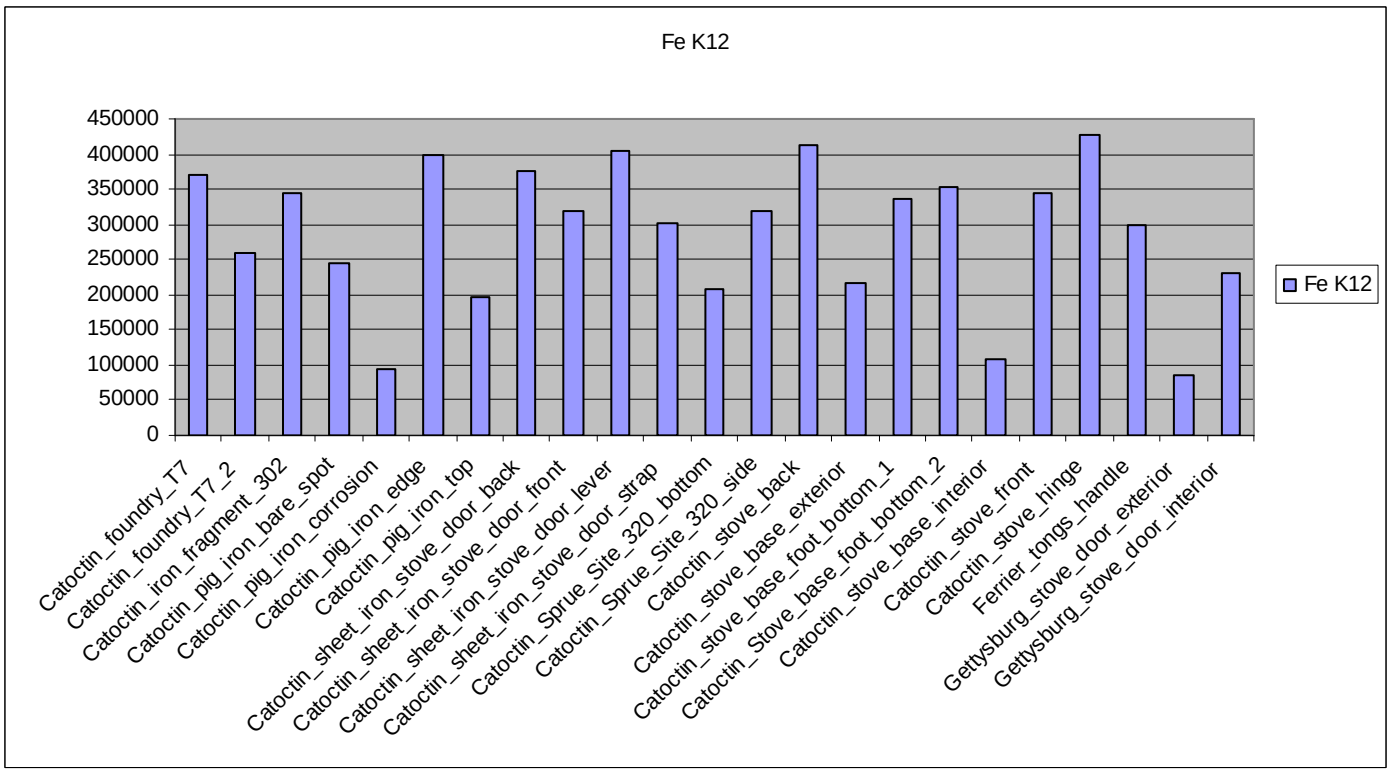
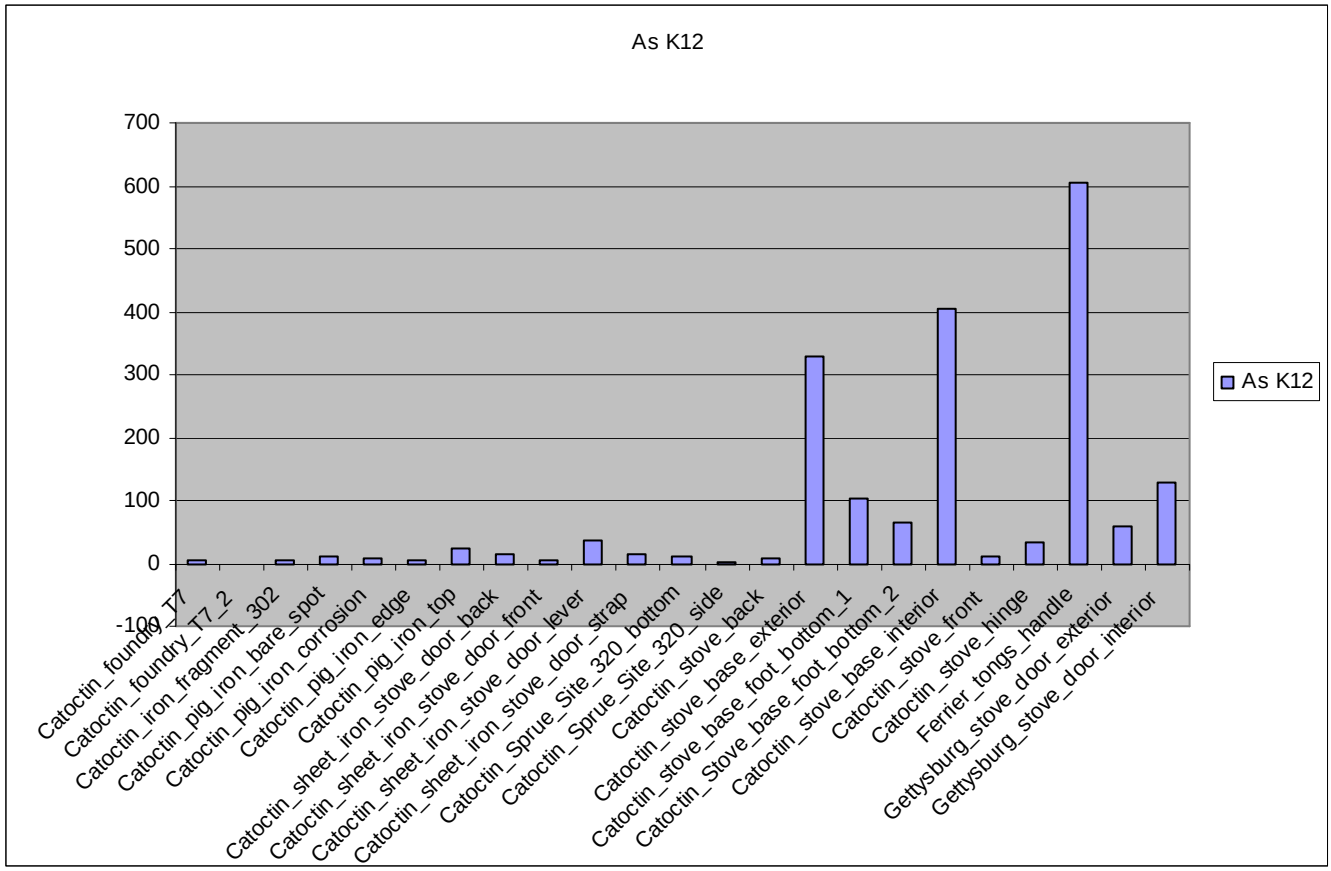
X-Ray Fluorescence, or XRF, is an important tool for analyzing archaeological specimens. The technique is non-destructive; analysis requires minimal preparation; and it is fast, user-friendly, and cost-effective. In a nutshell, a portable XRF device is able to fire short wavelength radiation at the surface of an object, which, in turn, is excited at the atomic level. The atom becomes ionized, and an electron from the nucleus of the atom is dislodged, creating a unique energy signature for each element. This energy burst is read by the portable XRF and expressed in numbers on a computer. It is then up to the analyzer to match each signature to the respective element.

