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Iron and copper mining and its related industries are a foundation of Lake Superior regional history. One of those related industries, intertwined into its mining history, is charcoal burning. While all types of alternative fuels were tried, charcoal became the primary fuel for the iron furnaces of the region.[1] At the turn of the nineteenth century Michigan's Upper Peninsula was the predominate charcoal iron producing region of the United States, largely due to the attractive geography of vast hardwood forests located adjacent to iron ore deposits.[2] This entire subsidiary industry had its own history and, while slowly fading into memories, still has a few tangible fragments that document its importance. Those are the few charcoal kilns that now draw tourists to masonry that is treated as art.

After the fur trade, fishing, and missionary episodes, the early history of Michigan's Upper Peninsula centers upon the mining of iron and copper. The charcoal iron industry accounts for much of that history, beginning at present-day Negaunee, Ishpeming, and Marquette. That industry was fueled from charcoal produced in hundreds of kilns that became local landmarks.[3] Thirty-six charcoal kilns were built near the Carp River Iron Furnace in ca. 1890 at the mouth of the Carp River in present-day Marquette. They were all similar and the lone survivor was described in 1978 as "a sandstone, beehive-shaped structure, 25 feet in diameter at the base, tapering to a height of 20 feet at the cap of the dome."[4] That kiln stood, reinforced, until 2016 when it collapsed under a heavy, wet snow.[5] The collapse was quickly recognized as a loss of a local historical treasure, and funding was raised to rebuild the kiln as an interpretative site and part of the nearby Iron Ore Heritage Trail.[6] The work on the site was completed and open to the public in 2020.

Fayette Ironworks in Delta County, now an historic state park, originally included 11 charcoal kilns next to the iron furnace. None of those survived, but a replica was built as part of the historic park to stress the importance of charcoal to an ironworks.[7] There are still scattered charcoal kiln remnants across the Lake Superior region; however, for those interest in local history, replicas must suffice.

Only a few prime examples of stone or brick charcoal kilns still exist in the state. Most of them are ruins, rather than intact kilns. Three-quarters of a century ago, when charcoal kilns remained an attraction for history-minded tourists, the *Escanaba Free Press* reported:

> Old charcoal kilns, most of them dilapidated ruins partially obscured by underbrush, are still to be seen at Fayette, Marquette, Ford River, Wilson, Schaffer and other communities in the Upper Peninsula. The dome-shaped structures of stone, brick and mortar are among the last remnants of the charcoal iron industry, which flourished for several decades in the hardwood region of Michigan and Northern Wisconsin.[8]

Most charcoal kilns held from 60 to 80 cords and ranged from 25 to 30 feet in height. A cord is a pile of wood four feet high, four feet wide, and eight feet long (128 cubic feet).[9] A cord of wood would produce from 30 to 50 bushels of charcoal, up to 1,000 pounds. They were usually built in rows so that a tramway could be used to load them. The kilns had rows of vents which could be plugged with bricks once the burning began. A fire was lit at the bottom and the kiln was

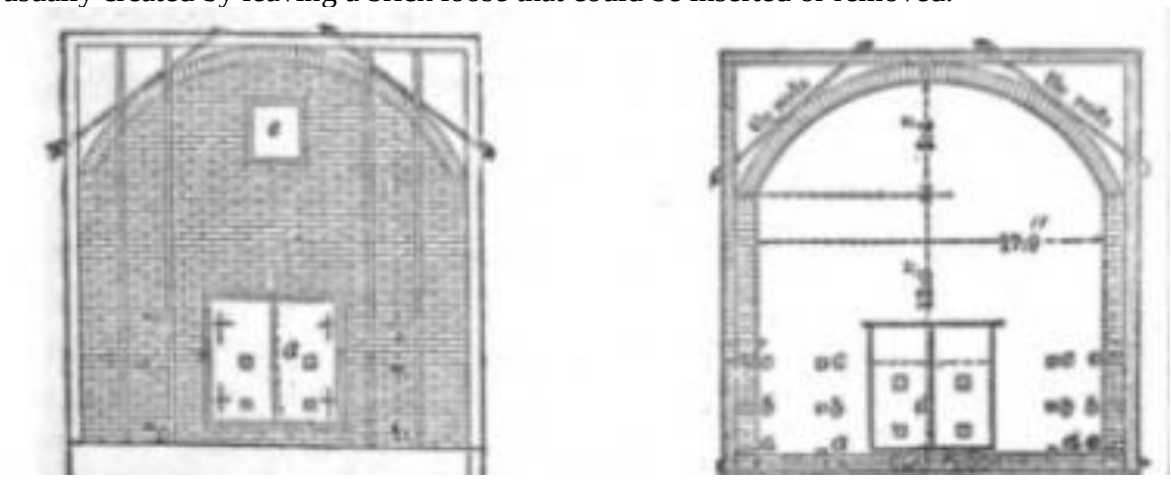
then shut up, allowed to "burn" for ten to twelve days, after which the "burned" cordwood, now charcoal, was permitted to cool for a week. Charcoal kilns tended to be located near the hardwood forests and the furnaces would purchase large tracts of timberland to be near the fuel supply.[10] As the production of charcoal pig iron was increased at the furnace(s), many kilns would be erected nearer the furnace(s) and railroad gondolas would be loaded with cordwood, in the woods, and moved to areas much nearer the furnace to be stacked for seasoning.

