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Heavy metal analysis in dust from the 2025 Eaton Canyon Fire: Pre- and post-remediation.

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On January 7, 2025, the Eaton Canyon Fire erupted in the foothills of the San Gabriel Mountains in Southern California, burning >14,000 acres and destroying >9,000 structures across the Altadena neighborhood over the following 24 days. Strong Santa Ana winds coupled with the release of burned material into the air resulted in a large-scale dust plume stretching across LA County. Unlike wildfires, urban firestorms can release toxic heavy metals (HM) from the burning of industrial and residential structures in fine particulates that can be transported along wind patterns far beyond ignition sites. Following settling, dust enriched in HM can contaminate residential areas, leading to widespread public health concerns. Here, we report on i) dust samples collected ~1 month after the fire both from indoor and outdoor surfaces from 52 houses across Altadena and adjacent neighborhoods to measure the HM concentrations in dust transported by the Eaton Fire dust plume and evaluate how effective common wet-wipe cleaning is at reducing elevated concentrations to levels below limits set by the US Environmental Protection Agency (EPA), and ii) new samples collected from 34 of the initial houses ~1 year after the fire to quantify the HM content that remains following varying stages of remediation, ranging from no remediation to professional remediation. Dust samples were leached in a trace metal-free clean lab, the Isotoparium (Caltech), to release labile HM, and measured via a Q-ICP-MS to obtain elemental concentrations. In our analyses, we focus on lead (Pb). Directly following the fire, highest Pb levels are traced along wind patterns, with homes even miles away from the burn scar exhibiting Pb surface concentrations above EPA limits. Between both windowsills and flat surfaces, most but not all cleaned surfaces contained Pb levels below EPA limits. Analysis of the post-remediation samples, collected 1 year later, is ongoing. Data from the Eaton Fire Residents United consortium suggests that some Pb contamination may persist regardless of remediation, an hypothesis we will examine carefully. As the frequency of destructive urban fires increases, comprehensive evaluation of HM contamination is vital for city- and national-scale regulations regarding effective emergency response and remediation strategies.