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THE TEXTURE OF MISSISSIPPIAN, UPPER DEVONIAN, AND LOWER PENNSYLVANIAN SANDSTONES IN THE APPALACHIAN BASIN

by

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and

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Introduction.--This report presents the writers' textural (size) analyses of 272 outcrop and 420 well samples from the Mississippian, Upper Devonian, and lower Pennsylvanian sandstones of Ohio, Pennsylvania, and West Virginia. They constitute the largest body of textural data yet accumulated on these formations in the Appalachian basin. As such, they are presented at this time without interpretation to permit their immediate use by oil and gas operators. When sufficient information has been obtained for each formation, the relation of texture to other sedimentary characteristics, and to the occurrence of oil and gas will be worked out and presented.

The data were obtained as part of the oil and gas investigations of the Appalachian basin by the Geological Survey, United States Department of the Interior. As additional information becomes available, supplementary reports of similar type will be issued.

The use of textural data.--Texture is one of several factors which together determine the porosity and permeability of reservoir rocks. Consequently, texture in part controls the initial rate of oil and gas productivity, and should influence the selection of production methods for both primary and secondary recovery.

An excellent example of the relation of texture and initial production is furnished by the belt of relatively thin Berea that extends from the northwestern panhandle of West Virginia through Ohio and West Virginia to Wyoming County in southern West Virginia. In this belt textural and production data have been obtained on 71 wells in which the Berea is five feet or more in thickness. In 51 of these, the Berea is a sandstone (average or median grain size coarser than 1/16 millimeter). Of these 9 are oil wells, 21 are gas wells (25 M cubic feet or more), 11 have oil and gas shows, and only 10 (20%) are dry holes. In the other 20 wells, the Berea is a siltstone (average grain size between 1/16 and 1/256 millimeter). Of these, none are oil wells, 1 is a gas well, 5 have oil or gas shows, and 14 (70%) are dry holes. This is a highly significant difference in production.

Texture influences permeability in two ways. First, as the average size of grain decreases, the size of the pores also decreases. Consequently, it is more difficult for the oil and gas to migrate through the rock. Second, as the spread of the grains about the average increases (the sorting of the sand becomes poorer), the smaller grains fill the openings between the larger grains and thereby reduce both the total porosity and the size of the pores. There are exceptions to both relationships.1/)

The basic relation of texture to porosity and permeability may be modified by (1) partial filling of the pore spaces by quartz, calcite, pyrite, or other inter-grain cements, (2) the orientation (type of packing) of the grains, (3) the shape of the grains, and (4) the degree to which the sediment has been compacted. In addition, the rock may be fractured, or may have its permeability increased through solution of calcite or other minerals. Consequently, it is not possible to take just the size analysis of a sediment and predict exactly what the permeability will be. The modifying factors must also be considered. But texture will usually give a good preliminary estimate of the maximum permeability that may be expected. Where cable tool samples are the only ones available, texture may provide the best estimate of permeability.

Texture also promises to be a useful tool for locating the stratigraphic traps from which much of the future oil and gas production of the Appalachian basin will come. The texture of a sediment reflects the hydraulic conditions that existed at the place and during the time the sediment was accumulated. The bars, beaches, and other sedimentary forms that contain our oil and gas deposits were accumulated by current and wave action that varied from place to place in accordance with definite physical laws. Therefore, a related variation in texture from place to place would also occur. Thus in going from a sandy shore, where wave and current action would be vigorous, to deeper and quieter water offshore, a progressive change in texture to finer and finer sand and then to silt and clay may occur. A less pronounced progressive decrease in size also may occur along the beach in the direction that the sediment was transported.

When sufficient textural data are available, it should be possible, by a process very similar to the three-point method of determining dips, to work out textural gradients. With these, zones in which permeable sands

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1/ Fraser, H. J., Experimental study of porosity and permeability of clastic sediments: Jour. Geology, vol. 43, no. 8, pt. 1, pp. 910-1010, 1935.

grade into less permeable silts and shales can be located. Such zones are potential stratigraphic traps and consequently their delineation is highly desirable. It should be noted that traps of this type may be entirely unrelated to structure and, with methods now in use, would be found only by lucky wildcatting.

Analytical procedure, outcrop samples.--Outcrop samples were composed of chips taken from several beds, usually over a vertical range of 5 to 20 feet. When possible, fresh rock below the outer case-hardened and weathered surface was obtained. Because study of the sands was the main object of the investigation, conglomerate, siltstone, and shale horizons usually were not sampled. Consequently, some samples are representative only of the sandy layers and not of the formation as a whole.

In the laboratory, several pieces were selected for thin section examination. The rest of the sample was broken down by hand, or by gentle pounding in a mortar, to pass a 4 mm. sieve. A test sample of 90 to 110 grams was split out in a Jones-type riffle sample splitter. This test sample was weighed and then soaked in water for 12 hours or more. The fine silt and clay (less than about 0.01 mm.) was removed by repeated decantation, some aggregates of grains being broken up during this washing process.

