STONE COALS OF INDIANA.

Humanity, in its progress, has passed its infancy—the Age of Stone; its boyhood—the Age of Bronze; its young manhood—the Age of Iron; and, with wondrous achievements, its ripening manhood—the Age of Gold and Silver. To-day, armed with all the glories of the past, its cycles of thought and labor, and advancing with the momentum of all the Ages, we stand upon the summit of these thoughts and works, and, boldly invading the future, achieve the Age of Steel—of quick, exact thought and realizations. Every work of forest, farm, field and commerce requires this adjutant, grander and greater than gold or silver, and welcomes the aids of science and steel.

Steam is the soul and spirit of our past advancement; at every step its voice, tame as the sigh of love, terrible as the cyclone, is heard, but the food, the nerving fire that drives the great advances of progress, civilization, Christianity and happiness, is Coal.

I am indebted for arrangement and compilation of many succeeding facts to favor of Oscar F. Mayhew, to whom thanks are returned.

COAL.

The Coal period was the grand culmination of the earth's existence. Long ages were required to reach it, and ages upon ages to pass it. From what is known, coal is the result of slow chemical action upon vast bodies of vegetable growth, accumulated under conditions favorable to the condensation of its carbon and hydrogen into solids embodying more or less of the latter element, and forming the anthracite, or pure carbon, and the bituminous, or hydro-carbon, coals as we find them—though the anthracite is the result of subsequent elimination of the volatile matter from previously formed bituminous coal. As a hint of the vast period of time and immense quantity of vegetation required for the formation of the Coal Measures, "all the forests of the Mississippi Valley could not furnish to the sea from their river spoils, during a hundred thousand years, one of the anthracite beds of Schuylkill county, Pennsylvania."—*Lesley.*

The great economic value of coal to man can not be estimated, and is the justification for repeated attention to it in these Reports. Until something better (electricity perhaps) shall be controlled and made

subservient to the production of light and heat, coal must rank as only second to the food we eat in its relation to man's necessities. It has made ocean steam navigation not only a possibility but a grand success. It has rendered practicable the building and profitable operation of vast systems of railways, until they ramify into every civilized quarter of the globe, in the more densely populated parts, forming a network of connections and establishing stations in close proximity to the homes of millions of people, cheapening transportation, diffusing and equalizing the benefits of manufactures and traffic, opening up vast tracts of new country to settlement and cultivation, and reaching out to newer and cheaper sources of iron, timber, stone and hundreds of other raw materials that contribute to man's progress and enjoyment. It makes the steam that operates millions of machines, facilitating and lightening labor, and increasing and cheapening billions of mechanical productions. It makes the iron that enters into all these. It furnishes the light for the streets and business places of hundreds of towns and cities and thousands of homes. It cooks the food and warms the abodes of millions of people. And when inventive genius shall have devised appliances for its perfect combustion and consequent better utilization, its already immense value will be more than doubled.

Anthracite coal, of which none exists in this State, is, when free from impurities, a pure carbon, very hard, difficult to ignite, burns slowly, under a moderate draft, with a light bluish flame, evolving carbonic-oxide gas. Its waste in burning in the stoves and furnaces in common use is 67 per cent. of its heat value, in the uncombined gas that is carried off by the smoke flue.

Bituminous coal, of which Indiana has 7,000 square miles, is, when free from impurities, nearly pure hydro-carbon in varying combination, easily ignited, evolving nearly pure carburetted hydrogen gas, that burns with a luminous and more or less ruddy flame. The bituminous coals are utilized for illuminating as well as heating purposes. On account of the volatile matter contained in them, they are wasted, even in the best constructed furnaces, at the rate of more than 75 per cent. of their heat-producing capability.

Although there is considerable variety in the coals found in Indiana, ranging from the non-caking block, or splint, through all the grades of caking up to the most highly bituminous, including cannel, affording, in abundance, varieties best adapted to steam and gas making and domestic and metallurgic purposes, yet, for some of these and other purposes, it becomes necessary or advantageous to convert it into coke. Since the discovery and development of the bituminous or caking coals, and before the discovery of the block or non-caking coal, coke was principally used in the blast furnace and cupola of the iron founder, and, except in this State, is still generally so used. Block coal is used in the cupola here. The

principal object of coking is to get rid of the sulphur that is contained in most coals, and to provide a fuel that will not cake, or become packed, under the weight of the superincumbent mass, so that the heat may freely permeate every part. Sulphur, whether in the coal or the ore, destroys the tenacity and malleability of the iron.

Coke is the solid carbon and ash of coal, and is produced by driving off the volatilizable constituents, as the water, hydrogen, sulphur, etc. This is done by heat, in ovens built for the purpose, though the primitive, wasteful method of coking in pits made of earth is still in use in some places. The volatile matters driven off are nearly one-half by weight, but their expulsion does not lessen, materially, the volume, though this varies with the method of coking. Under pressure, with a slow fire at beginning and until the the sulphur is driven off, followed by a brisk fire, the product will be a hard, heavy, bright coke that has a ring when struck, while a smouldering fire, without pressure, yields a dark, spongy product.

Indiana is highly favored in having many hundreds of square miles of the best natural fuel in the world for the reduction of iron ore in the blast furnace, in her non-caking block coal, as well as in the vast area of coal adapted to making excellent coke.

COAL PRODUCTS.

"The readiness shown by the elements of coal to enter into new combinations where it is exposed to an increase of temperature, and the great variety of combinations obtained under different degrees of heat, or by the admission or exclusion of air, indicate the close relation of coal to the elements of the vegetable kingdom. It consists of carbon, hydrogen, oxygen and nitrogen, which make up the great bulk of vegetable matters, and these show the same disposition as in the plants themselves to separate from existing combinations and enter into new. The number of new products thus formed is almost unlimited. They differ from one another and from the original substance from which they are generated, as do those obtained in the processes of vegetable fermentation. When heat is applied without access of air, the vapor of water, set free, acts on the existing combinations of the elements. These are broken up, and hydrogen and oxygen are evolved under the most favorable circumstances, in their nascent state, to form new compounds with the carbon present, the characters of which vary greatly with the temperature. The process is called dry distillation. By keeping the retorts in which it is conducted at a cherry-red heat, the gases used for illumination are most copiously evolved, the tar itself being decomposed and converted into gaseous matters. But if the object is to obtain the coal oils, parafine, benzole and other hydro-carbons of this nature, care is taken that the retorts are heated very gradually, and do not acquire more than a low, red heat. The tarry matters thus escape decomposition, and, by repeated distillations, afford

crude naptha and its secondary products. Coal tar was, for a long time, a troublesome product of the gas works, no useful application of it, to any great extent, being known. It was employed as a covering to protect iron work exposed to the weather, and the pitch obtained by distilling it was found, when mixed with earthy matters, to be a good substitute for the natural product, asphaltum, used for artificial pavement, water-tight covering for roofs, etc. Finally, the tar came to be an object of purchase by tar distillers, who learned to extract from it the crude naptha and also the light oily fluids. The pitch, too, by repeated distillations, was made to yield more oily matters, which are useful for lubricating machinery and other purposes. The crude naptha is now purified by mixing it with a tenth its bulk of concentrated sulphuric acid, adding, when cold, five per cent. of peroxyde of manganese, and distilling off the upper portion. A rectified naptha is thus obtained, which readily dissolves caoutchouc, and, mixed with wood naptha, produces a powerful solvent of various resinous substances useful in making varnishes. Still further purified, the liquid benzole is obtained, which has been applied to many useful purposes. The light essential oils, as also the heavier qualities which come over after these, are found to possess antiseptic properties, which render them of value for preserving wood from decay. From the essential oils, the tar creosote or carbolic acid is obtained, which possesses extraordinary antiseptic properties, and is used in the preparation of a valuable dye-stuff, carbazotic acid. The heavy oil yields a substance called aniline, which gives, with bleaching powder and other agents, a magnificent blue color, and is employed in dyeing. Napthaline, also (which is a solid white substance, obtained in large quantities in the distillation of the tar), yields two coloring matters—one called napthalic acid and the other chloro-napthalic acid, the latter of which is nearly identical with the coloring principle of madder, and gives, with alkalies, a beautiful red color. Instead of napthaline, by conducting the distillation at a lower temperature, may be obtained the waxy substance of parafine, which is now used for the manufacture of candles and the parafine oils. * * * By oxidizing aniline with bichromate of potash, a bronze-colored substance is produced, dissolving in alcohol with a beautiful purple color. In concentrated sulphuric acid its solution is green. On adding water, and precipitating with an alcoholic solution of potash, the coloring matter is precipitated unchanged. It is of intense hue, and considered as good, if not better, than archil. It is very stable, not being decomposed at a temperature of 482° Fahr. One pound of the solid substance will dye 200 pounds of cotton a moderately dark lilac, the color standing well the action of light and heat, acids and alkalies."—*Amer. Cycl., Vol. 4, page 752.*

Coal oils have been made from the cannel and other fat coals, and also from the bituminous shales, which, until late years, were considered worthless; but the wonderful production of petroleum renders their manufacture unprofitable.

LOCOMOTIVE USE OF COAL.

The world, in an economic sense, is made up of little things. Like building a house, it is only one brick on another. As an illustration of the importance of detail in all the affairs of life, the following is copied:

HOW GREAT THINGS ARE DONE.

Success in great things generally depends upon the care and faithfulness with which all the little details are done. This is true, whether it be a sermon or a shoe factory, a play or a printing house, a picture or a war.

The fact is strikingly illustrated by a description of the manner in which the fastest railroad train on the continent is run between New York and Philadelphia, as described in the American Machinist:

"To accomplish the distance in the time requires the most minute supervision—the engine, even down to the oil cans, must be in perfect order, the brake air-pump working, the valves, joints and reservoirs in exact condition. To pass over what would be obviously necessary in the skill and judgment of the engineer, there is the skill of the fireman alone, whose neglect would cause a serious difference in the time which the train is obliged to make. His coal is all broken into lumps of equal size; it is to be pitched, while the engine rocks and leaps, to the right spot in the fire-box ten feet long; only one shovelful is thrown in at a time, so the fire is not choked with fuel, as it would be by an unskillful fireman; but every two minutes in goes the right quantity at the right spot, and the door closed quickly.

"When the engine arrives at its destination there are only a few inches of glowing coals left, so accurate is the calculation by which the steam in the boiler is kept to an exact and steady degree of temperature, and the very highest service got of the engine in consequence. It is in this way invariably that great and substantial achievements in every department of life are gained."

CONNECTED SECTION OF THE COAL MEASURES IN INDIANA.

0 to 20	feet.	Buff, brown, mottled, flaggy sandstone.
5 to 20	"	Merom sandstone, upper division shaly.
5 to 40	"	Merom sandstone, massive.
10 to 24	"	Gray or buff shales and flaggy sandstone, ripple marked.
1 to 6	"	Hard, clinky, gray limestone, sometimes flinty; to the west a calcareous shale.
0 to 34	"	Argillaceous shale and shaly sandstone.
0 to 2	"	Black slate with fish spines and fossils.
0 to 1	"	SECOND RASH COAL.
0 to 2	"	Fire clay.
0 to 6	"	Gray shales.

