26.5 Heavy Metals Precipitation with Calcium Polysulfide

Following two years of operating with a DTC based precipitation system, one operation switched to a calcium polysulfide (CaPS) precipitation system. This generates even less sludge than the DTC system, as well as consuming a lower volume of chemicals overall. After about fifteen months on the CaPS system, the weight of sludge generated is 40% less than that generated by the DTC system. This source reduction occurred despite a slight increase in square footage of circuit boards manufactured.

The sludges generated by CaPS and DTC are hazardous waste, characterized as F006 under the federal guidelines. As such, they are subject to the Land Disposal Restrictions (LDR) for hazardous wastes, and are not suitable for land disposal. However, the Institute for Interconnecting and Packaging Electronic Circuits (IPC), a circuit board industry trade association, is working with the USEPA Project XL to exempt this sludge from classification as hazardous waste. It would then be classified as hazardous solely on its ability to meet the Extraction Procedure (EP) toxicity test. This is significant because CaPS chemically bonds to heavy metals more tightly than does DTC; thus CaPS sludge will have a higher likelihood of meeting the EP toxicity test for the purposes of LDR classification.

There are some reasons why this exemption may not translate into immediate benefits for the printed circuit board manufacturing in California. First, California's waste extraction test (WET) is used in place of the USEPA EP toxicity test, and is similar but not identical to the EP toxicity test. Therefore meeting the EP toxicity test does not guarantee meeting the WET. Secondly, California regulates copper, while the USEPA normally does not. The generator intends to closely monitor this proposed exemption in pursuing source reduction efforts

26.6 Heavy Metals Precipitation with Sodium Hydroxide

One operation used sodium hydroxide (NaOH) to precipitate metals from spent rinsewater and spent process baths. However for wastewater containing chelator, NaOH will not pull metals from the chelator. The result is that the metals would pass through the NaOH precipitation step with the chelator. This problem can be solved by the use of DTC to precipitate the heavy metals, mostly copper and some lead and nickel, from the chelator.

26.7 Copper Precipitation with Sodium Borohydrate

At one system, a feed and bleed system discharges spent electroless plating solution from the electroless copper bath (Section 21.6). The spent bath solution goes into a drum. The copper is chemically precipitated as metallic copper, using sodium borohydrate. The borohydrate also consumes accumulated formaldehyde. Following precipitation of the copper from solution, there is no detectable copper and no formaldehyde remaining in the solution. The treated effluent solution contains sodium salts and some sodium hydroxide, and is managed as treatment residue which can be discharged to the POTW. The precipitated copper is shipped to an offsite recycling facility, with other metal-laden wastes. If this precipitation is done onsite, it might require an onsite treatment permit.

26.8 EectroStrip Recovery Systems

RC Chemical Ultima ElectroStrip is a possible substitution for onsite waste management of spent process solutions containing copper. This process deposits the etched copper onto a cathode, for recovery as nonhazardous metallic copper tank bottoms sludge.

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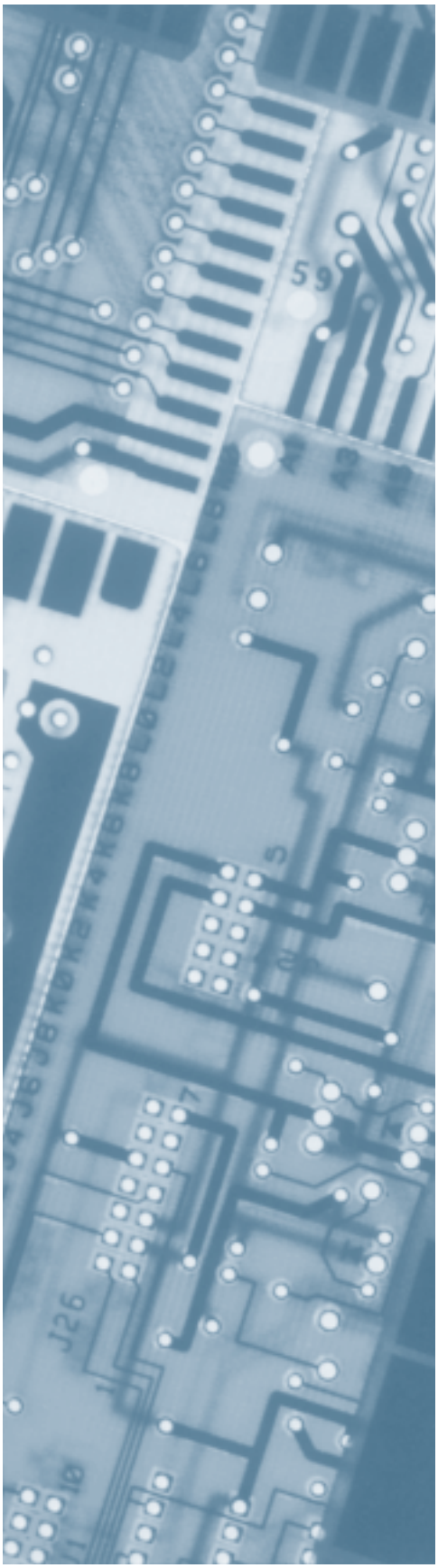

SOURCE REDUCTION TECHNOLOGIES IN CALIFORNIA PRINTED CIRCUIT BOARD MANUFACTURE

Gray Davis, Governor
State of California

Peter M. Rooney, Secretary
California Environmental Protection Agency

Jesse R. Huff, Director
Department of Toxic Substances Control

California Environmental Protection Agency

Department of Toxic Substances Control

Office of Pollution Prevention
and Technology Development

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