Charcoal iron furnaces of the Lake Superior region are well established in mining and industrial history; not so with charcoal kilns. Charcoal production was usually mentioned in those histories only as an addendum, explaining its use as a fuel source for the smelting process. Of course, geographically, charcoal kiln locations are closely tied to iron furnace locations, but, as wood resources were exhausted near iron furnaces, charcoal production moved greater and greater distances from the furnaces. Here we describe the charcoal production regions of the Lake Superior region and give some idea of where the batteries of charcoal kilns existed in the period of the late nineteenth and early twentieth centuries. It is difficult to be precise regarding the ownership and numbers of charcoal kilns at any location. Ownerships changed over time and the number of kilns at any location could vary (under heavy use kilns could burn out and new kilns were often added at prime locations when charcoal demand was sufficiently high).

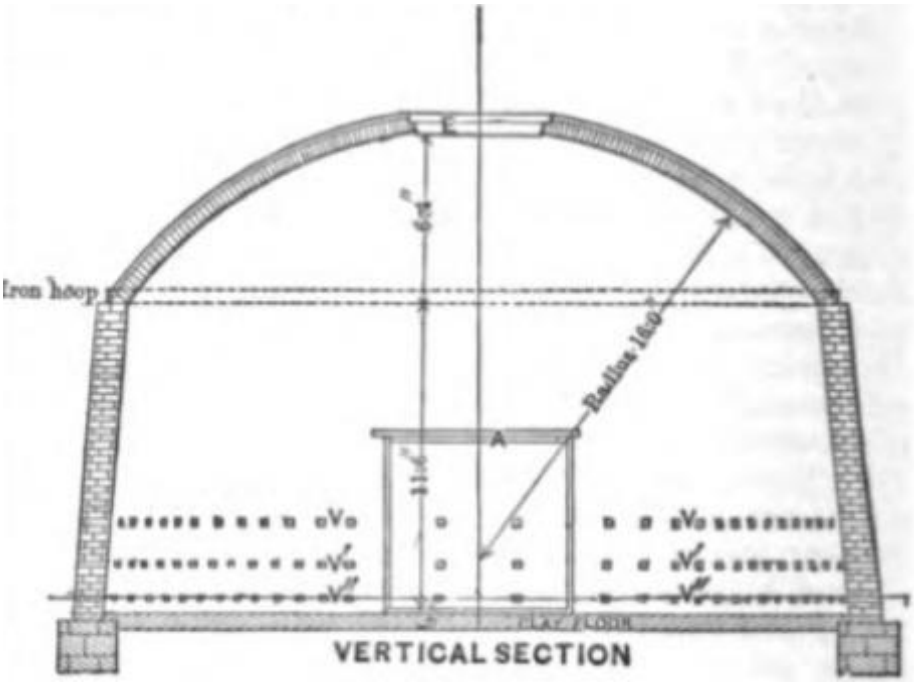
Charcoal Kiln Types and Operation

The type of charcoal kilns mainly varies by construction material (stone, brick, or a combination of the two) and shape. The former needs little explanation, but the latter is not as self-explanatory. Charcoal kilns in the Lake States region took on three general shapes: rectangular, beehive, and conical. Kiln capacity ranged from 20 to 100 cords and average yield was 40 to 45 bushels per cord.[11]

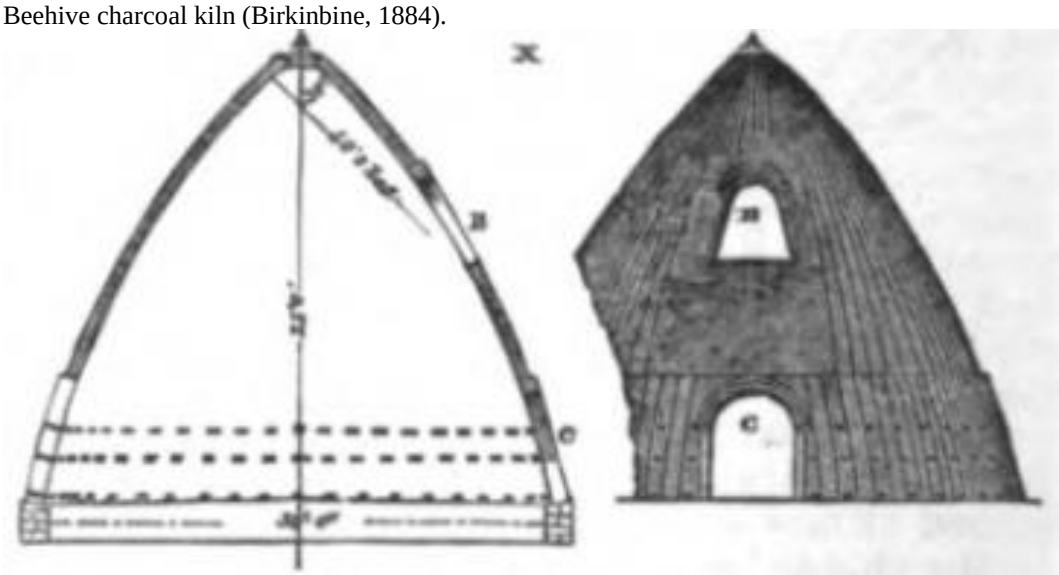
Rectangular charcoal kilns had four vertical walls and were of large capacity. The illustration is of a 90-cord kiln used in Michigan. Beehive kilns were second in terms of average capacity. They had a vertical or slightly tapering circular wall and a dome roof. A beehive kiln might hold 50 cords. Conical kilns were usually of the smallest capacity. They are conical in shape, with a circular base, and with the apex rounded. A conical kiln might hold 30 to 35 cords. All the kiln types had rows of vents around the bottom, generally three rows, and a lower and upper door (usually five-feet square) for charging the wood and discharging the charcoal. The vents were usually created by leaving a brick loose that could be inserted or removed.[12]