The test sample was dried, weighed, and then boiled in 3 to 4 N hydrochloric acid for 10 minutes to remove iron oxides and carbonates. The acid, and additional silt and clay released during the acidizing, were removed by washing the sample with water. The sample was again dried and weighed. Several acid treatments were required to remove all iron oxides from some samples.

If aggregates still persisted, the sample was placed in a nest of Tyler standard sieves, in which each sieve had openings twice the diameter of the subadjacent sieve. After about 1 minute of hand shaking, the material retained on each sieve was removed and the aggregates broken down by rolling the end of an iron pestle gently over the material. The sample was recomposed, replaced in the sieves, and shaken mechanically in a Rotap sieve shaker for 15 minutes. The sieve separates were weighed and packaged for subsequent mineralogical study. The percentages of material removed during acid treatment and by decantation were computed.

Analytical procedure, well samples.--In most well samples few pieces larger than 4 mm. were present. Also washing to remove the drilling mud had eliminated most silt and clay except that in sandstone or siltstone aggregates or in shale fragments. When no shale was present, a test sample of 5 to 100 grams (depending on the amount of material available) was split out. This sample was acidized, disintegrated, and sieved using the procedure outlined

1 mm. were removed, but in sizes finer than 1 mm. it was necessary to estimate the percentage of shale in each size grade. Although estimates of shale content by both writers usually agreed closely, there is some possibility of error from this factor.

Fortunately, the sources of variation from the original size distribution tend to counterbalance one another. Consequently, in most cases the textural data presented in table 1 are believed to be good approximations of the original size distributions. The sandy limestones, limey sandstones, and coarse siltstones are probably most in error, but even these furnish data that are usable if the several factors discussed above are kept in mind.

Presentation of data.--Textural data for both outcrop and well samples are presented in table 1. Outcrop data are grouped by State and formation. Well samples are arranged by State and approximate alphabetical order of well name. For well samples, the formation is given in the fourth column, and it is the driller's name unless followed by the designation (GR), which indicates that the driller's identification has been revised or confirmed by petrographic analysis.

West Virginia outcrop samples were collected from measured sections that are described in county reports of the West Virginia Geological Survey. The section names, bed number, county, and page are presented in the second, third, fourth, and fifth columns of table 1. Ohio and Pennsylvania outcrop samples are located by distance in miles from 5-minute intervals of latitude and longitude. All well samples are located in the same way. In table 1 well samples are identified by symbol and well name. The full name, company, and location are given in table 2.

In the analytical data columns, "pan" represents sediment between 0.062 and about 0.01 mm. "Acid plus fines" represents acid soluble material (mainly carbonates and iron oxides) and insoluble material finer than about 0.01 mm. The degree of effervescence is indicated in the "acid plus fines" column as follows: v2, very vigorous; v, vigorous; m, medium; s, slight; n, none; ?, no observation.

Acknowledgments.--The writers wish to thank the West Virginia University and the West Virginia Geological Survey for use of office and laboratory space and equipment, and the many individuals and companies who made well samples available for analysis. About 75 of the Ohio outcrop and well samples were analyzed by Miss Jean Reycroft.

Table 4.--Texture of outcrop and well samples from West Virginia, Ohio, and Pennsylvania

