

**PAINT THE
TOWN RED**

The problem
with exposure
to residential
lead

Lead Based Paint Contamination in Residential Soils: A Palmerston North City Case Study

Jack Blunden

Team Leader – Environmental Compliance

Waikato Regional Council

Participants and Confidentiality

- Participants were sought through Massey university staff and students
- Owner/occupier properties only
- Included information sheet
- Confidentiality agreement with participants and anonymous data



Study Location



- Palmerston North City is New Zealand's eighth largest urban area
- Population of 80-100,000
- Boasts around 23,500 dwellings

Sampling Methods

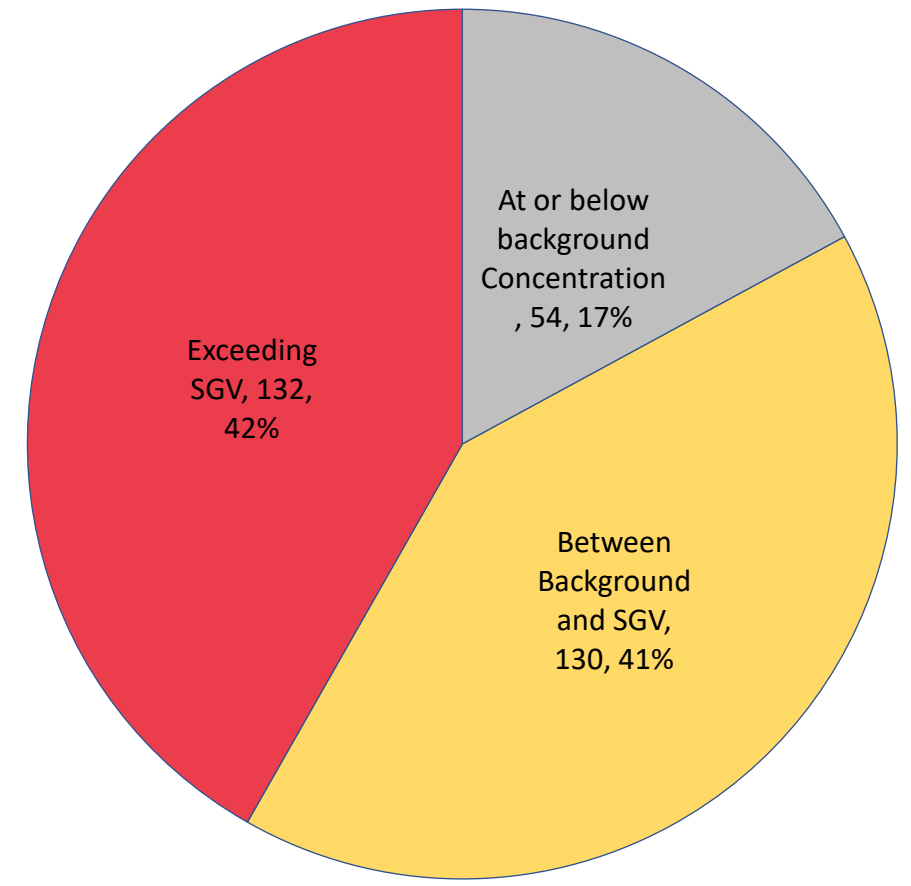
- Initial sampling at 8-12 locations around the curtilage of 34 properties
- Intensive grid sampling at three properties at 10cm and 20cm depths.
- Nitric acid digestion and ICP-MS for total Pb



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In this study, **50%** of properties had average soil lead concentrations exceeding recommended guidelines.



