acid	598.9238	
	7H-Perfluoro heptanoic acid	344.9790	
	2H,2H-Perfluoro decane acid	476.9789	
	2H,2H,3H,3H-Perfluoro undecanoic acid	490.9945	
	Perfluoro-3H-4,8-dioxa nonanoic acid	476.9625	
	Perfluoro-3,7-dimethyl octanoic acid	512.9600	
1H,1H,2H,2H Perfluoro octane sulfonic acid	426.9679		
1H,1H,2H,2H-Perfluoro decane sulfonic acid	526.9615		
Perfluoro octane sulfonamide	497.9462		
Phthalate esters	Benzyl butyl phthalate		313.1434
	Di(2-ethylhexyl) phthalate		391.2843
	Di(2-methoxyethyl) phthalate		283.1176
	Tri(2- chloroethyl)phosphate		284.9612

Group	Substance	[M-H]-	[M+H]+
	Dibutyl phthalate		279.1591
	Dipentyl phthalate		307.1904
	Dihexyl phthalate		335.2217
	Diheptyl phthalate		363.2530
	Diocetyl phthalate		391.2843
	Dinonyl phthalate		419.3160
	Didecyl phthalate		447.3470
<b>Benzotriazoles</b>	Benzotriazol		120.0556
	4-Toliltriazol		134.0713
	5-Toliltriazol		134.0713
	5,6-dimetilbenzotriazol		148.0869
	5-clorobenzotriazol		154.0167
<b>Benzotriazole UV stabilizers</b>	UV P		226.0975
	UV 326		316.1211
	UV 327		358.1681
<b>Hormones</b>	Estrone	269.1548	271.1693
	Estradiol	271.1705	273.1849
	Ethynylestradiol		319.1669
<b>Biocides</b>	Triclosan	286.9439	
	Triclocarban	312.9297	314.9853
	Dichlorocarbanilide	279.0086	
	Bis(tributyltin) oxide		291.1129
<b>Antimycotic drugs</b>	Fluconazole		307.1113
	Etaconazole		328.0614
	Ketoconazole		531.1560
	Clotrimazole		277.0788
	Econazole		383.0293
	Miconazole		416.9904
	Terbinafine		292.2060
	Climbazole		293.1108
<b>Other pharmaceuticals</b>	Amitryptiline		278.1909
	Sertraline		306.0811
	Amiodarone		646.0310
	N-Desethylamiodarone		617.9997

**Table A1.** Substances included in the screening, classified by families and including the monitored [M+H]<sup>+</sup> and [M-H]<sup>-</sup> ions in Da

### Quality control

A number of extraction and solvent blanks were also analysed to ensure the detection of any possible contamination resulting from sample handling in the laboratory. Any background contaminants detected in blanks are subtracted from the chromatograms obtained for the samples before mass spectra are interpreted.

### Analysis for metals

#### Preparation

A representative portion of each sample was air dried to constant weight, homogenised and then ground to a powder using a pestle and mortar. Approximately 0.25 g of the ground sample was accurately weighed and digested with 5.0 ml concentrated nitric acid and 0.5 ml concentrated hydrochloric acid, firstly overnight at room temperature then using microwave-assisted digestion with a CEM MARS Xpress system with temperature ramping: heating to 110°C over 20 minutes, held at 110°C for 20 minutes, heating to 170°C over 20 minutes, held at 170°C for 20 minutes, heating to 220°C over 20 minutes, held at 220°C for 20 minutes. Following cooling, 2.5 ml hydrogen peroxide (30% v/v) was added dropwise to each sample and the samples were subsequently treated to a second microwave-assisted digestion using the same temperature ramping as before. Following cooling, each digest solution was filtered and made up to 25 ml with deionised water. Prior to analysis, each digest solution was diluted 1:4 using deionised water.

#### Analysis

Prepared sample digests were analysed by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) using an Agilent 7900 Spectrometer utilizing a collision cell with helium as the collision gas to minimize polyatomic interferences. Multi-element standards, matrix matched to the samples, at concentrations of 1, 10, 100, 1000 and 5000 µg/l respectively, other than for mercury (1, 2, 5, 20 µg/l respectively) were used for instrument calibration. Analysis employed in-line addition of an internal standard mix at 1000 µg/l (Scandium, Germanium, Yttrium, Indium and Terbium). Any sample exceeding the calibration range was diluted accordingly, in duplicate, and re-analysed.

#### Quality control

One soil sample and one ash sample were prepared for ICP analysis in duplicate and analysed to verify method reproducibility, along with a blank sample. To check the method efficiency, two certified reference material (CRM) and one reference material samples were prepared in an identical manner; CRM7004, loam with elevated analyte levels certified by the Czech Meteorological Institute; CRM012, Incinerator Ash certified by Sigma-Aldrich RTC and LGC6180, Pulverised Fuel Ash.

Calibration of the ICP-MS was validated by the use of quality control standards at 80 µg/l and 800 µg/l (4 µg/l and 16 µg/l for mercury) prepared in an identical manner but from different reagent stocks to the instrument calibration standards.

Further details of the methods employed can be provided on request.

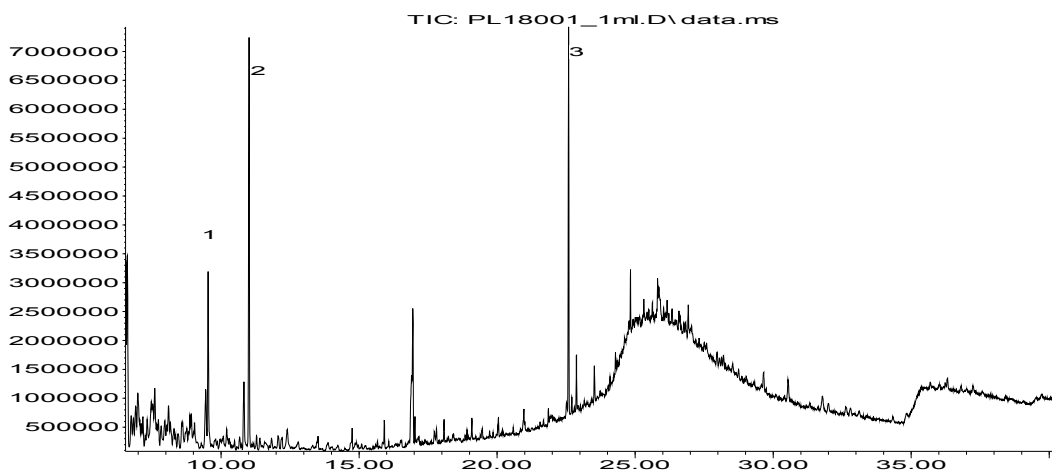
**Appendix 2: Detailed semi-volatile organic (sVOCs) chromatograms and analytical screening data**  
 Chromatograms and detailed screening data arising from GC-MS analysis of all samples are presented below.

***Semi-volatile organic analysis results (sVOCs)***

<b>Sample code</b>	PL18001
<b>Location</b>	Jakubów 17B gm. Radwanice (Lower Silesia), Poland
<b>Sample type</b>	Soil & ash
<b>Date &amp; time</b>	06.09.2018, 06:05
<b>Description</b>	Sample taken next to the place where wastewater from fire suppression actions was flowing down to the forest. There was a concrete underneath the soil and ash on the top of it.



Abundance



Time-->

**Peaks identity:**

- 1 Benzene, 1-(1,1-dimethylethyl)-3-methyl-
- 2 Benzene, 1-methyl-4-(1-methylethyl)-

### 3 Decanedioic acid, dibutyl ester

**Number of compounds isolated: 97**

**Compounds identified to better than 90%:**

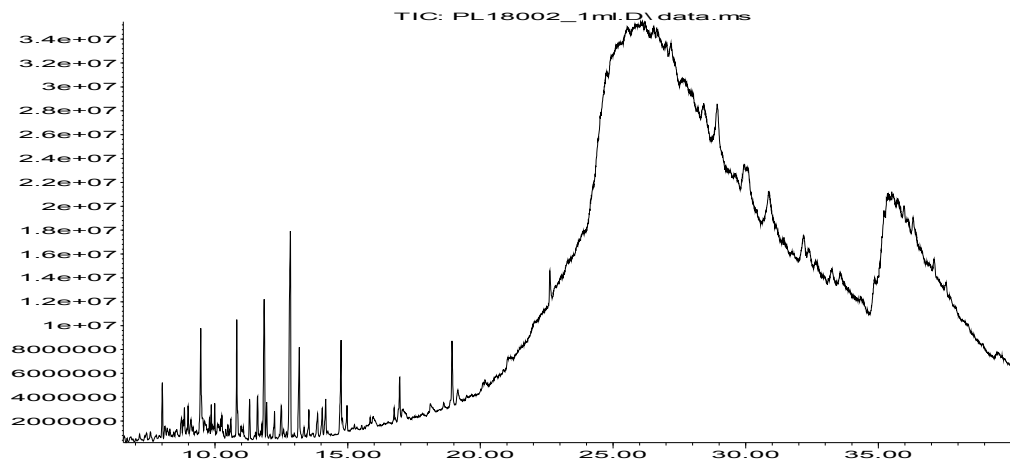
<b>CAS#</b>	<b>Name</b>
000117-81-7	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester
000084-74-2	1,2-Benzenedicarboxylic acid, dibutyl ester
000084-69-5	1,2-Benzenedicarboxylic acid, diisobutyl ester
074685-29-3	(9E)-9-Icosene
000000-00-0	Methyltricosane
003910-35-8	1H-Indene, 2,3-dihydro-1,1,3-trimethyl-
016204-72-1	1H-Indene, 2,3-dihydro-1,1,4-trimethyl-
035507-09-6	7-Hexadecene, (z)-
054986-44-6	Benzene, (1,3,3-trimethylnonyl)-
000098-82-8	Benzene, (1-methylethyl)-
000526-73-8	Benzene, 1,2,3-trimethyl-
000120-82-1	Benzene, 1,2,4-trichloro-
000634-66-2	Benzene, 1,2,3,4-tetrachloro-
000634-90-2	Benzene, 1,2,3,5-tetrachloro-
001075-38-3	Benzene, 1-(1,1-dimethylethyl)-3-methyl-
000527-84-4	Benzene, 1-methyl-2-(1-methylethyl)-
000099-87-6	Benzene, 1-methyl-4-(1-methylethyl)-
025155-15-1	Benzene, methyl(1-methylethyl)-
000000-00-0	Butadiene, pentachloro-, 2 isomers
000000-00-0	Butadiene, tetrachloro-, 5 isomers
000000-00-0	Butene, hexachloro-
000109-43-3	Decanedioic acid, dibutyl ester
000629-97-0	Docosane
000112-40-3	Dodecane
000112-95-8	Eicosane
000630-04-6	Hentriacontane
000629-78-7	Heptadecane
000630-01-3	Hexacosane
000544-76-3	Hexadecane
000112-95-8	Icosane
000629-92-5	Nonadecane
000629-62-9	Pentadecane
000646-31-1	Tetracosane
000629-59-4	Tetradecane