Sample	Measured section	Bed No.	County report	Page	Formation	Size grade > 2 mm.	2-1 mm.	1-.5 mm.	.5-.25 mm.	.250-.125 mm.	.125-.062 mm.	Pan	Acid + Fines
						Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
					WEST VIRGINIA OUTCROP SAMPLES								
660	Caldwell	-	Greenbrier	202	Broad Ford	---	---	tr.	12.6	33.4	21.4	13.4	19.2
679	Cromer Top	-	Randolph	165	do	---	---	tr.	2.3	33.3	33.9	13.0	17.5
696	Evenwood	-	Randolph	191	do	tr.	tr.	tr.	6.2	37.2	30.2	14.4	11.9
673	Mingo	53	do	176	do	---	---	---	tr.	.1	40.0	32.3	27.6
675	do	62	do	do	Berea	---	tr.	tr.	1.0	32.8	28.7	20.5	17.0
688	Durbin	31	Pocahontas	116	do	0.7	2.1	14.5	22.7	32.9	13.0	7.9	6.2
644	Edray	86	do	93	Broad Ford	---	tr.	.1	7.4	8.2	40.2	21.0	23.1
642	do	93	do	do	L. Pocono	---	tr.	tr.	.2	21.2	38.4	17.6	22.5
636	Kee Flats	3	do	96	Broad Ford	---	---	.1	22.9	36.5	16.2	9.9	14.4
638	do	5	do	do	do	---	---	---	tr.	.1	48.4	23.7	27.8
648	Knapp Cr.	1	do	105	Berea	18.5	24.4	30.1	13.4	6.7	2.9	2.0	2.0
649	do	3	do	do	Berea (?)	---	---	tr.	2.4	23.4	37.4	20.2	16.6
650	do	6 (?)	do	do	Catskill	---	---	tr.	5.0	36.8	25.0	15.5	17.7
651	do	7 (?)	do	do	do	---	---	tr.	8.4	44.1	19.2	15.7	12.6
633	do	13	do	do	Gordon (?)	---	---	tr.	6.5	50.8	19.8	11.2	11.7
632	do	14	do	do	do do	---	.1	.4	12.8	39.6	19.0	14.6	13.5
631	do	16	do	do	Catskill	---	---	tr.	3.9	43.4	21.4	15.7	15.6
630	do	18	do	do	do	---	.1	tr.	.5	18.9	38.1	21.5	20.9
629	do	20	do	do	Hendricks	tr.	1.7	11.3	24.6	24.4	17.1	11.9	9.0
658	Stevens Hole	5	do	115	Berea	---	---	tr.	1.1	22.8	34.2	21.8	20.1
659	do	7	do	do	do	---	---	tr.	10.0	40.6	18.1	14.6	16.7
659a	do	9	do	do	do	---	---	.1	9.6	32.6	25.8	15.3	16.6
749	Hardesty	-	Preston	102	Pocono	---	tr.	tr.	5.2	28.2	39.1	16.3	11.2
748	do	-	do	do	do	.1	.1	.1	.7	8.6	28.8	36.4	25.2
747	do	-	do	do	do	---	---	tr.	.4	16.8	36.7	26.1	20.0
746	do	-	do	do	Pocono (?)	---	---	tr.	3.5	41.7	23.1	15.1	16.6
745	do	-	do	do	Catskill	---	---	---	.2	24.0	31.3	20.6	23.9
744	do	-	do	do	do	---	---	---	tr.	10.4	36.6	25.4	27.6

Sample	Measured section	Bed no.	County report	Page	Formation	Size grade > 2 mm.	2-1 mm.	1-.5 mm.	.5-.25 mm.	.250-.125 mm.	.125-.062 mm.	Pan	.1 + Fines
						Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
743	Hardesty	-	Preston	102	Catskill	---	---	tr.	0.1	24.8	35.2	20.0	19.9
742	do	-	do	do	do	---	---	---	.4	20.4	33.4	21.6	24.2
701	Sturgisson	-	Monongalia	-	Connequ'g	---	tr.	0.3	18.9	57.0	11.6	6.9	5.3
703	do	-	do	-	Loyalhanna	---	0.2	4.4	9.7	4.0	11.7	6.2	63.8
704	do	-	do	-	do	---	tr.	1.2	4.4	6.8	11.7	4.1	71.8
700	do	-	do	-	Burgoon	---	tr.	2.4	44.0	26.1	11.7	7.8	8.1
702	do	-	do	-	do	---	.2	4.8	47.1	25.6	9.7	6.5	6.1
699	Dry Fork	-	Tucker	137	U. Pocono	tr.	tr.	5.0	39.1	27.8	10.1	8.6	9.4
698	do	-	do	do	Berea (?)	0.1	.1	.2	19.5	32.2	24.1	11.9	12.0
697	do	-	do	do	Gordon (?)	---	---	tr.	4.8	36.7	22.7	18.2	17.5

	Location: Miles south of		Miles west of										
					OHIO OUTCROP SAMPLES								
73	1.9	39°25'	2.2	82°25'	U. Massillon	--	2.6	13.7	48.2	16.8	5.1	4.2	9.4
100	2.2	39°35'	2.2	82°20'	do	---	---	---	10.4	46.0	18.0	6.2	19.4
116	2.1	39°25'	0.2	82°30'	do	---	---	4.4	58.8	17.0	4.5	4.0	11.3
126	1.9	39°30'	1.3	82°20'	do	---	---	tr.	3.1	26.8	38.6	14.3	17.2
167	5.4	39°10'	4.3	82°30'	do	---	.1	7.3	53.0	16.1	4.7	4.1	14.7
168	3.3	39°10'	3.0	82°30'	do	---	---	tr.	25.2	49.0	6.9	4.5	14.4
169	0.3	39°05'	2.7	82°30'	do	---	---	.2	41.7	34.9	4.6	3.9	14.7
170	2.7	39°05'	1.5	82°35'	do	---	---	---	2.2	36.0	31.3	9.1	21.4
267	4.9	38°55'	2.8	82°40'	do	---	---	tr.	5.8	45.8	16.9	7.5	24.0
268	0.0	38°50'	2.9	82°40'	do	---	---	---	6.9	48.8	16.7	5.9	21.7
281	0.0	38°45'	3.7	82°45'	do	---	tr.	.5	26.5	42.2	9.4	4.9	16.5
283	3.7	38°45'	0.8	82°45'	do	---	---	tr.	3.1	46.0	21.6	8.3	21.0
357	4.8	39°55'	1.6	82°10'	do	---	---	.1	12.6	47.1	15.3	7.1	17.8
367	4.9	40°50'	3.9	81°35'	do	---	---	.1	21.6	45.7	8.9	6.2	17.5
437	1.6	41°00'	1.2	81°40'	do	---	tr.	1.5	57.6	26.3	4.0	2.7	7.9
438	1.6	41°00'	1.2	81°40'	do	---	tr.	1.1	41.7	35.1	5.1	2.9	14.1
439	1.6	41°00'	1.2	81°40'	do	---	---	6.6	78.2	8.1	1.9	.9	4.3
456	1.9	40°35'	3.6	81°50'	do	---	---	.1	3.2	14.4	41.9	15.5	24.9
509	3.8	39°45'	2.0	82°15'	do	---	.1	7.7	36.4	18.5	8.2	7.8	21.3

