

Introduction

It is well known that soils next to old houses painted with paint containing lead may contain high concentrations of lead. The old paint peels off the house naturally or it can be scrapped off. The lead can stay in the soils for long periods of time. The concentrations of the lead in the soils can be harmful to little children who may eat the soil.

Hypothesis

I believe my old house was painted with paint containing lead. I also believe the soils next to my house contain high concentrations of lead. I believe these lead concentrations are present at the surface and deeper in the soil. I think these lead concentrations can be higher than the Environmental Protection Agency (E.P.A.) allows and could be toxic to little children. I also believe the soil next to my neighbor's house which is built of stone with no paint does not have high concentrations of lead.

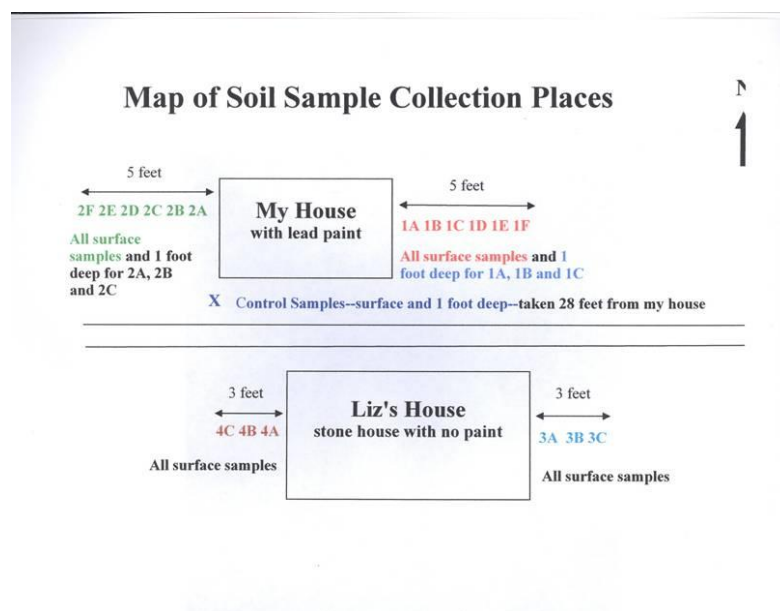
Procedure

Collection of Soil Samples

A hand hoe and a shovel were used to collect my samples. I collected surface soil samples from 2 sides of my house and from 2 sides of my neighbor's house. I also collected soil samples one foot deep below some of the surface samples from both sides of my house. I also collected a soil sample from the surface and one foot deep in my yard at a large distance from my house. All samples were placed in labeled plastic sandwich bags.

On each of the 2 sides of my house, I collected the first soil sample right next to the house and the next 5 samples were collected one foot from each other away from the house. The surface samples were labeled **1A-1F** on one side and **2A-2F** on the other side of the house. My father dug a 1-foot-deep groove along the collection line from the house on both sides. I collected 3 samples 1-foot-deep from the 3 closest positions next to the house on both sides (**1A 1 ft deep-1C 1ft deep** on one side and **2A 1ft deep-2C 1 ft deep** on the other side of the house). I also collected a surface and 1-foot deep "Control" **Soil Sample** 28 feet from the house (**Control Top** and **Control 1 foot deep**).

On each of the 2 sides of my neighbor's (Liz) house, I collected the first soil sample next to the house and the next 2 samples were collected 1 foot distance from each other. Only surface samples were collected at this house. The samples were labeled **3A-3C** on one side and **4A-4C** on the other side of the house. A map of the soil sample collection places is shown below.



Physical Preparation of the Samples

All samples were taken to my basement and dried. The clumps of soil in each sample were eliminated by using a mortar and pestle. All samples were placed in labeled bottles. The samples were taken to a geology laboratory at Southwest Missouri State University. A 1.00 gram of each sample was weighed with a Sartorius Analytical Balance and placed in a labeled centrifuge tube. Twenty milliliters of 3N nitric acid was added to each centrifuge tube. The centrifuge tubes with samples were placed in a Fisher Scientific Versa-Bath-S Hot Water Shaker Bath, heated at 70 degrees C. and shaken at 50 rpm for 24 hours. Each sample was centrifuge bottle was placed in an International High Speed Centrifuge for 4 minutes and the liquid poured into labeled analyses bottles.

Chemical Analyses of the Samples

The samples were taken to a chemistry laboratory at Missouri State. Lead standards and an acid blank solution were obtained. A Varian Liberty 150 AX ICP Emission Spectrometer was used to determine the concentrations of lead in each sample.

Preparation of Map, Table, Chart and Paper for the Study

Microsoft Frontpage was used to prepare a location map of soil sample collection sites and a table of lead concentrations for each sample. Microsoft Excel was used to prepare a chart of lead concentrations. Microsoft Word was used to prepare this research paper.