Rectangular charcoal kiln (Birkinbine, 1884).



Beehive charcoal kiln (Birkinbine, 1884).



Conical charcoal kiln (Birkinbine, 1884).

The wood was usually laid flat and tightly packed. It would take four to five men one day to fill a 45-cord kiln. A "chimney" was created in the center of piled wood so that kindling could be inserted, and a second channel connected the chimney to the lower door. This was used to ignite the wood. Once the fire was burning, vents at the bottom would control and limit airflow.[13] Control of airflow was an art and 24-hour a day careful supervision of the kiln was necessary. The collier (charcoal maker) could judge the rate of burning by the color and smell of the smoke produced.

Burning would take ten to 12 days for a 50-cord kiln and six to seven days for a 35-cord kiln. For the first four days a thick, white smoke could be seen exiting the upper vents, indicating that water (steam) was being driven from the wood. Yellowish smoke would continue for about the next four days, followed by blue smoke. The presence of blue smoke indicated that the burn was nearly complete. The vents would be closed to end the burn and five to six days were then

required for the charcoal to cool. The exteriors of charcoal kilns were whitewashed between burns, not for neatness, but to seal the kiln from air. One collier could supervise five to six kilns if they were close together. If a kiln was opened too soon, water was sprayed on the contents to put out fire or the charcoal would burn to ash.[14]

Marquette Area Charcoal Kilns

Iron production on the Upper Peninsula began in 1847 with the Jackson Mining Company building a forge on the Carp River. Three more forges followed over the next seven years, and an experimental furnace was constructed at Collinsville in early 1858, three miles north of Marquette on the Dead River. The first true blast furnace, the Pioneer Furnace, started producing pig iron in April 1858. These early forges and the Pioneer Furnace at the beginning utilized pit charcoal. A charcoal pit was a temporary structure where four-foot bolts of wood (called billets) were closely stacked into a mound shape and covered with a thin layer of leaves first, then soil to form an airtight enclosure. This took the place of a kiln and allowed the wood to be converted into charcoal without the expense of kiln construction. A charcoal pit might hold 25 to 50 cords and could easily yield over 1,000 bushels of charcoal. A charcoal wagon would haul the pit charcoal into the furnace site.[15]

The early smelting furnaces on the Upper Peninsula centered in the Marquette area, which resulted in a demand for charcoal. Charcoal kilns were constructed, and large areas of hardwood were converted into smelter fuel.[16] Charcoal represented the only demand for wood in the Upper Peninsula prior to 1890. When charcoal became scarce in the Marquette area, smelters located near other Upper Peninsula forest resources. Early ironworks were established at Escanaba, Manistique, Menominee, and Saint Ignace, with Alger County emerging as a center of charcoal production. Exhaustion of local hardwood supplies could cause an iron furnace to close.[17] Railroads greatly expanded the area of hardwood accessible to the furnaces and allowed the industry to continue past the 1880s.[18]

Based on rough chronological order and geography, we will discuss the early blast furnaces of Michigan's Upper Peninsula and the associated charcoal kilns. This will allow for insights into where the charcoal production took place and historically where charcoal kilns were located. The number and even the type of charcoal kilns at a location would change over time. Charcoal kilns would burn out with heavy use and, if a site proved productive in charcoal making, often more kilns were added. So, any mention of kiln number is tied to a date and often sources slightly disagree over the number of kilns at a site.