3 to 12	feet.	Yellow, ferrugineous limestone, passing to calcareous shale or clod, in the west.
10 to 25	"	Gray shale.
0 to 2	"	First rash coal and black slate.
1 to 2	"	Fire clay.
40 to 110	"	Flaggy, blue, buff and gray sandstone, with much gray shale and beds of clay iron-stones.
15 to 28	"	Yellow and gray sandstone quarry beds.
0 to 1	"	Black slate, or clod, with fossils.
0 to 2	"	Coal N. Choice, gassy, caking.
1 to ·5	"	Fire clay, shaly at bottom, with pyrite.
2 to 8	"	Brown or gray limestone, with *Chætetes*.
30 to 40	"	Gray or white shale, with bands of sandstone.
40 to 70	"	Siliceous shale, passing to massive sandrock at the south and west. "Anvil Rock," of Dr. Owen.
2 to 4	"	Black slate and clod, with many animal and vegetable fossils.
3 to 6	"	Coal M.
2 to 4	"	Fire clay.
3 to 14	"	Shale, with balls of pyrite.
2 to 4	"	Brown, compact limestone.
2 to 20	"	Argillaceous sandstone.
20 to 84	"	Gray shale and soapstone.
1 to 2	"	Soapstone crowded with plant remains.
3 to 11	"	Coal L.
2 to 5	"	Fire clay.
20 to 120	"	Siliceous shale and coarse, massive ferrugineous sandstone.
2 to 8	"	Bituminous limestone and black slate.
2 to 8	"	Coal K.
2 to 10	"	Fire clay.
16 to 22	"	Gray shale and soft sandstone.
3 to 4	"	Coal I. Main "Block."
6 to 10	"	Fire clay.
0 to 2	"	Dark shales.
0 to 2	"	Coal H.
16 to 24	"	Fire clay and shale.
0 to 1	"	Coal G.
15 to 23	"	Shale and sandstone.
2 to 4	"	Coal F. Lower "Block."
30 to 80	"	Sandstone and gray shales.
0 to 3	"	Coal B. Part "Block" and splinty cannel.
2 to 4	"	Fire clay.
10 to 22	"	Siliceous shale and coarse, soft sandstone.
60 to 125	"	Massive conglomerate gritstones.

Block coal (local.)

2 to	30 feet.	Black, aluminous, pyritous shale, highly ferruginous.
0 to	2 "	Black slate.
0 to	2 "	COAL A. Impure.
2 to	4 "	Fire clay.
10 to	40 "	Dark pyritous shale, with ferruginous clays. Kaskaskia limestone, Chester group Lower Carboniferous period.

FUEL VALUES OF COAL.

HEAT UNITS—STEAM VALUES.

The State Geologist is indebted to Dr. G. M. Levette for the preparation of the following tables of the heat units and steam values of the coals of Indiana and other competing regions.

Prof. John Collett, State Geologist:

SIR—Herewith you will find a compilation of all the analyses of Indiana coals given in the reports of Dr. David Dale Owen, Prof. Richard Owen and Prof. E. T. Cox, comprising, in the aggregate, 390 examples; also two analyses of peat from the north end of the State. In addition, for comparison, are given fifty-six examples of coal analyses from Ohio, Pennsylvania, Kentucky, Illinois, Missouri, Iowa and other States and Territories, not forgetting the widely known Newcastle coal of England and the Albertite of New Brunswick. In all cases the authority is given in the heading of the tables or in the column under "Remarks."

The figures in the column headed "Units of Heat"* indicate the pounds water one pound of the coal will raise from 39° to 40°. As an example, one pound of coal, No. 1, of the tables (Barnett's mine) will raise the temperature of 8086 pounds of water 1° Fahr., or 4043 pounds 2° or 44.9 pounds from 32° to 212°.

The units of heat in any fuel are calculated from the per cent. of carbon and hydrogen contained in it.

The rules for these calculations are deduced from numerous experiments, through several years, by MM. Scheurer-Kestner and C. Meunier-Dollfuss, who, following the line of investigation instituted by Favre and Silberman, devised a modification of their calorimeter, by which the theoretical and experimental calorific value of fuels were made to coincide so closely that approximately correct multipliers were established for each per cent. of carbon or hydrogen found by chemical analysis in a fuel.

The column headed "Steam Value" gives the gallons of water that one ton (2,000 pounds) of the coal will raise from 100° F. to steam, at atmospheric pressure. For example, 2000 pounds of coal, No. 2, of the table

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*A *unit of heat* is the quantity of heat required to raise the temperature of one pound of water from 39° to 40° Fahr., 39° being the temperature of greatest density.

(Garlic & Collins) will convert 1396 gallons of water into steam, starting with the water at 100° F., a temperature at which many heaters deliver water to the boilers.

All the calculations under the head of "Steam Value," and all in black face type, under "Units of Heat," were made specially for this report, while all other figures in the following tables were copied from the authorities given in the headings or in the column under "Remarks."

The first analyses of Indiana coals of which I find any record, were made by Dr. David Dale Owen, in his laboratory in New Harmony, by authority of an act of the Legislature "to provide for a geological survey of Indiana," approved February 6, 1837. Wood being more of a burden than a blessing, at that time, in most parts of the State, its extreme low price rendered coal mining unprofitable and unnecessary; but few coal banks were known, simple outcrops along streams or valleys having attracted the attention of settlers. It was from these few exposures Dr. Owen took his samples and made his analyses.

In 1859, the Legislature of Indiana authorized "a geological reconnoissance of the State." Dr. D. D. Owen was again made State Geologist. His death occurring soon after the appointment, his principal assistant, Professor Richard Owen, made the report in which is found analyses of twenty-two examples of coal.

In 1869, the Legislature provided for a geological survey. Professor E. T. Cox was appointed State Geologist, and served in that capacity until the spring of 1879, during which time all the important coal banks or mines in the State were visited, samples selected and analyses made, 363 of which are given in the following tables.

All of which is respectfully submitted by

Yours truly,

G. M. LEVETTE.

Analyses of Coals, Clay County, Indiana. Geological Report of Indiana, 1869, *E. T. Cox.*

	NAME OF MINE OR OWNER.	Specific gravity.	Lbs. Weight of one cubic foot.	Fixed Carbon.	Ash.	Color of Ash.	Coke.	Gas.	Water.	Total volatile matter.	Units of Heat.	Steam value. See page 10.
1	Barnett's mine	1.250	78.12	57.0	1.5	. . . . .	58.5	37.5	4.0	41.5	**8086**	1500.
2	Garlic & Collins	1.230	76.87	57.5	3.0	. . . . .	60.5	31.0	8.5	39.5	**7523**	1396.
3	Knightsville No. 1.	1.176	73.50	59.8	0.3	. . . . .	60.1	30.9	9.0	39.9	**7725**	1433.
4	Knightsville No. 2.	1.167	72.93	57.0	2.0	. . . . .	59.0	33.0	8.0	41.0	**7668**	1423.
5	McClelland's No. 1.	1.279	79.93	54.7	1.5	. . . . .	56.2	38 8	5.0	43.8	**8023**	1489.
6	McClelland's No. 2.	1.279	79.93	53.0	2.5	. . . . .	55.5	40.0	4.5	44.5	**7994**	1481.
7	Star Mine, Harmony	1.242	77.62	61.5	2.5	. . . . .	64.0	32.5	3.5	36.0	**7985**	1483.
8	Newburg mine	1.327	82.93	47.3	6.0	. . . . .	53.3	39.7	7.0	46.7	**7550**	1400.

Clay County Coals—Continued. *Geological Report of Indiana*, 1870, *E. T. Cox.*

9	Carbon Block Coal Company	1.296	81.00	55.25	1.5	White.	56.75	39.85	3.40	43.25	**8176**	1517.
10	Garlic & Collins, Otter creek	1.244	77.75	57.90	3.5	White.	61.40	35.85	2.75	38.60	**8027**	1489.
11	Otter creek, lower seam.	1.232	77.00	57.95	2.6	White.	60.55	37.35	2.10	39.45	**8166**	1515.
12	Niblock & Zimmerman	1.231	76.93	55.63	0.75	White.	56.38	40.62	3.00	43.62	**8243**	1529.
13	Morris Coal Company	1.244	77.75	52.00	1.00	White.	53.00	43.50	3 50	47.00	**8238**	1528.
14	Markland Mining Company, 1873	1.211	75.69	52.00	2.0	White.	54.00	41.50	4.50	46 00	**8053**	1494.

15	E. Cooprider, Middlebury, top	1.280	80.00	44.00	4.50	Pink.	48.50	47.50	4.00	51.50	7924	1469.
16	E. Cooprider, Middlebury, middle	1.533	95.81	45.00	8.50	Brown.	53.50	44.00	2.50	46.50	7673	1423.
17	E. Cooprider, Middlebury, bottom	1.211	75.88	50.50	4.00	Yellow.	54.50	42.50	3.00	45.50	7980	1480.
18	J. Cooprider, Middlebury, middle	1.271	79.44	44.50	5.50	Purple.	50.00	47.00	3.00	50.00	7808	1448.
19	J. Cooprider, Middlebury, bottom	1.274	79.62	41.50	7.50	Purple.	49.00	47.50	3.50	51.00	7711	1431.
20	Kennedy, Centre Point, top	1.354	84.62	46.50	15 50	Brown.	62.00	35.00	3.00	38.00	6968	1292.
21	Kennedy, Centre Point, middle	1.204	75.25	49.50	9.00	White.	58.50	39.00	2.50	41.50	7575	1405.
22	Kennedy, Centre Point, bottom	1.188	74.25	52.00	4.50	White.	56 50	40.50	3.00	43.50	7917	1468.
23	Knickerbocker Coal Company, top	1.167	72.93	55.00	5.50	Buff.	60.50	37.00	2.50	39.50	7838	1454.
24	Knickerbocker Coal Company, middle	1.184	74.00	52.50	6.00	White.	58.50	39.50	2.00	41.50	7774	1442.
25	Knickerbocker Coal Company, bottom	1.241	77.56	50.50	6.50	White.	57.00	40.00	3.00	43.50	7750	1438.
26	Kress, Middlebury, top	1.318	82.37	44.00	13.00	Red.	57.00	39.50	3.50	43.00	7179	1332.
27	Kress, Middlebury, middle	1.287	80.43	40.50	10.50	Brown.	51.00	44 50	4.50	49.00	7355	1365.
28	Kress, Middlebury, bottom	1.432	89.40	38.50	13.00	Gray.	51.50	44.50	4 00	48.50	7194	1335.
29	Limited Liability Coal Company	1 231	76.93	57.00	3.00	White.	60.00	37.00	3.00	40.00	8000	1484.
30	Lodi	1.303	81.43	43.00	13.50	Red.	56.50	40.50	3.00	43.50	7190	1334.
31	Markland Coal Company, top	1.202	75.12	58.00	4.00	White.	62.00	36.00	2.00	38.00	7989	1482.
32	Markland Coal Company, middle	1.145	71.56	63.50	0.50	White.	64.00	35.50	2.50	36.00	8205	1522.
33	Markland Coal Company, bottom	1.221	76.31	59.00	2.50	White.	61.50	36 00	2.50	38.50	8070	1497.
34	Morrison's, Centre Point, top	1.233	77.06	52.50	7.00	Flesh.	59.50	37.00	3 50	40.50	7637	1417.
35	Morrison's, Center Point, middle	1.253	78.31	58.50	4.50	White.	63.00	34.00	3.00	37.00	7846	1455.
36	Morrison's, Centre Point, bottom	1.209	75.56	57.00	3.50	Flesh.	60.50	36.00	3.50	39.50	7909	1467.
37	Muir & Free, top	1.269	79.31	52.00	3.00	White.	55.00	42.50	2.50	45.00	8101	1503.
38	Muir & Free, middle	1.167	72.93	48.50	6.00	White.	54.50	41.50	4.00	45.50	7727	1433.
39	McClelland & Zeller	1.285	80.31	56.50	2 50	White.	59.00	32.50	8.50	41.00	8005	1485.
40	J. McCrea, Hoosiertown, top	1.196	74.75	56.50	2.00	White.	58.50	39.50	2.00	41.50	8189	1519.
41	J. McCrea, Hoosiertown, middle	1.229	76.81	56.00	5.50	White.	61.50	36.00	2.50	38.50	7828	1452.
42	J. McCrea, Hoosiertown, bottom	1.227	76.06	58.00	2.50	White.	60.50	37.00	2.50	39.50	8080	1499.
43	Niblock & Co., "Chicago mine"	1.251	78.19	50.50	2.00	White.	52.50	41.50	6.00	47.50	7888	1463.

