pronounced. Blending with 30 percent low-volatile coal effected some further decrease in the abradability of Powellton coke; otherwise, the increase in the proportion of low-volatile did not improve the cokes from either coal. The gas from Powellton coal was slightly richer than that from No. 2 Gas-Peerless coal; the heating values per pound of coal were 3,210 and 3,100 B.t.u., respectively. The properties of the tars and light oils were normal for high-volatile A coals.

Beckley Coal

Beckley-bed coal from the Stanaford mine, Mt. Hope, Raleigh County, W. Va., contained 79.5 percent fixed carbon on the dry, mineral-matter-free basis and therefore ranks as a low-volatile coal. It was carbonized in 13-inch BM-AGA retorts at 600°, 700°, and 800° C. and in 18-inch retorts at 900° and 1,000° C. Oxidized samples were carbonized at 800° C., and blends with Pittsburgh-bed coal were carbonized at 900° C. Yields and properties of the carbonization products from these tests are given in tables 12, 13, 14, and 15.

This Beckley coal yielded 80.6 percent coke; 10,700 cubic feet of gas; 6.2 gallons of tar; 1.78 gallons of light oil; and 19.4 pounds of ammonium sulfate per ton at 900° C. The average yields for 11 low-volatile coals[62] differed appreciably from these in two respects - the average coke yield was 82.8 percent, and the average tar yield was 3.8 gallons per ton. The 900° C. coke was fine-grained and well-fused; its 1-1/2-inch shatter index was 86.0 and its 1- and 1/4-inch tumbler indexes were 66.0 and 72.2, respectively. The cokes made at lower temperatures had higher shatter indexes and lower 1/4-inch tumbler indexes. The 900° C. gas had heating values of 533 B.t.u. per cubic foot and 2,850 B.t.u. per pound of coal and contained 150 grains of hydrogen sulfide per cubic feet.

Blending Beckley coal with 70 and 80 percent Pittsburgh-bed coal lowered the yield of coke 7.5 to 8.6 percent and increased the percentage yields of other products except free ammonia. The yield of gas calculated to the volume basis decreased. The strength-test indexes of the cokes from the blends were very similar to the averages for the cokes from 10 low-volatile coal blends in which the same Pittsburgh-bed coal was used.[63] For example, the indexes for the 20 percent low-volatile blends were for Beckley and the average low-volatile coals, respectively: 1-1/2-inch shatter, 79.8 and 79.9; 1-inch tumbler, 62.3 and 61.5; and 1/4-inch tumbler, 72.6 and 72.4. The blend containing 30 percent Beckley coal yielded slightly stronger coke. Blending raised the specific gravity and heating value of the gas, these effects being due to a reduction in the hydrogen content.

In the investigation of Beckley coal the study of its expanding properties was emphasized. The carbonizing sample, blends with 70 and 80 percent

62/ Reynolds, D. A., and Davis, J. D., Blending Properties of Low- and Medium-Volatile Coals as Determined in the BM-AGA Apparatus: Bureau of Mines Rept. of Investigations 3936, 1946, 20 pp.

63/ See footnote 62.

Pittsburgh coal, and six samples representing different sections of the mine were tested in the sole-heated oven; the blends were also tested in the vertical-slot oven. The carbonization sample expanded 15.9 percent in the sole-heated oven at a charge density of 55.5 pounds per cubic foot, which was more than the six mine samples expanded (9.0 to 13.6 percent; table 20). Pocahontas No. 3 coal from Kimball, McDowell County, W. Va., expanded 24.4 percent under similar test conditions.64/ The blend of 20 percent Beckley and 80 percent Pittsburgh coals contracted 3.6 percent in the sole-heated oven and developed a maximum pressure of 0.8 pound per square inch in the vertical-slot oven; the corresponding results for 30:70 blend were 1.0 percent expansion and pressure of 3.4 pounds per square inch. These blends probably could be carbonized safely in byproduct ovens; however, the 30:70 blend should not be charged at high densities, because it developed rather high pressure in the vertical oven.