**Note: chromatogram contained a number of unidentified compounds that showed fragmentation pattern characteristic for chlorinated compounds**

<b>Sample code</b>	PL18002
<b>Location</b>	Jakubów 17B gm. Radwanice (Lower Silesia), Poland
<b>Sample type</b>	Soil & ash
<b>Date &amp; time</b>	06.09.2018, 06:25
<b>Description</b>	Sample taken at the bottom of the mound of earth (a hill that existed before the fire), just next to the firemen' wastewater flow



Abundance



**Number of compounds isolated: 194**

**Compounds identified to better than 90%:**

CAS#	Name
000092-52-4	1,1'-Biphenyl
000000-00-0	1,1-Dichloro-2-chloromethyl-cyclopentane
000131-11-3	1,2-Benzenedicarboxylic acid, dimethyl ester
000084-66-2	1,2-Benzenedicarboxylic acid, diethyl ester
000084-74-2	1,2-Benzenedicarboxylic acid, dibutyl ester



001459-93-4 1,3-Benzenedicarboxylic acid, dimethyl ester  
 003126-90-7 1,3-Benzenedicarboxylic acid, dibutyl ester  
 000120-61-6 1,4-Benzenedicarboxylic acid, dimethyl ester  
 004714-35-6 1,2,2-Trichloro-1-(4-chlorophenyl)ethene  
 000126-86-3 2,4,7,9-Tetramethyl-5-decyne-4,7-diol  
 013674-84-5 2-Propanol, 1-chloro-, phosphate (3:1)  
 000000-00-0 Aniline, dichloro-  
 000090-02-8 Benzaldehyde, 2-hydroxy-  
 000098-82-8 Benzene, (1-methylethyl)-  
 000120-82-1 Benzene, 1,2,4-trichloro-  
 000634-66-2 Benzene, 1,2,3,4-tetrachloro-  
 000634-90-2 Benzene, 1,2,3,5-tetrachloro-  
 000095-93-2 Benzene, 1,2,4,5-tetramethyl-  
 000608-93-5 Benzene, pentachloro-  
 001077-56-1 Benzenesulfonamide, N-ethyl-2-methyl-  
 000080-39-7 Benzenesulfonamide, N-ethyl-4-methyl-  
 000606-28-0 Benzoic acid, 2-benzoyl-, methyl ester  
 000093-58-3 Benzoic acid, methyl ester  
 000119-61-9 Benzophenone  
 137909-40-1 Bis(1-chloro-2-propyl)(3-chloro-1-propyl)phosphate  
 137888-35-8 Bis(3-chloro-1-propyl)(1-chloro-2-propyl)phosphate  
 000076-49-3 Borneol, acetate  
 000000-00-0 Butyl 9,12-Octadecadienoate  
 000136-60-7 Butyl benzoate  
 000000-00-0 Butadiene, tetrachloro-, 3 isomers  
 000000-00-0 Butadiene, pentachloro-, 4 isomers (1 of which was tentatively identified)  
 000000-00-0 Butadiene, hexachloro-  
 042525-60-0 Butane, tetrachloro-, 2 isomers  
 056771-77-8 Butene, tetrachloro-, 5 isomers (4 of which were tentatively identified)  
 063099-65-0 Butene, pentachloro-  
 014982-53-7 Cholestane  
 000095-48-7 *o*-Cresol  
 000000-00-0 Cyclobutane, trichloro-, 2 isomers  
 001331-43-7 Cyclohexane, diethyl-  
 000112-40-3 Dodecane  
 000134-62-3 Diethyltoluamide  
 000122-99-6 Ethanol, 2-phenoxy-  
 000079-34-5 Ethane, 1,1,2,2-tetrachloro-  
 000629-78-7 Heptadecane  
 031158-91-5 Hexadecanoic acid, 1,1-dimethylethyl-  
 000000-00-0 Hexyl methyl phthalate  
 138261-41-3 Imidacloprid  
 002958-76-1 Naphthalene, 2-methyldecahydro-  
 001750-51-2 Naphthalene, decahydro-1,6-dimethyl-  
 000123-95-5 Octadecanoic acid, butyl ester  
 021245-02-3 Padimate  
 000629-62-9 Pentadecane  
 002467-02-9 Phenol, 2,2'-methylenebis-  
 000119-47-1 Phenol, 2,2'-methylenebis[6-(1,1-dimethylethyl)-4-methyl-  
 000618-45-1 Phenol, 3-(1-methylethyl)-  
 000080-05-7 Phenol, 4,4'-(1-methylethylidene)bis-  
 000620-92-8 Phenol, 4,4'-methylenebis-



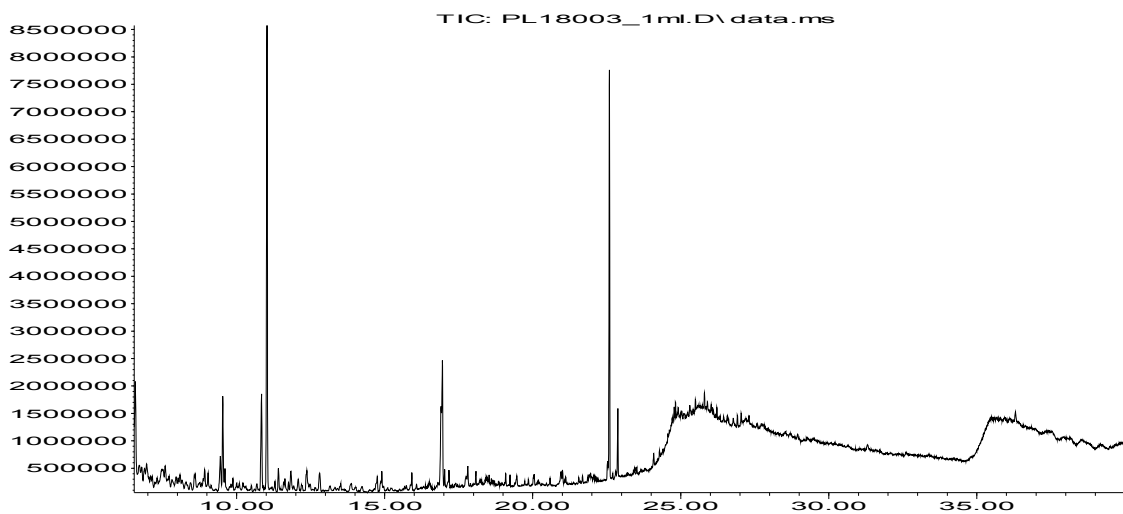
000126-73-8    Phosphoric acid, tributyl ester  
000078-40-0    Phosphoric acid, triethyl ester  
000629-59-4    Tetradecane  
001002-43-3    Undecane, 3-methyl-  
001632-70-8    Undecane, 5-methyl-

**Note: chromatogram contained a number of unidentified compounds that showed fragmentation pattern characteristic for chlorinated compounds**

<b>Sample code</b>	PL18003
<b>Location</b>	Jakubów 17B gm. Radwanice (Lower Silesia), Poland
<b>Sample type</b>	Mixture of soil, ash & slime
<b>Date &amp; time</b>	06.09.2018, 07:20
<b>Description</b>	Sample taken from the place in the central part of dumpsite where vegetation was growing before the fire; big particles of ash and slime are observed



Abundance



Number of compounds isolated: 114

**Compounds identified to better than 90%:**

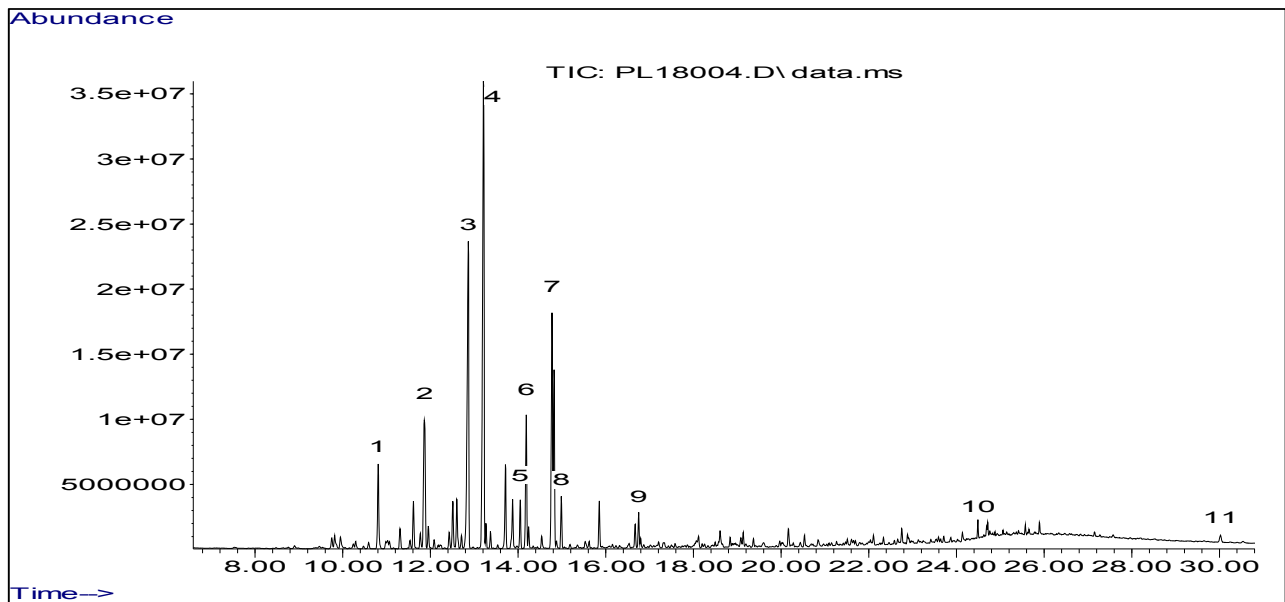
<b>CAS#</b>	<b>Name</b>
000084-74-2	1,2-Benzenedicarboxylic acid, dibutyl ester
000629-73-2	1-Hexadecene
018435-45-5	1-Nonadecene
000000-00-0	1-Octadecanol
000112-88-9	1-Octadecene
016204-72-1	1H-Indene, 2,3-dihydro-1,1,4-trimethyl-
040650-41-7	1H-Indene, 2,3-dihydro-1,1,5-trimethyl-
020324-32-7	2-Propanol, 1-(2-methoxy-1-methylethoxy)-
035953-54-9	2-Tetradecene, (e)-
000098-51-1	4- <i>tert</i> -Butyltoluene
074685-30-6	5-Eicosene, (e)-
000120-82-1	Benzene, 1,2,4-trichloro-
001075-38-3	Benzene, 1-(1,1-dimethylethyl)-3-methyl-
000099-87-6	Benzene, 1-methyl-4-(1-methylethyl)-
000000-00-0	Butadiene, pentachloro-, 2 isomers
000000-00-0	Butadiene, tetrachloro-, 3 isomers
000527-84-4	<i>o</i> -Cymene
000295-48-7	Cyclopentadecane
000297-03-0	Cyclotetracosane
000109-43-3	Decanedioic acid, dibutyl ester
000134-62-3	Diethyltoluamide
034590-94-8	Dipropylene glycol monomethyl ether
000629-97-0	Docosane
000112-95-8	Eicosane
000630-04-6	Hentriacontane
000629-78-7	Heptadecane
000544-76-3	Hexadecane
000111-06-8	Hexadecanoic acid, butyl ester
000630-02-4	Octacosane
000593-45-3	Octadecane
000629-62-9	Pentadecane
000085-01-8	Phenanthrene
000629-59-4	Tetradecane
041446-66-6	Tetradecene
000638-68-6	triacontane
000115-86-6	Triphenyl phosphate