The Pioneer Furnace at Negaunee was the first blast furnace in the Upper Peninsula; it had two stacks, one built in 1858 and one in 1859. When purchased by the Iron Cliffs Company in 1866, it had existing charcoal works, but also had a serious problem securing charcoal.[19] The second blast furnace, the Collins Furnace at Collinsville, also started up in 1858. Kilns were built near the furnace at the base of an adjacent bluff.[20] One source listed 15 charcoal kilns, built in a row so that wood could be hauled up a tramway. In 1863 the Furnace contracted to have 21 kilns built and operated.[21] The Furnace went out of blast in 1873 due to the failure of charcoal supply.[22]

The Northern Furnace was located at the mouth of the Chocolay River, about four miles south of Marquette in the village of Harvey. It went into blast in 1860, designed for using anthracite coal, but soon shut down due to a lack of fuel. Local farmers desired a market for hardwood cleared off their land and convinced the Furnace to convert to charcoal fuel. Within two years it had ten iron and ten square brick kilns: in 1910 as the company was being reorganized, 50 new brick kilns were built.[23] The Bancroft Furnace located in Forestville, Marquette County, went into blast in

1861. One source identified its fuel supply as 16 charcoal kilns with a weekly output of 12,000 bushels, located in the hardwoods near the village. Operation of the kilns was contacted out and required a total of 80 woodchoppers and 25 teams of horses and teamsters.[24]

The Morgan Iron Company built a furnace eight miles west of Marquette that went into blast in 1863. Construction and operation of these charcoal kilns was contacted out for 21 kilns with a weekly output of 1,700 bushels.[25] In 1868-1869 the charcoal fuel adjacent to the furnace was exhausted and new kilns were built on company land nine miles from the furnace.[26] The Morgan Iron Company built a second furnace, the "Champion," that went into blast in 1867. At first six of a planned 12 kilns were built, so that the forest resource and the charcoal output could match supply and needs. Supplemental charcoal was made in pits.[27]

The Michigan Iron Company erected two furnaces, the Greenwood Furnace in 1865, 12 miles west of Negaunee, and the Michigan Furnace that went into blast in 1867 at Clarksburg.[28] In 1870 the Greenwood Furnace had 19 charcoal kilns; it was unusual that only four utilized hardwood and 15 used white pine.[29] At first 15 charcoal kilns were built for the Michigan Furnace to supply 110,000 bushels by the time the furnace went into blast. Fuel demand was so great that five additional kilns were soon erected.[30]

Another charcoal iron furnace, located 12 miles west of Marquette, Deer Lake Furnace, went into blast in 1868 and was built on the Carp River, just below Carp Falls (Ishpeming). Well before the new furnace went into blast, colliers were making charcoal for it using pits. A second stack was added at Deer Lake in 1873 and, with two stacks, 39 charcoal kilns and 300 employees were necessary.[31] Nearby, the Peat Furnace was erected south of Ishpeming in 1872 and used a mixture of peat and charcoal for fuel. It only operated for about two years and in 1879 the Carp River Iron Company rebuilt it to burn charcoal (it also leased the ten Kloman kilns west of Escanaba and contracted for six kilns each to be constructed at Barkville and Spalding on the Chicago and North Western Railway line). It was renamed the Excelsior Furnace. Since charcoal could be provided from kilns located elsewhere, the three kilns located at the furnace were converted into buildings.[32] By the early twentieth century there were 43 charcoal kilns reported for that furnace.[33]

The Carp River Iron Company built a furnace at the mouth of the Carp River in 1874.[34] These kilns included the charcoal kiln that collapsed in 2016, described earlier. The Cliffs Furnace, built three miles south of Negaunee went into blast in 1874. It was short-lived, due to a shortage of charcoal.[35] In 1903 the Pioneer Iron Company (a subsidiary of the Cleveland-Cliffs Iron Company) would erect its Number Two Furnace at Marquette, which would obtain its fuel supply from a total of 86 charcoal kilns, 80 of which were designed with a capacity of 80 cords, producing 3,500 bushels per burn, and six of which were designed with a capacity of 90 cords per turn – the latter producing more smoke and gas per cycle per kiln than the first 80 kilns. Smoke from the kilns was converted into chemical products.[36] These kilns were of similar design to the company's 70 beehive charcoal kilns at its Number One Furnace at Gladstone near Escanaba built in 1896 that also used the exhaust smoke and gases for chemical production.[37]

A summary of charcoal kilns in 1873 is presented in Table 1.[38] Most kilns were in the Marquette area, but a few were located in other areas of the Upper Peninsula. Table 1 also contains average kiln capacity in cords. It provides an interesting perspective on how iron industry charcoal kilns were distributed around the Upper Peninsula.

Expansion Beyond the Marquette Area

Prior to 1890 the charcoal iron industry's demand for smelter fuel represented the only demand for wood in the Upper Peninsula besides small sawmills and mining timbers. The industry was centered in Marquette, near the iron ore and hardwood forests needed to produce charcoal. Once these hardwood resources became scarce, charcoal iron furnaces located in other areas of the Upper Peninsula. Railroads allowed the industry to continue past the 1880s, as hardwood supplies dwindled near the furnaces by greatly expanding the area of accessible hardwoods. About the same time a shift in technology caused stone and brick kilns to be displaced by retorts that burned charcoal more efficiently and captured the gases that were lost in kiln-burning, producing valuable chemicals.[39]

