The Pittsburgh Coal Bed—Its Early History and Development*

By Howard N. Eavenson,† Member A.I.M.E.

(New York Meeting, February, 1938)

From the Pittsburgh coal bed in the four states of Pennsylvania, Ohio, Maryland and West Virginia has been produced an output that, at mine prices, represents a greater value than any other single mineral deposit in the world has yielded.[12] While this distinction may in a few years pass to the gold reef of the Witwatersrand, it is possible that eventually, owing to the tremendous reserves still remaining, the ultimate yield of the Pittsburgh bed will be greater than that of any other known single deposit.

Considering its importance, not a great deal has been written of its early history and development as a whole; most of the accounts have been of limited localities, or, at the most, of the area within a single state. In "Coal through the Ages" the writer mentioned some references to its early history, but this study will deal not only with its history but with the character of the bed, where and why it was first developed, and its effect upon the states in which it is found.

It has not been the intention to write a detailed history of the development of the seam in each locality, as neither time nor inclination were available for doing such work, but only to show the influences that tended to hasten or retard such development. In general the historical matter ends about 1830, when geological surveys began to be made. Some of the maps show data available only since that time, and the sections about coal preparation and coking have been extended to the present time to show the changing conditions.

It is believed that the early history includes all published records, and many more sources than those shown in the bibliography were consulted. It is quite likely that some references to coal in this area may be found in the unpublished papers of some of our early soldiers and colonizers, which exist in several libraries, and it is hoped that some future

---

Manuscript received at the office of the Institute Feb. 15, 1938.

* A paper that will appear in Volume 130 of the Institute's Transactions, 1938.

† Mining Engineer, Eavenson, Alford and Auchmuty, Pittsburgh, Pa.

[12] References are at the end of the paper.

Printed in U. S. A.

historian will be able to collect and publish all such data. There are undoubtedly in existence some records of early mines from which helpful data can be obtained and a study of the early records of the transportation companies showing the movement of coal should be made before such data are irretrievably lost.

The language of the early travelers that commented on the coal deposits west of the mountains has been quoted so largely because it shows better than can be told otherwise the different conditions met; the smoke cloud over the growing town at the head of the Ohio was noticeable because nowhere else, as yet, was anything but wood being used except for very special purposes. Through the lines one can see the establishment of the great glass industry, of which the products were so necessary to the pioneer, even before ironmaking began; the early start of steam navigation and the use of steam engines; can feel the coming to life of the Mississippi Valley empire, whose development in the short space of a century is one of the marvels of all time, and hear the throbbing growth of the great industries in this workshop of the nation, which were made possible by the presence of this great coal bed.

If suitable acknowledgment of the assistance extended by many friends, libraries and historical societies has not already been made, the writer acknowledges this now, as no work of this kind can be done without such aid, and usually only thanks can be extended. If this paper helps to a better understanding of the beginnings of one of the nation's greatest industries and stimulates efforts to preserve such data for posterity, the writer's purpose will be served.

Early Conditions of Fuel Use in the United States

In the development of any new country the establishment of the home and the food supply for it comes first; later the local manufacture of some of the necessities of life is begun, and then comes the development of minerals, whether for their own value or for raw materials for the needed goods. Until within about one hundred years, land transport was as it had been for centuries, cumbersome and expensive, and for all but short distances all bulky, heavy and cheap materials, such as coal, iron ore and similar materials, could be moved economically only by water. The development of both coal and iron production in the United States was determined by this fact; the furnaces were built near the local ore supplies, and used charcoal, made from local wood, as fuel, being abandoned when either material approached exhaustion, and until the advent of railroad transport of bituminous coal in the 1840's (anthracite was available a few years earlier), all of the bituminous coal used in this country was supplied by local mines situated within a few miles, or was moved by water.

How much coal was needed at that time, and what were the conditions requiring its use? So commonplace has become the production of enormous quantities of coal and iron that it requires an effort to picture the conditions slightly over a century ago. Wood was the universal fuel except in the cities along the Atlantic Coast, at Cleveland, in the towns along the Ohio River and at Richmond, Va. In 1828 it was estimated that of the total yearly fuel consumption 80 per cent came from wood, 3 per cent from charcoal, a little over 14 per cent from anthracite, and less than 2 per cent from bituminous coal.[14] Even in those places wood was almost entirely used as late as 1830,* although its cost was beginning to increase, and as the railroads tapped the coal mines, the use of wood lessened and that of coal increased.

Nearly all metallurgical processes used charcoal for fuel, although along the coast some coal was imported from Nova Scotia and England; about 8000 tons per year were imported from England before 1800 (ref. 47, p. 331). The amount increased after that date, but was still small, as far as tonnage was concerned, and naturally it did not move more than a few miles from the coast. Records of consumption were not kept, but the list of imports enlightens us to some extent. All available data are shown in Table 1.

Until after 1804, bituminous coal was mined at only two places in the United States, one east of the mountains and available to the Atlantic coast cities, along the James River in Virginia, a short distance above Richmond; and the other one at Pittsburgh, west of the mountains and available only there and along the Ohio River. Small amounts of anthracite were floated down the Susquehanna River from near Wilkes-Barre in 1775 and following years for use in the arsenal at Carlisle, and in 1807 regular shipments began of as much as 500 tons annually to lower river points and Baltimore (ref. 76, p. 53), but anthracite shipments were of small volume until some years later.

The Richmond coal field occupied a large place in the annals of coal production and consumption of this country until 1840, although now few but those interested in history know anything about it. In 1699 some Huguenots settled on the James River at a place now called Manakin, about 14 miles above Richmond. They early discovered coal, as Col. William Byrd, F.R.S., the most prominent man of his day in the colony, wrote to the Colonial Council of Virginia, under date of May 10 and 11, 1701:

> The 10th of May, last, I with Coll. Randolph, Capt. Epes, Capt. Webb, Ec., went up to the new settlements of ye French Refugees at ye Manakan Town . . . We went up to ye Cole, w'ch is not above a mile and a half from their settlement on the great upper Creeke, w'ch, riseing very high in great Raines hath washed away the Banks

* In 1833, the value of wood used as fuel in New York and Philadelphia exceeded that of coal by 50 per cent; i.e., $1,372,571 compared to $900,581 (ref. 107, 15, 352).

that the Coal lyes bare, otherwise it's very deep in the Earth, the land being very high, and near the surface is plenty of Slate. (Ref. 243, p. 467.)

A few years later an Englishman visited this place, and gives the following account of it in a "Plain & Friendly Persuasive to the Inhabitants of Virginia and Maryland for Promoting Towns & Cohabitation," London, 1705:

And I assure you, Gentlemen, the best, richest and most healthy part of your Country is yet to be inhabited, above the Falls of every River, to the Mountains, where are several advantages not yet generally known, as sea coal, lately discovered near the French Settlement, above the falls of James River; and also some mines, of which have been made some Experiences. (Ref. 258, **4,** 257.)

Mines are said to have been opened here as early as 1750, and in July 1759 the Rev. Thomas Burnaby wrote: "some coal mines have also been opened upon James River near the Falls, which are likely to answer very well" (ref. 34, p. 13).

The colonial records show the following data of exports from "Upper Dist. James River" for three years as follows (ref. 258, **1,** 98).

Between 25th Oct. 1763 and 25th Oct. 1764—11,452 bus. coal* (462 net tons)
Between 25th Oct. 1764 and 25th Oct. 1765—15,292 bus. coal (612 net tons)
Between 25th Oct. 1765 and 25th Oct. 1766— 4,900 bus. coal (196 net tons)

Coal from here was advertised for sale in Richmond in 1766 and that some of the exports noted above went to eastern cities is very probable, because this coal was known and needed in Philadelphia early in the Revolution. The minutes of the Pennsylvania Supreme Executive Council show (Vol. X, p. 707): "August 31st, 1776, Resolved, that Mr. Wharton and Mr. Biddle be appointed to employ proper persons to bring the Coal from Virginia, Contracted for by the late Committee of Safety." There is no record of the earlier negotiations or of the delivery of the coal.

The need for coal in Pennsylvania at a little earlier date is shown by the following minute of the Committee of Safety (Minutes, vol. X, p. 428):

Dec. 15th, 1775: Mr. Samuel Howell informing this Board that he has a considerable quantity of Sea Coal in the Island of Jamaica, Resolved, That he be requested to write to Jamaica, and give orders for a Load of Coal to be sent from there to this place, on account of this Committee, if it can be delivered at 3s. currency per Bushel, or under. Upon application of Daniel Offley & William Clifton, that this Board would advance a sum of money towards Searching for a Coal Mine said to be in Bucks County.

Resolved, That this Board pay one half the sum expended for that purpose, provided the whole expense doth not exceed one hundred pounds; And in case the said Mine is worked that this Board have the refusal of any quantity they may want for the use of the Publick.

* Throughout 25 bushels equal one net ton.

At that time Bucks County covered a much larger area than it does now, including most of the Anthracite Region, but no available record indicates the outcome of the search for the coal mine mentioned.

Colonel Byrd has left us a reference to the earliest known *use* of coal in this country by white men.* He wrote of a "Progress to the Mines" on Oct. 4, 1732, the mines being of iron "oar," and gives a description of Colonel Spotswood's iron "air furnace," at Massaponux (near Fredericksburg), where "sow" iron was made into castings:

> There is an Opening about a foot square for the fresh Air to pass through from without. This lead up to an Iron Grate that holds about a half a Bushel of Sea Coal, and is about 6 foot higher than the opening.[40]

As Byrd knew of the Richmond coal, it is likely he would have mentioned that it was used here, had it been the source of the "Sea Coal" mentioned.

Additional references to the use of Virginia coal are given in "Coal through the Ages," and the available data about production are given in Table 1 (ref. 76, p. 46).

The Duke de la Rochefoucault Liancourt, accompanied by an Englishman, Mr. Guillemard, visited one of the mines near Richmond on June 20, 1796, and made the following comments:[41]

> Messrs. Graham and Havans employ about five hundred negroes in this mine, and the business of the farm, in the province of which it is situated. In the lowest ground the vein runs one hundred and twenty feet below the surface, and is, in general, twenty-four feet thick. The ground from the surface down to the vein consists of a good red and yellow clay, interspersed with stone, easily reducible to dust. The vein is enveloped in a small layer of imperfect slate, and rests on a bed of granite; a circumstance, which, in the opinion of my friend, Mr. Guillemard, must puzzle all the naturalists of Europe. The coals of this mine, and indeed of all those which have hitherto been opened in this country, are very small, and the most solid pieces which can be obtained crumble into dust at the slightest shock, so that they are more adapted to be used in the forges of smiths, than to be burned in grates. Some veins, it is supposed, contain more solid coals; if this should be the case, the mine would prove far more profitable for the owners: but this supposition remains as yet a matter of mere conjecture.

In 1807 J. Mease visited Richmond and noted both the amount of coal being shipped and the smoke caused by its use:

---

* Within the past few years it has been discovered that the Hopi Indians in Navajo County, Arizona, used lignite circa 1300 A.D. for burning pottery, and that they were able to obtain a clear color in their ware that could not be obtained with brush fires. The coal was mined by hammers from outcrop openings, some of which can still be seen, and the tools used have been found in them. For details of this, and other mining by these Indians, see *Museum Notes*, Museum of Northern Arizona (April 1935).

In Ohio and Western New York, and perhaps a few other places, some articles have been found in Indian mounds made of cannel or splint coal. These were not for use, except as ornaments, but probably a little coal was ground for pigments.

Inexhaustible quantities of it (coal) are also found upon James River, in Virginia. The exportation of this coal to the other parts of the union, forms a considerable branch of commerce.

The city of Richmond, in Virginia, has been referred to as an example of the febrifuge operation of the smoke of coal; the febrile ailments of its inhabitants having greatly lessened, since their fires were generally made of this material.[168]

Early References to the Pittsburgh Bed

While coal was found on Coal River, then Virginia, in 1742 (ref. 76, p. 47), the earliest reference to it in the Northern Appalachian fields is on the Fry and Jefferson map (Fig. 1, in pocket), dated 1751 but prepared in 1749. Joshua Fry was a professor at William and Mary College and colonel in command of the Virginia militia, and it was because of his death that the command developed upon Major George Washington, in 1754, when the expedition against Fort Duquesne was being prepared; Peter Jefferson was the father of President Thomas Jefferson. Both Fry and Jefferson were surveyors of experience and influence and had worked on surveys of the Fairfax lands in northern Virginia, but they left no notes to show where they obtained the data to place on their map "coal" on the north side of the Potomac River, near the Savage River, in the Cumberland region. The exact location of this opening is not known, and it may have been of a lower seam than the Pittsburgh, but by reason of the great thickness of this seam here it is probable that its exposure was noticed in a steep hillside along the river, where many of the strata were plainly visible nearly 80 years later.* The Fry and Jefferson map was one of the best of the early ones and undoubtedly was the source of the data shown on the French map in 1782.†

Gist found coal in Kentucky in 1751 and also in Wood County, West Virginia (head of Tygart's Creek) in 1752‡ and left records of both in his journals. After these journeys he settled at what is now Mt. Braddock, Fayette County, and lived there for some years. His tract was on top of one of the best areas of the Pittsburgh seam, in the Connellsville region, where it outcrops on the eastern edge, but there is no record left

* A letter from Chas. Kinsey to Gen. Duff Grim, dated Wash. Dec. 18, 1835 attached to the charters of the Union Potomac Co. and the Union Co. says after passing the mouth of Savage R., on the Va. side, four coal seams are exposed in a near-by perpendicular mountain, this point being known as Brandt's mines.

† Ref. 76, p. 55; also in ref. 258, **30,** 178, an article entitled The Settlement of the Valley, by C. E. Kemper, Staunton, Va., a footnote says: "One of the most interesting documents in the records of Augusta County, Va. is the entry book of Thomas Lewis, County Surveyor from 1744–48, now in the office of the present County Surveyor. This record contains 320 pages . . . The location of some of the forts in the French and Indian War are shown, and deposits of coal and iron, stone quarries are also located." The writer had this reference checked, but two searchers were unable to find any such mention of coal.

‡ Darlington thinks this location is correct. It is impossible to locate it by the courses and distances given, which, of course, are only approximate. There is no coal of any value in this neighborhood, but some thin seams are found.

showing that he or any of those making Braddock's road, which crosses the outcrop in several places, ever found any coal. It is inconceivable that such keen observers as these pioneers never saw any evidence of such a thick seam in western Pennsylvania, and one must conclude that the paucity of such records is not due to lack of discovery but rather to the fact that these men were doers, and not primarily writers; when Gist was traveling for someone else he recorded such things, but there was no necessity for doing it later, when "on his own."

Lewis Evans published his map of the middle colonies in 1755 (Fig. 2, in pocket), on which he showed three coal openings in West Virginia and Kentucky and also in two places in Ohio, but nothing to indicate that any exposures of the Pittsburgh seam were known. Most of his data must have been furnished by traders, and the knowledge of any such openings cannot have been extensive. In the first edition of the analysis of this map, which was published with it in 1755, he makes the following comments about the Ohio River:

> Licking Creek . . . has Plenty of Coals.†
> Kiskiminetas . . . has Coal† and Salt.
> Muskingum, though so wide extended in its Branches, spreads all in most excellent Land, abounding in good Springs and Conveniencies, particularly adopted for Settlements remote from marine Navigation, as Coal, Clay and Freestone. In 1748 a Coal Mine, opposite Lamenshikola Mouth, took Fire, and kept burning above a Twelvemonth, where great Quantities are still left.
> Ohio is naturally furnished with Salt, Coal, Limestone, Grindstone, Millstone, Clay for Glass-houses and Pottery, which are of vast advantage to an Inland Country, and well deserving the Notice I take of them in the map.[82]

The map prepared by W. Scull, dated 1770 (Fig. 3, in pocket), is the first one to show coal in Pennsylvania; it is indicated in two localities in the anthracite region and also at Pittsburgh.

In 1776, T. Pownall, M. P., late Governor of Massachusetts Bay and South Carolina, published "A Topographical Description of such parts of North America as are contained in the Map" (Evans) and said:

> . . . on the East side of the Mountains, next the European Settlements, there are some,* but very few, and those thin Beds of Coal; There are some Brackish Licks or Springs, but no Salt Springs. On the West Side, both these abound everywhere.

Within the last two years several references to coal in western Pennsylvania, earlier than any previously known, have been found. Early in 1758, a young Quaker trader, James Kenny, set out from Philadelphia to establish himself in Pittsburgh. He stayed with Christopher Gist at his home and made the following entry in his journal: "1758–4th mo. 25th. Proceed'd today to a Bottom upon Redstone Creek, about 9 miles from Guest's place. In this Bottom grows plenty of Clover, & I found some pieces of Stone Coal that burns well" (ref. 193, **37,** 418). This

* One at the Falls of James River (ref. 212, p. 28).
† Not Pittsburgh seam.

place is close to where the Pittsburgh bed dips under that stream, and this is the first known reference to this bed in Pennsylvania.

About a year later, Col. Hugh Mercer, then in command at Pittsburgh, made a report to Colonel Bouquet, dated 24th April, 1759, in which he said:

> Excellent coal and limestones, contiguous to each other, have been lately discovered within a mile of the Monongahela, almost opposite to Pittsburgh. The conveyance to the River easy, just now, for Packhorses. It is probable that Tarr may be made here, and one of the soldiers, understanding the method, it shall be attempted immediately.*

Both of these references are earlier than that of Col. Jas. Burd to his finding coal on Redstone Creek and Coal Run (ref. 76, p. 50).

The location of the opening mentioned by Mercer was on the north side of Sawmill Run about a mile from its mouth, and on the south side of Coal Hill, now Mt. Washington. James Kenny, who had made a trip to Philadelphia and returned to Pittsburgh, visited this opening May 27, 1761, and took coal from it on Oct. 15, 1761. On this return journey he was accompanied by the distinguished botanist, John Bartram, and they visited the opening Sept. 16, 1761.†

This opening probably supplied all the coal used in the fort until at least some time after this date, as it is not likely that Kenny and Bartram would have failed to go to an opening nearer the town had one been made

---

* Lily Lee Nixon; "Col. Jas. Burd in the Campaign of 1759." The letter referred to has not been published, but photostat copies are available in Lib. of Congress and Western Penna. Hist. Society.[271]

† Journal of James Kenny (ref. 137, p. 6): "1761, 5 mo. 27th—I & my brother & two other Men went to see ye Coal Pit on land in ye Mountain Side over ye Monongahela; ye Mountain is so high & Steep that its with Care & difficulty people gets up to it, but its easy got, as ye bank of it being dug away a Piece, its level ground from ye Cole & ye Cole is in a bank fronting like a upright Wall in ye Hill side they put it into bags and *tumbles* them down ye hill." p. 20—9 mo. 16th—Bartram desirous that he & I should go out by ourselves, we did another Day going to ye Saw Mill & up ye Run from thence ye South of ye Monongahela Mountain in order to go to ye French Lime Kiln and ye Coal Mine which lay on a Branch of ye Sd. Run, but we keeping ye Main Run it lead us some miles wrong to ye South." p. 25 "10 mo. 15th. About this time I went to get Coal over ye Mountain South Side of ye Monongahela about 1¼ Miles from ye sd. River with four men and 3 horses carried them in bags to ye River and brot home at night in a flat boat 40 Bushels fine Coal being dug out before. I killed a Turkey."

Such a keen observer and recorder as John Bartram was not likely to leave such an occasion as this without a reference to it; the writer found on investigation that he had written an account of his journey to the western end of the state and had sent it to his friend Peter Collinson, in London, for publication, as he had attended to printing two earlier journals. Collinson acknowledged its receipt, but it was never published and none of the collections of Americana in this country has any knowledge of such a journal, and the British Museum has no copy of it. It has apparently vanished, unless it may turn up in the papers of Peter Collinson or his descendants.

then. Major Ward made an opening just opposite the point, probably in 1762, although Hutchins said it was done in 1760 (ref. 76, p. 50). Craig evidently obtained his information from Hutchins' notes.* This was on the north side of Coal Hill, now Mt. Washington, and from this beginning the development spread upstream and became the tremendous traffic it now is, one of the largest freight movements in the world.

Continuously after that, coal was used in the town for its principal fuel, although wood was still plentiful, and with the possible exception of Richmond, Va., for a short time, the city at the "forks of the Ohio" was the largest user of coal on this continent for many years, certainly during three generations. The comments of many travelers are available in the journals they have left; some were those of keen observers realizing the value of such a fuel supply, but many were only interested because of the novelty of the fuel and of the smoke it made.

The title of "Smoky City" was early bestowed upon the struggling town and we can all testify to its lasting qualities. Until in the late 1790's most of the coal was used for domestic and possibly smithing purposes; after the new century came in, manufacturing began and the volume of coal used for that purpose rapidly increased.

In 1766 the Rev. Charles Beatty, with his companion, the Reverend Duffield, probably the first two Presbyterian ministers to preach in Pittsburgh, arrived there, and on Monday, Sept. 8:

> In the afternoon we crossed the Mocconghehela River accompanied by two gentlemen, and went up the hill opposite the fort, by a very difficult ascent, in order to take a view of that part of it more particularly from which the garrison is supplied with coals, which is not far from the top. A fire being made by the workmen not far from the place where they dug the coal, and left burning when they went away, by the small dust communicated itself to the body of the coals and set it on fire, and has now been burning almost a twelve month entirely under ground, for the space of twenty yards or more along the face of the hill or rock, the way the vein of coal extends, the smoke ascending up through the chinks of the rocks. The earth in some places is so warm, that we could hardly bear to stand upon it; at one place where the smoke came up we opened a hole in the earth till it was so hot as to burn paper thrown into it; the steam that came out was so strong of sulphur that we could scarce bear it. We found pieces of matter there, some of which appeared to be sulphur, others nitre, and some a mixture of both. If these strata be large in this mountain it may become a volcano. The smoke arising out of this mountain appears to be much greater in rainy weather than at any other times. The fire has already undermined some part of the mountain, so that great fragments of it, and trees with their roots are fallen down its face. On

* "Farewell to Pgh. and the Mountains," by Rev. John Wrenshall. Footnote. The author here refers particularly to *Coal Hill* which acquired its name from the fact that in 1760, Major Ward opened the first coal pit west of the Allegheny Mountains, near the summit of the hill. Major Ward was the same person, who as Ensign Edward Ward, surrendered the unfinished fort in the "Forks of the Ohio" to Contrecoeur, April 17, 1754. The coal was sent down a chute into flats, and thus conveyed to the fort. This pit was long known as "Wards Pit." (Note by Isaac Craig.) (Ref. 193, **9**, 94.)

the top of the mountain is a very rich soil covered with a fine verdure, and has a very easy slope on the other side, so that it may be easily cultivated.[19]

The proprietors of Pennsylvania, the descendants of William Penn, were cognizant of the presence of coal early and on Jan. 6, 1769, John Penn directed the Surveyor General "to cause to be surveyed for our use the quantity of Five Thousand Acres of Land about Pittsburgh to include the Fort and the Cole Mine opposite or nearly opposite the Fort on the other side of the River.* This patent, or manor, included Coal Hill, which was laid out in lots and opened for development in 1784.

In 1766, Capt. Harry Gordon, Chief Engineer of North America, made an expedition from army headquarters to Pittsburgh, thence down the Ohio and Mississippi to the Gulf. He was accompanied by Lt. Thos. Hutchins, but the journal of the trip makes no reference to coal anywhere.†

That the presence of coal in Westmoreland County was known at this time is shown in the permit issued for some land near Ligonier, which was granted by Arthur St. Clair to Frederick Rorer:

By Arthur St. Clair, late Lieut. in his Majesty's Sixtieth Regt. of foot, having the care of his Majesty's fort at Ligonier.

I have given permission to Frederick Rorer to cultivate a certain Piece of Land in the neighborhood of Fort Ligonier, over a certain creek, which empties itself into the Loyal Hanning, known by the name of the Coal Pitt Creek, supposed to contain two hundred acres he, the said Frederick Rorer, being willing to submit to all orders of the Commander in Chief, the commanding officer of the District, and of the Garrison. Given under my hand at Ligonier this 11th day of April, 1767.‡

Ar. St. Clair. (Ref. 83, p. 37.)

Washington, in 1770, used some coal at Crawford's—now Connellsville (ref. 76, p. 51).

Whether the fire Beatty mentioned lasted for years is not known, but again in 1771, a fire is mentioned in the following entry from the Diary of David McClure (page 101):

1772 Oct. 14th—We crossed the Monongahela, and ascended the top of the hill, opposite Pittsburgh, to take a view of the effects of the fire on its top, which has been burning more than 12 months. The fire among the coal has formed a basin or crater, 60 or 70 yards in circumference, and killed the trees and herbage some distance around. As I sat near the edge, I perceived the ground warm, and forcing a staff through the surface, there appeared to be a cavity, and the staff came out black and smoking. Should the fire continue a Volcano may be formed of the sulphurious coal. Some uneffectual efforts have been made to extinguish it.

The volcano was not formed because the fire was soon afterward extinguished by the caving in of the earth about it.

---

* Copy of warrant and ref. 76, p. 51.

† Mereness[97] includes Capt. Gordon's journal, which is not well known.

‡ A careful search of the records in Carlisle, Bedford and Greensburg failed to find any references to coal before the formation of Washington County in 1781, either in the conveyances or in names of streams.

David Jones made several visits to the Indians, passing through Western Pennsylvania. In his Journals of Two Visits to Indians, he said (page 44):

1773, Jan. 1., This country has its excellence as well as some seeming disadvantages, among which the great abundance of stonecoal may be reckoned as one advantage, especially in process of time. The black smiths about Redstone use none other in their shops, and find it answers their purposes well.

Redstone was the early name for Brownsville, which at that time was about as large as Pittsburgh, and at least until about 1790 did about as much business.

During the Revolution coal undoubtedly was mined from Coal Hill for the garrison, although evidently not under the best conditions. Soon after Brig. Gen. William Irvine assumed command in 1781, he issued the following order at Fort Pitt, Dec. 12, 1781:

The several corps will provide coal and wood for themselves in such manner as the commandants may think best; the coal pit to be occupied by turns day and day about, at first, till all have some days' supply; afterwards, each three days to be determined by lot who shall have the first day for the present in this business. The artillery and the Pennsylvania detachment will work together and Capt. Livergood's company with Col. Gibson's regiment. Each will supply the blacksmiths, armorers, and the general's family in rotation, with such quantities as Mr. (Samuel) Sample shall direct, who will also assign boats and teams in due proportion as the case will admit.

The general requests the officers to make such arrangements as (that) the men will be kept as short time as possible on fatigue in each tour and never to exceed two days. Boatmen, carters and colliers who have skill in the business may render it necessary to keep them constantly in the employ. The general flatters himself there will be no more cause of complaint for want of these articles (of fuel). If the troops should hereafter suffer, he hopes they will attribute it to the real cause (indolence), which he will not charge them with without good evidence. (Ref. 38, p. 86.)

In 1783, S. A. Hermelin, a Swedish engineer, said: "Coal mines have also been worked for several years near Pittsburg." (Mines in the United States, 45.)

Some years later a distinguished Virginian, Arthur Lee, visited Pittsburgh, and made some caustic comments about the town and its people. His comment about the coal (Dec. 17, 1784) is as follows:

The banks of the Monongahela on the west, or opposite side of Pittsburgh, are steep close to the water and about two hundred yards high. About a third of the way from the top is a vein of coal, above one of the rocks. The coal is burnt in the town and considered very good. The property of this and of the town is in the Penns. They have lotted out the face of the hill at thirty pounds a lot, to dig coal as far in as the perpendicular falling from the summit of the bank. (Ref. 143, **2**, 384.)

No reference is made elsewhere to this kind of a sale. The deeds to these lots do not mention coal in any way, and nothing about "the summit of the bank," although the back line of these lots was on the top of the hill. The north face of Coal Hill, from about opposite the point to

In 1796 the French government sent Victor Collot, an engineer, to America to make a survey of the Ohio and Mississippi Rivers, possibly with a view to military operations from Louisiana. He was a keen observer and left a map of Pittsburgh (Fig. 4) that shows the first actual locations of the workings along Coal Hill. He was much impressed with the tremendous possibilities of the Ohio Valley and made the following comments about Pittsburgh:

This town, when the Indian frontier is thrown back, and the roads are rendered practicable, will certainly become one of the first inland cities of the United States.

The general aspect of the country is delightful; two chains of festooned mountain line the opposite banks of the river of the Alleganies, and that of the Monongahela, stretching towards those of the Ohio. If at their junction the Allegheny river did not form an acute angle, which, by its projection, intercepts the magnificient prospective of the Ohio, the situation of Pittsburgh at this spot would perhaps be one of the most picturesque on the continent.

A rich vein of coal is found on the summit of one of the mountains which bounds the Ohio on the left. The quality of this coal is equal to the best kind in England; the mine is open, and the coal so cheap, and forming such excellent fuel, that although the inhabitants live in the midst of forests, they prefer it to their best wood. It costs less than four-pence sterling a bushel.

It is remarkable, that notwithstanding the difficulty and high price of the carriage of merchandise, this town has made little effort to establish manufactures, even for articles of the first necessity; these are still drawn from Philadelphia or Baltimore, and obtained at exorbitant prices.

The carriage of an hundred weight from Philadelphia to Baltimore is from eight to ten dollars, and from Baltimore seven or eight; notwithstanding this difference, two wagons come from Philadelphia to Pittsburgh against one from Baltimore.

A few iron mines have lately been worked on the Monongahelea where coppers, cauldrons, country ovens, pots, and other utensils of the like kind are cast; the price of which is from forty-three to forty-five pounds per cwt. Pennsylvania currency; making from one hundred and fourteen to one hundred and twenty dollars. (Ref. 51, **1**, 38, 39.)

The commission sent out to determine the boundary of the United States stopped at Pittsburgh in 1796 and Andrew Ellicott made some measurements of water temperatures:

Oct. 6, 1796.—On the 6th, found the water in the Allegheny river 68°; that in the Monongahela 64°; and a few paces within the coal-pit, the temperature was 51° (ref. 77, p. 6).

Lieutenant Robbins, who settled at what is now Robbins Station on the Youghiogheny River, about nine miles above McKeesport, at the edge of Westmoreland County, opened a coal pit there in 1796; and the first glass plant built in Pittsburgh in 1797, by General O'Hara and Major Craig, on the south side, at the point, obtained its fuel supply from Coal Hill, just back of it (ref. 246, p. 122).

