atmosphere

Supplementary Materials: Population Health Risks Assessment from Air Pollution Exposure in an Industrialized Residential Area in Greece

Michail Pachoulis [1], Thomas Maggos [1], Panagiotis Panagopoulos [1], Maria Dasopoulou [1], Dimitra Balla [1], Asimina Stamatelopoulou [1], Manousos-Ioannis Manousakas [2,3], Konstantinos Eleftheriadis [2] and Dikaia Saraga [1,*]

GLOSSARY

PM: Particulate Matter
IARC: International Agency for Research on Cancer
PAHs: Polycyclic Aromatic Hydrocarbons
DALYs: Disability Adjusted Life Years
VOCs: Volatile Organic Compounds
SVOCs: Semivolatile Organic Compounds
IR: Inhalation Rate
BW: Body weight
CR: Cancer Risk
OEHHA: Office of Environmental Health Hazard Assessment
PEF: Potency Equivalency Factor
SF: Slope Factor
EF: Exposure Factor
AF: Adjustment Factor
ED: Exposure Duration
AT: Averaging Time
RPF: Relative Potency Factor
ASF: Age Sensitivity Factor
FAH: Fraction At Home
RfD: Reference Dose
RR: Relative Risk
CDI: Chronic Daily Intake
IUR: Inhalation Unit Risk
EC: Exposure Concentration

Table S1. Values of the limit of detection (LOD), the limit of quantitation (LOQ) and the expanded uncertainty at 95% confidence level and k = 2 that has been estimated experimentally (Uexp) for each detected PAH.

	LOD	LOQ	%Uexp (k=2)
Acenaphthene	0.39	1.29	13.0
Acenaphthylene	0.24	0.79	6.11
Anthracene	0.45	1.49	6.77
Benz(a)anthracene	0.19	0.63	23.1
Benzo(a)pyrene	0.72	2.38	11.6
Benzo(e)pyrene	1.12	3.7	14.1
Benzo(b)fluoranthene	1.00	3.3	13.9

Benzo(k)fluoranthene	0.78	2.57	26.0
Benzo(ghi)perylene	0.59	1.95	11.3
Chrysene	0.3	0.99	8.58
Dibenzo(a,h)anthracene	0.44	1.45	16.5
Fluoranthrene	0.48	1.58	10.4
Fluorene	0.41	1.35	9.19
Perylene	0.59	1.95	15.9
Indeno(1,2,3-c,d)pyrene	0.91	3.00	21.9
Phenanthrene	0.57	1.88	14.5
Pyrene	0.39	1.29	6.27
3,6-dimethylphenanthrene	0.43	1.42	12.3
1-methylphenanthrene	0.53	1.75	7.71

Table S2. Description of gaseous pollutant recording methods.

Parameter	Measurement principle	Measurement standard
VOC's & SVOC's	Chromatographic: Sapling with Sorbent Tubes and analysis with TDS GC/FID & GC/MS	ISO 16017 – 1:2001
Chemical composition $PM_{2.5}$	PAHs (B[a]P)	EN 12884:2000
Chemical composition $PM_{2.5}$	Heavy metals (Zn, Cu, Pd, Ni, Cd, As, Hg)	EN 14902:2005

Table S3. PAHs, PEF & SF (OEHHA, 2015 & 2019) [21,37].

PAH	PEF	Inhalation Slope Factor $(mg/kg\text{-}day)^{-1}$
benzo[a]pyrene	1.00	3.9
benz[a]anthracene	0.10	3.9×10^{-1}
benzo[b]fluoranthene	0.10	3.9×10^{-1}
benzo[k]fluoranthene	0.10	3.9×10^{-1}
dibenz[a,h]anthracene	5.00	$4.1 \times 10^{+0}$
indeno[1,2,3-cd]pyrene	0.10	3.9×10^{-1}
chrysene	0.01	3.9×10^{-2}

Table S4. Studies were used for risk assessment of cancer and non cancer effects.

Methodology	Study
A.I	R.M. Maertens et al., 2008 [13]
A.II	R.M. Maertens et al., 2004 [12]
A.III	M.M. Jackson et al., 2005 [30]
A.IV	P. Gao et al., 2019 [4]
B.I	OEHHA (2015) [24]
B.II	T. Shao et al., 2018 [14]
B.III	E. Chalvatzaki et al., 2019 [25]
B.IV	L. Megido et al., 2017 [26]

C.I	T. Xu et al., 2018 & F.F. Farris et al., 2014 [48,23]
C.II	R.M. Maertens et al., 2004 and F.F. Farris et al., 2014, [12,23]

Table S5. Cancer potency factor, OEHHA (2015 & 2019) [24,43].

Chemicals	Cancer potency factors $(mg/kg\text{-}day)^{-1}$
Benzo[*a*]pyrene	$3.9 \times 10^{+0}$
benz[a]anthracene	3.9×10^{-1}
Benzo[b]fluoranthrene	3.9×10^{-1}
Benzo[k]fluoranthrene	3.9×10^{-1}
Chrysene	3.9×10^{-2}
Dibenz[a,h]anthracene	$4.1 \times 10^{+0}$
Indeno[1,2,3-c,d]pyrene	3.9×10^{-1}
Nickel (and compounds)	9.1×10^{-1}
Lead (and compounds)	4.2×10^{-2}
Benzene	1.0×10^{-1}

Table S6. Concentrations, Acute RELs & Target Organ System(s) (OEHHA Appendices, 2015) [34].

Substance	Maximum 1-hour concentration ($\mu g/m^3$)	Acute REL ($\mu g/m^3$)	Target Organ System(s)
Benzene	1,39	27	Reproductive/Development Immune System Hematologic System
Toluene	3,56	37000	Reproductive/Development Nervous System Respiratory System Eyes
Xylene 1	3,08	22000	Nervous System Respiratory System Eyes
Xylene 2	2,76	22000	
Xylene 3	7,53	22000	

Table S7. Parameters for non – cancer risks.

Pollutants	C (ng/m^3)	RFC (mg/m^3)	$IR_{d(0\text{-}16\ yrs)}$	$IR_{d(16\text{-}80\ yrs)}$	
			Kids	Women	Men
BaP	0,059	$2x10^{-6}$	For 24hrs IR_d: 10,8 m^3/day	For 24hrs & 14hrs IR_d: 12,6 & 7,35 m^3/day	Για 24hrs & 14hrs IR_d: 16,4 & 9,57 m^3/day
Ni	4,38	$2x10^{-5}$			
Pb	8,03	$2x10^{-4}$			
Benzene	1390	$3x10^{-2}$			
Toluene	3563	$5x10^{+0}$			
Trimethylben	2300	$6x10^{-2}$			
m-Xylene	3077	$1x10^{-1}$			
o-Xylene	2760	$1x10^{-1}$			
p-Xylene	7533	$1x10^{-1}$			
Cyclohexane	7187	$6x10^{+0}$			
Nonane	773	$2x10^{-2}$			