Furnace	Owners	Town and County	Kilns, No.	Kilns, Average Capacity in Cords
Pioneer	Iron Cliff Company	Negaunee, Marquette Co.	54	38
Collins	Collins Iron Company	Marquette, Marquette Co.	16	45
Bancroft	Bancroft Iron Company	Marquette, Marquette Co.	20	25
Northern	Northern Iron Company	Chocolay, Marquette Co.	26	45
Morgan	Morgan Iron Company	Morgan, Marquette Co.	29	41
Champion	Morgan Iron Company	Ely, Marquette Co.	12	85
Greenwood	Michigan Iron Company	Ely, Marquette Co.	40	
Michigan	Michigan Iron Company	Ely, Marquette Co.		
Fayette	Jackson Iron Company	Fayette. Delta Co.	27	70
Deer Lake	Deer Lake Iron and Lumber Co.	Ishpeming, Marquette Co.	20	25
Munising	Munising Iron Company	Munising, Schoolcraft Co.		
Bay	Bay Furnace Company	Munising, Schoolcraft Co.		
Escanaba	Escanaba Iron Company	Escanaba, Delta Co.	26	30

Table 1. Furnaces on Upper Peninsula of Michigan, January 4, 1873.[40]

The Fayette Furnace was the first furnace that expanded beyond the Marquette area to be located near hardwood supplies (owning over 20,000 acres of hardwood). The Jackson Iron Company chose the Garden Peninsula in Delta County, 20 miles east of Escanaba, for the location. Fayette Furnace used over 1,800 cords of wood in its charcoal kilns in a single "burning."[41] The number one stack went into blast in 1867 and the number two stack in 1870. Eleven top-loading

kilns with arched roofs stood near the harbor (each measuring 14 feet by 18 feet, with a capacity of 75 cords). Gate's Kilns were three miles northwest of the furnace; they were six round kilns, 28 feet in diameter, with a capacity of 65 cords. Two miles southwest of the furnace were four more kilns, each with a capacity of 70 cords. A railroad, originally with wood tracks, led from the furnace to the kilns; iron rails were relaid in 1872.[42]

The Schoolcraft Iron Company at Munising was formed in 1866 and the Schoolcraft (Munising) Furnace, located on the south shore of Grand Island Bay in present-day Alger County, was placed in blast in 1868. Five charcoal kilns were located at the furnace and six more were constructed in the hardwood forest. In addition, many charcoal pits supplied the furnace. In the early 1870s six new kilns were built at the Munising location.[43]

The Bay Furnace Company was formed in 1869 to build a blast furnace six miles west of Munising. The first stack was placed in blast in 1870 and the second in 1872. The company owned 20,000 acres of hardwood and had had 14 kilns at the furnace and six kilns each at two locations near the furnace in the hardwood forest. Charcoal pits also supplied this furnace too.[44]

Furnace companies tended to own large acreages of hardwood forest, but also contracted with independent colliers for charcoal supply. The Union Fuel Company, centered in Alger County, and owned by Charles Schaffer (called the "Alger County Charcoal King"), controlled many charcoal kilns. Expansion of the railroad east of Marquette allowed for charcoal transportation. These kilns were centered about 25 miles west of Munising at a place he called the Onota location, half way between Munising and Marquette, near the shore of Lake Superior. He built a battery of kilns three miles east of Onota and a battery five miles west of Onota (Whitefish location), Schaffer had a contract to supply 100,000 bushels of charcoal per month over 1885, and also supplied other furnaces, including the Carp River, Pioneer, Iron River, and Vulcan. Eleven kilns were also located on the south bank of the Carp River. By 1891 he had 40 charcoal kilns in operation at locations that included Whitefish, Rock River, Glenwood, and Onota. Later he began operating kilns along the Chicago and North Western Railway with batteries at Kloman (Lake), Spalding, Deloughary (now named Harris), Wilson, Deloughary, and Schaffer, all located west of Escanaba.[45]

The Rock Kilns located ten miles northwest of Au Train in Alger County are well-known charcoal kiln remnants. They were part of the Union Fuel Company kilns along the Detroit, Marquette, and Mackinac Railroad. The kilns produced charcoal from 1879 to 1896, eventually totaled a dozen, and employed 200 workers.[46]

The Cascade Iron Company built the Escanaba Furnace about one and one-half miles north of Escanaba. It went into blast in 1873. By the middle of 1874 charcoal was being supplied by 49 kilns, still not enough to keep up with demand. These were located above and below Escanaba on the line of the Chicago and North Western Railway, with ten 50-cord kilns at Kloman, 13 at Perkins (five 30-cord and eight 50-cord capacity), 12 white beehive kilns at Maple Ridge, now Rock, 18 miles north of Escanaba (30-cord capacity), and 14 at Mile Post 22 (30-cord capacity). Kiln operations required 125 men.[47]

The National Iron Company of De Pere, Wisconsin, constructed a furnace (named Menominee and later Champion) in Menominee that went into blast in 1873. Kilns were located around the furnace. In 1878 the firm leased ironworks that included kilns at Brookside, Kloman, and Stephenson.[48] Charles J. L. Meyer from Fond du Lac, Wisconsin required more pine than the Winnebago Valley of Wisconsin could produce, and he began to purchase land in Menominee County, Michigan in 1873 for his Wisconsin Land and Lumber Company. He founded Hermansville, near his nearly 100,000 acres of timberland, and named it for his son. In order to

maximize his profit from the lumber operation, he built a battery of charcoal kilns in Hermansville to utilize the wood scraps to produce charcoal for the iron furnaces.[49]