Clay County Coals—Continued. *Geological Report of Indiana*, 1875, *E. T. Cox.*

	NAME OF MINE OR OWNER.	Specific gravity.	Lbs. Weight of one cubic foot.	Fixed Carbon.	Ash.	Color of Ash.	Coke.	Gas.	Water.	Total volatile matter.	Units of Heat.	Steam Value. See page 10.
44	A. Phipps, Middlebury, top	1.303	81.43	52.00	5.50	Brown.	57.50	39.50	3.00	42.50	7826	1452.
45	A. Phipps, Middlebury, middle	1.266	79.15	48.50	4.50	Pink.	53.00	44.50	2.50	47.00	8002	1484.
46	A. Phipps, Middlebury, bottom	1.333	83.31	40.00	10.50	Red.	50.50	47.00	2.50	49.50	7544	1400.
47	J. Roush, Middlebury	1.239	77.42	49.50	7.00	Flesh.	56.50	40.00	3.50	43.50	7670	1423.
48	Stedman's, Centre Point, top	1.208	75.50	57.50	4.00	White.	61.50	35.50	3.00	38.50	7903	1466.
49	Stedman's, Centre Point, middle	1.216	76.00	50.50	8.00	White.	58.50	39.50	2.00	41.50	7904	1466.
50	Stedman's, Centre Point, bottom	1.220	76.25	60.00	5.00	White.	65.00	32.00	3.00	35.00	7784	1444.
51	J. Storm, Middlebury, top	1.204	75.25	52.50	7.00	White.	59.50	38.00	2.50	40.50	7728	1434.
52	J. Storm, Middlebury, middle	1.257	78.56	59.00	2.50	White.	61.50	36.00	2.50	38.50	8070	1497.
53	J. Storm, Middlebury, bottom	1.230	76.87	55.50	7.00	White.	62.50	35.50	2.00	37.50	7731	1434.
54	Wagstaff, Clay City, top	1.319	82.43	61.00	3.00	Red.	64.00	33.50	2.50	36.00	8003	1484.
55	Wagstaff, Clay City, middle	1.231	76.93	59.00	2.50	Pink.	61.50	36.00	2.50	38.50	8070	1497.
56	Wagstaff, Clay City, bottom	1.214	75.87	54.50	2.50	Pink.	57.00	40.50	2.50	43.00	8120	1506.
57	Ward & Perry, Oakland, bottom	1.165	72.81	57.00	3.50	Red.	60.50	36.50	3.00	39.50	7955	1476.
58	Ward & Perry, Oakland, top	1.162	72.62	58.50	3.00	White.	61.50	36.00	2.50	38.50	8030	1489.
59	Ward & Perry, Oakland, top	1.222	76.37	58.00	5.00	White.	63.00	34.50	2.50	37.00	7851	1456.
60	Woodruff & Fletcher, Hoosiertown, middle	1.221	76.31	55.50	6.50	White.	62.00	36.00	2.00	38.00	7787	1447.
61	Woodruff & Fletcher, Hoosiertown, middle	1.216	76.00	59.00	3.50	Flesh.	62.50	35.50	2.00	37.50	8024	1489.
62	Woodruff & Fletcher, Hoosiertown, bottom	1.188	74.12	58.00	1.50	White.	59.50	38.50	2.00	40.50	8218	1524.
63	Woodruff & Fletcher, near Brazil	1.142	71.37	59.00	1.50	White.	60.50	35.50	4.00	39.50	8024	1489.

Analyses of Coals, Daviess County, Indiana. Geological Report of Indiana, 1870, E. T. Cox.

64	Allen, Joseph, coal . . . . . K	1.293	80.81	56.00	6.50	Brown.	62.50	30.50	7.00	37.50	7355	1364.
65	Aikman's coal L	1.270	79.37	56.50	3.00	N'rly white.	59.50	35.50	5.00	40.50	7860	1458.
66	Berry,s, Walter, coal	1.288	80.50	59.00	5.50	Brown.	64.50	28.50	7.00	35.50	7412	1375.
67	Cox's coal L	1.259	78.68	57.50	3.50	White.	61.00	35.00	4.00	39.00	7894	1465.
68	Clark's coal I	1.277	79.81	57.30	3.50	White.	60.80	34.70	4.50	39.20	7848	1456.
69	Dutch Bank L	1.264	79.00	61.50	2.00	White.	63.50	34.50	2.00	36.50	8171	1515.
70	Gregory's coal . . . . . K?	1.276	79.75	60.50	2.00	Drab.	62.50	30.50	7.00	37.50	7719	1432.
71	John Gregory's coal . . . . . K?	1.275	79.68	49.50	2.00	Lilac.	51.50	42.00	6.50	48.50	7897	1465.
72	McCord's coal . . . . . K	1.245	77.81	54.00	2.00	Flesh.	56.00	40.00	4.00	44.00	8075	1498.
73	O'Brian's . . . . . K	1.270	79.37	56.50	1.50	Salmon.	58.00	35.50	6.50	42.00	7860	1458.
74	Odell's coal . . . . . A	1.262	78.87	53.00	2.00	White.	55.00	36.50	8.50	45.00	7670	1423.
75	Raymond's coal X	1.200	75.00	50.75	1.75	Cream.	52.50	46.50	1.00	47.50	8416	1561.
76	Spink & Cable, main shaft L	1.294	80.87	60.00	4.50	Fawn.	64.50	30.00	5.50	35.50	7632	1416.
77	Sulphur Spring Bank L	1.280	80.00	58.30	6.00	Brown.	64.30	31.20	4.50	35.70	7650	1419.
78	Spicer's Mill L	1.268	79.25	48.50	1.00	Blue.	49.50	44.00	6.50	50.50	8002	1484.
79	Stone's coal	1.264	79.00	54.30	2.00	Red brown.	56.30	35.20	8.50	43.70	7652	1419.
80	John Shaffer's coal . . . . . A	1.308	81.75	58.00	3.50	Brown.	61.50	30.50	8.00	38.50	7517	1395.
81	Turner's coal . . . . . A	1.278	79.75	55.50	1.50	White.	57.00	35.50	7.50	43.00	7779	1443.
82	Ward's coal . . . . . A	1.261	78.81	55.00	2.50	White.	57.50	36.00	6.50	42.50	7785	1444.
83	Wilson's coal L	1.268	79.25	59.20	2.50	White.	61.70	34.90	3.40	38.30	8915	1489.
84	Buckeye Cannel Coal Company, Cannel coal	1.229	76.87	42.00	6.00	White.	48.00	48.50	3.50	52.00	7894	1465.

Daviess County Coals—Continued. *Geological Report of Indiana*, 1875, *E. T. Cox.*

85	J. S. Morgan, top, No. 1	1.277	79.81	56.00	5.50	Red.	61.50	32.50	6.00	38.50	7507	1393.
86	J. S. Morgan, bottom, No. 2	1.252	78.25	53.50	5.00	White.	58.50	36.00	5.50	41.50	7626	1415.
87	J. S. Morgan, lower seam, No. 3	1.239	77.44	53.00	2.50	White.	55.50	39.50	5.00	44.50	7906	1466.

Analyses of Coals, Dubois County, Indiana. Geological Report Indiana, 1871, E. T. Cox.

	NAME OF MINE OR OWNER.	Specific gravity.	Lbs. Weight of one cubic foot.	Fixed Carbon.	Ash.	Color of Ash.	Coke.	Gas.	Water.	Total volatile matter.	Units of Heat.	Steam Value. See page 10.
88	Burnham coal . . . . . A	1.306	81.62	53.00	3.50	White.	56.50	39.00	4.5	43.50	**7902**	1466.
89	Elkin . . . . . A	1.295	80.93	50.50	4.00	Brown.	54.50	39.00	6.5	45.50	**7700**	1429.
90	Harbison . . . . . A	1.198	74.87	23.50	18.00	Pink.	33.50	60.50	6.0	66.50	**7513**	1394.
91	Hay, upper part . . . . . A	1.289	80.56	51.50	3.50	White.	55.00	40.50	4.5	45.00	**7920**	1469.
92	Hay, middle part . . . . . A	1.264	79.00	49.50	3.00	White.	52.50	40.50	7.0	47.50	**7758**	1439.
93	Hay, bottom part . . . . . A	1.271	79.43	51.50	2.00	White.	53.50	40.00	6.5	46.50	**7873**	1461.
94	Kesler, upper part . . . . . A	1.333	83.31	40.00	11.50	Blue.	51.50	41.50	7.0	48.50	**7083**	1314.
95	Kesler, middle part . . . . . A	1.268	79.25	40.50	8.50	Gray.	49.00	45.00	6.0	51.00	**7448**	1382.
96	Kesler, bottom part . . . . . A	1.260	78.75	40.50	9.00	Brown.	49.50	44.00	6.5	50.50	**7356**	1365.
97	Fest . . . . . A	1.305	81.56	48.00	5.50	Faun.	53.50	41.00	5.5	46.50	**7682**	1425.
98	Bridenbaugh, upper part . . . . . K	1.273	79.56	52.50	4.00	Red.	56.50	37.00	6.5	43.50	**7676**	1423.
99	Bridenbaugh, middle part . . . . . K	1.265	79.06	51.50	3.50	Red.	55.00	40.50	4.5	45.00	**7920**	1469.
100	Bridenbaugh, bottom part . . . . . K	1.246	77.87	52.50	3.50	Red.	56.00	39.00	5.0	44.00	**7861**	1458.
101	Rudolph . . . . . K	1.361	78.81	48.50	4.00	Red.	52.50	42.00	5.5	47.50	**7816**	1450.
102	J. Stein	1.260	78.75	48.50	3.50	Brown.	52.00	43.50	4.5	48.00	**7955**	1476.
103	M. Wilson . . . . . K	1.416	88.50	53.00	2.50	White.	55.50	40.50	4.0	44.50	**8041**	1491.
104	M. Wilson, another part of mine . . . . . K	1.286	80.37	44.50	5.00	Red.	49.50	44.50	6.0	50.50	**7725**	1433.
105	Adam Smith, upper part . . . . . K?	1.256	78.50	43.50	3.50	White.	47.00	46.00	7.0	53.00	**7783**	1443.
106	Adam Smith, middle part . . . . . K?	1.335	83.43	49.00	2.50	White.	51.50	43.50	5.0	48.50	**7996**	1483.
107	Adam Smith, bottom part . . . . . K?	1.261	78.81	44.50	4.50	Gray.	49.00	45.50	5.5	51.00	**7818**	1449.
108	Bretzville . . . . . A?	1.275	79.68	49.00	3.50	White.	52.50	43.00	4.5	47.50	**7950**	1475.

Analyses of Coals, Fountain County, Indiana. Geological Report Indiana, 1869–'70–'75, E. T. Cox.

109	Norbourn Thomas, semi-block coal	1.277	79.81	59.80	4.5	. . . . .	64.30	32.70	3.0	35.70	**7818**	1450.
110	W. B. Coates, top, coal . . . . . N	1.249	78.06	51.80	2.6	Brown.	54.40	42.60	3.0	45.60	**8146**	1511.
111	W. B. Coates, bottom . . . . . N	1.301	81.31	49.00	7.2	Gray.	56.20	40.20	3.6	43.80	**7671**	1423.
112	Hatfield's Mill, cannel coal	1.195	74.68	47.50	1.0	Red.	48.50	47.00	4.5	51.50	**8199**	1521.
113	Barker's	1.195	74.68	54.50	4.5	White.	59.00	36.00	5.0	41.00	7707	1429.
114	Judge Coates	1.220	76.25	47.50	3.0	White.	50.50	44.00	5.5	49.50	7875	1461.
115	Kirtland, top	1.203	75.18	47.50	2.5	Red.	50.00	46.00	4.0	50.00	8058	1493.
116	Kirtland, bottom	1.211	75.68	39.00	4.5	Brown.	43.50	53.00	3.5	56.50	8014	1487.
117	J. W. McKee, top	1.205	75.31	55.00	4.0	White.	59.00	35.00	6.0	41.00	7655	1420.
118	J. W. McKee, bottom	1.225	76.56	47.50	5.5	White.	53.00	41.50	5.5	47.00	7646	1418.
119	S. Thompson, top	1.239	77.43	52.50	4.5	White.	57.00	37.50	5.5	43.00	7682	1425.
120	S. Thompson, bottom	1.207	75.43	51.50	4.0	Flesh.	55.50	41.50	3.0	44.50	7969	1478.

