

**Report on Lead Dust Monitoring in residences undertaken in Esperance
Between 1 July and 8 August 2007
Department of Health
December 2007**

Sampling methodology

Twenty-five residential homes were selected for dust lead monitoring. The properties were selected based on their relative proximity to the Port or where wind patterns were likely to impact on residents. Some homes were also selected based on requests by residents with young children residing on a property. In addition, to determine the effects of dust cleaning, some homes which were swabbed for lead dust in April 2007 prior to cleaning were re-sampled. The homes were visited on the 1 July and 8 August 2007 and a range of dust samples were taken from inside and outside the premises. The sampling and analysis was undertaken by the WA Chemistry Centre in Perth.

Prior to sampling, some of the residences had been cleaned internally and externally in accordance with instructions from the Department of Health (DOH) newsletter on the management of lead dust in and around the homes and from a DOH DVD titled *Managing Lead Dust around your Home*. (<http://www.health.wa.gov.au/envirohealth/hazards/esperance.cfm>).

Swabs were taken from a variety of internal and external surfaces including appliances, shelves, furniture, windows, window coverings, door frames, ceiling beams, decking, cubby houses and other outside structures, furniture and play equipment.

Relevant safety standards for lead inside residences

No Australian Standards have been established for lead in dust around homes. However the DOH considers a clean up goal for lead in dust on surfaces accessible to young children to be $0.04 \mu\text{g}/\text{cm}^2$. For other surfaces around the home that would be readily accessed by adults but not young children, the clean up goal for lead in surfaces would be $0.4 \mu\text{g}/\text{cm}^2$.

Results of swabs inside residences

Five of the 18 residences had been sampled prior to cleaning in April 2007. The pre-cleaning swabs taken from internal surfaces had a lead content range of 0.019 to $0.5 \mu\text{g}/\text{cm}^2$. After cleaning the range was 0.013 to $0.037 \mu\text{g}/\text{cm}^2$ (<http://www.health.wa.gov.au/envirohealth/hazards/esperance.cfm>).

In July 2007, 84 dust swabs were taken from 18 residences. Forty-four swabs were obtained from internal surfaces of homes. Lead content of the swabs range from below the level of detection ($<0.005 \mu\text{g}/\text{cm}^2$) to $1.1 \mu\text{g}/\text{cm}^2$. Eighteen samples obtained from 11 premises were found to have an internal lead dust swabs above the paediatric clean up goal of $0.04 \mu\text{g}/\text{cm}^2$. All samples with the exception of two window sills were swabbed from surfaces such as the top of cupboards and door frames which are not readily accessible to children. Ten dust surface swabs were obtained from the roof cavity of seven properties. Surface dust concentration in the roof cavities range from <0.005 to $0.93 \mu\text{g}/\text{cm}^2$. Seven samples from six premises had dust from their roof cavities collected, weighed and analysed for lead. The lead content in the dust range from 28 to 830 mg/kg.

In August 2007, 45 dust swabs were obtained from eight premises. Twenty-one swabs were sampled from internal surfaces. Lead content of the swabs ranged from < 0.005 to $0.21 \mu\text{g}/\text{cm}^2$. In addition, seven swab samples were obtained from toy surfaces of three properties and these had a lead concentration ranging from < 0.005 to $0.042 \mu\text{g}/\text{cm}^2$. Two dust swabs were obtained from the roof cavity of one property and the lead concentrations were 0.025 to $2.7 \mu\text{g}/\text{cm}^2$.

The lead swab results indicate that residences that were sampled pre and post cleaning, were found to have reduced lead contamination inside the residences after the cleaning, which is consistent with the clean-up goals for surfaces accessible to adults and young children

Due to the absence of Australian and international health guidelines for metal content in ceiling dusts, swabs obtained from the roof cavities of three residences located beyond 5 km from the Esperance Port have been used to determine background levels. The dust concentrations of the three swabs ranged from 0.018 to $0.67 \mu\text{g}/\text{cm}^2$ and these were found to be lower than homes located closer to the port. It should be noted that the DOH is of the opinion that the collection, weighing and analysis of roof dust for lead is a more appropriate method of measuring ceiling dust because it provides a better representation of roofs with higher lead levels which a swab sample would not necessary do. Notwithstanding, it is important to ensure that dust from roof cavity does not significantly contaminate the interior of the house. This can be done by minimising any point of entry between roof space and the interior of the house and by cleaning up any dust that may arise from the roof cavity.

