TCLP Heavy Metal Leaching of Personal Computer Components*

Yadong Li, P.E., M. ASCE; Jay B. Richardson; Aaron K. Walker; and Pao-Chiang Yuan

Abstract: Electronic waste (E-waste), including all obsolete electronic products, has become the fastest growing component in the solid waste stream. Personal computers (PCs) — the most significant component in E-waste stream — were studied for their potential leaching toxicity of contaminants. All the components in a PC that are composed of, or contain printed wire boards (PWBs) including the motherboard, various expansion cards, disk drives, and power supply unit were tested by the Toxicity Characteristic Leaching Procedure (TCLP). The total contents of eight heavy metals including arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver in the PWBs and their TCLP leaching from the PWBs were examined. Among these eight heavy metals lead was found to be the predominant element that causes the toxicity characteristic of the PC components. The lead concentrations in the TCLP extracts of the vast majority of the PWBs ranged from 150 to 500 mg/L, which are 30 to 100 times the regulatory level of 5 mg/L for classifying a waste as hazardous. The motherboard in a PC contributed 50-80% of the total lead that could leach out from all the PWBs in the PC under the TCLP test conditions. The contents of barium and silver were found to be high in some components, but they were not leachable under the TCLP test conditions. The contents of other five elements in all the PC components were hardly detectable. They would not have the potential to cause toxicity characteristic leaching concern.

* Full text of this paper may be obtained through the publisher or by contacting the corresponding author Dr. Yadong Li.