The lands east of Marquette were opened by the construction of the Detroit, Mackinac and Marquette Railroad. Construction of the Martel Furnace began in 1880 at St. Ignace and it went into blast in 1881. The furnace started with charcoal kilns, but abandoned them in 1882 for retorts (the first used in the Upper Peninsula).[50] The Vulcan Furnace company constructed a large furnace at Newberry that went into blast in 1883. The plan was to use retorts to produce both charcoal and chemicals. By 1885 the retorts were considered a failure and the firm decided to use charcoal kilns. At the end of 1885 42 charcoal kilns were in operation at various charcoal stations. In 1886 seven more kilns were added for more production. In 1912 the old plant was reported to consist of 54 100-cord charcoal kilns and the furnace mainly used 20 retort burning kilns (largest charcoal retort plant in the world). The charcoal kilns were still used for large wood.[51]

The Iron River Furnace Company put the Iron River Furnace (later called the Gogebic Furnace) into blast in 1886. It was located near Stambaugh and by 1887 the firm had 28 kilns. Ten were located at the furnace and called the "Home Kilns;" eight were located two miles from the furnace, and three and one-half miles out in the forest were the "East Kilns." The Home Kilns also supplied the large furnace in Ashland, Wisconsin.[52] The Weston Furnace Company put a charcoal iron furnace into production in 1891 at Manistique. Large charcoal kilns at the furnace produced the fuel.[53] The Cleveland-Cliffs Iron Company put the Gladstone Furnace, located near Escanaba, into blast in 1886. Forty kilns, each 31 feet in diameter, each with a 62-cord capacity, supplied about two-thirds of the fuel. These kilns also distilled wood to make chemicals. Neighboring farmers supplied the rest from charcoal pits.[54] In 1903 Cleveland-Cliffs put its Pioneer Furnace Number Two at Marquette into operation that included 93 kilns, which were replaced by steel ovens in 1916.[55]

This discussion has centered on charcoal iron industry kilns erected in the nineteenth century, mostly the traditional stone kilns that serve as relics of that industry. These are kilns from the same furnaces covered in LaFayette's *Flaming Brands* – those of primary historical interest. Later, industry consolidations and a trend towards capturing chemical by-products resulted in the kilns subsumed by large industrial operations often more concerned with chemicals than charcoal. In the early twentieth century the furnace consolidations produced Lake States Iron and Chemical Company and later the Charcoal Iron Company of America.[56] Even Ford Charcoal Briquets (Kingsford Charcoal) were part of the Upper Peninsula's charcoal history.[57]

The charcoal kiln remnants are scattered around the Upper Peninsula. A little over forty years ago a survey of historic industrial sites on Michigan's Upper Peninsula noted 29 blast furnaces on 25 sites were erected between 1858 to 1896 and nine sites still existed with 20 remaining charcoal kilns.[58] The following six sites are those that still had significant charcoal kilns or ruins on them at the time of that 1978 survey:

The Carp River Iron Company built six kilns at Barksville (now Bark River) in 1879 and the ruins of three existed back in 1978. They were conical stone kilns, approximately 25 feet in diameter, and about 20 feet tall. The charcoal went to the Peat Furnace in Ishpeming.[59]

The Escanaba Iron Company operated 49 kilns with a 50-cord capacity on the Chicago and North Western Railway between Escanaba and Powers at Kloman (now Wilson). They were built about 1872, are conical-shaped, about 20 feet in diameter, and approximately 25 feet tall. Seven were reported as still standing in 1978.[60]

The Jackson Iron Company's Fayette Ironworks is now a historic state park. Both original and restored structures are located on-site. Next to the original furnace were 11 beehive charcoal

kilns, 14 feet in diameter, and 18 feet tall. Those charcoal kilns no longer exist, but a replica charcoal kiln has been erected.[61]

The Menominee Furnace Company built the Stephenson Kilns about two miles east of Stephenson in 1875 on the Chicago and North Western Railway line. Stephenson is located 17 miles north of the twin cities of Marinette and Menominee. In 1978 there were five standing kilns at the site, with the ruins of a sixth. They were made of stone, about 25 feet in diameter, and 20 feet tall.[62]

The Carp River Furnace at the mouth of the Carp River was built in 1872 by the Carp River Iron Company that merged with the Peninsular Iron Company in 1874. A major fire shut it down in 1882 and in 1889 Charles Schaffer, the "Alger County Charcoal King", acquired a controlling interest and briefly returned it to production. He erected the 36 charcoal kilns discussed earlier in about 1890, with one of them still surviving in 1978. There were also a set of 16 charcoal kilns operating at a site south of Harvey that supplied the Carp River Furnace. The Mangum Kiln at Carp River, built about 1878, was probably a single surviving one of those. It was constructed of rough stone, about 20 feet in diameter, and about 20 feet in height.[63]

The Union Fuel Company operated sets of kilns in Alger County. Charles Schaffer, the "Alger County Charcoal King," leased them in 1884 and acquired them in 1886. A single kiln and the ruins of another survived in Onota Township; this is the Rock Kiln discussed earlier. It is described as a stone structure, 25 feet in diameter, and 25 feet in height.[64]