Francis Baily, a fellow of the Royal Society, visiting Pittsburgh in 1796, was much impressed by the abundance of coal, as well as iron in this area:

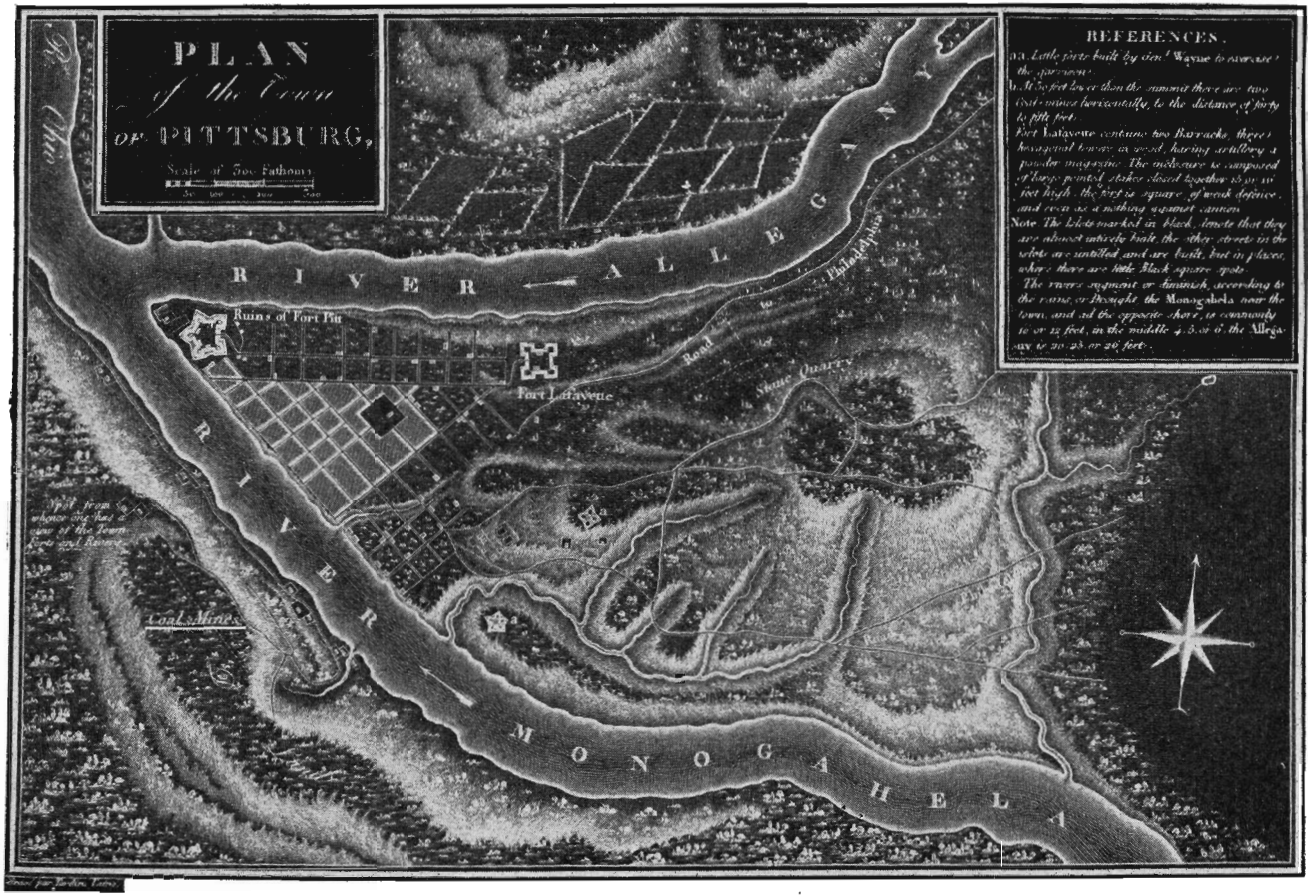


FIG. 4.—PLAN OF THE TOWN OF PITTSBURGH.
(From Collot: A Journey in North America, 1796.)

Nov. 1796. There is a great quantity of iron near this place, which is brought down the Monongahela River, and as to coal, it abounds very much all over the western country, and lies so near the surface of the ground that the wagon wheels often cut into it on the roads; it is of an excellent quality, and extends for some hundred miles over the country. The inhabitants lay it in at about 3½ d. sterling per bushel.[15]

In 1797, Capt. Gilbert Imlay, who had served in the Revolution and was the commissioner for laying out lands in the Back Settlements, passed through Pittsburgh to Kentucky and wrote:

This whole country abounds in coal, which lies almost upon the surface of the ground: the hills opposite Pittsburgh, upon the banks of the Monongahela, which are at least three hundred feet high, appear to be one solid body of this mineral.

I have already mentioned the coal mines in the upper parts of the Ohio Country; besides which there are great quantities of coal upon the upper branches of the Mississippi. It is particularly favorable that this mineral lies at the heads of our larger rivers, as it can be sent down with the greatest facility; and it is very certain that the great body of it, which the Ohio country alone contains, is equal to answer all the purposes for which it may be wanted throughout this extensive empire.

Muskingum, though so wide extended in its branches, spreads all in most excellent land, abounding in good springs and conveniences, particularly adapted for settlements remote from marine navigation, as coal, clay and freestone. In 1748 a coal mine, opposite Lamenshikala mouth, took fire and kept burning above a twelvemonth, where great quantities are still left. (Ref. 126, pp. 24, 136, 117.)

An interesting view of the conditions of business in several of the small towns west of the mountains in 1792 is given in an article published in *American Museum:*

The Towns of Washington, Pittsburg, Bedford, and Huntington, in Pennsylvania (the nearest of which is 150 miles from a seaport) exhibit the strongest proofs that manufactures are the best support of the interior landed interests, and are necessary at once to the accomodation and prosperity of the cultivators of the middle and western country. The following table (on p. 17) contains an account of the population of those villages, which is not exagerated.

It appears from this table, that in those county towns (or seats of justice) in the interior and western parts of Pennsylvania, the necessity for manufactures has occasioned a little congregation of artizans, in the proportion of twenty-seven parts in one hundred, of the whole village in the smallest instance, and in the proportion of thirty-seven parts in one hundred, in the largest. The town of Washington, which is the most remote, and is beyond the Ohio, has been created since the late war. Its distance is about 300 miles west of Philadelphia. The variety of its manufactures is striking, and it may be safely affirmed, that at the seats of justice, in the counties of Delaware, Bucks, Chester and Montgomery, which are nearest to Philadelphia, as great a number of manufactures, in proportion to their respective population, does not exist, though the family manufacturers are more considerable in these, and though they have numerous tanneries, iron works, powder mills, paper mills, blacksmiths, hatters, shoemakers, weavers, and other valuable workmen, in their villages and scattered throughout their populous townships. This, however, is the case, in some degree, likewise in the townships of the western scene above described. (Ref. 107, **8**, 223.)

Mechanical Branches	Wash.	Pitts.	Bed.	Hunt.
Clock and Watch makers	1	1	0	0
Silversmiths	1	0	0	1
Coopers	1	2	1	0
Skin dressers and Breeches makers	1	1	0	0
Tanners and Curriers	1	2	1	0
Tailors	2	0	2	3
Cabinet Makers	2	4	0	2
Blacksmiths	2	5	3	4
Shoemakers	2	5	2	4
Hatters	2	2	1	2
Dyers	1	0	0	0
Weavers	2	2	0	2
Reed-makers	1	0	0	0
Saddlers	1	3	2	2
Saddle Tree Makers	1	0	0	0
Spinning Wheel Makers	1	0	0	0
Nailers	1	0	1	0
Malsters and Brewers	1	1	0	0
Potters	1	0	0	0
Tinners	1	2	0	0
Distillers	3	0	1	0
Wheelrights	0	3	1	2
Stocking Weavers	0	1	0	1
Gunsmiths	3	0	0	0
Rope Makers	0	1	0	0
Whitesmiths	0	2	0	0
Total of manufacturers	32	37	15	23
Total families	*	130	40	85

* The population of Washington is unknown, but it is less than that of Pittsburg.

John Bernard, an Englishman, came to Pittsburgh in 1800 and was impressed by the difference in its appearance as contrasted with that of other towns:

> On approaching Pittsburg, we were struck with a peculiarity nowhere else to be observed in the States; a cloud of smoke hung over it in an exceedingly clear sky, recalling to me many choking recollections of London. Instead of wood they here use coal, mines of which are plentiful in the neighborhood. (Ref. 21, p. 182.)

Shortly afterward a French visitor, Perrin du Lac, passed through the city on his way to Louisiana, and noticed the use of coal:

> The coal-pits are numerous and abundant in the environs of Pittsburg, and the coal is of such a good quality, that the inhabitants burn it in preference to wood, which is considerably cheaper (ref. 75, p. 37).

The effect of labor costs in the choice of coal or wood for fuel is seen in the remark of the younger Michaux in 1802:

Before reaching Greensburgh, a mile from the town, and on the edge of a deep ravine, I observed unequivocal indications of a mine or pit-coal. I learnt both at Greensburgh and Pittsburgh that this substance is so common and so easily procured, that several of the inhabitants burn it for cheapness. This does not arise from a deficiency of wood; but labor is so very dear, that there is not a landholder at Pittsburgh who would not sell a cord of wood for half the price which coals would cost, if the purchaser would go a mile to fell the trees, and bring them home. (Ref. 172, p. 64.)

In the following year one T. M. Harris made a tour west of the mountains. He noticed the occurrence of coal in several places as he rode along:

On Laurel Hill, and the mountains westward of that, the fossil coal (Lithanthrox) abounds, and lies so near the surface that it is discoverable in the gullies of the road, and among the roots of trees that have been overturned by the wind (ref. 102, p. 25).

The whole region abounds in coal, which lies almost on the surface (p. 29). The banks of the river opposite to Pittsburg, and on each side for some distance, or rather the high hills whose feet it laves, appear to be one entire body of coal. This is of great advantage to that flourishing town, for it supplies all their fires, and enables them to reserve their timber and wood for ship building and the use of mechanicks (ref. 102, p. 31).

Speaking of the water supply at Pittsburgh, he says:

But the spring water, issuing through fissures in the hills, which are only masses of coal, is so impregnated with bituminous and sulphurous particles as to be frequently nauseous to the taste and prejudicial to the health (ref. 102, p. 45).

In passing through Ohio, he noticed: "There is abundance of pit-coal (Lithanthrox) in every part of the state" (p. 103).

The first coal was exported from Pittsburgh in 1803. Before this several ships had been built here, loaded with grain, etc. and sent down the Ohio, but the "Louisiana" carried 350 tons of coal down the river to the Gulf and thence to Philadelphia, where the coal brought 37½ cents a bushel, or $9.37 per ton.

Both Cuming (ref. 76, p. 52) and Schultz in 1807 commented on the smokiness of the town. The latter said:

Sept. 9, 1807—The town of Pittsburg is abundantly supplied with fuel, having inexhaustible mines of coal in its vicinity, which, from the cheapness of labour, are delivered at the houses for six cents a bushel. It is conjectured that not less than five thousand five hundred chaldrons* are consumed annually by the town and factories. The first entry into Pittsburg is not equally agreeable to every person, as the sulphurous vapour arising from the burning of coal is immediately perceptible; a few days residence will, however, in a great measure, accustom you to this inconvenience. (Ref. 231, p. 126.)

In 1808 Zadock Cramer published "The Navigator," which described the navigation of the Monongahela and the Ohio Rivers; in 1811 and 1814 other editions were published. None of these mentions any coal mines on the Monongahela in the description of that river and the towns along it; but the early edition (page 17) said of the upper Ohio:

* A chaldron was 36 bushels or 1.44 net tons.

The hills on both sides of the Ohio, as low as Grave Creek, below Wheeling, are filled with excellent coal. Below this, coal grows scarce, and what is found is not of so good quality. Coal has been boated down from Grave Creek to Marietta and Limestone, where it sold for 25 cents per bushel. Even at this high price, it is not a very advantageous article of trade.

In 1809, one Joshua Gilpin, of Philadelphia, made a tour to the western part of the state. He was evidently familiar with manufacturing and business conditions and his remarks are interesting. He stayed in Somerset Sept. 22, and noted that coal was generally used there as fuel, and in crossing Laurel Ridge the following day that "there are a number of veins of Limestone—Iron & Coal—and in general this hill has the appearance of being rich in minerals." After reaching Connellsville on Sept. 24, he:

walked to John Gibson's abt. 1½ miles below the town & found his house an elegant freestone one, built abt. 100 feet from the brink of the river, which is here a precipice of about 50 feet fringed with wood. One of the first objects which attracted our attention was his coal bank from whence he draws the coal for his works & we immediately proceeded to view it descending the precipice by a road little less than perpendicular—the river here forming a sweep has laid open its Banks almost with the nicety of a chizzle—this bank as I have said before is about 50 feet high—the strata on the water is entirely of coal laid open like the side of a house abt. 10 feet in heighth—& still deeper below the level of the stream—they have therefore only to dig directly into the Bank & to throw the coal into boats—in order however to go methodically to work & to prevent the upper part of the precipice from tumbling over them, they carry caves or shafts directly into the Bed of coal leaving between each cave a large space for support—8 or 10 of these caves are thus formed which they have preferred to carry them so deep into the hill as to have the coals to wheel any distance—outside of the caves is a small bank between them and the water which serves as a kind of landing to approach with the boats—the heighth of the coal being about 10 feet above the river—about 8 feet is worked which leaves a sufficient descent from the floor of the caves for the water to run off & not so near the roof as to take bad coal—above the coal is several feet of a mixed kind of bad coal & iron abounding in Sulphur & in vitriol effloresceing in white & yellow flowers & chrystyals: above this is a stratum of rich iron stone some inches thick—as the precipice was difficult to reascend a boat was ordered in which we embarked from the coal caves & were soon landed at the hills near the house below—a more interesting spectacle of a colliery I certainly never saw—Coal abounds in the same manner in numerous places above and below the town which is supplied with it at 4 cents p bushel delivered at the door & wood at $1 per cord—Iron is found in very thin veins all over the country but seldom in large masses except on the mountains or their spurrs—there seems no doubt but the chestnut ridge & Laurel hill which immediately skirt this country & cross the Youghiogheny just above the town abount in minerals especially Iron & they have this advantage that for a long distance back these mountains compose a district of so poor a soil that will probably be kept in woods & afford a vast supply for many years to come.[96]

After visiting Uniontown and Brownsville he reached Pittsburgh and devoted some time to a study of its situation and of its probable future:

The last circumstance in favor of manufacture of this country, is the existence of mineral substances in such abundance, and to be acquired with a degree ease unrivalled

perhaps in any other country—coal the bases of almost every manufacture is here the spontaneous gift of nature in every place and in astonishing nearness where it can be applied—it is so universally diffused over all the country, westward of the Allegheny mountain that no mineral, vegetable, or animal substance can be furnished in any place where coal is not to be had on the spot or so near it as to bring the manufacturer depending upon it into immediate operation—the high bank of the river opposite Pittsburgh exhibits on its surface open today & immediately bordering on the river a stratum of coal of the first quality 14 feet thick—horizontal in its position—& of an extent, which can scarcely be traced—this stratum lies sufficiently above the river to be secure from freshes, but is with little labor thrown into boats which approach within a few yards & in many places immediately beneath the stratum itself it is thus taken from the drift of tunnells, put into boats, landed at Pittsburgh on the opposite shore and carted to the houses there for 5 cents per bushel—and at the coal bank itself, manufactures are formed, where it does not cost more than the mere labor of throwing it a few yards from the pit to the furnace—the land under which this coal exists is of the finest quality & tho its being immediately on the river & opposite the town renders it highly valuable—the monopoly of its advantages are prevented by the knowledge that every hill around the town & over a vast expanse of country contains the same treasure attainable at a very moderate increase of expence.[96]

John Melish, an Englishman, in 1810 came over the mountains and on Aug. 14:

After passing several branches of the Yoxhiogeni river; the principal of which is Sewickley Creek; and seven miles from thence we reached Greensburg, passing in our way a salt spring, and a coal mine, the first I had seen in the United States.

After describing the manufactures of Pittsburgh, he said: "and there is an everlasting supply of coal in the hills all around the town." (Ref. 169, p. 60.)

Mills Day left a journal of his travel to Ohio and return by way of Pittsburgh in 1810. He left this comment about Western Pennsylvania:

June 19. As I proceeded toward Pittsburg, (from Washington and Canonsburg) the country grew more populous. The hills appeared to consist of strata of freestone, iron, coal and slate. June 20. Its (Pittsburg's) water communication with a vast extent of country and the immense beds of coal in its immediate vicinity render it a place peculiarly adapted to manufactures. Coal may be obtained of a good quality, ready delivered at 5 cents a bushel.[69]

In 1811, "The Navigator" speaks of a steam grist mill put in operation in 1809:

The water of the boilers are heated by large fires made of stone coal, which is introduced at one end into a grated fire place as long as the cylinders themselves; the quantity of coal consumed daily by these boilers is said to be about twenty bushels, which cost one dollar.

Later it mentions the effect of burning coal:

On entering the town the stranger is rather offended with its dark and heavy appearance. This arises from the smoke of the coal, which is used as the common fuel; and of which about 250,000 bushels are consumed annually. It costs about six cents a bushel at your door, and is said to be equal to any in the world. Our rough

hills are filled with it, and our rooms in winter feel the effects of its warmth, and cheerfulness. Wood as an article of fuel costs 2 dollars a cord delivered—The abundance and cheapness of coal will be peculiarly advantageous to Pittsburgh in her progress in arts and manufactures. Coal Hill, on the south side of the Monongahela, abounds in coal; and a pit in it is said to have taken fire about the year 1765, and continued burning for 8 years; and another pit on Pike run, which burned 10 years. This is a high and steep hill, and its top affords a handsome prospect of the town and rivers below it.

From the immense quantity of coal burnt, there arises a cloud of smoke which hangs over the town in a body, and may be seen at two or three miles distance; when in the town, this cloud of smoke is not discovered, and the place soon becomes familiar to the eye, while the ear is occupied with the mixed sounds of the implements of industry from 5 o'clock in the morning till 9 at night. (Ref. 56, pp. 57, 68, 69.)

The 1814 edition of "The Navigator" tells more at length of the production of coal in a few paragraphs entitled "Coal Banks":

This place has long been celebrated for its coal banks, and both as to quantity and quality it is not exceeded by any part of America, or perhaps of the world. It is in fact, in general use in all private houses, and in the extensive manufacturies established through the town. . . . Coal is found in all the hills around this place, for ten miles at least, and in such abundance that it may almost be considered the substratum of the whole country. The mines or pits which supply the town, are not further than from one to three miles distant, between the rivers; until within a few years, no coals were brought across the Monongahela, but since the price has been advanced from the increased demand, a considerable supply is now obtained from that quarter. Little short of a million of bushels are now consumed annually; the price formerly six cents has now risen to twelve cents, keeping pace with the increased price of provisions, labor, etc. Several of the manufacturings have coal pits at their very door, such as those under Coal hill, which saves the expense of transportation. The coal pits on the side of the Coal hill are about one third from the top, which is about on a level with the stratum on the opposite side of the river. There are forty or fifty pits opened, including those on both sides of the river. They are worked into the hill horizontally, the coal is wheeled to the mouth of the pit in a wheelbarrow, thrown upon a platform, and from thence loaded into wagons. After digging in some distance, rooms are formed on each side, pillars being left at intervals to support the roof. The coal is in the first instance separated in solid masses, the veins being generally, from six to eight feet in thickness, and is afterwards, broken into smaller pieces for the purpose of transportation. A laborer is able to dig upwards of one hundred bushels per day. It is supposed, and perhaps with good reason, that the main or principal stratum, lies considerably deeper, as in the English colleries; but the quantity so near the surface of the earth, will for a long time render it unnecessary to look for it at greater depth. Fuel, that indispensable necessary of life, is so cheap here, that the poorest rarely suffer for the want of it. We do not witness, near Pittsburgh, that pitiable spectacle, the feeble infancy, and decrepit age of the unfortunate poor, suffering in a cold winter day, for a little fire to warm their meagre and chilly blood,—we do not see them shivering over a few lighted splinters, or pieces of bark gleaned from the highways or torn from the fences in the skirts of town.

As every blessing has its attendant evil, the stone coal is productive of considerable inconvenience from the smoke which overhangs the town and descends in fine dust, which blackens every object; even snow can scarcely be called white in Pittsburgh. The persons and dress of the inhabitants, in the interior of the houses as well as the exterior, experience its effects. The tall steeple of the court house, was once painted

white but alas! how changed. Yet all this might be prevented by some additional expense on the construction of the chimneys. In the English manufacturing towns a fine is imposed upon those who do not consume their smoke. Incalculable would be the advantage to this place, could such a regulation be adopted. The advantage of cleanliness, and even health, not to mention the improvement in the azure of the sky, and in the light of the sun and moon, ought surely to rouse the public spirit of the inhabitants. (Ref. 56, pp. 108, 109.)

An Englishman, H. B. Fearon, made the following notes about coal during his visit in October 1817:

Pittsburgh—its exhaustless possession of that first-rate material for manufacturies, coal . . . coal 4d per bushel.

In the coal hills which I have visited, the mineral is found in a horizontal position, lying at present above level. It is worked by adits or openings into the side of the hills, which draw off the water. The stream being boarded over, the coal is wheeled out in barrows, and tripped from an overhanging stage into one horse waggons. The waggons are without wheels, and the horses, if blind, are preferred, the hills being so steep, that in case of the least start, nothing can save them from destruction. Labourers earn in the coal excavations 31s. 6d. to 36s. per week. (Ref. 86, pp. 199–203.)

In November 1817, speaking of the vicinity of Cincinnati:

Limestone abounds; coal and iron have not yet been discovered except in the eastern part of the state (ref. 86, p. 219).

Another Englishman, James Flint, visited Pittsburgh in 1818, and notes as follows the coal around the town, later some on Beaver Creek and also in Ohio below Moundsville, W. Va.:

Sept., 1818. Between the rivers, there is a ridge of about 300 feet high, which terminates with a gentle slope in the most inland part of the town. This is the hill that a florid exaggerator has described as a solid mass of coal. The description was unnecessary, as the coal field in which the hills of Pittsburg lie, may be considered as the most extensive that are known, altho the only bed here is no more than four and a half feet thick. The strata being horizontal, and the out-burst of the coal about the middle-steep of the hill, it is not necessary to make shafts, as it is level free, and may be quarried and carried out in wheel barrows, like road metal. (Ref. 91, p. 83.)

(His description was of Minersville and Herron Hill, and does not refer to Coal Hill as most other travelers do.)

Oct. 26, 1818. Went up Beaver Creek. Within three miles of its mouth there are three saw-mills, a grist-mill, an iron furnace and forge, a fulling-mill, a carding mill, and a mill for bruising flax-seed. At the iron furnace, cast goods are fabricated, the coarsest that I have ever seen. Coal is abundant, but not used in reducing the ores.

Nov. 5, 1818. On the right-hand side of the river, and about four miles below Grave Creek, a bed of coal is wrought. It lies in a horizontal position, and under high water mark. Boats take in lading close by the mouth of the mine. (Ref. 91, pp. 95, 107.)

It is strange that in several directories, almanacs and other publications in which are given lists of the various industries carried on, printed

at intervals between 1817 and 1835, not a single mention is made of coal mining, nor are coal operators listed as such. There were many banks opened then, of course, but evidently they were considered as adjuncts to other and more important industries, and not deemed of enough importance for separate classification.

Thomas Nuttall passed through Pittsburgh en route to Arkansas in 1818. He noticed obvious indications of coal between Ligonier and Greensburg and arrived in the city Oct. 15, where "smoke, bustle and filth appeared to predominate." He commented on the importance of the openings on Coal Hill, on the economy of the settlement and the "very good quality" of the coal. On the way down the Ohio he saw coal again at Wheeling.

> Oct. 26th. This evening we arrived at Wheeling—At the northern extremity of the town is a very productive bed of coal, and equally horizontal with that at Pittsburgh; its thickness is about six feet, and as it occurs beneath the limestone it must of course be considered as a second bed. Oct. 27th. Today I again observed a bed of coal in the bank of the Ohio, worked beneath the limestone, situated nearly opposite to Little Grave Creek. Ten or twelve miles further, the same coal bed still bassets out from beneath the calcarious rock, and so near to the present low level of the river as not to admit of being worked at any other state of water. (Ref. 179, pp. 42, 46.)

About this same time, one Estwick Evans, on a walking tour through the eastern United States, stopped in Pittsburgh. His remarks about coal are interesting but not enlightening:

> There are also a considerable number of buildings on the opposite side of the Monongahela. Immediately back of these buildings there is a ridge of very high and steep hills, which contain inexhaustible coal mines. Some coal mines exist also in the Alleghany hills, and in the banks of the Ohio. Those on the west of the Monongahela, constitute a horizontal strata six inches thick and apparently unlimited in its direction through the mountains. This coal is superior to that of England: it is heavier, and contains a greater quantity of the bituminous quality. The general price of this article at Pittsburgh is about six cents a bushel.
>
> Owing to the exclusive use of coal here, both by the manufacturer and by private families, the whole town presents a smoky appearance. Even the complexion of the people is affected by this cause. (Ref. 81, p. 248.)

John S. Wright, journeying from Saratoga County, New York, to Illinois was much impressed as he came down the Allegheny to Pittsburgh:

> Dec. 3, 1818. Nature has been uncommonly bountiful in her gifts. She has provided an inexhaustible supply of stone coal, iron ore of the first quality, etc. Coal constitutes the principal article of their fuel and it is exported in great quantities to towns below, and is made use of in their steamboats and in all their great manufacturies which are propelled by steam. (Ref. 44, p. 155.)

Edwin James passed through western Pennsylvania to join Major Long's expedition to the Rocky Mountains early in 1819, and, of course, noticed the coal:

Laurel ridge, the next in succession—near the summit of this ridge, coal beds have been explored, and, at the time of our visit, (April, 1819) coals were sold at the pits for ten cents per bushel. . . . The coal formation, containing the beds which have long been wrought near Pittsburgh, appears to be of great extent; but we are unable particularly to point out its limits towards the north and east. (Ref. 128, pp. 53, 57.)

Thomas Hulme, an Englishman, visited the section in the spring of 1819 and saw the mines at both Pittsburgh and Wheeling. His comparison of the relative earnings of miners here with those in England is interesting:

Pittsburgh, June 4th and 5th, 1819. After showing us through his extensive and well conducted glass works, he rowed us across the Monongahela to see the mines from which the fine coals we had seen burning were brought. These coals are taken out from the side of a steep hill, very near to the river, and brought from thence and laid down in any part of the town for 7 cents the bushel, weighing perhaps 80 lb. Better coals I never saw.

June 8th. Came to Wheeling at about 12 o'clock. Fine coals here, and at Steubenville.

July 28th. Mr. Graham took us likewise to see the fine coal mines near this place (Wheeling) and the beds of limestone and freestone, none of which I had time to examine as we passed Wheeling in our ark. All these treasures lie very convenient to the river. The coals are principally in one long ridge, about ten feet wide; much the same as they are in Pittsburgh, in point of quality and situation. They cost 3 cents per bushel to be got out from the mine. This price, as nearly as I can calculate, enables the American collier to earn upon an average, double the number of cents for the same labor that the collier in England, can earn; so that as the American collier can, upon an average, buy his flour for one third of the price that the English collier pays for his flour, he receives six times the quantity of flour for the same labour. (Ref. 122, pp. 37, 77.)

Another Englishman, Adlard Welby, about the same time, remarked on the prevalence of coal here and in Ohio:

Aug. 22nd, 1819. At Washington, Pensilvania, eight miles west of Canonsburg. The land about Canonsburg to this place—; it abounds in coal, lime and iron; the first only two cents per bushel at the pit, and laid down at the door for two more. Oct. 25th—In passing through Ohio, the Derbyshire of the United States, we found in the sitting-rooms coal fires used almost generally in preference to wood; but from an extraordinary prejudice, which even exists at Philadelphia, and other places, wood is still used for the purpose of cookery, and they will not believe that a dinner can be dressed properly at a coal fire. (Ref. 264, p. 201.)

W. Faux, also from England, realized the future prospects of the city, when he visited it early in 1820:

Jan. 21st. Reached Pittsburgh. It is most eligibly situated amidst rocks, or rather hills of coal, stone, and iron, the coals lying up to the surface, ready for use. One of these hills, or coal banks, has been long on fire, and resembles a volcano. Bountiful nature has done everything for this rising Birmingham of America.

22nd. Left Pittsburgh for Greensburgh. The hills and mountains seem full of coal-mines and stone quarries, or rather banks of coal and stone ever open gratuitously to all. The people about here are economical and intelligent; qualities characteristic of Pennsylvania. (Ref. 85, p. 19.)

A few months later, April 25, 1821, George W. Ogden, in "Letters from the West," commented on the unpleasant and smoky appearance of the town, which he thought had affected the complexions of the people and said that the price of coal in town then was from four to six cents per bushel; the abundance of coal "in ten or twelve of the surrounding counties" impressed him. (Ref. 180, pp. 27, 28.)

An Italian, Beltrami, visited this section in 1823, and said about it:

April 20, 1823. Pittsburg, whence the trade of the Delta, of the Monongahela and of the Alleghany, extends to all points, and where the abundance and cheapness of coal greatly facilitates manufactures. (Ref. 20, **2**, 69.)

That complaints about the smoke were made in that day can be concluded from an argument advanced by Dr. William H. Denny, on the "Salubrity of Pittsburgh," in Cramer's almanack, 1827:

The abundance, cheapness, and consequent general and even profuse use of the best fuel, is certainly one great cause of our superior healthfulness. The low fevers so prevalent in the large cities, among the poor, during a hard winter, and the ague so common in wet seasons, in the eastern counties of the state, where wood is scarce, are here in a great degree avoided by the universal practice of keeping good coal fires late in the spring, and early in the autumn, and indeed at all seasons when the weather is damp or inclement. (Ref. 57, p. 62.)

The good doctor had no doubt of the advantage of such a fine fuel, even though it made smoke.

A titled visitor, Prince Maximilian of Wied, was here in 1832, and made the following comment:

Oct. 1832. Coal mines in the immediate neighborhood (a part of which is now on fire), afford an ample supply of fuel for the numerous steam engines, stoves, etc., steam engines are employed, of which, as we were told, there are above 100 at work, which are likewise made here. (Ref. 162, p. 138.)

Early References to Pittsburgh Bed in Virginia, now West Virginia

In Virginia—now West Virginia—the first coal from the Pittsburgh seam was probably mined near the mouth of Grave Creek, now Moundsville, where the coal was nearly at the surface of the river. Cramer said[56] in 1808 that coal had been boated from Grave Creek to Marietta and Limestone—now Maysville, and that even then the trade was not profitable. It is likely that it began earlier than 1806. (Ref. 6, p. 297.)

Near Wheeling, where the bed is higher in the hill, mining began a few years later. The West Virginia Geological Survey, Ohio, Brooke & Hancock Cos. 1906, says:

Before the year 1810 all the coal used in Wheeling was brought down the river in boats from Pipe Creek, on the north side of the Ohio, and its use was almost entirely for blacksmithing purposes. About this time Conrad Cotts, a miner, came to Wheeling from Pittsburg and opened a mine, which he operated for five years, when it caved

and was not reopened, but other mines were opened and the coal industry at Wheeling gradually increased.

The only other place in the state available to river transportation was Mason County, south of the Little Kanawha River. There are no records of the first mining here, but in 1860 there was produced in this county about 130,000 tons.

We know that coal was mined and used locally in and around Clarksburg, Fairmont and Morgantown, because its use is mentioned in early records, but without any details. In general, with the exceptions noted, the development of the Pittsburgh seam in the present state of West Virginia occurred almost entirely after railroad transportation became available. Niles *Register* for April 1833 (**44,** 113) says:

> Immense quantities of first quality bituminous coal is found near Clarksburg, Virginia. It is so easily obtained that it sells for little more than two cents per bushel, delivered in that town.