**Note: chromatogram contained a number of unidentified compounds that showed fragmentation pattern characteristic for chlorinated compounds**

<b>Sample code</b>	PL18004
<b>Location</b>	Jakubów 17B gm. Radwanice (Lower Silesia), Poland
<b>Sample type</b>	Soil
<b>Date &amp; time</b>	06.09.2018, 07:46
<b>Description</b>	soil from a flat ground opposite to a large mound of burnt down trash; area that was probably cleaned after fire



PL18004, soil



**Peaks identity:**

- 1 Butadiene, tetrachloro-
- 2 Propene, pentachloro-
- 3 Chlorinated unidentified compound
- 4 Butene, hexachloro-
- 5 Benzene, 1,2,4,5-tetrachloro-
- 6 & 7 Butene, pentachloro-, 2 isomers

8	Benzene, 1,2,3,4-tetrachloro-
9	Benzene, pentachloro-
10	Toluene, tetrachloro-
11	Naphthalene, octachloro-

**Number of compounds isolated: 455**

**Compounds identified to better than 90% (98 compounds):**

<b>CAS#</b>	<b>Name</b>
000319-84-6	.alpha.-Lindane
000000-00-0	1-Octadecanol
000092-52-4	1,1'-Biphenyl
000000-00-0	1,1'-Biphenyl, heptachloro-
072101-18-9	[1,1'-Biphenyl]-3-ol, dichloro-
000589-33-3	1H-Pyrrole, 1-butyl-
000000-00-0	2,4-Dichloro-n-cyclopropyl-benzamide
013674-84-5	2-Propanol, 1-chloro-, phosphate (3:1)
006582-42-9	3,4-Dichloropropiophenone
006971-40-0	17-Pentatriacontene
117021-38-2	5-Hexacosenoic acid, methyl ester, (Z)-
000000-00-0	Aniline, pentachloro-
002282-84-0	Benzoic acid, 2,4,6-trimethyl-, methyl ester
000074-11-3	Benzoic acid, 4-chloro-
000000-00-0	Benzoic acid, dichloro-, 2 isomers
000000-00-0	Benzophenone
137909-40-1	Bis(1-chloro-2-propyl)(3-chloro-1-propyl)phosphate
000111-44-4	Bis(2-chloroethyl) ether
063099-65-0	Butene, pentachloro-
000000-00-0	Butadiene, tetrachloro-, 5 isomers
000000-00-0	Butadiene, pentachloro-, 3 isomers
000000-00-0	Butadiene, hexachloro-
000634-66-2	Benzene, 1,2,3,4-tetrachloro-
000634-90-2	Benzene, 1,2,3,5-tetrachloro-
000095-94-3	Benzene, 1,2,4,5-tetrachloro-
000120-82-1	Benzene, 1,2,4-trichloro-
000106-46-7	Benzene, 1,4-dichloro-
000000-00-0	Benzene, chloro(chloroethyl)-
000000-00-0	Benzene, dichloro(chloroethenyl)-
000000-00-0	Benzene, chloro(trichloroethenyl), 3 isomers
000000-00-0	Benzene, dichloro(trichloroethenyl)-, 2 isomers
000118-74-1	Benzene, hexachloro-
000608-93-5	Benzene, pentachloro-
000000-00-0	Butane, tetrachloro-, 2 isomers
000000-00-0	Butene, tetrachloro-, 4 isomers
000000-00-0	Butene, pentachloro-, 2 isomers
000000-00-0	Butene, hexachloro-, 3 isomers
000123-95-5	Butyl stearate
022599-96-8	Cholestan-3-ol, 2-methylene-
014982-53-7	Cholestane
000000-00-0	Cyclobutane, 1,1,2-trichloro-
000000-00-0	Cyclopropane, 1,1-dichloro-2-chloromethyl-
054482-31-4	d-Homoandrostane

006975-98-0	Decane, 2-methyl-
000334-48-5	Decanoic acid
000131-11-3	Dimethyl phthalate
000143-07-7	Dodecanoic acid
000544-85-4	Dotriacontane
000079-34-5	Ethane, 1,1,2,2-tetrachloro-
000112-34-5	Ethanol, 2-(2-butoxyethoxy)-
000630-01-3	Hexacosane
000544-76-3	Hexadecane
000111-06-8	Hexadecanoic acid, butyl ester
000112-39-0	Hexadecanoic acid, methyl ester
000627-93-0	Hexanedioic acid, dimethyl ester
000947-19-3	Methanone, (1-hydroxycyclohexyl)phenyl-
000000-00-0	Naphthalene, chloro-, 2 isomers
000000-00-0	Naphthalene, trichloro-
000000-00-0	Naphthalene, tetrachloro-
000000-00-0	Naphthalene, hexachloro-, 5 isomers
000000-00-0	Naphthalene, heptachloro-, 3 isomers
002234-13-1	Naphthalene, octachloro-
000630-02-4	Octacosane
000593-45-3	Octadecane
000108-95-2	Phenol
000933-78-8	Phenol, 2,3,5-trichloro-
000088-06-2	Phenol, 2,4,6-trichloro-
000080-05-7	Phenol, 4,4'-(1-methylethylidene)bis-
000000-00-0	Propane, pentachloro-
015600-01-8	Propane, 1,1,2,2,3,3-hexachloro-
000000-00-0	Propene, 1,1,1,2-tetrachloro-
000000-00-0	Propene, trichloro-2-methyl-
000000-00-0	Propene, pentachloro-, 3 isomers
000111-02-4	Squalene
001897-45-6	Tetrachloroisophthalonitrile (synonym: Chlorothalonil)
000646-31-1	Tetracosane
014303-70-9	Tetradecanoic acid, propyl ester
000143-24-8	Tetraglyme
000000-00-0	Toluene, dichloro-
000000-00-0	Toluene, trichloro-, 3 isomers
000000-00-0	Toluene, tetrachloro-, 10 isomers
000000-00-0	Toluene, pentachloro-
000000-00-0	Toluene, hexachloro-, 4 isomers
000000-00-0	Xylene, tetrachloro-
000000-00-0	Xylene, hexachloro-

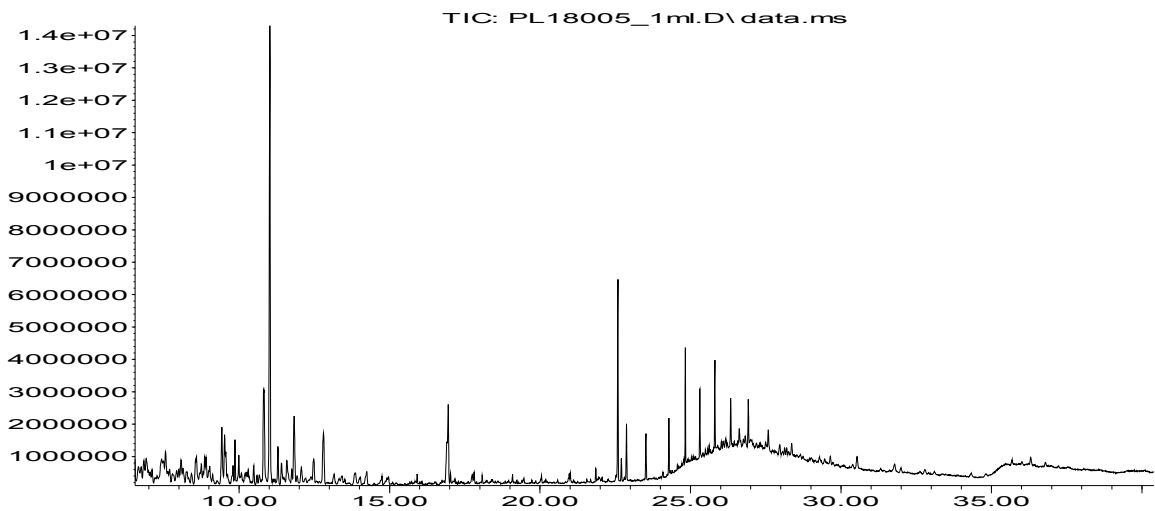
**Note: chromatogram contained a number of unidentified compounds that showed fragmentation pattern characteristic for chlorinated compounds**



<b>Sample code</b>	PL18005
<b>Location</b>	Jakubów 17B gm. Radwanice (Lower Silesia), Poland
<b>Sample type</b>	Mixture of soil, ash & slime
<b>Date &amp; time</b>	06.09.2018, 08:03
<b>Description</b>	Sample taken from ground in the forest remains in central part of the dumpsite, just next to the warehouse that was burnt to the ground, brown sand was observed underneath the soil



Abundance



Time-->

Number of compounds isolated: 159

Compounds identified to better than 90%:

CAS#	Name
000117-81-7	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester
014276-95-0	1H-Indene, 2,3-dihydro-1,1,6-trimethyl-
000098-51-1	4- <i>tert</i> -Butyltoluene
000629-73-2	1-Hexadecene
035507-09-6	7-Hexadecene, (z)-



