

Bloodgood D, Grosz B, Bordwell B, Colson R (2023) XRF Analysis of Pb Concentrations in Soils in and near Moorhead, MN, presented at the National CUR conference in University of Wisconsin-Eau Claire, Eau Claire, WI, April 14, 2023.

Abstract (this abstract is actually from the MSUM Student Academic Conference, but was the same as submitted to NDCUR)

Prior to its ban in 1996, leaded gasoline was available for use in all vehicles. We suspected that the use of this gasoline may have increased the concentration of lead in the soil near Highway 10. The purpose of this experiment is to determine the anthropogenic levels of lead in soil, and its relation to how lead partitions and deposits in soil.

Surveying lead within Moorhead and surrounding areas. We collected soil samples from some places within Moorhead itself along parks, residential areas, and our college campus. We collected soil along a transect eastward of Moorhead along highway 10. We also collected soil from two transects perpendicular from highway 10.

In analyzing the samples, we began the process by evaporating water from the samples at a temperature in the range of 100°-105°C for 18-19 hours, maintaining the temperature to prevent evaporating any volatile or trace elements. Using an agate mortar and pestle, we ground the dried samples to a fine powder. Next, the Hitachi X-Met8000 Handheld-analyzer was used to analyze the elemental composition of the samples through x-ray fluorescence. Then, using the data collected, we recorded it digitally to create graphs, tables, and spreadsheets. In compiling data, we aimed to determine correlations in lead levels.

In our observations, we noticed some statistically significant trends. Among these, we noticed a trend in depth, an East-West trend, and a significant northward trend perpendicular to highway 10. We did not observe anything statistically significant southward perpendicular to highway 10, but did observe a remarkable amount of variability within town.

Our results show that the agricultural areas are well below the EPA guidelines for residential gardens of 100 ppm. We plan to further examine the relationship between depth and concentration.