Early References to Pittsbrugh Bed in Maryland

While the Pittsburgh seam was seen near Cumberland before it was seen at Pittsburgh, its development in Maryland occurred later. Coal was discovered near the present site of Frostburg by a Mr. Riser in 1804 (ref. 48, p. 167). Various openings were made and small amounts of coal were taken out, but it was about twenty years later before any shipments were made. In 1825 flat boats were loaded at Cumberland, and when the stage of water permitted they were floated down the Potomac to Georgetown. At first only 300 bushels (12 tons) was loaded into a boat, but as experience was gained the load was increased to 1500 bushels (60 tons). (Ref. 147, p 311.)

Scharf records (ref. 228, **2,** 1434) that on April 20, 1826: "three or four bateaux arrived in Washington D. C. laden with coal from the rich mines near Cumberland, on the Potomac. It sold 20 cents cheaper than the Richmond coal, and was of better quality."

S. W. Pomeroy, formerly of Boston, but then owner of the Pomeroy, Ohio, field, who passed that way in November 1831, said that "coal was then being mined on Great Savage Mt. and being hauled 10 miles to Cumberland and put on flat boats there." (Ref. 7, 1831, p. 343.)

While coal could be transported on the river only at high water, and at best the business was risky both to life and boats, it was so done until the completion of the Baltimore and Ohio Railroad to Cumberland in 1842, since such time shipments have been continuous and records of annual output are available. Scharf states that:

> from fifty to sixty boats, carrying in the aggregate about seventy-five thousand bushels (3000 tons) of coal, was the average shipment per year on the river by freshets, prior to the completion of the B & O RR. and the C & O canal to Cumberland (ref. 228, **2,** 1435).

That this estimate was conservative is shown by the following statement in Niles *Register*, Aug. 31, 1833, page 5:

> Potomac Coal Trade. Cumberland Md. Aug. 6. This important branch of our trade has from the time of its commencement been regularly increasing. Not many years since only a boat load or two of coal found its way to the eastern market; now upwards of 300,000 bushels are annually sent down the Potomac. The freshets since February last have already furnished the means of despatching about 250,000 bushels, so that the quantity for the present year will be much beyond that of former years. A market for this coal is readily found along the river between this place and Harper's Ferry; a boat load now and then finds its way below the falls to Georgetown and other markets, but the demand even on this side is far greater than the means of supply. The annual income from this trade is estimated at about 75,000 dollars. Although this is a very small business, when compared with that of other coal regions, it nevertheless is very considerable when reference is had to the immense difficulties to be overcome in the navigation of the river, which presents now the great and only obstacle to bringing this coal, superior in quality to any in the United States, into market. We may anticipate, therefore, when a cheap and easy way is opened with the Atlantic seaboard, by the completion of the Chesapeake and Ohio canal, that the coal trade of Cumberland will become the most important in the country.

The river shipment, because of its danger and expense, stopped on the completion of the railroad, which was followed a few years later by that of the canal.

Early References to Coal in Ohio

Comment has already been made that coal was shown in Ohio on the early maps (Figs. 2 and 3 in pocket) before it was in Pennsylvania; all of the early references and developments, except a few along the Ohio River, were on lower seams than the Pittsburgh.

In 1785 a survey party started to lay off the first seven ranges in the state, the starting point being on the north bank of the Ohio River at a point "due north from the western termination of a line run as the southern boundary of the state of Pennsylvania . . . West of this point, about 2.8 miles 'Stoney Brook' " was passed with "large pieces of excellent Coal washed by the Rains from the Neighboring Hills" in it (ref. 120, **3,** 136). This is now called California Hollow, just back of East Liverpool; the coal was from a lower seam.

In 1787 a pamphlet was written for the agents of the Scioto Co., in France, to help them sell lands in Ohio. Of the Hockhocking River, it said: "we find also, very frequently in the neighborhood of this river, coal mines and salt springs, which abount in this Western country." Of the Muskingum River it mentioned "the excellent springs, the salt wells, the mines of coal, particularly that of Lamenchicola." (Ref. 181, **3,** 84, 98; ref. 81, 9.)

John Bradbury was one of the early travelers in the interior, and in writing about Ohio said:

All that is known of this country is confined, as regards useful articles, to coal, salt, iron, lead, and nitre. From the numerous and general indications and the known existence of coal, it may be presumed to be very abundant. Coal is actually found at Pittsburgh, at Zanesville, on Green River, in the Illinois, and in the western territories. It is uniformly bituminous, and highly charged with that substance. In all these instances it has manifested itself on the surface of the earth, and indicates almost inexhaustible beds. (Ref. 32, p. 309.)

Mills Day, in his description of Ohio, said of Zanesville, June 9, 1810:

Iron ore and coal are found in any requisite quantity near the town. A furnace and forge are already erected on Licking Creek near the mouth. Coal is so easily obtained that the inhabitants of the town use it altogether for fuel notwithstanding the supply of timber in the neighborhood. (Ref. 69, **2.**)

Manasseh Cutler in 1812 spoke of the coal along the Muskingum River and in Marietta, where it was being sold for about three cents a bushel, and was "much preferred by the inhabitants for fuel, when wood can be purchased at one dollar per cord." At Zanesville coal abounded and was nearly as cheap as at Marietta. (Ref. 64, p. 22 at seq.)

In its description of Ohio, "The Emigrant's Guide, 1818" (pp. 68 et seq.) speaks of coal in Jackson and Muskingum Counties and in the Connecticut Reserve, that Harrison County abounds "with coal mines, freestone, limestone, etc.," and that Monroe County had "coal mines and iron ore on Sunfish Creek," but has no other references to coal.

The *Ohio Gazeteer*, published by John Kilbourne in 1821, mentioned the abundance of coal in Athens, Columbiana, Jackson and Muskingum counties, but makes no other reference to it.

About 1830 mining began in the Pittsburgh seam on McMahon's Creek, Bellaire, in Belmont County, shipments being by river, of course.*

In 1838, Caleb Atwater published his "History of Ohio"; he fully realized the value it would be to the state as he said:

Coal occurs in nearly every county east of the Scioto river, in our hilly region, but is most abundant in Gallia, Lawrence, Meigs, Scioto, Athens, Hocking, Washington, Morgan, Muskingum, Perry, Licking, Coshocton, Guernsey, Belmont, Monroe, Jefferson, Harrison, Carroll, Columbiana, and Tuscarawas counties. It is found in Portage county, near the Cuyahoga river.

It burns easily, with a whitish flame, yielding a black smoke, and a bituminous odour. Its color is black, and it soils the fingers, when touched. Sometimes, it is combined with sulphur and iron. Some beds, especially, in Licking and Guernsey counties resemble, in appearance and distinctive characters the canel coal of England.

This coal is almost always found in strata, and there are three such strata, extending from Zanesville, to Wheeling, in Virginia. There is one stratum near the surface;—secondly, another stratum, a considerable depth below it, and a third one, about two hundred feet below the upper one. The upper stratum, in some places is washed away, being near the surface. It is a thin one;—the second one is thicker and better, and the lower stratum is not so good for fuel, as the two strata above it.

---

* Ref. 186, Belmont County, 322.

On the whole, we may safely conclude, that we have coal enough, and more than enough, to last forever, for all the uses to which, we shall put it, in all ages, yet to come. The coal, iron ore, and salt water, are all abundant in the same region. They form materials sufficient, to support and sustain millions of industrious, healthful, happy human beings, so long as man shall dwell on this earth.

These three articles furnish sources of wealth, of health and happiness, that will endure, and become, more and more valuable and useful, forever.[13]

Coal from the Pittsburgh seam in the Pomeroy field was first shipped by river about 1833.

While coal had been mined for local use since the start of the century, as already shown, and some shipments had been made on the Ohio River, the real development of mining in Ohio began in 1828 with the completion of the canal from Cleveland to Akron, when coal from Talmadge, in Summit County, where it was opened by stripping in 1810, was hauled to the canal and shipped to the lake port. The canal reached Masillon in 1833 and shipments from that field began then.

In the very early days of the state a decided prejudice against the use of coal existed in the salt industry, and in 1810 the legislature "offered a rebate of the rent to any of the salt workers of the state who would introduce the use of coal." The use of coal grew steadily with the growth of the iron industry, both in the northern and southern parts of the state, and while the first use of raw bituminous coal in a blast furnace was made in Mercer County, Pennsylvania, in 1845, many furnaces in Ohio used raw coal from the free burning, splint or "Massillon block coal," usually from No. 1 seam, for many years with good success. (Ref. 273, pp. 3, 7.)

Shipments by lake began from Cleveland in 1837 (ref. 183, p. 12) and until 1845, when shipments began from Erie, coal dealers in Cleveland had a monopoly of this business. Lake steamers began using coal for fuel in 1843, and in 1845 it finally supplanted wood for cargo fuel. Toledo, Sandusky and Ashtabula did not begin coal shipments until 1872.[273]

There were no railroads built to the coal areas in Ohio before 1852, so that all shipments prior to that time were either by the Ohio River or by the canal built between Cleveland and Portsmouth. This canal was completed to Summit County, near Akron, in 1828 and the first coal, 30 tons, was delivered to Cleveland that year, being mined from one of the lower seams. By 1830 the shipments had increased to 5100 tons (ref. 244, p. 61). This canal was entirely west of the Pittsburgh coal area, and all coal carried on it came from seams below the No. 8. A branch from this canal reached Nelsonville, in the Hocking field in 1840, and the first coal from the Hocking Valley to Columbus was delivered in that year.

The first railroad mine was opened in Ohio, in 1858, about one mile west of Bellaire, and about ten years later the second one was opened at Franklin Station, 8 miles west of Bellaire (ref. 185, p. 13).

Fig. 5 (in pocket) shows the dates at which the various railroads serving the area in which the Pittsburgh bed were completed and explains the slowness of the development of the seam in Ohio, as compared with the neighboring states.

River Transportation

It is not the intention to give here a detailed history of the shipping industry on the Monongahela and Ohio Rivers, as this has been well done by Hulbert,[120] Leahy[141] and Ambler.[6] As all shipments of Pittsburgh coal prior to 1853 were by river, it is necessary, however, to touch upon it briefly. Shipments were made from the Monongahela down the Ohio by keelboat as early as 1800, and the voyage of the "Louisiana," loaded with coal, from Pittsburgh to Philadelphia in 1803 has been mentioned. While this voyage was about 3700 miles, even longer ones were later made by coal going to the head of the Missouri River. Local shipments were made continuously, both around Pittsburgh and Wheeling prior to 1810. In 1806, Giles and others were carrying coal in flat boats from mines in Meigs County, Ohio to Cincinnati (ref. 6, pp. 297, 298). Tom Jones is credited with the first shipment in flat boats from a Coal Hill pit to Maysville, Ky., in 1817 (ref. 246, p. 123), but Reno floated coal from Pittsburgh to Louisville for foundry use in 1815 and about this same time a number of others took up the business. Shipments from Pomeroy down river were regular in 1819, and a shipment was made from Pittsburgh to Louisiana in 1829. (Ref. 6, pp. 297, 298.)

It must be remembered that all of the traffic on the Monongahela until the locks and dams were completed in 1844, and on the Ohio for many years later, depended upon the stage of the river, and that frequently months elapsed between times of sufficient water for navigation.

In fact, the movement of coal on the Ohio River from the Pittsburgh district southbound below Wheeling had almost, or quite, ceased, before the locks and dams on that stream were completed so as to afford a 9-ft. channel to Cairo. Of the early years, few data about tonnages remain, but in 1818 a merchant of Cincinnati estimated that the amount of coal then used on the Ohio River between Pomeroy and the falls (Louisville) was as follows:[186]

	Bushels	Tons
Cincinnati	44,000	1760
Maysville	30,000	1200
Louisville	30,000	1200
Dean steam mill, 100 miles below Cincinnati	12,000	480
	116,000	4640

All of the available data of river shipments are shown in Table 2 (in pocket). (For comment on Table 2, see Appendix A.) The column of

total river shipments shows the total tonnage moved on the Monongahela River, while the column headed "exported" shows the tonnages moving below Pittsburgh. In later years the tonnages were not separated, but only the total movement recorded. Table 3 shows the total tonnage moved on the Monongahela River from the establishment of the locks and dams in 1845.

TABLE 3.—*Coal Shipments on Monongahela River from Establishment of Locks and Dams*

Year Calendar	Coal Net Tons	Year Calendar	Coal Net Tons
1845	164,207	1892	3,896,749
47	365,605	93	3,671,692
48	392,774	94	4,661,612
49	386,340	95	4,195,436
1850	491,916	96	5,716,392
51	500,649	Fiscal	
52	565,233	1896	5,729,110
53	626,654	99	6,344,060
54	663,277	1900	5,233,110
55	693,277	01	5,959,726
56	343,363	02	7,990,245
57	1,156,943	03	10,007,626
58	1,027,666	04	6,052,642
59	1,131,466	05	7,796,676
1860	1,517,909	06	9,474,666
61	643,626	07	9,917,236
62	643,357	Calendar	
63	1,057,760	1908	8,197,490
64	1,402,636	09	9,746,326
65	1,440,761	1910	9,472,635
66	1,704,212	11	9,207,232
67	1,202,906	12	9,943,333
68	1,612,040	13	10,335,585
69	2,100,504	14	8,637,331
1870	2,303,856	15	10,016,588
71	1,944,562	16	10,391,708
72	2,191,220	17	12,300,097
73	2,331,079	18	12,932,764
74	2,712,648	19	14,630,409
75	2,546,300	1920	20,717,535
76	2,739,240	21	13,834,667
77	3,179,236	22	11,606,146
78	3,073,010	23	18,344,470
79	2,623,520	24	14,134,636
1880	3,575,086	25	15,531,836
81	3,801,414	26	17,408,774
82	4,246,732	27	16,010,669
83	4,495,615	28	19,405,454
84	3,266,274	29	21,124,594
85	3,436,924	1930	19,022,849
86	4,523,965	31	11,997,300
87	3,156,516	32	6,743,857
88	4,632,596	33	9,724,624
89	3,246,500	34	11,509,677
1890	4,722,444	35	14,286,166
91	4,296,766	36	

Prior to 1897, data are from reports of Monongahela Navigation Co.
1898 to 1923, Inc., data are from U. S. Engineers Office, Pgh. Pa.
1924 to 1936, Inc., data are from U. S. Bureau of Mines.

After the formation of the Monongahela River Cons. C. & C. Co., in 1899, the river business became largely concentrated in its hands, and passed to those of the Pittsburgh Coal Co., when it absorbed the Monongahela company in 1907. The development of the Alabama mines and of transportation on the Warrior River in that state and along the coast

line to Lake Pontchartrain and New Orleans increased competition at that point, and after a tremendous loss caused by a storm on the lower river in 1915 Pittsburgh shippers gave up the lower river business and the movement of Pittsburgh-seam coal below points near Wheeling ceased in 1916; now the river movement of coal, while much greater in tonnage than ever before, is confined to coal moving to plants along the streams or for reshipment to points near Youngstown.

For about a century this movement of coal from mines above Pittsburgh to New Orleans, a distance of about 1900 miles, was made at rates not exceeding $2.25 per net ton. Considering the character of the streams used, its intermittent nature because of water stages, and the one-way traffic, this was truly a remarkable performance, and probably the cheapest long-distance traffic movement ever seen in the world.

Growth of Industry and Mining Methods

The early mines, or pits, were all small, probably for some years not much more than openings driven under cover some distance, and it is likely that only the lump coal was used, or at least that much of the slack was left, as one of the early mine fires was caused by "fine coal communicating an outside fire to the body of the coals."[19] The coal was taken out by barrows or hand carts and either dumped on the ground to be loaded into wagons later, or dumped from the barrows directly into wagons beneath the opening. Later, at most of the pits, inclines were built down the hillsides to the river tipples and the coal was dumped into cars at the top of the inclines. For many years dogs were used to help the miners pull these hand carts, the miner taking his place between the shafts, the dog in the lead, harnessed to the cart. It is recorded that Michael Dravo, in his mine near McKeesport, about 1838, substituted horse power for the underground movement of coal with the present system of tracks and mine cars, and that this example was soon followed by all other mines.*

No records have been left showing an accurate list of the number of mines in operation at any time, but from casual references the following list has been compiled of the mines near Pittsburgh (U. S. Census Rept, 1865, **3**):

Year	Mines
1759	1
1762	2
1837	35 to 40
1859	64
1864	103

In 1859 Thurston published a List of Coal Works of the Monongahela and Youghiogheny Valleys, with some notes on capacity, cost, ownership, etc., from which the following data were compiled:

* Ref. 151, Pittsburgh, 625.

TABLE 4.—*Coal Works of the Monongahela and Youghiogheny Valleys*, 1859

River	Number of Plants	Men Employed	Annual Output		Shipped Net Tons to			
			Bushels	Net Tons	New Orleans	Cincinnati	Louisville	Pittsburgh
Youghiogheny	14	660[a]	5,450,000[c]	218,000	58,000[e]	5,000	53,000	
Monongahela	50	1,889[b]	23,140,000[d]	925,600	173,000[f]	120,000	151,000	62,000
	64	2,549	28,590,000	1,143,600	231,000	125,000	204,000	62,000

[a] Three not reporting.
[b] Seventeen not reporting.
[c] One not reporting.
[d] Twenty-two not reporting.
[e] Six not reporting distribution of shipments.
[f] Thirty-six not reporting distribution of shipments.

Lists were published at various times, especially in 1803, 1808, 1812, 1817 and 1836, showing articles manufactured in Pittsburgh, with sometimes lists of "master workmen" in each particular line of business; 55 articles of manufacture were listed in 1803 and 77 classes of workmen were mentioned in 1808, but in no one of these lists is there a single reference to coal or to coal miners or operators,[247] evidently the mines were considered only as adjuncts to other businesses and not as a separate industry.

Fig. 6 (in pocket) shows the dates of opening of the early mines along the Monongahela and Youghiogheny Rivers.

EXTENT, THICKNESS AND QUALITY OF SEAM

Fig. 7 (in pocket) shows the entire extent of the Pittsburgh seam. In each township or district the average thickness of the coal is shown, as "c105," and where the information was available the total number and thickness of the partings is shown, as "2P5." These thicknesses were figured from all available published data in both State and U. S. Geological Survey reports; in the earlier reports the thicknesses of partings are not usually given, and in many cases no measurements of the total seam are given, but only of the section being mined. No roof coal is included anywhere, and the sections generally are nearer the thickness usually mined than the total seam thickness, so that the seam thickness may be as much as 12 in. more, in the thick coal areas, than the measurement given. Most of the early Pennsylvania Survey reports do not give detailed sections, but as many of these areas have been completely mined out, no better data will ever be available.

The greatest thickness of the bed was in its easternmost part in the Georges Creek field, where district averages of 121 and 135 in. are shown. Much greater thicknesses than these were found here; several of 240 in. in swamps are reported and in several mines near Frostburg the writer saw heights of 168 and 192 in. The next thickest area was in the Connellsville

Basin, extending from Latrobe to south of Uniontown. Data are not plentiful here, but the average thickness mined in this entire area was nearly 108 in. All of Fayette, Westmoreland and Greene Counties in Pennsylvania have thick coal, and the same condition exists in Taylor, Barbour, Monongalia, Marion and Harrison Counties in northern West Virginia. Elsewhere the coal thins considerably and in the southern West Virginia areas and the western parts of Ohio it is too thin for commercial mining.

In the early days geologists assumed that the seam extended below water level over the entire area between its eastern and western outcrops. Dr. I. C. White many years ago warned that oil drilling indicated that this was not so, and within the past 25 years it has been definitely proved that in large areas in both West Virginia and Ohio, where the bed could be expected, it did not exist at all. In spite of this fact, the remaining area is probably the largest one known of any single mineral deposit.

Where found, the mining conditions are remarkably uniform. In Greene County, Pennsylvania, near the river some "want" areas, where the seam has been entirely, or almost entirely, washed out, have been found; these rarely exceed a few acres in extent and their total area, as known now, is not more than 1200 acres. Clay veins, vertical intrusions filled with clay or rock varying in thickness from a few inches to several feet, are frequent in some areas, but their total extent is trifling compared with the total seam area.

The immediate roof over the seam is a rather tender slate, called "draw slate," varying from a few inches to as much as 8 ft. thick. Where the seam is thick, top coal is left to protect this roof, but where less than 6½ ft. of coal is found this slate must always be handled in headings and in most places in rooms, at a considerable cost. In some comparatively small areas the roof over the seam is sandstone, making splendid mining conditions but usually at the expense of the chemical quality of the coal. In some areas the top rider coal is within 12 to 18 in. of the top of the seam proper, and occasionally the draw slate is taken down and some of the rider coal recovered; while high in ash, it can be used in local power plants.

The bottom under the coal is usually a rather fine fire clay, which disintegrates in the presence of moisture and becomes soft; in some places the coal rests directly upon limestone and in others upon slate.

The seam is multiple bedded and where normal in thickness always carries two slate partings a few inches apart about the middle of the seam. These partings vary from ⅛ in. to several inches in thickness, usually from ½ to 1 in. In the early days they were usually mined with the coal unless too thick, but now, with demand for increasingly high quality, they are either picked out by hand or removed in cleaning plants at the mines producing the better coals. In the southern part of the Ohio area this character of the seam changes and a heavy slate parting divides the

seam into two benches. The local conditions and sections are described in the various state geological reports.

The average analysis of the coal in each township or district is shown on Fig. 7 (in pocket), all on as-received basis. The volatile matter is the top figure, ash is next, sulphur third, British thermal units next, and the ash-softening temperature, where available, last. These analyses include all published ones whose location could be identified, *and are of face and not shipped samples.* The sampling, over such a long period, as well as analysis methods, was not uniform, but all analyses, with the limitations given, are included. Most of the large streaks of impurities, which are or should be excluded in mining, were not included in the samples. In many areas no ash-softening temperatures are available, as this figure was not considered important until about 20 years ago, and in every instance the average for this item is based on a much smaller number of analyses than any of the others. There are more analyses available from West Virginia than from other sections.

The volatile content of the seam changes its classification from a low-volatile coal in the Cumberland and Meyersdale districts to a medium-volatile one in the Ligonier area and a high-volatile coal in by far the greater part of its area, the variation being from 19.3 to 42.4 per cent in Athens County, Ohio. In the Connellsville district, where its coking reputation was established, the volatile varied from 30.8 to 33.1 per cent; west of the Monongahela River, in only one township is it less than 34 per cent. The volatile matter increases constantly toward the west. The arithmetical averages for the various counties and states are shown in Table 5 (in pocket).

There is no such constant change in any of the other constituents shown, with the possible exception of the ash-softening temperature. Not enough data are available to make a definite statement about this feature, but those shown indicate that north of the Mason and Dixon line and an extension of it westward to the Ohio River the ash-softening temperature decreases toward the westward, and is lowest along the Ohio River; west of that it either increases slightly or remains about the same. Much more analytical work must be done before this can be definitely established or the reason for it be found.

Ash varies considerably from place to place. The averages for counties and states are shown in Table 5. The lowest average is for Derry township, 3.5 per cent, and the highest for Burrell township, 13.4 per cent, both in Westmoreland County, Pennsylvania. These extremes are probably due to paucity of sampling in these areas, as very little of the Pittsburgh seam is less than 5 per cent ash or more than 10 per cent.

Variations in sulphur are similar to those of ash, the extremes being 0.7 per cent in Derry township, Westmoreland County, Pennsylvania

and 4.8 per cent in Kirkwood and Somerset townships, Belmont County, Ohio. Generally speaking, it averages lowest in Westmoreland and Fayette Counties, Pennsylvania, although some districts in Washington County, Pennsylvania and Marion County, West Virginia, are equally low. Its amount in different parts of the seam varies widely, and in most of the mines producing average low-sulphur coal it is possible to find streaks several inches in thickness between which the variation in sulphur content is greater than the variations between the maximum and minimum district averages noted.

In general, the heating value is lower in the western part of the deposit than in the eastern, on an as-received basis, but the change is not constant. On a moisture-and-ash-free basis, this relation might be changed and a constant decrease toward the westward be shown, but not sufficient data are available to decide this.

The amount of phosphorus in coal is important in various phases of steelmaking and for many years the limit of this element in metallurgical coal was 0.015 per cent. During recent years this has been raised to 0.018 per cent. The same statement may be made about phosphorus as about sulphur; that is, its variation in different parts of the seam in the same mine is usually more than that between districts. In many mines the top or bottom coal, and in some cases both, are left in to eliminate both sulphur and phosphorus.

The variations in analyses of 27 commercial mines in the Pittsburgh district are shown in Table 6, all on a moisture-and-ash-free basis, the samples being of composite raw coal, excluding the bands and the coal between them.

TABLE 6.—*Analyses of Coal in Pittsburgh District*[a]
MOISTURE-AND-ASH-FREE BASIS

Volatile Matter			British Thermal Units			Ash-fusion Temperature, Deg. F.			Ash, Per Cent			Sulphur, Per Cent			Total Height of Seam, In.		
Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
36.2	43.5	39.4	14,935	15,455	15,220	2,220	2,645	2,380	5.4	11.9	7.5	0.90	3.05	1.55	61.5	92.2	73 0

[a] From 27 commercial mines.

The variations between benches of various groups of mines in the Pittsburgh district are shown on Fig. 8. The sections shown on Fig. 9 of the top bench of 27 mines in the Pittsburgh district show clearly that the variation in thickness of the seam is caused largely by a decrease in the thickness of the top bench. The roof coal is practically constant in

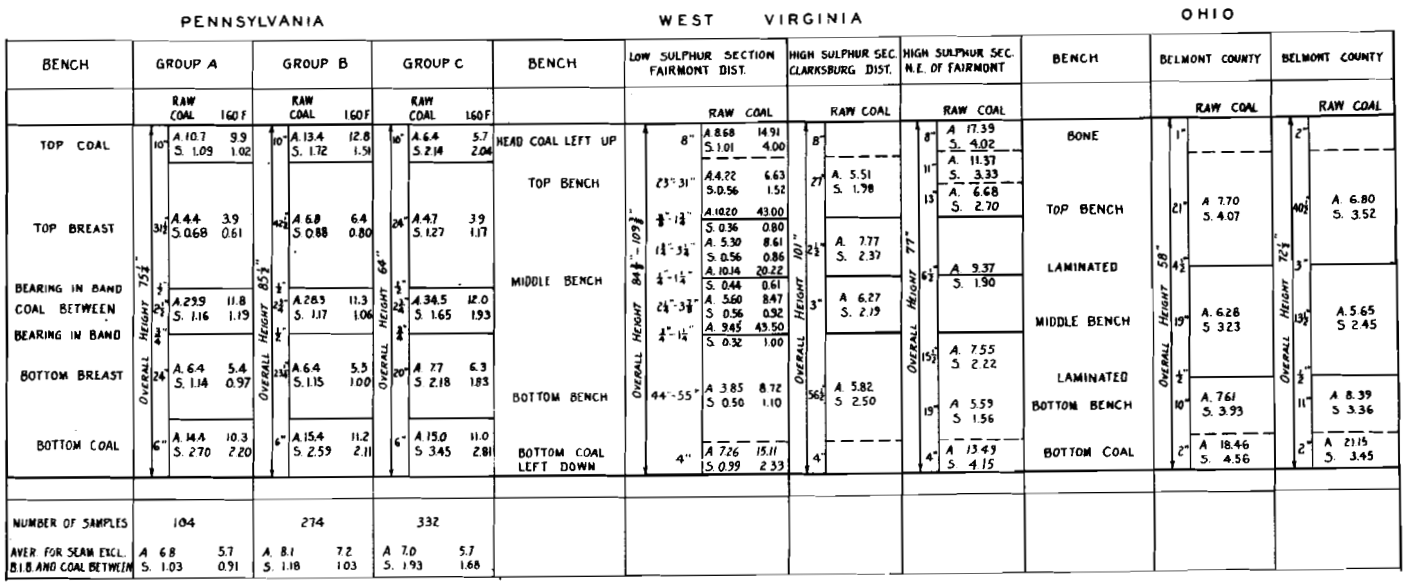


FIG. 8.—VARIATIONS BETWEEN BENCHES, PITTSBURGH COAL BED.

thickness and the maximum variation in the bottom bench is only 4 in., while that in the top breast is 25 inches.

The variations mentioned may seem large to the casual reader—and producers know that to some buyers they are even more than this—but in view of the enormous area covered by this deposit and the tremendous quantity of it laid down originally, it is remarkable that its quality is so uniform. Many coal seams can show much greater consistency in some qualities than the Pittsburgh, but considering quality, thickness and mining conditions together, few mineral deposits of any kind, anywhere, can rank with it.

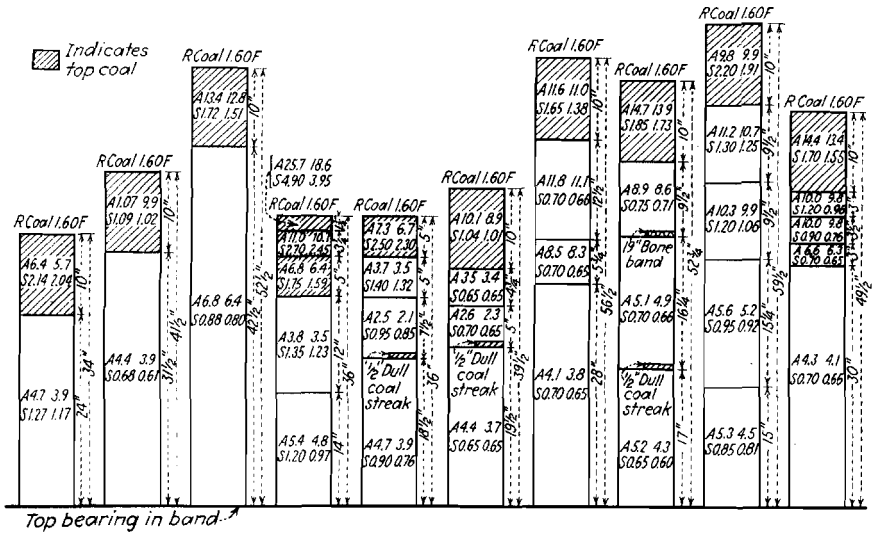


FIG. 9.—VARIATIONS IN TOP BENCH, PITTSBURGH COAL BED, IN 27 MINES IN PITTSBURGH DISTRICT.

COAL CLEANING

Within the last 10 years cleaning coal by both dry and wet processes has become rather common at the largest plants in the Pittsburgh district, and now the district contains plants that for size and completeness are not surpassed anywhere. Several similar plants have been built in eastern Ohio and in northern West Virginia.

The erection of these plants has been criticized by some as unnecessary, and as an unwanted and additional expense to the industry in this section. Neglecting the primary facts that increasing market demands for quality and uniformity and competition with better quality, Southern coals made such plants necessary, the critics also overlooked the fact that much of the earliest coal washing in this country was done in the Pittsburgh district. In 1874 jigs were in operation at the Larimer coke plant, owned by Carnegie & Co., washing the slack coal shipped there from the

Penn and Westmoreland mines,* and in 1875 washers were in operation at Ellrod station and at two plants at Shaner station. In 1880 there were 13 plants washing coal in Allegheny, Fayette and Westmoreland counties, and an additional one was built at Latrobe in 1881. All available information about these plants is given in Table 7.[262]

TABLE 7.—*Coal-washing Plants in Pennsylvania*

Year	County	Number of Plants Having Washers	Number of Washers	Kind of Washer
1880	Allegheny	8	5	Diescher
			4	Stutz
			3	Endres
			1	Slush
	Fayette	1	1	Stutz
	Westmoreland	4	4	Hybrid
			2	Diescher
			1	Landers-4 Compartments
			1	Waverly Coal Co.

