Following WHO guidance, Australia needs to limit lead in paint to 90ppm

The Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP), is what allows lead in paint in Australia to be up to 1000 ppm so in order to follow the WHO guidance and limit lead in paint to 90 ppm, applications must be made to Amend the SUSMP. Use the form at https://www.tga.gov.au/form/application-amend-poisons-standard and send the application to the Advisory Committee on Chemicals (ACCS) at Chemicals.Scheduling@health.gov.au

Please support this application by Elizabeth O'Brien, Lead Scientist and Lead Advisor, The LEAD Group Inc (health promotion charity), 30th October 2020, during the WHO/UN International Lead Poisoning Prevention Week of Action 2020. NB: the deadline for submissions to be considered at the March 2021 meeting of the ACCS is 6th November 2020

OVERVIEW

In order to protect the health of Australians, the lead limit in new paint sold must be reduced from the current maximum of 0.1% or 1000 ppm to the WHO-recommended maximum of 0.009% or 90 ppm.

BACKGROUND

The past President of the Australian Paint Manufacturers Federation (APMF), wrote in 2019 that he was reasonably sure that most Australian paint manufacturers who are members of the APMF already manufacture paints which comply with the proposed maximum content of 90 ppm lead (Richard Phillips, *pers comm).* Residential paints sold in the USA have complied with this proposed lead limit since 2009 (ATSDR 2017).

(F) Any Other Matter that May be Relevant to the Scheduling of a Substance

Whereas the October 2020 SUSMP SECTION SEVEN/Appendix I - PAINT OR TINTERS

7.1 General Requirements

Clause 2 states:

(2) A person must not manufacture, sell, supply or use a paint or tinter containing more than **0.1%** Lead (the proportion of Lead for the purposes of this section is calculated as a percentage of the element present in the non-volatile content of the paint).

In order to comply with the recommendation of the WHO/UN Global Alliance to Eliminate Lead in Paint ("Lead Paint Alliance"), Clause 2 needs to be amended to:

(2) A person must not manufacture, sell, supply or use a paint or tinter containing more than **90 parts per million (ppm)** Lead (the proportion of Lead for the purposes of this section is calculated as a percentage of the element present in the non-volatile content of the paint).

Discussion and Supporting Information

In August 2020 WHO & UNEP published **Global elimination of lead paint - why and how countries should take action – Technical Brief** which includes the following:

Why set a limit of 90 ppm for the total lead content in paint?

The Lead Paint Alliance *Model Law and Guidance for Regulating Lead Paint* recommends that the total lead content in paint should be no more than 90 ppm of the weight of the total non-volatile content of the paint

or the weight of the dried paint film (UNEP, 2018). The rationale for setting a limit of 90 ppm is based on the established need to minimize exposure to lead to the extent possible (Dixon et al., 2009; Oulhote et al., 2013), while also ensuring that the limit is technically feasible for paint manufacturers to achieve.

Evidence for lead in paint as a source of human exposure

The exposure pathway linking lead in paint to elevated blood lead concentrations is well established. A chain of evidence confirms that lead paint, particularly when used in homes, contaminates dust and soil, and that contaminated household dust and soil are associated with elevated blood lead concentrations in children and adverse health outcomes (Charney et al., 1980; da Rocha Silva et al., 2018; Dixon et al., 2007; Dixon et al., 2009; Etchevers at al., 2015; Lanphear et al., 1996; Lanphear et al., 1998; USEPA, 2013). In addition, dust and fumes generated by the removal of lead paint have also been shown to expose both workers and inhabitants to lead when proper precautions are not in place (Dixon et al., 2009; Jacobs et al., 2003; Pelclová et al., 2016; Rodrigues et al., 2010; Spanier et al., 2013). Some of the evidence linking lead paint to lead exposure is summarized here.

Lead isotope studies have confirmed that lead paint is a source of lead in household dust (Beauchemin et al., 2011; Glorennec et al., 2010; Rasmussen et al., 2011). Other studies have shown a correlation between high levels of lead in paint and levels of lead in household dust (Dixon et al., 2007; Jacobs et al., 2003). Dixon et al. (2007), for example, found that a 50% increase in window paint lead was associated with a 5% increase in floor dust lead. Another study found that paint used on exterior railings with a lead loading of 2.6 mg/cm$_2$ or higher was associated with an approximately 50% higher lead loading in household dust, emphasizing the importance of exterior paint as a source of lead contamination inside the home (Lucas et al., 2014).

