Avoiding the Risk of Lead Exposure by Detecting Harmful Lead Levels in Children's Products

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Background

Detecting sources of lead in a child's environment is key in eliminating the risk of lead exposure.

Keeping this in mind, the U.S. Consumer Product Safety Commission set the limits on the amount of lead in children's products, and phased in over the course of three years:

1. By February 10, 2009, products designed or intended primarily for children 12 and younger may not contain more than 600 ppm of total lead by weight.
2. On August 14, 2009, the limit was set to no more than 300 ppm of total lead by weight.
3. On August 14, 2011 the limit on total lead by weight in children's products was set to100 ppm, where technologically feasible.
4. **Also on Aug 14, 2009, CPSC enacted CPSIA, 16 CFR, 1303.1, which states that Lead content in Paint and Surface Coatings on any consumer products, should not exceed 90 ppm.**
5. **This paper is to show our laboratory's capacity to detect this level of lead in painted surfaces of children's and other consumer products.**

Introduction

Per CPSIA, CFR1303.1, we developed a method by modifying CPSC's lead detection protocol to meet 90 ppm limit in children's products.

Any product with a value above the CPSC reporting limit of 90 ppm would be referred to local Childhood Lead Poisoning Prevention Program (CLPPP) for investigation.

Analytical Method

SOP: CPSC protocol, "CPSC-CH-1003-09.1, Lead in Paint and Other Similar Surface Coating", Modified.

Samples: 50+ samples of different materials (e.g. metals, fabrics, plastics, ceramics, paper products etc.) with painted surfaces.

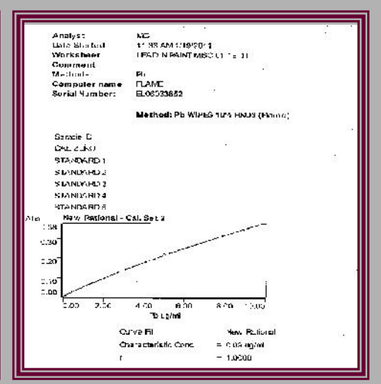
Processing: Used a rotary saw to scrape off surface paint, weighed 0.05 grams, used Microwave Digestion method in 10 milliliter HNO_3.

Analytical Instrument: Flame Atomic Absorption Varian 240FS.

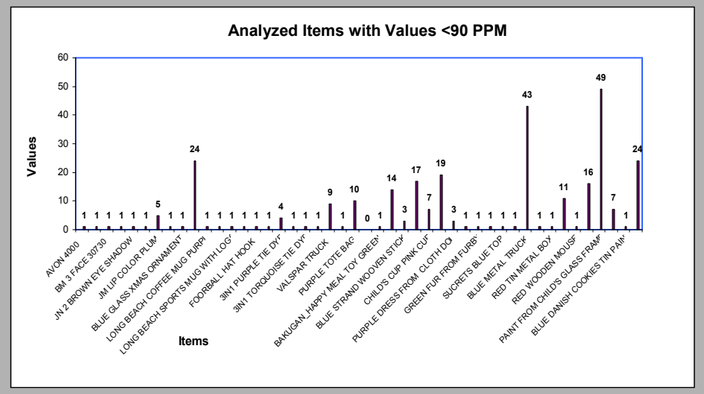
Calibration: Six-point calibration curve including zero in the Flame AA instrument.

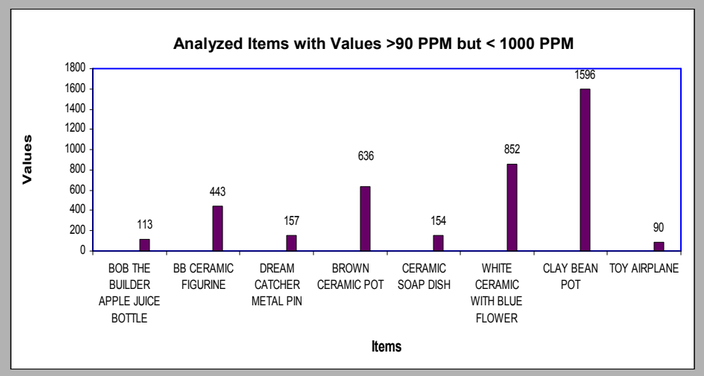
Quality Control: ICB, ICV, LSD, RLVS, LCS1 and 2, CCB, CCV.