Technical Paper 683 65/ gives results of an investigation of the composition and properties of Powellton coal from Coal Mountain mine, Guyan, W. Va. This coal ranks as high-volatile A bituminous and contained only 2.2 percent moisture, 3.0 percent ash, and 0.6 percent sulfur. Yields of carbonization products in the 18-inch BM-AGA retort at 900° C. were: Coke, 70.9 percent; and (upon the basis of per ton of coal carbonized) gas, 10,900 cubic feet; tar, 13.5 gallons; light oil in gas, 2.80 gallons; and ammonium sulfate, 19.7 pounds. The coke was well-fused and less abradable than the average coke from high-volatile A coals tested previously. Blending with 20 percent Pocahontas No. 3 coal improved the physical properties of the coke, but no significant improvement was gained by increasing the proportion of this low-volatile coal to 30 percent. Oxidation tests indicated that the coking power of Powellton coal is less durable than that of Pittsburgh-bed coal. Powellton coal contracted 6.4 percent in the sole-heated oven at a charge density of 55.5 pounds per cubic foot; the blends containing 20 and 30 percent Pocahontas No. 3 coal expanded 3.2 and 5.1 percent, respectively, at the same charge density. The results indicate that blends of these coals should be used with caution in byproduct ovens.

Results of a study of the composition and carbonizing properties of Eagle-bed coal from a prospect shaft sunk from the Carbon Fuel Co. No. 7 mine working the Powellton bed at Carbon, Kanawha County, W. Va., were published.66/ The investigation included chemical and physical tests, carbonization tests by the BM-AGA method, expansion tests in the sole-heated oven, oxidation tests, and assays at low and high temperatures. Blends of Eagle

64/ Davis, J. D., Reynolds, D. A., Ode, W. H., and Holmes, C. R., Carbonizing Properties of Pocahontas No. 3-Bed Coal from Kimball, McDowell County, W. Va., and the Effect of Blending this Coal with Pittsburgh-Bed Coal: Bureau of Mines Tech. Paper 670, 1944, 35 pp.

65/ Reynolds, D. A., Davis, J. D., Ode, W. H., Brewer, R. E., and Holmes, C. R., Carbonizing Properties of Powellton-Bed Coal from Coal Mountain Mine, Guyan, Wyoming County, W. Va.: Bureau of Mines Tech. Paper 683, 1945, 44 pp.

66/ Reynolds, D. A., Davis, J. D., Ode, W. H., Brewer, R. E., and Birge, G. W., Carbonizing Properties of Eagle-Bed Coal from Prospect Shaft, Carbon, Kanawha County, W. Va.: Bureau of Mines Tech. Paper 691, 1946, 43 pp.

and Pocahontas No. 3 coals were carbonized at 900° C.; one blend contained equal parts of Eagle and Powellton coal from the same mine. The Eagle-bed, high-volatile A bituminous coal fulfilled all chemical specification for gas and coking coals. Yields of carbonization products in the 18-inch retort at 900° C. were: Coke, 72.1 percent, and (upon the basis of per ton of coal carbonized) gas, 10,500 cubic feet; tar, 12.6 gallons; light oil, 3.44 gallons; and ammonium sulfate, 20.9 pounds. The yield of coke was 3.7 percent higher than the average yield from 32 high-volatile A coals carbonized previously, and the yields of gas and tar were lower than average for coals of that rank. Cokes obtained at all temperatures were well-fused. The 900° C. coke was fine-grained and moderately fissured and was more abradable than the average coke from high-volatile A coals. Blending with 20 and 30 percent of low-volatile Pocahontas No. 3 coal increased the yield and strength of coke and decreased the yields of gas, tar, and light oil. Blending with 50 percent of high-volatile A Powellton coal decreased the yield of coke, lowered the 1-1/2-inch shatter index, and raised the 1- and 1/4-inch tumbler indexes. Eagle coal contracted 21.2 percent in the sole-heated oven at a charge density of 55.5 pounds per cubic foot; the Powellton coal contracted 9.0 percent. A blend containing equal parts of these coals contracted 17.2 percent, and blends containing 20 and 30 percent of Pocahontas No. 3 coal contracted 11.8 and 5.9 percent, respectively. A blend of 35 percent Eagle, 35 percent Powellton, and 30 percent Pocahontas No. 3 coals contracted 3.6 percent. These results indicate that relatively large proportions of low-volatile coal could be blended with Eagle coal in commercial carbonization. Results of oxidation tests at 100° C. for periods of 4.8, 12.2, 20.0, and 33.2 days indicated that Eagle coal oxidized at a low rate and should have excellent storage properties.