The use of these plants was gradually discontinued, and for many years, from about 1900 to 1926, little coal was washed in the entire area. In 1927, Pittsburgh Coal Company built a dry cleaner at its Montour No. 10 plant, and since then has built five more cleaning plants, and its example has been followed by other operators in the Pittsburgh and other districts.

During the period when little washing was done in the Pittsburgh-bed area, it was considered that this seam of coal could not be beneficiated enough by cleaning to pay for doing it; with better machinery and better methods, it has been possible to produce a coal having greater uniformity and lower ash and sulphur contents, the first item alone being worth the cost in metallurgical practice. With the plants now in use, in daily practice, it is possible to maintain the ash content within 0.2 per cent and sulphur within 0.05 per cent if those limits are needed. With an increased cost of cleaning, due to extra care and the necessity for making intermediate sizes, coal of almost any quality can be produced, and coal from this seam can be prepared with a limit of 4.5 per cent ash and 0.7 per cent sulphur, a quality that can be surpassed by only a very few coals in this country.

COKE

The ability of coal from the Pittsburgh bed to produce coke of excellent quality and great physical strength caused the tremendous growth of the iron industry in the Pittsburgh district after the use of

* Second Pennsylvania Geol. Survey: Rept. KK (1877); Rept. L (1875) 90.

charcoal became too expensive. Until 1836 the use of charcoal in blast furnaces in this country was universal, although the lessening of the supply of fuel was becoming felt. Some experiments with the use of coke in steelmaking and blast furnaces had been made some years previous to that date, but for various reasons its use had been abandoned. In 1837 a furnace at Lonaconing, Md., was successfully run on coke made there in open pits; indeed, no coke ovens were ever built in the coal fields of Maryland. In the same year some coke was made at Tallmadge, Ohio, and a furnace was run on half coke and half charcoal. In the

TABLE 8.—*Cleaning Plants in the Pittsburgh Coal-bed Area*

Company	Mine	Year Started	Capacity, Tons per Hr.	Size Cleaned, In.	Kind
Ohio					
Hanna Coal Co.	No. 10 Willow Grove	1935	250	−4	Link Belt Simon Carves jigs
	Dun Glen	1936	250	−4	Link Belt Simon Carves jigs
Powhatan Min. Co.	Powhatan Point	1931	300	4 to ¼	Chance cone
Pennsylvania					
Humphreys C. & C. Co.	Greensburg	1929	50	−1	American dry tables
Clinton Block Coal Co.	Imperial	1928	200	½ to 4	Hydroseparator
				½ to 0	Arms dry tables
Jones & Laughlin Steel Corp.	Aliquippa	1912	300	−¾	Foust jigs
	Hazelwood	1930	80	−¾	Baum jigs
Keystone C. & C. Co.	Salem		150		Foust jigs and Overstrom tables
Saxman C. & C. Co.	Latrobe	1927	50	¾ to 0	Pittsburgh jig
Buckeye Coal Co.	Nemacolin	1929	700	All	Rheolaveur
Carnegie-Ill. Steel Co.	Clairton	1931	800	All	Rheolaveur
Jamison C. & C. Co.	Hannastown	1931	350	−2	Peale Davis dry table and Simon Carves jig
Pittsburgh Terminal Coal Co.	Coverdale No. 8	1931	500	4½ to ⅜	Chance cone
W. J. Rainey	Clyde No. 3	1930	140	⅝ to 0	American dry table
Westmoreland Coal Co.	Hutchinson	1931	300	4 to ½	Menzies hydroseparator
Acme Coal Cleaning Co.	Avella	1933	300	4 to ¼	Chance cone
Weirton Steel Co.		1937	350	4 to 0	Baum jig
Deep Vein Conn. Coal Co.	Brier Hill	1929	200	4 to 0	Peale-Davis dry tables
Hillman Coal & Coke Co.	Naomi	1933	100	4 to 5/16	Jeffrey jig
Cannonsburg C. Co.		1929	120	4 to ⅛	Menzies hydroseparator
Lincoln Gas C. Co.	Lincoln No. 1	1928	250		Air-Peale-Davis tables
Panhandle Min. Co.	Midway				Mechanical
Washington Gas Coal Co.	Tyler				Mechanical
Pittsburgh Coal Co.	Champion No. 1	1928	700		Rheolaveur
	Champion No. 2	1936	100	4 to 1⅛	Menzies hydroseparator
	Champion No. 3	1927	300	2 to 0	Arms tables, dry
	Champion No. 4	1929	450	4 to 0	Rheolaveur
	Champion No. 5	1929	450	4 to 0	Rheolaveur
	Champion No. 6	1933	400	3½ to 0	Rheolaveur and stump tables
Westmoreland Coal Co.	Magee	1938	275	6 to ¼	Chance cone
West Virginia					
Pursglove Coal Min. Co.	No. 2 Pursglove	1937	180	6 to ½	Chance cone

east anthracite was beginning to be used, and some years later the block coal of Ohio was successfully used, although the first furnace to use this fuel was in Mercer, Pa. Coke did not come into use as furnace fuel very rapidly, and in 1849 there was not a single coke furnace operating in Pennsylvania.*

When the B. & O. R. R. was completed to Turtle Creek in 1857, and Connellsville coke was used with great success in the Clinton furnace in 1859, that famous region had its first real start, and after that its growth was phenomenal, as was of course the iron business, which depended solely on it in this section from that time, and in not many years coke almost entirely supplanted all other fuels for blast furnaces. How fortunate it was that this first trial of coke was made with the most strongly coking coal in this country, and the one that could most easily be made into coke!

Table 9 (in pocket) shows better than words can describe the wonderful growth of the coke industry in the Pittsburgh bed area in Pennsylvania and northern West Virginia as compared to that in the entire United States. Although two small plants in Ohio coked some coal from this seam, no data are available about them. Until 1914, both beehive and by-product ovens are included in this table; after that date they are reported separately and Table 10 shows the same data for the retort ovens. In 1841 there was one plant with two ovens in the entire country; in 1909 the high-water mark was established of 579 plants and 103,982 ovens. Only 27 years later the beehive plants had decreased to 71 with 13,012 ovens, and the use of coke made in them was practically confined to boom periods.

Naturally, the use of by-product ovens was slow in starting in the Pittsburgh coal area; in 1915 there were only six plants coking about 10 per cent of the coal used in these ovens. Once started, the growth was rapid and 20 years later the 19 plants carbonized nearly 40 per cent of the total coal used in by-product ovens.

The relative importance of the Pittsburgh bed area to that of the entire United States is better shown in Table 11.

Remembering that during the last 20 years many by-product plants have been established solely for gasmaking and domestic fuel supply, all of which are included in this table, although in this area little coal is carbonized for either purpose, it is indeed remarkable that a small area in northern West Virginia, southwestern Pennsylvania and eastern Ohio consumes such a large part of the coal used for coke in this country, and shows better than anything else the tremendous part this section has played, and is still playing, in the iron industry of our country. The years have disproved the old saying that the ore goes to the fuel, as many

* An interesting account of the early history of coke making and of the use of coke in furnaces is given by J. D. Weeks in the Report of the Manufacture of Coke, U. S. Census, 1880.

TABLE 10.—*Number of By-product Coke Plants and Ovens, and Coal Used, in Pittsburgh Coal Area and in United States*[a]

Year	Western Pennsylvania			Northern West Virginia			Ohio									Total Pittsburgh Bed Area			Total United States		
							Canton & Cleveland			Youngstown			Total Ohio								
	Plants	Ovens Built	Net Tons Coal Used	Plants	Ovens Built	Net Tons Coal Used	Plants	Ovens Built	Net Tons Coal Used	Plants	Ovens Built	Net Tons Coal Used	Plants	Ovens Built	Net Tons Coal Used	Plants	Ovens Built	Net Tons Coal Used	Plants	Ovens Built	Net Tons Coal Used
1895	1	60														1	60		2	72	
1896	2	75														2	75			160	
1897	3	195														3	195			280	
1898	3	195		1	60											4	255			520	
1899	3	295		1	60											4	355			1,020	
1900	3	295		1	60											4	355			1,085	
1901	3	295		1	120											4	415			1,165	
1902	3	295		1	120											4	415			1,663	
1903	4	567		1	120											5	687			1,956	
1904	4	667		1	120											5	787			2,910	
1905	4	667		1	120		1	80					1	80		6	867			3,159	
1906	4	667		1	120		1	80					1	80		6	867			3,603	
1907	4	779		1	120		1	105					1	105		6	1,004		44	3,892	7,506,174
1908	3	754		1	120		1	105					1	105		5	979		46	4,007	5,699,058
1909	3	754		1	120		1	25					1	25		5	899		51	3,989	8,390,129
1910	3	754		1	120		1	74					1	74		5	948		52	4,051	9,529,042
1911	3	754		1	120		1	74					1	74		5	948			4,624	
1912	3	754		1	120		1	74					1	74		5	948		69	5,211	14,767,543
1913	3	754		1	120		1	74		1	68		2	142		6	1,016			5,488	
1914	3	781		1	120		1	74		1	68		2	142		6	1,043			5,809	15,500,021
1915	3	794	2,049,019	1	120		1	100		1	143		2	243		6	1,157	2,049,019	48	6,036	19,554,382
1916	3	794	2,491,056	2	214		3	351	602,827	2	347	1,337,758	5	698	1,940,585	10	1,706	4,431,641		6,607	26,524,502
1917	3	794	2,516,433	2	214		3	351	1,883,796	3	431	2,520,027	6	782	4,403,823	11	1,790	6,920,256	61	7,298	31,505,759
1918	4	1,524	3,516,050	2	214	851,684	4	531	2,737,188	3	533	2,992,778	7	1,064	5,729,966	13	2,802	10,099,670	67	8,304	38,867,721
1919	5	1,892	6,366,361	2	214	571,743	4	531	2,283,018	3	533	2,586,974	7	1,064	4,869,992	14	3,170	11,808,094		8,574	35,857,419
1920	7	2,052	8,239,850	3	274	626,196	4	531	2,669,412	3	533	2,649,193	7	1,064	5,319,205	17	3,390	14,185,251	71	10,881	44,204,996
1921	7	2,200	6,156,833	3	274	277,345	4	531	1,337,064	3	533	1,592,766	7	1,064	2,929,830	17	3,538	9,364,008	71	11,142	28,713,111
1922	8	2,310	8,118,451	3	274	757,877	4	531	2,276,725	3	533	2,536,828	7	1,064	4,813,553	18	3,648	13,689,881	70	11,212	41,052,670
1923	7	2,250	9,244,804	4	311	1,400,864	4	531	3,096,778	3	594	3,168,680	7	1,125	6,265,458	18	3,686	17,611,126	70	11,156	54,245,577
1924	7	2,616	10,001,709	4	311	1,484,951	4	531	2,876,552	3	594	2,791,061	7	1,125	5,667,613	18	4,052	17,154,273	75	11,413	49,061,339
1925	7	2,391	11,896,577	4	311	1,526,820	4	531	3,313,194	3	594	3,366,145	7	1,125	6,679,339	18	3,827	20,102,736	80	11,290	57,109,651
1926	7	2,297	13,751,203	4	411	1,632,790	4	531	3,428,260	3	594	3,504,496	7	1,125	6,932,756	18	3,833	22,316,751	82	11,716	63,646,610
1927	7	2,600	13,841,727	4	411	2,065,812	5	580	3,697,110	3	594	3,088,197	8	1,174	6,785,307	19	4,185	22,692,846	85	12,475	63,239,773
1928	6	2,486	17,630,482	4	411	1,966,364	5	580	3,807,300	3	594	3,528,393	8	1,174	7,335,693	18	4,071	26,932,539	89	12,544	70,162,906
1929	7	2,556	18,094,742	4	411	2,056,475	5	595	3,963,934	3	594	3,808,797	8	1,189	7,772,731	19	4,156	27,923,948	90	12,649	76,758,958
1930	7	2,614	15,467,486	4	362	2,121,745	5	595	2,633,297	3	594	2,814,950	8	1,189	5,448,247	19	4,165	23,037,478	89	12,831	65,521,321
1931	7	2,614	8,824,632	4	362	565,551	5	595	1,614,998	3	594	1,658,072	8	1,189	3,273,070	19	4,165	12,663,253	89	13,108	46,846,277
1932	7	2,614	4,269,185	4	362	1,340,622	5	595	869,894	3	594	800,523	8	1,189	1,670,417	19	4,165	7,280,224	91	13,053	30,887,181
1933	7	2,614	7,263,103	4	362	1,580,429	5	595	1,335,401	3	594	1,099,910	8	1,189	2,435,311	19	4,165	11,278,843	91	13,053	38,680,937
1934	7	2,614	7,712,497	4	362	1,982,557	5	595	1,647,070	3	594	1,474,046	8	1,189	3,091,116	19	4,165	12,786,170	90	12,963	44,342,798
1935	7	2,614	9,795,452	4	362	2,294,324	5	595	1,838,221	3	594	1,856,876	8	1,189	3,695,097	19	4,165	15,784,873	90	12,860	49,045,619
1936	7	2,614	15,666,274	4	362	2,425,957	5	595	2,459,628	3	594	2,454,928	8	1,189	4,914,556	19	4,165	23,006,787	90	12,849	65,243,517

[a] Data are from reports on coke by the U. S. Geol. Survey or Bureau of Mines. Amounts of coal used in by-product ovens by districts, prior to years shown, are included in data for beehive ovens.

other factors are also involved, but it will be many years before the coking coal of the Pittsburgh bed is displaced from its dominating position in the cokemaking and blast-furnace industries.

TABLE 11.—*Coal Coked*

Year	Coal Coked In		Percentage Pittsburgh Bed of Total
	Pittsburgh Bed Area	United States	
1880	4,326,918	5,237,741	82.6
1890	5,436,083	8,071,126	67.3
1900	18,440,584	32,113,553	57.4
1910	35,940,295	63,088,327	56.9
1915	34,792,286	61,832,898	56.3
1918	43,120,149	85,028,018	50.7
1923	41,538,996	84,359,943	49.2
1926	38,087,014	82,871,110	46.0
1929	35,700,607	86,786,474	41.1
1931	13,979,466	48,613,060	28.8
1935	16,640,164	50,514,474	32.9
1936	24,680,298	65,941,675	37.4

In past years the market area for Pittsburgh coal extended down the Mississippi River to New Orleans, up the Missouri River almost to its head, covered the states of Iowa and Minnesota and all of the area east of them and north of the Ohio and Potomac Rivers. Through the operation of economic factors, the opening of new fields and increasing competition with other fuels, this market has been greatly narrowed, and now its greatest use is in the area from Clarksburg to Wheeling, to Columbus, to Toledo, thence with the lakes to Rochester and thence to Johnstown, Grafton and Clarksburg. This is probably the most intensive coal-using area of similar size in the world, and contains more large industrial plants than any other one, so that a large market, secured by local conditions and freight rates, will always be available to producers of coal from this seam. From the standpoint of the commercial mines, organized for a much broader market, the outlook is not so promising because nowhere else do so many captive mines exist and nowhere else are the consumers so active in producing their own fuel. From a broad public viewpoint, however, the situation is better; it is a well-known fact that the fuel that has to travel farthest to reach a market rarely yields as great a profit as that used nearer home, and while the adjustment to such a condition is hard, it may ultimately be much better for the community to use its fuel at home, keeping alive great manufacturing industries, and to allow competing fields to hunt the far-away consumers, and the total profit, if any, may be larger.

This study has revealed to the writer many blind spots in our industrial statistics, and the paucity of published information about the growth of our great industries. Undoubtedly some of these defects can be remedied by the collection of early records before it is too late. The early railroad records should be collected and preserved, wherever available. Collection of such data would form useful work for some of our fact-finding bodies.

APPENDIX A

As the production from the Pittsburgh region in the early years, prior to 1804, had never been published, and as the data that were published were evidently much under the actual figures, it became necessary to construct a new table for the production of the Pittsburgh bed area, and to bring it forward to 1880, after which time accurate figures are available.

Table 1 (in pocket) is the result of this effort and represents the result of collecting all the available figures of production, and from them constructing a table of probable output.

Table 2 (in pocket) shows all the data that the writer has been able to find and the sources of the information are all stated, as well as the method used in estimating the annual output where figures were not available. The first census figure giving coal production was that of 1840, and the county tonnage figures are available; for 1850 only the value of the output, and not the tonnage was collected; for 1860 the tonnage and value of each state and the *value only* by counties, was collected; in 1870 the present method of collecting both tons and value began and has been followed since. The Census Bureau was able to supply some early data not published heretofore, and was very helpful. As was to be expected, there were some discrepancies in the figures but the last column of this table gives the nearest approach to the actual tonnage of Pittsburgh coal produced in Pennsylvania that it is now possible to obtain. The writer believes these figures are below, rather than above actual output. For the years between definite outputs, the figures were interpolated.

For West Virginia the figures shown include all the production, from the start, of the counties included in the present state; the production from Virginia is that of only the Richmond field, as none of the western fields of the state were opened prior to 1880.

For Virginia the output prior to 1822, after which date figures of production were available, was estimated from the average production per capita in the period 1822 to 1832, using the population of Boston, New York, Philadelphia, Baltimore and the Richmond area as the base. For the early years a lower per capita figure was used than for the later ones.

For West Virginia the census of 1840 gave the first accurate data. With the per capita figure then the earlier years were estimated, using of course a lower figure for the earlier years. Table 12 is the result.

For Maryland it was only necessary to estimate the years 1804 to 1832, when a good figure was available, and after 1842 the railroad shipment figures are available.

TABLE 12.—*Pittsburgh Seam Production, West Virginia*, 1800–1880
ALL NET TONS. 25 BUSHELS = 1 TON

County	1800[a]	1810[a]	1820[a]	1830[a]	1840	1850[a]	1860	1870	1880
Barbour						2,000	2,000[a]	2,500[a]	3,361
Branton					200[a]	500	800[a]	1,100[a]	1,312
Brooke	2,500	3,000	5,000	6,400	7,783	15,000	22,700	15,120	36,499
Doddridge						600	1,000[a]	1,400[a]	1,714
Gilmer						300	500[a]	700[a]	1,082
Hancock						8,000	5,900	1,620	19,950
Harrison	2,000	5,000	5,500	7,300	8,037	6,000	80,000[a]	110,100	143,589
Lewis			800	1,200	1,600[a]	2,500	2,000[a]	3,000[a]	4,991
Marion					1,000[a]	1,000	6,000[a]	40,000	107,636
Marshall					7,000[a]	30,000	45,000[a]	55,000[a]	67,103
Mason		1,000	2,500	6,500	20,000[a]	40,000	130,500	110,000[a]	90,748
Mineral (part of it)								95,300	63,171
Monongalia	600	3,500	3,500	4,800	6,688	7,000	7,000[a]	2,400	20,796
Ohio	2,500	10,000	18,000	40,000	47,120	13,000	16,400	15,230	205,039
Preston			1,700	2,500	3,000	5,000	34,800	88,000	142,327
Putnam						500	600	20,000	49,000
Taylor						900	1,200[a]	1,604	105,962
Tyler			100	100	100	100	200[a]	300	400
Upshur							1,400[a]	1,600[a]	1,892
Wetzel						200	300[a]	500[a]	760
Total	7,600	22,500	37,100	68,800	102,528	132,600	358,300	565,370	1,067,342

[a] Based on probable use per capita and population.

Ohio, as always, was the most difficult state to estimate, as no figures for smaller areas than counties are collected even now, and the census data were the only available ones. Shipments began by canal in 1828, but none of the coal shipped this way was from the Pittsburgh seam. On the other hand, there are records that coal came from Ohio across to Wheeling before mines were opened on that side of the river, and that large shipments were made from Meigs County by river before any coal was shipped by canal. These shipments, while now known to have been from the Redstone seam, are classed here as from the Pittsburgh bed, as it was always considered to be during the period covered by the table. The Ohio production was estimated in the same way as that of West Virginia, and is shown in Table 13.

The result is that the data heretofore published have been largely increased and the estimated production shown for Pennsylvania, Ohio and West Virginia is considerably greater than that heretofore given. It is probable that a careful study of some of the early production data of other regions would cause similar increases.

It should be remembered that these figures are production, and not shipment tonnages.

C. E. Lawall, Director of the School of Mines, University of West Virginia, and H. E. Nold, Professor of Mining Engineering at Ohio State University, were very helpful in having searches made in their states for early production data, largely with negative results.

TABLE 13.—*Production of Pittsburgh Coal in Ohio*

ALL NET TONS: 25 BUSHELS = 1 TON

County	1800	1810	1820	1830	1840 (a)	1843 (c)	1847 (c)	1848 (c)	1850	1860 (b)	1870 (a)	1880 (a)
Athens					3,358	4,000	22,306	28,604	30,000	38,000	131,140	323,050
Belmont					7,544	8,000	8,000	9,000	10,500	15,300	123,902	399,747
Gallia					616	1,200	1,600	1,800	1,800			21,032
Guernsey					2,234	2,400	2,400	2,400	2,800	4,590	73,369	157,650
Harrison					7,572	8,000	8,000	8,000	9,000	13,000	16,990	20,400
Jefferson					13,388	19,000	27,000	29,000	34,000	54,570	266,830	324,070
Meigs					33,736	46,000	80,000	100,000	206,000	734,500	268,700	359,225
Monroe					218	240	400	600	1,000	1,800	2,600	3,310
TOTAL	8,000	14,000	35,000	50,000	68,666	90,840	149,706	179,404	295,100	861,760	883,550	1,608,484

(a) U. S. Census figures.
(b) U. S. Census figures - No county tonnages are given - these are obtained by dividing county value by average value for state.
(c) Niles National Register, 1849. (p. 269)
Estimated from population and probable per capita consumption. 0.4 ton per year excepting in 1800.
In 1857, 520,000 tons were shipped via Ohio River, of which 320,000 tons were from Pomeroy. (DeBow's Review, Vol. 26, p. 72) 3/18/58
For 1853, 1854 and 1857, see DeBow's Review, Vol. 26, p. 68, by counties. Usually much larger than used above.

APPENDIX B

As it was possible that place names as recorded in deeds might indicate an earlier knowledge of coal than was indicated by maps, the writer had a search made of the records before 1770 in the counties including the bituminous coal fields of western Pennsylvania. The coal areas were all originally in Lancaster County, but in 1750 were included in Cumberland County when it was formed. In 1771 Bedford County was formed from

Cumberland, and in 1773 Westmoreland was created from Bedford and included all the coal in the southwestern end of the state. Washington County was formed from Westmoreland in 1781, and Allegheny County was created in 1788 from both Westmoreland and Washington Counties. In Carlisle before 1771, in Bedford before 1773, and in Greensburg before 1777, not a single reference could be found in any deed to coal, or to any place names that indicated a knowledge of it.

In Washington County is recorded a deed from Levi Stephens of Westmoreland County to Alexander McConnal, dated April 17, 1777, for a parcel of land on the waters of Miller's Run and the headwaters of Coal Pitt Run (DB 1A, p. 8). In the same book a deed dated Oct. 12, 1778, from Thomas Phillips to James Moore, conveys a tract of land on the waters of Shirter Creek (Chartiers) "with all the appurtanances therewith belonging all manner of timber, water and water courses, soil, stones, quarys, mines and mineralls" (DB 1A, p. 208). In later pages of this book another reference is made to Coal Pitt Run, and one to Stone Coal Run of Shirter's Creek, but there are no other references to coal, and there are none in the book following.

Coal Hill, now Mt. Washington, was laid out in lots in November 1784, but the plan was never recorded. The sale of these lots began soon afterward, and many of the deeds were recorded in 1785 and afterward. As Lee stated, the price at first was 30£ per lot, later 40£, but beyond stating that the lot was on Coal Hill, not a single mention is made of coal, and all the deeds are fee simple conveyances. A number of larger areas, south of the Coal Hill lots, were also conveyed in the same manner.

Many of these lots and tracts were later conveyed to others, but it was in 1829 before coal was specifically mentioned:

Dec. 22, 1829, John McKee sold a tract to Alex. Glass, one of the lines running "acrost the road excluding the entrance to a Coal Bank," and reserved the right to use the coal from the bank mentioned (DB 40, p. 74).

In 1930, Jas. S. Burnett sold a number of tracts to A. Shorb and J. Burnett "together with . . . mines . . . collieries" (DB 40, p. 500).

Jan. 20, 1930, Jas. Lafferty sold 17 acres to Jos. Hays, "also if a coal pit can be opened on the above land the said Hays . . . are at liberty to take from under the adjoining land of the said Laffertys as much coal as they may wish to use of on the said land, but not to take any of it" (DB 43, p. 267).

April 22, 1835, Joseph Allen sold S. Leonard & A. M. N. Semple the coal in 124 acres near Coal Hill, with "full permission, power and authority to open pits, levels and avenues to the said Coal on the side of the hill . . . where the pits are *now open*, and shall have full power and authority to open a Pit or Level or sink a Shaft in other part of the said farm . . . with the least injury to the said farm. No other pits to be

opened, but air holes and ventilators may be put in. Permission to erect coke ovens at mouths of pits" (DB 46, p. 646).

Dec. 1, 1835, Wm. Philpot sold a parcel adjoining the Coal Hill lots "together with all and singular the Coal, improvements, etc." (DB 50, p. 15).

On Dec. 9, 1835, Caleb Foster gave Wm. Philpot the right to dig and haul coal over his property south of Coal Hill (DB 112, p. 141).

Dec. 1, 1835, Neville B. Craig, Committee, transferred to L. C. Semple a tract of 33 acres reserving "the right of having a double track of rails on any of the streets running from the River to Coal Hill for the purpose of transporting Coal by horse power" (DB 49, p. 625).

APPENDIX C

The writer has not included the amount of reserve tonnage in the Pittsburgh bed, as this subject has been exhaustively dealt with in the State Geological Survey Reports, and in the various excellent papers in the Transactions of the American Institute of Mining and Metallurgical Engineers that are listed below:

The Pittsburgh Coal Bed, by I. C. White, G. H. Ashley and J. A. Bownocker (1926) **74,** 481.

Production and Reserves of the Pittsburgh Coal Bed, by George H. Ashley (1938) **130.**

In this last paper the estimated recoverable reserve, as at 1935, was 16,020,000,000 net tons.

Partial List of Works Consulted

A

1. W. E. A. Aiken: Geology of the Country between Baltimore and the Ohio River.
2. G. D. Albert: History of the County of Westmoreland, Pa., 1882.
3. W. E. Albig: Early Development of Transportation on the Monongahela River.
4. F. V. Aler: History of Martinsburg and Berkeley County, West Virginia.
5. Alexander and Tyson: Report on Georges Creek C. & I. Co., 1836.
6. C. H. Ambler: Transportation in the Ohio Valley.
7. American Journal of Science.
8. American Philosophical Society Transactions, to 1860.
9. American State Papers, Class 4, Commerce and Navigation, **14** and **15.**
10. E. B. Andrews: Economic Geology of Southern Ohio.
11. Ashe: Travels in America, 1806–1807.
12. G. H. Ashley: Production and Reserves of the Pittsburgh Coal Bed. *Trans.* A.I.M.E. (1938) **130.**
13. C. Atwater: A History of Ohio, 1838.

B

14. H. F. Bain: Chapter in Century of Industrial Progress. Amer. Phil. Soc.
15. F. Baily: Journal of a Tour in the Unsettled Parts of North America in 1796–1797.

16. Baltimore and Ohio R. R. Co., 9th Annual Report (1837).
17. Bartonia: Supplement to vol. 12 (1931).
18. J. Bartram: Observations in his Travels to Lake Ontario, 1751.
19. C. Beatty: Journal of a Two Months Tour in America, 1768.
20. Beltrami: A Pilgrimage in Europe and America, 1823.
21. J. Bernard: Retrospections in America, 1800–1801.
22. Bezanson, Gray and Hussey: Wholesale Prices in Philadelphia, 1790, 1861.
23. Bezanson, Gray and Hussey: Prices in Colonial Pennsylvania, 1720–1775.
24. M. Birkbeck: Notes of a Journey in America.
25. J. L. Bishop: History of American Manufactures from 1608 to 1860.
26. S. Blodget: Economics—a Statistical Manual (1806).
27. J. N. Boucher: Westmoreland County, Pa.
28. J. N. Boucher: Old and New Westmoreland.
29. J. N. Boucher: A Century and a half of Pittsburgh and her people.
30. H. Bouquet: Expedition against the Ohio Indians, 1764.
31. H. H. Brackenridge: Gazette Publications, 1806.
32. J. Bradbury: Travels in the Interior of America, 1809–11. Thwaite's Early Western Travels.
33. Bullock: Journey through the Western States, 1827.
34. A. Burnaby: Travels through the Middle Settlements in North America in 1759 and 1760.
35. T. H. Burrowes: State Book of Pennsylvania, 1846.
36. B. L. Butcher: Upper Monongahela Valley, W. Va.
37. C. W. Butterfield: Washington-Crawford Letters.
38. C. W. Butterfield: Washington-Irvine Letters.
39. Buttrick: Voyages, Travels and Discoveries, 1812–19.
40. W. Byrd: History of the Dividing Line and Other Tracts, Ed. of 1866, 74. Richmond, Va.
41. W. Byrd: *Ibid.*: Ed. 2, **3**, 120. 1800. Also other writings.

C

42. Calendar of Virginia State Papers, **3** and **4.**
43. J. M. Callahan: Semi-centennial history of West Virginia.
44. G. B. Catlin: Early Travel on the Ohio and its Tributaries, 1818. *Mich. History Mag.* (1936).
45. R. E. Chaddock: Ohio before 1850.
46. T. J. Chapman: Old Pittsburgh Days.
47. V. S. Clark: History of Manufactures in the United States.
48. Clark, O'Harra, Rowe and Ries: Maryland Geol. Survey, Allegany County, 1900.
49. Coal Trade of Pennsylvania in 1836. Report of Pennsylvania Senate.
50. P. Collinson: A Tribute to the Memory of William H. Dillingham.
51. V. Collot: A Journey in North America, 1796.
52. Copley: Improvement of the Ohio River, 1856.
53. T. Coxe: A View of the United States of America, 1794.
54. N. B. Craig: The Olden Time, 1846–47.
55. N. B. Craig: History of Pittsburgh, 1851.
56. Z. Cramer: Navigator, 1808–11.
57. Z. Cramer: Almanack, 1804–1829.
58. A. Creigh: History of Washington County, Pa., 1870.
59. N. Creswell: Journal of 1774–77.
60. St. J. Crevecoeur: Letters from an American Farmer.
61. G. Croghan: Journals and Letters.

62. B. Crumrine: History of Washington County, Pa. 1882.
63. F. C. Cummings: Tour to the Western Country, 1807–09.
64. M. Cutler: Topographical Description of the State of Ohio.

D

65. Daddow and Bannan: Coal, Iron and Oil.
66. W. Darlington: Memorials to Bartram and Marshall.
67. W. M. Darlington: Christopher Gist's Journals.
68. J. Davis: Travels of Four and a Half Years in the United States of America, 1798.
69. Mills Day: Travels in Virginia and Ohio. Unpublished Ms. in Yale Univ. Library.
70. Day: Historical Collections of Pennsylvania.
71. J. B. Dillon: History of Indiana.
72. R. Dinwiddie: Official Records of 1751–58.
73. J. R. Dodge: West Virginia, 1865.
74. D. B. Douglass: Report on the Coal and Iron Formation near Frostburg, 1836.
75. P. du Lac: Travels through the two Louisianas in 1801–03.