Sample	Location				Formation	Size grade							
	Miles south of		Miles west of			> 2 mm.	2-1 mm.	1-.5 mm.	.5-.25 mm.	.250-.125 mm.	.125-.062 mm.	Pan	Acid + Fines
						Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
420	1.5	41°20'	2.2	81°00'	N. Massillon	---	---	0.3	17.2	54.8	12.4	4.6	10.7
421	1.5	41°20'	2.2	81°00'	do	---	---	.5	28.9	41.1	17.2	5.4	6.9
441	4.7	41°00'	2.9	81°35'	do	---	0.1	6.0	47.1	29.1	5.5	2.7	9.5
454	3.3	40°30"	0.2	82°05'	do	---	tr.	23.8	56.6	8.7	2.7	1.5	6.7
455	5.1	40°45'	3.7	81°50'	do	---	---	4.7	49.8	26.7	5.9	2.9	10.0
510	3.8	39°45'	2.0	82°15'	do	---	.1	.6	58.5	25.2	6.5	2.9	6.2
138	4.7	39°10'	0.1	82°40'	Sharon	0.4	.2	1.2	40.6	43.9	7.3	2.3	4.1
140	5.0	39°10'	4.3	82°35'	do	.3	.8	3.5	58.7	30.9	3.0	.5	2.3
142	5.4	39°10'	3.9	82°35'	do	---	tr.	.4	5.9	49.5	24.6	6.6	13.0
150	5.2	39°00'	0.6	82°45'	do	1.6	4.9	16.6	59.5	10.9	1.9	.4	4.2
155	5.6	39°10'	2.5	82°40'	do	.1	.1	1.0	25.8	52.3	14.3	2.0	4.4
156	5.6	39°10'	2.5	82°40'	do	---	tr.	tr.	2.4	75.0	16.3	2.8	3.5
165	4.9	39°10'	2.5	82°45'	do	.5	1.3	11.3	59.1	15.4	4.5	2.0	5.9
174	1.3	39°10'	2.2	82°35'	do	---	---	tr.	22.2	63.8	7.0	2.7	4.3
189	2.9	39°25'	0.4	82°55'	do	---	---	tr.	4.5	71.7	21.2	1.2	1.4
278	0.6	38°50'	2.9	82°45'	do	---	tr.	tr.	9.2	62.0	20.5	5.6	2.7
359	1.5	39°55'	2.7	82°15'	do	---	.1	.9	40.5	47.8	5.1	2.8	2.8
383	4.0	41°20'	0.2	81°50'	do	---	.1	1.6	57.0	36.0	2.3	.3	2.7
407	1.0	41°05'	2.9	81°35'	do	---	tr.	1.0	38.4	49.5	5.4	1.8	3.9
418	4.6	41°20'	1.1	81°00'	do	---	---	.7	38.4	50.5	5.6	1.9	2.9
422	4.4	41°25'	3.3	81°00'	do	.1	.1	2.0	49.8	36.7	6.2	1.4	3.7
436	2.8	41°00'	2.7	81°40'	do	---	---	.1	1.5	46.2	38.0	8.0	6.2
442	4.8	41°00'	3.7	81°35'	do	---	---	.1	27.6	64.3	4.7	.4	2.9
431	3.2	41°10'	3.6	80°40'	do	---	tr.	11.4	67.1	10.7	3.2	1.7	5.9
269	1.3	38°50'	4.1	82°40'	do	---	---	.2	12.6	70.1	10.0	2.2	4.9
270	2.8	38°50'	1.0	82°45'	do	tr.	tr.	tr.	.2	53.8	26.7	12.5	6.8
274	1.7	38°50'	2.9	82°50'	do	---	---	.1	14.0	77.6	5.3	.6	2.4
113	3.2	39°20'	0.2	82°35'	Allensville	---	---	---	.1	18.7	60.0	7.9	13.3
115	3.2	39°20'	0.2	82°35'	do	---	---	tr.	.3	20.0	61.3	7.1	11.3
254	0.5	39°25'	4.2	82°40'	do	.7	21.3	49.6	9.6	3.4	1.8	.9	12.7
256a	0.2	39°25'	4.3	82°40'	do	.9	20.8	47.8	8.2	2.6	1.5	1.4	16.8
335	0.6	39°35'	0.8	82°35'	do	---	.1	76.5	2.7	.9	6.6	5.4	7.8

