

# What is the state Mineral of Missouri \_\_\_?

- A. Lead
- B. Galena
- C. Mozarkite



# A View of the Lead Mines of Missouri

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Henry R. Schoolcraft

1819

# Henry Rowe Schoolcraft, 1793-1864



- 26 years old when he Published “A View to the Lead Mines of Missouri (1819)”
- “Journal of a Tour into the Interior of Missouri and Arkansas (1821)”
- Served as Indian agent in Michigan and later commissioned to produce a survey and history of the American Indians (published 1851-1857)

# Missouri Weather in the Winter of 1819

“The weather is, however, subject to very sudden changes; a circumstance that will induce an emigrant to exclaim on the great heat one day.  
and on the great cold the next.

The old people have very few signs by which they can foretel the weather.”

H. R. Schoolcraft

# Summary I.

- Lead deposits found prior to 1803, defined the Old Lead Belt of Washington, Ste. Genevieve , Jefferson and Madison counties (St. Francois county formed in 1821).
- Annual production, 1803-1818, of 1130 miners working at 12 mines/mine areas estimate average was 9,893 pounds (4.9 tons) per miner.
- Galena was mined from residual bedrock and clays at shallow depths, hand-sorted, -broken and -cleaned.

# Summary II.

- 1803-1818, Total value of lead sold, \$3,066,148, *20% of the price of the Louisiana Purchase.*
- Three year government leases deterred larger capital investment in mining.
- Settlement by Americans had led to improvements in mining and the more civilized nature of the region.
- Believed the lead mines in Missouri might be “paralleled by no other mineral district in the world.”



# 1. Lead Mining Prior to 1803

- Lead was found at what would become Mine Lamotte about 1723 by Philip Francis Renault and M. La Motte, at the head of the St. Francois River.
- Renault had left France in 1719 with 200 artificers and miners, and acquired 500 slaves in St. Domingo to work the ore deposits. Galena was mined and smelted from several diggings in the region, but in 1731 Renault lost his concessions.

*Mining at Mine Lamotte in bedrock ended in 1959, and had produced 325,000 tons of lead. 239 years after the initial discovery of lead mined from the soil.*

- Mine a' Burton (Mine au Breton) around 1763, by Francis Azor (Mr. Burton), on a branch of Mineral Fork at Potosi



## 2. Lead Mining Prior to 1803

- Mines operated under the Spanish:

Mine La Motte on the St. Francis River

Mine a Joe on Flat River

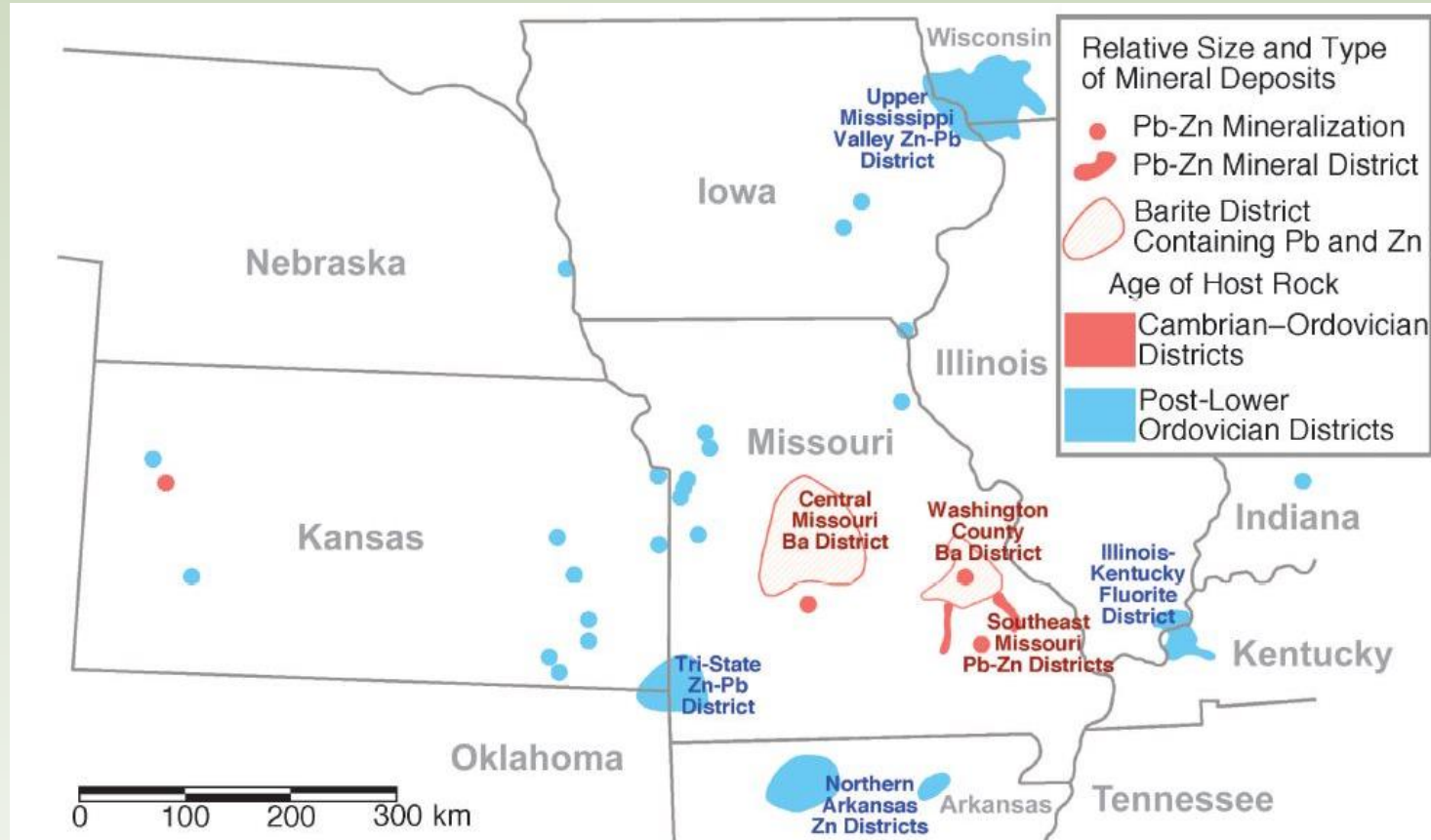
Old Mines, Mineral Fork

Renault's Mines also on Mineral Fork

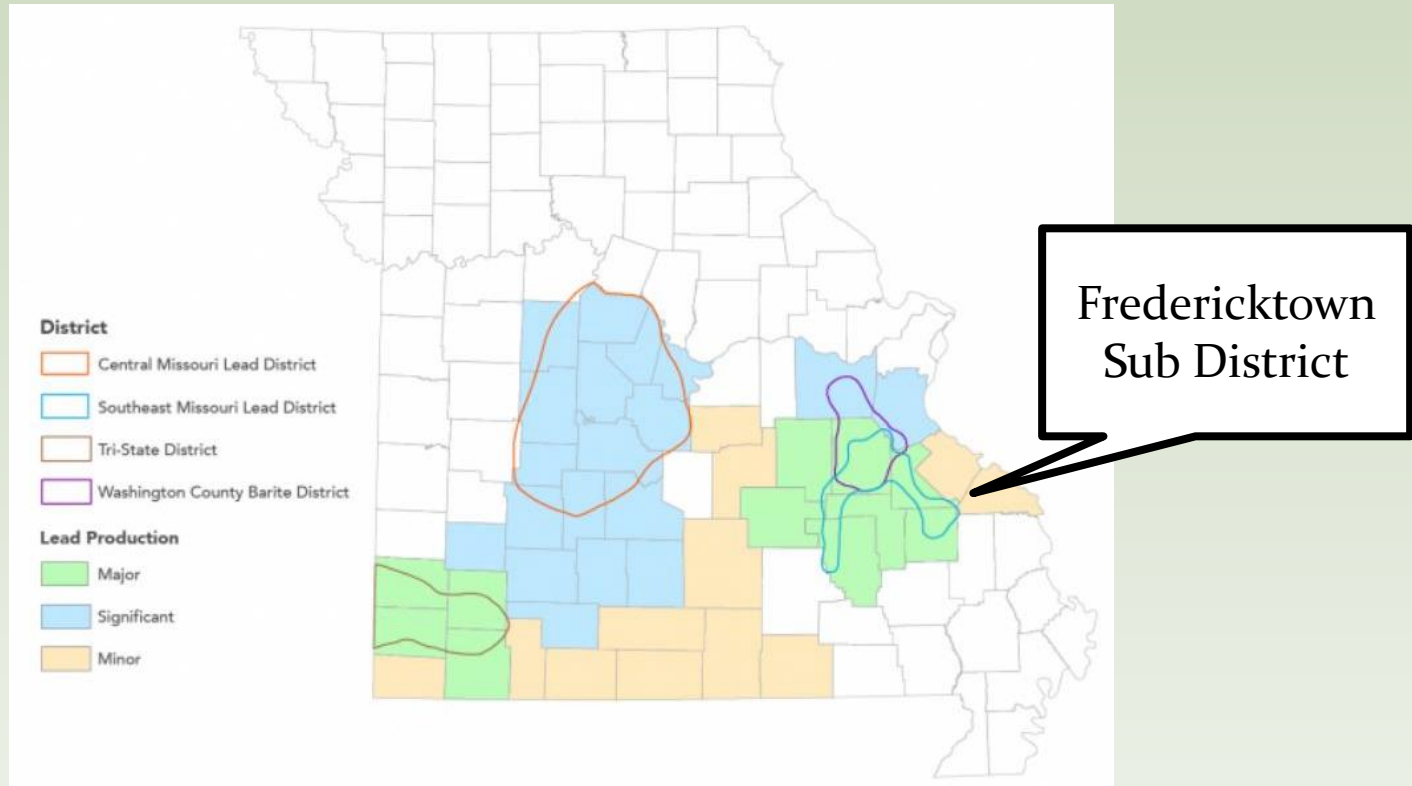
# Moses Austin and Missouri Lead Mining

- Emigrated from Virginia in 1797 to Mine a Breton in Louisiana, was given a land grant from the Spanish.
- Modernized smelting building a reverberatory furnace that could process the lead ashes.
- Built a shot tower, managed by Elias Bates and improved shot production, and began making sheet lead.
- He had the first proper shaft, to 80 feet, for raising ore at Mine a Breton.