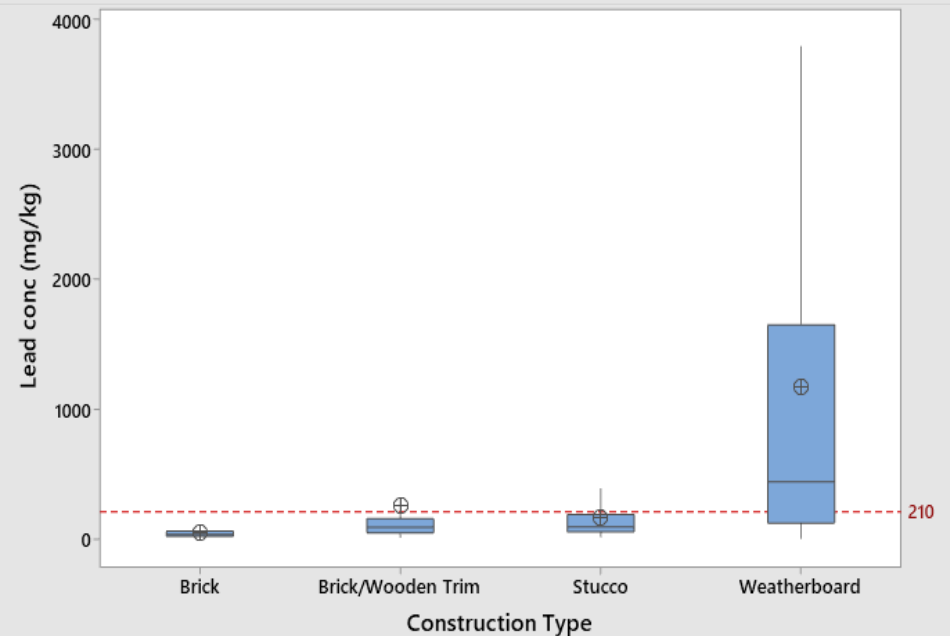
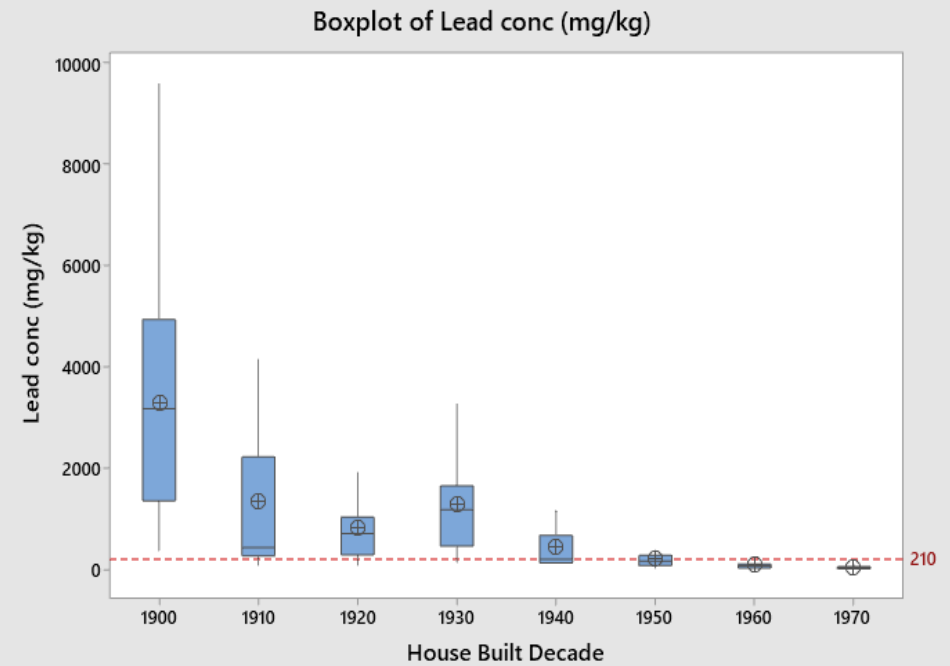
Significant Factors