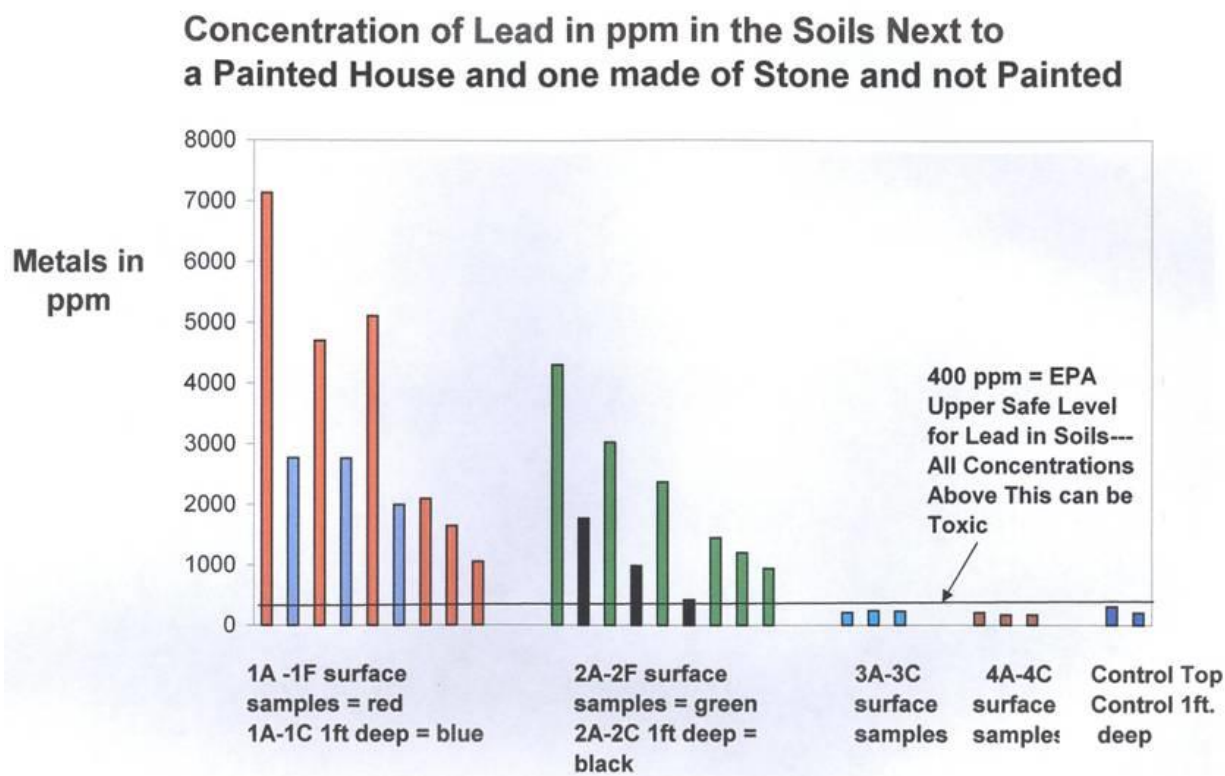
Results

The lead concentration of each sample is shown in the table below.

Sample Code Name and Concentration of Lead in ppm

Sample Code Name	Concentration of Lead in ppm
1A	7134
1B	4698
1C	5104
1D	2094
1E	1643
1F	1050
1A 1ft Deep	2798
1B 1ft Deep	2758
1C 1ft Deep	1991
2A	4302
2B	3022
2C	2364
2D	1442
2E	1199
2F	938
2A 1ft Deep	1764
2B 1ft Deep	979
2C 1ft Deep	422
Liz 3A	206
Liz 3B	236
Liz 3C	229
Liz 4A	201
Liz 4B	168
Liz 4C	167
Control Top	301
Control 1ft Deep	198

The lead concentration chart with the data from the table below is shown below.



The lead concentrations in the surface and 1-foot-deep soils next to my house decrease with distance away from the house. This is true on both sides of the house. A line that shows the acceptable upper safe level of lead concentration in soils established by the EPA is shown on the chart. All surface and 1-foot-deep samples are above the 400 ppm upper limit established by the EPA. The lead concentration of all surface soil samples next to my neighbor's house on both sides (**3A-3C** and **4A-4C**) are below the 400 ppm upper limit. The **Control Top and Control 1ft deep** samples are also below the 400 ppm upper limit and similar in concentration as those at my neighbors house.

Conclusion

My results agree with my hypothesis. The concentrations of lead next to my house were very high and above the safe limit of lead concentrations in soils set by the EPA. Also, the lead concentrations in the soil next to my neighbor's stone house were similar to the control soil samples collected in my front yard.

The concentrations of lead in the soils next to my house may be similar to the same at many other houses painted with lead paint. Little children playing in these soils could be affected by lead poisoning. Contaminated soils next to houses could be covered with plastic and decorative rock to protect children from lead poisoning.

If I were to continue this kind of research, I would collect soil samples farther away from the house and deeper to find how far the lead spreads. I would like to compare the concentrations of lead in the soils next to tall and small houses.

Acknowledgments

I wish to thank Southwest Missouri State University for the use of their facilities. I also wish to thank my neighbor, Liz who permitted me to collect soil samples from her property. I wish to thank my father for mentoring me in this project and correcting my research paper. Also I wish to thank my teachers at St. Agnes Elementary for their help and encouragement.