Analyses of Coals, Greene County, Indiana. Geological Report Indiana, 1869, E. T. Cox.

121	Babbitt	1.238	77.30	59 90	1.5	. . . . .	61.40	35.60	3.0	38.60	**8142**	1510.
122	Bledsoe	1.251	78.20	63.00	0.5	. . . . .	63.50	29.50	7.0	36.50	**7828**	1452.
123	Harrell	1.263	78.31	48.10	2.5	. . . . .	50.60	42.40	7.0	49.40	**7822**	1451.
124	McKissick	1.189	74.37	62.50	2.0	. . . . .	64.50	32.00	3.5	35.50	**8020**	1488.
125	Templeton	1.238	77.37	59.30	4.5	. . . . .	63.80	28.70	7.5	36.20	**7499**	1391.

Analyses of Coals, Gibson County, Indiana. Geological Report Indiana, 1873, E. T. Cox.

126	Finney	1.307	81.68	51.50	6.5	Brown.	58.00	36.00	6.0	42.00	**7502**	1391.
127	McGregor, coal . . . . . N	1.249	78.06	52.50	3.5	Yellow.	56.00	39.50	4.5	44.00	**7908**	1467.
128	Oakland City . . . . . L?	1.391	86.93	43.50	18.5	Red.	62.00	32.00	6.0	38.00	**6484**	1200.
129	G. S. Vanada	1.275	69.68	54.00	5.5	Red.	59.50	35.50	5.0	40.50	**7658**	1421.

Analyses of Coals, Knox County, Indiana. Geological Report Indiana, 1873, E. T. Cox.

	NAME OF MINE OR OWNER.	Specific gravity.	Lbs. Weight of one cubic foot.	Fixed Carbon.	Ash.	Color of Ash.	Coke.	Gas.	Water.	Total volatile matter.	Units of Heat.	Steam value. See page 10.
130	Curry, coal L	1.319	81.87	57.00	4.5	White.	61.50	34.50	4.0	38.50	**7807**	1447.
131	John Hooper. . . . . M	1.261	78.81	51.50	6.5	Red.	58.00	38.50	3.5	42.00	**7734**	1435.
132	Dr. Keith, upper . . . . . K	1.292	80.75	49.50	5.0	Gray.	54.50	39.50	6.0	45.50	**7665**	1422.
133	Dr. Keith, middle . . . . . K	1.311	81.93	49.00	6.0	Gray.	55.00	39.00	6.0	45.00	**7578**	1405.
134	Dr. Keith, lower . . . . . K	1.305	81.56	49.00	6.5	Brown.	55.50	39.00	5.5	44.50	**7578**	1405.
135	McKenna	. . .	. . .	57.50	4.0	White	61.50	35.00	3.5	38.50	**7894**	1465.
136	Sanborn . . . . . K	1.287	80.43	48.00	3.5	Brown.	51.50	44.50	4.0	48.50	**8000**	1484.
137	Sanborn, cannel coal . . . . . K	1.601	100.07	38.50	25.0	Brown.	63.50	33.00	3.5	36.50	**6173**	1146.
138	Shepard & Hazlet . . . . . K	1.304	81.50	49.00	6.5	Blue.	55.50	39.00	5.5	44.50	**7578**	1405.
139	A. Simonson, upper L	1.250	78.12	47.00	2.5	Faun.	49.50	47.00	3.5	50.50	**8159**	1514.
140	A. Simonson, middle L	1.244	77.75	49.50	3.5	Faun.	49.00	47.50	3.5	51.00	**8408**	1559.
141	A. Simonson, lower L	1.253	78.31	48.50	3.0	Pink.	51.50	45.50	3.0	48.50	**8048**	1493.
142	Simonson & Hulan, upper . . . . . K	1.281	80.06	45.50	3.0	White.	50.50	45.50	4.0	49.50	**7899**	1465.
143	Simonson & Hulan, middle . . . . . K	1.276	79.75	49.00	3.5	White.	52.50	43.00	4.5	47.50	**7950**	1475.
144	Simonson & Hulan, lower . . . . . K	1.286	81.00	52.00	7.0	Red.	59.00	37.50	3.5	41.00	**7682**	1425.
145	Swick . . . . . M?	1.276	79.75	46.00	5.5	Red.	51.50	46.50	3.0	48.50	**8032**	1490.
146	James D. Williams . . . . . M?	. . .	. . .	54.00	4.0	Brown.	58.00	38.50	3.5	42.00	**7936**	1472.
147	Weaver Coal Company (borings) . . . . . M?	. . .	. . .	59.00	3.5	White.	62.50	34.00	3.5	37.50	**7969**	1478.
148	Weaver Coal Company, mine . . . . . M	1.277	79.81	52.00	4.5	Brown.	56.50	38.50	5.0	43.50	**7774**	1442.
149	Weaver Coal Company, mine L	1.286	81.00	53.00	5.0	Red.	58.00	38.50	3.5	42.00	**7855**	1457.

Analyses of Coals, Martin County, Indiana. Geological Report, Indiana, 1870, E. T. Cox.

150	Baker, upper part . . . . . A	1.238	77.37	51.25	1.5	White.	52.75	44.75	2.5	47.25	**8294**	1539.
151	Baker, lower part . . . . . A	1.239	77.43	48.75	0.8	White.	49.50	47.50	3.0	50.50	**8367**	1551.
152	Horn & Co . . . . . A	1.246	77.87	42.50	2.5	Brown.	45.00	52.00	3.0	55.00	**8259**	1532.
153	P. Hultz . . . . . A	1.262	78.87	47.50	2.5	White.	50.00	46.50	3.5	50.00	**8153**	1512.
154	Munson's Ridge, upper . . . . . A	1.270	79.37	50.00	1.5	Brown.	51.50	45.50	3.0	48.50	**8262**	1532.
155	Sampson's Hill, upper I	1.588	99.25	28.50	41.0	Gray.	69.50	25.00	5.5	30.50	**4228**	892.
156	Sampson's Hill, middle I	1.232	77.00	53.00	1.0	White.	54.00	44.00	2.0	46.00	**8365**	1551.
157	Sampson's Hill, bottom I	1.252	78.12	47.00	1.5	Red.	48.50	48.50	3.0	51.50	**8298**	1539.
158	Sampson's Hill, carbon markings			83.40	0.8	. . . . .	84.20	13.30	2.5	15.80	**7963**	1477.
159	Turner, Sampson's Hill . . . . . A	1.359	84 31	45.50	9.0	Red.	54.50	41.50	4.0	45.50	**7528**	1396.
160	Willow Valley . . . . . A	1.286	80.37	48.00	2.5	Lead.	50.50	46.75	2.8	49.50	**8240**	1529.

Analyses of Coals, Montgomery County. Geological Report, Indiana, 1875, E. T. Cox.

161	B. Clover, near Waveland	1.254	78.37	52.00	3.5	White.	55.50	41.50	3.0	44.50	8010	1486.
162	H. S. Burford, near Waveland	1.202	75.12	49.00	5.0	White.	54.00	43.50	2.5	46.00	7950	1475.

Analyses of Coals, Owen County. Geological Report, Indiana, 1875, E. T. Cox.

163	Arney's, top	1.212	75.75	49.50	2.5	White.	52.00	45.00	3.0	48.00	8129	1508.
164	Arney's, middle	1.206	75.37	49.50	2.0	White.	51.50	45.00	3.5	48.50	8129	1508.
165	Arney's, bottom	1.271	79.44	51.50	5.0	Red.	56.50	40.50	3.0	43.50	7877	1461.
166	Reuben Barton	1.267	79.18	44.00	4.5	Red.	48.50	49.00	2.5	51.50	8051	1493.
167	James Beaman	1.240	77.50	52.50	3.0	Red.	53.50	41.00	3.5	44.50	8004	1485.
168	J. Brammer, Patricksburg, top	1.192	74.50	46.00	1.5	Yellow.	47.50	48.50	4.0	52.50	8167	1515.
169	J. Brammer, Patricksburg, middle	1.204	75.25	53.50	3.5	Red.	57.00	41.00	2.0	43.00	8085	1500.
170	J. Brammer, Patricksburg, bottom	1.277	79.81	46.00	4.5	Pink.	50.50	47.00	2.5	49.50	8029	1489.

Analyses of Coals, Owen County—Continued. *Geological Report Indiana*, 1875, *E. T. Cox.*

	NAME OF MINE OR OWNER.	Specific Gravity.	Lbs. Weight of one cubic foot.	Fixed Carbon.	Ash.	Color of Ash.	Coke.	Gas.	Water.	Total volatile matter.	Units of Heat.	Steam Value. See page 10.
171	T. Burger, middle	1.191	75.68	54.00	1.5	White.	55.50	42.50	2.0	44.50	8262.	1532.
172	T. Burger, bottom	1.223	76.44	58.00	3.5	White.	61.50	35.00	3.5	38.50	7897.	1464.
173	Chambers, top	1.230	76.87	49.00	3.0	Brown.	52.00	45.50	2.5	48.00	8134.	1509.
174	Chambers, middle	1.237	77.31	56.50	2.0	White.	58.50	39.00	2.5	41.50	8143.	1511.
175	Chambers, bottom	1.248	78.00	50.00	8.5	Brown.	58.50	39.00	2.5	41.50	7618.	1413.
176	D. C. Cress	1.248	78.00	55.00	2.5	Yellow.	57.50	39.50	3.0	42.50	8068.	1496.
177	G. Croft, middle	1.214	75.87	57.50	2.0	White.	59.50	38.50	2.0	40.50	8178.	1516.
178	G. Croft, bottom	1.250	78.12	57.00	4.5	White.	61.50	36.00	2.5	38.50	7909.	1467.
179	Joel Dillon	1.243	77.68	53.00	4.5	White.	57.50	39.50	3.0	42.50	7906.	1467.
180	A. Fiscus	1.362	85.12	45.00	19.5	Gray.	64.50	33.00	2.5	35.50	6664.	1237.
181	C. Fletcher, top	1.219	76.18	60.00	3.0	White.	63.00	35.00	2.0	37.00	8059.	1495.
182	C. Fletcher, middle	1.206	75.37	58.00	2.5	White.	60.50	37.50	2.0	39.50	8126.	1507.
183	C. Fletcher, bottom	1.241	77.56	44.00	8.5	Red.	52.50	45.50	2.0	47.50	7638.	1416.
184	Louisa Hester, cannel slate	1.333	83.31	47.00	12.5	Gray.	59.50	36.00	4.5	40.50	7101.	1317.
185	James Jackson	1.222	76.31	32.50	9.5	Pink.	42.00	54.00	4.0	58.00	7580.	1406.
186	McCreary, top	1.280	80.00	53.50	5.5	Brown.	59.00	38.00	3.0	41.00	7809.	1449.
187	McCreary, bottom	1.276	79.76	51.60	4.5	Red.	55.50	42.00	2.5	44.50	7974.	1479.
188	W. S. Norris	1.282	80.12	45.00	5.0	Red.	50.00	48.00	2.0	50.00	8040.	1491.
189	Oberholtzer, middle	1.242	77.62	57.00	4.5	Yellow.	61.50	35.00	3.5	38.50	7817.	1450.
190	Oberholtzer, bottom	1.292	80.75	53.00	9.5	White.	62.50	34.50	3.0	37.50	7447.	1381.
191	Jesse Reagan, top	1.261	78.81	52.50	7.5	White.	60.00	37.00	3.0	40.00	7555.	1402.

