



What I Have Learned About Lead - Part 2a Lead Balloon

Justone Lead-Soldier, 27th September 2020

What is a “lead balloon”?

I don't know if the saying is used only in the UK or also elsewhere, but ‘This will go down like a lead balloon’ means that something is going to be really unpopular - as portrayed in Jack Dee's series of the same name featuring annoyances, disappointments and embarrassments.

“Lead balloon” particularly applies when you tell people that what they are doing risks releasing lead dust – especially tradesmen.

I asked one decorator how they dealt with dust from lead paint sanding outside. Their reply was “we let the wind deal with that”. A window installer said the best way to clean lead came was with wire wool. He had had a heart attack!

Not everyone is ignorant, as I was, about the risks of lead, but often their responses can be described as one or more of:

Laziness

Excuses

Apathy

Denial

This article describes tips, tricks and techniques that I have discovered while DIY decorating and renovation in our lead-rich house. I have not commented on products that did not work well for me because of fear of defamation claims against me or The LEAD Group.

I must acknowledge the help provided by Hesaan Sheridan of Heritage Testing for analysing many of my dust test samples. The results of some of these appear in this article.





Lead Safe Ish

In general, what I have found is that, lead free is impossible. Lead safe maybe achievable, but there is often some doubt left. Accidents will happen – containment will fall down, steps will be taken outside the work area, tests may not collect all the lead.

It has been said that “Certainty is a luxury you cannot afford”. The time, money, effort and anxiety involved in getting to lead safe begins to realise diminishing returns. In many cases, I have found that there is only judgement left to determine if there is a dangerous contamination problem or not.

In writing this account I am not recommending anyone else does the same and I do not provide any guarantees these techniques will work for others. I am just sharing ideas of what I believe has worked for me.

Guidance

I have used several resources to guide my DIY work. I most often try to be compliant with the [Renovation, Repair and Painting Program](#) (RRP) from the Environmental Protection Agency in the USA. I mostly refer to the contents of a training course [student manual](#). One difference is that I do not apply the 6 sq ft applicability minimum. I apply RRP to any sized area of work.

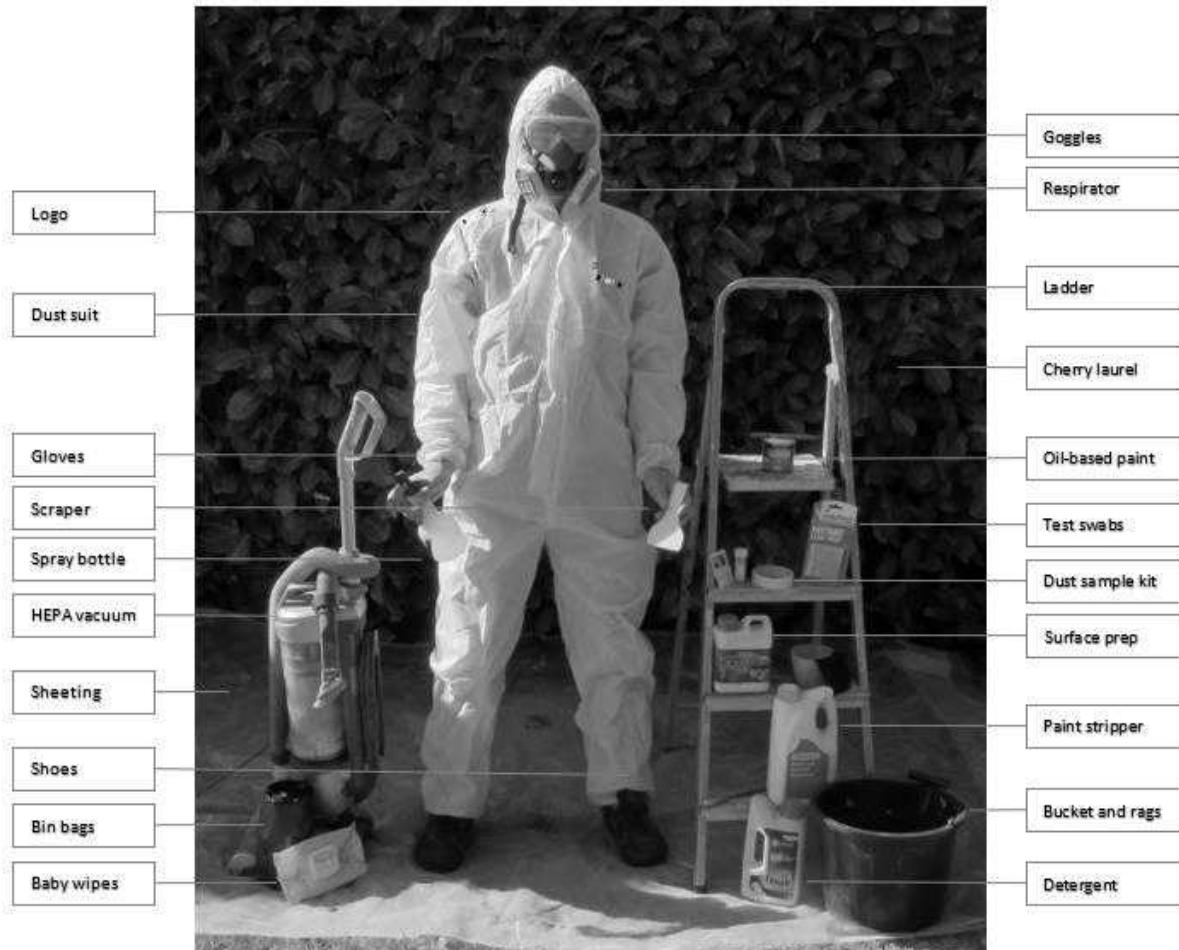
One part of the guidance in the RRP is to hire a certified lead-safe contractor. There is no such thing in the UK. There is [training](#), but no certification scheme so, to be sure of compliance to lead safe practices, I need to do the work myself or persuade a tradesman that I am not mad and get them to do their work they way I believe is safe.

