

Organic Contaminants in Greek Mining - Impacted Coastal Marine Areas

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Although there are many studies focusing on environmental pollution by metals as a result of mining activities, relatively little work has been done on the contamination by organic pollutants related with these activities. The purpose of this study was to study the distribution and geochemistry of organic contaminants in sediments of two coastal marine areas of Greece directly impacted from mining activities and to evaluate their potential toxicity by comparison against effect – based sediment quality guidelines. The first area is located in Antikyra bay and is influenced from bauxite and alumina processing units (refinery and smelter), while the second one is located in Larymna bay and is influenced from a ferronickel smelting plant extracting nickel from laterite ore.

Several surface sediment samples were collected during the last ten years and organic contaminants were determined by gas chromatography - mass spectrometry. The mean quotient Effect- Range Median (m-ERM) was used to evaluate the potential of adverse effects posed to benthic organisms.

Very high polycyclic aromatic hydrocarbon (PAH) concentrations, more than 100000 ng/g, were found in Antikyra bay, whereas clearly lowest values, but still indicating significant pollution, were measured in Larymna bay (PAHs concentrations up to 7500 ng/g). PAH compounds with 4 or more aromatic rings were dominant in all cases. The examination of various molecular indices and diagnostic criteria, based on isomeric PAH ratios and on their methylated derivatives distribution, revealed that in both bays more than 80% of the PAHs had pyrolytic origin. The spatial distribution of PAHs in the surface sediments was not coincided with that of metals, suggesting different transportation and/or particle association mechanisms.

With respect to ecotoxicological effects, m-ERM values higher than 1.5 were calculated in Antikyra bay, indicating that the sediments in this area have a high probability (76%) of being toxic. In Larymna bay the m-ERM values were between 0.11 and 0.5 bay suggesting a lower probability (21%) of toxicity.