000112-63-0	9,12-Octadecadienoic acid (Z,Z)-
000000-00-0	Acetaldehyde, <i>m</i> -tolyl-dimethyl-
034127-96-3	Benzaldehyde, 3-butoxy-4-methoxy-
005736-88-9	Benzaldehyde, 4-butoxy-
000634-66-2	Benzene, 1,2,3,4-tetrachloro-
000634-90-2	Benzene, 1,2,3,5-tetrachloro-
000095-94-3	Benzene, 1,2,4,5-tetrachloro-
000120-82-1	Benzene, 1,2,4-trichloro-
000106-46-7	Benzene, 1,4-dichloro-
000118-74-1	Benzene, hexachloro-
000608-93-5	Benzene, pentachloro-
001075-38-3	Benzene, 1-(1,1-dimethylethyl)-3-methyl-
000527-84-4	Benzene, 1-methyl-2-(1-methylethyl)-
000205-99-2	Benzo[b]fluoranthene
000000-00-0	Butadiene, pentachloro-, 2 isomers
000000-00-0	Butadiene, tetrachloro-, 5 isomers
003405-32-1	Butane, 1,2,3,4-tetrachloro-
000000-00-0	Butene, dichloro-
000000-00-0	Butene, tetrachloro-, 3 isomers
014982-53-7	Cholestane
000109-43-3	Decanedioic acid, dibutyl ester
000106-18-3	Dodecanoic acid, butyl ester
000629-97-0	Docosane
000112-95-8	Eicosane
000115-20-8	Ethanol, 2,2,2-trichloro-
000112-34-5	Ethanol, 2-(2-butoxyethoxy)-
000206-44-0	Fluoranthene
000629-94-7	Heneicosane
015594-90-8	Heneicosanol
000629-78-7	Heptadecane
000544-76-3	Hexadecane
000103-23-1	Hexanedioic acid, bis(2-ethylhexyl) ester
000111-06-8	Hexadecanoic acid, butyl ester
000373-49-9	<i>cis</i> -9-Hexadecenoic acid
054482-31-4	d-Homoandrostane
007206-19-1	Octadecene
000301-02-0	Oleic acid amide
003687-46-5	Oleic acid, decyl ester
000000-00-0	Pentacosene
000629-62-9	Pentadecane
000483-65-8	Phenanthrene, 1-methyl-7-(methylethyl)-
000085-01-8	Phenanthrene
000108-95-2	Phenol
028108-99-8	Phosphoric acid, (1-methylethyl)phenyl diphenyl ester
000115-86-6	Phosphoric acid, triphenyl ester
000000-00-0	Propene, tetrachloro-
000000-00-0	Propene, trichloro-methyl-
000646-31-1	Tetracosane
000110-36-1	Tetradecanoic acid, butyl ester
000629-50-5	Tridecane

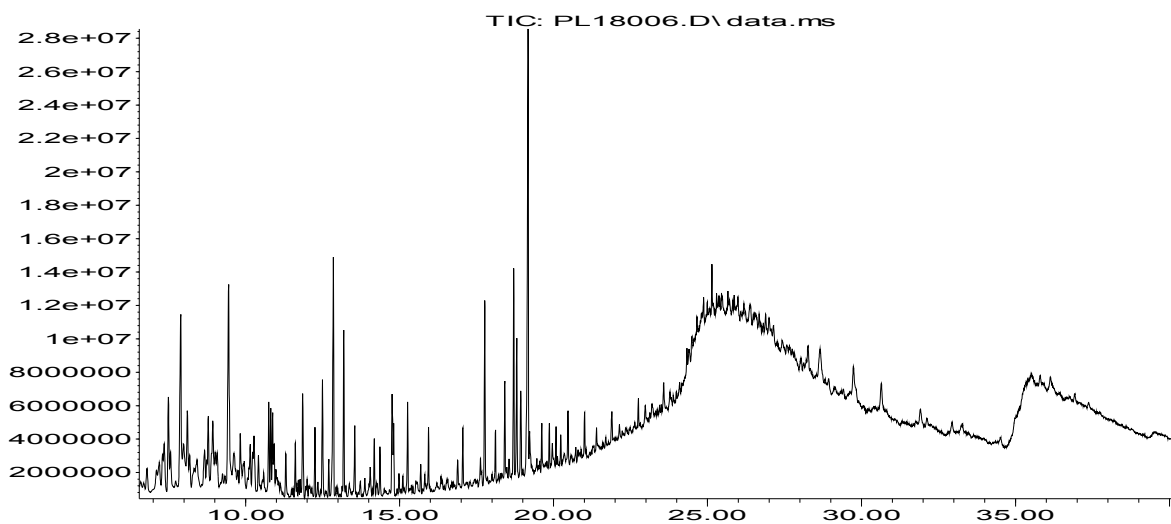
**Note: chromatogram contained a number of unidentified compounds that showed fragmentation pattern characteristic for chlorinated compounds**

<b>Sample code</b>	PL18006
<b>Location</b>	Jakubów 17B gm. Radwanice (Lower Silesia), Poland
<b>Sample type</b>	Soil & slime
<b>Date &amp; time</b>	06.09.2018, 08:58
<b>Description</b>	Sample taken from the place where wastewater from fire suppression actions was running, in the forest outside the dumpsite. Very sticky, black matter.



Movie: [https://drive.google.com/open?id=1BgrWOejsZSQ\\_6rdxGjNBNR0W7BPpF-1](https://drive.google.com/open?id=1BgrWOejsZSQ_6rdxGjNBNR0W7BPpF-1)

Abundance



Number of compounds isolated: 399

Compounds identified to better than 90%:

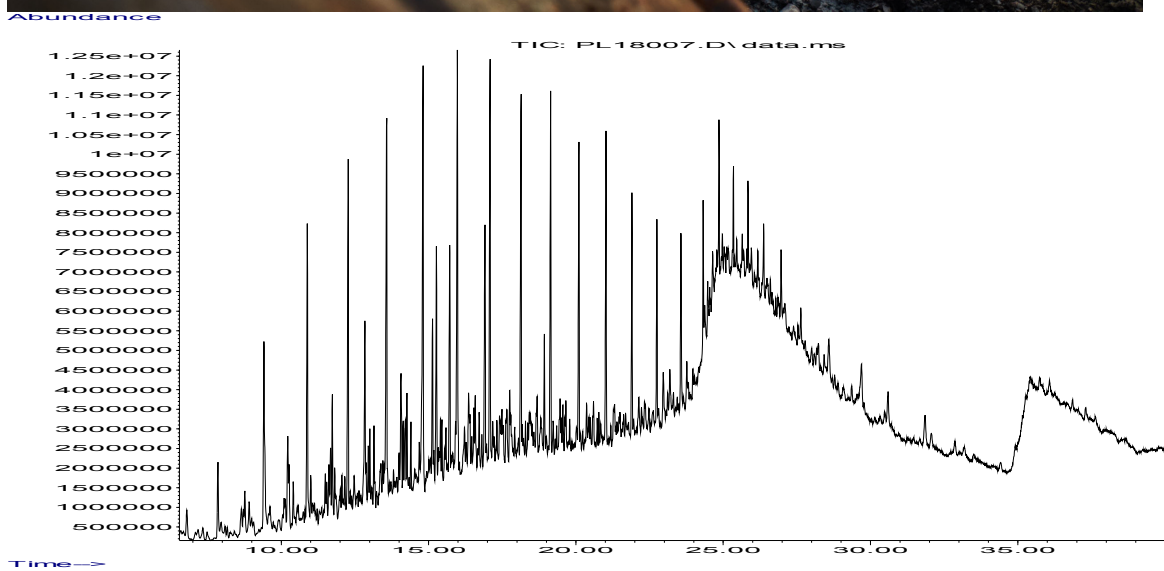
CAS#	Name
000092-52-4	1,1'-Biphenyl
007116-95-2	1,1'-Biphenyl, 4-(1-methylethyl)-
000000-00-0	1,1,2,3,3,5-Hexamethyl-2,3-dihydroindene
000104-76-7	1-Hexanol, 2-ethyl-
000083-33-0	1H-Inden-1-one, 2,3-dihydro-
007473-98-5	Benzoyl isopropanol
005131-66-8	2-Propanol, 1-butoxy-
000000-00-0	2,2',3,3'-Tetramethylbiphenyl
003075-84-1	2,2',5,5'-Tetramethylbiphenyl
004707-47-5	2,4-Dihydroxy-3,6-dimethylbenzoate
037275-49-3	4,7-Methano-1H-indenol, hexahydro-
000126-86-3	5-Decyne-4,7-diol, 2,4,7,9-tetramethyl-
000060-33-3	9,12-Octadecadienoic acid (z,z)-
000112-80-1	9-Octadecenoic acid (z)-
000098-86-2	Acetophenone
000090-02-8	Benzaldehyde, 2-hydroxy-
000121-32-4	Benzaldehyde, 3-ethoxy-4-hydroxy-
000121-33-5	Benzaldehyde, 4-hydroxy-3-methoxy-
000538-39-6	Benzene, 1,1'-ethylidenebis[4-methyl-
000098-82-8	Benzene, (1-methylethyl)-
000000-00-0	Benzene, 1,2-dimethyl-4- (1-methylethyl)-
000634-66-2	Benzene, 1,2,3,4-tetrachloro-
000634-90-2	Benzene, 1,2,3,5-tetrachloro-
000095-94-3	Benzene, 1,2,4,5-tetrachloro-
000635-81-4	Benzene, 1,2,4,5-tetraethyl-
010222-95-4	Benzene, 1,2,4-trimethyl-5-(1-methylethyl)-
085914-57-4	Benzene, 1,2,4-trimethyl-5-[(4-methylphenyl)methyl]-
000577-55-9	Benzene, 1,2-bis(1-methylethyl)-
013540-56-2	Benzene, 1,2-dimethyl-4-(phenylmethyl)-
000120-82-1	Benzene, 1,2,4-trichloro-
000526-73-8	Benzene, 1,2,3-trimethyl-
000108-67-8	Benzene, 1,3,5-trimethyl-
004810-04-2	Benzene, 1,3,5-trimethyl-2-propyl-
010375-96-9	Benzene, 1,4-dimethyl-2,5-bis(1-methylethyl)-
000611-14-3	Benzene, 1-ethyl-2-methyl-
004218-48-8	Benzene, 1-ethyl-4-(1-methylethyl)-
001074-17-5	Benzene, 1-methyl-2-propyl-
001595-16-0	Benzene, 1-methyl-4-(1-methylpropyl)-
025550-13-4	Benzene, diethylmethyl-
000100-42-5	Benzene, ethenyl-
000608-93-5	Benzene, pentachloro-
000103-65-1	Benzene, propyl-
051407-46-6	Benzeneacetaldehyde, .alpha.-methyl-4-(2-methylpropyl)-
001077-56-1	Benzenesulfonamide, N-ethyl-2-methyl-
000080-39-7	Benzenesulfonamide, N-ethyl-4-methyl-
000065-85-0	Benzoic acid
000606-28-0	Benzoic acid, 2-benzoyl-, methyl ester
000098-73-7	Benzoic acid, p-tert-butyl-
000611-20-1	Benzonitrile, 2-hydroxy-
000111-44-4	Bis(2-chloroethyl) ether