From the UK, I refer to the Department for Environment, Food & Rural Affairs (DEFRA) leaflet “[Advice on lead paint in older homes](#)” and the; British Coatings Federation, Painters and Decorators’ Association and Scottish Decorators’ Federation; “[PaintSafe](#)” initiative - particularly their tri-fold leaflet.



Tools

This picture, previously presented in Lead Action News, shows most of the tools that I use when working with lead contaminated materials:



I point out cherry laurel in this picture because this is another toxic hazard. The plant contains [cyanide](#) which is released if the leaves are crushed or the wood is burned. Even water that drips off the leaves is poisonous.

Testing

The main tools I use for testing for lead are 3M LeadCheck swabs and dust samples sent to a laboratory for analysis.

When taking dust samples for analysis for lead I use the EPA [Lead Dust Sampling Technician Field Guide](#). One exception is that I use nappy bags secured with rubber bands instead of gloves. These allow me to turn them inside out and limit one source of possible sample contamination. It should be noted that the clearance





levels mentioned in the EPA guide have now been superseded by the US [Department of Housing and Urban Development](#).

The current HUD action levels are:

- Interior Floors: < 10 µg/ft²
- Porch Floors: < 40 µg/ft²
- Window Sills: < 100 µg/ft²
- Window Troughs: < 100 µg/ft²

These are the levels that I refer to and aim to meet.

Cleaning

Baby wipes

Cleaning follows the RRP or DEFRA advice, but usually utilising baby wipes and/or HEPA filter equipped vacuum. Evaluation of different methods by Heritage Testing found that baby wipes were the most effective of the methods tried. The best way is one directional wiping, not backwards and forwards, but by starting each swipe from the same edge of the area being cleaned.

More details of the method described by Heritage Testing include:

How many wipes to use:

Depends on the roughness of the surface. Generally, 1 ft x 1 ft for carpets and rough or areas that are not visually clean, 1 m x 1 m for smooth or visually spotless surfaces. For heavily contaminated areas, use up to three wipes.