Durability of Coking Power of Various Coals

The Bureau of Mines test for deterioration of coking power requires exposure to air in a steam-jacketed rotary drum at 100° C. of a large (400-pound) sample of stage-crushed 0- to 1/4-inch coal, followed by carbonization tests in 13-inch retorts at 800° C. of weighed portions (about 90 pounds each) of the coal after known periods of oxidation and determinations of the yields and quality of the resulting cokes and byproducts produced. The significant figure reported is the time of oxidation, in days, in air containing 20.93 percent of oxygen by volume, required to reduce the coke-strength index by 15 percent. This time is designated as T_{15} and is an expression of the "durability of coking power." The "durability of coking power" was determined for three low-volatile bituminous BM-AGA coals. These coals include Pocahontas No. 3 bed, Mead Nos. 2 and 3 mines, Pocahontas No. 4 bed, Mead No. 6 mine, and Beckley bed, Stanaford No. 1 mine, all from Raleigh County, W. Va. The "durability of coking power" value for Pocahontas No. 3 coal is 4.7, that for Pocahontas No. 4 coal is 7.3, and that for Beckley coal is 10.5 days. The value for Pittsburgh bed (Warden mine) high-volatile A bituminous coal from Allegheny County, Pa., is 28.5 days. It is evident from these results that the three low-volatile coals, in the order named, are considerably less resistant to exposure in storage than the high-volatile A coal.

Oxidizing Properties of Bituminous Coals

Table 16 gives the sources and descriptions of the thirteen bituminous coals whose oxidizing properties were studied during the year. As noted in the table, a number of these coals were received washed, and therefore such samples did not contain their true natural bed moisture. In such instances, the classifications by rank were made from previously analyzed samples collected from the same mines. The washed 3/4- by 1/8-inch, Pittsburgh No. 8 bed, Piney Fork No. 1 mine coal was similar in composition to the washed 3/4- by 0-inch coal from the same source and was used to prepare five different closely sized fractions for study of the effect of size of coal upon the rate of oxidation. The second sample of Beckley-bed coal was prepared from the first, but dried in methane gas to a moisture content of less than 0.05 percent before oxidation.

Table 17 summarizes the relative tendencies of fifteen different samples of coal to heat spontaneously in storage. All of the samples except the sized fractions of Piney Fork No. 1 mine washed coal, designated by coal numbers 288.3, 288.2, 288.1, 288.5, and 288.4, were tested in stage-crushed 0- to 1/4-inch size. The screen analyses of these five fractions and of coal 263, which was prepared from the washed 3/4- by 0-inch Piney Fork No. 1 mine coal are given in table 18, which also shows the effect of size of coal upon the forms of sulfur present. The data in table 17 show that the tendency of bituminous coals to heat spontaneously in storage increases with decreasing rank of the coals. In general, the agreement by the two methods of test is reasonably good. The data for the Beckley-bed coal samples show that "dry" coal oxidizes less rapidly than the same coal containing the normal amount of moisture, which agrees with previous observations on many other coals that the unwashed or raw coal oxidizes less rapidly than the wet or washed coal from the same mine; for example, compare coals 262 and 263 in table 17. The increase in relative characteristic oxidation rates with decreasing size of coal is well-illustrated by the data for the five closely sized fractions of Piney Fork No. 1 mine coal. The screen analyses of these five fractions and of stage-crushed 0- to 1/4-inch coal 263 shown in table 18 indicate that coal 263 is intermediate in size range between coals 288.2 and 288.1. The data in parentheses in columns 4 and 5 of table 17 show that coal 263, taken as 1, oxidizes less rapidly than coal 288.2 and more rapidly than coal 288.1