Sample	Location				Formation	Size grade							
	Miles south of		Miles west of			> 2 mm.	2-1 mm.	1-.5 mm.	.5-.25 mm.	.250-.125 mm.	.125-.062 mm.	Pan	Acid + Fines
						Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
128	2.5	39°35'	1.1	82°25'	Berne	21.3	26.2	26.5	15.7	3.9	1.5	1.5	3.4
332	0.6	39°35'	0.8	82°35'	do	36.8	10.9	4.6	25.1	9.5	2.3	4.1	6.7
395	2.5	40°55'	1.7	82°00'	do	---	tr.	1.3	43.3	39.4	7.5	2.7	5.8
397	2.5	40°55'	1.7	82°00'	do	.5	3.5	3.3	36.0	23.9	17.0	4.6	11.2
529	1.0	40°55'	0.0	81°50'	do	28.7	27.7	13.8	8.5	8.0	2.8	2.4	7.9
12	1.3	40°05'	1.4	82°15'	Black Hand	---	---	tr.	.1	11.7	60.1	6.1	22.0
14	1.3	40°05'	1.4	82°15'	do	.8	3.4	6.5	47.7	33.2	3.5	1.3	3.6
15	1.3	40°05'	1.4	82°15'	do	.4	.8	3.8	50.4	37.8	2.4	.4	4.0
16	1.3	40°05'	1.4	82°15'	do	---	.3	1.9	43.1	48.3	3.3	.4	2.7
17	1.3	40°05'	1.4	82°15'	do	---	---	.5	34.0	56.6	4.2	.8	3.9
18	1.3	40°05'	1.4	82°15'	do	---	tr.	2.0	46.0	41.7	2.6	.3	7.4
22	2.2	40°05'	3.2	82°10'	do	.7	1.6	9.1	67.1	19.6	.5	.1	1.3
32	1.6	40°25'	0.9	82°20'	do	---	.3	15.4	46.3	34.6	1.3	.6	1.5
36	2.6	40°25'	0.7	82°15'	do	---	.1	1.8	74.1	20.2	1.2	.6	2.0
46	3.1	39°40'	3.0	82°30'	do	tr.	1.3	20.7	55.0	17.6	1.0	.6	3.8
48	3.1	39°40'	3.0	82°30'	do	---	---	.3	51.0	34.6	6.9	2.0	5.2
62	5.5	39°30'	1.2	82°30'	do	---	.1	36.6	53.3	3.3	.7	.4	5.6
64	1.4	39°25'	2.3	82°30'	do	---	1.6	10.9	55.2	28.7	1.2	.5	1.9
66	1.4	39°25'	2.3	82°30'	do	---	tr.	.5	11.1	62.8	15.3	2.2	8.1
107	2.1	39°25'	0.6	82°35'	do	20.7	.3	.3	1.9	23.3	23.8	3.9	25.8
111	3.7	39°25'	1.4	82°35'	do	tr.	.2	3.2	11.8	40.0	30.6	4.2	10.0
129	2.5	39°35'	1.1	82°25'	do	3.6	12.1	23.3	38.3	7.2	.4	.2	14.9
130	2.5	39°35'	1.1	82°25'	do	tr.	1.4	13.0	60.1	21.7	1.3	.2	2.3
131	2.5	39°35'	1.1	82°25'	do	.3	1.2	4.7	33.4	50.1	5.8	1.6	2.9
223	1.4	39°30'	0.1	82°40'	do	18.1	10.5	12.2	39.4	17.7	.7	.1	1.3
251	0.5	39°25'	4.2	82°40'	do	---	---	---	.1	5.8	68.0	12.8	13.3
327	4.3	39°35'	0.5	82°40'	do	---	tr.	tr.	.8	36.5	45.6	7.2	9.9
328	3.1	39°35'	4.3	82°35'	do	---	.1	2.2	29.0	53.0	9.0	1.5	5.2
329	2.9	39°35'	4.2	82°35'	do	1.2	4.4	17.1	30.0	29.9	7.8	.8	8.8
336	0.6	39°35'	0.8	82°35'	do	.8	2.4	12.9	66.0	13.5	.6	.1	3.7
341	0.1	39°45'	2.4	82°40'	do	---	.4	15.3	67.7	13.3	.9	.3	2.1