Members of EAC/A, Inc. attended a workshop on the advanced use of portable XRF devices. At this workshop, we analyzed several iron objects from Catoctin using these devices, along with farrier tongs with no provenance and the door of a Gettysburg stove. These tests were conducted using a yellow light filter, and at consistent currents and energy levels. We also targeted multiple places on the same object to better understand the effects of corrosion and exposure to burning. The preliminary results are mapped out in the following graphs for iron, arsenic, lead, and zinc.

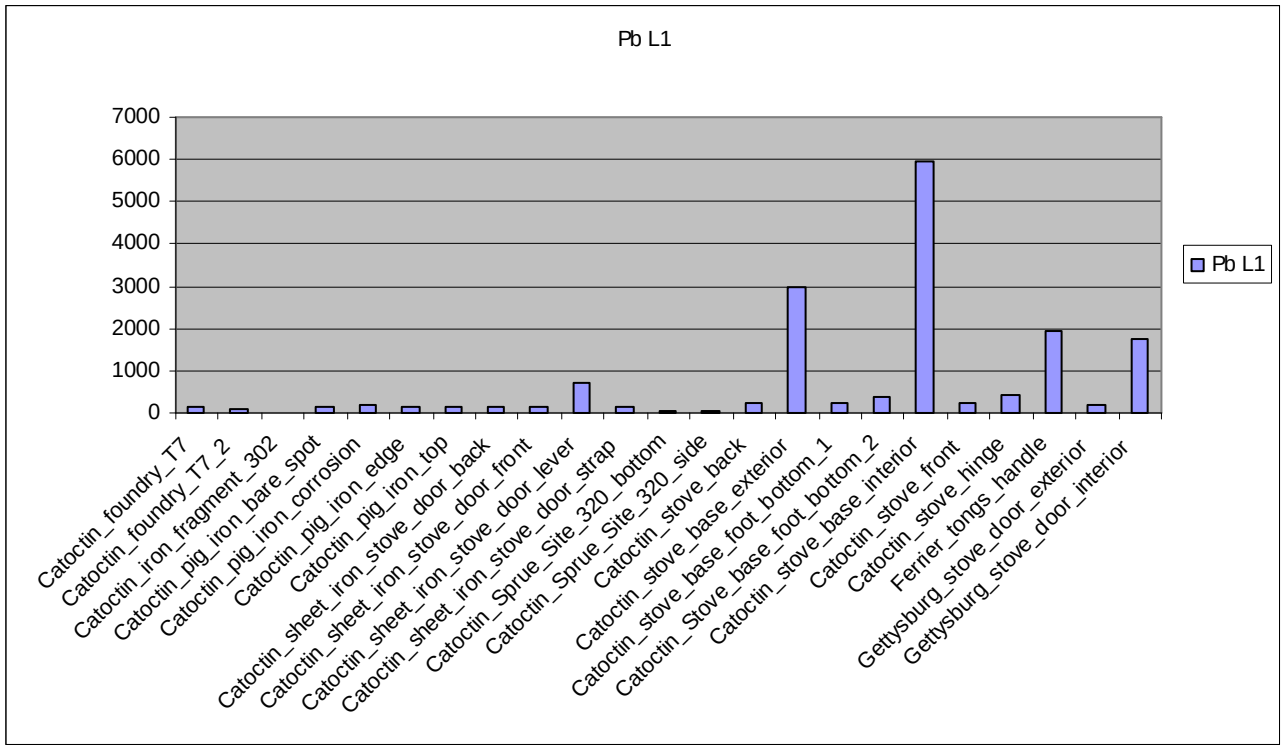
The signatures from iron were the strongest in every sample taken, as expected from iron parts. Low values were noted from corroded parts of the Catoctin pig iron, the Catoctin stove base interior (which is painted), and the Gettysburg stove exterior.