Earlier studies by the Bureau of Mines have shown that the rates of oxidation of different-sized fractions of the same coal are proportional to the cube roots of their specific surface areas. Values for the cube roots of the specific surface areas were calculated for coals 288.3, 288.2, 288.1, 288.5, 288.4, and 263. Expressed in terms of unity for coal 263, the relative characteristic oxidation rates computed from specific surface areas were found to be of the same order of magnitude as the values given in parentheses in columns 4 and 5 of table 17. Lack of close agreement probably results from the several assumptions that must be made for certain data and constants used in calculating the specific surface area from the data of screen analyses.

TABLE 16. - Source and description of coals tested for their oxidizing properties

State, county, town, and mine	Bed	Rank[1/]	Agglomerating index[2/]	Condition and size
ALABAMA				
Marion, Brilliant, Brilliant Nos. 2 and 7	Black Creek	(Hvab)	Cp	Washed, 1-1/2-inch slack.
Walker, Carbon Hill, New River	do.	(Hvab)	Cf	Washed, 3-inch by 1-1/2-inch.
Walker, Nauvao, Deepwater	do.	(Hvab)	Cf	Washed, 3-inch by 1-1/2-inch.
OHIO				
Jefferson, Piney Fork, Piney Fork No. 1	Pittsburgh No. 8	Hvab	Cf	Raw, 3/4-inch by 0-inch.
Do.	do.	(Hvab)	Cf	Washed, 3/4-inch by 0-inch.
Do.	do.	(Hvab)	Cf	Washed, 3/4-inch by 1/8-inch.
WASHINGTON				
King, Ravensdale, McKay	McKay	(Suba)	NAb	Washed, 1-inch by 3/32-inch.
Kittitas, Roslyn, N. W. I. Nos. 3, 5, and 9	Roslyn No. 5	(Hvab)	Cf	Washed, 1-5/8-inch by 0-inch.
Lewis, Centralia, Monarch No. 1	Foron	(Subc)	NAa	Washed, 1-3/4-inch by 5/8-inch.
WEST VIRGINIA				
Raleigh, Beckley, Stanaford No. 1	Beckley	Lvb	Cg	Raw.
Do.	do.	Lvb	Cg	Raw, dried before oxidation.
Raleigh, East Gulf, Mead Nos. 2 and 3	Pocahontas No. 3	Lvb	Cg	Raw.
Raleigh, East Gulf, Mead No. 6	Pocahontas No. 4	Lvb	Cg	Do.

1/ Rank according to A.S.T.M. Designation D 338-38: Lvb - low-volatile bituminous; Hvab - high-volatile A bituminous; Suba - subbituminous A; and Subc - subbituminous C. Ranks indicated by symbols in parentheses are based upon previously analyzed mine samples from the same mines.

2/ Cg - good caking; Cf - fair caking; Cp - poor caking; NAa - noncoherent residue; NAb - coke button shows no swelling or cell structure, and will pulverize under a 500-gram weight.