Age – properties built <1945 had high levels

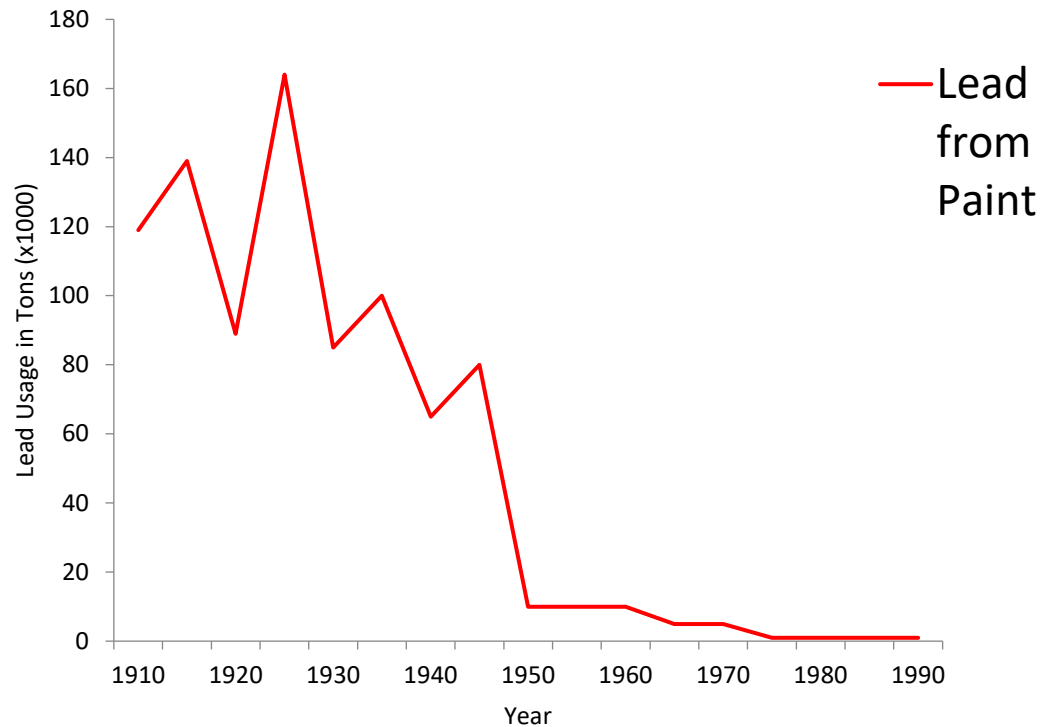
Construction Type – Weatherboards heavily impacted