Sample	Location: Miles south of		Miles west of		Formation	Size grade: > 2 mm.	2-1 mm.	1-.5 mm.	.5-.25 mm.	.250-.125 mm.	.125-.062 mm.	Pan	Acid + Fines
						Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
375	2.3	40°50'	1.0	82°25'	Black Hand	---	tr.	1.4	82.8	11.1	.6	.3	3.8
393	3.3	41°05'	2.4	81°45'	do	---	---	.1	.5	49.5	35.0	4.0	10.9
511	1.5	39°30'	0.1	82°40'	do	---	tr.	tr.	.2	24.3	49.8	14.0	11.7
512	1.7	39°30'	4.5	82°35'	do	---	tr.	tr.	.4	28.3	44.3	12.6	14.4
513	1.7	39°30'	4.5	82°35'	do	---	---	tr.	.3	30.1	46.4	13.5	9.7
514a	2.7	39°35'	4.2	82°30'	do	3.6	7.2	15.9	36.0	29.3	2.9	.7	4.4
515	4.9	40°15'	2.7	82°15'	do	---	.2	2.0	22.9	52.7	13.3	2.4	6.5
524	2.0	41°00'	3.4	81°40'	do	1.0	3.5	15.8	21.9	39.4	8.9	2.7	6.8
525	2.0	41°00'	3.4	81°40'	do	.2	.4	2.4	21.3	59.0	8.6	2.9	5.2
527	1.2	41°00'	0.2	81°50'	do	---	tr.	.2	4.8	60.7	22.8	4.9	6.6
528	1.0	40°55'	0.0	81°50'	do	---	tr.	.2	4.6	54.4	32.3	2.6	5.9
389	2.5	41°05'	2.5	81°45'	Armstrong	---	---	tr.	tr.	4.6	70.4	10.3	14.7
398	3.4	40°55'	1.1	82°00'	do	---	---	tr.	.1	2.9	36.7	45.8	14.5
399	3.4	40°55'	1.1	82°00'	do	---	---	.2	2.6	7.7	37.5	37.0	15.0
400	3.4	40°55'	1.1	82°00'	do	---	---	tr.	.1	.2	56.5	26.4	16.8
435	4.6	41°00'	0.2	81°45'	do	---	---	tr.	.4	13.6	50.8	21.6	13.6
29	2.9	40°25'	2.9	82°50'	Berea	---	---	.1	.6	5.8	71.4	11.9	10.2
285	2.6	38°45'	1.2	83°05'	do	---	tr.	.1	.4	5.4	21.2	55.3	17.6
322	2.3	39°05'	4.2	83°05'	do	---	---	.1	1.8	6.2	21.9	56.2	13.8
340	3.8	39°35'	1.0	82°50'	do	.2	tr.	.1	1.3	3.6	69.0	6.5	19.2
378	2.8	40°50'	2.0	82°45'	do	---	---	tr.	tr.	2.0	48.8	37.1	12.1
380	2.8	40°50'	2.0	82°45'	do	---	---	---	.1	3.3	66.0	22.6	8.0
386	3.5	41°20'	4.1	82°00'	do	---	---	tr.	2.4	67.0	22.0	3.6	5.0
388	3.5	41°20'	4.1	82°00'	do	---	---	tr.	5.6	65.4	18.2	3.6	7.2
403	2.7	41°20'	1.1	81°35'	do	---	---	.1	19.7	39.5	28.2	2.8	9.7
411	3.2	41°25'	1.3	81°50'	do	---	---	tr.	.7	18.2	64.4	6.5	10.2
412	2.9	41°25'	1.6	81°50'	do	---	tr.	.2	36.8	48.8	6.3	2.3	5.6
413	2.7	41°25'	1.7	81°50'	do	---	---	.2	19.4	66.1	6.0	2.1	6.2
414	2.3	41°25'	1.5	81°30'	do	---	tr.	.2	12.3	18.5	43.8	8.3	16.9
426	3.2	41°30'	3.5	80°55'	do	---	---	---	1.9	32.4	56.2	2.5	7.0
452	3.6	40°05'	0.2	82°50'	do	---	---	tr.	tr.	1.6	17.5	69.4	11.5