192	Jesse Reagan, middle	1.230	76.87	52.00	5.0	White.	57.00	40.50	2.5	43.00	7918	1450.
193	Jesse Reagan, bottom	1.250	78.12	52.50	5.5	White.	58.00	39.50	2.5	42.00	7866	1441.
194	J. Rowe, middle	1.235	77.18	56.00	5.0	White.	61.00	36.00	3.0	39.00	7828	1433.
195	J. Rowe, bottom	1.213	75.81	53.50	4.5	White.	58.00	39.00	3.0	42.00	7901	1466.
196	Wm. Royer, top	1.260	78.75	55.50	4.0	White.	59.50	38.00	2.5	40.50	7970	1479.
197	Wm. Royer, middle	1.193	74.56	55.00	3.0	Pink.	58.00	39.00	3.0	42.00	8022	1488.
198	Wm. Royer, bottom	1.219	76.18	51.50	4.0	White.	55.50	41.50	3.0	44.50	7969	1478.
199	J. C. Stahl	1.203	75.18	58.00	3.0	White.	61.00	36.00	3.0	39.00	7989	1482.
200	White	1.216	76.00	55.50	2.5	Pink.	58.00	39.00	3.0	42.00	8062	1495.

Analyses of Coals, Parke County. Geological Reports Indiana, 1869–'70–'71–'75, *E. T. Cox.*

201	Batty's Mine I	1.231	76.93	56.00	2.5	. . . . .	58.50	38.50	3.0	41.50	8097	1502.
202	Buchanan's Mine I	1.232	77.00	62.50	2.0	. . . . .	64.50	31.00	4.5	35.50	7927	1470.
203	Judge Maxwell	. . . .	. . . .	48.75	2.5	White.	51.25	45.50	3.25	48.70	8182	1518.
204	Cannel slate, near Rockville	. . . .	. . . .	34.50	26.0	Dark.	60.50	32.00	7.5	39.50	5757	1066.
205	Sand Creek coal	1.296	81.00	45.50	4.5	Light.	50.00	45.50	4.5	50.00	7899	1465.
206	Beard's coal	1.191	74.43	48.50	1.0	White.	49.50	42.50	8.0	50.50	7863	1459.
207	Moore's Mill	1.228	76.75	46.50	3.5	Brown.	50.00	46.00	4.0	50.00	7977	1479.
208	Bethany, cannel? coal	. . . .	. . . .	43.00	4.5	White.	47.50	47.00	5.5	52.50	7836	1453.

Analyses of Coals, Perry County. Geological Report Indiana, 1871, E. T. Cox.

	NAME OF MINE OR OWNER.	Specific gravity.	Lbs. Weight of one cubic foot.	Fixed Carbon.	Ash.	Color of Ash.	Coke.	Gas.	Water.	Total volatile matter.	Units of Heat.	Steam value. See page 10.
209	Everard's, coal . . . . . A	. . . .	. . . .	54.00	1.5	Red.	55.50	37.00	7.5	44.50	7797	1446.
210	Rock Island Seam, top . . . . . F	. . . .	. . . .	52.50	2.0	White.	54.50	41.00	4.5	45.50	8047	1493.
211	Rock Island Seam, middle . . . . . F	. . . .	. . . .	58.00	11.0	Red.	69.50	27.50	3.0	30.50	7461	1384.
212	Rock Island Seam, bottom . . . . . F	. . . .	. . . .	50.00	8.5	White.	58.50	37.00	4.5	41.50	7473	1386.
213	Rock Island Seam, slaty bottom	. . . .	. . . .	49.50	12.5	Lemon.	62.00	34.00	4.0	38.00	7155	1328.
214	Rock Island Seam, cannel . . . . . F	. . . .	. . . .	45.50	6.0	White.	51.50	42.00	6.5	48.50	7574	1405.
215	Cannelton, upper . . . . . F	. . . .	. . . .	51.50	4.0	White.	55.50	41.00	3.5	44.50	7966	1478.
216	Cannelton, middle . . . . . F	. . . .	. . . .	48.50	2.0	Brown.	50.50	43.00	6.5	49.50	7909	1467.
217	Cannelton, bottom . . . . . F	. . . .	. . . .	45.50	3.5	Red.	49.00	46.00	5.0	51.00	7945	1474.
218	Clarke Brothers, upper . . . . . F	. . . .	. . . .	48.50	2.0	White.	50.50	42.50	7.0	49.50	7863	1459.
219	Clarke Brothers, middle . . . . . F	. . . .	. . . .	49.50	3.5	White.	53.00	40.50	6.5	47.00	7758	1440.
220	Clarke Brothers, bottom . . . . . F	. . . .	. . . .	48.50	4.0	White.	52.50	41.00	6.5	47.50	7724	1433.
221	Heck's Mine, upper . . . . . F	. . . .	. . . .	49.50	6.0	Blue.	55.50	40.00	4.5	44.50	7712	1430.
222	Heck's Mine, lower . . . . . F	. . . .	. . . .	45.00	8.5	Red.	53.50	43.00	3.5	46.50	7626	1415.
223	McMahon, upper	. . . .	. . . .	48.50	4.0	Blue.	52.50	41.50	6.0	47.50	7770	1441.
224	McMahon, lower	. . . .	. . . .	50.50	5.5	Brown.	56.00	39.50	4.5	44.00	7746	1437.

Analyses of Coals, Pike County. Geological Report, Indiana, 1871, E. T. Cox.

225	Thomas Case . . . . . L ?	1.280	80.00	45.50	4.0	Faun.	49.50	47.00	3.5	50.50	**8038**	1491.
226	Bennett . . . . . K	1.268	79.25	45.50	3.5	Brown.	49.00	45.00	6.0	51.00	**7852**	1457.
227	Alexander's Seam . . . . . N	1.284	80.25	49.50	3.0	White.	52.50	41.50	6.0	47.50	**7851**	1457.
228	Alexander, another part of seam . . . . . N	1.259	78.69	52.00	4.0	White.	56.00	36.00	8.0	44.00	**7542**	1401.
229	Dr. Posey, upper . . . . . K	1.288	80.50	48.00	5.5	Blue.	53.50	40.00	6.5	46.50	**7590**	1408.
230	Dr. Posey, middle . . . . . K	1.275	79.68	48.00	4.0	Faun.	52.00	41.00	7.0	48.00	**7683**	1425.
231	Dr. Posey, bottom . . . . . K	1.244	77.75	50.50	6.0	Brown.	56.50	38.00	5.5	43.50	**7607**	1412.
232	Shandy's, upper . . . . . K	1.279	79.94	51.50	5.0	White.	56.50	37.00	6.5	43.50	**7595**	1409.
233	Shandy's, lower . . . . . K	1.270	79.37	49.00	3.5	White.	52.50	41.50	6.0	47.50	**7810**	1449.
234	DeBruler, upper . . . . . K	1.294	80.87	42.00	5.0	Blue.	47.00	45.00	8.0	53.00	**7569**	1404.
235	DeBruler, middle . . . . . K	1.271	79.43	44.50	5.5	Brown.	50.00	44.00	6.0	50.00	**7679**	1425.
236	DeBruler, bottom . . . . . K	1.268	79.25	50.00	3.5	Blue.	53.50	40.00	6.5	46.50	**7752**	1438.
237	Crowe's, upper L	1.274	79.62	52.50	3.5	Faun.	56.00	35.50	8.5	44.00	**7536**	1398.
238	Crowe's lower L	1.262	78.87	47.90	8.5	Gray.	56.40	35.10	8.5	43.60	**7086**	1315.
239	T. Smith's . . . . . N	1.279	79.93	53.50	2.5	White.	56.00	38.50	5.5	44.00	**7896**	1465.
240	Hawthorn & Gleason L	1.269	79.31	45.50	14.0	Gray.	59.50	32.00	8.5	40.50	**6646**	1233.
241	Barrs . . . . . M	1.260	78.75	57.00	3.5	White.	60.50	32.50	7.0	39.50	**7622**	1414.
242	Falls, upper . . . . . N	1.274	79.62	47.00	5.0	Faun.	52.00	42.50	5.5	48.00	**7742**	1436.
243	Falls, lower . . . . . N	1.268	79.25	51.50	4.0	White.	55.50	37.00	7.5	44.50	**7595**	1409.
244	Owner unknown . . . . . K	1.268	79.25	48.00	3.0	White.	51.00	44.50	4.5	49.00	**8008**	1486.
245	DeTar, upper . . . . . A	1.444	90.25	41.50	14.0	Red.	55.50	37.00	7.5	44.50	**6787**	1259.
246	DeTar, lower . . . . . A	1.288	80.50	49.50	5.0	Red.	54.50	40.00	5.5	45.50	**7712**	1431.
247	Bees, coal . . . . . K	1.269	79.31	44.50	14.0	Brown.	58.50	37.00	4.5	41.50	**7529**	1378.
248	Moulton, upper . . . . . K	1.244	77.80	48.00	3.5	Blue.	51.50	43.00	5.5	48.50	**7869**	1460.
249	Moulton, middle . . . . . K	1.257	78.56	50.50	8.5	Red.	59.00	36.50	4.5	41.00	**7468**	1385.
250	Moulton, bottom . . . . . K	1.257	78.56	49.50	3.0	White.	52.50	41.50	6.0	47.50	**7851**	1456.
251	Thomas . . . . . K	1.280	80.00	48.50	4.0	White.	52.50	40.50	7.0	47.50	**7677**	1425.
252	Wells & Whitman, upper L	1.294	80.87	52.50	2.5	White.	55.00	37.00	8.0	45.00	**7676**	1425.
253	Wells & Whitman, middle L	1.278	79.87	50.50	2.0	White.	52.50	41.50	6.0	47.50	**7932**	1471.
254	Wells & Whitman, bottom L	1.275	79.68	50.50	2.5	White.	53.00	42.00	5.0	47.00	**7978**	1480.

Analyses of Pike County Coals—Continued. *Geological Report of Indiana*, 1871, *E. T. Cox.*

	NAME OF MINE OR OWNER.	Specific Gravity.	Lbs. Weight of one cubic foot.	Fixed Carbon.	Ash.	Color of Ash.	Coke.	Gas.	Water.	Total volatile matter.	Units of Heat.	Steam Value. See page 10.
255	Massey, upper L	1.268	79.25	53.50	3.5	Gray.	57.00	34.50	8.5	43.00	**7524**	1396.
256	Massey, lower L	1.279	79.93	55.00	1.5	White.	56.50	36.50	7.0	43.50	**7831**	1453.
257	Martin, upper L	1.258	78.62	52.00	3.5	Gray.	55.50	37.00	7.5	44.50	**7635**	1416.
258	Martin, middle L	1.269	79.31	57.00	3.0	Gray.	60.00	33.50	6.5	40.00	**7724**	1433.
259	Martin, bottom L	1.275	79.68	55.00	2.5	White.	57.50	35.00	7.5	42.50	**7692**	1427.
260	Tevault . . . . . K	1.245	77.81	49.50	3.0	White.	52.50	40.50	7.0	47.50	**7758**	1440.
261	Wood . . . . . K	1.272	79.50	45.00	3.0	White.	48.00	47.50	4.5	52.00	**8044**	1492.
262	Ingham, upper . . . . . K?	1.280	80.00	49.00	2.0	White.	51.00	41.50	7.5	49.00	**7810**	1449.
263	Ingham, lower . . . . . K?	1.311	81.93	50.50	2.0	White.	52.50	41.00	6.5	47.50	**7885**	1463.

Analyses of Coal, Spencer County. *Geological Report of Indiana*, 1870–'71, *E. T. Cox.*

264	Priest coal	1.282	80.12	51.90	1.5	Cream.	53.40	43.10	3.5	46.60	**8192**	1518.
265	W. L. Barker I	1.317	82.31	43.50	6.5	Brown.	50.00	47.50	2.5	50.00	**7923**	1470.
266	Brashear & Howard I	1.281	80.06	52.50	1.0	White.	53.50	43.00	3.5	46.50	**8232**	1527.
267	Barr & Bro., upper L	1.274	79.62	46.00	2.5	Brown.	48.50	48.00	3.5	51.50	**8171**	1515.
268	Barr & Bro., middle L	1.282	80.12	48.50	2.5	Brown.	51.00	45.00	4.0	49.00	**8095**	1502.
269	Barr & Bro., lower L	1.278	79.87	48.50	3.0	Light red.	48.50	47.00	4.5	51.50	**8280**	1536.
270	R. L. Crosley L	1.267	79.17	47.50	4.0	Red.	51.50	45.00	3.5	48.50	**8014**	1487.
271	Lewisport I	1.294	78.06	47.50	1.0	White.	48.50	47.50	4.0	51.50	**8246**	1529.

