Project 4 Report

For this project, we designed a program that read a list of 1000 lead levels in the soil that, per their latitude and longitude, were from Newark, Ohio. The program then plotted these data points as a scatter plot over a generated map of Newark and color coded it according to the severity of the lead level. A blue dot signifies a level under 400ppm which is normal. A yellow dot signifies a level under 1000ppm, which is above average but still not necessarily dangerous provided one follows a few guidelines. An orange dot signifies a level under 2000ppm, a level that is dangerous yet still manageable, provided the soil is treated with the utmost sense of caution. A red dot signifies a level of over 2000ppm, which is extremely dangerous and indicates that the CDC should be called in to address the problem (http://extension.psu.edu/plants/crops/esi/lead-in-soil). The map we used was created with the matplotlib toolkit and the Mercator Basemap.

There were a few unique advantages and disadvantages that came with creating our map using the matplotlib toolkit. The primary advantage was that it allowed us to plot the lead level data with their given respective longitude and latitude coordinates and have the output be correct, forgoing any need for mathematical correction. The primary downside was that our map was the most basic map possible, showing none of the topographical or physical features of Newark, depicting it as a flat, white, sheet. Considering the context of our findings however, this is not necessarily a bad thing.

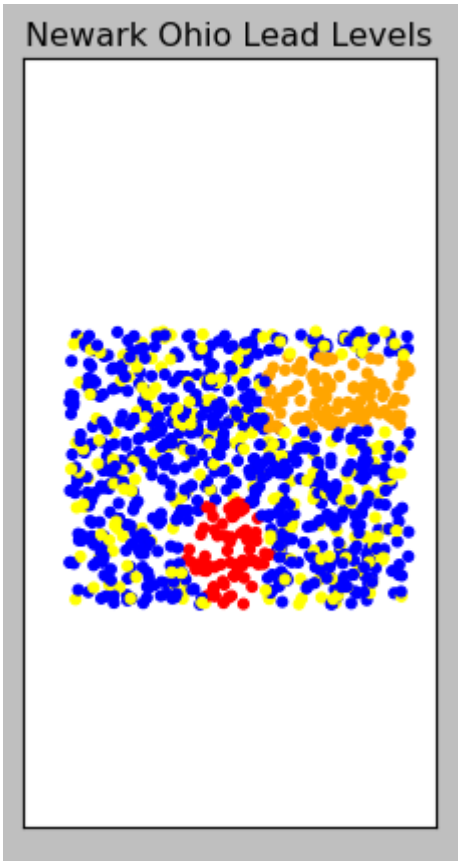
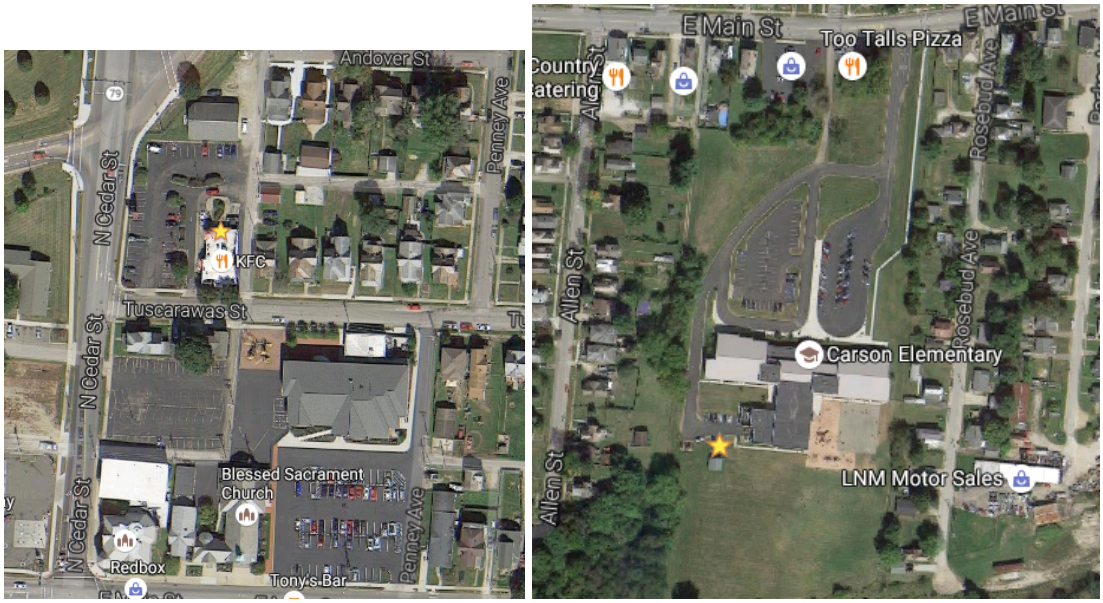