137909-40-1	Bis(1-chloro-2-propyl)(3-chloro-1-propyl)phosphate
137888-35-8	Bis(3-chloro-1-propyl)(1-chloro-2-propyl)phosphate
000000-00-0	Butadiene, hexachloro-
000000-00-0	Butadiene, tetrachloro-, 3 isomers
000000-00-0	Butane, tetrachloro-
000000-00-0	Butene, dichloro-
000000-00-0	Butene, hexachloro-
000000-00-0	Butene, tetrachloro-
063099-65-0	Butene, pentachloro-
000079-92-5	Camphene
014982-53-7	Cholestane
004706-90-5	Cumene, 3,5-dimethyl-
000295-65-8	Cyclohexadecane
000108-94-1	Cyclohexanone
000295-48-7	Cyclopentadecane
000535-77-3	m-Cymene
000099-87-6	p-Cymene
001740-19-8	Dehydroabietic acid
000134-62-3	Diethyltoluamide
000101-84-8	Diphenyl ether
000629-97-0	Docosane
000112-40-3	Dodecane
003891-98-3	Dodecane, 2,6,10-trimethyl-
000334-48-5	Decanoic acid
000143-07-7	Dodecanoic acid
054446-78-5	Ethanol, 1-(2-butoxyethoxy)-
000124-17-4	Ethanol, 2-(2-butoxyethoxy)-, acetate
007204-16-2	Ethanol, 2-[2-(2-phenoxyethoxy)ethoxy]-
000111-76-2	Ethanol, 2-butoxy-
000122-99-6	Ethanol, 2-phenoxy-
000112-95-8	Eicosane
000079-34-5	Ethane, 1,1,2,2-tetrachloro-
000593-49-7	Heptacosane
000629-78-7	Heptadecane
000630-01-3	Hexacosane
000544-76-3	Hexadecane
000638-36-8	Hexadecane, 2,6,10,14-tetramethyl-
000057-10-3	Hexadecanoic acid
000627-93-0	Hexanedioic acid, dimethyl ester
000142-62-1	Hexanoic acid
138261-41-3	Imidacloprid
057837-19-1	Metalaxyl
000119-61-9	Methanone, diphenyl-
000099-76-3	Methylparaben
000629-92-5	Nonadecane
000000-00-0	Naphthalene, decahydro-2-methyl-
000630-02-4	Octacosane
000593-45-3	Octadecane
000124-07-2	Octanoic acid
000108-95-2	Phenol
002467-02-9	Phenol, 2,2'-methylenebis-
000090-01-7	Phenol, 2-(hydroxymethyl)-

002467-03-0	Phenol, 2-[(4-hydroxyphenyl)methyl]-
000080-05-7	Phenol, 4,4'-(1-methylethylidene)bis-
000000-00-0	Phenol, methyl-, 2 isomers
000100-51-6	Phenylmethanol
001754-49-0	Phenylphosphonic acid, diethyl ester
000078-40-0	Phosphoric acid, triethyl ester
013674-84-5	Phosphoric acid, tris(2-chloro-1-methylethyl) ester
000085-44-9	Phthalic anhydride
001119-40-0	Pentanedioic acid, dimethyl ester
001501-27-5	Pentanedioic acid, monomethyl ester
000763-69-9	Propanoic acid, 3-ethoxy-, ethyl ester
055934-93-5	Propanol, [(butoxymethylethoxy)methylethoxy]-
000094-13-3	Propylparaben
000629-62-9	Pentadecane
000646-31-1	Tetracosane
000629-59-4	Tetradecane
000544-63-8	Tetradecanoic acid
007397-06-0	Xylene, 4-t-butyl-

**Note: chromatogram contained a number of unidentified compounds that showed fragmentation pattern characteristic for chlorinated compounds**

<b>Sample code</b>	PL18007
<b>Location</b>	Jakubów 17B gm. Radwanice (Lower Silesia), Poland
<b>Sample type</b>	Ash
<b>Date &amp; time</b>	06.40.2018, 06:05
<b>Description</b>	Sample taken under the pile of burnt metal barrels



Note: All major peaks on the chromatogram are linear aliphatic hydrocarbons

**Number of compounds isolated: 341**

**Compounds identified to better than 90%:**

CAS#	Name
003913-02-8	1-Octanol, 2-butyl-
000092-52-4	1,1'-Biphenyl



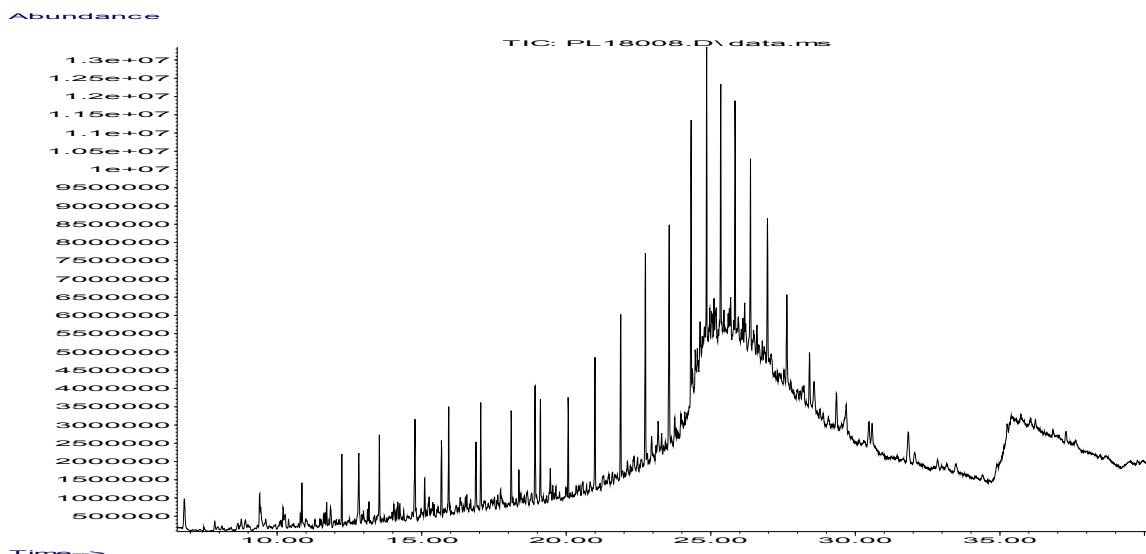
000117-81-7	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester
000131-11-3	1,2-Benzenedicarboxylic acid, dimethyl ester
000085-68-7	1,2-Benzenedicarboxylic acid, butyl benzyl ester
000084-66-2	1,2-Benzenedicarboxylic acid, diethyl ester
028553-12-0	} 1,2-Benzenedicarboxylic acid, diisononyl ester, mixture of 25 isomers
071549-78-5	
014103-61-8	
068515-48-0	
000626-17-5	1,3-Dicyanobenzene
000793-24-8	1,4-Benzenediamine, N-(1,3-dimethylbutyl)-N'-phenyl-
006971-40-0	17-Pentatriacontene
003910-35-8	1H-Indene, 2,3-dihydro-1,1,3-trimethyl-
000126-86-3	2,4,7,9-Tetramethyl-5-decyne-4,7-diol
013674-84-5	2-Propanol, 1-chloro-, phosphate (3:1)
000463-40-1	9,12,15-Octadecatrienoic acid, (Z,Z,Z)-
000301-00-8	9,12,15-Octadecatrienoic acid, methyl ester, (Z,Z,Z)-
000060-33-3	9,12-Octadecadienoic acid (Z,Z)-
000112-63-0	9,12-Octadecadienoic acid (Z,Z)-, methyl ester
000141-22-0	9- <i>cis</i> -Octadecenoic acid, 12-hydroxy-
000098-86-2	Acetophenone
000090-02-8	Benzaldehyde, 2-hydroxy-
000621-59-0	Benzaldehyde, 3-hydroxy-4-methoxy-
000120-57-0	Benzaldehyde, 3,4-methylenedioxy-
000480-63-7	Benzoic acid, 2,4,6-trimethyl-
000606-28-0	Benzoic acid, 2-benzoyl-, methyl ester
010287-53-3	Benzoic acid, 4-(dimethylamino)-, ethyl ester
000119-61-9	Benzophenone
137909-40-1	Bis(1-chloro-2-propyl)(3-chloro-1-propyl)phosphate
137888-35-8	Bis(3-chloro-1-propyl)(1-chloro-2-propyl)phosphate
000108-67-8	Benzene, 1,3,5-trimethyl-
000611-14-3	Benzene, 1-ethyl-2-methyl-
000000-00-0	Butadiene, tetrachloro-, 2 isomers
014982-53-7	Cholestane
000295-02-3	Cyclotridecane
006975-98-0	Decane, 2-methyl-
000334-48-5	Decanoic acid
001740-19-8	Dehydroabietic acid
000101-84-8	Diphenyl ether
000143-07-7	Dodecanoic acid
000629-97-0	Docosane
000112-40-3	Dodecane
061141-72-8	Dodecane, 4,6-dimethyl-
000112-95-8	Eicosane
000112-34-5	Ethanol, 2-(2-butoxyethoxy)-
000143-22-6	Ethanol, 2-[2-(2-butoxyethoxy)ethoxy]-
000111-76-2	Ethanol, 2-butoxy-
000122-99-6	Ethanol, 2-phenoxy-
000629-94-7	Heneicosane
000593-49-7	Heptacosane
000629-78-7	Heptadecane
054833-48-6	Heptadecane, 2,6,10,15-tetramethyl-
054105-67-8	Heptadecane, 2,6-dimethyl-



