

Figure S1: Concentration of key elements in various particle size fractions of SH15 (■) and PP (■).

Figure S2: Effect of solid to liquid ratio (◆ 1:100, ● 1:500, ▲ 1:1000 & ■ 1:5000) on the bioaccessibility (mg/kg) of Al, Cd, Fe, Mn and Zn (37°C, original Gamble solution, magnetic stirring). (mean ± SE, n = 3). SRM2710a = Standard reference material from the National Institute of Standards and Technology, SH15 = non-ferrous slag impacted PM₁₀, PP = smelter impacted PM₁₀ and CMW = calcinated mine waste impacted PM₁₀. Significant difference (ANOVA, $\alpha = 0.05$) between 1:5000 & 1:100 = a, 1:5000 & 1: 500 = b, 1:5000 & 1:1000 = c. Al and Zn dissolution in CMW was below level of detection.

Figure S3: Effect of agitation (magnetic stirring◆, orbital rotation●, occasional stirring▲, end over end■) on Al, Cd, Fe, Mn and Zn bioaccessibility (mg/kg) (37°C, original Gamble solution, S/L ratio of 1:5000) (mean ± SE, n = 3). SRM2710a = Standard reference material from the National Institute of Standards and Technology, SH15 = non-ferrous slag impacted PM₁₀, PP = smelter impacted PM₁₀ and CMW = calcinated mine waste impacted PM₁₀. Significant difference between end over end vs magnetic stirring = a, end over end vs occasional stirring = b and end over end vs orbital rotation = c). Cd dissolution in CMW was below level of detection.

Figure S4: Effect of fluid composition (original Gamble's solution◆, modified serum simulant●, modified Gamble's solution■ simulated epithelial lung fluid (SELF)▲, Hatch's solution◆) on Al, Cd, Fe, Mn and Zn bioaccessibility (mg/kg) at 37°C, S/L ratio of 1:5000 and end over end (45 rpm) (mean ± SE, n = 3). SRM2710a = Standard reference material from the National Institute of Standards and Technology, SH15 = non-ferrous slag impacted PM₁₀, PP = smelter impacted PM₁₀ and CMW = calcinated mine waste impacted PM₁₀. Significant differences (two-way ANOVA, $\alpha = 0.05$) in bioaccessibility among the SLFs are indicated as: a = Hatch's solution vs Original Gamble's solution; b = Hatch's solution vs modified Gamble's solution; c = Hatch's solution vs modified serum simulant; and d = Hatch's solution vs SELF. Cd dissolution in CMW was below level of detection.

Figure S5: Development of an inhalation-ingestion bioaccessibility assay (37°C, S/L=1:5000, end over end 45 rpm). Hatch's solution (H; ■), Hatch's + gastric solution (H+G; ■), Hatch's + gastric + intestinal solution (H+G+I; ■), gastric solution (G; ■), intestinal solution (I; ■). SRM2710a = Standard reference material from the National Institute of Standards and Technology, SH15 = non-ferrous slag impacted PM₁₀, PP = smelter impacted PM₁₀ and CMW = calcinated mine waste impacted PM₁₀. PM₁₀ was leached in Hatch's solution (H) for 24 hours, followed by gastric (G) and intestinal (I) solutions (SBRC method). Additionally, PM₁₀ was leached in gastric (G) and intestinal (I) solutions only to investigate the difference between inhalation + ingestion and ingestion only pathways. Statistically significant differences (ANOVA, $\alpha = 0.05$) among Cd, Mn and Zn bioaccessibility (mg/kg) in simulated biological solutions were indicated by dissimilar letters.