Figure 1 (Our Basemap)

As our map shows, there are two significant patches in Newark that have soils particularly high in lead concentration. Normally, identifying where these patches were might have been a problem, but considering the fact that they are both clumped together, combined with the way our color-coding process works, made identifying the locations of the contaminations relatively easy. Red dots indicate an area with a lead concentration over 2000, so to identify that section of the map we simply needed to find a lead concentration of over 2000 and cross reference its latitude and longitude values on an actual map. We repeated this process for the orange concentration as well, and found that the red concentration is above Carson Elementary School, while the orange concentration is in an area just north of the Blessed Sacrament Church, on top of a KFC, and right next to an inter-state highway. Outside of these

two concentrations the area depicted in Newark seems fine in regards to lead concentrations, with most of the residential neighborhood having safe and normal lead levels in their soil.



Figures 2 & 3 (Maps of the concentration areas for reference)

Given the two concentrations, there are a few recommendations that we would have for our customer interface team. For starters, we'd call the CDC, immediately evacuate Carson Elementary School, and stop using it until further notice. The lead concentration in the soil beneath Carson was already extremely dangerous, but that danger is multiplied exponentially for young children because they are more likely to put various things in their mouth; and at a place with a lead concentration this high, there is a good chance said object will have some form of lead in it. (Petinelli, 1) This measure is drastic, but it seems like the best one to take if we want to avoid cases of lead poisoning in our children.

Our other recommendation for the second high concentration of lead is much less drastic. While there is a certainly another high concentration of lead in Newark, it is not as serious as the concentration at Carson elementary and it likely results from its surroundings more than anything

else; which are largely unchangeable. Until 1991, lead was an ingredient in gasoline, meaning that any area next to a highway was likely to have an above average level of lead in its soil as the lead from exhaust settled over the years. (Petinelli, 2) Thus our recommendation for this area would be to simply not grow produce here, and to avoid growing anything if at all possible. In addition, we would suggest that inhabitants of these homes try to instill peat-moss, manure, fertilizer, or ground limestone in their yards, which will help in reducing the lead contents over time. (http://extension.psu.edu/plants/crops/esi/lead-in-soil). We would also recommend that homeowners try and replace old paints or sections of their homes that might have been built with lead as an ingredient, although it is understandable if they cannot.

In closing, our scatter plot showed us that while most of Newark, Ohio is fine in regards to lead levels in its soil, it has two dangerous concentrations of lead within its limits. The first is only mildly dangerous if ignored, and a byproduct of its location. The second is on top of an elementary school, and should merit immediate action. If the city of Newark can act on these two areas now, hopefully it will be enough to avoid any future problems that they might create.

Works Cited

Lead in Residential Soils: Sources, Testing, and Reducing Exposure. 1999. Penn State University Cooperative Extension. http://extension.psu.edu/plants/crops/esi/lead-in-soil

Lead in Garden Soils. University of Connecticut Soil and Nutrient Analysis Lab, Cooperative Extension. http://www.soiltest.uconn.edu/factsheets/LeadGardenSoils.pdf