000544-76-3	Hexadecane
000638-36-8	Hexadecane, 2,6,10,14-tetramethyl-
000630-06-8	Hexatriacontane
000057-10-3	Hexadecanoic acid
031158-91-5	Hexadecanoic acid, 1,1-dimethylethyl-
000112-39-0	Hexadecanoic acid, methyl ester
000627-93-0	Hexanedioic acid, dimethyl ester
042775-77-9	Naphthalene, 1,2,3,4-tetrahydro-6-propyl-
000629-92-5	Nonadecane
138261-41-3	Imidacloprid
000947-19-3	Methanone, (1-hydroxycyclohexyl)phenyl-
000057-11-4	Octadecanoic acid
000629-62-9	Pentadecane
001119-40-0	Pentanedioic acid, dimethyl ester
000108-95-2	Phenol
000108-39-4	Phenol, 3-methyl-
000080-05-7	Phenol, 4,4'-(1-methylethylidene)bis-
000099-89-8	Phenol, 4-(1-methylethyl)-
000085-44-9	Phthalic anhydride
000593-45-3	Octadecane
000601-58-1	Stigmastane
000544-63-8	Tetradecanoic acid
000629-50-5	Tridecane
000646-31-1	Tetracosane
000629-59-4	Tetradecane
000629-50-5	Tridecane
001120-21-4	Undecane
001002-43-3	Undecane, 3-methyl-

**Note: chromatogram contained a number of unidentified compounds that showed fragmentation pattern characteristic for chlorinated compounds**

<b>Sample code</b>	PL18008
<b>Location</b>	Jakubów 17B gm. Radwanice (Lower Silesia), Poland
<b>Sample type</b>	Ash
<b>Date &amp; time</b>	06.09.2018, 06:56
<b>Description</b>	Sample taken from the place where big plastic canisters burnt/melted and burnt metal barrels were dislocated



**Number of compounds isolated: 251**

**Compounds identified to better than 90%:**

CAS#	Name
000084-66-2	1,2-Benzenedicarboxylic acid, diethyl ester
000131-11-3	1,2-Benzenedicarboxylic acid, dimethyl ester
001459-93-4	1,3-Benzenedicarboxylic acid, dimethyl ester
000120-61-6	1,4-Benzenedicarboxylic acid, dimethyl ester
000117-81-7	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester
000084-74-2	1,2-Benzenedicarboxylic acid, dibutyl ester
000793-24-8	1,4-Benzenediamine, N-(1,3-dimethylbutyl)-N'-phenyl-
002004-39-9	1-Heptacosanol
000629-73-2	1-Hexadecene
003910-35-8	1H-Indene, 2,3-dihydro-1,1,3-trimethyl-3-phenyl-
052380-33-3	11-Octadecenoic acid, methyl ester
013674-84-5	2-Propanol, 1-chloro-, phosphate (3:1)
037275-49-3	4,7-Methano-1H-indenol, hexahydro-
000126-86-3	5-Decyne-4,7-diol, 2,4,7,9-tetramethyl-
056554-30-4	7,10,13-Hexadecatrienoic acid, methyl-
000060-33-3	9,12-Octadecadienoic acid (Z,Z)-
000112-63-0	9,12-Octadecadienoic acid (Z,Z)-, methyl ester
000090-02-8	Benzaldehyde, 2-hydroxy-
000623-08-5	Benzenamine, N,4-dimethyl-
001081-75-0	Benzene, 1,1'-(1,3-propanediyl)bis-
000634-66-2	Benzene, 1,2,3,4-tetrachloro-
000095-94-3	Benzene, 1,2,4,5-tetrachloro-
000095-93-2	Benzene, 1,2,4,5-tetramethyl-
000099-62-7	Benzene, 1,3-bis(1-methylethyl)-

000106-46-7	Benzene, 1,4-dichloro-
002282-84-0	Benzoic acid, 2,4,6-trimethyl-, methyl ester
000606-28-0	Benzoic acid, 2-benzoyl-, methyl ester
000119-61-9	Benzophenone
000100-51-6	Methanol, phenyl-
110983-39-6	Benzonitrile, 4-[2-(2-hydroxyphenyl)ethenyl]-, (E)-
137909-40-1	Bis(1-chloro-2-propyl)(3-chloro-1-propyl)phosphate
000092-52-4	Biphenyl
000000-00-0	Butadiene, tetrachloro-
055880-77-8	Butadiene, pentachloro-
000000-00-0	Butane, tetrachloro-
014982-53-7	Cholestane
000296-56-0	Cycloeicosane
000295-48-7	Cyclopentadecane
000295-02-3	Cyclotridecane
000143-07-7	Dodecanoic acid
000334-48-5	n-Decanoic acid
000629-97-0	Docosane
000112-40-3	Dodecane
003891-98-3	Dodecane, 2,6,10-trimethyl-
000112-95-8	Eicosane
000122-99-6	Ethanol, 2-phenoxy-
000629-94-7	Heneicosane
000593-49-7	Heptacosane
000629-78-7	Heptadecane
000630-01-3	Hexacosane
000544-76-3	Hexadecane
000638-36-8	Hexadecane, 2,6,10,14-tetramethyl-
000057-10-3	n-Hexadecanoic acid
031158-91-5	Hexadecanoic acid, 1,1-dimethylethyl ester
000112-39-0	Hexadecanoic acid, methyl ester
000000-00-0	Mediaglycol
057837-19-1	Metalaxyl
000112-61-8	Octadecanoic acid, methyl ester
000629-92-5	Nonadecane
000630-02-4	Octacosane
000593-45-3	Octadecane
000057-11-4	Octadecanoic acid
000000-00-0	Pentacosene
000629-62-9	Pentadecane
000108-95-2	Phenol
002772-45-4	Phenol, 2,4-bis(1-methyl-1-phenylethyl)-
000095-48-7	Phenol, 2-methyl-
000080-05-7	Phenol, 4,4'-(1-methylethylidene)bis-
000098-54-4	Phenol, 4-(1,1-dimethylethyl)-
000599-64-4	Phenol, 4-(1-methyl-1-phenylethyl)-
000099-89-8	Phenol, 4-(1-methylethyl)-
000106-44-5	Phenol, 4-methyl-
000085-44-9	Phthalic anhydride
007473-98-5	Propan-1-one, 2-hydroxy-2-methyl-1-phenyl-
000000-00-0	Propene, pentachloro-
000176-63-6	Spiro[4.5]decane

000646-31-1	Tetracosane
000111-01-3	Tetracosane, 2,6,10,15,19,23-hexamethyl-
000629-59-4	Tetradecane
000544-63-8	Tetradecanoic acid
000110-36-1	Tetradecanoic acid, butyl ester
000638-67-5	Tricosane
000629-50-5	Tridecane
000106-49-0	Toluene, <i>p</i> -amino-
001120-21-4	Undecane
001632-70-8	Undecane, 5-methyl-

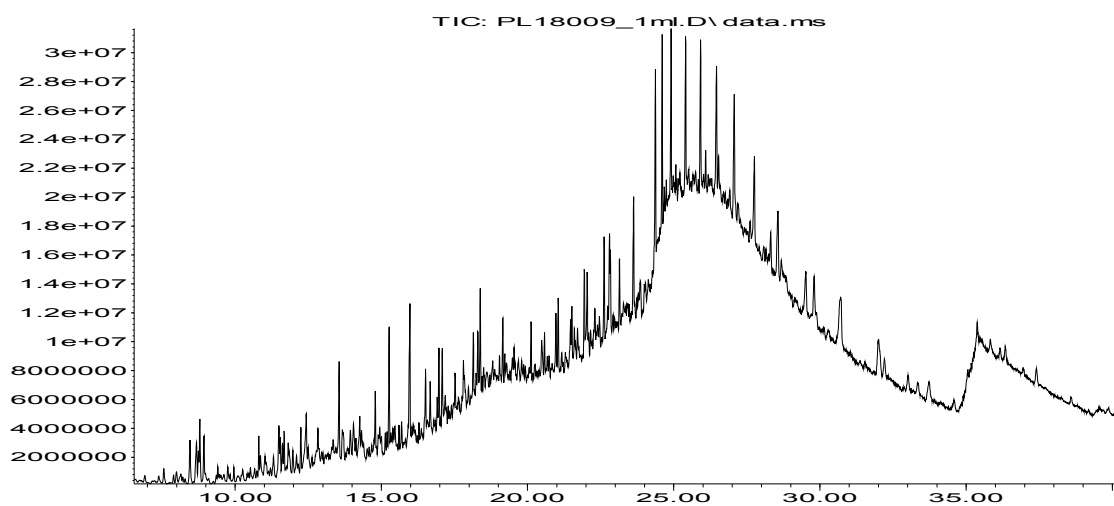
**Note: chromatogram contained a number of unidentified compounds that showed fragmentation pattern characteristic for chlorinated compounds**

<b>Sample code</b>	PL18009
<b>Location</b>	Jakubów 17B gm. Radwanice (Lower Silesia), Poland
<b>Sample type</b>	Ash
<b>Date &amp; time</b>	06.09.2018, 08:22
<b>Description</b>	Sample taken from burnt/ melted pile of trash, possibly roofing felts or other kind of construction material



Picture before fire

Abundance



Time-->

Number of compounds isolated: 357

Compounds identified to better than 90%:

CAS#	Name
035507-09-6	(7Z)-7-Hexadecene
000092-52-4	1,1'-Biphenyl
2000150-73-	1,1'-Biphenyl, 2,6-dimethyl-
001812-51-7	1,1'-Biphenyl, 2-ethyl-
007383-90-6	1,1'-Biphenyl, 3,4'-dimethyl-
000643-93-6	1,1'-Biphenyl, 3-methyl-
000644-08-6	1,1'-Biphenyl, 4-methyl-
000092-94-4	1,1'-Biphenyl, 4-phenyl-
005707-44-8	1,1'-Biphenyl, 4-ethyl-
000612-75-9	3,3'-Dimethylbiphenyl
117021-38-2	5-Hexacosenoic acid, methyl ester, (Z)-
037275-49-3	4,7-Methano-1H-indenol, hexahydro-
000086-73-7	9H-Fluorene
000000-00-0	Acetaldehyde, <i>m</i> -tolyl-dimethyl-
000098-86-2	Acetophenone
000779-02-2	Anthracene, 9-methyl-
000134-62-3	Benzamide, N,N-diethyl-3-methyl-
000098-82-8	Benzene, (1-methylethyl)-
001126-80-3	Benzene, (butylthio)-
000103-29-7	Benzene, 1,1'-(1,2-ethanediyl)bis-
001081-75-0	Benzene, 1,1'-(1,3-propanediyl)bis-
000000-00-0	Benzene, 1,2- or 1,3-dicyano-
000634-66-2	Benzene, 1,2,3,4-tetrachloro-
000634-90-2	Benzene, 1,2,3,5-tetrachloro-
000095-93-2	Benzene, 1,2,4,5-tetramethyl-
000120-82-1	Benzene, 1,2,4-trichloro-
000095-63-6	Benzene, 1,2,4-trimethyl-
000106-46-7	Benzene, 1,4-dichloro-
000611-14-3	Benzene, 1-ethyl-2-methyl-
001595-16-0	Benzene, 1-methyl-4-(1-methylpropyl)-
058249-45-9	Benzene 1- <i>tert</i> -butyl-4-(cyclopropylmethyl)-
000104-51-8	Benzene, butyl-
000700-88-9	Benzene, cyclopentyl-
000104-72-3	Benzene, decyl-
001078-71-3	Benzene, heptyl-
001077-16-3	Benzene, hexyl-
002189-60-8	Benzene, octyl-
000538-68-1	Benzene, pentyl-
000103-65-1	Benzene, propyl-
000136-60-7	Benzoic acid, butyl ester
000000-00-0	Benzoic acid, ethyl pentyl ester
000095-16-9	Benzothiazole
000120-75-2	Benzothiazole, 2-methyl-
000934-34-9	Benzothiazolone
000000-00-0	Butadiene, pentachloro-, 2 isomers
000000-00-0	Butadiene, tetrachloro-, 4 isomers
000000-00-0	Butene, dichloro-
000218-01-9	Chysene
000527-84-4	<i>o</i> -Cymene
000099-87-6	<i>p</i> -Cymene
054482-31-4	Homoandrostandane

030673-36-0	Decanoic acid, butyl ester
000106-18-3	Dodecanoic acid, butyl ester
000109-43-3	Decanedioic acid, dibutyl ester
000629-97-0	Docosane
000112-40-3	Dodecane
000544-85-4	Dotriacontane
000112-95-8	Eicosane
000629-94-7	Heneicosane
000630-04-6	Hentriacontane
000593-49-7	Heptacosane
000629-78-7	Heptadecane
000630-01-3	Hexacosane
000544-76-3	Hexadecane
000630-06-8	Hexatriacontane
000373-49-9	9-Hexadecenoic acid, (Z)-
000111-06-8	Hexadecanoic acid, butyl ester
000496-11-7	Indane
000610-48-0	Methyl-phenanthrene or methyl-anthracene
000091-20-3	Naphthalene
002131-42-2	Naphthalene, 1,4,6-trimethyl-
000483-78-3	Naphthalene, 1,6-dimethyl-4-(1-methylethyl)-
001127-76-0	Naphthalene, 1-ethyl-
000090-12-0	Naphthalene, 1-methyl-
000581-42-0	Naphthalene, 2,6-dimethyl-
000939-27-5	Naphthalene, 2-ethyl-
000091-57-6	Naphthalene, 2-methyl-
001750-51-2	Naphthalene, decahydro-1,6-dimethyl-
002958-76-1	Naphthalene, 2-methyldecahydro-
000630-03-5	Nonacosane
000629-92-5	Nonadecane
000630-02-4	Octacosane
000593-45-3	Octadecane
000629-99-2	Pentacosane
000629-62-9	Pentadecane
000630-07-9	Pentatriacontane
000085-01-8	Phenanthrene
000471-79-4	Phenanthrene, 1,2,3,4,4a,9,10,10a-octahydro-1,1,4a-trimethyl-
000108-95-2	Phenol
000088-69-7	Phenol, 2-(1-methylethyl)-
001198-37-4	Quinoline, 2,4-dimethyl-
013362-80-6	Quinoline, 4,8-dimethyl-
000646-31-1	Tetracosane
000629-59-4	Tetradecane
000110-36-1	Tetradecanoic acid, butyl ester
000638-68-6	Triacontane
000638-67-5	Tricosane
001560-96-9	Tridecane, 2-methyl-
006418-41-3	Tridecane, 3-methyl-
025117-31-1	Tridecane, 5-methyl-
000630-05-7	Tritriacontane
001120-21-4	Undecane
007045-71-8	Undecane, 2-methyl-



001002-43-3 Undecane, 3-methyl-

**Note: chromatogram contained a number of unidentified compounds that showed fragmentation pattern characteristic for chlorinated compounds**

**Table A2 Detailed summary of organic analysis conducted by GC/MS**

Sample Code	PL18 001	PL18 002	PL18 003	PL18 004	PL18 005	PL18 006	PL18 007	PL18 008	PL18 009
Sample type	soil	soil	soil	soil	soil	soil	ash	ash	ash
Number of sVOCs isolated	97	194	114	455	159	399	341	251	357
Number of sVOCs identified to >90%	39	67	39	125	62	120	104	89	108
Percentage of sVOCs identified to > 90% (%)	40	35	34	27	39	30	30	35	30
<b>CHLORINATED COMPOUNDS</b>									
.alpha.-Lindane				1					
1,1-Dichloro-2-chloromethyl-cyclopane		1							
1,1'-Biphenyl, heptachloro-				1					
1,2,2-Trichloro-1-(4-chlorophenyl)ethene		1							
[1,1'-Biphenyl]-3-ol, dichloro-				1					
2,4-Dichloro-n-cyclopropyl-benzamide				1					
3,4-Dichloropropiophenone				1					
Aniline, dichloro-		1							
Aniline, pentachloro-				1					
Benzoic acid, 4-chloro-				1					
Benzoic acid, dichloro-				2					
Bis(2-chloroethyl) ether				1		1			
Butene, pentachloro-				1					
Butadiene, tetrachloro-	5	3	3	5	5	3	2	1	4
Butadiene, pentachloro-	2	3	2	3	2			1	2
Butadiene, hexachloro-		1		1		1			
Benzene, dichloro-				1	1			3	1
Benzene, trichloro-	1	1	1	1	1	1			1
Benzene, tetrachloro-	2	2		3	3	3		3	2
Benzene, pentachloro-		1		1	1	1			
Benzene, hexachloro-				1	1				
Benzene, chloro(chloroethyl)-				1					
Benzene, dichloro(chloroethenyl)-				1					
Benzene, chloro(trichloroethenyl)-				3					
Benzene, dichloro(trichloroethenyl)-				2					
Butane, tetrachloro-		2		2	1	1		1	
Butene, dichloro-					1	1			1
Butene, tetrachloro-		1		4	3	1			
Butene, pentachloro-		1		2		1			
Butene, hexachloro-	1			3		1			
Chlorothalonil				1					
Cyclobutane, trichloro-		2		1					
Cyclopropane, 1,1-dichloro-2-chloromethyl-				1					
Ethane, 1,1,2,2-tetrachloro-		1		1		1			
Ethanol, 2,2,2-trichloro-					1				

Sample Code	PL18 001	PL18 002	PL18 003	PL18 004	PL18 005	PL18 006	PL18 007	PL18 008	PL18 009
Naphthalene, chloro-				2					
Naphthalene, trichloro-				1					
Naphthalene, tetrachloro-				1					
Naphthalene, hexachloro-				5					
Naphthalene, heptachloro-				3					
Naphthalene, octachloro-				1					
Phenol, trichloro-				2					
Propane, pentachloro-				1					
Propane, hexachloro-				1					
Propene, trichloro-methyl-				1	1				
Propene, tetrachloro-				1	1				
Propene, pentachloro-				3				1	
Toluene, dichloro-				1					
Toluene, trichloro-				3					
Toluene, tetrachloro-				10					
Toluene, pentachloro-				1					
Toluene, hexachloro-				4					
Xylene, tetrachloro-				1					
Xylene, hexachloro-				1					
<b>PHTHALATES, ADIPATES &amp; RELATIVE COMPOUNDS</b>									
1,2-Benzenedicarboxylic acid, dimethyl ester		1		1			1	1	
1,2-Benzenedicarboxylic acid, diethyl ester		1					1	1	
1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl)ester	1				1		1	1	
1,2-Benzenedicarboxylic acid, butyl benzyl ester							1		
1,2-Benzenedicarboxylic acid, dibutyl ester	1	1	1					1	
1,2-Benzenedicarboxylic acid, diisobutyl ester	1								
1,2-Benzenedicarboxylic acid, diisononyl ester							25		
1,2-Benzenedicarboxylic acid, hexyl methyl ester		1							
1,3-Benzenedicarboxylic acid, dimethyl ester		1						1	
1,3-Benzenedicarboxylic acid, dibutyl ester		1							
1,4-Benzenedicarboxylic acid, dimethyl ester		1						1	
Hexanedioic acid, bis(2-ethylhexyl) ester					1				
Phthalic anhydride						1	1	1	
<b>CARBOXYLIC/FATTY ACIDS AND DERIVATIVES</b>									
Benzoic acid and/or its ester		3		1		3	3	2	2
Decanedioic acid and/or its ester	1		1		1				1
Decanoic acid and/or its ester				1		1	1	1	1
Dodecanoic acid and/or its ester				1	1	1	1	1	1
Tetradecanoic acid and/or its ester					1	1			
Hexacosenoic acid and/or its ester				1					1
Hexadecanoic acid and/or its ester		1	1	2	1	1	3	3	1
Hexadecenoic acid and/or its ester					1				
Hexadecatrienoic acid and/or its ester								1	
Hexanedioic acid and/or its ester				1		1	1		