272	Rockport	1.275	79.68	49.50	4.0	White.	53.50	40.00	6.5	46.50	**7712**	1431.
273	L. G. Smith	1.232	77.00	45.50	1.5	White.	47.00	47.00	6.0	53.00	**8038**	1491.
274	Staal's coal I	1.237	77.31	47.20	3.5	Gray.	50.70	44.30	5.0	49.30	**7927**	1470.
275	Staal's coal (Col. J. W. Foster) I	1.243	77.68	54.00	1.6	White.	55.60	42.60	1.8	44.40	**8307**	1541.
276	Stocking's coal	1.267	79.18	46.60	3.0	Brown.	49.60	47.90	2.5	50.40	**8212**	1523.
277	Woods' coal I	1.289	80.56	48.00	3.5	Brown.	51.50	45.50	3.0	48.50	**8101**	1503.
278	H. B. Kittaen . . . . . A	1.244	77.75	46.50	2.0	White.	48.50	47.00	4.5	51.50	**8119**	1506.
279	Kathman, upper . . . . . A	1.256	78.12	45.50	2.0	White.	47.50	48.50	4.0	52.50	**8084**	1506.
280	Kathman, lower . . . . . A	1.251	78.18	47.50	2.5	White.	50.50	45.00	5.0	50.50	**8014**	1487.
281	Abbott of St. Meinrod . . . . . F	1.265	79.06	50.50	5.0	Brown.	55.50	39.00	5.5	44.50	**7690**	1427.

Analyses of Coals, Sullivan County. Geological Report of Indiana, 1870, *E. T. Cox.*

282	Chambers . . . . . N	1.206	75.37	48.50	2.0	Brown.	50.50	45.00	4.5	49.50	**8095**	1502.
283	B. & L. Burk . . . . . M	1.210	75.62	51.00	1.5	White.	52.50	44.00	3.5	47.50	**8204**	1522.
284	Dicks, upper . . . . . M	1.258	78.62	50.50	1.5	White.	52.00	43.50	4.5	48.00	**8117**	1505.
285	Dicks, middle . . . . . M	1.252	78.25	55.80	0.5	White.	55.30	39.20	4.5	44.70	**8144**	1510.
286	Dicks, lower . . . . . M	1.278	79.05	52.00	2.5	Red.	54.50	42.00	3.5	45.50	**8099**	1502.
287	Hanna, Standard L	1.281	80.06	54.00	2.5	Gray.	56.50	40.50	3.0	43.50	**8122**	1506.
288	Pigg's coal . . . . . M	1.271	79.43	49.00	2.5	Red.	51.50	42.50	6.0	48.50	**7903**	1466.
289	St. Johns . . . . . M	1.287	80.43	49.00	2.5	White.	51.50	45.00	3.5	48.50	**8135**	1509.
290	Henry K. Wilson . . . . . M	1.228	76.75	51.60	0.8	White.	52.40	45.25	2.35	47.60	**8360**	1551.
291	H. Wilson, Cass Tp. . . . . M	1.249	78.06	52.00	2.0	Blue.	54.00	43.00	3.0	46.00	**8192**	1520.
292	Curryville Shaft L	1.282	80.12	51.50	1.0	Red.	52.50	43.50	4.0	47.50	**8198**	1521.
293	Richards & Buckley, top L	1.278	79.05	51.50	2.5	Red.	54.00	43.00	3.0	46.00	**8152**	1513.
294	Richards & Buckley, middle L	1.284	80.25	50.25	2.0	Cream.	52.25	44.75	3.0	47.75	**8213**	1505.
295	Richards & Buckley, bottom L	1.296	81.00	53.70	2.8	Red.	56.50	39.75	3.75	43.50	**8011**	1486.
296	Standard Coal Company L	1.333	83.31	55.20	2.9	White.	58.10	40.10	1.8	41.90	**8155**	1513.

Analyses of Coals, Sullivan County. Geological Report of Indiana, 1871–'75, *E. T. Cox.*

	NAME OF MINE OR OWNER.	Specific Gravity.	Lbs. Weight of one cubic foot.	Fixed Carbon.	Ash.	Color of Ash.	Coke.	Gas.	Water.	Total volatile matter.	Units of Heat.	Steam value. See page 10.
297	Curryville, upper part	....	....	56.50	2.50	White.	59.00	36.50	4.5	41.00	**7952**	1475.
298	Curryville, middle	....	....	53.50	1.50	White.	55.00	40.00	5.0	45.00	**8035**	1490.
299	Curryville, lower	....	....	52.50	3.00	White.	55.50	40.00	4.5	44.50	**7954**	1476.
300	Dicks' coal, five years out of mine	1.239	77.43	55.00	1.5	White.	56.50	40.00	3.5	43.50	8114	1505.
301	Dicks' coal, fresh from mine	1.258	78.62	50.50	1.5	White.	52.00	43.50	4.5	48.00	8071	1497.

Analyses of Coals, Vanderburg County. Geological Report of Indiana, 1875, *E. T. Cox.*

302	Ingleside L	1.275	79.68	53.50	4.0	Red.	57.50	39.00	3.5	42.50	7901	1466.
303	Ingleside, top . . . . . M	1.273	79.56	44.00	13.5	White.	57.50	39.50	3.0	42 50	7179	1332.
304	Ingleside, middle . . . . . M	1.275	79.68	48 50	6.0	White.	54.50	42.00	3.5	45.50	7772	1442.
305	Ingleside, bottom . . . . . M	1.336	83.50	46.00	11.0	White.	57.00	39.50	3.5	43.00	7341	1363.

Analyses of Coals, Vermillion County. Geological Reports of Indiana, 1869–'75, *E. T. Cox.*

306	Grove's mine L	1.289	80.50	47.70	4.5	. . . . .	52.20	44.30	3.5	47.80	**7965**	1478.
307	Charles Moore.	1.258	78.62	46.00	4.5	Flesh.	50.50	44.00	5.5	49.50	7751	1438.

Analyses of Coals, Vigo County. Geological Reports of Indiana, 1870–'75, E. T. Cox.

308	Foote's coal, Honey Creek		1.217	76.06	50.10	1.8	Brown.	51.90	44.40	3.7	48.10	**8168**	1515.
309	Titcomb's coal, Grant	L?	1.257	78.56	46.50	2.5	White.	49.00	48.00	3.0	51.00	**8212**	1523.
310	Roof of Titcomb's coal		1.493	93.50	39.00	32.0	Fawn.	71.00	25.00	4.0	29.00	**5471**	1013.
311	Arbuckle & Budd, Seelyville, top		1.211	75.68	48.00	3.5	White.	51.50	45.00	3.5	48.50	8007	1485.
312	Arbuckle & Budd, Seelyville, bottom		1.250	78.12	50.00	3.5	White.	53.50	43.50	3.0	46.50	8031	1490.
313	Barrick & Sons		1.192	74.50	48.20	4 3	Red.	52.50	44.50	3.0	47.50	8000	1484.
314	H. Brayton, Grant		1.216	76.00	44 00	8.5	Red.	52.50	44.00	3.5	47 50	7592	1409.
315	Foote's bore		1.217	76.06	50.10	1.8	Brown.	51.90	44.40	3.7	48.10	8123	1507.
316	P. H. Holloman		1.242	77.62	42.00	12.5	White.	54.50	42.00	3 5	45.50	7247	1344.
317	G. W. Mooreland		1.195	74.70	47.50	4.5	Red.	52.00	43.50	4.5	48.00	7829	1452.
318	A. McPherson		1.239	77.43	56.50	4.0	White.	60.50	37.00	2.5	39.50	7959	1477.
319	McQuilkins		1.210	75.62	47.50	3.5	White.	51.00	44.50	4.5	49.00	7921	1469.
320	F. Rhyan		1.226	76.62	48.50	6.0	Flesh.	54.50	43.50	2.0	45.50	7910	1467.
321	Somerset Coal Co		1.210	75.62	51.00	1.5	White.	52.50	43.00	4.5	47.50	8066	1496.
322	Webster & Bramwell, top		1.197	74.81	48.00	3 0	Purple.	51.00	46.00	3.0	49.00	8098	1503.
323	Webster & Bramwell, bottom		1.210	75.62	47.50	4.0	Red.	51.50	45.50	3.0	48.50	8013	1487.
324	Wyeth, Hartford, top		1.237	77.31	49.00	7.5	White.	56.50	41.00	2.5	43.50	7721	1432.
325	Wyeth, Hartford, bottom		1.216	76.00	51.00	4.5	White.	55.50	42.00	2.5	44.50	7974	1479.

Analyses of Coals, Warrick County. Geological Reports of Indiana, 1870–'75, E. T. Cox.

326	Locust Grove, No. 1	I	1.300	81 25	47.50	14.0	Brown.	61.50	34.50	4.0	38.50	**7040**	1306.
327	Locust Grove, No. 2	I	1.279	79.93	50.50	2.0	White.	52.50	44.50	3.0	47.50	**8210**	1523.
328	Locust Grove, No. 3	I	1.313	82.06	46.00	7.0	Brown.	53.00	45.00	2.0	47.00	**7893**	1465.
329	Locust Grove, No. 4	I	1.282	80.31	50.50	2 5	White.	53.00	44.50	2.5	47.00	**8210**	1523.
330	Chandler's, top	M	1.274	79.62	47.50	9.0	White.	56.50	40.00	3.5	43.80	7508	1392.
331	Chandler's, middle	M	1.282	80.12	49.50	5.5	White.	55.00	41.50	3.5	45.00	7808	1449.
332	Chandler's, bottom	M	1.283	80.18	45.00	16.5	White.	61.50	34.50	4.0	38.50	6801	1262.
333	Millersburg, middle	N	1.242	77.62	53.00	2.5	Blue.	55.50	41.50	3.0	44.50	8090	1501.
334	Millersburg, bottom	N	1.243	77.68	49.00	2.0	Brown.	51.00	45.50	3.5	49.00	8042	1492.

Analyses of Coals, Warren County. Geological Report of Indiana, 1873, E. T. Cox.