E

76. H. N. Eavenson: Coal through the Ages. A.I.M.E., 1935.
77. A. Ellicott: Journal of Commission to Determine Boundary of the United States. 1796.
78. F. Ellis: History of Fayette County, Pa., 1882.
79. Emigrant's Guide (1818).
80. J. Espy: Ohio Valley Historical Society.
81. E. Evans: A Pedestrious Tour of 4000 Miles to the Western States, etc., 1818. Thwaite's Early Western Travels, **8.**
82. L. Evans: Analysis of a General Map of the Middle British Colonies in North America, 1755.
83. L. H. Everts: History of Westmoreland County, Pa. 1882.

F

84. Farnham: Travels in the great Western Prairie, 1839.
85. W. Faux: Memorable Days in America, 1819–20. Thwaite's Early Western Travels, **12.**
86. H. B. Fearon: Sketches of America, 1818.
87. B. Fernow: Ohio Valley in Colonial Days.
88. J. Filson: Discovery, Settlement and Present State of Kentucky.
89. E. Flagg: The Far West.
90. Fleming: History of Pittsburgh and its Environs.
91. J. Flint: Letters from America, 1818–20.
92. T. Flint: Condensed Geography and History of the Western States.
93. E. R. Forrest: History of Washington County, Pa.
94. Franklin Institute, Journal, **34.**
95. J. Fulton: Coke.

G

96. J. Gilpin: Journal of a Tour from Philadelphia in 1809. *Pennsylvania Mag. of Hist. and Biog.*, **51, 52.**

97. H. Gordon: Journal, 1766. In "Travels in the American Colonies," by N. D. Mereness.
98. E. W. Gould: Fifty Years on the Mississippi, 1889.
99. H. B. Greene: Coal and the Coal Mines.

H

100. Hanna: Wilderness Trail.
101. Harris: Directory of Pittsburgh, 1837, 1839, 1841, 1844, 1847.
102. T. M. Harris: Tour into the Territory Northwest of the Allegheny Mountains, 1803.
103. Hassler: Old Westmoreland.
104. G. B. Hawkins: A Critical Study of Pittsburgh.
105. R. H. Hawkins: Notes on Real Estate in Western Pennsylvania.
106. H. Haymond: History of Harrison County, West Virginia.
107. Hazard: Register of Pennsylvania. 16 vols.
108. J. Heart: Journal, 1785.
109. S. P. Hildreth: Memoirs of the Settlers of Ohio.
110. S. P. Hildreth: Pioneer History.
111. History and Progress of the County of Marion, West Virginia.
112. Historical Society of Western Pennsylvania: Inventory of Manuscript and Miscellaneous Collections.
113. A. Hodgson: Letters from North America, 1819–20–21.
114. J. S. Homans: Cyclopedia of Commerce and Commercial Navigation, 1858.
115. House Documents, 39th Congress, 2nd Session, 1866–1867.
116. House Documents, 50th Congress, 1st session.
117. W. Howard: Report on Monongahela River, Feb. 5, 1833. House Documents, 22nd Congress, 2nd Session No. 126, **3.**
118. H. Howe: Historical Collections of Ohio, **2.**
119. H. Howe: Historical Collections of Virginia.
120. A. B. Hulbert: Ohio in the Time of the Confederations. Marietta College Hist. Collections.
121. A. B. Hulbert: Waterways of Westward Expansion. Ohio River and Its Tributaries.
122. I. Hulme: Journal of a Tour in the Western Countries of America, 1818–1819. Thwaite's Early Western Travels, **10.**
123. F. S. Hunt: Coal and Iron of Southern Ohio.
124. C. Huston: History and Original Titles to Land in Pennsylvania.
125. T. Hutchins: A Topographical Description of Virginia, Pennsylvania, Maryland and North Carolina.

I

126. G. Imlay: A Topographical Description of the Western Territory of North America, 1797.
127. Inland Waterways Commission, Preliminary Report, 1908.

J

128. E. James: Account of an Expedition from Pittsburgh to the Rocky Mountains, under command of Major S. H. Long.
129. J. A. James: Pittsburgh, a Key to the West during the Revolution. *Ohio Arch. and Hist. Mag.*, **17.**

130. James River and Kanawha County, by Dunnaway. Columbia University. Studies in History, **104**, No. 2.
131. H. M. Jenkins: Pennsylvania, Colonial and Federal.
132. W. R. Jillson: The Kentuckie.
133. D. Jones: Journals of Two Visits.
134. S. Jones: Pittsburgh in 1826.
135. Journal of Senate, Pennsylvania, 1815–1816.

K

136. H. M. Keiffer: Some of the First Settlers of the "Forks of the Delaware."
137. J. Kenny: Journals, 1761–1763. *Pennsylvania Mag. of Hist. and Biog.* (1913) **37.**
138. S. Kercheval: History of the Valley of Virginia, 1833.
139. J. Kilbourn: Ohio Gazeteer, 1821.
140. L. K. Koontz: The Virginia Frontier, 1754–1763. Johns Hopkins Univ. Studies (1925) **43.**

L

141. E. C. Leahy: An Ohio River Anthology.
142. A. Lee: In N. B. Craig's The Olden Time, **2.**
143. R. H. Lee, Jr.: Life of Arthur Lee.
144. T. Lewis: Journal (Sept. 1746, Feb. 1747).
145. V. A. Lewis: History of West Virginia.
146. Long: Voyages, Travels of an Indian Interpreter, etc., 1768–1782.
147. W. H. Lowdermilk: History of Cumberland, Md.
148. W. G. Lyford: The Western Address Directory, 1837.

M

149. J. MacFarlane: The Coal Regions of America, 1875.
150. W. Maclay: Journal, 1789–1791.
151. Magazine of Western History.
152. Manufactures Census, 1810–20–30–40–50–60.
153. A. E. Martin and H. H. Shunk: Pennsylvania History told by Contemporaries.
154. W. L. Marvin: American Merchant Marine.
155. Maryland Geol. Survey: Garrett County (1902).
156. Maryland Geol. Survey: Allegany County (1900).
157. Maryland Geol. Survey: (1905) **5**; (1897) **1**; (1898) **2**; maps.
158. Maryland Geol. Survey: Coals of Maryland (1905).
159. Maryland Historical Magazine. 29 vols.
160. Massachusetts Historical Collections.
161. Maury: Resources of West Virginia, 1876.
162. Maximilian, Prince of Weid: Travels in the Interior of North America, 1832–34. Thwaite's Early Western Travels.
163. H. Maxwell: History of Randolph County, West Virginia.
164. H. Maxwell: History of Barbour County, West Virginia.
165. J. May: Journeys to the Ohio Country, 1788–89.
166. D. McClure: Diary.
167. W. J. McKnight: Pioneer Outline of the History of Northwestern Pennsylvania.
168. J. A. Mease: A Geological Account of the United States, 410, 413. 1807.
169. J. Melish: Travels in the United States of America in 1806 and 1807 and 1809–10–11.

170. Merchant's Magazine, Hunt's. 16 vols. to 1854.
171. A. Michaux: Travels into Kentucky 1795–1796.
172. F. A. Michaux: Travels West of the Allegheny Mountains, 1802.
173. Monongahela Navigation Co.: Annual Reports.
174. G. Morgan: Pages from Letter Book.
175. T. Morris: Journal upon the Maumee, 1764.
176. C. N. Morris: Internal Improvements in Ohio, 1825–1850.

N

177. New York Historical Society.
178. Niles: Weekly Register, 75 vols.
179. T. Nuttall: Journal of Travels into the Arkansa Territory. 1819. In Thwaite's Early Western Travels, **13.**

O

180. G. W. Ogden: Tour through the Western Country, 1821–1823. Thwaite's Early Western Travels, **19.**
181. Ohio Archaeological and Historical Soc. Publications, 44 vols.
182. Ohio Geol. Survey: 1st Annual Rept. (1837).
183. Ohio Geol. Survey: 2nd Annual Report (1838.)
184. Ohio Geol. Survey: 2nd Survey (1884) **5.** Orton.
185. Ohio Geol. Survey: *Bull.* 9 (1908).
186. Ohio, Mines and Mining Resources.
186*a*. Ohio Reports of Mine Inspectors (1880–1896).
187. Ohio County, *Records*, in Pennsylvania Historical Society.

P

188. J. E. Parke: Recollections of 70 Years, 1886.
189. A. W. Patterson: History of the Backwoods.
190. Pennsylvania Archives.
191. Pennsylvania Colonial Records.
192. Pennsylvania Commission on Frontier Forts.
193. Pennsylvania Magazine of History and Biography, 55 vols.
194. Pennsylvania Report of Mine Inspector (1870).
195. Pennsylvania Report of Bureau of Statistics of Labor and Agriculture (1872–1873, 1882, inc.).
196. Pennsylvania Second Geol. Survey: (*a*) Rept. on Coke Manufacture in Yough. Valley (1875); (*b*) Pittsburgh Coal Region (1886) pt. 1; (*c*) Fayette and Westmoreland Counties; Summary Final Report (1892) **1**; (*d*) (1884) pt. 1, XIX, XX, K, K2, K3, K4, Q, H3, H4, H5, L; (1895) **3**, pt. 2.
197. Pennsylvania Senate Journal (1833–1834) **2.**
198. Perkins: Annals of the West.
199. M. Phelps: Memoirs and Adventures in Two Trips to the Mississippi.
200. P. L. Phillips: The Cutler Map of Ohio, 1787.
201. T. A. Pitkin: Statistical View of the Commerce of the United States, 1835.
202. Pittsburgh-Buffalo County Yearbook (1911).
203. Pittsburgh and Western Pennsylvania Chamber of Commerce (1885).
204. Pittsburgh: The Mercantile, Manufacturing and Mining Interests (1884).
205. Pittsburgh: Its Industry and Commerce. Barr and Myers, 1870.
206. Pittsburgh Business Directory, 1854–1855.

207. Pittsburgh Manufactures. Report of Citizen's Committee, 1819.
208. Pittsburgh's Progress, Industries and Resources (G. H. Thurston), 1886.
209. S. W. Pomeroy: The Coal Region between Cumberland and Pittsburgh. *Amer. Jnl. Sci.*, **21.**
210. J. Pope: Tour through the Southern and Western Territories, 1792.
211. C. F. Post: Two Journals of Western Tours (1758–1759).
212. T. Pownall: Topographical Description of Parts of North America, 1776.
213. S. Powell: History of Marshall County, West Virginia.
214. R. Proud: History of Pennsylvania to 1742.

R

215 Randall and Ryan: History of Ohio.
216. Riddle: Directory of Pittsburgh, 1815.
217. H. L. Ritter: Washington as a Business Man.
218. P. Roberts: The Anthracite Coal Industry, 1901.
219. W. M. Roberts: Ohio River, 1857.
220. W. M. Roberts: U. S. Engineers Report (1873) **1.**
221. H. D. Rogers: Geology of Pennsylvania.
222. W. B. Rogers: Rept. of Geological Reconnaissance of the State of Virginia (1836).
223. A. Roy: History of the Coal Miners of the United States.
224. J. W. Rowe: Old Westmoreland in History.
225. Rupp: History of Pennsylvania and the West.

S

226. A. St. Clair: Papers.
227. Saugrain: Note Books, 1788. Amer. Antiquarian Soc., 1897–1908.
228. J. T. Scharf: History of Western Maryland.
229. J. T. Scharf: History of Baltimore, City and County.
230. J. D. Schoepf: Travels in the Confederation, 1788.
231. C. Schultz: Travels on an Inland Voyage, through the States of New York, Pennsylvania, Virginia, etc., 1807–1808.
232. Segur, Count de: Memoirs.
233. A. Seybert: Statistical Annals of the United States, 1818.
234. P. Slaughter: Life of Joshua Fry.
235. J. Smith: Life and Travels, 1755–1759.
236. W. H. Smith: The St. Clair Papers.
237. Smith: Old Redstone.
238. J. F. D. Smyth: A Tour of the United States.
239. H. N. Stevens: Lewis Evans, His Map.
240. R. Stobo: Memoirs, 1854.
241. J. M. Swank: Iron Making and Coal Mining in Pennsylvania.
242. J. M. Swank: Progressive Pennsylvania.
243. J. M. Swank: History of the Manufacture of Iron in All Ages. 1892.

T

244. R. C. Taylor: Statistics of Coal.
245. Thurston: Directory of the Monongahela and Youghiogheny Valleys, 1859.
246. Thurston: Allegheny County's One Hundred Years.
247. Thurston: Pittsburgh As It Is. 1857.
248. Thwaite's Early Western Travels.

249. P. Tome: Pioneer Life, or Thirty Years a Hunter.
250. W. Trent: Journal.
251. Tryon: Household Manufactures in the United States.
252. H. T. Tuckerman: America and Her Commentators.
253. P. T. Tyson: Report on Georges Creek Coal and Iron Co., 1837.

U

254. Union Potomac County and the Union County, Charters, 1836.
255. U. S. Geol. Survey: 22nd Ann. Rept. (1900–1901) pt. 3.
256. U. S. Geol. Survey: Mineral Resources (1883).
257. U. S. Geol. Survey: Mineral Resources (1893).

V

258. Virginia Magazine of History and Biography, **1, 4, 30.**
259. Virginias, The. 1880–1883.
260. C. F. Volney: View of the Climate and Soil of the United States.

W

261. P. E. Wagner: Economic Conditions in Western Pennsylvania during the Whiskey Insurrection.
262. J. D. Weeks: Reports on Manufacture of Coke. U. S. Census (1884–1894).
263. C. Weiser: Journal of a Tour to the Ohio.
264. A. Welby: A Visit to North America, etc., 1819–20. Thwaite's Early Western Travels, **12.**
265. I. Weld: Travels in North America.
266. West Augusta County, Va.: Record of Deeds for Court Held at Fort Pitt 1775–1776.
267. Western History, Magazine of, **2, 3, 7.**
268. Westmoreland County, Pa., History (Albert).
269. West Virginia Geol. Survey: Hampshire County.
270. West Virginia Geol. Survey: Bibliography and Cartography, *Bull.* 1.
271. Western Pennsylvania Historical Magazine (June 1935).
272. I. C. White: Pittsburgh Coal Bed. Amer. Assn. Adv. Sci. (1897).
273. C. Whittlesey: History of the Coal and Iron Business, 1872.
274. C. Whittlesey: Early History of Cleveland.
275. C. Whittlesey: Fugitive Essays.
276. F. W. Wile: A Century of Industrial Progress.
277. R. T. Wiley: Elizabeth and Her Neighbors.
278. S. T. Wiley: History of Monongalia County.
279. S. T. Wiley: History of Preston County.
280. Winsor: Westward Movement, 1897.
281. Wyeth: Journey from the Atlantic to the Pacific, 1832.

Y

282. A. Young: Observations on the Present State of the Waste Lands of Great Britain, 1773.

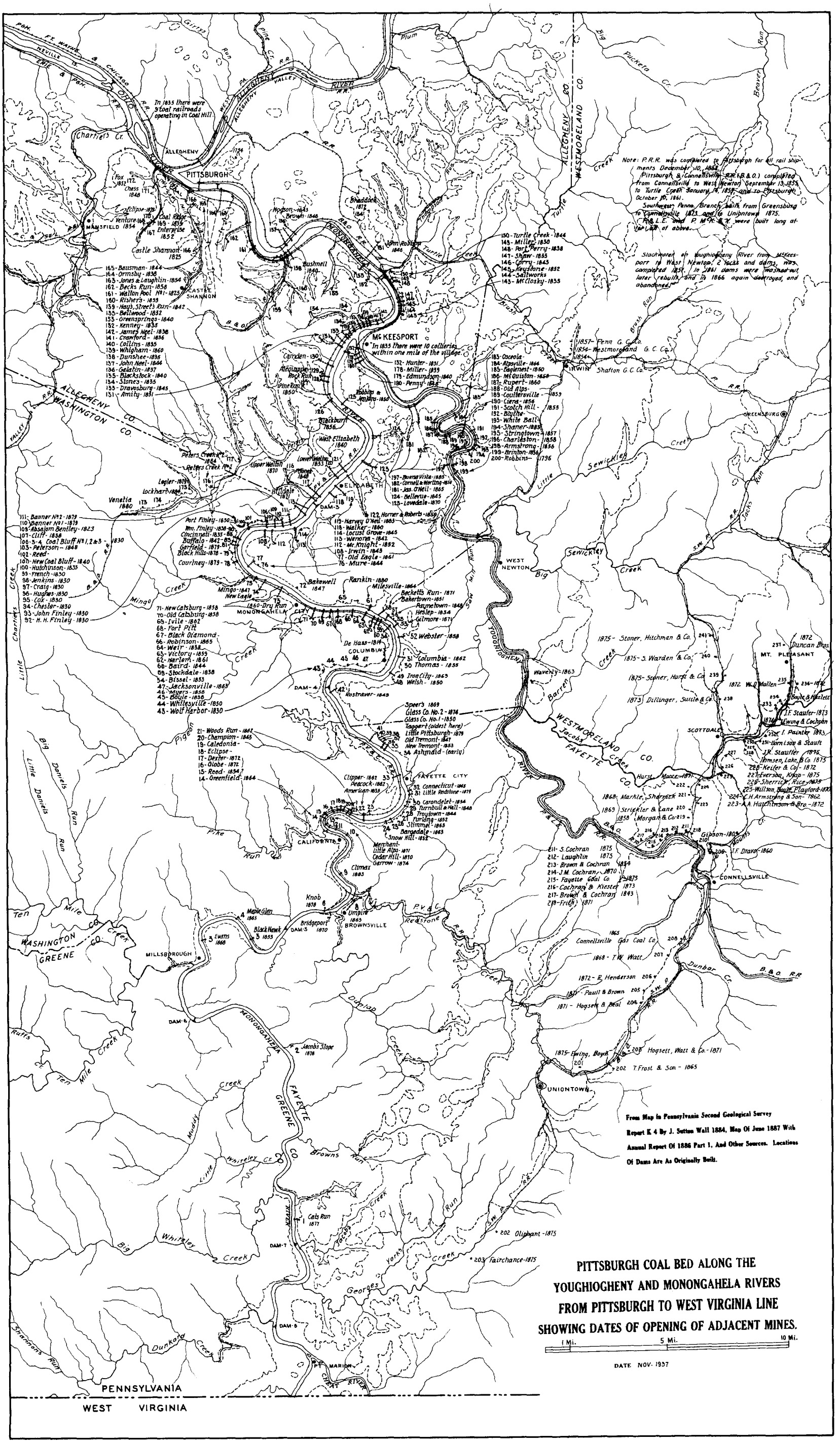
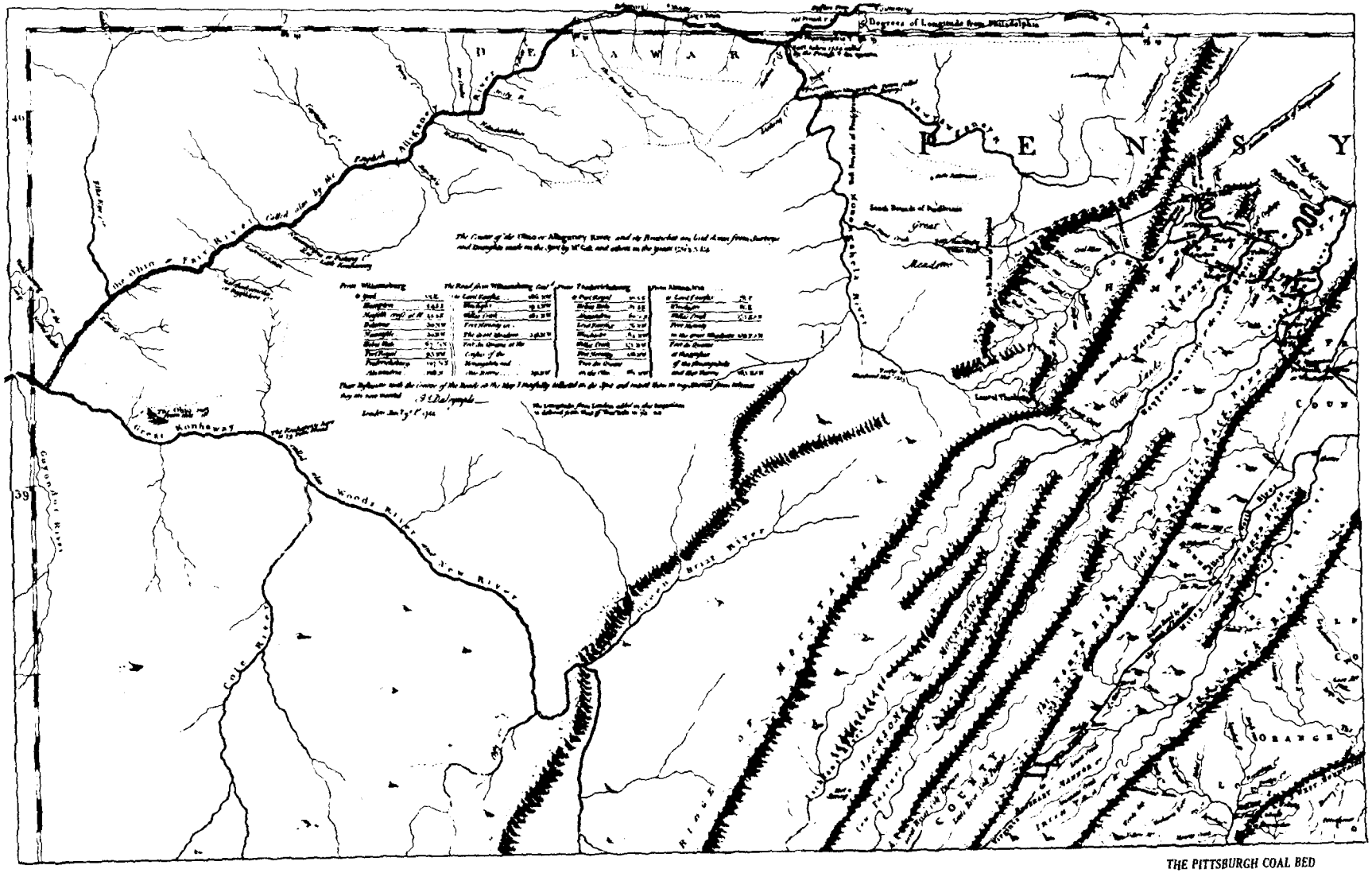


FIG. 6

THE PITTSBURGH COAL BED
ITS EARLY HISTORY AND DEVELOPMENT
BY HOWARD N. EAVENSON
TRANSACTIONS A. I. M. E. (1938) 130



FRY AND JEFFERSON MAP, 1755.

FIG. 1

THE PITTSBURGH COAL BED
ITS EARLY HISTORY AND DEVELOPMENT
BY HOWARD N. EAVENSON
TRANSACTIONS A. I. M. E. (1938) 130

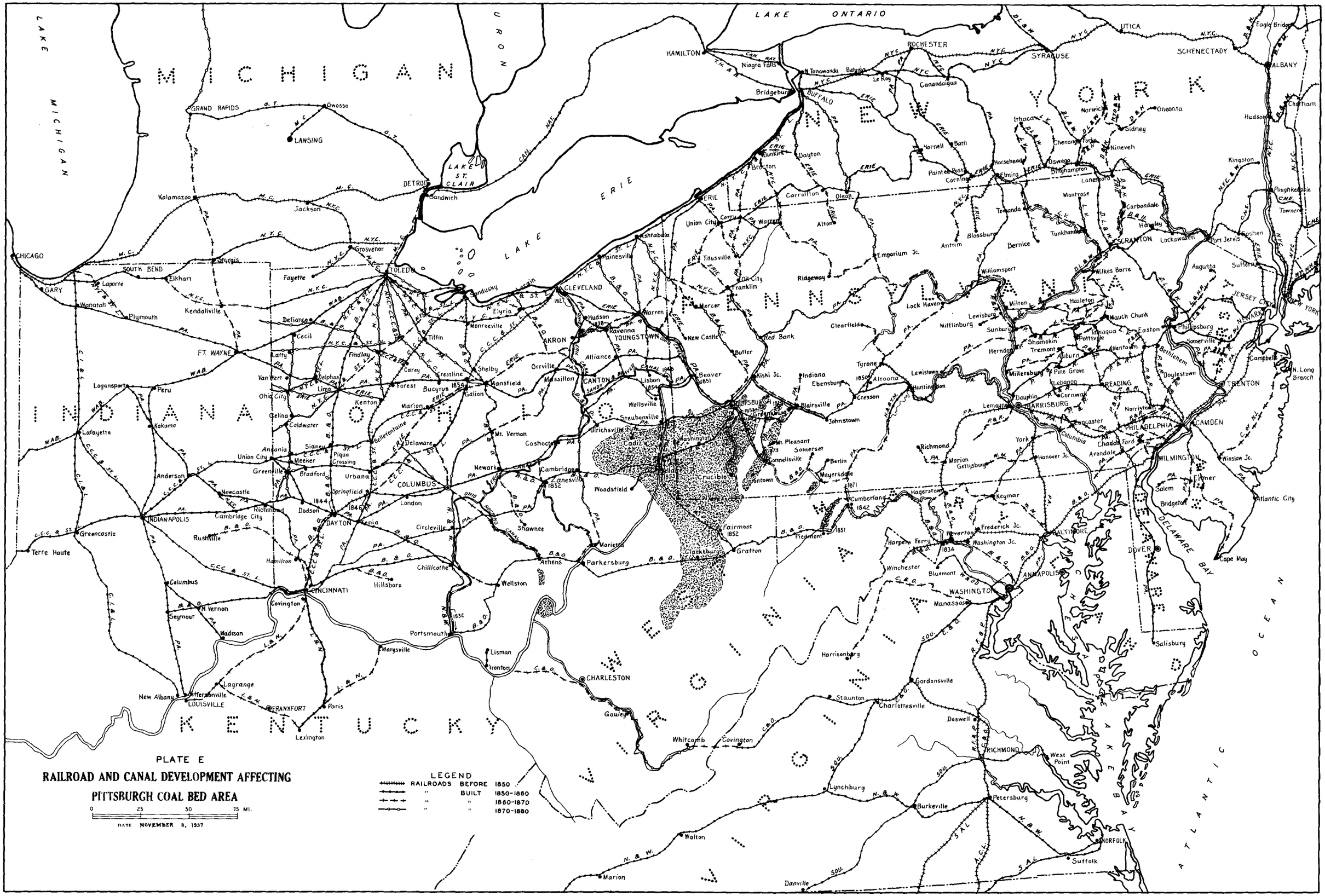


PLATE E

RAILROAD AND CANAL DEVELOPMENT AFFECTING PITTSBURGH COAL BED AREA

0 25 50 75 MI.

DATE NOVEMBER 8, 1937

LEGEND

RAILROADS BEFORE 1850
" BUILT 1850-1860
" " 1860-1870
" " 1870-1880

FIG. 5

THE PITTSBURGH COAL BED
ITS EARLY HISTORY AND DEVELOPMENT
BY HOWARD N. EAVENSON
TRANSACTIONS A. I. M. E. (1938) 130

To the Honourable Thomas Povnall Esq.r

Permit me, Sir, to pay You this Tribute of Gratitude, for the great Assistance You have given me in this Map; and to assure the Public, that it has past the Examination of a Gentleman, whom I esteem the best Judge of it in America:

Your most obedient, and most humble Servant.

Lewis Evans.

A general MAP of the MIDDLE BRITISH COLONIES, in AMERICA;

Viz VIRGINIA, MARILAND, DELAWARE, PENSILVANIA, NEW-JERSEY, NEW-YORK, CONNECTICUT, and RHODE ISLAND:

Of AQUANISHUONIGY, the Country of the Confederate Indians: Comprehending AQUANISHUONIGY proper, their Place of Residence, OHIO and OUUXSOXRÚNTIE their Deer-Hunting Countries, COUXSAXRAGE and SKANIADARADE, their Beaver-Hunting Countries; With the LAKES ERIE, ONTARIO and CHAMPLAIN. And of Part of NEW-FRANCE:

Wherein is also shewn the antient and present SEATS of the Indian Nations.

By Lewis Evans. 1755.

Engraved by Jas Turner in Philad.a

A SKETCH of the remaining Part of OHIO R.&c.

Explanation: The ITALIC CAPITALS shew the Seats of the Indians. White ABC. Nations extinct. Blue ABC. Antient Seats ... or Nations nearly extinct. Black ABC. Nations still consiederable. Indian Towns. P. Portages. X.X. in Indian Words, sounded as it stood in French ... each in its Welsh or German ... TR. Road of the Trade ... Gap or Passage

English Miles

The Confederates, July 6. 1701, at Albany, surrendered their Beaver-Hunting Country to the English, to be defended by them, for the said Confederates, their Heirs and Successors forever. And the same was confirmed Sept.r 14. 1726. when the Senecas, Cayugas and Onondagas surrendred their Habitations from Cayahoga to Oswego, and Sixty Miles inland, to the same, for the same Use.

The Confederates, formerly of 5 now of 7 Nations, called by the French Iroquois, consist of 1 Cantoneers or Mohocks, 2 Oneyuts, 3 Onondagues, 4 Cayugues, 5 Chenandoanes or Senecas, 6 Tuscaroras, 7 Oghsiquas.

The Western League or ILLINIS, (corruptly called Illinois by the French) consisting of the Tawixtawis, Miamis, Piankashaws, Wawiatas, Piques and Kickapus were seated till lately on the Illinois R. and Parts adjacent, but are all, except the last now removed to Ohio and its Branches, by the express Leave of the Confederates about 16 Years ago.

N.B. The Stream of Ohio is every where pretty moderate except at the Places mentioned to be otherwise.

The Falls is rather a long Rapid, where it is not safe to make a Portage.

Mine of Coal discovered in 1750 by Christopher Gist.

Part of NORTH CAROLINA

The perfect Agreement of Mr. Okies Observation of the Longitude of Boston with that of Philadelphia made by Mr. Short Godfrey and myself, determined me to give America this Position with regard to London.

	Quebec	Montreal	F. Frontenac	Oswego	Oniagara Falls	F. Detroit	Albany
Montreal	170						
F. Frontenac	190	360					
Oswego	80	270	440				
Oniagara Falls	200	350	470	640			
F. Detroit	270	470	550	740	910		
Albany	695	425	225	305	270	440	

	F. du Quesne	Oniagara Falls	Sandusky	Tawixtaws or Pice Town	G. Kanhawa Mouth	Lower Shawanese T.	Falls of Ohio	Wawiastas	Will's Cr.
Oniagara Falls	265								
Sandusky	350	200							
Tawixtaws or Pice Town	145	495	316						
G. Kanhawa Mouth	170	200	605	280					
Lower Shawanese T.	104	140	230	580	354				
Falls of Ohio	230	334	235	380	730	614			
Wawiastas	170	160	264	90	235	585	406		
Will's Cr.	340	727	497	393	429	313	350	113	

	Albany	Boston	New Port	New Haven	New York	Prince T.	Philadelphia	Lancaster	New Castle	Annapolis	Alexandria	Williamsburg	Will's Creek
Boston	150												
New Port	70	170											
New Haven	110	170	120										
New York	89	199	259	146									
Prince T.	54	143	253	313	186								
Philadelphia	43	07	186	296	156	229							
Lancaster	66	109	163	252	362	442	295						
New Castle	55	35	78	132	231	331	391	264					
Annapolis	107	114	112	185	239	338	438	408	371				
Alexandria	36	133	120	108	211	265	353	404	324	307			
Williamsburg	108	171	208	186	303	346	400	480	590	650	532		
Will's Creek	252	146	163	215	175	241	284	338	427	537	507	470	

Published according to Act of Parliament, by Lewis Evans, June 23. 1755. and sold by R. Dudsley, in Pall-Mall, LONDON, & by the Author in PHILADELPHIA.