Sample Code	PL18 001	PL18 002	PL18 003	PL18 004	PL18 005	PL18 006	PL18 007	PL18 008	PL18 009
Hexanoic acid and/or its ester						1			
Octadecadienoic acid and/or its ester		1			1	1	2	2	
Octadecanoic acid and/or its ester		1		1			1	2	
Octadecatrienoic acid and/or its ester							2		
Octadecenoic acid and/or its ester						1	1	1	
Octanoic acid and/or its ester						1			
Oleic acid, decyl estert					1				
Oleic acid amide					1				
Pentanedioic acid and/or its ester						2	1		
Propanoic acid and/or its ester						1			
Tetradecanoic acid and/or its ester				1			1	2	1
<b>PHENOL AND ITS DERIVATIVES</b>									
Phenol				1	1	1	1	1	1
Phenol, 2,2'-methylenebis-		1				1			
Phenol, 4,4'-methylenebis-		1							
Phenol, 2-(hydroxymethyl)-						1			
Phenol, 2,4-bis(1-methyl-1-phenylethyl)-								1	
Phenol, 4,4'-(1-methylethylidene)bis-		1		1		1	1	1	
Phenol, 2,2'-methylenebis[6-(1,1-		1							
Phenol, 2-[(4-hydroxyphenyl)methyl]-						1			
Phenol, methyl-		1				2	1	2	
Phenol, methylethyl-		1					1	1	1
Phenol, dimethylethyl-								1	
Phenol, methylphenylethyl-								1	
<b>ORGANOPHOSPHOROUS COMPOUNDS</b>									
Phenylphosphonic acid, diethyl ester						1			
Phosphoric acid, tributyl ester		1							
Phosphoric acid, triethyl ester		1				1			
Phosphoric acid, triphenyl ester			1		1				
Phosphoric acid, tris(2-chloro-1-methylethyl) ester						1			
Phosphoric acid, (1-methylethyl)phenyl diphenyl ester					1				
2-Propanol, 1-chloro-, phosphate (3:1)		1		1			1	1	
Bis(1-chloro-2-propyl)(3-chloro-1-propyl)phosphate		1		1		1	1	1	
Bis(3-chloro-1-propyl)(1-chloro-2-propyl)phosphate		1				1	1		
<b>PAHs AND DERIVATIVES</b>									
Benzo[b]fluoranthene					1				
Fluoranthene					1				
Naphthalene and its derivatives		2				1	1		10
Phenanthrene and its derivatives			1		2				3
Anthracene derivatives									1
9H-Fluorene									1

Sample Code	PL18 001	PL18 002	PL18 003	PL18 004	PL18 005	PL18 006	PL18 007	PL18 008	PL18 009
Chysene									1
<b>ALCOHOLS &amp; DERIVATIVES</b>									
1-Heptacosanol								1	
1-Octadecanol				1					
1-Octanol, 2-butyl-							1		
Benzoyl isopropanol						1			
Ethanol, alkoxyates				1	1	3	3		
Ethanol, phenoxylates		1				2	1	1	
Propanol, alkoxyates			1			2			
1-Hexanol, 2-ethyl-						1			
Methanol, phenyl-								1	
<b>ALDEHYDES &amp; KETONES</b>									
Acetaldehyde, <i>m</i> -tolyl-dimethyl-					1				1
Benzaldehyde, alkylhydroxylated derivatives		1			2	3	3	1	
Benzeneacetaldehyde, .alpha.-methyl-4-(2-methylpropyl)-						1			
Acetophenone						1	1		1
Benzophenone		1		1			1	1	
Cyclohexanone						1			
Methanone, diphenyl-						1			
Methanone, (1-hydroxycyclohexyl)phenyl-				1			1		
Propan-1-one, 2-hydroxy-2-methyl-1-phenyl-								1	
<b>OTHER COMPOUNDS</b>									
Benzene, 1,1'-ethylidenebis[4-methyl-						1			
1,1'-Biphenyl and its derivatives		1		1		4	1	1	9
Indane/Indene and derivatives	2		2		1	3	1	2	2
1H-Pyrrole, 1-butyl-				1					
1,4-Benzenediamine, N-(1,3-dimethylbutyl)-N'-phenyl-							1	1	
2,4-Dihydroxy-3,6-dimethylbenzoate						1			
2,4,7,9-Tetramethyl-5-decyne-4,7-diol		1				1	1	1	
Alkylated benzenes	7	2	4		3	21	2	2	19
Benzene, dicyano-							1		1
Benzenamine, N,4-dimethyl-								1	
Benzamide, N,N-diethyl-3-methyl-									1
Benzonitrile, 2-hydroxy-						1			
Benzonitrile, 4-[2-(2-hydroxyphenyl)ethenyl]-								1	
Benzothiazole and its derivatives									3
Benzenesulfonamide, ethylmethyl-		2				2			
Borneol, acetate		1							
Camphene						1			
Cholestane and derivatives		1		2	1	1	1	1	
d-Homoandrostane				1	1				
Dehydroabiatic acid						1	1		
Diethyltoluamide		1	1			1			

Sample Code	PL18 001	PL18 002	PL18 003	PL18 004	PL18 005	PL18 006	PL18 007	PL18 008	PL18 009
Diphenyl ether						1	1		
Dipropylene glycol monomethyl ether			1						
Homoandrostandane									1
Imidacloprid		1				1	1		
Linear & branched aliphatic hydrocarbons	15	7	19	8	13	18	24	27	31
Mediaglycol								1	
Methyl- and propylparabens						2			
Metalaxyl						1		1	
Padimate		1							
Quinoline, dimethyl-									2
Squalene				1					
Stigmastane							1		
Tetraglyme				1					
Toluene, <i>p</i> -amino-								1	

Appendix 3: Summary of LC-Orbitrap-MS analysis

Table A3 Properties of the compounds found in the Targeted Screening (Top) and in the Non-Targeted Screening (Bottom)

SUBSTANCE	CAS	Retention time (min)	[M-H]-	[M+H]+	Use
<b>PFASs</b>					
PFBS	Perfluoro butane sulfonic acid	375-73-5	10.8	298.943	Surfactant
		1763-23-		498.930	
PFOS	Perfluoro octane sulfonic acid	1	16.4	2	Surfactant
<b>PHTALATES</b>					
BBP	Benzyl butyl phthalate	85-68-7	13.1	313.1434	Platicizer
DMEP	bis(2-methoxyethyl) phthalate	117-82-8	9.5 ; 11.5	283.1176	Platicizer
DPP	Dipentyl phthalate	131-18-0	22.5	307.1904	Platicizer
DIHP	Diisooheptyl phthalate	3648-21-3	21.3	363.2530	Platicizer
TCEP	tris(2- chloroethyl)phosphate	115-96-8	11.5	284.9612	Platicizer
<b>BENZOTRIAZOLES</b>					
BTri	Benzotriazol	95-14-7	6.6	120.0556	Corrosion inhibitor. Deicers/antiicers ingredient
		29878-31-			Corrosion inhibitor. Deicers/antiicers ingredient
TTri	Toliltriazol	7	9.2	134.0713	Corrosion inhibitor. Deicers/antiicers ingredient
XTri	5,6-dimetilbenzotriazol	4184-79-6	8.2	148.0869	Corrosion inhibitor. Deicers/antiicers ingredient
<b>BENZOTRIAZOLE UV STABILIZERS</b>					
UV P	Tinuvin P	2440-22-4	12.4	226.0975	Photodegradation inhibitor
SUBSTANCE	CAS	Retention time (min)	[M-H]-	[M+H]+	Use
<b>PESTICIDES</b>					
Imid	Imidacloprid	138261-41-3	7.7	256.0591	Pesticide
		153719-			
Thia	Thiamethoxam	23-4	6.2	292.0261	Pesticide
	N,N-Dimethyl-N'-(4-	66840-71-			
DMST	methylphenyl)sulfamide	9	11.7	215.0847	Pesticide



SUBSTANCE		CAS	Retention time (min)	[M-H]-	[M+H]+	Use
DEET	DEET	134-62-3	13.2		192.1380	Pesticide
<b>INDUSTRIAL CHEMICALS</b>						
TPPO	Triphenylphosphine oxide	791-28-6	14.7		279.0927	Paints and coatings
CiA4	Citroflex A4	77-90-7	19		403.2319	Plasticizer
PPG7	PPG n7		14.3		442.3369	Production of polymers
PPG8	PPG n8		15.3		500.3786	Production of polymers
PPG9	PPG n9		16.3		558.4206	Production of polymers
PPG1						
0	PPG n10		17		616.4620	Production of polymers
AbiA	Abietic acid	514-10-3	21		303.2315	Ships caulkin ingredient Hydraulic fluid. Component of
DEHA	Bis(2-ethylhexyl)adipate	103-23-1	22		371.3150	aircraft lubricants
CLac	Caprolactam	105-60-2	5.2		114.0915	Production of polymers: Nylon 6
<b>PERSONAL CARE PRODUCTS</b>						
HCou	7-Hydroxycoumarine	93-35-6	8.1		163.0387	Sunscreen. Photomutagenic agent
		28715-21-				Metabolite of palmitic acid (soaps and
HMA	3-Hydroxy myristic acid	1	16.7		209.1898	cosmetics)
<b>ENDOGENOUS LIPID</b>						
OEA	Oleoyl ethanolamide	111-58-0	21.1		326.3050	

**Table A4** Samples containing the compounds found in the Targeted Screening (Top) and in the Non-Targeted Screening (Bottom)

SUBSTANCE	PL18001	PL18002	PL18003	PL18004	PL18005	PL18006	PL18007	PL18008	PL18009
<b>PFASs</b>						Detected			
PFBS						Detected			
PFOS		Detected				Detected	Detected	Detected	
<b>PHTALATES</b>									
BBP		Detected				Detected			
DMEP				Detected		Detected	Detected	Detected	
DPP		Detected				Detected	Detected	Detected	
DIHP	Detected	Detected	Detected	Detected	Detected		Detected	Detected	Detected
TCEP	Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected
<b>BENZOTRIAZOLES</b>									
BTri	Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected
TTri	Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected
XTri						Detected	Detected		Detected
<b>BENZOTRIAZOLE UV STABILIZERS</b>									
UV P		Detected				Detected	Detected		
SUBSTANCE	PL18001	PL18002	PL18003	PL18004	PL18005	PL18006	PL18007	PL18008	PL18009
<b>PESTICIDES</b>									
Imid	Detected	Detected	Detected	Detected		Detected	Detected	Detected	Detected
Thia		Detected		Detected		Detected	Detected	Detected	
DMST		Detected		Detected		Detected	Detected	Detected	
DEET	Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected
<b>INDUSTRIAL CHEMICALS</b>									
TPPO		Detected					Detected	Detected	
CiA4		Detected				Detected	Detected	Detected	
PPG7		Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected
PPG8		Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected
PPG9		Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected
PPG10		Detected	Detected	Detected	Detected	Detected	Detected	Detected	Detected
AbiA		Detected			Detected	Detected	Detected	Detected	Detected
DEHA						Detected	Detected		
CLac			Detected	Detected	Detected		Detected	Detected	Detected

SUBSTANCE	PL18001	PL18002	PL18003	PL18004	PL18005	PL18006	PL18007	PL18008	PL18009
<b>PERSONAL CARE PRODUCTS</b>									
HCou	Detected	Detected		Detected		Detected	Detected	Detected	Detected
HMA		Detected				Detected	Detected	Detected	
<b>ENDOGENOUS LIPID</b>									
OEA		Detected		Detected		Detected	Detected	Detected	

**Appendix 4: Photos of the chemical dumpsite before and after the fire**



**Burnt down magazine next to PL18005**



**Last one intact warehouse**





**Intact waste**









**LABELS:**

