

Monitoring lead pollution near a storage battery recycling plant in Taiwan, Republic of China

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摘要

Abstract

This study presents the distribution of blood lead levels and lead in various environmental samples (water, sediments, soils, and air) near the Shing-Yie storage battery recycling plant in Taiwan before (July 1990 to June 1991) and after (July 1992 to June 1993) amelioration. Before amelioration, the average blood lead levels in the neighborhood of the plant were in the range of 10.55 +/- 5.7 to 12.28 +/- 7.9 micrograms/dl. After amelioration, relatively lower average concentrations of blood lead (range 8.35 +/- 3.0 to 9.13 +/- 2.5 micrograms/dl) were generally found; however, these averages were still higher than that (7.79 +/- 3.5 micrograms/dl) from other lead-unpolluted areas of Taiwan. An exceedingly high geometric mean (GM) lead concentration (128 micrograms/L) was found in the downstream river water of the Tawulum River passing by the plant. The concentrations of lead (GM = 372 and 418 micrograms/g) in the downstream river sediments were higher than those (GM = 123 and 158 micrograms/g) in the upstream river sediments before and after amelioration, respectively. Furthermore, lead species in river sediments were analyzed by a sequential leaching technique. The sum of phases I, II, and III accounted for 83.7% of total lead at station R2 (nearest to the plant). Maximum lead concentration (GM = 2402 micrograms/g) in dust at the soil surface from station S1 (nearest to the plant) was much higher than those from the other stations by about 18 times before amelioration. However, the maximum value dropped to 1,155 micrograms/g after amelioration. On the whole, the geometric mean concentration of lead in dust at the soil surface nearest to the plant was > 1,000 micrograms/g and decreased to < 100 micrograms/g in the 15-30 cm depth soil about 2 km away from the plant. Before amelioration, the geometric mean lead concentration of 4.57 micrograms/m³ (range 0.102-37.6 micrograms/m³) in the air near the plant was higher than that at the background locations, the geometric