Latitude of travelling Observers.

Longitude West of London

FIG. 2

THE PITTSBURGH COAL BED
ITS EARLY HISTORY AND DEVELOPMENT
BY HOWARD N. EAVENSON
TRANSACTIONS A. I. M. E. (1938) 130

PITTSBURGH COAL BED

12-2-37

All analyses on "as received" basis.

Thicknesses and Analyses in Each County

State	County	Township or District	Thickness - Inches			No. of	Moisture			Volatile Matter			Fixed Carbon			Ash			Sulphur			BTU.			Ash Softening Temp.-°F.		
			Aver.	Max.	Min.	Samples	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.
Pa.	Greene	Monongahela	94	100	92	5	2.5	3.1	2.0	35.3	36.9	34.4	54.3	55.1	52.8	8.0	8.7	7.3	2.4	2.9	1.6	13570	13720	13330	2250	2350	2140
		Morgan	76	84	72	8	3.0	3.1	2.6	35.0	35.2	33.7	56.7	55.9	55.4	6.7	7.4	5.9	1.2	1.3	1.0	13665	13810	13510	2345	2370	2320
		Morris	66	68	62																						
		Perry	85	92	76																						
		Richhill	61	66	58																						
		Springhill	66	68	62																						
		Washington	71	76	68	3				36.5			57.4			6.1			1.4								
		Wayne	75	84	68																						
		Whiteley	80	88	72																						
Pa.	Indiana	Armstrong	78	82	60																						
		Blacklick	67	72	60	1	2.0			29.3			58.4			10.3			2.2			13520			2180		
		Burrell	65	70	60	3	1.1	1.4	0.9	28.5	29.1	27.4	54.9	58.5	49.7	13.4	19.0	10.2	2.1	3.0	0.8						
		Conemaugh	78	90	76																						
		Young	82	102	62	5	1.5	2.2	1.0	34.8	37.6	32.0	54.0	57.0	50.9	8.8	11.8	5.7	1.3	1.7	0.7						
Pa.	Somerset	Elk Lick	78			16	1.9	3.0	1.1	20.9	22.4	19.5	69.1	71.3	66.5	7.7	11.1	5.9	0.9	1.2	0.7	14085	14320	13730	2985	3010	2960
		Summit	78			4	2.5	3.6	1.4	21.4	22.7	20.0	67.3	69.4	65.1	8.5	11.1	5.6	1.1	1.8	0.8	13755	14110	13400	2705	2730	2680
Pa.	Washington	Allen	73	85	64	4																					
		Amwell	69	72	66																						
		Beallsville Boro	74	76	70	10										7.8	9.7	5.8	1.1	1.8	0.8				2360		
		Bentleyville Boro	64			100				36.5			57.5			6.0			1.0						2360		
		Blaine	60																								
		Buffalo	61			1	2.9			32.4			59.0			5.8			1.2			14180					
		Canton	61																								
		Carroll	62			32	2.8			36.2			58.8			5.0			0.9			13870			2420		
		Cecil	63	66	60	3	2.8	3.4	1.7	35.7	37.2	34.5	51.7	55.8	49.3	9.9	12.2	5.3	2.1	3.0	1.1	13180	14340	12560			
		Centerville Boro	78	84	71	3	1.5	2.3	0.8	36.1	36.9	34.7	54.5	56.8	51.5	7.9	12.2	4.1	1.3	2.3	0.8	13750			2260		
		Chartiers	63	66	60	13	2.0	4.0	1.0	39.6	41.0	38.1	51.3	55.0	48.8	6.4	7.7	2.9	2.0	2.6	1.2	13110			2240	2265	2200
		Cross Creek	62	62	55	2	3.0	4.3	1.7	37.6	37.7	37.4	53.5	54.6	52.3	5.3	6.1	4.5	1.8	2.1	1.5	13310			2080		
		Deemston Boro	73	81	67	10										8.3	10.0	4.6	1.5	2.6	0.9						
		Donegal	59																								
		E. Bethlehem	71	104	59	8	2.8	2.9	2.7	34.3	35.0	33.2	55.2	55.9	53.9	7.3	8.4	6.5	1.8	3.0	1.0	13535	13640	13430	2290	2370	2210
		E. Finley	61																								
		Elco Boro	86	88	84	3				32.8	33.7	32.0	59.5	60.1	58.9	7.7	8.4	6.8	0.9	1.2	0.6						
		E. Pike Run	100	108	92	14	1.9	2.7	1.4	33.4	34.3	31.5	56.5	58.7	54.1	7.6	9.4	6.5	1.6	1.6	0.7	13640	13910	13270	2535	2690	2410
		Fallowfield	73	96	68	3	1.8	2.6	0.7	36.2	38.5	34.7	56.6	57.3	55.9	5.1	6.2	4.0	1.8	1.7	0.9	14125	14150	14110	2545	2610	2480
		Hanover	52	60	48																						
		Hopewell	61																								
		Independence	60	62	50	1	1.1			38.7			40.3			16.2			3.7								
		Jefferson	56	62	50																						
		Long Branch Boro	99			5	1.2	1.4	0.8	32.9	33.7	32.3	57.7	58.6	56.6	7.2	8.5	6.3	0.9	1.2	0.8						
		Morris	66	68	62																						
		Mt. Pleasant	62	68	62	3	3.6			39.9	43.2	34.2				9.1	11.0	7.6	3.1	5.1	1.9				2275	2300	2250
		No. Franklin	65	68	62																						
		No. Strabane	66			2				40.4						5.9	6.4	5.4	1.4	1.6	1.2				2425	2485	2365
		Nottingham	67																								
		Peters	67			4	2.5	3.9	1.1	38.5	41.7	33.6	53.6	56.8	50.3	6.1	6.7	5.7	1.8	2.6	1.0	13820			2415	2440	2385
		Robinson	61	62	58	2	3.9			37.7			52.4			6.9	7.9	6.0	1.8	2.0	1.6	13460			2390	2400	2380
		Roscoe Boro	100																								
		Smith	61	62	58	2	3.3	3.5	3.0	38.2	40.5	35.8	49.2	49.6	48.8	9.9	11.9	6.9	3.7	4.0	3.4	12930	13410	12450	2165	2170	2160
		Somerset	62			100				36.5			57.5			6.0			1.0						2360		
		So. Franklin	65	66	62																						
		So. Strabane	66	66	62	2	1.7	1.9	1.4	36.7	37.1	36.2	53.8			7.1	8.2	6.2	1.8	2.3	1.5				2260	2315	2225
		Speers Bor o	96																								
		Stockdale Boro.	100																								
		Twilight Boro.	95	96	92	10	1.2	2.0	0.7	32.8	34.2	30.4	57.8	59.4	52.4	7.3	14.4	5.3	0.9	1.1	0.8						
		Union	70	72	66	2	3.7	4.3	3.0	34.1	35.2	33.0	53.0	55.4	50.7	9.2	12.0	6.4	1.7	2.2	1.2	13105	13660	12550	2420		
		Washington	65	66	62	2	1.5			37.8			57.1			5.8	8.8	2.8	2.0	3.1	0.8						
		W. Bethlehem	70	80	66	200	1.8	2.1	1.4	36.2	37.3	32.8	57.0	58.9	56.0	6.8	7.0	6.1	1.3	1.4	1.0	14220			2150		
		W. Finley	59																								
		W. Pike Run	76	83	66	30	2.3			38.1			55.3			7.6	11.3	5.7	1.2	2.1	0.7	13750			2410		
		Dunlevy Boro.	76	82	72	10										7.1	10.9	4.9	0.9	1.4	0.7						
Pa.	Westmoreland	Bell	74			115				36.1			53.6			8.3			1.5						2590		
		Derry	83	92	72	3	1.0	1.2	0.8	31.6	33.0	30.7	63.2	63.8	62.8	3.5	4.6	2.3	0.7	0.8	0.6						
		E. Huntingdon	97	108	94	50	2.6			30.3			61.4			8.3			1.1								
		Fa irfield	78			1	1.0			25.2			69.6			3.5			0.7								
		Franklin	80	88	76	1	3.9			33.6			57.0			5.5			1.2			13650			2410		

TABLE 5—SHEET 3

PITTSBURGH COAL BED

12-2-37

All analyses on "as received" basis

Thicknesses and Analyses in Each County

State	County	Township or District	Thickness - Inches			No. of	Moisture			Volatile Matter			Fixed Carbon			Ash			Sulphur			BTU			Ash Softening Temp.-°F.		
			Aver.	Max.	Min.	Samples	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.
Pa.	Westmoreland	Hempfield	85	94	72	4	3.2	4.4	1.0	31.7	34.5	28.1	57.4	61.3	55.0	8.6	11.0	3.3	1.3	1.8	0.9	13115	13310	13020			
		Ligonier	78			2	1.9	3.1	0.6	24.7	24.9	24.5	63.0	64.8	61.2	8.8	11.2	6.3	2.5	3.5	1.4	13320			2650		
		Loyalhanna	74			87				35.8			56.1			8.2			1.3								
		Mt. Pleasant	96	108	90	50	2.7			29.6			62.1			8.3			1.2								
		N. Huntingdon	80	95	68	4	1.9	3.2	1.3	36.7	39.2	32.8	55.1	56.5	54.4	5.9	7.5	4.3	0.7	1.4	0.6	13490					
		Penn	81	82	68	10	1.5	1.8	1.3	38.3			56.8	59.3	54.4	7.5			1.2						2410		
		Rostraver	93	104	68	20				37.0						7.7			1.0						2500		
		Salem	74	92	72	160	2.7	3.4	1.2	35.2			56.7	58.5	55.3	8.0	9.1	5.9	1.2	1.4	0.8	13475	13610	13390	2595	2650	2540
		Sewickley	73	85	68	3	1.6	2.0	1.2	34.6	37.2	33.0	57.0	58.2	54.8	6.4	10.4	2.5	0.9	1.4	0.6	14150			2480		
		S. Huntingdon	83	94	68	40				37.0	37.6	36.5				7.9	8.1	7.4	1.1	1.2	1.1				2575	2645	2515
		Unity	96	100	84	50	2.8			30.0			61.3			8.7			1.3								
		Upper Burrell	76																								
		Washington	76																								
W.Va.	Barbour	Barker	110	127	84	2	1.6	2.4	0.8	33.7	34.3	33.0	58.3	59.5	57.0	6.5	7.6	5.4	2.4	2.5	2.4						
		Cove	120			1	2.6			33.0			59.8			4.5			0.8								
		Elk	93	110	66	2	1.0	1.1	0.9	38.3	38.7	37.9	56.2	56.3	56.0	4.6	5.2	3.9	2.3	2.3	2.2						
		Pleasant	87	113	61	4	0.8	1.5	0.4	38.0	39.1	37.3	54.4	56.3	52.8	6.8	8.2	5.4	2.8	3.1	2.1	14270	14400	14140			
		Union	76	94	36	1	0.7			40.1			50.2			9.0			3.7								
W.Va.	Braxton	Birch	47	70	35	1	1.8			39.7			49.8			8.7			2.8			13110					
		Otter	55	82	39	4	2.3	2.8	1.8	39.3	40.9	35.4	52.1	57.5	47.6	6.3	8.7	5.3	2.3	3.4	1.7	13290					
		Salt Lick	55	78	37	3	2.1	2.5	1.4	38.9	40.4	38.2	52.5	52.9	52.0	6.5	6.7	6.3	2.1	2.5	1.8	13620	13630	13610			
W.Va.	Brooke	Buffalo	55	72	47	10	2.9	4.2	0.6	34.6	39.4	29.9	53.3	57.9	49.7	9.3	12.0	6.0	2.9	4.5	1.7	12930	13430	12230	2210		
		Cross Creek	52	66	44	14	2.8	5.1	1.0	35.3	37.4	33.0	54.5	59.9	50.1	7.3	11.4	4.1	1.9	4.2	0.7	13410	14000	12860	2185	2340	2030
W.Va.	Cabell	Barboursville	36			1	2.4			42.2			48.6			6.8			3.0			12800					
W.Va.	Calhoun	Washington	36			2	1.2	1.4	1.0	34.9	35.5	34.3	56.9	58.8	55.0	7.0	9.3	4.7	3.4	4.3	2.5	13750	14110	13380			
W.Va.	Clay	Otter	44	54	35																						
W.Va.	Doddridge	Cove	72																								
		Grant	72																								
		Greenbrier	72																								
		McClellen	72																								
		New Milton	72																								
W.Va.	Gilmer	Center	51	73	42	8	1.4	1.7	1.0	39.1	43.0	34.5	51.6	57.1	47.4	7.9	13.7	4.3	2.9	7.1	1.8	13120	13530	12610			
		Glenville	70	105	48	16	1.6	2.8	1.1	42.1	44.2	40.5	49.7	51.7	48.2	6.7	7.5	4.9	2.4	3.1	1.8	13750	13940	13520			
		Troy	66	81	52	1	1.4			42.6			49.6			6.5			2.1								
W.Va.	Grant	Union	135																								
W.Va.	Hancock	Butler	50	52	48	2	2.2	2.2	2.2	34.5	34.6	34.3	55.3	55.7	54.9	7.9	8.2	7.7	2.4	2.8	2.0	13180	13210	13140			
W.Va.	Harrison	Clark	87	103	60	9	2.0	4.9	0.9	38.5	40.8	36.4	53.2	56.1	49.0	6.4	8.6	5.1	3.0	4.0	1.9	13920	14470	13470			
		Clay	95	107	83	14	1.8	2.5	1.1	37.0	39.2	34.5	54.7	58.5	51.3	6.5	7.9	4.8	2.3	3.7	0.9	13830	14190	13470			
		Coal	89	105	72	19	1.4	1.7	0.7	38.6	42.4	30.3	53.3	62.3	48.1	6.8	8.4	5.4	3.2	4.4	1.9	13810	14170	13430			
		Elk	75																								
		Grant	78	100	45	10	2.4	6.1	0.9	37.2	38.8	35.4	54.7	57.8	51.4	5.8	6.3	5.2	2.9	3.6	2.1	13730	13940	13320			
		Eagle	86	93	71	14	1.7	2.5	0.8	39.4	41.1	37.0	52.1	53.1	50.6	6.8	8.6	5.9	3.1	4.2	2.4	13670	13820	13390			
		Sardis	79			1	1.7			41.3			50.1			7.0			3.6			13540					
		Simpson	93	97	89	4	2.5	3.3	1.5	38.5	40.0	37.7	53.4	53.9	53.1	5.5	5.7	5.1	2.1	2.4	1.4	13980	14110	13800			
		Union	55	64	47	1	0.6			41.0			51.7			6.6			4.8			13730					
W.Va.	Kanawha	Jefferson	51																								
		Poca	61	78	44	5	3.2	4.1	2.3	38.2	40.4	32.8	52.7	57.8	49.0	6.0	8.2	5.0	2.2	4.0	1.1	13560	13690	13400			
		Union	63	92	48	8	2.0	2.8	1.5	40.9	44.6	33.8	50.7	57.4	47.0	6.0	9.7	4.4	1.2	3.1	0.6	13550					
W.Va.	Lewis	Freemans Creek	58	88	36	2	1.1	1.2	1.0	42.0	42.9	41.0	49.8	51.2	48.3	7.2	9.7	4.7	2.6	3.4	1.7						
		Hackers Creek	56			1	1.1			40.9			53.7			4.3			2.5								
W.Va.	Marion	Fairmont	87	95	78	8	1.6	2.3	1.0	37.5	39.2	34.6	54.3	57.3	51.8	6.8	7.3	6.2	2.1	2.5	1.4	13950	14060	13780	2120	2130	2110
		Grant	80	90	53	24	1.7	3.0	0.8	36.7	40.2	32.8	55.7	58.2	50.4	5.9	8.2	4.2	1.5	3.0	0.7	14000	14300	13690	2215	2270	2090
		Lincoln	79	88	70	10	2.0	4.0	0.9	36.5	37.7	34.7	54.1	57.1	52.8	6.2	10.0	5.8	1.1	2.0	0.7	13770	14040	13220	2270	2340	2130
		Pawpaw	90	92	86	4	1.7	2.7	0.8	36.0	37.2	34.8	55.9	56.7	55.3	6.4	7.2	5.6	1.6	2.0	1.2	14140	14430	13860			
		Union	64			1	1.8			36.5			53.4			8.3			2.5			13650					
		Winfield	85	95	74	5	1.4	1.9	0.9	36.6	37.7	34.9	55.7	57.7	54.3	6.3	7.2	5.6	1.7	2.4	1.2	14110	14190	14050			

TABLE 5—SHEET 4

PITTSBURGH COAL BED

9/28/37

All analyses on "as received" basis.

Thicknesses and Analyses in Each County.

State	County	Township or District	Thickness - Inches			No. of	Moisture			Volatile Matter			Fixed Carbon			Ash			Sulphur			B.T.U.			Ash Softening Temp.-0°F.		
			Aver.	Max.	Min.	Samples	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.
W.Va.	Marshall	Clay	59			2	2.7	3.4	1.9	38.5	41.6	35.4	51.0	54.0	48.0	7.9	8.8	7.0	3.6	3.8	3.3	13740	14160	13310	2080		
		Frenklin				1				40.5			53.4			6.1			2.8								
		Union	60	64	58	6	2.6	3.2	2.0	40.4	41.6	39.7	49.3	51.0	47.2	7.7	8.9	7.0	4.4	4.7	3.9	13350	13540	13160	1970		
		Washington	61			3	2.8	4.5	1.8	37.3	38.7	34.9	49.3	53.0	45.0	10.6	13.1	6.9	4.7	5.8	3.7	13410	14130	12330	2080		
		Webster				1	1.3			37.7			50.6			10.4			4.8								
W.Va.	Mason	Waggener	51	56	44	4	5.7	7.0	4.6	38.9	40.4	37.5	49.3	53.0	45.9	6.1	8.6	4.8	1.7	3.1	0.9	12910	13270	12550			
W.Va.	Mineral	Elk	121	154	77	6	1.6	4.7	0.8	19.3	24.4	16.2	72.2	76.1	62.9	7.0	9.6	5.1	1.0	1.2	0.8	13920	14780	11820	2570	2720	2400
		Piedmont	105																								
W.Va.	Monongalia	Cass	98			1	0.8			36.9			53.5			8.8			3.7			13720					
		Clinton	85	94	77	2	2.7	4.5	0.9	36.5	38.2	34.7	54.8	55.2	54.5	6.0	6.4	5.6	1.8	1.9	1.8	13950	14260	13640			
		Grant	99	120	85	2	1.7	2.1	1.3	35.7	35.8	35.5	54.9	56.4	53.4	7.8	9.1	6.5	2.6	2.8	2.3	13745	13970	13520			
		Morgan	84			1	2.1			34.6			54.2			9.2			2.1			14280					
		Union	97			1	1.2			32.7			61.2			4.9			3.5			14360					
W.Va.	Ohio	Richland	50	54	46	4	2.8	3.6	1.4	35.3	37.3	32.8	54.6	57.8	51.4	7.2	9.9	5.8	3.1	3.4	2.7	13370	13460	13250			
		Triadelphia	59	64	56	5	2.8	3.1	0.6	38.3	41.4	34.5	51.2	54.2	47.5	9.3	9.3	5.9	3.8	4.4	3.0	13110	13620	12400			
		Wheeling	57	67	52	5	0.8	1.1	0.6	40.1	40.7	39.4	51.5	53.6	50.3	7.7	9.6	4.8	3.5	4.3	3.0						
W.Va.	Preston	Lyon	103	108	99	2	0.5	0.5	0.5	30.5	33.7	27.2	63.7	65.6	61.7	5.5	6.8	4.2	1.1	1.4	0.8						
W.Va.	Putnam	Pocatalico	57	66	30	7	3.9	5.4	2.9	38.7	39.8	37.4	51.0	53.5	48.3	6.6	7.3	5.6	2.0	3.3	0.7	13250	13810	12910	2150		
W.Va.	Roane	Geary				1	1.0			38.8			56.3			3.9			1.6			13960					
		Smithfield				3	1.2	1.3	1.1	36.4	37.0	35.4	54.5	55.0	54.4	7.9	8.5	7.5	2.2	3.8	1.0	13420	13510	13230			
W.Va.	Taylor	Courthouse	74	84	65	6	0.9	1.0	0.3	36.5	38.9	35.4	55.5	57.0	53.7	7.2	9.0	5.8	2.5	3.5	1.1	14100	14400	13810			
		Flemington	85	90	79	4	1.2	1.3	1.1	37.8	39.0	36.9	54.7	55.5	53.6	6.2	6.5	6.1	3.2	3.5	2.8	14220	14280	14140			
W.Va.	Tucker	Fairfax	117																								
W.Va.	Upshur	Warren	67	105	36	1	0.9			41.4			51.2			6.6			3.1								
W.Va.	Wetzel	Center	72																								
		Church	72																								
		Clay	72																								
		Grant	72																								
		Greene	72																								
		Proctor	72																								

TABLE 5—SHEET 5

THE PITTSBURGH COAL BED
ITS EARLY HISTORY AND DEVELOPMENT
BY HOWARD N. EAVENSON
TRANSACTIONS A.I.M.E. (1938) 130

PITTSBURGH SEAM PRODUCTION - WESTERN PENNSYLVANIA, 1790-1880

ALL NET TONS

IN CONVERSION OF OLD DATA, 25 BUSHELS = 1 NET TON

Compiled by Howard N. Eavenson from various sources, 1936-37.

Year	Population Pittsburgh	Population District	River Shipments			Local Pits		Railroads & Canal		Domestic	Manufacturing	Totals		Total Production Southwestern Pennsylvania
			Total	Exported	Used at Home	Shipped	Used at Home	Shipped	Used at Home			Shipped	Used at Home	
1790		63,518												30,000
1791														34,000
1792														38,000
1793														42,000
1794														46,000
1795														50,000
1796	1,395													57,000
1797														64,000
1798														71,000
1799														79,000
1800	1,565	86,270												87,000
1801														89,000
1802														92,000
1803														94,000
1804														97,000
1805														100,000
1806	4,740												7,900 (a)	104,000
1807														108,000
1808														112,000
1809														116,000
1810	4,768	112,712											10,000 (b)	120,000
1811														130,000
1812														142,000
1813	5,748												36,000 (c)	154,000
1814														167,000
1815														180,000
1816														200,000
1817	7,000													220,000
1818														240,000
1819														220,000
1820	7,248	132,784												200,000
1821														200,000
1822														200,000
1823														200,000
1824														200,000
1825													40,000 (p)	200,000
1826														220,000
1827														240,000
1828													40,000	260,000
1829														280,000
1830	16,988	161,003												300,000
1831														320,000
1832														340,000
1833										224,000 (h)	75,263 (g)		286,620 (p)	286,620
1834				19,600 (r)										380,000
1835											255,000 (q)			400,000
1836			201,200	100,600	100,600					145,000	228,480		205,200 (d)	452,160 (d)
1837													452,160 (u)	403,000
1838											280,000 (p)	120,000 (p)		406,000
1839														461,542 (t)
1840	38,931	198,787												410,093 (e)
1841														460,000
1842											320,000 (p)	100,000 (p)		510,400 (f)
1843														570,000
1844														630,000
1845			184,207 (f)	106,413	77,794						520,000 (p)	240,000 (p)		690,000
1846			311,156	209,457	101,699									760,000 (f)
1847			385,805	260,560	125,245									900,000
1848			392,774	259,842	132,932									1,039,000
1849			388,340	253,196	135,144									1,178,000
1850	79,873	279,067	491,919	313,002	178,917									1,317,000
1851			500,849	305,808	195,041									1,456,000
1852			585,233	396,157	189,076									1,596,000
1853			628,655	432,025	196,630			40,000 (f)	25,000 (f)					1,735,000
1854			693,276	546,660	146,616			65,000	70,000					1,874,000
1855			889,360	652,006	237,354	80,000 (f)	40,000 (f)	135,000 (n)	110,000 (n)					2,012,000
1856			343,364 (f)	206,979	136,370		375,400	140,480 (f)	124,929 (f)	434,000 (f)	902,000 (f)			2,151,286 (f)
1857			1,158,944								457,850 (i)			2,208,000
1858			1,027,867											2,266,000
1859			1,131,467	945,320 (m)	185,847									2,323,000
1860	124,844	319,281	1,517,910	1,303,235	214,675		77,500 (n)							2,380,460 (e)
1861			834,628	640,199	194,429									2,603,000
1862			743,358	561,308	182,050									2,826,000
1863			1,057,770	865,573	192,197									3,049,000
1864			1,402,837	1,181,663	221,174		147,000 (n)		381,700 (n)					3,272,000
1865			1,580,912	1,322,908	258,004									3,496,000
1866			1,704,612	1,600,000 (m)	104,612									3,719,000
1867			1,202,908											3,942,000
1868			1,812,040	1,760,000 (s)	52,040									4,165,000
1869			2,100,504											4,389,000
1870			2,303,856											4,613,625 (e)
1871			1,944,852											3,978,000 (k)
1872			2,168,352											6,608,000 (k)
1873			2,204,540											6,479,000 (k)
1874			2,635,268					1,573,097 (v)						5,268,000 (k)
1875			2,456,360											5,000,000
1876			2,495,800											4,107,000
1877			2,908,112											3,216,563 (k)
1878			2,797,530											5,992,345 (k)
1879			2,480,612											10,044,926 (k)
1880			3,361,934											11,809,516 (e)

REFERENCES

(a) Travels on an Inland Voyage - C. Schultz, p. 126.
(b) Cramers Navigator, 1811 - Consumption of town in previous year.
(c) Cramers Navigator, 1814 - Consumption of town in previous year.
(d) Harris - Directory of Pittsburgh, 1837, pp. 175-6.
(e) Data for 1840, 1860, 1870, 1880 is by counties - From letters U. S. Bureau of Census, 3/24/37, 3/3/37 - For 1850 only number of establishments and value of product were collected, and no tonnage figures are available.
(f) Thurston - Pittsburgh as It Is, pp. 60-65, inc.
(g) Hazard - Register of Pa., Vol. 12, pp. 314, 315. List of manufacturing plants with monthly coal consumption of each.
(h) Journal Pa. Senate, 1833-4, Vol. 2, pp. 482-4, 490. Report on the coal trade - Data about coal consumption.
(i) Thurston - Pittsburgh as It Is, pp. 113, 161, 64.
(j) History of Washington Co. - Forrest. Evidently amount stated is too large.
(k) Pa. Bureau of Statistics - Labor & Agriculture, including Mine Inspectors' Reports.
(m) 1859 to 1866 - Report of W. Milner Roberts on Ohio River Improvements, House Document 1866-7. 39th Congress, 2nd Session.
(n) Report on Mfrs., 8th Census - Issued 1865.
(p) Statistics of Coal - R. C. Taylor, p. 80.
(q) American Journal of Science - Vol. 29 - 1836 - p. 79.
(r) In only one week succeeding rise in Nov. 1834. Could "50 Years on the Mississippi, 1889", p. 499.
(s) Pittsburgh, Its Industry & Commerce, 1870, p. 13.
(t) Harris - General Business Directory, 1841. Taken by Marshal of W. Pa. for year 1839.
(u) Proc. Railroad Convention at Harrisburg, 1838, p. 25.
(v) Statistics of Iron & Coal Trades of Pgh. for 1874 - American Manufacturer.

NOTES AND EXPLANATIONS

Popultion in second column is that of Pittsburgh only.
Population in third column is that of *Washington, Westmoreland, Allegheny and Fayette* Counties. Greene is not included because coal used locally was generally from other seams.
Columns one, two and three are all available data on shipments on Monongahela River, above Lock No. 1.
Columns four and five are from mines on Coal Hill and Sawmill Run, partly loaded on Monongahela River, below Lock No. 1.
Columns six and seven are shipments on railroad and canal, partly used locally, but partly "exported", or shipped east.
Column eight - Coal used for domestic purposes.
Column nine - Coal used for manufacturing purposes.
Columns ten and eleven are totals of preceding ones.
Column twelve shows all definite data available - Other years are interpolated.

DATA USED FOR PRODUCTION PRIOR TO 1830

Pa. Senate Journal - 1833-4, Vol. 2, p. 482. In 1833, 30,000 people in Pittsburgh and suburbs, 6,000 buildings averaging 3 grates, each using 200 bushels (8 tons) per year, equals 3,600,000 bushels, or 144,000 net tons or 4.8 tons per person.
In 1836, Lyford calculated population of city and manufacturing districts at 30,000 or 5,000 families, with an average consumption of 382 bushels per year equals 15.3 tons per family or 2.5 tons per person.
Harris Pittsburgh Directory, 1837 - comments on above - says 6 persons per family is O. K., but consumption should be 500 bushels per year or 20 tons or 3.3 tons per person.
Cramers Navigator, 1811, gives consumption of previous year at 10,000 tons - Population 4,786 or 2.1 tons per person.
Use 2.0 tons per capita to 1810 in Pittsburgh - 1.0 outside.
Use 2.1 tons per capita to 1820 in Pittsburgh - 1.0 outside.
Use 2.5 tons per capita to 1830 in Pittsburgh - 1.0 outside.
Pa. Geological Survey - Report K-4, p. XXVII - Quotes Harris Directory of Pittsburgh, 1837, pp. 175-6 as showing 9 mines operating in Coal Hill at that time and 20 teams hauling from other banks with a total production of 205,200 tons.

PITTSBURGH SEAM PRODUCTION - WESTERN PENNSYLVANIA, 1790-1880

ALL NET TONS

IN CONVERSION OF OLD DATA, 25 BUSHELS = 1 NET TON

Compiled by Howard N. Eavenson from various sources, 1936-37.

