

## THE LIFE OF THE SMELTER MAN

**Several weeks ago while returning from our visit to the Passage Thru Time Museum in Potosi, we detoured to view the remains of the British Hollow Lead Smelter. This is the only surviving example of an early (1840's) Scotch Hearth stone smelter in the old lead region. Alan Van Natta has been laboring over ten years to get this site restored, and deserves great appreciation and help from the community in accomplishing his goal. Visit the British hollow site at <http://www.vangrafx.com/PTHS/bhollow/bh.html#>**

**When we visited the remains of the British Hollow Smelting Furnace I knew nothing of the lives of the men who worked there. Subsequently I found a book called "Lead poisoning in the smelting and refining of lead – February 17, 1914" By Alice Hamilton of the United States Bureau of Labor Statistics which, though written decades after this smelter was built, describes the dangers and trials of this work. What follows is an excerpt from this book:**

### ORE HEARTHS.

“These furnaces, commonly known in America as Scotch or open, are considered first as being the oldest device and involving the simplest process still in use for smelting lead.

“The usual hearth is a cast-iron box, 4 feet long, 18 inches wide, and 1 foot deep; it rests on a base or legs with its top about waist high. About the hearth box and resting on it is a three-sided water jacket, also of cast iron, while above is always an inner hood to catch most of the fume and in addition a broader, more spreading hood may be placed over both men and box.

“Two men work the hearth; they throw on the fine ore and coke with a shovel; they stir the charge with pokers and toss the hot slag, first out onto the work plate or apron, then into a receptacle at one side (which may contain water) and drain out the melted lead into a pot at the other side. Almost without intermission the work goes on during the shift. Whenever the fire blazes up well through the smoothed-off mass, the latter must be stirred and restirred and thrown back, and more ore and coke added, and after a rest of a few seconds the whole operation must be repeated.

“The blast comes into the hearth through a row of holes in the back just above the level of the lead which practically fills the box. Before the lead quite overflows one of the men banks the channel at one corner of the work apron and with his shovel pumps the lead up over the edge so that it will run down into the side pot. A little coal fire burns under this pot to keep the lead hot till enough has accumulated for the helper to mold it into 100-pound bars. Such is smelting at the ore hearth.



Ore Hearth or Scotch Hearth

“The work is hard and hot for the hearth man and his helper. In order to make full wages a man has to work assiduously. He has to stand up to the flame and red hot charge and keep the hearth in condition all the time, for it will not make even standard extraction if at all neglected. In winter it is not so bad, but in summer no man can stand it continuously for many days. There are no pauses for lunch; if the man stops he does it at his own loss. If he wishes to wash his hands and sit down and eat his lunch, he must do it knowing that the hearth will stop producing during that time. Many do not eat at all while at work, especially if they are troubled by the

sickishly sweet taste of lead; others stop for a few moments now and then to eat, but not to wash. It would be hard to say which is worse, exposure to lead fumes with an empty stomach, or eating lead soiled food.



Joe Sherwin and Molly Smith enter the site

“About 50 per cent of the lead from the charge is recovered from the ore hearth as metallic lead, about 35 per cent goes into the gray slag and the rest into the fumes, which means that smoke from the lead pot, the slag pot, and from the furnace itself are all rich in lead. At every visit paid to an ore hearth building the air was found to be cloudy with lead fumes. ***The rate of lead poisoning is said to be very high.***

“The ground ore, more or less dry, goes through many processes of 'roasting and smelting. In these processes the risk to the men comes from the handling of dusty lead compounds and from the fumes which escape when lead or lead ores are heated. Melted lead is not dangerous as long as it is kept below a dull red heat, but at this point fumes begin to be formed and in roasting and smelting it is raised to temperatures far above this. The men who transport the ore and the roasted products and who charge the furnaces are exposed to dust chiefly but more or less to fumes also. The men who tend and discharge furnaces are exposed especially to fumes. The exact point at which lead fumes begin to form and escape has been determined at 750° to 800° C.





Molly points out details of the structure

“It must not be forgotten that, in addition to the evils of dust and fume, men working in lead smelters and refineries are subject to extreme heat and to rapid changes of temperature, while at the same time their work calls for great physical exertion. In smelting, all the furnace men and their helpers are exposed to great heat and to rapid cooling off. As to overexertion, Sommerfeld \* says that physical overstrain is a decided factor in smelting work, especially in unloading ore, transporting ore, charging furnaces, breaking up roasted ore, repairing and cleaning furnaces, loading bullion on cars, etc. Not only the arms, but the muscles of the back and shoulders are used to their utmost. Physical fatigue is one of the predisposing causes to plumbism (lead poisoning).

***Dennis Note: Early symptoms of lead poisoning in adults are commonly nonspecific and include depression, loss of appetite, intermittent abdominal pain, nausea, diarrhea, constipation, and muscle pain. Other early signs in adults include malaise, fatigue, decreased libido, and problems with sleep. An unusual taste in the mouth, and personality changes are also early signs.***

“Considering how little information it was possible to obtain in many of the plants, it does not seem an exaggeration to say that the number of cases found falls far below the truth, and that the record for the smelting industry in the United States for one year (1912) is at least 1,657

men poisoned among 7,400 employed (22.4%). (We must) emphasize the danger from dust in transporting, grinding, and sifting leady substances, charging furnaces, repairing, sweeping, cleaning out flues, etc., and the danger from fumes whenever lead is melted. All of the hearth men who were interviewed complained of the heat, the fumes, and the driving pace. It is doubtful whether there is any one piece of work in the smelting of lead which is as dangerous to health as the ore-hearth work, unless it be the handling of flue dust. Smelters which have ore hearths have over five times their proper proportion of encephalopathy (convulsions, delirium, insanity, etc.), and about four times their proper proportion of palsy. “