

PENTACHLOROPHENOL AS AN INDUSTRIAL PRESERVATIVE

Herb Estreicher¹ and John Wilkinson²

¹Keller and Heckman LLP, 1001 G St. NW, Washington, D.C. and

²Pentachlorophenol Task Force, 205 James Thurber Court, Falls Church, VA

Summary

Pentachlorophenol (penta) has a long history of use as a wood preservative. Recently the United States Environmental Protection Agency (USEPA) in the United States and the Pest Management Regulatory Agency (PMRA) of Health Canada have conducted a joint review of the use of penta. They have concluded that the current uses are acceptable and do not pose a threat to human health and the environment, but they have included additional worker protection and environmental protection requirements as part of the required label updates.

1. Introduction

Pentachlorophenol (penta) is a broad spectrum biocide and previously was used in many products including herbicides, algacides, fungicides, and disinfectants by agriculture and other industries, including textiles, paints, oil drilling and forestry. It was used in numerous products, including leather, paper, construction materials and adhesives. Today, the use of penta in Canada and the US is limited to industrial wood preservation (USEPA, 2008a). Penta has been used as a wood preservative since 1936. The use of penta as a wood treatment are regulated by United States Environmental Protection Agency (USEPA) in the United States and the Pest Management Regulatory Agency (PMRA) of Health Canada in Canada and are governed by commodity standards of the American Wood Protection Association (AWPA, 2010) in the U.S. and of the Canadian Standards Association in Canada (CSA, 2008). The major use is for treatment of utility poles and cross-arms, but treated wood is also used for bridges, pilings, and highway dividers.

2. Discussion

Advantages of Pentachlorophenol as a Wood Treatment. Penta contains no heavy metals. As an inhibitor of oxidative phosphorylation, it provides long-term protection against insects such as termites and powder post beetles, and other organisms. Penta is water-resistant, increasing its vertical stability and reducing the incidence of checking and splitting. Penta is made from two widely available feedstocks - phenol and chlorine - which do not present unique supply problems. A 6% diesel solution of penta is forced under pressure into the wood. Retention rates range from 0.6 to 0.8 pcf in the outer half-inch zone for wood poles.

Use as a Treatment for Utility Poles. For more than 60 years penta has been a preservative and maintenance staple of the Canadian and American utility industries – providing wood utility poles a service life of up to 60 years. Of the 200 million existing poles in the United States, nearly half have relied on Penta for protection against wood boring insects, rot, decay, climate and extreme weather. In Canada, Penta has a smaller but stable market. Since its introduction to the utility industry over four decades ago, penta has become one of the preferred wood preservative because: Penta poles have clean surfaces that are easy to climb. Penta is water-resistant, increasing its vertical stability and reducing the incidence of checking and splitting. Penta poles are easily transported, handled and installed. Penta doesn't corrode metal fixtures on the poles. Penta pole replacement rate averages less than 4 percent per decade with just periodic maintenance.

Environmental Considerations. Pressure-impregnated penta does not evaporate or bleed significantly, and low concentrations (<100 ppm) of penta are biodegradable and susceptible to photodecomposition in sunlight. Penta-treated wood promotes forest sustainability; the 40 to 60-year service life of treated wood allows time for replacement trees to grow.

Regulation. The production and use of penta is regulated in Canada by PMRA under the Pest Control Products Act (PCPA) and in the US by the EPA through Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). PMRA and USEPA conducted a joint reregistration review of wood preservatives. The Reregistration Eligibility Document (RED) approving the current uses of penta was issued by EPA in 2008 (USEPA, 2008b). The Canadian Proposed Re-evaluation Decision was issued 20 August 2010 (Health Canada, 2010). The EPA RED concluded that penta meets the “no unreasonable risks adverse effects” criteria in FIFRA. In their Proposed Re-evaluation Decision Canada is proposing continued registration of penta, noting the development and implementation of best management practices and proposing new labeling requirements and revisions to treatment protocols to improve worker safety.

Label revisions. Canada is requiring updates to labels statements to further protect workers and the environment. These include changes to first aid statements and precautionary statements concerning smoking and eating near treatment and treated wood handling areas and care of work clothes.

Specified personal protective equipment (PPE) statements include:

- Wear approved respirator
 - when air concentrations exceed TLV or are unknown
 - when maintaining or cleaning equipment or
 - if treated wood is handled in enclosed areas
- Wear impermeable coveralls, gauntlets, boots, etc. and face shield or goggles when preparing solutions and handling lumber during treatment

Another added statement is “DO NOT discharge effluent containing this product into sewer systems, lakes, streams, ponds, estuaries, oceans or other waters”. Directions for use have also been clarified. Treatment conditions must be calibrated to yield the target retention levels found in the following table:

Table 1: Required Treatment Parameters for Canada

Decay Susceptibility	Commodity	Target Retention (kg/m³)
Ground contact	Railway ties	3.4–3.8
Above Ground	sawn products, plywood	4.8–6.4
Ground/Freshwater contact	sawn products, plywood	6.4–8.0
	Posts and Poles	6.1–12.8
	Pilings	12
	Poles (thermal butt treatment)	16

Specifications for storage areas have been added:

- Roofed drip pad – no release in the environment
- Roofed, paved and drained drip aprons – no loss of treatment solution
- DO NOT expose treated lumber to rains immediately after treatment
- Conditions MUST be provided to minimize leaching/bleeding of preservative from treated wood

With regard to storage, handling and disposal of treated wood there are instructions to contact the provincial regulatory agency for advice. Finally, all operational procedures must be consistent with the Environment Canada document: Recommendations for the Design and Operations of Wood Preservation Facilities – Technical Recommendations Document.

Data Requirements. Additional data are being developed to support current uses. Both the US and Canada have identified chlorinated dibenzodioxins and chlorinated dibenzofurans (CDDs and DDFs) and hexachlorobenzene (HCB) as contaminants formed during the manufacture process. They note that penta is only one of many sources of CDDs, CDFs, and HCB in the environment, but they want to assure contributions from penta wood treatment uses are as low as technically feasible. Data is being developed on concentrations of microcontaminants to show that there has been a reduction from previous levels.

International issues. Penta was nominated for inclusion in the Persistent Organic Pollutants (POPs) Protocol of the United Nations Economic for Europe Convention on Long-range Atmospheric Transport (Canada and US belong). The conclusion of the Task Force on POPs was that penta didn’t meet the criteria for listing – although the Europeans felt a

metabolite pentachloroanisole did meet the criteria and therefore penta could be listed. The matter is now before the Executive Body. A final decision is expected in December 2010.

3. Conclusions

Pentachlorophenol is an important industrial wood preservative, particularly for utility poles. Regulatory agencies in North America have concluded that the current uses do not pose a threat to human health or the environment, although they have required revisions to label language about personal environmental protection.

4. Literature

American Wood-Preservers Association, 2010. Book of Standards , P8, Section 1, Birmingham, Al.

Canadian Standards Association, 2008, CAN/CSA O80 Series 8, Wood Preservation, Mississauga, Ontario.

Health Canada, 2010. Proposed Re-evaluation Decision, PRVD2010-03. Heavy Duty Wood Preservatives: Creosote, Pentachlorophenol, Chromated Copper Arsenate (CCA), and Ammoniacal Copper Zinc Arsenate (ACZA).

USEPA, 2008a, Pentachlorophenol Fact Sheet, available at http://www.epa.gov/pesticides/factsheets/chemicals/pentachlorophenol_main.htm.

USEPA, 2008b, Reregistration Eligibility Decision for Pentachlorophenol, available at http://www.epa.gov/pesticides/reregistration/status_page_p.htm