Sample	Location: Miles south of		Miles west of		Formation	Size grade: > 2 mm.	2-1 mm.	1-.5 mm.	.5-.25 mm.	.250-.125 mm.	.125-.062 mm.	Pan	Acid + Fines
						Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
517	4.6	41°10'	4.0	82°35'	Berea	---	tr.	tr.	tr.	1.2	30.2	43.4	25.2
520	5.5	41°25'	2.1	82°20'	do	---	---	tr.	0.1	38.8	44.6	9.4	7.1
791	2.3	41°35'	1.2	80°30'	do	---	tr.	tr.	1.3	26.8	51.3	9.4	11.0
831	3.4	41°35'	4.0	80°35'	do	---	0.2	0.1	32.8	40.0	15.8	3.3	7.8
792	2.4	41°35'	1.4	80°35'	Cussewago	---	---	tr.	20.5	52.4	6.5	6.9	13.7
793	2.4	41°35'	1.4	80°35'	do	---	---	.1	19.0	59.5	7.2	5.2	9.1
794	2.4	41°35'	1.4	80°35'	do	---	tr.	tr.	7.0	72.7	10.0	3.2	7.0
832	3.6	41°35'	3.6	80°35'	do	---	---	tr.	4.9	32.8	36.6	14.4	10.3
834	5.7	41°30'	2.5	80°50'	do	0.2	.1	3.8	49.0	33.4	7.1	1.6	4.8
					PENNSYLVANIA OUTCROP SAMPLES								
536	1.4	41°20'	3.9	79°35'	Conneque'g	---	.1	8.8	69.1	14.3	3.1	1.5	3.1
537	4.9	41°25'	1.7	79°45'	do	---	---	2.7	34.4	45.7	9.1	4.1	3.9
538	4.9	41°25'	1.7	79°45'	do	---	.5	4.4	37.9	28.0	10.1	8.3	11.0
551	5.0	41°30'	2.1	79°30'	do	---	tr.	2.2	50.9	37.9	5.0	2.0	2.0
559	2.8	41°50'	3.1	79°10'	do	---	tr.	2.0	47.2	34.6	6.0	3.8	6.4
560	3.0	41°50'	3.4	79°10'	do	.3	3.8	24.7	50.5	6.6	4.1	3.7	6.3
566	1.9	41°55'	2.9	79°00'	do	---	---	tr.	.7	46.7	37.9	10.2	4.5
572	5.5	41°00'	2.2	80°20'	do	---	---	tr.	.5	43.6	26.7	15.0	14.2
600	4.4	41°25'	3.4	79°55'	do (?)	---	.1	5.9	65.6	19.4	2.4	1.5	5.1
621	1.6	41°30'	1.8	79°25'	do (?)	---	---	tr.	7.8	39.4	21.2	15.7	15.9
622	1.6	41°30'	1.8	79°25'	do (?)	---	---	tr.	3.2	35.3	28.0	16.0	17.6
623	3.4	39°55'	1.0	79°40'	do (?)	---	---	tr.	5.9	47.6	14.9	11.5	20.2
624	3.4	39°55'	1.0	79°40'	do	---	---	tr.	13.3	43.8	13.2	9.7	20.0
757	3.8	41°45'	3.1	79°00'	do	---	tr.	4.4	56.1	23.8	6.0	3.3	6.3
760	0.6	41°55'	0.8	78°40'	do	.1	.1	.3	4.8	47.2	36.6	6.1	4.9
763	0.4	41°55'	0.3	78°45'	do	---	.1	8.8	73.0	8.1	3.6	2.5	3.8
769	0.5	41°45'	1.0	78°40'	do	---	---	1.3	72.6	14.6	3.6	2.0	5.9
786	0.2	40°25'	3.9	78°55'	do	.1	1.8	17.8	39.4	19.3	9.0	6.1	6.4

Sample	Location				Formation	Size grade							
	Miles south of		Miles west of			>2 mm.	2-1 mm.	1-.5 mm.	.5-.25 mm.	.250-.125 mm.	.125-.062 mm.	Pan	Acid + Fines
						Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
535	1.4	41°20'	3.9	79°35'	Olean	---	tr.	tr.	0.5	7.0	47.2	27.3	18.0
539	0.9	41°20'	2.9	79°40'	do	---	tr.	0.1	7.1	35.2	36.3	11.4	9.9
540	0.9	41°20'	2.9	79°40'	do	---	tr.	3.8	34.2	41.9	11.3	4.5	4.3
541	0.9	41°20'	2.9	79°40'	do	---	tr.	1.3	27.2	42.0	18.2	7.5	3.8
561	2.5	41°50'	2.4	79°10'	do	---	0.1	4.9	76.5	9.6	2.2	1.8	4.9
564	2.1	41°55'	3.2	79°00'	do	63.6	8.0	7.2	5.2	6.8	4.4	2.5	2.3
565	2.1	41°55'	3.2	79°00'	do	33.7	15.1	24.9	17.5	3.7	1.3	.7	3.1
753	0.2	41°40'	1.2	79°25'	do	.2	.4	8.6	61.3	12.7	3.2	1.0	12.7
755	2.5	41°40'	3.5	79°05'	do	.4	.8	30.9	48.5	7.6	2.9	1.7	7.2
758	3.6	41°45'	2.8	79°00'	do	---	.6	18.0	63.9	11.3	2.8	1.0	2.5
762	0.1	41°55'	0.4	78°40'	do	.5	.1	10.3	75.6	8.1	1.8	1.0	2.7
764	4.0	42°05'	2.2	78°25'	do	---	tr.	4.6	78.4	7.6	3.2	2.0	4.0
765	0.1	41°45'	1.1	78°40'	do	---	.1	2.2	40.6	33.6	9.8	5.5	8.2
625	3.4	39°55'	1.0	79°40'	Loyalhanna	---	---	.7	32.6	24.7	8.7	5.4	27.9
628	0.9	39°45'	0.1	79°45'	do	---	---	2.4	15.8	7.5	13.0	11.3	49.9
627	0.9	39°45'	0.1	79°45'	Burgoon	---	tr.	.5	39.0	27.8	13.1	10.2	9.5
777	0.6	40°25'	3.5	78°55'	do	tr.	.8	14.9	44.1	17.6	9.8	6.4	6.4
778	0.6	40°25'	3.5	78°55'	do	---	---	tr.	19.6	31.2	20.1	15.0	14.1
785	0.6	40°25'	3.5	78°55'	do	---	---	tr.	18.6	40.6	17.6	11.0	12.2
601	4.4	41°25'	3.4	79°55'	"Above Carl"	---	.1	1.9	24.1	43.6	11.6	7.0	11.7
604	5.4	41°25'	3.3	79°55'	do	---	---	tr.	.6	39.2	25.5	18.0	16.7
602	4.4	41°25'	3.4	79°55'	Shenango	---	---	5.1	81.6	4.8	1.8	1.5	5.2
605	5.3	41°25'	3.4	79°55'	do	---	tr.	5.0	56.8	22.4	5.0	3.0	7.8
606	4.9	41°30'	2.7	79°55'	do	---	---	.1	40.7	43.5	6.7	3.9	5.1
607	2.0	41°35'	0.6	80°00'	do	---	tr.	tr.	5.9	32.2	35.8	12.9	13.2
608	2.0	41°35'	0.6	80°00'	do	---	---	tr.	7.0	40.6	28.2	13.3	10.9
613	3.7	41°40'	2.0	79°35'	do	---	---	.1	7.5	36.0	34.5	10.4	11.5
614	3.7	41°40'	2.0	79°35'	do	---	---	tr.	3.6	39.8	31.5	9.7	15.4
615	5.3	41°30'	1.2	79°40'	do	---	tr.	2.5	30.9	37.6	13.1	9.2	6.7
618	1.6	41°30'	1.8	79°25'	do	---	---	tr.	1.6	41.4	33.9	12.0	11.1
619	1.6	41°30'	1.8	79°25'	do	---	---	---	tr.	5.7	40.9	35.7	17.7