TABLE 17. - Relative tendencies of coals to heat spontaneously in storage[1]

Coal No.	Bed and mine	Rank[2]	Relative characteristic oxidation rate at 212° F. when X=1[3]: Basis of dry, mineral-matter-free coal	Relative characteristic oxidation rate at 212° F. when X=1[3]: Basis of dry coal	Adiabatic calorimeter, ratio of self-heating rates on basis of dry coal at - 158° F.	Adiabatic calorimeter, ratio of self-heating rates on basis of dry coal at - 212° F.
281	Pocahontas No. 3, Mead Nos. 2 and 3	Lvb	0.57	0.55	-	-
280	Pocahontas No. 4, Mead No. 6	Lvb	.90	.87	-	-
90.1	Beckley bed, Stanaford No. 1 (dry coal)	Lvb	1.05	1.06	-	-
90	do.	Lvb	1.13	1.14	-	0.72
262	Pittsburgh No. 8, Piney Fork No. 1 (raw) ...	(Hvab)	1.19	.97	2.21	1.79
263	Pittsburgh No. 8, Piney Fork No. 1 (washed).	(Hvab)	2.13	2.00	4.09	2.58
288.3	do.	do.	1.35 (0.64)	1.29 (0.65)	-	-
288.2	do.	do.	1.89 (.89)	1.80 (.90)	-	-
288.1	do.	do.	3.14 (1.48)	2.98 (1.49)	-	-
288.5	do.	do.	4.64 (2.18)	4.42 (2.21)	-	-
288.4	do.	do.	9.36 (4.40)	8.84 (4.42)	-	-
260	Black Creek, Brilliant Nos. 2 and 7	do.	2.17	2.15	6.97	2.98
252	Roslyn No. 5, N.W.I. Nos. 3, 5, and 7	do.	2.80	2.43	3.17	1.53
255	McKay, McKay	(Suba)	12.14	11.57	15.79	8.71
251	Foron, Monarch No. 1	(Subc)	25.71	23.67	34.99	15.30

1/ The self-heating tendencies, except for values in parentheses in columns 4 and 5, are all expressed as ratios to washed Pittsburgh bed, Warden mine, coal (h28) = 1. Values in parentheses in columns 4 and 5 represent the ratios to Pittsburgh No. 8 bed, Piney Fork No. 1 mine, washed 3/4-inch by 0-inch (263). The absolute values for coal h28 are: column 4, 0.133 percent oxygen per day by weight of dry, mineral-matter-free coal after the dry, mineral-matter-free coal has consumed 1 percent of oxygen by weight; column 5, 0.127 percent oxygen per day by weight of dry coal after the dry, mineral-matter-free coal has consumed 1 percent of oxygen by weight; column 6, 0.783° F. per hour at 158° F.; and column 7, 3.29° F. per hour at 212° F. Corresponding absolute values for coal 263 are: column 4, 0.283; column 5, 0.254; column 6, 3.20° F. per hour at 158° F.; and column 7, 8.51° F. per hour at 212° F.

2/ Rank according to A.S.T.M. Designation D 338-38: Lvb - low-volatile bituminous; Hvab - high-volatile A bituminous; Suba - subbituminous A; and Subc - subbituminous C. Ranks indicated by symbols in parentheses are based upon previously analyzed mine samples from the same mines.

3/ Ratio of the characteristic oxidation rates of 0- to 1/4-inch coal at 212° F. in air after the dry, mineral-matter-free coal has consumed 1 percent of oxygen by weight.

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TABLE 18. - Screen analyses and sulfur forms of washed Pittsburgh No. 8-bed, Piney Fork No. 1-mine samples

Tyler standard screen scale sieves, opening, in inches[1/]	Coal Numbers					
	288.3	288.2	263	288.1	288.5[2/]	288.4[2/]
Through 0.525 on 0.371	9.0					
Through .371 on .312 (2-1/2)	36.1					
Through .312 on .263 (3)	42.6					
Through .263 on .221 (3-1/2)	8.8					
Through .221 (3-1/2)	3.5					
On 0.185 (4)		34.3	34.2	8.9	4.2	0
Through 0.185 on 0.093 (8)		60.9	30.8	34.4	20.7	0
Through .093 on .046 (14)		1.7	15.0	37.5	29.2	.8
Through .046 on .0232 (28)			8.9			
Through .046 on .0164 (35)		.8		16.5	28.6	2.2
Through .0232 on .0116 (48)			6.0			
Through .0164 on .0069 (80)		1.2		1.8	9.9	5.9
Through .0116 on .0058 (100)			2.5			
Through .0069 on .0041 (150)		.5		.4	3.5	9.0
Through .0058 on .0029 (200)			1.2			
Through .0041 on .0029 (200)		.6		.2	1.5	9.0
Through .0029 (200)		0	1.4	.3	2.4	73.1
Totals	100.0	100.0	100.0	100.0	100.0	100.0
Sulfur forms (as-received basis), percent:[3/]						
Sulfate	0.152	0.204	0.023	0.269	0.223	0.271
Pyritic	1.123	1.117	1.479	.983	1.024	.930
Organic	.946	.833	1.057	.955	.971	.978
Total	2.2	2.2	2.6	2.2	2.2	2.2