Living in a home with lead-contaminated dust is associated with elevated blood lead concentrations. A pooled analysis of 12 studies showed that lead-contaminated house-dust was a major source of intake of lead in children who had blood lead concentrations of 10–25 µg/dL (Lanphear et al., 1998). Lead loadings in floor dust well below 40 µg/ft$_2$ (430.6 µg/m$_2$) are associated with increased blood lead concentrations (Etchevers et al., 2015; Dixon et al., 2009; Lanphear et al., 1996; Lanphear et al., 1998). This value was, until recently, the health-based dust-lead hazard standard [The dust-lead hazard standard in the United States is used by risk assessors of lead-based paint to identify hazards that should be remediated] for residential floor dust in the United States. In 2019 these standards were reduced from 40 to 10 µg/ft$_2$ (107.6 µg/m$_2$) for floor dust and from 250 to 100 µg/ft$_2$ (1076.4 µg/m$_2$) for windowsill dust to provide better protection for children (US Government, 2019).

Case reports and studies attest to the fact that living or spending time in a home or other premises painted with lead paint can cause lead exposure and sometimes overt, symptomatic lead poisoning (e.g. Talbot et al., 2018; Goldman & Weissman, 2019; Keller et al., 2017; da Rocha Silva et al., 2018; Mathee et al., 2003). The release of lead from paint, the amount of lead in dust and the amount of lead exposure are dependent on a variety of individual factors, such as the age of the paint, the type of lead ingredient, household cleaning routines and child behaviour. It has not, therefore, been possible to make a direct correlation between specific concentrations of lead in paint and the resulting concentrations of lead in household dust and the blood lead concentration and, therefore, directly to quantify the impact of a 90-ppm limit.

There are only limited data relating concentrations of lead in paint directly to blood lead concentrations. A lead isotope study has demonstrated that in homes where the lead loading in paint is above 1 mg/cm$_2$ this paint can be the source of lead in children's blood (Oulhote et al., 2011). In one small case series, an adult and two young children developed lead poisoning, with blood lead concentrations ranging from 24 to 80 µg/dL, following the abrasive removal of paint that had a soluble lead content of 530 ppm (Pelclová et al., 2016). A study carried out in the United States found that children living in homes where the lead content in paint was 2 mg/cm$_2$ or higher were nearly six times more likely to have a blood lead concentration above 30 µg/dL in the winter, and nearly 16 times more likely in the summer, than children living in homes without lead paint (Schwartz & Levin, 1991). A further study in children living in homes where the mean lead paint loading ranged from 4.9 to 5.3 mg/cm$_2$ correlated blood lead concentrations with the paint lead loading and condition index (the measurement by X-ray fluorescence multiplied by a factor of 1 to 3, where 3 indicated poor quality paint condition). The study found that for every 10 mg/cm$_2$ increase in the paint lead loading and condition index there was a 7.5% higher mean

blood lead concentration (Spanier et al., 2013).

While there may not be data specifically linking a 90-ppm limit on lead in paint with health outcomes, there is evidence that regulatory controls on the lead content of paint reduce the lead content in dust and reduce lead exposure. In the United States and France, older homes have been shown to have higher concentrations of lead in dust than newer homes built after the implementation of regulatory limits on lead in paint. Gaitens et al. (2009), for example, found that homes in the United States constructed after 1978, when the limit on the lead content of new paint for residential and consumer use was established at 600 ppm, had significantly less lead contamination in dust than housing built before 1978 when there was a voluntary limit of 10 000 ppm. A study in France investigated the source of lead in household dust and found that it was only in older homes that interior paint contaminated household dust. In newer homes, paint was not a contributor because the lead content in the paint was low (concentration not stated) (Lucas et al., 2014). Another study in France carried out in 2008–09 found that living in housing built before 1949, when basic lead carbonate was still widely used, was positively associated with a higher blood lead concentration and the effect was stronger in the presence of peeling paint or renovation work (Etchevers et al., 2014). There are other studies that have shown that children living in newer homes decorated with paint without added lead were less likely to have elevated blood lead concentrations (>10 µg/dL) than those living in older homes with lead paint (Dixon et al., 2009; McClure et al., 2016).

