

Week 3: Ore and Fuel Group Exercise

PART 1.

There are two general types of iron ore; bog and mineral. Bog ore consists of iron oxide minerals such as limonite and goethite and it's formed by wetland precipitation and it's formation is also aided by bacteria found in the wetland. Mineral ore is found in concentrated rock masses and generally has more iron content than bog ore, however one would need to mine in order to extract this kind of ore.

Gangue is all of the material that one aims to remove during a melt into the slag. Failing to remove a certain amount of the gangue from the ore will result in a iron bloom that will contain many impurities, which in turn can have many consequences one of which is the workability of the iron.

One type of ore extraction is open pit mining, where a large area of land has to be dug in order to expose the ore, one can find areas to dig by using a metal detector, the ore that has been found must then be crushed and separated based on the percentage of iron that certain parts have. The process of refining the ore for the furnace is beneficiation, a term that encompasses further crushing of the ore and treating the bits with water and magnetic separation.

Charcoal is produced by heating wood in an enclosure that limits the amount of air that reaches the fire heating the wood. This enclosure is typically a pit covered in sod or metal sheet. The heat changes the wood by driving off volatile constituents leaving only carbon and ash. It has been found that a mixture of hard and soft woods together contribute to making a high quality charcoal, this is due to the density differences of the woods which contribute to how they burn. Each batch takes two weeks approximately.

PART 2.

Summary;

Our group decided that considering our limited work force, four people, and the resources available to us that we should begin our operation using bog ore, since the area we decided to place our iron works is in the vicinity of bogs. We placed ourselves around 47degrees east and 97degrees north. We decided that we could really only use bog ore because we did not have the tools to mine, however our goal is to produce our tools with out bog ore and then use these to mine for mineral ore in the region. We would treat the bog ore by roasting it first, then crushing it and then using magnetic separation to try to maximize the quality of our bloom. As for fuel we decided to use charcoal since there are enough trees in the region to create the amounts we need and also because of the favorable description of the type of wood available hard and soft which

would produce good charcoal. Although charcoal will make our bloomery slower than had we decided to use coke, charcoal is easier to make and it's slowness would actually be of benefit to us because we would then have more time to collect materials like more bog ore for our iron works. We would also preheat our air blast in order to minimize the amount of charcoal needed to fuel our furnace which would mean that we would use around 30% less charcoal which would give us more wiggle room to have time to gather more bog ore, make more blooms and have a nice supply of charcoal on hand. Ideally we would power our bellows using the force of the river, however we found it unreasonable to suggest that we would right away jump into using a tripp hammer, so we will first smith by hand, smashing out impurities by hand. If our bloom is successful enough for us to make our own tools then maybe we will have enough time, resources to invest ourselves into making a tripp hammer to smith our iron blooms. Our aim is to create high quality wrought iron, by minimizing the carbon content in our blooms which we can try to do by controlling things like air supply and the way air is fed into the furnace which will in turn affect the reduction process necessary to create purer iron. By focusing on these things for now, we hope to have a successful iron works.

Reaction;

I really liked this exercise and found the way it was formatted to be very conducive to clarifying the processes involved in creating workable iron. I liked that this was more hands on and it really re-enforced the readings to try it out in a thought experiment. My team worked well together and I think it helped that we all sort of got into "character" pretending that it was all really going to happen. However I was presented with the issue of not being sure if in creating an iron work how much I should pretend to know about the process, although it helped that the experiment was conditioned with the knowledge that we were all "iron masters" so that we all must have known how to go about making a successful bloomery. I think this speaks to an issue of experimental archeology which is trying to reconcile modern technology and scientific knowledge of certain chemical processes with the creation of an authentic production method. It seems somehow necessary for me to know exactly what kind of knowledge an "ironmaster" would have and what exact time period my group is working in. For this I feel that anthropological research is necessary in order to inform the way we go about making our iron works, without this I find it hard to reconcile the knowledge I have on the production process with the knowledge I do not really have on the character, life and knowledge of the people who my team was supposed to be. However, this might have not been the focus of this particular experiment. This experiment might just have been a way for us, as students, to put together pieces from lecture and readings into practice.