Citizen Science Project - LeadSafe Vs Sugarsoap for Cleanup after Lead Paint Removal

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A LEAD Group Kit customer kindly agreed to become a "citizen scientist" during the COVID-19 lockdown in Australia, by using dust wipes from his LEAD Group Kits to sample dust from surfaces in his vacant 1940's home after paint stripping (by a contractor using Heritage No. 1 stripper), in order to determine the cleaning solution which makes surfaces most lead-safe for a baby to move in. I have summarised the tentative findings below.

Disclaimer: this project was not carried out in a lab where one could have controlled the lead loading (micrograms of lead per metre squared of surface, or ug/m2) for all areas cleaned, so there's no way for sure we can know that the 30cm x 30cm wipe areas (despite being chosen for looking similar and even alongside one another) actually had the same lead loading before cleaning.

Aim: to determine at before and during cleanup (following lead paint stripping with a chemical stripper), whether detergent was more effective than water alone, and which of two detergents being trialled was more effective at reducing the lead loading, so that that detergent could be used for the remainder of the cleanup.

Method: noting that LeadSafe detergent costs (by volume) approximately 4 times more than Liquid Sugarsoap, and that the recommended lead cleanup method is the Three Bucket Cleaning System*, the citizen scientist followed the LEAD Group Kit dust wipe sampling instructions (which are based on the Australian New Zealand Standard AS/NZS 4361.2:1998 "Guide to Lead Paint Management) to collect dust wipe samples (wearing the lead-free gloves and using the Ghost Wipes and laboratory-grade sampling containers that come in the Kit) from an area that was consistently 900cm² (either 30 cm x 30 cm or 15 cm x 60 cm). He first sampled dust wipes on some stained or oiled reclaimed timber which looked in quite variable condition, post paint stripping and pre- and post-wipe down by the paint removal contractor, but before cleaning, to get a baseline lead loading, and sent these off to the lab for urgent analysis before the cleaning contractors arrived to start the HEPA vacuuming and wet-cleaning. A dust wipe from one wall was sampled because it was made of the same reclaimed stained or oiled timber as the lounge floor, but of course would have had no track-in or fall-out dust.

Baseline Results:

Timber feature wall made from reclaimed wood.	30cmx30cm wipe. Timber appears to be stained or oiled in past with variable condition (wiped down)	25ug/m2

Lounge room Timber floor (reclaimed wood) Centre of room, under metalwork with lead paint (post paint stripping)	30cmx30cm wipe. Timber appears to be stained or oiled in past with variable condition (wiped down)	63ug/m2
Lounge room Timber floor (reclaimed wood) Centre of room, under metalwork with lead paint (post paint stripping)	30cmx30cm wipe. Timber appears to be stained or oiled in past with variable condition (not wiped down)	190ug/m2

Method (continued): Then two similar areas of the lounge timber floor and corridor polished concrete floor were cleaned by first HEPA vacuuming then following the Three Bucket Cleaning System and using the concentration recommended on the container for both Fiberlock Lead Safe Lead Dust Cleaner ("Leadsafe") and Selley's Liquid Sugarsoap ("Sugarsoap").

Results:

Lounge Timber floor cleaned with "Leadsafe"	30cmx30cm wipe. Timber appears to be stained or oiled in past with variable condition	64ug/m2
Lounge Timber floor cleaned with "Sugarsoap"	30cmx30cm wipe. Timber appears to be stained or oiled in past with variable condition	170ug/m2
Corridor Concrete floor cleaned with "Leadsafe"	30cmx30cm wipe. Polished concrete	72ug/m2
Corridor Concrete floor cleaned with "Sugarsoap"	30cmx30cm wipe. Polished concrete	145ug/m2

Method (Modification One): The following day, realizing that water alone may be doing a lot of the lead removal, our citizen scientist collected three dust wipe samples in each area of the home, one cleaned only with water in the Three Buckets, one with Leadsafe and one with Liquid Sugarsoap, but having found online that the Australian federal Environment department recommended Sugarsoap be used at four times the concentration listed on the Selley's Liquid Sugarsoap detergent container, for lead paint cleanup, he used the Sugarsoap this time at the "correct concentration" for lead cleanup. Noting the wide variation in lead dust loading results, he also began testing similar-looking surfaces within an area. Then knowing that once the family was in residence they would be using the ceiling fans that had both winter and summer modes, he thought to also test the unconventional non-child accessible surface of the "ceiling", specifically, the underside of metal roofing in areas without a ceiling void.

