

**Demonstration Charcoal Mound
Project for Building the Model at the
James L. Goodwin State Forest**

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Above photos by: Pete Vertefeuille

- 1.) Hearth is cleared and leveled, 30 to 40 feet in diameter.
- 2.) Wood is delivered and organized by girth
 - a.) Billets - 4 feet long and 4 to 7 inches in diameter
 - b.) Lap Wood - 4 feet long and 1 1/2 to 4 inches in diameter.
- 3.) Fagan pole, 18 feet high, is set in the center of the hearth to guide the formation of the pile.
- 4.) Three-sided chimney of lap wood is built around the Fagan pole to the height of the pile.
- 5.) Pile is constructed of billets and lap wood 20 – 30 feet in diameter at the foot and 14 feet high at the head. Lap wood is used to fill in gaps in the foot, waist, shoulder and head of the pile.
- 6.) Pile is covered with leaves and ferns.
- 7.) Pile is dusted with fine dirt to the depth of one foot on the head. This allows for the control of air entering the pile.
- 8.) Chimney is filled with small wood and fired with coals from the campfire.
- 9.) Firing requires 10 to 14 days to reach the foot or post, and drive all chemicals except carbon out of the wood yielding about 30 to 40 bushels of charcoal per cord of wood.
- 10.) Cooling and opening the pile required up to one week.

Late Fall through Early Spring

Step 1: Clear 30–40 ft. round hearth.
Bank soil at edge.



Photo Courtesy of the National Park Service

Step 2: Cut the wood in 4-foot lengths, sort by girth into billets and lap-wood and deliver.



Photo Courtesy of the National Park Service

Stack lap-wood on bank. Lean billets against it.



Photo Courtesy of the National Park Service



Photo Courtesy of the National Park Service

Late Spring through Early Fall

Steps 3 & 4: Build the pile around Fagan pole and chimney by stacking billets.



Photo Courtesy of the National Park Service

Step 5: Fill in the cracks and cover the sides and top with lap-wood, 20 feet across 14 feet high.



The Connecticut Historical Society, Hartford, Photo CD 0543-29

25-30
cords
of
wood

Step 6: Cover the pile with leaves & ferns.



Photo Courtesy of the National Park Service

Step 7: Dust the pile.



Photo Courtesy of the National Park Service

Step 8: Fire the pile. Fill the chimney with small wood, brands and hot coals.



Photo Courtesy of the National Park Service

Step 9: Tend the pile. Read the signs of the smoke. Fill in low spots, tamp out high. Control the burn.



The Connecticut Historical Society, Hartford, Photo CD 0543-28

Jump the burning pile tamping out air pockets.



Photo Courtesy of the National Park Service

Step 10: Cool the pile. Rake out sections.



Photo Courtesy of the National Park Service

What is Charcoal?

Charcoal is black carbon made from wood that was heated in a controlled burn with little air. This process prevents complete combustion of the wood. First, any water is steamed out of the wood. Next the volatile compounds of creosote and tar are driven out (yellow-brownish smoke.) The last step is the cooling of the remaining residue which is black carbon (charcoal), and a small amount of ash.

The Process during the Burn

The chemical process of wood decomposition enters an exothermic stage of burning that produces more heat (700-800 degrees). The hot gases convert the wood to charcoal. The heat of the fire in the chimney gives off gases and heat which fuels the burn. This process is why a small fire at the center of a pile of wood causes the whole mound to become charred, while really a small amount is burnt by the fire. Charcoal has a higher heat value than wood which is why it produces the intense heat required for the blacksmith, iron, copper and brass industries.

The Impact of Charcoal

Imagine Northeast Connecticut completely bare of trees. In 30-year cycles, entire hillsides of young trees were cut and cleared following the forestry practice of coppicing. The timber was made into charcoal, the preferred fuel of Connecticut's brick, iron, and brass industries. Charcoal burned hotter and cleaner than wood making purer metals and less smoke at the industrial sites.

Connecticut industries had a tremendous appetite for charcoal. A small, typical iron furnace converting ore to pig iron consumed all the charcoal made from one acre of woodland each day. At least 150 acres of timber converted to charcoal were needed every year to produce 1000 tons of pig iron at the furnace. Each acre required about 30 years to regenerate the young hardwood trees required for making charcoal in order to stay in business. One small furnace needed to own or lease 3,000 acres of timberland. The availability of charcoal limited the amount of pig iron until a new energy source, coke was derived from coal.

In addition to the remains of the original charcoal mound at Goodwin State Forest are the surrounding woodlands that show the effects from making charcoal. Many of the mature trees are the same age because they resprouted from the stumps or germinated from seed that remained after the area was clear-cut.



Uses of Charcoal

- Iron, copper and brass industries.
- Blacksmith forges, glass industry.
- Packing meat and storing ice and drying tobacco.
- Purifier of food and water, remove odors.
- Charcoal flat irons, brushing teeth.
- Crayons, pigment in ink and tattoos.
- Gun powder, gas masks.
- In medicines and antidotes for poisons, bee stings, breath sweetener, poison ivy and upset stomachs.
- Barbecues, domestic use.



Cold-Blast Iron Furnace, Caanon, CT, Photo by Jim Rabis

Facts about Charcoaling

- Prehistoric: Over 5,500 years old
- 1 cord of wood in 1830's = \$1.20
- 1 cord = 4 ft. wide x 4 ft. high x 8 ft. long stack of wood
- 1 cord = 30 - 40 bushels of charcoal
- 30 cords of partly seasoned wood in charcoal mound would produce 900-1,200 bushels of charcoal.
- 1 acre produces 30 cords of wood in 30 years.
- Hickory was the best wood, but Oak and Beech were more abundant.
- 1830's - \$.08 to \$.10 per bushel of charcoal
- Wood chopper averaged 1-2 cords a day at a wage of \$.40 to \$.50 a day.
- A good collier could earn \$150.00 a year.

Commonly Used Terms

- **Brands** - Partly charred wood which remain after the pit has been cooled.
- **Coaling Out** - Act of digging and raking charcoal from the pit
- **Lapping Off** - Placing smaller wood on the outer surface to make the pit as tight as possible.
- **Pit Will Blow** - Gases generated by the charring wood often caused the top of the pit to blow off.
- **Pit** - a 30'x40' diameter area also referred to as the hearth, mound, kiln or bottom

The Collier

- Uses his strength, wood, leaves, dirt, baskets, axes, hatchets, saws, long-handled shovels, and rakes to produce the clean, hot-burning fuel of his time for homes and industry. Charcoal filled a role in its time similar to oil and natural gas in ours.
- Carefully stacks the pile so it will burn slowly and support his weight.
- Camps during the burn in a hut.
- With his eyes and nose he reads the smoke to know the center of the mound and avoids explosions of steam, gasses, and flame.



8 feet in diameter and 10 feet high.

- Jumps up and down on top of 30 cords of burning wood to tamp down the air pockets and slow the rate of burning. Fire was a serious problem.
- Tends the outdoor hearths 24/7 for 10 to 14 days in sun, rain and wind.



Photo Courtesy of the National Park Service

Sources and Credits

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Demonstration Charcoal Mound Project Site located along the Red/White - RW trail between Grand Junction and Governor's Island
<http://www.ct.gov/deep/lib/deep/education/goodwin/goodwintrailmap.pdf>