Poor **paint condition** may also be an influence

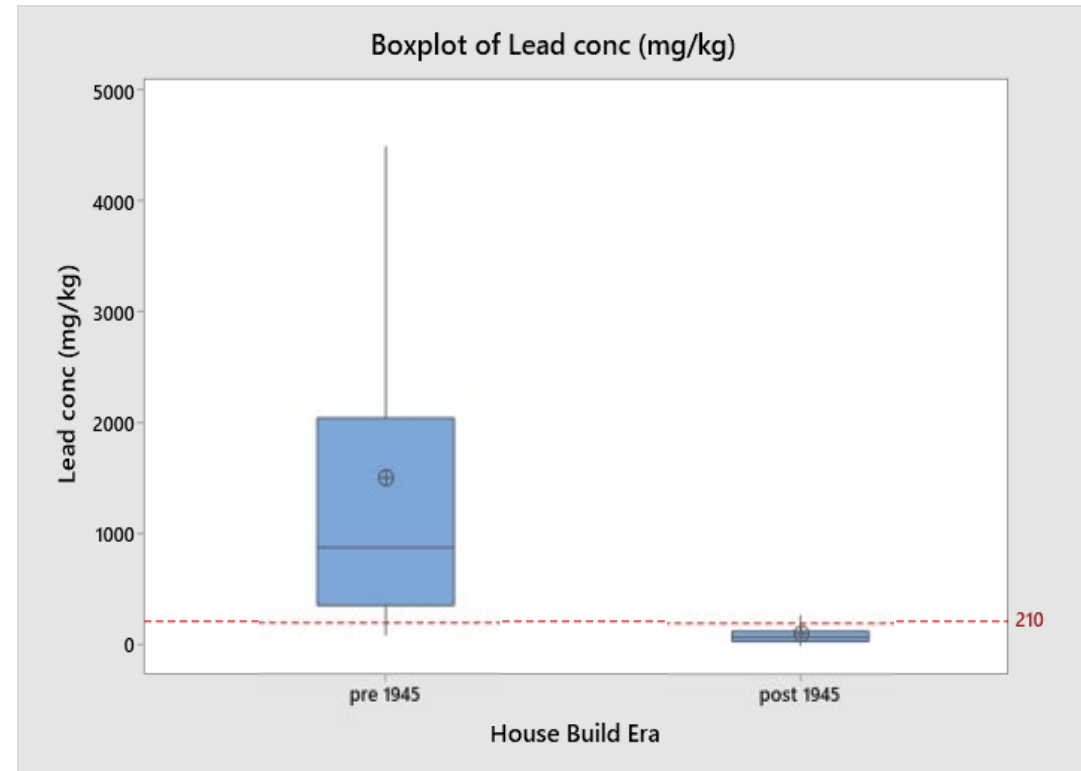
Similar results to other studies



Significant Factors



Estimated lead usage in tons as additives in paint (USA). Adapted from "Resuspension of urban soils as a persistent source of lead poisoning in children: A review and new directions," by Laidlaw M. & Filippelli, G. (2008). *Applied Geochemistry*, 23, 2021-2039.



Box and whisker plot of soil lead concentrations in homes constructed before and after 1945. Dotted line represents the 210mg kg⁻¹ SGV for lead.

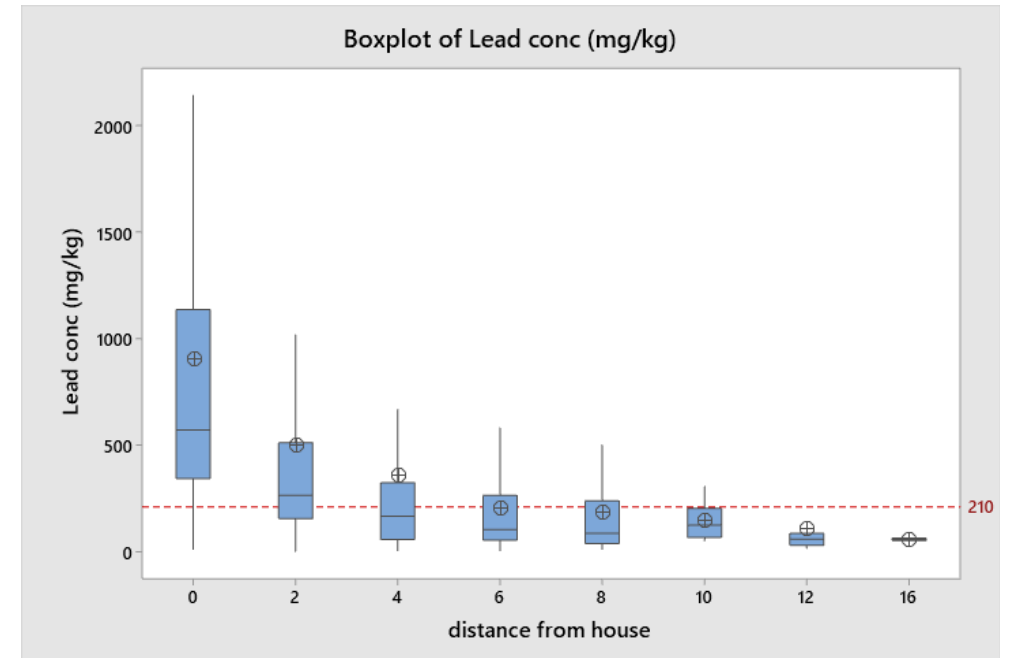
Non-Contributing Factors

- Lawn/garden
- Soil type
- Leaded Petrol
- Property features



Grid Sampling Investigation

- Total Pb concentrations decrease with distance from the curtilage
- Variability of concentrations also decreases with distance from the curtilage.