1/ Figures in parentheses designate Tyler mesh sizes.
2/ Coals 288.5 and 288.4 were prepared from reserve samples of coals 288.3 and 288.2, respectively.
3/ Analyses of coal 263 were made shortly after receiving the sample, whereas the washed 3/4- by 1/8-inch coal from which the five other samples were prepared had been in storage for 5 months. The storage before preparation of these five samples may account for their relatively higher proportions of sulfate and their lower proportions of pyritic and organic forms of sulfur, as compared with those of coal 263. The change in percentages of the different forms of sulfur with decreasing size of coal 288 is noteworthy.

In connection with the cooperative study with the Southern Natural Gas Co. of the complete gasification properties of Alabama coals by the Lurgi process, using oxygen and steam, it was found that these coals were too strongly coking to be completely gasified before trouble resulted from coking of the coal charge while it was being fed into the bottom end of the vertical retort. A number of oxidation tests were made on two of the least strongly coking coals (from New River and Nauvao mines; table 16) in an effort to reduce the coking properties of these coals before charging them for gasification in the Lurgi retort. Oxidation was carried out in steam-jacketed, 50-pound-capacity, rotary-drum units using oxygen gas at 100° C. up to 100 and 141.62 hours. This oxidation treatment, while reducing the coking power, did not completely destroy the coking properties of these coals. The work is being continued for longer periods of time at higher temperatures.

Bureau of Mines Technical Paper 681, abstracted in last year's annual report,67/ was republished in condensed form.68/

Plasticity of Coal

Plastic properties of the 47 coal samples and blends described in table 19 were determined during the fiscal year. The samples were tested by either the Gieseler or Davis plastometer methods; two or more tests on the same coal were usually made by each method. A total of 187 tests was made, 65 by the Gieseler method and 122 by the Davis method.

The effect of oxidation was reflected in the plastometer tests made on a resample of high-volatile A bituminous Elkhorn No. 3 bed coal from Floyd County, Ky., which had been tested previously in March 1944. Gieseler maximum fluidity and Davis maximum resistance were reduced. Addition of 20 and 30 percent of low-volatile Pocahontas No. 3 bed coal from McDowell County, W. Va., to the Elkhorn coal reduced the maximum fluidity and increased the maximum resistance.

Beckley-bed coal from Raleigh County, W. Va., showed plastic properties characteristic of a low-ranking, low-volatile bituminous coal. Tests on 20:80 and 30:70 percent blends of this coal with high-volatile A Pittsburgh bed-coal indicated that the Beckley-bed coal would be a suitable low-volatile blending coal for making blast-furnace coke.

A blend of 49.5 percent of Eagle run-of-mine coal from the border of Fayette and Raleigh Counties, W. Va., and 50.5 percent of Pocahontas No. 3 slack from Raleigh County, W. Va., as prepared for coke-oven use by the Citizens Coke & Gas Utility, Indianapolis, Ind., was tested for its plastic properties. Excellent coking power of this blend was indicated by the 310 dial divisions per minute maximum fluidity observed in the Gieseler test, and by the extremely high maximum resistance of 50.7 pound-inches in the Davis test.