Each occupant of the houses surveyed in this study received a letter from the DOH, discussing their results and advising them on ways to minimize dust fall from areas that are prone to collect dust.

Results of swabs outside residences and results of soil sampling for lead

In April, five of the 18 residences had also been sampled prior to cleaning. The swabs taken from external surfaces had a lead content range of 0.48 to $34 \mu\text{g}/\text{cm}^2$ after cleaning the range was 0.037 to $19 \mu\text{g}/\text{cm}^2$.

In July 2007 external samples consisting of 23 swabs were obtained from a variety of locations including windows, doors, beams, cubby houses and other external structures outside residences. Lead content of the swabs ranged from 0.01 to $19 \mu\text{g}/\text{cm}^2$.

Fourteen soil samples obtained from nine properties in July 2007 indicated a lead concentration range of 1.5 to $40 \text{ mg}/\text{kg}$. Lead concentrations in the soils are well below the HILs-A of $300 \text{ mg}/\text{kg}$. The results therefore indicate that there is no appreciable risk to children from daily contact with the soil. However they should continue to wash their hands before eating as previously advised.

Three soil samples obtained in July 2007 from an external floor mat of a property had lead concentrations ranging from 11 to $140 \text{ mg}/\text{kg}$. There is currently no health guideline for metal content in soils obtained in this manner in Australia or internationally. In the absence of a guideline, the use of the NEPC HILs-A for soil gives an indication that lead concentrations are well below the HIL-A for lead ($300 \text{ mg}/\text{kg}$) hence there is no appreciable risk to children from daily contact with the dust.

In August 2007, 12 swabs were taken from external surfaces. Lead content of the swabs ranged from 0.13 to 10 µg/cm².

The lead swab results indicate that residences that were sampled pre and post cleaning, were found to have reduced lead contamination inside the residences which is consistent with the clean-up goals for surfaces accessible to adults and young children. While cleaning reduced the overall levels of lead contamination on external surfaces, most external surfaces continued to have levels that are considered unsafe for young children and some surfaces had levels that would be unsafe for adults. Some of these surfaces are inaccessible to young children, such as sheds and patio beams and therefore may not pose a direct problem while other surfaces such as decks and patio furniture are directly accessible to young children.

Relevant safety standards for lead in soil

Lead analysis results for soil were compared with the *Health Investigation Levels (HILs-category A)* published by the National Environmental Protection Council (1999). The category-A screening levels are applicable to residential areas, children's daycare centres, kindergartens, pre-school and primary schools. The screening levels are calculated based on the concept of a tolerable daily intake (TDI) which is a dose of a particular contaminant that a young child may be exposed to on a daily basis throughout life without appreciable health risk.

The level of lead present in soil samples taken in Esperance is low and does not represent a public health risk. In addition, the uptake of lead from soil by plants is low therefore Esperance residents growing their own vegetables for consumption can do so without significant lead intake. The DOH advises that all fruit and vegetables grown at home should be washed to remove any traces of dust or soil before consumption.

Summary of results of residential testing for lead

Overall the results suggest that cleaning did control lead dust contamination on internal surfaces. Externally, cleaning reduced the overall levels of dust contamination but recontamination with lead containing dust was occurring. These results show that properties near the Port of Esperance continue to be impacted by lead containing dust. The Department of Health therefore recommends that in order to prevent any further exposure of occupants in homes, particularly young children, it is important to continue to clean any sources of dust in and around the home following the guideline established by the Department of Health (please refer to the webpage http://www.health.wa.gov.au/envirohealth/home/docs/Managing_lead_dust_in_and_around_the_home.pdf and DVD supplied by the Department). Additional queries regarding the lead dust monitoring results should be directed to Dr Martin Matisons A/Principal Toxicologist of the Department of Health on 08 9388 4946.

References:

1. The Western Australia Department of Health (DOH). 2007. Managing possible lead dust in and around the home. Online [Available]: http://www.health.wa.gov.au/envirohealth/home/docs/Managing_lead_dust_in_and_around_the_home.pdf [Acquisition date: 10/12/2007].
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