

**THE INTERNATIONAL RESEARCH GROUP ON WOOD PROTECTION**

**Section 5**

**Sustainability and Environment**

**A Case Study of Long-term CCA Preservative Leaching from Treated  
Hardwood Poles in a Humid Tropical Condition**

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## **Abstract**

Chromated copper arsenate (CCA)-treated Malaysian hardwoods have long been used as utility poles, posts, construction piles and motorway fencing in soil contact exposed to the threats of decay fungi and termites. Despite global concerns citing predominantly temperate conditions of long-term leaching of CCA toxic heavy metals from wood into surrounding soils and groundwater since the 1990's, the preservative leaching severity in the tropics has been far less appreciated due to dearth of work in this area. In 2013 (after 30 years exposure), levels of total copper, chromium and arsenic within 20 treated hardwood poles of Sarawak and in soils surrounding these poles, installed in 1980 and 1981 at a plot located in Timber Research and Technical Training Centre, Kuching, Sarawak, Malaysia, were sampled. The ground is waterlogged after heavy rainfall. It is shown that there is insignificant variations of CCA salt retention in wood between 1300 cm above ground and 0-20 cm below ground ( $P < 0.05$ ). Nevertheless levels of these elements are significantly ( $P < 0.05$ ) elevated in soils surrounding, especially up to 25 mm away from, the poles than at distant sampling points (150 – 300 mm) from poles as well as at sites well away from the poles containing very low levels ( $< 6 - 13.4$  ppm) of such heavy metals. Metal levels were also highest at the soil surface directly in contact with the poles (0 – 50 mm soil depth position) and decreased with remaining 2 soil depth positions 150 – 200 mm and 300 – 350 mm. Mean extractable arsenic levels ranged from 14.5 to 100.1 ppm, chromium levels from 23.3 to 148.3 ppm and copper from 21.8 to 104.7 ppm. Results, rather than indicating relatively higher CCA leaching, concurred with that reported temperate experience and showed that soil closest to the treated poles are most contaminated, albeit slightly, after 30 years of in-ground exposure.

Keywords: tropical hardwoods, CCA preservative, long-term leaching, contaminated soil