Year	Population Pittsburgh	Population District	River Shipments			Local Pits		Railroads & Canal		Domestic	Manufacturing	Totals		Total Production Southwestern Pennsylvania
			Total	Exported	Used at Home	Shipped	Used at Home	Shipped	Used at Home			Shipped	Used at Home	
1790		63,518												30,000
1791														34,000
1792														38,000
1793														42,000
1794														46,000
1795														50,000
1796	1,395													57,000
1797														64,000
1798														71,000
1799														79,000
1800	1,565	86,270												87,000
1801														89,000
1802														92,000
1803														94,000
1804														97,000
1805														100,000
1806	4,740												7,900 (s)	104,000
1807														108,000
1808														112,000
1809														116,000
1810	4,768	112,712											10,000 (b)	120,000
1811														130,000
1812														142,000
1813	5,748												36,000 (c)	154,000
1814														167,000
1815														180,000
1816														200,000
1817	7,000													220,000
1818														240,000
1819														220,000
1820	7,248	132,784												200,000
1821														200,000
1822														200,000
1823														200,000
1824														200,000
1825													40,000 (p)	200,000
1826														220,000
1827														240,000
1828													40,000	260,000
1829														280,000
1830	16,988	161,003												300,000
1831														320,000
1832														340,000
1833										224,000 (h)	75,263 (g)		286,620 (p)	286,620
1834				19,600 (r)										380,000
1835											255,000 (q)			400,000
1836			201,200	100,600	100,600					145,000	228,480		205,200 (d)	452,160 (d)
1837													452,160 (u)	403,000
1838											280,000 (p)	120,000 (p)		406,000
1839														461,542 (t)
1840	38,931	198,787												410,093 (e)
1841														460,000
1842											320,000 (p)	100,000 (p)		510,400 (f)
1843														570,000
1844														630,000
1845			184,207 (f)	106,413	77,794						520,000 (p)	240,000 (p)		690,000
1846			311,156	209,457	101,699									760,000 (f)
1847			385,805	260,560	125,245									900,000
1848			392,774	259,842	132,932									1,039,000
1849			388,340	253,196	135,144									1,178,000
1850	79,873	279,067	491,919	313,002	178,917									1,317,000
1851			500,849	305,808	195,041									1,456,000
1852			585,233	396,157	189,076									1,596,000
1853			628,655	432,025	196,630			40,000 (f)	25,000 (f)					1,735,000
1854			693,276	546,660	146,616			65,000	70,000					1,874,000
1855			889,360	652,006	237,354	80,000 (f)	40,000 (f)	135,000 (n)	110,000 (n)					2,012,000
1856			343,364 (f)	206,979	136,370		375,400	140,480 (f)	124,929 (f)	434,000 (f)	902,000 (f)			2,151,286 (f)
1857			1,158,944								457,850 (i)			2,208,000
1858			1,027,867											2,266,000
1859			1,131,467	945,620 (m)	185,847									2,323,000
1860	124,844	319,281	1,517,910	1,303,235	214,675		77,500 (n)							2,380,460 (e)
1861			834,628	640,199	194,429									2,603,000
1862			743,358	561,308	182,050									2,826,000
1863			1,057,770	865,573	192,197									3,049,000
1864			1,402,837	1,181,663	221,174		147,000 (n)		381,700 (n)					3,272,000
1865			1,580,912	1,322,908	258,004									3,496,000
1866			1,704,612	1,600,000 (m)	104,612									3,719,000
1867			1,202,908											3,942,000
1868			1,812,040	1,760,000 (s)	52,040									4,165,000
1869			2,100,504											4,389,000
1870			2,303,856											4,613,625 (e)
1871			1,944,852											3,978,000 (k)
1872			2,168,352											6,608,000 (k)
1873			2,204,540											6,479,000 (k)
1874			2,635,268					1,573,097 (v)						5,268,000 (k)
1875			2,456,360											5,000,000
1876			2,495,800											4,107,000
1877			2,908,112											3,216,563 (k)
1878			2,797,530											5,992,345 (k)
1879			2,480,612											10,044,926 (k)
1880			3,361,934											11,809,516 (e)

REFERENCES

(a) Travels on an Inland Voyage - C. Schultz, p. 126.
(b) Cramers Navigator, 1811 - Consumption of town in previous year.
(c) Cramers Navigator, 1814 - Consumption of town in previous year.
(d) Harris - Directory of Pittsburgh, 1837, pp. 175-6.
(e) Data for 1840, 1860, 1870, 1880 is by counties - From letters U. S. Bureau of Census, 3/24/37, 3/3/37 - For 1850 only number of establishments and value of product were collected, and no tonnage figures are available.
(f) Thurston - Pittsburgh as It Is, pp. 60-65, inc.
(g) Hazard - Register of Pa., Vol. 12, pp. 314, 315. List of manufacturing plants with monthly coal consumption of each.
(h) Journal Pa. Senate, 1833-4, Vol. 2, pp. 482-4, 490. Report on the coal trade - Data about coal consumption.
(i) Thurston - Pittsburgh as It Is, pp. 113, 161, 64.
(j) History of Washington Co. - Forrest. Evidently amount stated is too large.
(k) Pa. Bureau of Statistics - Labor & Agriculture, including Mine Inspectors' Reports.
(m) 1859 to 1866 - Report of W. Milner Roberts on Ohio River Improvements, House Document 1866-7. 39th Congress, 2nd Session.
(n) Report on Mfrs., 8th Census - Issued 1865.
(p) Statistics of Coal - R. C. Taylor, p. 80.
(q) American Journal of Science - Vol. 29 - 1836 - p. 79.
(r) In only one week succeeding rise in Nov. 1834. Gould "50 Years on the Mississippi, 1889", p. 499.
(s) Pittsburgh, Its Industry & Commerce, 1870, p. 18.
(t) Harris - General Business Directory, 1841. Taken by Marshal of W. Pa. for year 1839.
(u) Proc. Railroad Convention at Harrisburg, 1838, p. 25.
(v) Statistics of Iron & Coal Trades of Pgh. for 1874 - American Manufacturer.

NOTES AND EXPLANATIONS

Population in second column is that of Pittsburgh only.
Population in third column is that of Washington, Westmoreland, Allegheny and Fayette Counties. Greene is not included because coal used locally was generally from other seams.
Columns one, two and three are all available data on shipments on Monongahela River, above Lock No. 1.
Columns four and five are from mines on Coal Hill and Sawmill Run, partly loaded on Monongahela River, below Lock No. 1.
Columns six and seven are shipments on railroad and canal, partly used locally, but partly "exported", or shipped east.
Column eight - Coal used for domestic purposes.
Column nine - Coal used for manufacturing purposes.
Columns ten and eleven are totals of preceding ones.
Column twelve shows all definite data available - Other years are interpolated.

DATA USED FOR PRODUCTION PRIOR TO 1830

Pa. Senate Journal - 1833-4, Vol. 2, p. 482. In 1833, 30,000 people in Pittsburgh and suburbs, 6,000 buildings averaging 3 grates, each using 200 bushels (8 tons) per year, equals 3,600,000 bushels, or 144,000 net tons or 4.8 tons per person.
In 1836, Lyford calculated population of city and manufacturing districts at 30,000 or 5,000 families, with an average consumption of 382 bushels per year equals 15.3 tons per family or 2.5 tons per person.
Harris Pittsburgh Directory, 1837 - comments on above - says 6 persons per family is O. K., but consumption should be 500 bushels per year or 20 tons or 3.3 tons per person.
Cramers Navigator, 1811, gives consumption of previous year at 10,000 tons - Population 4,786 or 2.1 tons per person.
Use 2.0 tons per capita to 1810 in Pittsburgh - 1.0 outside.
Use 2.1 tons per capita to 1820 in Pittsburgh - 1.0 outside.
Use 2.5 tons per capita to 1830 in Pittsburgh - 1.0 outside.
Pa. Geological Survey - Report K-4, p. XXVII - Quotes Harris Directory of Pittsburgh, 1837, pp. 175-6 as showing 9 mines operating in Coal Hill at that time and 20 teams hauling from other banks with a total production of 205,200 tons.

PRODUCTION AND IMPORTS OF COAL IN UNITED STATES FROM 1750 TO 1880

ALL NET TONS

Year	Pennsylvania					Ohio			Maryland	Virginia	West Virginia			Kentucky	Illinois	Indiana	Missouri	Alabama	Tenn.	Iowa	Others	Total				
	Anthracite	Bituminous Pgh. Seam	Bituminous Other	Bituminous Total	State Total	Pgh. Seam	Other	Total			Pgh. Seam	Other	Total									Anthracite	Total Bituminous	Production	Imports Less Exports	Total Consumption
1750										500													500	500	3,000	3,500
1751										600													600	600	3,000	3,600
1752										700													700	700	3,000	3,700
1753										800													800	800	3,000	3,800
1754										900													900	900	3,000	3,900
1755										1,000													1,000	1,000	3,000	4,000
1756										1,100													1,100	1,100	3,000	4,100
1757										1,200													1,200	1,200	3,000	4,200
1758										1,300													1,300	1,300	3,000	4,300
1759		50		50	50					1,400													1,450	1,450	3,000	4,450
1760		50		50	50					1,500													1,550	1,550	4,000	5,550
1761		100		100	100					1,800													1,900	1,900	4,000	5,900
1762		100		100	100					2,100													2,200	2,200	4,000	6,200
1763		100		100	100					2,400													2,500	2,500	4,000	6,500
1764		100		100	100					2,700													2,800	2,800	4,000	6,800
1765		100		100	100					3,000													3,100	3,100	6,000	9,100
1766		100		100	100					3,500													3,600	3,600	6,000	9,600
1767		100		100	100					4,000													4,100	4,100	6,000	10,100
1768		100		100	100					4,500													4,600	4,600	6,000	10,600
1769		100		100	100					5,000													5,100	5,100	6,000	11,100
1770		100		100	100					5,500													5,600	5,600	8,000	13,600
1771		100		100	100					6,000													6,100	6,100	8,000	14,100
1772		100		100	100					6,500													6,600	6,600	8,000	14,600
1773		100		100	100					7,000													7,100	7,100	8,000	15,100
1774		100		100	100					7,500													7,600	7,600	8,000	15,600
1775		150		150	150					8,000													8,150	8,150	2,000	10,150
1776	100	150		150	250					8,700												100	8,850	8,950	2,000	10,950
1777	100	150		150	250					9,400												100	9,550	9,650	2,000	11,650
1778	100	200		200	300					10,100												100	10,300	10,400	2,000	12,400
1779	100	200		200	300					10,800												100	11,000	11,100	2,000	13,100
1780	100	400		400	500					11,500												100	11,900	12,000	2,000	14,000
1781	100	600		600	700					12,200												100	12,800	12,900	2,000	14,900
1782	100	800		800	900					12,900												100	13,700	13,800	2,000	15,800
1783	100	1,000		1,000	1,100					13,600												100	14,600	14,700	4,000	18,700
1784	100	3,000		3,000	3,100					14,300												100	17,300	17,400	5,000	22,400
1785	100	5,000		5,000	5,100					15,000												100	20,000	20,100	5,000	25,100
1786	100	10,000		10,000	10,100					15,600												100	25,600	25,700	5,000	30,700
1787	100	15,000		15,000	15,100					16,300												100	31,300	31,400	5,000	36,400
1788	100	20,000		20,000	20,100					17,000												100	37,000	37,100	5,000	42,100
1789	100	25,000		25,000	25,100					17,700												100	42,700	42,800	4,312 b	47,112
1790	200	30,000		30,000	30,200					18,400												200	48,400	48,600	7,858	56,458
1791	200	34,000		34,000	34,200					19,100												200	53,100	53,300	11,977	65,277
1792	200	38,000		38,000	38,200					19,800												200	57,800	58,000	10,718	68,718
1793	200	42,000		42,000	42,200					20,500												200	62,500	62,700	5,312	68,012
1794	200	46,000		46,000	46,200					21,200												200	67,200	67,400	4,570	71,970
1795	300	50,000		50,000	50,300	1,000		1,000		21,900												300	72,900	73,200	5,014	78,214
1796	300	57,000		57,000	57,300	2,000		2,000		22,600												300	81,600	81,900	7,996	89,896
1797	300	64,000		64,300	64,300	3,000		3,000		23,100												300	90,100	90,400	11,230	101,630
1798	300	71,000		71,000	71,300	5,000		5,000		23,600												300	99,600	99,900	6,805	106,705
1799	300	79,000		79,000	79,300	7,000		7,000		24,000												300	110,000	110,300	10,230	120,530
1800	400	87,000		87,000	87,400	8,000		8,000		26,000	7,600		7,600									400	128,600	129,000	13,202	142,202
1801	400	89,000		89,000	89,400	8,600		8,600		27,300	9,200		9,200									400	134,100	134,500	26,602	161,102
1802	500	92,000		92,000	92,500	8,900		8,900		28,000	10,000		10,000									500	138,900	139,400	15,350	154,750
1803	500	94,000		94,000	94,500	9,200		9,200		28,600	10,800		10,800									500	142,600	143,100	20,156	163,256
1804	500	97,000	50	97,050	97,550	9,800		9,800	100	29,900	12,400		12,400									500	149,250	149,750	13,028	162,778
1805	600	100,000	200	100,200	100,800	10,500		10,500	300	31,200	14,000		14,000									600	156,200	156,800	17,305	174,105
1806	600	104,000	600	104,600	105,200	11,200		11,200	500	32,500	15,700		15,700									600	164,500	165,100	14,950	180,050
1807	700	108,000	1,000	109,000	109,700	11,900		11,900	700	33,800	17,400		17,400									700	172,800	173,500	18,273	191,773
1808	700	112,000	1,500	113,500	114,200	12,600		12,600	900	35,100	19,100		19,100									700	181,200	181,900	14,066	195,966
1809	700	116,000	2,000	118,000	118,700	13,300		13,300	1,100	36,500	20,800		20,800									700	189,700	190,400	5,311	195,711
1810	700	120,000	2,500	122,500	123,200	14,000		14,000	1,300	38,000	22,500		22,500									700	198,300	199,000	14,432	213,432
1811	700	130,000	3,000	133,000	133,700	16,000		16,000	1,500	39,100	23,900		23,900									700	213,500	214,200	14,827	229,027
1812	700	142,000	3,500	145,500	146,200	18,000		18,000	1,750	40,200	25,300		25,300									700	230,700	231,400	1,808	233,208
1813	700	154,000	4,000	158,000	158,700	20,000		20,000	1,900	41,300	26,700		26,700									700	247,900	248,600	3,265	251,865
1814	700	167,000	4,500	171,500	172,200	22,000		22,000	2,100	42,400	28,100		28,100									700	266,100	266,800	775	267,575
1815	700	180,000	5,000	185,000	185,700	24,200		24,200	2,300	43,500	29,500		29,500									700	284,500	285,200	3,936	289,136
1816	700	200,000	6,000	206,000	206,700	26,400		26,400	2,500	44,600	31,000	20,000	51,000									700	330,500	331,200	21,424	352,624
1817	700	220,000	7,000	227,000	227,700	28,600		28,600	2,600	45,700	32,500	30,000	62,500									700	366,400	367,100	26,413	393,513
1818	700	240,000	8,000	248,000	248,700	30,800		30,800	2,700	46,800	34,000	40,000	74,000									700	402,300	403,000	35,178	438,178
1819	700	220,000	9,000	229,000	229,700	33,000		33,000	2,900	47,900	35,500	50,000	85,500									700	398,300	399,000	37,304	436,304
1820	700	200,000	10,000	210,000	210,700	35,000		35,000	3,000	49,000	37,100	60,000	97,100									700	394,100	394,800		394,800
1821	1,202	200,000	11,000	211,000	212,202	36,500		36,500	3,000	51,000	40,200	70,000	110,200									1,202	411,700	412,902	25,106	438,008
1822	2,509	200,000	12,000	212,000	214,509	38,000		38,000	3,000	54,000 j	43,300	80,000	123,300									2,509	430,300	432,809	38,833 b	471,642
1823	6,522	200,000	13,000	213,000	219,522	39,500		39,500	3,000	60,000	46,400	90,000	136,400									6,522	448,900	455,422	34,085 e	489,507
1824	10,686	200,000	14,000	214,000	224,686	41,000		41,000	3,000	67,040 j	49,500	100,000	149,500									10,686	474,540	485,226	30,495	515,721
1825	39,080	200,000	15,000	215,000	254,080	42,500		42,500	3,000	75,000	52,600	110,000	162,600									39,080	498,100	537,180	28,722	565,902
1826	53,813	220,000	16,000	236,000	289,813	44,000		44,000	3,000	88,720	55,800	120,000	175,800									53,813	547,520	601,333	39,878	641,211
1827	71,046	240,000	17,000	257,009	328,046	45,500		45,500	3,000	94,000	59,000	130,000	189,000									71,046	588,500	659,546	45,088	704,634
1828	86,807	260,000	18,000	278,000	364,807	47,000	20,900	67,900 e	3,000	100,080 j	62,200	140,000	202,200	328								86,807	651,508	738,315	36,178	774,493
1829	125,533	280,000	19,000	299,000	424,533	48,500	31,900	80,400	3,000	100,000	65,500	150,000	215,500	2,000								125,533	699,900	825,433	50,840	876,273
1830	195,702	300,000	20,000	320,000	515,702	50,000	42,900	92,900	3,000	102,800	68,800	160,000	228,800	2,000								195,702	749,500	945,202	65,112	1,010,314
1831	197,702	320,000	26,000	346,000	543,702	51,800	53,900	105,700	3,000	118,000	72,100	170,000	242,100	2,100								197,702	816,900	1,014,602	40,890	1,055,492
1832	407,536	340,000	32,000	372,000	779,536	53,600	64,900	118,500	12,000 p	132,000	75,400	180,000	255,400	2,500								407,536	892,400	1,299,936	81,745	2,437,173
1833	546,278	286,620	38,000	324,620	870,898	55,400	75,900	131,300	11,600	142,000 f	78,700	190,000	268,700	2,750	6,000							546,278	1,433,248	1,979,526	103,524	2,083,050
1834	421,832	380,000	44,000	424,000	845,832	57,200	45,000	102,200	11,200	124,000	82,000	200,000	282,000	5,000	7,500							421,832	955,900	1,377,732	102,621	1,480,353
1835	628,049	400,000	50,000	450,000	1,078,049	59,000	47,000	106,000	10,800	178,000 h	95,300	210,000	295,300	6,000	8,000							628,049	1,654,100	1,882,149	55,965	1,738,114
1836	764,319	452,160	53,000	505,160	1,269,479	60,900	48,000	108,900	10,400	163,000	88,700	220,000	308,700	8,000	10,000							764,319	1,114,160	1,878,479	121,444	1,999,923
1837	987,253	403,000	50,000	453,000	1,440,253	62,800	57,100	119,900	10,000	148,000	92,100	230,000	322,100	10,000	12,500							987,253	1,075,500	2,062,753	170,744	2,233,497
1838	828,008	406,000	51,000	457,000	1,285,008	64,700	67,152	131,852	9,600	133,000	95,500	238,000	333,500	11,500	14,000							828,008	1,090,452	1,918,460	144,573	2,063,033
1839	917,646	461,542	53,000	514,542	1,432,188	66,700	70,800	137,500	9,200 o	117,000	99,000	246,000	345,000	16,000	15,038							917,646	1,124,280	2,041,926	203,237	2,245,163
1840	962,848 r	410,093 g	54,733	464,826 g	1,427,674	68,666 k	71,670	140,336 g	8,880	101,960 g	102,600	253,075 g	355,934 g	23,527	16,967	9,682	9,972	946	558	400	1,640	962,848	1,102,828	2,065,676	182,411	2,248,087
1841	1,182,441 t	460,000	58,000	518,000	1,700,441	76,200	99,800	176,000	9,000	83,600	105,500	191,100	296,600	35,000	35,000	10,000	12,000	1,000	600	500		1,182,441	1,176,700	2,359,141	174,041	2,533,182
1842	1,365,563	510,400	63,000	573,400	1,938,963	83,700	163,800	247,500	9,000	65,000 f	108,500	200,140	308,640	50,000	58,000	18,000	15,000	1,000	1,000	750		1,365,563	1,347,290	2,712,853	158,504	2,871,357
1843	1,556,753	570,000	67,000	637,000	2,193,753	90,840 c	217,160	308,000	12,421 u	64,000	111,500	203,500	315,000	60,000	75,000	25,000	25,000	1,200	4,500	1,000		1,556,753	1,528,121	3,084,874	46,103	3,130,977
1844	2,009,207	630,000	71,000	701,000	2,710,207	105,200	241,800	374,000	18,245	63,000	114,500	206,500	321,000	75,000	120,000	30,000	35,000	1,200	10,000	2,500		2,009,207	1,751,045	3,760,252	97,522	3,857,774
1845	2,480,032	690,000	73,000	763,000	3,243,032	119,760	309,200	428,000 e	30,372 u	62,000	117,500	209,500	327,000	100,000	150,000	35,000	50,000	1,500	18,000	5,000		2,480,032	1,970,872	4,450,904	96,069 w	4,546,973
1846	2,887,815	760,000	81,000	841,000	3,728,815	134,700	327,300	462,000 m	36,707 u	61,000	120,500	213,500	334,000	115,000	165,000	40,000	68,000	1,500	25,000	6,500		2,887,815	2,155,707	5,043,522	175,853	5,219,375
1847	2,982,309 r	900,000	89,000	989,000	3,971,309	149,700 q	378,300	528,000	65,222	60,000	123,500	216,500	340,000	120,000	180,000	45,000	80,000	2,000	30,000	8,000		2,982,309	2,447,222	5,429,531	165,784	5,595,315
1848	3,805,942	1,039,000	98,000	1,137,000	4,942,942	179,400 q	414,600	594,000	98,032	60,000	126,500	215,500	346,000	125,000	200,000	50,000	85,000	2,000	40,000	10,000		3,805,942	2,747,032	6,552,974	209,282 w	6,762,256
1849	3,995,334	1,178,000	106,000	1,284,000	5,279,334	237,000	423,000	660,000	175,457	60,000	129,500	223,500	353,000	140,000	260,000	56,000	90,000	2,500	52,000	12,500		3,995,334	3,145,497	7,140,831	211,178	7,352,009
1850	4,138,164	1,317,000	115,000	1,432,000	5,570,164	295,100	408,900	704,000	242,517	59,000	132,600	226,400	359,000	150,000	300,000	60,000	100,000	2,500	60,000	15,000		4,138,164	3,484,017	7,622,181	158,702	7,780,883
1851	5,481,065	1,456,000	118,000	1,574,000	7,055,065	351,000	186,000	537,000	317,460	59,000	155,100	209,900	365,000	160,000	320,000	60,000	125,000	3,000	70,000	18,000		5,481,065	3,608,460	9,089,525	198,343	9,287,868
1852	6,151,957	1,596,000	120,000	1,716,000	7,867,957	407,000	363,000	770,000	411,707	58,000	177,600	194,400	372,000	175,000	340,000	75,000	140,000	3,000	75,000	20,000		6,151,957	4,155,707	10,307,664	154,200	10,461,864
1853	7,195,000 r	1,735,000	123,000	1,858,000	7,053,000	463,000	373,000	836,000	657,862	57,000	200,000	178,000	378,000	180,000	375,000	75,000	160,000	4,000	85,000	23,000		5,195,000	4,688,862	9,883,862	170,240	10,054,102
1854	7,394,875	1,874,000	125,000	1,999,000	9,393,875	519,000	361,000	880,000	812,727	56,000	222,600	161,400	384,000	190,000	385,000	80,000	175,000	4,500	90,000	25,000		7,394,875	5,081,227	12,476,102	178,059	12,654,161
1855	8,141,754	2,012,000	127,000	2,139,000	10,280,754	575,000	404,000	979,000	735,137	55,000	245,100	145,900	391,000	200,000	400,000	80,000	185,000	6,000	100,000	28,000		8,141,754	5,298,137	13,439,891	200,281	13,640,172
1856	8,524,779	2,151,286	129,300 v	2,280,586	10,805,365	632,000	391,000	1,023,000	817,659	54,000	267,600	129,400	397,000	215,000	410,000	85,000	200,000	6,800	115,000	30,000		8,524,779	5,634,645	14,168,824	42,614	14,211,438
1857	8,186,567	2,208,000	201,800	2,409,800	10,596,367	689,000	836,000	1,525,000	654,017	53,000	290,200	112,800	403,000	240,000	450,000	85,000	220,000	8,000	125,000	33,000		8,186,567	6,205,817	14,392,384	120,729	14,513,113
1858	8,426,102	2,266,000	185,500	2,451,500	10,877,602	746,000	354,000	1,100,000	722,686	52,000	312,800	97,200	410,000	250,000	490,000	87,000	240,000	8,500	135,000	37,500		8,426,102	5,984,186	14,410,288	158,571	14,568,859
1859	9,619,771	2,323,000	235,500 v	2,558,500	12,178,271	803,000	363,000	1,166,000	833,249	51,000	334,500	81,500	416,000	275,000	530,000	95,000	260,000	9,000	150,000	42,000		9,619,771	6,385,849	16,005,620	582,379	16,587,999
1860	9,397,332 r	2,380,460	310,326	2,690,786 g	12,088,118	861,760 k	530,340	1,392,100 g	438,000	50,000 g	358,300	65,060	423,360 g	285,760	728,400	101,280	280,000	10,200	165,300	41,920	11,394	9,397,332	6,618,500	16,015,832	227,278	16,243,110
1861	9,799,654	2,603,000	597,000	3,200,000 u	12,999,654	864,000	401,000	1,265,000 g	287,073	47,000	378,000	52,000	430,000	280,000	670,000	128,000	300,000	10,000	150,000	50,000	18,120	9,799,654	6,035,193	16,634,847	425,733	17,060,580
1862	9,695,110	2,826,000	1,174,000	4,000,000	13,695,110	866,200	453,800	1,320,000	346,261	43,000	398,000	39,000	437,000	275,000	780,000	150,000	320,000	12,500	140,000	53,000	41,900	9,695,110	7,918,601	17,613,711	368,458	17,982,169
1863	11,785,320	3,049,000	1,951,000	5,000,000	16,785,320	868,400	456,551	1,324,951	877,313	40,000 n	418,000	26,648	444,648 u	250,000	890,000	200,000	360,000	15,000	100,000	57,000	95,200	11,785,320	8,853,112	20,638,432	529,910	21,168,342
1864	12,538,649	3,272,000	2,567,000	5,839,000	18,377,649	870,600	1,125,962	1,996,562	755,764	40,000 u	438,000	16,888	454,888	250,000	1,000,000	250,000	375,000	15,000	100,000	63,000	108,200	12,538,649	11,247,414	23,786,063	404,025	24,190,088
1865	11,891,746	3,496,000	2,854,000	6,350,000	18,241,746	872,800	817,039	1,689,839	1,025,208	40,000	458,000	29,897	487,897	200,000	1,260,000	280,000	420,000	12,000	100,000	69,574	119,530	11,891,746	12,054,048	23,945,794	618,928	24,564,722
1866	15,651,183	3,719,000	3,081,000	6,800,000	22,451,183	875,000	1,201,166	2,076,166	1,217,668	40,000	479,000	33,068	512,068	180,000	1,580,000	320,000	450,000	12,000	100,000	99,320	153,920	15,651,183	13,541,142	29,192,325	159,254	29,351,579
1867	16,002,109	3,942,000	3,358,000	7,300,000	23,302,109	877,200	1,424,267	2,301,567	1,381,429	50,000	500,000	89,360	589,360	175,000	1,800,000	350,000	500,000	10,000	110,000	150,000	214,190	16,002,109	14,931,546	30,933,655	251,665	31,185,320
1868	17,003,405	4,165,000	3,335,000	7,500,000	24,503,405	879,400	1,844,028	2,723,428	1,529,879	59,051	522,000	87,227	609,227	160,000	2,000,000	375,000	541,000	10,000	125,000	241,453	232,101	17,003,405	16,106,139	33,109,544	129,207 w	33,238,751
1869	17,083,134	4,389,000	2,361,000	6,750,000	23,833,134	881,500	1,826,684	2,708,184	2,216,300	65,000 u	543,000	60,148	603,148	160,000	1,854,000	400,000	550,000	10,000	130,000	295,105	325,687	17,083,134	16,067,424	33,150,558	171,858	33,322,446
k 1870	15,650,275 r	4,613,625	3,184,893	7,798,518	23,448,793	883,500 k	1,643,785	2,527,285	1,819,824	61,803 k	565,370	43,508	608,878 r	150,582	2,624,163	437,870	621,930	11,000	133,418	263,487	312,547	15,664,275	17,371,305	33,035,580	210,348	33,245,928
1871	19,342,057	3,978,000	5,062,565	9,040,565	28,382,622	956,000	3,444,000	4,400,000	2,670,238	70,000 u	616,000	2,830	618,830	250,000	3,000,000	600,000	725,000	15,000	180,000	300,000	6,053,290	19,342,057	27,923,023	47,265,080	183,154	47,448,234
1872	24,233,166	6,608,000	5,087,040	11,695,040	35,928,206	1,028,000	4,818,794	5,846,794	2,647,156	69,440	666,000	34,000	700,000	380,800	3,360,000	896,000	784,000	16,800	224,000	336,000	795,703	24,233,166	24,727,733	48,960,899	85,149	49,046,048
1873	26,152,837	6,479,000	6,619,829	13,098,829	39,251,666	1,100,000	1,905,028	3,005,028 m	3,198,911	67,200	716,000	284,000	1,000,000	400,000	3,920,000	1,000,000	784,000	44,800	350,000	392,000	2,643,875	26,152,837	31,904,643	58,057,480	135,979 x	57,921,501
1874	24,818,790	5,268,000	7,052,000	12,320,000	37,138,790	1,172,000	2,422,285	3,594,285	2,899,292	70,000	766,000	354,000	1,120,000	360,000	4,203,000	812,000	789,680	50,400	350,000	799,936	687,137	24,818,790	28,055,830	52,874,620	302,738 x	52,571,882
1875	22,485,766 t	5,000,000	6,760,000	11,760,000	34,245,766	1,245,000	4,105,259	5,350,259	2,808,018	60,000 n	817,000	303,000	1,120,000	500,000	4,453,178	800,000	840,000	67,200	360,000	1,231,547	998,353	22,485,766	30,348,555	52,834,321	91,759 x	52,742,562
1876	22,793,245	4,107,000	8,773,000	12,880,000	35,673,245	1,518,000	2,332,000	3,850,000	2,126,873	55,000	867,000	29,000	896,000	650,000	5,000,000	1,008,000	112,000	550,000	1,250,000	2,498,882	22,793,245	31,826,755	54,620,000	183,875 x	54,436,125
1877	25,660,316	3,216,563	10,783,437	14,000,000	39,660,316	1,391,000	4,384,000	5,775,000	1,939,575	50,000	917,000	203,000	1,120,000	850,000	5,350,000	1,000,000	1,008,000	196,000	450,000	1,300,000	2,327,869	25,660,316	35,366,444	61,026,760	269,223 x	60,757,537
1878	21,689,682	5,992,345	9,127,655	15,120,000	36,809,682	1,464,000	4,586,000	6,050,000	2,068,925	50,000	967,000	153,000	1,120,000	900,000	5,760,000	1,000,000	1,008,000	224,000	375,000	1,350,000	1,829,993	21,689,682	36,795,918	58,485,600	90,985 x	58,394,615
1879	30,207,793 t	10,044,926	6,195,074	16,240,000 u	46,447,793	1,536,000	5,064,000	6,600,000	2,132,233	45,000 u	1,017,000	383,000	1,400,000 u	1,000,000	5,000,000	2,196,490	1,008,000	280,000	450,000	1,400,000	1,746,282	30,207,793	38,498,005	68,705,798	191,003 x	68,514,795
1880	28,640,819 r	11,809,516	6,266,032	18,075,548 r	46,716,367	1,608,484 k	5,108,111	6,716,595 m	2,228,917 u	43,079 k

THE PITTSBURGH COAL BED
ITS EXTENT, THICKNESS, AND ANALYSES
DATE 1926

COMPILED FROM GEOLOGIC REPORTS AND MAPS OF MD., OHIO, PENN., AND W. VA., AND U. S. GEOLOGIC SURVEY
TOWNSHIP OR DISTRICT. ANALYSES AND AVERAGES OF ALL THICKNESSES ARE AVERAGES OF SECTIONS SHOWN IN EACH
PUBLISHED BY AUTHORITIES ABOVE AND ARE FACE SAM
PLES, AS RECEIVED BASIS.

SCALE
0 5 MI. 10 MI. 15 MI. 20 MI.