While Upper Peninsula charcoal kiln history is more closely associated with the charcoal iron industry, charcoal kilns are also associated with the copper smelting industry. Michigan's Copper Country (Keweenaw Peninsula) was the earliest major copper mining district in the United States and dominated the national copper industry for the second half of the eighteenth century. It supported seven copper smelters that also obtained fuel from charcoal kilns.[65] The Quincy Smelter in Ripley, across the Portage Canal from the city of Houghton, had a charcoal house that dates back to the beginning of smelter in 1898 and charcoal kilns were located nearby.[66] Oskar, about five miles north of Houghton, had two sets of charcoal kilns, that supplied several copper smelters. The charcoal was used to clarify copper in the smelting process and was transported to the smelters via barges.[67] An early copper smelter existed on Isle Royale and was supported by a charcoal kiln; its stone foundation is still on the island.[68]

Ashland and Northeast Wisconsin Charcoal Kilns

A charcoal iron furnace requires three basic raw materials: iron ore, limestone (as a flux to help control the chemical reaction in the furnace and remove impurities), and charcoal (or later coal or coke) for fuel. Investors in and around Green Bay saw a great opportunity in the nearby iron deposits of Michigan's Upper Peninsula, using barges to provide cheap transportation for the raw ore and the smelted product, with a nearby large area of timberlands for the production of charcoal.[69] Nearby sources of wood were used first, then harvest expanded outward from the furnace, with transportation arteries following. Depleted forestlands were the main reason many iron furnaces would eventually be abandoned, and it was the reason all charcoal iron furnace companies began to develop extensive systems of charcoal kilns as nearby wood supplies diminished.

Fuel was a crucial issue for the many charcoal iron furnaces that smelted Lake Superior ores in and near Wisconsin's Fox River Valley. The Fox River Iron Company in West De Pere curtail operation due to a lack of fuel.[70] In 1880 charcoal became so scarce that the company was building batteries of ten kilns each at Bagley, Kloman, and Nadeau in Michigan's Upper Peninsula

(Menominee County, Michigan) along the Chicago and North Western Railway line, a distance of 100 miles from Green Bay and De Pere furnaces.[71] The National Furnace Company in De Pere experienced similar charcoal supply problems and was required to procure charcoal by rail from the kiln near Escanaba, Michigan, "there being scarcely enough wood left in Brown County for fire wood for the farmer."[72]

The Fond du Lac Furnace was put into blast in 1883, and the firm boasted of having "ample charcoal kilns," but the local supply of cordwood quickly became scarce, making charcoal supply an issue nearly from the start.[73] So, encouraged by liberal freight rates for charcoal offered by the railroads, furnace owner Charles J. L. Meyer purchased over 50,000 acres of timberland near Hermansville, Michigan (Menominee County) and considered moving the furnace there to utilize the hardwood for charcoal production. In 1882 he began to operate a set of 12 charcoal kilns near his timberland in Hermansville. Fond du Lac capitalists organized the Fond du Lac Iron Company to prevent the move by purchasing the furnace.[74] The Florence Furnace Company went into blast in 1881 in then-Marinette County and was furnished with charcoal fuel by 30 kilns, ten of them at Florence, and the remainder located at other points, including Waucedah, Michigan (then-Menominee County).[75]

In the mid-1880s the vast iron deposits of the Gogebic Iron Ore Range attracted these industry interests to northern Wisconsin on the border of Michigan and Wisconsin and they remained there until the last iron mine closed in Wisconsin in the late-1960s.[76] In 1887-1888 a large charcoal iron furnace was constructed at Ashland (Hinkle Furnace) that would prove to be one of the best and largest producers of charcoal iron in the country.[77] The Ashland Iron and Steel Company constructed many charcoal kilns along the line of the Wisconsin Central Railroad to convert cordwood into charcoal for fuel for its furnace. After 1902, production of charcoal shifted from the railroad line locations to the company's furnace site in Ashland, so that the valuable chemical byproducts could add to profits.[78] Eventually the furnace site included 84 modern charcoal kilns capable of capturing the chemicals lost in the regular charcoal production process. The company was reorganized as the Lake Superior Iron and Chemical Company in 1907 and in 1913 as the Charcoal Iron Company of America.[79] The furnace at Ashland ceased operation in 1925 which virtually ended production of charcoal iron production in northern Wisconsin and Michigan's Upper Peninsula.