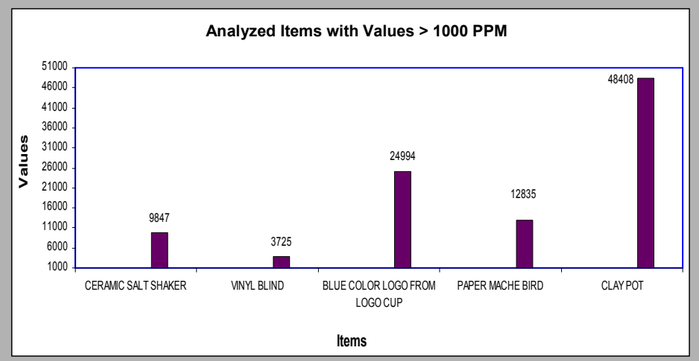
A few solutions were diluted and rerun to get an accurate value within the calibration range.



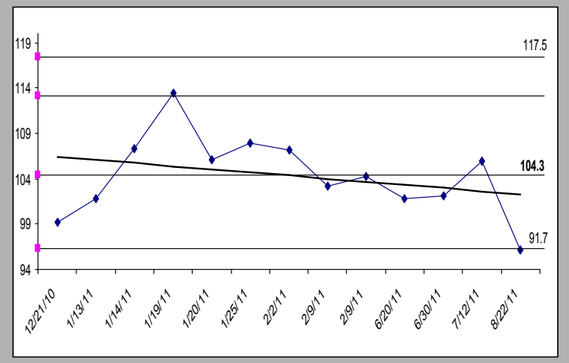
Results



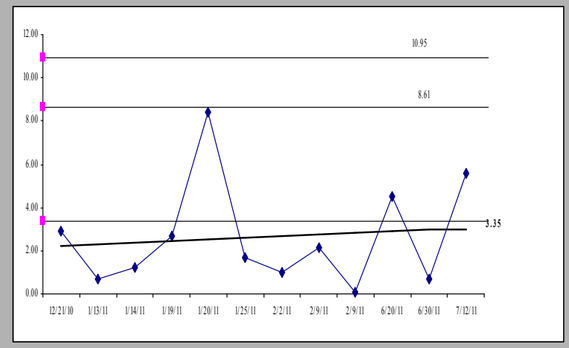




Quality Control



QC Chart_Accuracy: LCS % Recovery



QC Chart_Precision: LCS RPD

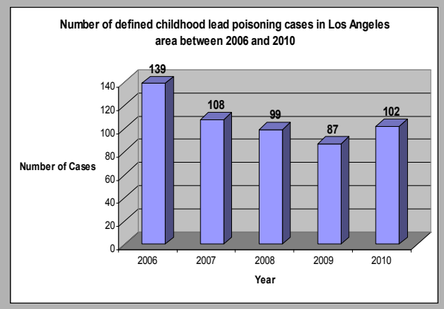
Conclusion

Our method is adequate to detect harmful lead levels in children's products per CPSC protocol.

Future Plan

We will offer lead testing services to local CLPPPs to determine sources of lead exposure.

Discussion



- Presence of lead in the atmosphere stems from its historic use in paint and gasoline.
- Lead is found in everyone's body today because of its widespread past use.
- **The decline of the Roman empire has been blamed, in part, on lead in the water supply.**
- Lead poisoning often occurs with no obvious symptoms and the effects of lead ingestion are cumulative.
- Lead poisoning can affect nearly every system in the body.
- In children, behavioral problems, learning disabilities, hearing problems, and growth retardation have been associated with sustained blood lead levels as low as 10 micrograms per deciliter (µg/dl).
- Approximately 250,000 U.S. children aged 1-5 years have blood lead levels greater than 10 micrograms of lead per deciliter of blood, the level at which CDC recommends public health actions be initiated.

Sources of Lead Exposure:

- Imported toys, crayons and painted metal toys.
- Paint on houses built before 1979.
- Soil contaminated from leaded gasoline use and factory pollution.
- Tamarind, chili powder, and chili coated candies from other countries.
- Handmade or imported pottery and ceramic dishes.
- Home remedies such as azarcon and greta, Ayurvedic medicine products such as spices, herbs, vitamins etc.

Acknowledgements

Center for Disease Control (CDC) data and Stats.
CPSC: http://www.cpsc.gov/about/cpsia/LockerLead.pdf
CPSIA: CFR 1303.1
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