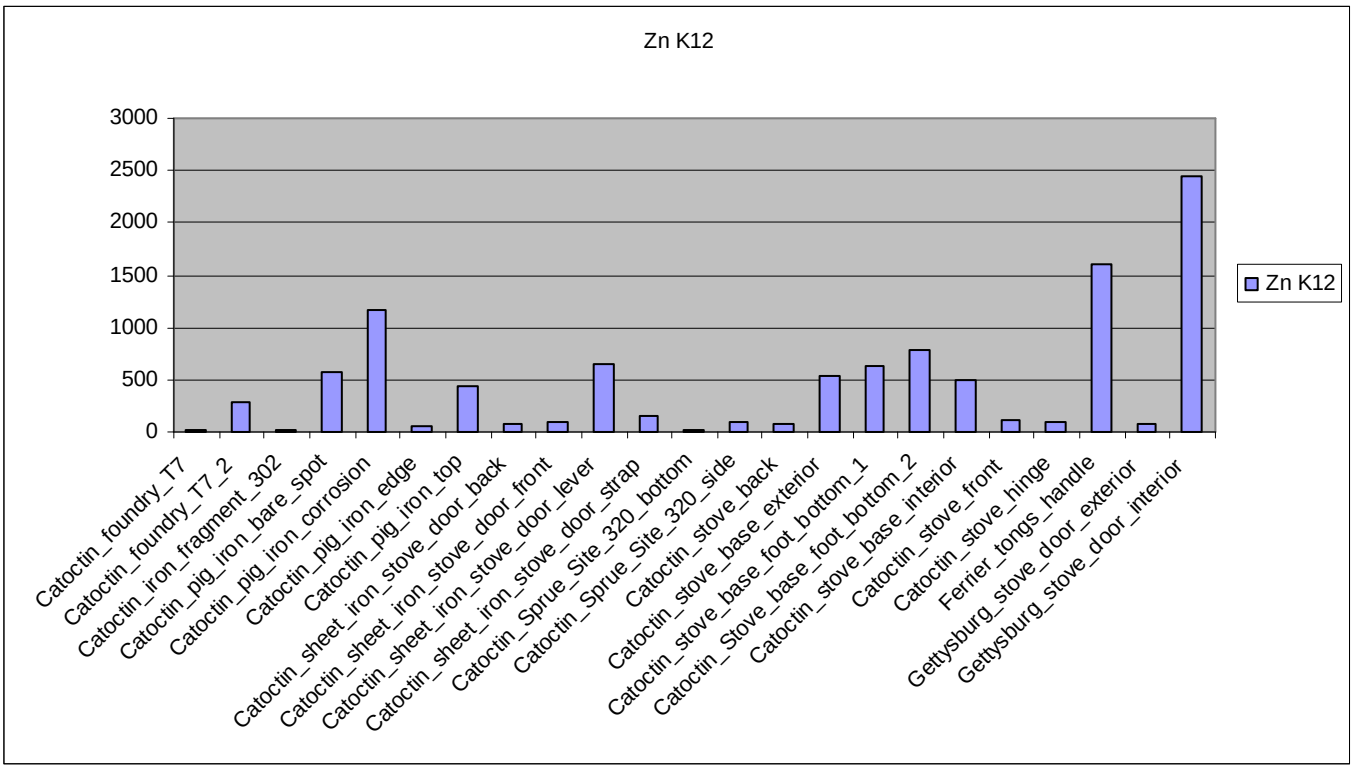


Very small traces of arsenic were present in most of the artifacts analyzed, but the values were very low. The results are very preliminary and need to be re-calibrated, as there is a negative value for one of the samples. However, arsenic is present at much higher levels in the Gettysburg stove, the farrier tongs, and the painted Catoctin stove base. Remember that we are only analyzing atoms on the surface, so in the latter case, we are only analyzing the paint of the stove base, not the stove base.



Lead was also present in many of the samples, but again noticeably more in the Gettysburg stove, the farrier tongs, and the painted Catoctin stove base.





Traces of zinc were also present in a number of the samples, but at much higher levels with the farrier tongs and the Gettysburg stove.

This was a learning exercise, and thus these results should not be taken as representative of all iron produced at Catoctin Furnace. No certain conclusions can be made, but these results at least show some promise in the use of XRF for the detection of elemental variation in products made at Catoctin and elsewhere.