When to use:

The 'baby wipe' method was effective as a 'finishing clean' for areas that had been repeatedly cleaned, but are still not below acceptable levels. This method is not good for cleaning of previously un-cleaned areas - it would probably take many more baby wipes (and a smaller grid).

How to use:

Wipe in one direction or sweep in an 'S' or 'double S' shape, you can fold the wipe inwards halfway through if necessary. The technique is to push everything the wipe collects in one direction, rather than scrub. At the end, of the sweep, fold inwards again and collect any dust pushed towards the bottom of the 'S' or 'double S'. Then discard the wipe.

Effectiveness:

One wipe was usually enough for lightly contaminated surfaces, and resulted in a dramatic (more than 90%) reduction in lead content on floor and window sill surfaces, and more than 50% reduction on carpet or rough wood upper surfaces (after using HEPA vacuum cleaners to remove lead dust from deep within the pile or cracks).

Materials

Containment and cleaning in lead rich renovation requires a lot of use of plastics. There could be concerns about the use of a non-biodegradable plastic products. I take the view that it is waste management that is the problem with plastics so I always ensure that used wipes and sheeting go into my domestic rubbish, as advised by DEFRA. Once in land fill the hydrocarbons are back underground, where they came from, where they will decompose slowly. This seems better than degradable plastics



which will release greenhouse gasses such as methane and carbon dioxide more quickly. I would be happy to be told if this is wrong.



HEPA

I use vacuum cleaners equipped with HEPA ([High Efficiency Particulate Arrestance/Air](#)) filters.

However, I have learned that some HEPA filters are higher than others.

Under European normalization standards EN 779, the following [filter classes](#) were recognized until 2018 when they were replaced by [ISO 16890](#). The details of this standard are not publicly available for free. The test standard for HEPA filters is BS EN1822.

Usage	Class	Performance	Performance test	Particulate size approaching 100% retention
Semi HEPA	E10	85%	Minimum value	>1 µm
	E11	95%	Minimum value	>0.5 µm
	E12	99.5%	Minimum value	>0.5 µm
HEPA	H13	99.95%	Minimum value	>0.3 µm
	H14	99.995%	Minimum value	>0.3 µm

Some filters I have used are actually marked 'H12' which is confusing, but I assume means that they are 99.5% efficient.

The highest lead loadings that I have found in our house are in the 100s of µg Pb/ft². I assume that 99.5% efficiency means that 1 in 200 particles gets through the filter. Based on that, my logic is that a loading of 500 µg Pb/ft² would be reduced to 2.5 µg Pb/ft² which is well below the HUD clearance level and not even detectable in the laboratory analyses that I use. Most recent dust tests around the house have met the HUD clearance levels so there does not seem to be a general problem with distribution of lead contaminated dust via the vacuum cleaner. I am satisfied that this level of filtration is adequate.

I actually have three vacuum cleaners which I use for different purposes and keep them for that purpose.

Removing lead paint flakes.

Cleaning up dirty areas possibly contaminated with lead.

Normal house cleaning.

This means I reduce cross-contamination between areas of different lead loading.

I have seen it said that vacuums leak. I have found that all my vacuum cleaners leak, but inwards. That is, upstream of the post-motor filter. I therefore think that this is not a problem.



Cleaning the cleaner

One technique with vacuum cleaners I can mention is what I call back-sucking. If I am using a brush attachment and it is getting dirty, I will take it off and simply vacuum the bristles to remove the dirt.

If I feel the vacuum cleaner has become contaminated I will wash the non-electrical parts in a solution of dishwasher detergent, rinse and then leave it to dry. This may also require disassembly before washing. I found that washing without disassembly resulted in any fluff remaining in the parts getting damp and becoming smelly. I found a [YouTube video](#) that explains how to disassemble on one example vacuum cleaner.

Cleaning contaminated objects

All detritus, tools and clothes are put into plastic bags before being removed from the work area. The tools are scrubbed and washed in dishwasher detergent. The clothes are thrown away, or washed separately, and hung out to dry outside. This is rather than allowing the tumble dryer to blow any residual lead contaminated dust around inside the house. The clothes are then used only for future lead risk work and not brought back into normal use.