67/ See footnote 27.
68/ Elder, J. L., Schmidt, L. D., Steiner, W. A., and Davis, J. D., Spontaneous Heating Tendencies of Coals: Am. Gas Assoc. Monthly, vol. 27, Sept. 1945, pp. 411-414.

TABLE 19. - Description of coals and blends tested

Coal No.	Description
86	Elkhorn No. 3 bed, Wheelwright mine, Floyd County, Ky.
86A	80 percent coal 86 and 20 percent coal c75.
86B	70 percent coal 86 and 30 percent coal c75.
c75	Pocahontas No. 3 bed, Kimball, McDowell County, W. Va.
90	Beckley bed, Stanaford No. 1 mine, Raleigh County, W. Va.
90A	20 percent coal 90 and 80 percent coal 1-28.
90B	30 percent coal 90 and 70 percent coal 1-28.
1-28	Pittsburgh bed, Warden mine, Allegheny County, Pa. (washed)
257	49.5 percent Eagle run-of-mine coal from border of Fayette and Raleigh Counties, W. Va., and 50.5 percent Pocahontas No. 3 slack from Raleigh County, W. Va.
258	1.55 floats from Powellton bed, Powellton No. 2 mine, Fayette County, W. Va.
258A	80 percent coal 258 and 20 percent coal c75.
258B	70 percent coal 258 and 30 percent coal c75.
259	1.55 floats from Peerless and No. 2 Gas bed, No. 3 North mine, Fayette County, W. Va.
259A	80 percent coal 259 and 20 percent Pocahontas No. 3 bed coal b75.
259B	70 percent coal 259 and 30 percent Pocahontas No. 3 bed coal b75.
279	100 percent Peruvian coal, South America.
279A	20 percent coal 279 and 80 percent coal 276 (Lower Sunnyside bed, Sunnyside mine, Carbon County, Utah).
280	Pocahontas No. 4 bed, No. 6 mine, East Gulf, W. Va.
280-1-ox.	Coal 280, oxidized 3.8 days at 100° C.
280-2-ox.	Coal 280, oxidized 9.0 days at 100° C.
280-3-ox.	Coal 280, oxidized 14.2 days at 100° C.
281	Pocahontas No. 3 bed, Nos. 2 and 3 mines, East Gulf, W. Va.
281-1-ox.	Coal 281, oxidized 5.0 days at 100° C.
281-2-ox.	Coal 281, oxidized 11.0 days at 100° C.
281-3-ox.	Coal 281, oxidized 13.1 days at 100° C.
282	Pocahontas No. 3 bed, No. 2 mine, East Gulf, W. Va.
284	Core-drill hole No. 10-9, Coal Creek, Gunnison County, Colo., coal log 932 feet, 8-1/2 inches to 936 feet, 9-1/2 inches.
285	Core-drill hole No. 10-9, Coal Creek, Gunnison County, Colo., coal log 946 feet, 1 inch to 952 feet, 7 inches.
286	Core-drill hole No. 10-9, Coal Creek, Gunnison County, Colo., coal log 958 feet, 2 inches to 964 feet, 11 inches.
288	Pittsburgh No. 8 bed, Piney Fork No. 1 mine, Piney Fork, Jefferson County, Ohio.
	Fleming Elkhorn gas coal, Elkhorn No. 4 mine, Kentucky.
	Alabama coals
	(All coals crushed to pass 1/2-inch, and screened fraction between 1/2-inch and 9 mesh used for tests.)
264	Carter bed, Snider mine, 1/2 mile S. E. of Cedar Cove, Tuscaloosa County.
265	Milldale bed, Abston mine, 8 miles E. of Peterson, Tuscaloosa County.
266	Brookwood bed, Abston mine, 8 miles E. of Peterson, Tuscaloosa County.
267	Mary Lee bed, Warrior River mine, 1-1/2 miles S. E. of Carbon Hill, Walker County.
268	Black Creek bed, New River mine, 1-1/2 miles S. E. of Carbon Hill, Walker County.
269	Mary Lee bed, Aldridge Shaft mine, 6 miles S. E. of Parrish, Walker County.
270	Black Creek bed, Deepwater mine, 1-1/2 miles S. E. of Nauvao, Walker County.
271	Thompson bed, Piper No. 2 mine, Piper, Bibb County.
272	Montevallo bed, Dogwood Nos. 1 and 3 mines, 1 mile N. W. of Underwood, Shelby County.
273	Mammoth Nos. 2 and 3 beds, Acmar mine (Colgate washer), 1 mile S. W. of Acmar, St. Clair County.
275	American bed, Virginia mine, 7 miles W. of Bessemer, Jefferson County.
	Special samples
DSC2	Grab sample from top bench of Pittsburgh bed, Shannopin mine, Bobtown, Greene County, Pa.
245A	85 percent lignite char (500° C.) from McAlester strip mine, 3 miles S. W. of Rockdale, Milan County, Tex., and 15 percent crude asphalt.
245B	85 percent Texas lignite char (400° C.) and 15 percent No. 4 asphalt binder.
245C	85 percent Texas lignite char (400° C.) and 15 percent No. 3 asphalt binder.
245D	85 percent Texas lignite char (300° C.) and 15 percent No. 4 asphalt binder.

