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# Treating old railway sleepers as hazardous waste

**Wooden railway sleepers,** or crossties, soaked in creosote are used in railway tracks across Europe. However, wooden sleepers are gradually being removed and disposed of, to be replaced with concrete ones. New research suggests that many of the wooden sleepers exceed the critical creosote limit set by the European Union and when they are disposed of they should be treated as hazardous waste.

**Creosote has been** used as a wood preservative for many years and contains toxic chemical compounds including polycyclic aromatic hydrocarbons (PAHs). Some of these are a danger to human health as they are carcinogenic. Creosote is therefore also classified as potentially carcinogenic.

High numbers of creosote sleepers are installed in typical railway tracks, for example, there are approximately 8.5 million along 15,000 km of railway line in Sweden. While sleepers remain embedded in railway tracks, the creosote is considered to be environmentally safe. However, upon removal, if the total creosote content is greater than the limit set by the European Union, of 1000 ppm dry weight (1 g per kg dry weight), the sleepers should be classified as hazardous waste and disposed of according to the regulations.[1] Under the EU directives [2], 75/442/EEC, 91/156/EEC and 94/67/EEC, strict precautions are in place for the safe disposal of sleepers as hazardous waste [3].

As the costs associated with hazardous waste storage and disposal are higher than for ordinary waste, there is a tendency among financial stakeholders to underestimate the creosote content in sleepers. When sleepers are burnt as ordinary waste, some carcinogenic compounds are released.

To determine whether creosote concentrations generally exceeded the critical limit set by the European Union, researchers in Sweden measured the PAH content of creosote in samples taken from railway tracks, which represented the generic population of used sleepers. According to international standards, it is suggested that creosote content is represented by the total concentration of sixteen of the PAH compounds ($PAH_{16}$), including seven that are classed as carcinogenic ($PAH_7$).

The content of compounds found in creosote varies, so the researchers suggest that a critical limit of 150 ppm $PAH_{16}$ (dry weight) should be set to represent the lower limit of a hazardous concentration of $PAH_{16}$. Sleepers with levels of creosote content above than this should be classified as hazardous waste and disposed of in the appropriate manner. The general concentration of creosote was, nevertheless, found to be significantly above the EU's critical creosote limit. Therefore, all creosote railway sleepers should be considered as hazardous waste and disposed of accordingly.

Factors affecting the concentration of creosote in sleepers were also investigated, including the type of wood used in sleepers, the nature of the embankment materials, how long crossties had been in place and whether crossties were used in switches and/or railway yards. The research suggests that these all had a substantial impact.

1. See: http://europa.eu/scadplus/leg/en/lvb/l21197.htm for a Summary of Waste Disposal Legislation. Directive 2006/12/EC of the European Parliament and of the Council of 5 April 2006 on waste
2. See: http://ec.europa.eu/environment/waste/legislation/a.htm EU Waste Legislation - Framework Waste Legislation and http://ec.europa.eu/environment/guide/part2c.htm for Overview of EU Environmental Legislation – Waste Management
3. See: http://europa.eu/scadplus/leg/en/lvb/l28072.htm for the Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste.

**Source:** Thierfelder, T. and Sandström, E. (2008). The creosote content of used railway crossties as compared with European stipulations for hazardous waste. *Science of the Total Environment.* 402: 106-112.

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