

## PATHS IN WATER AND SOILS FROM THE COAL MINING ACTIVITY OF PUERTOLLANO

The aim of this study was to examine if the soils and waters of Puertollano area are affected by pollution of polycyclic aromatic hydrocarbons (PAHs) and their quantification. The results show that PAHs concentrations are higher in all samples than the reference levels gathered in the Spanish legislation. The possible actions for the coal waste remediation (re-wash of waste dumps, photodegradation and biorremediation) seems to be unviable in this case because of the large volume of materials affected, the slowness of these processes, and the geomorphological characteristics of the carboniferous Puertollano basin. During the spatial regional planning, maps showing the concentration of PAHs should be made to adapt the soil for its corresponding use. It is proposed to consider as contaminants more PAHs, such as naftalene or fluorantene in waters, and phenanthrene and benzo[ghi]perilene in soils.



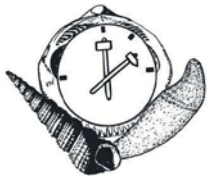


### SAMPLE PLL-14 (water)

Compuesto	Concentración (ppb)	Nivel de referencia en aguas (ppb)	Nivel de referencia en suelos (ppb)
Benzo[b]fluoranteno	2,341	0,10	200
Benzo[k]fluoranteno	1,018		2000
Benzo[ghi]perileno	1,327		
Indeno[1,2,3-cd]pireno	0,000	0,10	300
Benzo[a]pireno	1,738	0,010	20
Fluoranteno	8,653	-----	8000

### Muestra PLL-22 (water)

Compuesto	Concentración (ppb.)	Nivel de referencia en aguas (ppb.)	Nivel de referencia en suelos (ppb.)
Benzo[b]fluoranteno	0,000	0,10	200
Benzo[k]fluoranteno	0,216		2000
Benzo[ghi]perileno	0,000		
Indeno[1,2,3-cd]pireno	0,000	0,10	300
Benzo[a]pireno	1,169	0,010	20
Fluoranteno	0,000	-----	8000



### SAMPLE PLL-11 (soil)

PAH's	Uso industrial (ppm)	Uso urbano (ppm)	Otros usos(ppm)	PLL-11
Naftaleno	0,1	0,05	0,06	345,43
Acenafteno	100	60	6	24,36
Fluoreno	100	50	5	669,74
Fenantreno	-----	-----	-----	273,62
Antraceno	100	100	45	48,40
Fluoranteno	1	0,03	1,96	53,35
Pireno	100	60	6	62,92
Criseno	100	100	20	713,15
Benzo[a]antraceno	20	2	0,2	684,36
Benzo[b]fluoranteno	20	2	0,2	325,85
Benzo[k]fluoranteno	100	20	2	278,70
Benzo[a]pireno	2	0,2	0,02	367,01
Dibenzo[a,h]antraceno	3	0,3	0,03	129,16
Indeno[1,2,3-cd]pireno	30	3	0,3	549,72
Benzo[ghi]perileno	-----	-----	-----	115,94

### SAMPLE PLL-18 (soil)

PAH's	Uso industrial (ppm)	Uso urbano (ppm)	Otros usos(ppm)	PLL-18
Naftaleno	0,1	0,05	0,06	4008,27
Acenafteno	100	60	6	0
Fluoreno	100	50	5	1055,28
Fenantreno	-----	-----	-----	483,75
Antraceno	100	100	45	7700,28
Fluoranteno	1	0,03	1,96	204,85
Pireno	100	60	6	5074,40
Criseno	100	100	20	3232,30
Benzo[a]antraceno	20	2	0,2	2570,10
Benzo[b]fluoranteno	20	2	0,2	1596,07
Benzo[k]fluoranteno	100	20	2	647,11
Benzo[a]pireno	2	0,2	0,02	1836,38
Dibenzo[a,h]antraceno	3	0,3	0,03	805,52
Indeno[1,2,3-cd]pireno	30	3	0,3	1804,56
Benzo[ghi]perileno	-----	-----	-----	864,25