Door Dipping

If you have an old door with many layers of paint then the general advice is to get them dipped by a professional company. You then probably need to sand them as described in this conversation ([Money Saving Expert, 2006](#)). The advice given is 'let them air dry (totally - or you'll damage the surface) and then sand them really well'.

The problem I have found is that when the doors come back from the dipping process they are leaded. This is easily checked with a 3m LeadCheck swab. The surface may be rough with many loose wood fibres. Sanding this is very likely to release lead contaminated dust onto the worker, their clothes and the surrounding area.

The thing is, that the lead on the doors may have come from other doors. My understanding is that the vat of caustic solution for door dipping is used repeatedly. It would seem obvious that this may become a leaded soup which will soak into other doors even if they were not already covered in lead paint.



In a test I found the level of lead on a door to be 428 $\mu\text{g Pb/sq ft}$ without sanding.

I have found that covering with water based varnish does not solve this problem. Lead can still be detected with LeadCheck swabs even after two coats. I have found that two or three coats of polyurethane varnish are needed. Then no lead was detected with LeadCheck. Also, recent dust samples in the area analysed for lead have been sub-detects.



Leaded Internal Display Cabinets

Our house was built in the 1920s and has several original features. These include display cabinets with glass doors and lead comes (Cames are the strips of lead used to hold the glass together. The pieces of glass are called quarries). A dust sample from inside one of these cabinets showed a disturbing level of 731 $\mu\text{g Pb/sq ft}$.



My solution was to encapsulate the glass panes between two sheets of acrylic. The

encapsulated panes were sealed with 40mm PVC tape and held in place with spring clips. Work on the windows was done away from the cabinets, with the windows placed in a cardboard box, while I was wearing PPE. The resultant encapsulation is almost invisible.




The doors and interior of the cabinet were also thoroughly cleaned and painted with oil-based gloss paint and varnish. Care was taken to ensure that the doors are not rubbing against their frames as this could lead to abrasion of the new paint through to the original lead paint.

Sometime after the work, a dust sample taken from the floor near the display cabinet was analysed and the result was a no-detect.



Lead Painted Walls

I have not been able to detect lead in the paint on the walls of the house with LeadCheck except in the pantry. This appeared to have been painted with a grey, leaded gloss paint. Unfortunately, a previous roof leak had caused the paint to fail. This was probably the nastiest problem in the house that I needed to deal with. Dust sample analysis showed the following levels of lead:

Location	Picture	µg Pb/sq ft
Shelf – before cleaning		352
Shelf – after cleaning with baby wipes, one directional		<2.85 Baby wipes work
Wall – note the lead pipe with an electric cable in it! However, all water pipes in the house have been replaced with copper.		19.25 A little lead being released from the surface despite being over painted.
Floor		< 2.85 Lead paint flakes are not reaching the floor in a detectable quantity

My approach to deal with this issue was to remove as many paint flakes as possible, while keeping the surface wet. I also put up a containment sheet on the doorway and covered the floor with thick plastic sheeting held down with sticky tape. After getting to a sound surface two layers of emulsion paint, known as latex in some countries, was applied. A test with LeadCheck still detected lead. Two further coats of oil based gloss were applied, after which, LeadCheck did not detect any lead.

Some may say that it is not appropriate to leave lead paint in place, even when covered with layers of non-lead paint, because this leaves a toxic hazard for the future. My judgement was that, in this case, attempting to remove the paint from the rough brick surface would have been very difficult and could have spread contamination. I could have used a product such as EcoBond, but this is not available in



the UK.

A recent dust analysis found no detectable lead.

Shoes

I wondered whether lead contaminated dust was being brought into the house from outside. I calculated the area of the sole of my shoes, took a wipe sample and sent it off for analysis.

The result was 24 $\mu\text{g Pb/sq ft}$. And, no, I do not have square feet!

Even if all the lead on the shoes was transferred from the shoes to the floor it would soon be distributed widely enough to be below the HUD clearance level. However, over time, without cleaning, that lead could build up and become more dangerous especially if children played on the floor. A sample from a doorway that had not been cleaned for a few weeks was analysed and found to have 21 $\mu\text{g Pb/sq ft}$ which is above the HUD clearance level for floors, but not for porches.