	NAME OF MINE OR OWNER.	Specific Gravity.	Lbs. Weight of one cubic foot.	Fixed Carbon.	Ash.	Color of Ash.	Coke.	Gas.	Water.	Total volatile matter.	Units of Heat.	Steam Value. See page 10.
335	John Briggs, coal . . . . . K	1.212	75.75	48.50	2.0	Flesh.	50.50	44.75	4.75	49.50	**8071**	1497.
336	J. T. Briscoe, upper L	1.223	76.44	57.50	7.0	Gray.	64.50	32.00	3.50	35.50	**7616**	1413.
337	J. T. Briscoe, middle L	1.267	79.18	54.70	8.0	Blue.	62.70	33.80	3.50	37.30	**7559**	1402.
338	J. T. Briscoe, lower L	1.350	84.37	52.25	16.0	Blue.	68.25	28.75	3.0	31.75	**6890**	1278.
339	R. W. Claypool, upper L	1.246	77.87	48.50	10.0	Red.	58.50	38.50	3.0	41.50	**7491**	1390.
340	R. W. Claypool, middle L	1.204	75.87	55.50	2.5	White.	58.00	38.00	4.0	42.00	**8011**	1486.
341	R. W. Claypool, lower L	1.205	75.31	54.50	8.5	Brown.	63.00	34.00	3.0	37.00	**6751**	1253.
342	R. W. Claypool . . . . . M	. . . .	. . . .	48.00	3.5	Brown.	51.50	45.00	3.5	48.50	**8050**	1493.
343	Goodrick . . . . . M	1.343	83.93	45.00	9.5	Red.	54.50	39.50	6.0	45.50	**7302**	1355.
344	Goodrick, upper L	1.304	81.50	46.50	8.5	Purple.	55.00	42.00	3.0	45.00	**7655**	1420.
345	Goodrick, lower L	1.262	78.87	46.00	4.5	Flesh.	50.50	46.50	3.0	49.50	**8032**	1490.
346	Hooper & Barringer, upper L	1.238	77.37	59.00	2.5	White.	61.50	34.50	4.0	38.50	**7967**	1478.
347	Hooper & Barringer, lower L	1.236	77.35	56.00	2.5	White.	58.50	35.00	6.5	41.50	**7773**	1442.
348	Harold & Co., upper L	1.282	80.15	54.00	6.5	Red.	60.50	36.00	3.5	39.50	**7704**	1429.
349	Harold & Co., middle L	1.290	80.62	49.50	7.5	White.	57.00	38.50	4.5	43.00	**7572**	1405.
350	Harold & Co., lower L	1.252	78.25	56.00	3.5	White.	59.50	31.00	9.5	40.50	**7401**	1373.
351	Jarvis, upper . . . . . K	1.243	77.68	50.50	6.5	Red.	57.00	38.00	5.0	43.00	**7607**	1411.
352	Jarvis, middle . . . . . K	1.251	78.18	53.50	3.0	White.	56.50	40.75	2.75	43.50	**8104**	1504.
353	Jarvis, lower . . . . . K	1.348	84.25	51.50	12.0	White.	63.50	33.00	3.5	36.50	**7183**	1333.
354	Luppoldt, upper L	1.222	76.37	49.00	9.5	Red.	58.50	37.00	4.5	41.50	**7386**	1370.
355	Luppoldt, middle L	1.254	78.37	52.50	9.0	Red.	61.50	33.50	5.0	38.50	**7351**	1364.

356	Luppoldt, lower L	1.256	78.50	57.00	4.5	White.	61.50	35.50	3.0	38.50	**7900**	1465.
357	Schoonover, upper . . . . . K	1.284	80.25	49.40	9.5	Red.	58.90	37.60	3.5	41.10	**7480**	1488.
358	Schoonover, lower . . . . . K	1.229	76.81	55.25	6.25	Red.	61.50	34.00	4.8	38.50	**7640**	1417.
359	John Thomas . . . . . M	1.415	88.43	49.50	12.5	Red.	62.00	33.50	4.5	38.00	**7108**	1318.
360	Tinker & Co., upper L	1.257	78.56	50.00	3.5	Red.	53.50	43.50	3.0	46.50	**8077**	1405.
361	Tinker & Co., middle L	1.282	80.12	47.00	3.0	Blue.	50.00	44.50	5.5	50.00	**7927**	1278.
362	Tinker & Co., lower L	1.244	77.75	50.50	5.0	Red.	55.50	42.50	2.0	44.50	**8024**	1489.

Analysis of Coals, Posey County. Geological Report of Indiana, 1875, *E. T. Cox.*

363	G. Heldfert, St. Wendells	1.327	82.93	51.00	5.5	Brown.	56.50	39.50	4.0	43.50	**7745**	1437.

Analyses of Peat, Northern Counties. Geological Report of Indiana, 1869–'70–'71, *E. T. Cox.*

364	Peat from St. Joseph county	. . . .	. . . .	26.50	9.5	Yellow.	36.00	55.50	8.5	64.00	**7292**	1353.
365	Peat from Lake county	. . . .	. . . .	21.50	23.0	Buff.	42.50	51.25	6.25	57.50	**6493**	1202.

Analyses of Indiana Coals, by Dr. David Dale Owen, in 1838.

								Car.	Bit.			
366	Fountain County, Sugar Creek Foundry	1.219	76.18	43.90	3.5	White.	47.40	75.00	20.00	52.60	**7916**	1468.
367	Fountain County, Coal Creek	1.260	78.75	44.60	15.0	Brown.	59.60	60.00	25.00	40.40	**7168**	1330.
368	Vermillion County, Brouillet's Creek	1.270	79.37	42.00	9.0	Yellow.	51.00	52.00	39.00	49.00	**7821**	1451.
369	Sullivan County, Lick Fork	1.240	77.50	54.90	2.0	White.	56.90	70.00	28.00	43.10	**8254**	1531.
370	Vigo County, Honey Creek	1.240	77.50	46.10	2.5	White.	48.60	70.00	27.50	51.40	**8208**	1523.

Analyses of Indiana Coals by Prof. Richard Owen in 1859–'60.

	NAME OF MINE OR OWNER.	Specific Gravity.	Lbs. Weight of one cubic foot.	Fixed Carbon.	Ash.	Color of Ash.	Coke.	Gas.	Water.	Total volatile matter.	Units of Heat.	Steam Value. See page 10.
371	Clay County, Brazil shaft			44.0	3.0	White.	47.0	48.0	5.0	53.0	**8010**	1486.
372	Clay County, Staunton			55.0	1.0	Gray.	56.0	39.0	5.0	44.0	**8063**	1496.
373	Dubois County, Portersville			50.0	5.0	Gray.	55.0	39.0	6.0	45.0	**7659**	1421.
374	Dubois County, Celestine			53.0	3.0	Gray.	56.0	39.0	5.0	44.0	**7902**	1466.
375	Dubois County, S. H. Jacobs			55.0	3.0	Gray.	58.0	34.0	8.0	42.0	**7599**	1410.
376	Fountain County, N. Thomas			51.5	4.5		55.0	37.0	8.0	45.0	**7595**	1409.
377	Greene County, T. Hays			53.0	2.0	Gray.	55.5	36.0	8.5	44.5	**7623**	1415.
378	Harrison County, M. Smith's			54.5	4.0	Gray.	58.5	31.5	10.0	41.5	**7327**	1359.
379	Harrison County, A. Rosenberg			41.2	10.0	Red.	51.2	46.8	2.0	48.8	**7674**	1423.
380	Harrison County, Houghton's			48.7	12.0	Red.	60.7	30.3	9.0	39.3	**6749**	1252.
381	Harrison County, Leavenworth			40.0	20.0	Red.	60.0	29.0	11.0	40.0	**5923**	1100.
382	Orange County, Powell's			50.4	7.0	Gray.	57.4	35.6	7.0	42.6	**7375**	1368.
383	Parke County, W. G. Coffin			49.0	3.0	Gray.	52.0	42.0	6.0	48.0	**7857**	1457.
384	Parke County, J. W. Campbell			49.0	2.0	Brown.	51.0	42.0	7.0	49.0	**7857**	1457.
385	Perry County, Cannelton			50.0	3.0	Light.	53.0	39.0	8.0	47.0	**7659**	1421.
386	Pike County, Hughes			51.0	5.0	Dark.	56.0	38.0	6.0	44.0	**7647**	1418.
387	Pike County, Rhodes			54.5	1.0	Red.	55.5	30.0	14.5	44.5	**7187**	1333.
388	Posey County, Priest			42.0	19.0		61.0	36.0	3.0	39.0	**6734**	1250.
389	Spencer County, Woods			48.0	3.5		51.5	45.0	3.5	48.5	**8054**	1494.
390	Vermillion County, Bell & Groves			54.0	3.0	Red.	53.0	33.0	10.0	47.0	**7426**	1278.
391	Warren County, Burr's Mill			40.0	15.0	Gray.	55.0	40.0	5.0	45.0	**6944**	1289.
392	Warren County, Kiester's			51.5	6.5	White.	58.0	40.0	2.0	42.0	**7873**	1461.

Analyses of Ohio Coals by Prof. Womley. Geological Report of Ohio, "Vol. III, Geology."

393	Hocking Valley, Stallsmith Seam	1.254	....	51.85	4.14	.....	55.99	36.41	3.8	40.21	**7566**	1403.
394	Straitsville, "Great Seam"	1.270	....	59.61	3.04	.....	62.65	31.37	5.98	31.37	**7727**	1433.
395	Keith's Mine, Coshocton County	1.339	....	54.70	5.10	.....	59.80	32.20	4.00	36.20	**7408**	1375.
396	Steubenville, Jefferson County	1.308	....	65.90	1.80	.....	67.70	29.50	1.40	30.90	**8062**	1496.
397	Briar Hill or Mahoning Valley coal	1.284	....	62.66	1.16	.....	63.82	32.58	3.60	36.10	**8086**	1500.

Jackson coal, Star shaft (Womley), specific gravity, 1.267; water, 7.50; ash, 4.10; volatile matter, 30.90; fixed carbon, 57.50; heat units, 7513.5; gallons of water from 100° to steam at atmosphere pressure, 1391.

Jackson coal, Star shaft (Levette), specific gravity, 1.270; coke, 64.50; volatile matter, 35.50; ash, 6.00; fixed carbon, 58.50; gas, 30.00; water, 5.50; heat units, 7510.8; gallons of water from 100° to steam at atmosphere pressure, 1391.

Analyses of Kentucky Coals by Dr. Peters. Geological Report of Kentucky, Vol. 1, 1875.

398	Boyd County, Buena Vista Furnace	1.328	....	52.78	6.82	.....	59.60	33.90	6.50	40.40	**7408**	1375.
399	Carter County, Star Furnace, bottom	1.288	....	54.64	4.40	.....	59.04	34.36	6.60	40.96	**7634**	1416.
400	Greenup County, Amanda Furnace	1.335	....	53.34	9.00	.....	62.34	33.62	4.04	37.66	**7424**	1278.
401	Muhlenburg County, Airdrie Furnace	1.278	....	58.50	6.50	.....	65.00	31.40	3.60	35.00	**7650**	1419.

Analyses of Pennsylvania Coals by A. S. McCreath. Pa. 2d Geol. Survey, Vol. M.M.

	NAME OF MINE OR OR OWNER.	Specific Gravity.	Lbs. Weight of 1 Cubic Foot.	Fixed Carbon.	Ash.	Color of Ash.	Coke.	Gas.	Water.	Total volatile matter.	Units of Heat.	Steam Value. See page 10.
402	Washington County, "Pittsburg bed"	....	....	51.46	8.89	Gray.	60.35	36.77	0.77	37.54	**7569**	1404.
403	Westmoreland County, "Pittsburg bed"	....	....	65.52	5.76	Gray.	71.28	25.20	1.27	26.47	**7630**	1415.
404	Tioga County, "Blossburg Coal"	....	....	71.69	5.34	Gray.	76.03	20.75	1.19	21.94	**7718**	1431.
405	Greene County, "Pittsburg bed"	....	....	59.05	2.60	Cream.	61.65	36.49	1.03	37.52	**8151**	1512.
406	Fayette County, "Pittsburg bed"	....	....	61.84	4.56	Gray.	66.40	31.84	1.20	33.04	**7951**	1475.
407	Westmoreland County, gas coal	....	....	59.29	2.89	Cream.	62.18	35.36	1.78	37.14	**8066**	1496.
408	Bedford County, "Broad Top Coal"	1.330	....	74.65	7.50	.....	....	17.55	0.30	....	**7660**	1421.
409	Lehigh, anthracite	....	....	88.05	6.66	.....	94.71	2.94	2.34	5.28	**7387**	1400.

Analyses of Missouri Coals by R. Chauvenet. Geological Survey Missouri, Broadhead.

410	Barton County, H. Flack's	....	....	58.71	5.36	Purple.	64.07	34.04	1.89	35.93	**7902**	1466.
411	Vernon County, Cassell's	....	....	53.91	5.12	Gray.	59.03	38.39	2.58	40.97	**7917**	1469.
412	Bates County, Hecadon's	....	....	49.72	2.78	Pink.	52.50	44.93	2.57	47.50	**8149**	1511.
413	Sullivan County, Sodder's	....	....	50.03	4.92	Brown.	54.95	37.37	7.68	45.05	**7507**	1393.
414	Adair County, Williams	....	....	49.69	6.19	White.	55.88	38.99	5.13	44.12	**7675**	1423.

Analyses of Iowa Coals by Rush Emery. Geological Report, Iowa, White, 1869.