THE PITTSBURGH COAL BED
ITS EARLY HISTORY AND DEVELOPMENT
BY HOWARD N. EAVENSON
TRANSACTIONS A. I. M. E. (1926) 120

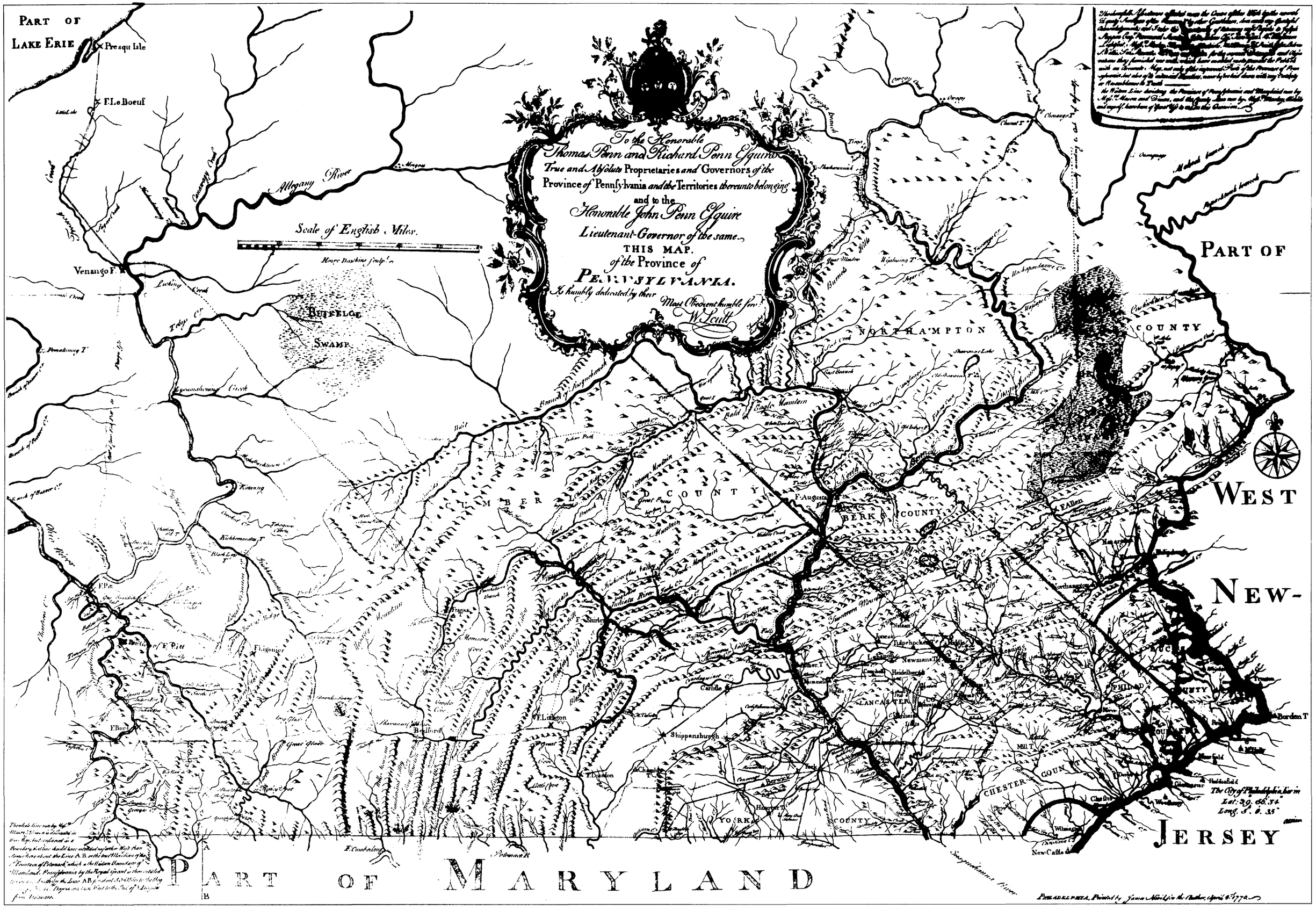

PART OF
LAKE ERIE
Presqu Isle
L.Le Boeuf
Allegany River
Scale of English Miles
To the Honorable
Thomas Penn and Richard Penn Eſquires
True and Abſolute Proprietaries and Governors of the
Province of Pennſylvania and the Territories thereunto belonging
and to the
Honorable John Penn Eſquire
Lieutenant-Governor of the ſame.
THIS MAP.
of the Province of
PENNSYLVANIA.
Is humbly dedicated by their
Most Obedient humble Serv.
W. Scull
Venango F.
Buffelo Swamp
Kittanig
F.Pitt
F.Ligonier
F.Augusta
F.Littleton
Bedford
Carlisle
Shippensburgh
Frankstown
F.Shurly
Northampton
Lancaster
York
Berks
Chester
Northampton County
Lancaster County
York County
Cumberland County
Berks County
Chester County
PART OF
WEST
NEW-
JERSEY
Philadelphia
Borden T
Haddonfield
The City of Philadelphia lies in
Lat: 39. 56. 30.
Long. 5. 0. 35.
PART OF MARYLAND
PHILADELPHIA, Printed by James Humphreys Jr. Author, April 8th 1770.

FIG. 3

PITTSBURGH COAL BED

9-28-37

All analyses on "as received" basis.

Thicknesses and Analyses in Each County.

State	County	Township or District	Thickness - Inches			No. of	Moisture			Volatile Matter			Fixed Carbon			Ash			Sulphur			BTU.			Ash Softening Temp.- O°F		
			Aver.	Max.	Min.	Samples	Aver.	Max.	Min	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.
Md.	Allegany	Barton	122	161	78	1	0.7			18.3			73.7			7.3			1.0			14270					
		Borden Shaft	108	129	89	3	1.2	2.2	0.6	18.7	19.1	18.2	72.6	73.4	71.6	7.6	8.3	7.0	1.0	1.2	0.9	14230	14290	14180	3010		
		East Frostburg	94	107	82	3	2.6	3.2	2.2	15.4	17.8	14.0	73.5	75.8	69.1	8.4	10.9	6.7	1.0	1.1	0.9	13880	14110	13430	3010		
		East Lonaconing	118																								
		Eckhart	94	111	77	3	2.2	3.3	0.7	16.2	17.9	14.5	73.8	74.7	72.8	7.8	8.8	6.8	1.1	1.0	1.3	14170	14340	13910			
		Frostburg	78	106	54	3	2.3	3.9	0.8	19.4	22.0	18.0	68.1	72.5	63.9	10.1	14.2	7.8	1.3	1.4	1.2	13610	14060	12740	2670	2740	2600
		Hampshire Hill	114																								
		Lonaconing	121	144	98	5	1.3	3.7	0.6	18.9	19.5	18.4	72.7	74.6	71.3	7.2	8.5	6.0	0.9	1.2	0.7	14170	14370	13940	2960		
		Mt. Savage	69	114	56	4	1.6	3.2	0.6	18.3	18.8	17.7	69.1	75.5	66.7	10.9	14.3	5.5	1.4	2.5	0.8	13540	14420	13180	2460		
		Ocean	113	128	87	7	1.5	2.8	0.6	17.5	19.5	15.0	73.7	75.4	71.6	7.5	8.3	6.3	1.0	1.1	0.8	14200	14440	14080	2980	3010	2960
Md.	Garrett	Elbow	133	134	132																						
		Franklin Hill	161	170	152																						
Ohio	Athens	Berne	70	96	43	6	5.2	6.6	3.6	40.9	44.8	35.1	45.8	48.8	43.5	8.1	10.2	6.9	3.8	4.2	3.4	12320	12560	11890	2340	2380	2300
		Ames	45	54	40																						
		Canaan	59	73	37	1	7.4			39.0			42.5			11.1			4.2			11530			2285		
		Alexander	48	51	45	1	7.1			41.5			42.1			9.3			4.5			11810			2345		
		Lodi	48	60	36	1	6.7			41.2			41.0			11.1			2.8			11700			2200		
Ohio	Belmont	Colerain	57	60	53	1	3.8			36.4			50.8			9.0			4.2			12860					
		Goshen	59																								
		Flushing	49	56	42	3	3.4	4.2	1.9	38.1	39.2	36.3	49.5	50.2	48.8	9.0	9.4	8.5	4.4	4.7	4.2	12880	13090	12600			
		Kirkwood	50			1	3.8			38.0			47.4			10.8			4.8			12360					
		Mead	69			1	2.9			37.9			51.2			8.0			4.3			13210					
		Pease	59	61	56	2	3.7	3.9	3.4	38.2	39.6	36.8	50.0	51.9	48.0	8.2	8.5	7.9	3.2	3.4	3.0	12980	12990	12960	2040		
		Pultney	60	68	52	5	3.7	4.1	3.3	39.0	40.8	37.2	49.9	51.0	49.1	7.4	9.0	6.4	3.7	4.3	3.4	13170	13600	12790			
		Smith	55	61	49	2	4.6	6.0	3.2	39.0	41.2	36.8	48.4	52.7	44.0	8.1	8.8	7.3	4.3	4.3	4.3	12860	13140	12580	2000		
		Somerset	48	54	43	2	3.9	4.1	3.7	39.1	41.0	37.1	47.0	48.2	45.8	10.1	10.6	9.5	4.8	5.0	4.6	12620	12760	12480	2260		
		Union	54	56	51	2	4.4	4.5	4.2	38.9	41.9	36.0	46.4	48.8	44.0	10.3	10.8	9.9	4.5	4.6	4.5	12490	12550	12430	2000		
		Warren	48	52	44	3	4.1	4.5	3.7	41.1	43.2	37.5	45.1	47.0	43.8	9.6	11.0	8.6	4.6	4.7	4.5	12690	12950	12380	1960		
		Washington	69	74	64	1	2.8			37.9			49.9			9.4			5.1			12990					
		Wayne	65																								
		Wheeling	57	60	48	3	4.1	4.3	4.0	36.9	39.2	33.5	49.8	51.9	48.7	9.1	10.4	8.0	4.1	4.2	4.0	12760	13090	12430			
		York	58	60	55	2	2.7	3.1	2.3	42.2	42.6	41.8	48.1	48.4	47.7	7.0	7.3	6.7	3.3	3.5	3.2	13290	13420	13150	2430	2500	2360
Ohio	Gallia	Clay	42	49	36																						
		Green				1	6.7			34.3			46.0			13.0			4.4			11440					
		Harrison	59	77	36	2	7.4	7.8	7.0	35.1	36.1	34.1	48.1	48.3	47.9	9.4	9.8	9.0	4.6	5.2	3.9	11820	11850	11780			
		Ohio	38	40	36	1	5.8			36.8			47.4			10.1			4.3			11750					
Ohio	Guernsey	Millwood	46	48	43	2	4.4	4.4	4.3	40.7	41.1	40.3	46.2	46.5	45.8	8.8	8.9	8.7	4.7	4.9	4.6	12720	12730	12710	2180		
		Oxford	39																								
Ohio	Harrison	Athens	55	57	52	1	6.0			34.4			53.7			6.0			1.4			12960					
		Cadiz	53			1	3.8			36.7			48.6			10.9			4.4			12360					
		German	47																								
		Green	51																								
		Short Creek	51	54	48	2	5.3	6.5	4.2	36.3	37.0	35.5	50.9	51.2	50.7	7.5	8.2	6.7	2.5	2.8	2.2						
Ohio	Jefferson	Cross Creek	54	58	48	1	5.2			34.7			50.7			9.5			2.4								
		Island Creek	42																								
		Knox	49	69	40	3	3.3	3.4	3.2	38.0	38.1	37.9	49.2	49.4	48.8	9.6	10.0	9.4	4.0	4.0	3.9	12940	12940	12920	2160	2170	2150
		Mt. Pleasant	57	66	49	3	4.1	5.0	3.1	35.9	37.9	34.5	52.0	54.1	49.5	8.0	9.5	6.5	2.9	3.8	1.8	12950	13100	12860			
		Salem	48																								
		Short Creek				1	4.2			37.0			50.6			8.2			2.8			12890					
		Smithfield	54	73	47	6	4.9	5.5	4.1	36.0	37.8	34.5	52.6	54.2	50.4	6.6	7.9	4.6	2.1	3.5	0.8	13100	13320	12860	2370	2710	2120
		Springfield	48																								
		Steubenville	59	60	58	1	6.6			34.5			50.4			8.6			2.5								
		Warren	54	61	53	3	4.2	4.8	3.1	35.3	37.9	32.4	52.9	54.0	50.8	7.7	9.0	5.9	2.3	4.0	1.2	12900	13020	12900			
		Wayne	52	58	42	2	4.9	5.1	4.7	36.3	36.6	35.9	51.0	51.1	50.8	7.0	8.0	6.0	2.7	2.8	2.6	12910	12950	12870	2200		
		Wells	56	60	52	7	4.7	5.3	4.1	35.8	38.0	33.1	51.7	54.0	49.1	7.9	10.7	5.3	2.7	4.1	1.0	13040	13350	12520	2175	2190	2160
Ohio	Monroe	Malaga	30																								
		Salem	65																								
		Sunbury	58	60	57																						
Ohio	Morgan	Homer	59	91	39	2	5.8	6.9	4.8	41.4	42.2	40.6	43.7	44.4	43.0	9.1	10.0	8.2	4.7	5.2	4.2	11990	12100	11880			
		Marion	77																								

TABLE 5—SHEET 1

PITTSBURGH COAL BED

12-2-37

All analyses on "as received" basis.

Thicknesses and Analyses in Each County.

State	County	Township or District	Thickness - Inches			No. of	Moisture			Volatile Matter			Fixed Carbon			Ash			Sulphur			BTU.			Ash Softening Temp.- °F.		
			Aver.	Max.	Min.	Samples	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.
Pa.	Allegheny	Baldwin	68	72	66	1	3.5			35.2			55.4			5.9			1.2			13700			2415		
		Bethel	66			1	3.3			34.4			54.1			8.2			1.1			13380			2510		
		Braddock	76																								
		Chartiers	68																								
		Collier	65	68	60																						
		Elizabeth	76	95	70	3	2.6	2.6	2.5	33.3	33.9	32.7	58.3	59.4	57.2	6.4	7.1	5.3	0.9	1.0	0.8	13925	14090	13760	2485	2535	2440
		Findley	60	68	60																						
		Forward	69			1				39.0						6.8			1.8						2240		
		Franklin	72																								
		Greentree Boro.	68																								
		Jefferson	72	74	70	1				39.8						7.3			1.8						2210		
		Lincoln	76	85	70																						
		Lower St. Clair	68																								
		Mifflin	72	74	70	1	3.9			34.1			56.0			6.0			1.4			13510					
		Moon	61	68	60																						
		No. Fayette	67	68	60	2										9.9	11.9	7.9	2.4	2.5	2.4				2385	2405	2360
		No. Versailles	71																								
		Patton	76			1	2.9			34.9			54.8			7.3			1.2			13520					
		Penn	76			1	4.0			34.6			55.3			6.1			1.1			13340					
		Pine	72																								
		Pittsburgh City	71	76	68																						
		Plum	76			2	3.7	4.3	3.0	34.5	34.9	34.1	54.3	54.7	53.9	7.6	7.7	7.4	1.2	1.3	1.1	13145	13490	12800	2510		
		Portvue Boro	71																								
		Robinson	64	68	64	1				41.9						7.8			1.8						2420		
		Scott	66	68	62																						
		Snowden	69	72	66	4	2.9	3.7	2.4	35.1	36.0	34.0	56.5	57.6	55.0	5.9	6.9	5.1	1.4	1.6	1.2	13925	14070	13820	2500	2520	2470
		So. Fayette	62	68	60																						
		So. Versailles	90			1	3.2			32.8			56.5			7.5			1.4			13490			2800		
		Stowe	64																								
		Union & West Liberty	68																								
		Upper St. Clair	65	66	62	1										6.7			1.9						2385		
		Versailles	70																								
		Wilkins	76																								
Pa.	Armstrong	Kiskiminitas	76	80	60	1	2.3			34.5			53.7			9.5			1.7			13450			2540		
		South Bend	57	94	50	1	0.8			36.9			50.2			9.0			3.0								
Pa.	Beaver	Hanover	60																								
		Hopewell	60																								
Pa.	Fayette	Brownsville	111	112	90																						
		Bullskin	101	108	98	10	2.6			29.6			63.5			6.8			1.2								
		Connellsville City	101	106	96																						
		Connellsville Twp.	104	108	96	10	2.6			29.7			62.9			7.4			1.2								
		Dunbar	98	112	94	20	2.2			32.2			61.0			7.8			1.1			13590	13850	13330	2910		
		Franklin	97	108	90	20	2.6			32.2			59.9			7.9			1.3								
		Georges	103	108	90	20	2.8			31.9			60.6			7.5			1.2			13710	13890	13530	2770	2850	2690
		German	106	110	96	20	2.2			33.5			58.7			7.8			1.1			13845	13990	13660	2795	2960	2600
		Jefferson	105	112	90	10	2.2			33.4			58.7			7.8			1.3								
		Lower Tyrone	105	108	96	10	2.5			32.3			59.3			8.4			1.3								
		Luzerne	109	112	96	10	2.8	2.9	2.5	34.1			57.1			8.9			1.6	1.8	1.4	13645	13650	13640	2330	2370	2290
		Menallen	100	108	94	20	2.2	3.6	1.0	33.0			59.3			7.7			1.0			13650			2750		
		Nicholson	99	104	90	10	2.6			33.4			58.2			8.4			1.1			13280			2470		
		No. Union	102	130	96	20	2.7			31.2			60.9			8.0			1.3			13850			2910		
		Perry	103	108	86	20	0.9			34.8	33.2	36.8	59.2			7.7	8.6	6.9	1.3	1.4	0.9				2500	2540	2460
		Redstone	109	112	90	10	2.6			33.7			58.1			8.2			1.1			13570			2740		
		So. Union	108	108	96	10	2.6			30.9			61.5			7.6			1.2								
		Springhill	94	96	80	4	3.1	3.7	2.4	35.1	35.7	34.4	54.9	55.5	54.4	7.0	7.8	6.5	2.2	2.4	1.9	13695	13810	13620	2265	2360	2160
		Uniontown City	98	100	96																						
		Upper Tyrone	99	108	96	20	2.6			29.5			62.6			8.0			1.0								
		Washington	97	108	86	1										8.2			1.0						2535		
Pa.	Greene	Aleppo	63	66	60																						
		Center	67	72	62																						
		Cumberland	93	104	80	2	2.2	2.2	2.1	34.6	35.1	34.0	56.4	57.0	55.7	7.7	8.5	6.8	1.4	1.5	1.2	13765	13860	13670	2330	2400	2220
		Dunkard	91	103	82	15	2.2	3.1	0.9	36.4	38.4	34.4	54.5	59.1	52.6	8.3	13.2	2.6	2.5	3.2	0.8	13495	13590	13330	2225	2270	2140
		Franklin	72	80	68																						
		Gilmore	69	72	66																						
		Greene	88	94	80																						
		Jackson	67	72	66																						
		Jefferson	85	108	80	10	2.8			34.4			56.5			9.1			1.7			13350			2200		

TABLE 5—SHEET 2

(9-20-37)
Revised
(5-13-38)

NUMBER OF BEEHIVE COKE PLANTS AND OVENS, AND COAL USED, IN PITTSBURGH COAL BED AREA, AND IN UNITED STATES

	Pennsylvania																					West Virginia			Total Pgh.Bed Area			Total United States		
	Connellsville District			Greensburg District			Irwin District			Lower Connellsville Dist.			Up.Connellsville Dist.			Pittsburgh District			Total Pa.Pgh.Bed Area			Upper Monongahela								
Year	No. Plants	Ovens Built	Net Tons Coal Used	No. Plants	Ovens Built	Net Tons Coal Used	No. Plants	Ovens Built	Net Tons Coal Used	No. Plants	Ovens Built	Net Tons Coal Used	No. Plants	Ovens Built	Net Tons Coal Used	No. Plants	Ovens Built	Net Tons Coal Used	No. Plants	Ovens Built	Net Tons Coal Used	No. Plants	Ovens Built	Net Tons Coal Used	No. Plants	Ovens Built	Net Tons Coal Used	No. Plants	Ovens Built	Net Tons Coal Used
1841 t	1	2	100																1	2	100				1	2	100	1	2	
1842 t	2	7																	2	7					2	7		2	7	
1844 t	3	14																	3	14					3	14		3	14	
1850																												4		
1855		26	15,000 n													80 n	40,000 n			106	55,000					106	55,000		106	
1860		56														80				136						136		21		
1865		56														80				136						136				
1870 s	7															6 s	200		13	200					13	200		25 s		
1875 m	45	3,578														7	248 m		52	3,826					52	3,826				
1880	67	7,211	3,367,856 a	1	10	7,750	6	399	215,055	1	60 r	157,000 u	8	757	319,927	21	534	194,393	104	8,971	4,261,981	8	145	64,937	112	9,116	4,326,918	186	12,372	5,237,741
1885 b	68	10,471	4,683,831	1	10		6	399		1	60		11	1,168	555,735	17	416	91,101	104	12,524	5,330,667	12	278	105,416	116	12,802	5,436,083	233	20,116	8,071,126
1890 b	28	15,865	9,748,449	2	58	44,000	4	661	270,476	1	60		14	1,569	889,277	14	541	149,230	63	18,754	11,101,432	18	1,051	276,367	81	19,805	11,377,799	253	37,158	18,005,209
1891 b	33	17,551	7,083,705	2	58	38,188	4	696	323,099	1	60		14	1,724	1,000,184	13	590	154,054	67	20,679	8,599,230	15	1,081	517,615	82	21,760	9,116,845	243	40,245	16,344,540
1892 b	31	17,309	9,389,549	2	58	15,005	4	696	328,193	1	60		14	1,843	706,171	15	725	292,357	67	20,691	10,731,275	19	1,129	441,266	86	21,820	11,172,541	261	42,002	18,813,337
1893 b	28	17,504	7,095,491	3	88	29,983	5	725	238,832	1	60		14	1,843	499,809	10	885	357,400	61	21,105	8,221,515	19	1,158	379,506	80	22,263	8,601,021	258	44,201	14,917,146
1894 b	29	17,829	7,656,169	3	118	27,290	5	725	176,318	1	60		14	1,843	279,971	9	779	371,569	61	21,354	8,511,317	20	1,221	280,748	81	22,575	8,792,065	260	44,772	14,337,937
1895	29	18,028	12,174,597	3	118	31,300	5	725	166,124	1	60		14	1,849	319,285	9	973	452,845	61	21,753	13,144,151	20	1,260	392,297	81	23,013	13,536,448	265	45,565	20,848,323
1900	98	20,981 c	14,946,659	5	680	331,305	5	697	93,647	12	2,033	579,928	14	1,999	1,042,170	8	1,641	862,610	142	28,031	17,856,319	24	1,563	584,265 i	166	29,594	18,440,584	396	58,484	32,113,553
1903	99	22,563 d	13,498,859	7	1,332	813,216	6	691	207,067	32	5,753	3,452,568	19	2,556	1,180,947	9 f	1,636	1,404,660	172	34,531	20,557,317	37	2,319	724,915	209	36,850	21,282,232	500	79,334	39,423,525
1904	101	22,695 e	13,185,690	7	1,332	511,303	6	691	14,468	34	6,570	4,229,755	19	2,660	601,236	8	2,195	1,370,629	175	36,143	19,913,081	37	2,348	478,513	212	38,491	20,391,594	507	83,599	36,531,608
1905	100	22,033	16,930,341	7	1,328	908,003	5	680	258,039	45	7,484	5,666,812	19	2,434	1,159,158	8	2,226	2,317,159	184	36,185	27,289,512	39	2,861	576,201	223	39,046	27,865,713	519	87,564	49,530,677
1906	101	23,616	17,956,160	8	1,428	1,118,227	5	581	348,007	53	9,708	7,465,205	22	2,516	1,491,285	10	2,868	2,376,403	199	40,717	30,761,287	37	2,873	1,028,258	236	43,590	31,789,545	532	93,901	55,746,374
1907	101	23,857	19,751,739	8	1,735	1,206,981	5	572	315,601	62	12,264	9,150,693	22	2,724	1,557,978	12 g	3,185 h	2,807,931	210	44,337	34,790,923	40	2,983	1,107,659	250	47,320	35,898,582	552	99,680	61,946,109
1908	104	24,071	10,238,665	7	1,690	1,119,391	5	572	138,082	62	13,162	6,156,553	22	2,906	779,468	9 j	3,110	1,742,119	209	45,511	20,174,278	37	3,008	442,346	246	48,519	20,616,624	551	101,218	39,440,837
1909	117	24,422	17,581,999	7	1,751	1,443,394	5	572	165,644	70	14,215	9,781,803	22	2,915	1,282,756	11	3,299	2,826,164	232	47,174	33,081,660	37	3,060	917,864	269	50,234	33,999,524	579	103,982	59,354,937
1910	118	24,481	17,205,615	6	1,940	1,503,241	5	572	89,409	73	14,805	12,130,425	21	2,850	780,888	13	3,734	3,388,964	236	48,382	35,098,542	36	3,068	893,882	272	51,450	35,992,424	578	100,362 p	63,088,327
1913	106	22,189	17,379,314	7	2,056	1,608,900	2	289	Idle	75	15,736	13,498,088	21	2,828	1,244,230	14	4,554	4,258,903	225	47,652	37,989,435	34	2,918	793,508	259	50,570	38,782,943	551	102,650	69,239,190 q
1914	106	21,343	11,739,842	7	2,057	1,349,449	2	289		76	16,037	9,296,713	20	2,552	919,316	14	4,558	3,047,241	225	46,836	26,402,561	33	2,868	472,933	258	49,704	26,875,494	359	93,946	36,123,729
1915 k	102	21,339	14,540,251	7	2,041	1,390,937	2	289		76	16,400	11,930,691	21	2,746	966,580	12	4,208	3,183,972	220	47,073	32,012,431	33	2,868	584,757	253	49,941	32,597,188	354	93,110	42,278,516
1916	101	21,129	18,274,300	7	2,041	1,475,432	2	289	133,162	73	16,360	14,472,277	19	2,631	1,045,679	12	4,208	3,886,368	214	46,658	39,287,218	34	2,962	773,531	248	49,620	40,060,749	389	91,581	55,084,958
1917	100	20,974	15,388,687	6	1,981	1,340,130	2	289	124,449	74	16,420	12,785,016	15	2,314	1,117,491	11	3,951	4,098,688	208	45,929	34,854,461	24	2,328	842,677	232	48,257	35,697,138	398	88,027	52,246,612
1918	95	20,365	14,325,959	6	1,981	1,467,462	2	289		71	16,234	11,875,495	13	2,028	961,131	10	3,711	3,871,162	197	44,608	32,501,209	23	2,241	960,924	220	46,849	33,462,133	466	84,635	48,160,297
1919	92	19,825	10,454,353	6	1,782	805,870	2	289		71	16,300	7,297,405	12	1,820	540,787	10	3,318	2,285,930	193	43,534	21,384,345	24	2,270	175,000	217	45,804	21,559,345		82,580	29,730,499
1920	81	19,245	10,743,558	6	1,889	1,143,081	1	100		64	15,146	7,592,680	12	1,709	941,001	10	3,314	2,648,064	174	41,403	23,068,484	24	2,228	524,099	198	43,631	23,592,583	347	75,298	31,985,836
1921	70	16,719	3,309,159	6	1,889	249,379	Abandoned			59	13,426	2,451,640	11	1,549	170,319	9	3,213	110,155	155	36,796	6,290,652	20	1,739	52,442	175	38,535	6,343,094	303	66,014	8,475,446
1923	66	15,341	11,411,725	6	1,846	1,001,038				56	12,557	8,739,859	12	1,702	778,367	11	3,381	1,902,126	151	34,827	23,833,115	21	1,776	263,620	172	36,603	24,096,735	291	62,349	30,084,366
1924	63	15,256	5,484,692	5	1,787	574,266				53	12,258	4,788,835	12	1,674	470,320	5	2,345	1,071,509	138	33,320	12,389,622	18	1,548	150,780	156	34,868	12,540,402	272	60,432	15,914,310
1925	62	15,133	6,470,819	5	1,787	642,195				54	11,552	5,058,370	12	1,652	601,664	5	1,552	1,271,731	138	31,876	14,044,779	18	1,544	171,826	156	33,420	14,216,605	267	57,201	17,422,351
1926	65	15,454	7,411,701	5	1,788	577,563				52	11,458	5,889,788	12	1,668	693,453	4	1,593	1,004,285	138	31,921	15,576,790	17	1,524	154,337	155	33,445	15,731,127	250	52,358	19,224,990
1927	62	15,055	3,851,813	3	1,288	438,540				48	11,158	3,518,905	11	1,427	488,150	4	833	237,072	128	29,761	8,534,480	17	1,524	130,736	145	31,285	8,665,216	240	49,795	11,208,115
1928	56	12,515	1,408,587	3	1,288	393,560				42	10,154	2,637,833	10	1,397	408,252	3	825	117,479	114	26,179	4,965,211	14	1,372	139,746	128	27,551	5,105,557	204	41,288	7,017,974
1929	46	10,056	2,241,830	3	1,288	326,007				32	7,882	3,985,720	9	1,322	426,798	3	789	643,498	93	21,337	7,623,853	7	741	152,806	100	22,078	7,776,659	146	30,082	10,027,516
1931	35	6,764	252,565	2	460	111,459				24	5,176	682,913	7	974	219,365	3	789		71	14,163	1,266,402	4	524	49,811	75	14,687	1,316,213	113	21,588	1,766,783
1935	17	4,355	149,057	2	275	164,685				19	2,576	389,552	5	580	99,312	2	491	1,800	45	8,277	804,406	2	195	50,885	47	8,472	855,291	75	13,674	1,468,855
1936	18	3,883	371,788	2	275	181,833				17	2,791	897,143	5	670	164,821	2	491		44	8,110	1,615,585	2	195	57,926	46	8,305	1,673,511	71	13,012	2,698,158

NOTES:
a - Manufacture of Coke, J. D. Weeks, 1885.
b - U. S. G. S. Mineral Resources, 1894.
c - Includes 50 by-product ovens.
d - Includes 80 by-product ovens.
e - Includes 110 by-product ovens.
f - Includes now Allegheny Valley district.
g - Includes also 3 plants in Mercer and Beaver Counties.
h - Includes 355 by-product ovens.
i - Includes 120 by-product ovens.
j - Includes 330 by-product ovens.
k - After 1914 no by-product ovens are included.
m - Platt - Pennsylvania Geol. Survey 1875 - Report on Coke.
n - Pittsburgh, Its Industry and Commerce, 1870, p. 18.
p - Beehive ovens only.
q - To and including 1915, coal used in by-product ovens is included.
r - Cat's Run Plant - Built 1877.
s - U. S. Census, Manufacturers, 1870.
t - Westmoreland County, Pennsylvania - Albert, p. 404.
u - Coke from Pennsylvania Geological Survey 1886, pt. 1, p. 22.

Unless otherwise shown data are from U. S. Geological Survey or Bureau of Mines Reports.
There were two plants built in Athens County, Ohio; one started in 1880 with 20 ovens, both plants had a total of 175 ovens. They did not operate after 1896, no data are available about coal used.
Number of plants and ovens is intended to be number in existence at end of each year. In some cases the number of plants reported may be number in operation.
After 1900 the years shown were chosen to best show the rise and decline of the industry.

TABLE 9