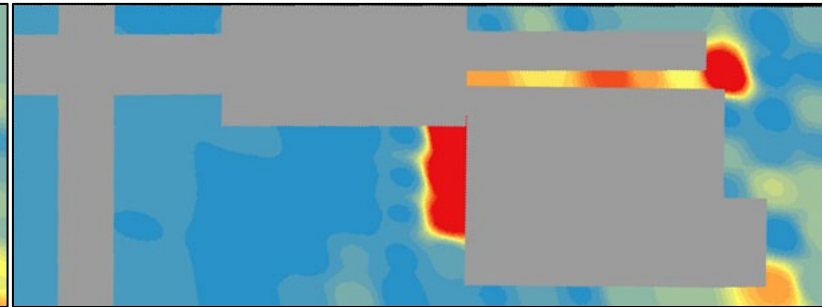
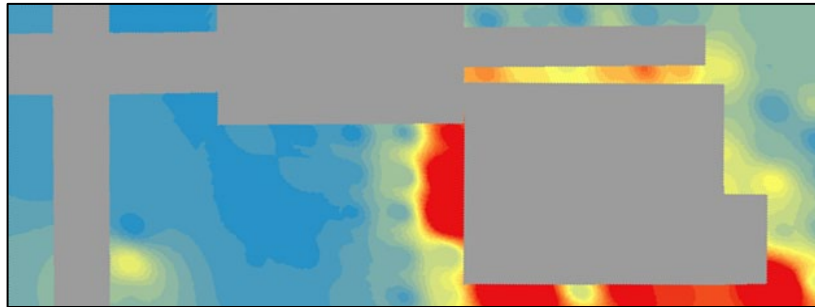


Spatial Distribution

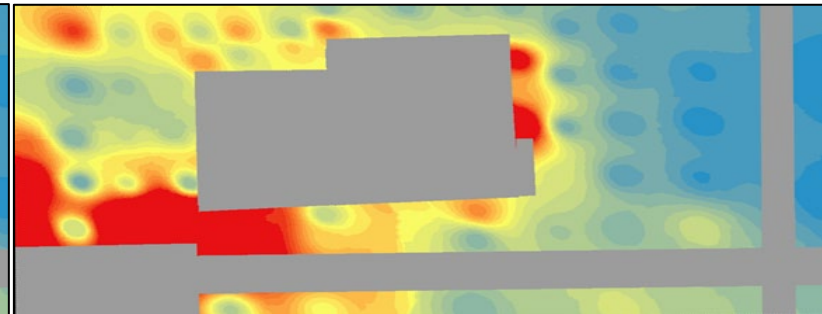
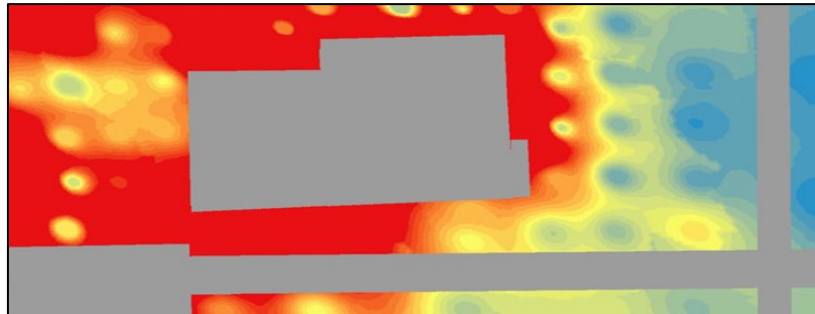
0-10cm Depth