# Lead and Zinc Mines - Central United States

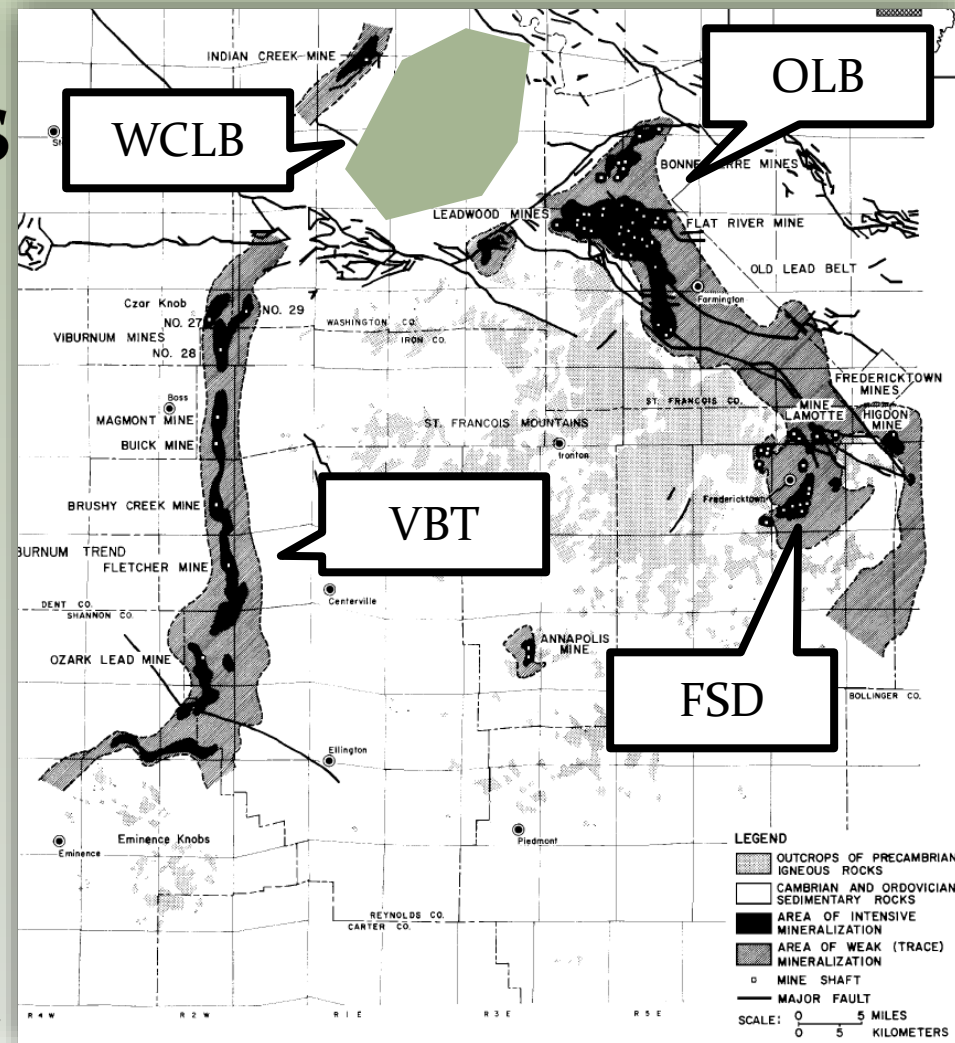


# Lead Mine Areas and Mineralization in Missouri

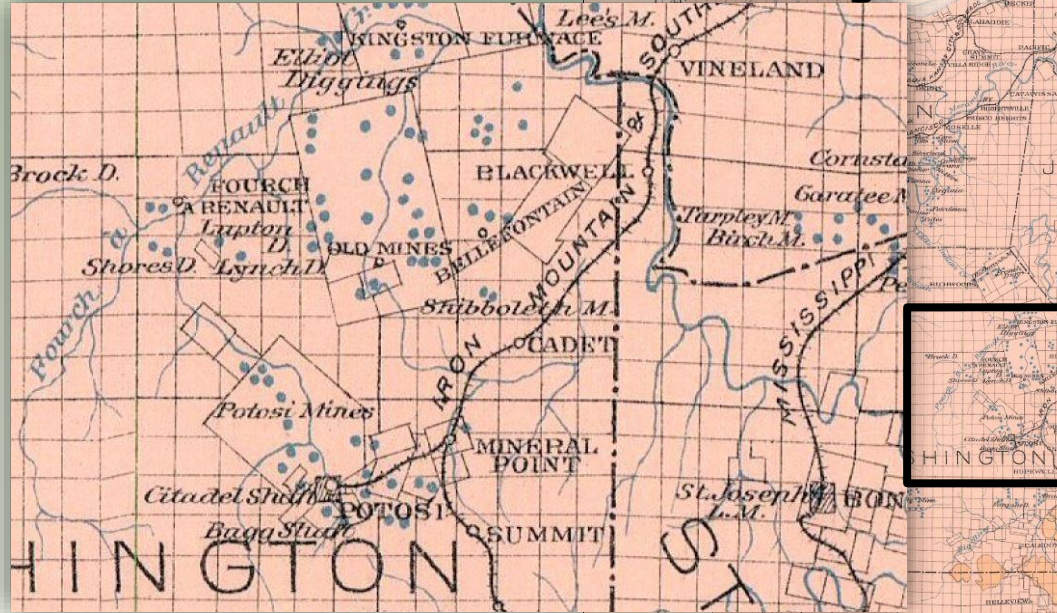


# Missouri Lead Belts

- Old Lead Belt ~1723-1972, Bonnetterre to Fredericktown
- New Lead Belt 1953 to present, Indian Creek mine and the Viburnum Trend



# Economic Activity



Washington County  
Mines and Manufactories in 1819

- 38 Lead mines
- 34 Lead furnaces
- 16 Grist mills
- 8 Saw mills
- 10 Distilleries
- 3 Salt petre caves
- 1 Powder mill
- 6 "Iron deposits"
- 1 Tan yard

Winslow, 1894

# 1. WHAT WERE THE USES OF LEAD IN 1819?

- Pigments for both ceramic or paint
- Ball and shot – Elias Bates Tower produced 668,350 pounds in 18 months ending June 1, 1817
- Pewter
- Sheet lead – used on decks of vessels, roofing, cistern linings, bath tubs, gutters, underground water pipes

## 2. WHAT WERE THE USES OF LEAD IN 1819?

- Solders
- Printers Type
- Pot-metal – in this period was 67<sup>0</sup>% copper and 29<sup>0</sup>% lead and 4<sup>0</sup>% antimony. These amounts were not always precise.
- Potter's Glazing
- Enamels



### 3. WHAT WERE THE USES OF LEAD IN 1819?

- Flint Glass – oxide as a flux, in place of potash, to give the melted glass more pliability
- Artificial Gems
- Sugar of Lead
- Metallic Buttons
- Sheet lead boxes
- Weights and Measures AND Toys

# 1. Nature of ores at Mine a Burton

- Dug by hand from residual soils to depths up to 20 feet
- This red earth contained radiated quartz (chalcedony), sharp fragments of flinty stones (chert), red clay and rounded siliceous gravel or pebbles. 1 to 2 feet thick.
- Red clay 4 or 5 feet thick followed by gravel and small rounded lumps of galena.

## 2. Nature of ores at Mine a Burton

- The upper ore beneath this clay was small rounded detached lumps of galena in about 1 foot of siliceous gravel.
- The greatest ore was imbedded in barite and enveloped in thick “marly” clay on top of the “limestone” (dolomite bedrock).
- Blende (shalerite), zinc ore, accompanied and is often more abundant than the galena. Found at Mine Renault and Elliots mines.