The 1.55 specific gravity floats from Powellton bed, Fayette County, W. Va., showed plastic properties typical of a coal of high-volatile A bituminous rank. Blending this coal with 20 and 30 percent of low-volatile bituminous Pocahontas No. 3-bed coal decreased the fluidity and increased the resistance. The 1.55 specific gravity floats from the Peerless and No. 2 Gas bed, Fayette County, W. Va., showed plastic properties similar to those obtained for the 1.55 floats from the Powellton bed; blending with 20 and 30 percent of low-volatile bituminous Pocahontas No. 3-bed coal produced the same characteristic changes as noted for the blend with Powellton floats.

The sample of 100-percent low-volatile bituminous coal from Peru, South America, showed plastic properties similar to those of other low-volatile coals tested in the BM-AGA Survey of American coals. Tests on a blend of 20 percent of this coal with 80 percent of high-volatile A Lower Sunnyside-bed coal gave results characteristic of such blends. The plastic properties indicate that the Peruvian coal would probably be suitable for blending purposes.

Three low-volatile bituminous coals, (1) Pocahontas No. 4 bed, No. 6 mine, (2) Pocahontas No. 3 bed, Nos. 2 and 3 mines, and (3) Pocahontas No. 3 bed, No. 2 mine, all showed similar plastic properties characteristic of coals of this rank. After several days' oxidation at 100° C. of the first two samples, their slight swelling tendencies disappeared, and after about 14 days' oxidation fusion was almost completely destroyed.

Three core-drill samples from Gunnison County, Colo., showed increasing fluidity and resistance in order of increasing depth of coal log, indicating that the coking properties should improve in that order. Judged from plasticity determinations, these samples offer promise of a new source of coking coal in Colorado. A series of core-drill samples, taken from another location in the same County last year, showed no fusion in either Gieseler or Davis plastometer tests at the normal rate of heating of 3° C. per minute.

Pittsburgh No. 8 bed coal from Jefferson County, Ohio, showed a low maximum fluidity and a high maximum resistance, indicating that it should make fair coke.

A sample of Fleming Elkhorn Gas coal from Kentucky was submitted by the Bureau of Mines, Synthetic Gas Production Laboratories at Morgantown, W. Va., for plasticity determinations. The data obtained indicate that this high-volatile A bituminous coal should make good coke.

In connection with a cooperative study with the Southern Natural Gas Co., 11 Alabama coals were tested for their plastic properties by the Davis-plastometer method to determine the suitability of these coals for complete gasification by the Lurgi process, which uses steam and oxygen at high and low pressures. Most of the coals proved to be strongly coking and would, therefore, offer too much resistance to the passage of gas through a heated coal column. The coals showing a long period of minimum resistance or maximum fluidity, a long plastic temperature range, and a low maximum resistance