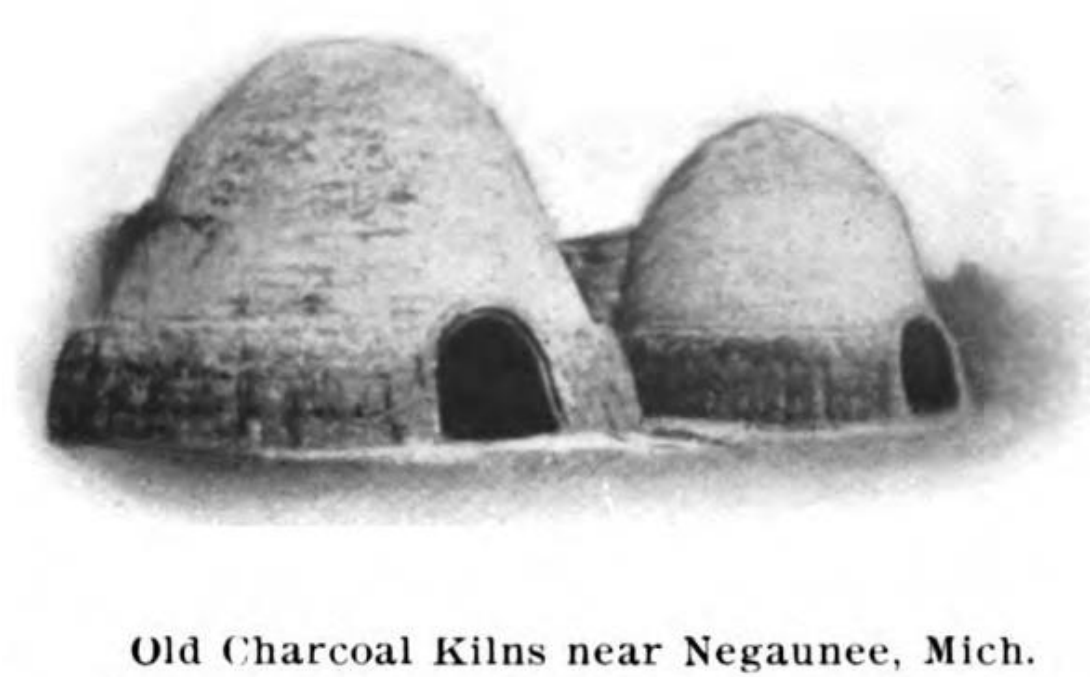
The Wisconsin Central Railroad provided a transportation network that would fuel the Hinkle Furnace; an early description of the railroad noted the importance of charcoal: "Along the lines of this company in Northern Wisconsin, … many kilns have been erected where large quantities of wood is converted into charcoal for use in manufacturing the famous charcoal pig iron that is turned out at the Ashland Steel and Iron Company's furnace at Ashland."[80] In 1894 the Ashland purchased all the charcoal kilns along the Wisconsin Central Railroad.[81]

Many of the stations on the Wisconsin Central line supported sets of charcoal kilns. Heading south from Ashland, those kiln sites included: Saxon, Highbridge, Glidden, Butternut (12 kilns), Rib Lake (eight to ten kilns), Stetsonville, Dorchester (ten kilns), Curtiss, and Colby (ten kilns).[82]

The Village of Butternut, 50 miles south of Ashland, is a good example of those locations. Charcoal manufacture was its "leading industry" for a few short years (the kilns were in operation from 1893 to 1902) and one of the main reasons for the founding of the community.[83] An interesting description of the kilns is included in the village history and gives an excellent description of what these kilns looked like:

> The Butternut set of twelve kilns was built in two rows with a tramway between the rows. The kilns were of brick construction and were filled from an opening in the top. Sixty cords of hardwood were piled in each kiln and then ignited. After burning for about three days the kiln was sealed and the contents allowed to char, which took about six days. When sealed, each kiln was given a coat of whitewash as a sealing medium. The weather had much to do with the burning of the charcoal. The velocity of wind was the prime consideration and here the charcoal burner had to use his experience to regulate the draft. This was done through a series of holes, the size of a brick, spaced about three feet apart and about three feet from the ground all around the kiln. Should the wind be brisk, some of the holes were plugged; if the weather was calm more holes were opened, as was the kiln door. The kilns were about thirty feet in diameter and about 20 feet high. The dome was shaped like a beehive. The operation of the kilns was a year round operation from 1893 to 1902, although the bringing of the cordwood was seasonal and done with horse and sleigh during the wintertime. The local yard at that time was covered by 15,000 to 20,000 cords of wood each winter and measured about thirty acres. This product was measured by the bushel and the annual output of the Butternut battery of kilns was 480,000 bushels.[84]

Not all charcoal production in Northern Wisconsin was intended for intrastate consumption. The Goodman Lumber Company in Goodman, Marinette County erected charcoal kilns to capture wood chemicals and produce charcoal for use at the Cleveland-Cliffs Corporation's iron furnaces on Michigan's Upper Peninsula and the Wisconsin Chemical Company charcoal retorts in Phelps, Vilas County also sent charcoal to Michigan.[85]



Old charcoal kilns near Negaunee (Credit: Mather, 1903).

Menominee Furnace Company Stephenson charcoal kiln (Credit: Abbott and Hyde, 1978).

Peninsular Iron Company Mangum Charcoal Kiln (Credit: Abbott and Hyde, 1978).

Escanaba Iron Company Kloman charcoal kiln at Wilson (Credit: Abbott and Hyde, 1978).

An example of a conical charcoal kiln from Fayette Historic State Park, Garden Peninsula, Michigan (Credit: Legends of America).

Charcoal kilns at Ashland Iron and Steel, largest charcoal iron furnace in world (Credit: Ashland [Wisconsin] Historical Society Museum).

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