# Washington County Barite-Zn-Pb

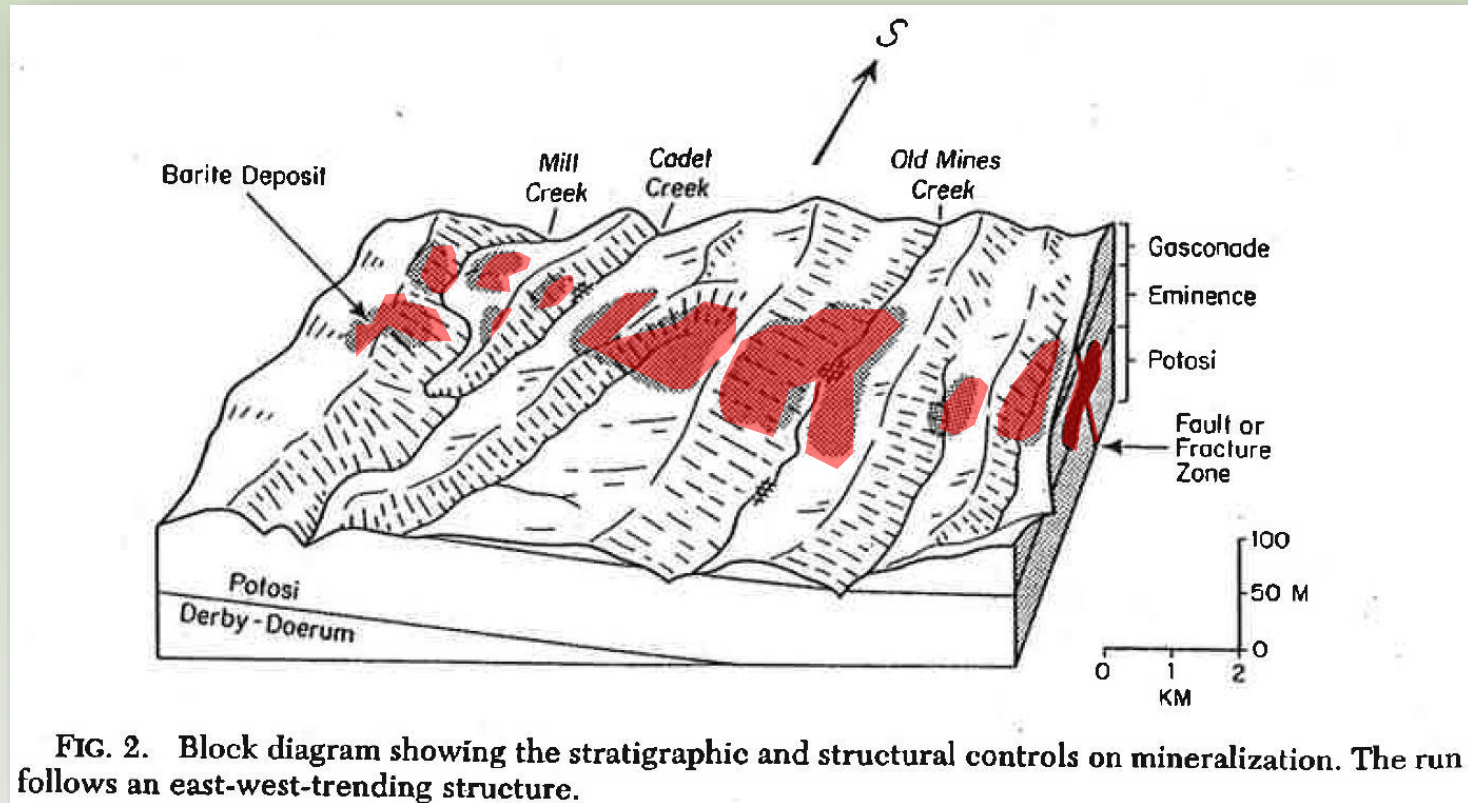
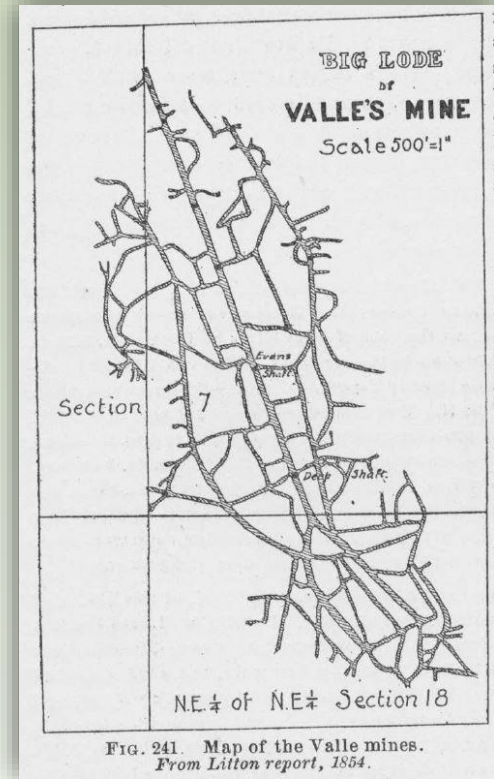
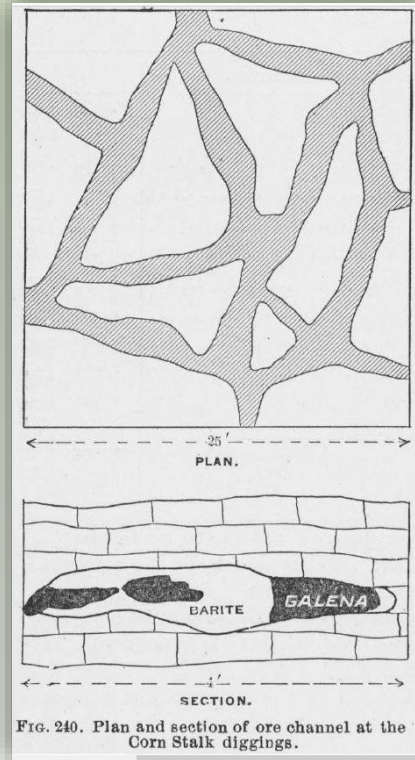
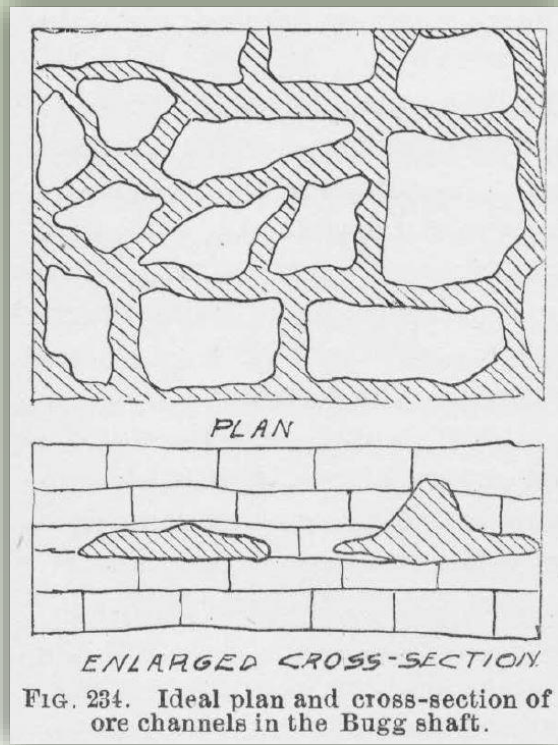