Ingestion of paint flakes or chips, particularly when this is repeated, as in children with pica, is a direct pathway of exposure. Where studies and case reports have provided this information, toxic blood lead concentrations were associated with lead concentrations in paint ranging from 1000 ppm to 122 000 ppm (Yaffe et al., 1984; Mathee et al., 2003; Tenenbein, 1990) or less than 5000 ppm (Lavoie & Bailey, 2004).

Some guidance as to what would constitute a hazardous amount of lead in paint is provided by estimates from the American Academy of Pediatrics Committee on Environmental Hazards, which calculated the lead content of 1 cm_2 paint chips according to different lead concentrations in the paint. For paints with a lead content of 10 000 ppm, a 1 cm_2 paint chip was estimated to contain between 65 µg and 650 µg of lead, depending on the number of layers of paint (range 1–10). For a paint containing 500 ppm of lead, the amount of lead in the paint chip was estimated to be between 3.2 µg and 32 µg (American Academy of Pediatrics, 1972). Using the same calculation, for a paint containing 90 ppm of lead, a 1 cm_2 paint chip would contain 0.6 µg of lead if there was one layer of paint and 6 µg if there were 10 layers.

These numbers may be considered in the context of estimations by the Joint FAO [Food and Agriculture Organization of the United Nations] /WHO Expert Committee on Food Additives (JECFA) for dietary exposure to lead. In its review on the toxicity of lead, JECFA found that a mean dietary exposure of 1.9 µg/kg body weight per day in children would result in the loss of 3 IQ points at the population level (JECFA, 2011). As these estimations are based on population-level data, it is not possible to make accurate estimations of health impacts for a single child. However, for illustrative purposes, if the paint contained 500 ppm, then a 10 kg child (approximate age 2 years) would exceed an intake of 1.9 µg/kg body weight by ingesting 6–7 chips of single-layer paint per day. If the paint contained 90 ppm of lead the child would need to ingest around 31 chips of paint per day, which is less likely to occur. This demonstrates the greater protection provided by a 90-ppm limit.

Further support for the need to minimize the lead content of paint is provided by recent assessments of lead as a food contaminant. In 2011, after reviewing dose-response data for the neurodevelopmental toxicity of lead in children and cardiovascular toxicity in adults, JECFA withdrew its provisional tolerable weekly intake value for lead on the grounds that it was not possible to establish a health-protective value (JECFA, 2011). The European Food Safety Authority came to the same decision (EFSA, 2010). The lack of therapeutic interventions that can reverse the effects of lead on cognitive development and other long-term health outcomes is also an important consideration (Dietrich et al., 2004; USEPA, 2013; American Academy of Pediatrics, 2016). These two findings emphasize the importance of the primary prevention of lead exposure, i.e. removal of the source of exposure.

WHO & UNEP (2020) further states:

The total lead limit of 90 ppm, recommended in the *Model Law and Guidance*, is the lowest existing lead limit for paints in countries around the world. This limit has already been set in a number of countries for some or all types of paints

and coatings; these countries include Bangladesh, Cameroon, Canada, China, Ethiopia, India, Iraq, Israel, Jordan, Kenya, Nepal, the Philippines, and the United States (UNEP, 2019a).

CONCLUSION

Australia needs to amend 0.1% or 1000 ppm to 90 ppm as the maximum lead content of paint in Appendix I.

Graphic downloaded from https://www.who.int/campaigns/international-lead-poisoning-prevention-week/2020/campaign-materials

BIBLIOGRAPHY

ATSDR - Agency for Toxic Substances and Disease Registry, USA, (2017) **Lead Toxicity - What Are U.S. Standards for Lead Levels?** June 12, 2017 https://www.atsdr.cdc.gov/csem/csem.asp?csem=34&po=8

Phillips, Richard, then director of the APMF - Australian Paint Manufacturers Federation (2019) *Personal communication.* In an email to Elizabeth O'Brien, The LEAD Group, dated 17th January 2019, Richard Phillips wrote:

"I'll be discussing all of this [reducing the lead limit in Australian residential paint from 1000ppm to 90ppm], with our technical committee at its next meeting in March. I'm also reasonably sure that most members would already be within this lower limit."

WHO & UNEP – World Health Organization and United Nations Environment Programme (2020) **Global elimination of lead paint - why and how countries should take action – Technical Brief,** 14th August 2020, downloadable from: https://www.who.int/campaigns/international-lead-poisoning-prevention-week/2020/about