	NAME OF MINE OR OWNER.	Specific Gravity.	Lbs. Weight of one cubic foot.	Fixed Carbon.	Ash.	Color of Ash.	Coke.	Gas.	Water.	Total volatile matter.	Units of Heat.	Steam Value. See page 10.	
415	Monroe Co., Miller's mine . .	. . . .	. . . .	51.30	6.15	. . . . .	57.45	37.84	4.71	42.55	**7556**	1402.	
416	Marion Co., Bousquest's mine.	. . . .	. . . .	47.54	3.32	. . . . .	50.86	43.25	5 89	49.14	**7854**	1457.	
417	Mahaska Co., Burtis' mine . .	. . . .	. . . .	48.00	4.50	. . . . .	52.50	42.27	5.23	47.50	**7801**	1447.	
418	Wapello Co., Inskeep's mine.	. . . .	. . . .	49.15	4.02	. . . . .	53.17	42.96	3.87	46.83	**7969**	1478.	
419	Hardin Co., Buckner's mine .	. . . .	. . . .	44.72	4.82	. . . . .	49.54	42.54	7.92	50.46	**7559**	1402.	
420	Average of sixty-four samples (Prof. White)	. . . .	. . . .	45.42	6.77	. . . . .	. . . .	39.24	8.57	. . . .	**7341**	1362.	

Analyses of Illinois Coals.

421	Jackson Co., "Big Muddy" coal.	. . . .	. . . .	60.80	1.50	. . . . .	62.30	31.20	6.50	37.70	**7808**	1448.	James Macfarlane.
422	Vermillion Co., Danville . .	1.357	84.81	46.78	8.64	Brown.	55.42	40.58	4.00	44.58	**7545**	1400.	Geo. Rep. Ind., 1870.
423	Peoria Co	1.243	77.68	58.60	2.80	Gray.	61.40	25.80	12.80	38.60	**7202**	1337.	Blaney, Econ. Geo. Ill., vol. 1.
424	LaSalle Co	1.243	77.68	55.00	7.60	Fawn.	62.60	27.40	10.00	37.40	**6989**	1297.	Blaney, Econ. Geo. Ill., vol. 1.
425	Grundy Co	1.259	78.48	58.20	1.80	Gray.	60.00	29.20	10.80	40.00	**7412**	1375.	Blaney, Econ. Geo. Ill., vol. 1.
426	Randolph	1.278	79.68	58.20	5.20	Lilac.	63.40	26.60	7.00	36.60	**7171**	1331.	Blaney, Econ. Geo. Ill., vol. 1.

Analyses of Coals from Other States and Territories.

	NAME OF MINE OR OWNER.	Specific Gravity.	Lbs. Weight of 1 Cubic Foot.	Fixed Carbon.	Ash.	Color of Ash.	Coke.	Gas.	Water.	Total volatile matter.	Units of Heat.	Steam Value. See page 10.	
427	Alabama, DeKalb Co			57.42	6.31			35.51	0.76		**7935**	1472.	Alabama 2d Geo. Rep.
428	Michigan, Eaton Co			45.00	2.00			49.00	2.00		**8183**	1518.	
429	Arkansas, Yell Co			80.40	5.20			11.40	3.00		**7555**	1402.	Dr. D. D. Owen.
430	North Carolina			70.48	6.46			21.90	1.16		**7727**	1434.	
431	Colorado, Golden City	1.320		45.57	3.85	Gray.		37.15	13.43		**7129**	1323.	W. P. Blake.
432	Colorado, Boulder Co	1.330		49.72	5.20	Gray.		33.08	12.00		**7087**	1315.	W. P. Blake.
433	Colorado, Canon City	1.279	79.23	56 80	4.50	Yellow.	61.30	34.20	4.50	38.70	**7763**	1441.	Geo. Rep. Ind., 1870.
434	Colorado, Fair Play	1.254	78.37	55.58	2.00	Fawn.	57.58	37.92	4.50	42.40	**8010**	1486.	Geo. Rep. Ind., 1870.
435	Colorado, San Miguel, Ouray Co	1.314	82.12	39.50	10.50	Brown.	50.00	40.50	9.50	50.00	**6950**	1290.	G. M. Levette, 1881.
436	Colorado, LaPlatte Co	1.296	81.00	45.75	5.25	Orange.	51.00	37.50	11.50	49.00	**7177**	1331.	G. M Levette, 1881.
437	Utah Territory, Evanston	1.300		49.90	6.30			35.22	8.58		**7300**	1354.	W. P. Blake.
438	Wyoming Territory, Carbon	1.330		49.72	8.00			35.48	6.80		**7310**	1356.	W. P. Blake.
439	West Virginia, Coalburg	1.257	78.56	56.00	1.50	White.	57.50	40.50	2.00	42.50	**8283**	1537.	Ind. Geo. Rep., 1870.
440	West Virginia, Campbell Cr'k	1.290	80.62	57.00	2.50	Red.	59.50	38.00	2.50	40.50	**8131**	1508.	Ind. Geo. Rep., 1870.
441	West Virginia, Peytona, cannel	1.322	82.62	59.50	3.50	White.	63.00	34.50	2.50	37.00	**8009**	1486.	Ind. Geo. Rep., 1870.
442	Texas, Robertson Co., lignite	1.232	77.00	45.00	4.50	White.	49.50	39.50	11.00	50.50	7260	1347.	Ind. Geo. Rep., 1875.
443	California, Mt. Diablo, lignite			46.84	4.58			33.89	14.69		**6929**	1286.	Dr. J. S. Newberry.
444	Oregon, Coos Bay, lignite			41.98	5.34			32.59	20.09		**6417**	1188.	Dr. J. S. Newberry.
445	Alaska, Cook's Inlet, lignite			49.89	7.82			39.87	1.25		**7731**	1434.	Dr. J. S. Newberry.
446	Vancouver's Island, Naminn.			46.31	18.55			32.16	2.98		**7712**	1430.	Dr. J. S. Newberry.
447	Newcastle, England			61.70	3.75			33.55	0.99		**8090**	1501.	
448	New Brunswick, Albertite			42.00	1.00			57.00			**8683**	1608.	
449	Crude Petroleum, Pa	Carbon, 84 per cent.; Hydrogen, 13.75 per cent.; Water, 2 25									**11526**	2134.	H. Wurtz.

COMPARISON OF INDIANA BLOCK COALS WITH ILLINOIS COALS.

The following exhibit of fuel values of Indiana coals and those of Illinois, prepared by Prof. E. T. Cox, in 1876, has never been officially published. The present State Geologist has pleasure in availing himself of the labors of his efficient predecessor:

H. G. Sleight, Indianapolis:

DEAR SIR—The following is the result of the analyses, made in the laboratory of the State Geologist, of the three samples of coal which you brought to me for that purpose:

No. 1. Block coal. Taken at random from a car load, shipped from Brazil, Clay county, Ind.

No. 2. From Wilmington, Ill., on the Chicago & Alton R. R. Sample taken from the delivery at Chicago.

No. 3. Minonk Coal, Ill., on the Illinois Central R. R. Also taken from the delivery at Chicago.

No. 1 is an ordinary sample of block coal. No. 2 is a glossy, jet-black caking coal, with specks and scales of pyrites. No. 3 is a very brilliant black caking coal, which, when broken, shows numerous markings of sulphide of iron.

A large lump of each sample was reduced to fine powder and kept, well stoppered, in separate bottles. From these bottles, which contained proper average samples of the coals, the quantities were taken necessary to complete the separate processes to which a coal must be subjected in order to point out its commercial value. For convenience, these coals will now be referred to by the numbers given above. The results are given in 100 parts of coal:

NO. ONE. INDIANA BLOCK COAL.

Specific gravity, 1.285. A cubic foot weighs 80.31 lbs.

Ash, white	2.50	Coke, 59.00 per cent.
Fixed carbon	56.50	
Volatile matter	32.50	
Water	8.50	
	100.00	
Iron	0.82	
Alumina	1.20	
Silica, lime and magnesia	0 48	
Ash	2.50	

Total sulphur. 1.43. The iron is combined with 0.947 of sulphur, leaving 0.483 of sulphur combined with the other constituents of the ash and carbon. This coal contains 7424 calculated heat units, and one pound will convert 11.4 pounds of water from 0° Cent. (32° Fahr.) into steam at 100° Cent. (212° Fahr.).

NO. TWO. WILMINGTON COAL.

Specific gravity, 1.248. A cubic foot weighs 78 lbs.

Ash, red	6.50	Coke, 52.50 per cent.
Fixed carbon	46.00	
Volatile matter	37.00	
Water	10.00	
	100.00	

Total amount of sulphur in this coal, 4.74 per cent. Iron 4.34 per cent.=9.298 of pyrites; this would be in excess of the sulphur, so that all the iron does not exist as sulphide. The ash is composed of iron 4.34; silica, 2.16.

This coal contains, by calculation, 6762 units of heat. One pound will convert 10.4 pounds of water from 0° Cent. (32° Fahr.) into steam at 100° Cent. (212° Fahr.).

NO. THREE. MINONK COAL.

Specific gravity, 1.232. A cubic foot weighs 77 lbs.

Ash, brown	5.50	Coke, 53.50 per cent.
Fixed carbon	48.00	
Volatile matter	35.00	
Water	11.50	
	100.00	

Total sulphur, 3.63 per cent. Sulphur combined with iron, 2.719. Sulphur combined with other mineral matter, 0.911.

Composition of ash.	Iron	2.38
	Alumina	0.80
	Silica	2.32

This coal contains 6756 calculated heat units. One pound will convert 10.3 pounds of water from 0° Cent. (32° Fahr.) into steam at 100° Cent. (212° Fahr.).

From this it will be seen that one ton of the Indiana block coal will convert into steam, from 0° Cent. (32° Fahr.) to 100° Cent. (212° Fahr.) 22,800 pounds of water, while the Illinois coals will only convert into steam, under the same conditions, 20,800; a difference of 2,000 pounds in favor of the block coal, or nearly eight barrels.

In addition to its superior heat-producing properties, the Indiana block coal contains a minimum quantity of sulphur and ash, while the other coals contain these injurious diluents in great excess.

I need hardly dwell upon the injurious effect which the sulphur exerts upon grate-bars, fire-boxes and boilers, where it is used for generating steam, since it is well known to all intelligent engine drivers that when sulphur is brought in contact with red-hot iron it causes it to fuse or lose its tenacity; thus, the sulphur from coal will destroy the grate-bars, fire boxes, and, sooner or later, the boilers themselves.

The pyritiferous ash of the Illinois coals will also give great trouble, since it will fuse into clinkers, which, by their rapid accumulation, stop the draft, and otherwise derange the perfect combustion of the coal, so that frequent stops must be made, or favorable moments taken, to remove them from the fire-chamber. On passenger trains, using such coals, much inconvenience is also experienced by the passengers, who are compelled to inhale the sulphurous fumes which escape from the smoke-stack and are wafted back into the coaches by the motion of the train.

No inconsiderable part of the commercial value of a coal depends upon its strength and resistance to atmospheric agencies, which cause it to crumble and waste when stocked. In this respect, again, the Indiana block coal will endure stocking for years without deterioration or loss from crumbling, while the Illinois coals will crumble into dust from the decomposition of sulphide of iron which it contains in such large quantities. It is given in Trautwine's "Engineers' Pocket Book," that 4.47 tons of water will carry a passenger train twenty to thirty miles, or even more if the grades are light. Then, assuming for the sake of comparison that the evaporation of 4.47 tons of water will run a given train twenty-five miles, one ton will run it 5.7 miles. Now, a ton of Indiana block coal will convert into steam one ton more water than the Illinois coal; consequently, it will, under like conditions, run a train 5.7 miles further than the Wilmington or Minonk coals—a difference of more than twenty per cent. in favor of Indiana coal. Indeed, so different is the Indiana block coal from the Illinois coals here reported on, chemically and physically, that they can not rightly come in competition for steam and house purposes, where a due regard is paid to economy of fuel, safety to machinery, comfort and health.

E. T. COX, *State Geologist.*

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