These results were lower than I expected, but still enough to show that removing shoes when coming indoors will help to reduce overall lead loading.



Soil

I have had two soil samples analysed from our garden. These showed:

83ppm in an old raised bed, top 50mm of soil

97ppm in cultivated soil, between 50mm and 150m depth

The background level in soil in England ([Environmental Protection Act 1990](#)) was found to be 180mg/kg (180 ppm by weight). [Thornton et al. 1990](#), found a geometric mean on 266 $\mu\text{g/g}$.

The EPA standard for lead in soil in play areas does not apply here, but is higher than the levels I found at [400ppm](#).

I am, therefore, not very worried about lead in most of our soil, but still grow vegetables in raised beds with new soil. I say most, because this is one drain from a lead covered flat roof that discharges on to a flower bed. I treat that with extreme caution including not putting material from there into compost.

Carpets

Most analyses of dust samples from carpets have not found detectable lead. One location persistently would not go below the HUD clearance level of 10 $\mu\text{g Pb/sq ft}$. This was even after two rounds of professional carpet cleaning. The levels found were not alarmingly high at 25, 28, 28, 59, 59 and 68 $\mu\text{g Pb/sq ft}$, but we decided to replace the carpet anyway before any children played on it.



Lead Painted Wood And Metal

Preparation

The RRP guidelines explain how to deal with flaking lead paint. I follow those guidelines so there is no need to repeat here.

If the paint surface is sound, but needs a new top coat there needs to be a way to help the new paint adhere. If the paint is not leaded then the normal practice would be to sand it. I don't want to do that if there is lead paint present, even in lower layers of the surface.

What I have found works well is a “chemical sander”. This may also be described as an adhesion enhancer. I have used a product called ‘Easy Surface Preparation’ made by Owatrol.

I have found this to provide a good surface for gloss paint, with no flaking, even outside and exposed to direct, all-day sunlight. The sale assistant in the DIY shop said it would not last five minutes which makes me wonder why they sell it. However, it seems to work very well. It looks expensive at around £25 a litre, but it does a long way and maybe turns out cheaper than abrasive and is certainly less effort.





Encapsulation

If a lead painted surface is at-risk of being knocked and chipped then I have sometimes encapsulated it to cover up the surface and eliminate the risk. Sometimes this is no more than sticking white PVC tape over the vulnerable edge. Some times it required more substantial encapsulation.

Larder



One edge of our larder door was especially vulnerable to being chipped as shown in this picture.

Our solution was to encapsulate the door frame and architrave in MDF board and paint it. This was done while the area was contained. It was also cleaned thoroughly afterwards in case any lead paint was disturbed in the process.

The door hinges and stricker plates were replaced as the old ones were covered in leadpaint.

Before

After





Airing cupboard



The airing cupboard had an old door that was warped as well as being painted, under the top layers, with lead paint. The door frame also had original lead paint.

The approach we took was to stop any contamination going into the cupboard with plastic sheeting as well as putting sheeting on the floor. We then taped over the old leaded door frame to stop any leaded dust being released during the work and then screwed in a new frame within a frame. The was made the right size to accommodate some replacement doors. The old architrave was retained and overpainted, but was not now vulnerable to chipping.

Shaving Foam

Just one last point in this edition. If there is a situation where a small amount of lead paint may be disturbed, e.g. removing old screws, drilling into lead painted wood, I have found a way to stop lead contaminated dust being distributed is to use shaving foam. Put a blob of shaving foam over the point of contact. This traps paint chips or dust so that they easily be collected on a piece of kitchen paper or baby wipe for safe disposal.

Another method is to smear over some silicon sealer.

Future Articles

Other planned articles in the 'What I Have Learned About Lead' series:

Window replacement – lead paint, lead comes, lead nightmare

Whole Lotta Lead – Things with lead, things that release lead

Pb or not Pb – Experience with different testing methods

Plumbing the Depths – A review of the health impacts of lead exposure