11-20cm Depth

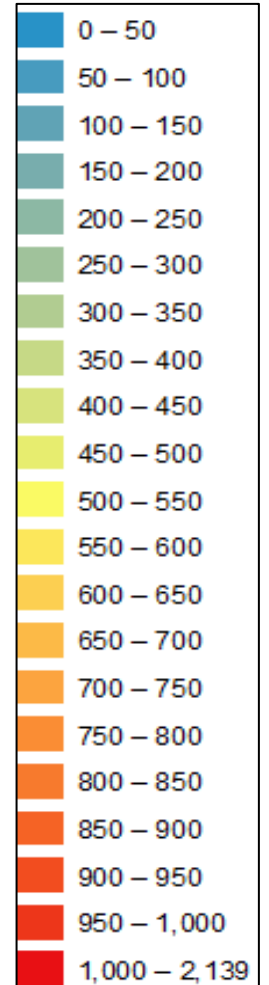
A



B

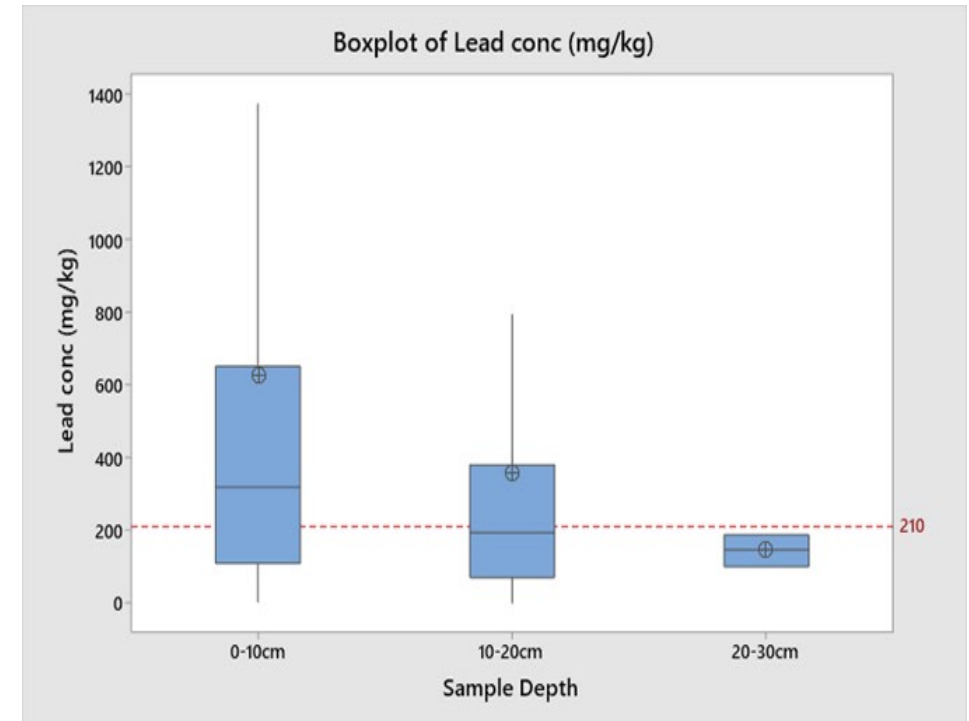


C



Vertical Distribution

- Total PB concentrations decreases with depth
- Variability decreases with depth
- Garden Soils showed a reverse trend

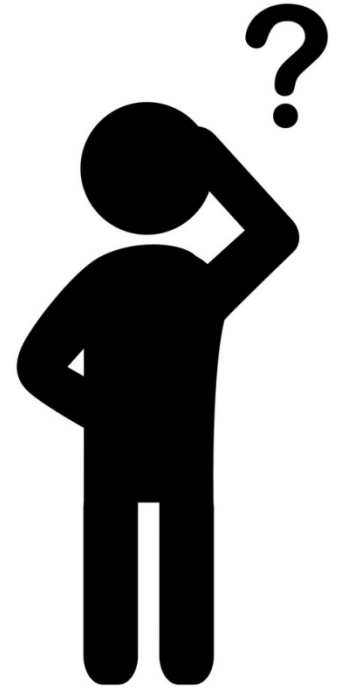


How Big is the Problem?

- Lead is relatively immobile in soils and has limited plant uptake.
- Current risk is assessed against soil guideline values which may not adequately quantify the risk.
- How should these sites are managed in the future can't be determined until we have adequately defined the risk.
- Further research into bioavailability of soil lead is a sensible next step.

How do we communicate the Risk?

- Properties with high lead concentrations >1000mg/kg?
- How do we communicate the risk in relation to the soil SGV?
- How do we answer basic questions from property owners looking to do the right thing:
 - What do I do now?
 - Where can I go for help?
 - House values?



Questions?