FIG. 2. Block diagram showing the stratigraphic and structural controls on mineralization. The run follows an east-west-trending structure.

From Kaiser and others, 1987

# Old Lead Belt mines by 1894



# Hand Mining Barite, 1930's

*B. Miner using windlass to hoist ore from shaft; abandoned shaft and waste piles nearby*



Werner (1937), National Archives Catalog

**Figure 12.** Barite diggings.

# Hand Mining Barite, 1930's

A. Miner digging laterally at bottom of shaft



Rothstein (1939a), Library of Congress

# Hand Mining Barite, 1930's

*B. Miner sorting and cleaning barite ore next to shaft and windlass*



Rothstein (1939b), Library of Congress

**Figure 13.** Hoisting barite ore to the surface, and cleaning and sorting the barite.

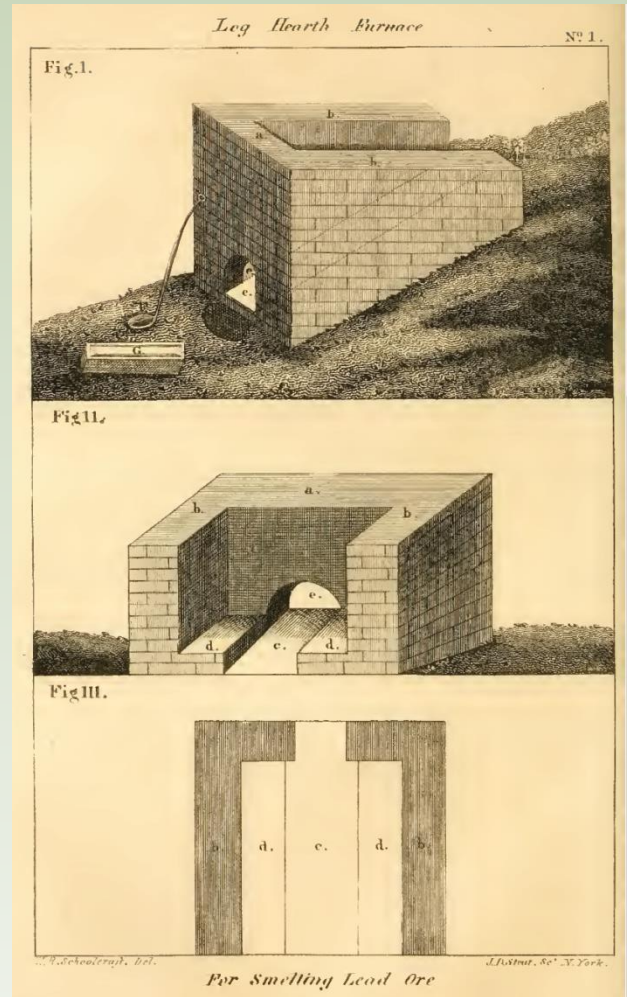


# Mine Statistics 1817-1819

| Mine       | Workers | Pounds of Ore | Tons  | Tons/Miner |
|------------|---------|---------------|-------|------------|
| Breton     | 160     | 1.5 million   | 750   | 4.6        |
| Shibboleth | 240     | 2.7 million   | 1,350 | 5.6        |
| Lamotte    | 210     | 2.4 million   | 1,200 | 5.7        |
| Richwoods  | 140     | 1.3 million   | 650   | 4.6        |

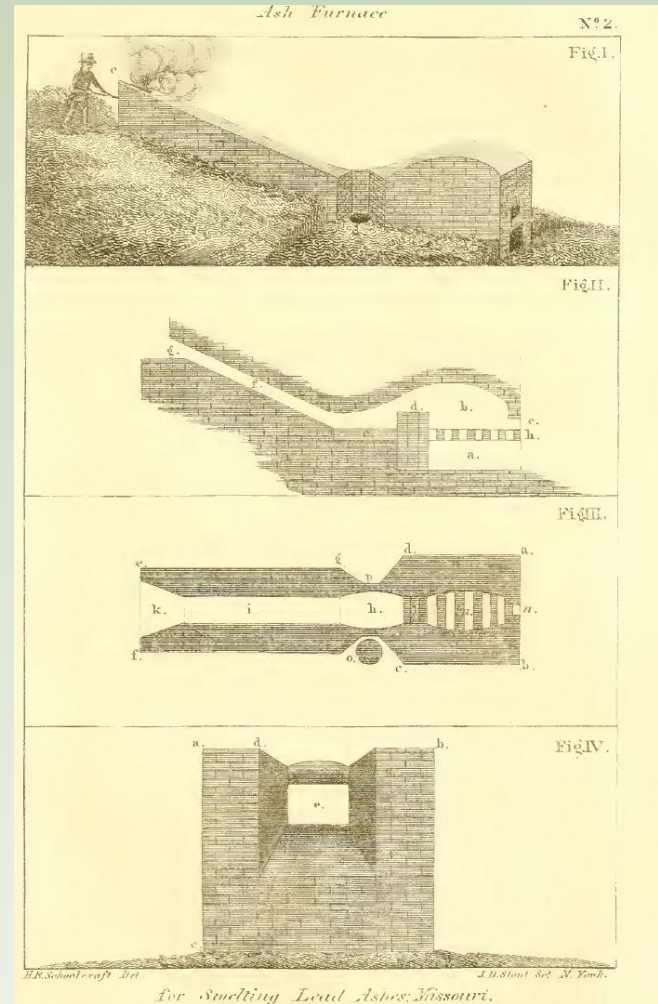
# Log Hearth Furnace

- Three large oak logs on the bottom, small split logs set on the two sides and front.
- Ore is piled on to the logs, perhaps 5000 pounds. Yield estimated at 50%.
- More wood is piled on top of the ore. The fire was tended for 24-36 hours.



# Lead Ash Furnace

- Lead-ashes mixture was pounded into a rough powder and repeatedly water-washed in troughs (buddles).
- Sand or lime is introduced as a flux to produce a slag that molten lead will settle to the bottom of the pot.