Results:

Dining Concrete floor cleaned with Water	30cmx30cm wipe. Polished concrete	8.0ug/m2
Dining Concrete floor cleaned with "Leadsafe"	30cmx30cm wipe. Polished concrete	7.5ug/m2
Dining Concrete floor cleaned with "Sugarsoap correct concentration"	30cmx30cm wipe. Polished concrete	0.5ug/m2

Lounge 1 Timber floor cleaned with Water	30cmx30cm wipe. Timber appears to be stained or oiled in past with variable condition	160ug/m2
Lounge 1 Timber floor cleaned with "Leadsafe"	30cmx30cm wipe. Timber appears to be stained or oiled in past with variable condition	210ug/m2
Lounge 1 Timber floor cleaned with "Sugarsoap correct concentration"	30cmx30cm wipe. Timber appears to be stained or oiled in past with variable condition	265ug/m2

Lounge 2 Timber floor cleaned with Water	30cmx30cm wipe. Timber appears to be stained or oiled in past with variable condition	100ug/m2
Lounge 2 Timber floor cleaned with "Leadsafe"	30cmx30cm wipe. Timber appears to be stained or oiled in past with variable condition	68ug/m2
Lounge 2 Timber floor cleaned with "Sugarsoap correct concentration"	30cmx30cm wipe. Timber appears to be stained or oiled in past with variable condition	63ug/m2

Corridor A Concrete floor cleaned with Water	15cmx60cm wipe. Polished concrete floor	260ug/m2
Corridor A Concrete floor cleaned with "Leadsafe"	15cmx60cm wipe. Polished concrete floor	95ug/m2
Corridor A Concrete floor cleaned with "Sugarsoap correct concentration"	15cmx60cm wipe. Polished concrete floor	350ug/m2
[202003037J 09/04/2020] Corridor A Concrete floor. Near wood, floor cleaned with "Leadsafe"	15cmx60cm wipe. Polished concrete floor	510ug/m2
[202003037K 09/04/2020] Corridor A Concrete floor. Centre, floor cleaned with "Leadsafe"	30cmx30cm wipe. Polished concrete floor	2.5ug/m2
[202003037L 09/04/2020] Corridor A Concrete floor near beam, kitchen side, floor cleaned with "Leadsafe"	15cmx60cm wipe. Polished concrete floor	44ug/m2
[202003037M 09/04/2020] Corridor A Underside of Metal roof (near metal beam) "ceiling" cleaned with "Leadsafe"	15cmx60cm wipe. Sheet metal "ceiling"	320ug/m2

Method (Modification Two): Having decided to aim for his baby's blood lead level never to exceed 1 microgram per decilitre (1 ug/dl), and despite the one floor dust wipe result after cleaning with Sugarsoap where the result was the lowest that The LEAD Group has ever seen (0.5 ug/m^2) our citizen scientist collected a dust wipe after a second clean using the generally more lead-reducing Leadsafe detergent (and the Three Bucket System) and collected one floor dust wipe sample for urgent analysis at the lab before the cleaning contractor finished up, to see whether cleaning twice with Leadsafe would achieve clearance (a lead-safe home in which the family could reside), ie bring the floor dust wipe lead loading to below The LEAD Group's recommended 12ug/m^2 which is aimed at keeping a blood lead level below 1 ug/dl.

Results:

Corridor A after 2nd clean with "Leadsafe"	15cmx60cm wipe. Polished concrete	21ug/m2
Lounge Ceiling right of centre 4 after 2nd	15x60cm wipe. Underside of Zincaluminum roof	3.5ug/m2

clean with "Leadsafe"	above ceiling fan that has both Summer and Winter modes	

Method (Modification Three): Having not achieved the target lead loading of less than 12 ug/m2 with **two** Three Bucket cleans using Leadsafe on the floor, our citizen scientist collected more dust wipe samples after **three** Three Bucket cleans with Leadsafe detergent, and ensured that brushing or scouring with a soft (non-metal) scourer was vigorous enough for the detergent to form a lather.

Result:

Corridor A Ceiling Wipe near metal after 3rd clean with "Leadsafe"	15x60cm Zincaluminum roof	**2.0ug/m2**

Conclusions: Different dust wipe areas, even those that look exactly alike, can have widely variable lead dust loadings. The substrate (reclaimed oiled timber, Zincaluminum roofing, polished concrete) being sampled makes a large difference. Some (perhaps significant amount of) lead dust can be removed by repeated wiping down with water. If "Leadsafe" is used with a non-metal scourer and forms a lather, extraordinarily low lead loadings can be achieved, though several cleans may be necessary for this "clearance.

* Three Bucket Cleaning System (see below) - Reference: *Lead Safe - A Renovator's Guide To The Dangers Of Lead* (1998) - Part available online at http://web.archive.org/web/20070830233627/www.epa.nsw.gov.au/leadsafe/leadinf4.htm by the Lead Reference Centre (LRC) - a now defunct part of NSW Environment Protection Authority (EPA)

Three bucket cleaning system

You will need:

- three buckets (1 - for detergent, 2 - for clean water, 3 - for emptying used water into)
- two mops or rags, one for clean and one for dirty
- a lead specific cleaning detergent (e.g. liquid sugar soap).

Method:

1. Place mop into detergent solution, wipe area
2. Squeeze into empty bucket
3. Place second mop into clean water and wipe area and squeeze into empty bucket
4. Replace water every room or every half hour whichever comes first
5. Pour water down toilet
6. Start at top and furthest corner from door

2020 Volcano Art Prize (VAP) Entry. Title: Mother mops up lead dust while baby plays in high chair. Lead-Safety Message: When babies are crawling, floors in old houses should be wet-cleaned every other day. Artist: Rose Lennon. Aged 7. Description of Work: Pen drawing. https://volcanoartprize.com/portfolio-item/mother-mops-up-lead-dust-while-baby-plays-in-high-chair/