# Goods Exported from Herculaneum

|  |               |
|--|---------------|
| 2,008,404 lbs. of Pig and bar lead,<br>deposited at, and exported from<br>Elias Bates' warehouse ..... | \$100,420.00  |
| 517,495 lbs. of lead, deposited with<br>and shipped by sundry other per-<br>sons .....                 | 25,874.75     |
| 668,350 lbs. of Patent shot, manu-<br>factured by Elias Bates, and C.<br>Wilt .....                    | 46,784.50     |
| 5,500 barrels of Flour, manufac-<br>tured by J. Horine, A. Van Zandt,<br>and J. Bryan .....            | 41,250.00     |
| 44,924 gallons of Whiskey, manu-<br>factured by Horine, Van Zandt,<br>and Bryan.....                   | 32,192.62½    |
| 500 bushels of Wheat, shipped for<br>N. Orleans .....  | 500.00        |
| 400 barrels of Beef and Pork.....  | 5,000.00      |
| 40,000 wt. of Bacon.....   | 4,000.00      |
| 66,000 feet of Pine boards, from<br>Washington County .....  | 2,640.00      |
| 214,000 ft. of Oak boards and scant-<br>ling .....   | 61,200.00     |
| 60,000 lbs. of Gunpowder, manu-<br>factured by Ashley & Brown,<br>Washington County .....              | 30,000.00     |
|  | <hr/>         |
|  | \$352,861.87½ |

|   |                  |
|---|------------------|
| 2,008,404 pounds pig lead, Elias Bates.....                           | \$100,420.00     |
| 517,495 pounds lead from other persons.....                           | 25,874.75        |
| 668,350 pounds of shot, Elias Bates, C. Wilt.....                     | 46,784.50        |
| 5,500 barrels of flour, J. Horine, A. Van Zandt,<br>and J. Bryan..... | 41,250.00        |
| 44,924 gallons of whiskey, Horine, Van Zandt,<br>and Bryan.....       | 32,192.62½       |
| 500 bushels of wheat, to New Orleans.....                             | 500.00           |
| 400 barrels of Beef and Pork.....                                     | 5,000.00         |
| 44,000 wt.(?) of bacon.....   | 4,000.00         |
| 66,000 board feet of Pine boards, from<br>Washington County.....      | 2,640.00         |
| 214,000 board feet of Oak and scantling.....                          | 61,200.00        |
| 60,000 pounds of gunpowder, Ashley and Brown                          | <u>30,000.00</u> |
|   | <hr/>            |
|   | \$352,861.87½    |

# Summary of Herculaneum Export Revenue

|  |               |
|--|---------------|
| 2,008,104 lbs. of Pig and bar lead, deposited at, and exported from Elias Bates' warehouse ..... | \$100,420.00  |
| 517,495 lbs. of lead, deposited with and shipped by sundry other persons .....                   | 25,874.75     |
| 668,350 lbs. of Patent shot, manufactured by Elias Bates, and C. Wilt .....                      | 46,784.50     |
| 5,500 barrels of Flour, manufactured by J. Horine, A. Van Zandt, and J. Bryan .....              | 41,250.00     |
| 44,924 gallons of Whiskey, manufactured by Horine, Van Zandt, and Bryan.....                     | 32,192.62½    |
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| 400 barrels of Beef and Pork.....  | 5,000.00      |
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| 66,000 feet of Pine boards, from Washington County.....  | 2,640.00      |
| 214,000 ft. of Oak boards and scantling .....  | 61,200.00     |
| 60,000 lbs. of Gunpowder, manufactured by Ashley & Brown, Washington County .....                | 30,000.00     |
|  | <hr/>         |
|  | \$352,861.87½ |

\$352,861.87½ Was the total value of goods for an 18 month period ending June 1818, from Herculaneum.

*This total is equal to \$831,342,577.50 in 2023 dollars.*

The price of the Louisiana Purchase was \$15,000,000.00, or, \$35 and acre for 530,000,000 acres

1803-1818, Total value of lead sold alone, \$3,066,148, was  
***20% of the price of the Louisiana Purchase.***

# Schoolcraft's View of the Lead Mines of Missouri

- Believed the lead mines in Missouri might be “paralleled by no other mineral district in the world.”
- Missouri mines were producing \$190,653 of lead per year, about \$3 million since United States possession; 20 percent of the cost of the Louisiana Purchase.
- Employed nearly 1200 miners, producing 3.7 million pounds/year. Produced all by hand, from mines less than 80 feet deep. Price at Herculaneum was \$0.04 a pound.

# Schoolcraft's Economic View of the Lead Mines of Missouri

- His account of the mines, furnaces and lead production was an important contribution that underscored the significance of Louisiana Purchase territory to the young United States of America.
- There would be no deep mines at Potosi proper, save the Indian Creek mine discovered in 1948. Instead the great ore deposits would be found and opened in St. Francois and Madison counties.
- Washington county would become a producer of barite, which had a market by the 1860's.

# Washington County Barite and Sphalerite on Dolomite