Sample	Location				Formation	Size grade							
	Miles south of		Miles west of			> 2 mm.	2-1 mm.	1-.5 mm.	.5-.25 mm.	.250-.125 mm.	.125-.062 mm.	Pan	Acid + Fines
						Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
766	0.1	41°45'	1.1	78°40'	Shenango ?	0.3	0.3	1.0	15.1	40.8	23.7	8.7	10.1
767	0.1	41°45'	1.1	78°40'	do ?	---	tr.	.1	.6	42.8	30.8	13.3	12.3
542	1.8	41°20'	3.6	79°40'	Shenango "C"	---	tr.	tr.	1.2	34.2	30.0	19.2	15.4
543	1.8	41°20'	3.6	79°40'	do	---	---	tr.	7.0	40.4	25.5	13.8	13.3
544	1.8	41°20'	3.6	79°40'	do	---	---	tr.	5.1	37.2	27.2	14.2	16.3
552	4.5	41°30'	2.5	79°30'	do	tr.	tr.	.3	6.2	40.7	31.6	9.2	12.1
603	5.4	41°25'	2.9	79°55'	do	---	tr.	tr.	.1	7.6	45.3	29.1	17.9
620	1.6	41°30'	1.8	79°25'	do	---	---	tr.	tr.	.2	18.0	60.0	21.8
533	5.7	41°30'	2.1	79°40'	Shenango "B"	---	---	tr.	3.5	53.3	26.6	6.5	10.1
534	5.7	41°30'	2.1	79°40'	do	---	tr.	.5	19.2	34.5	18.7	15.6	11.5
545	0.7	41°20'	3.8	79°40'	do	---	---	tr.	7.6	38.6	29.2	11.8	12.8
546	0.7	41°20'	3.8	79°40'	do	---	---	.2	17.9	45.3	19.1	9.6	7.9
612	0.6	41°25'	1.2	79°40'	do	---	tr.	.6	20.6	40.2	19.6	11.0	8.0
548	0.6	41°20'	3.5	79°40'	Shenango "A"	---	---	.7	6.7	28.4	34.0	18.6	11.6
610	0.4	41°25'	1.5	79°40'	do	---	tr.	tr.	.1	2.3	44.5	30.5	22.6
774	1.0	40°25'	3.3	78°55'	Pocono	---	tr.	tr.	1.6	37.6	30.8	17.5	12.5
775	1.0	40°25'	3.3	78°55'	do	---	---	tr.	tr.	.4	31.8	33.0	20.3	14.4
547	1.2	41°30'	2.1	79°30'	Cuyahoga	---	---	---	tr.	14.1	62.2	10.6	6.3	6.8
616	1.5	41°30'	1.1	79°25'	do	1.3	2.8	6.8	46.9	28.8	4.3	3.2	5.9
617	1.5	41°30'	1.1	79°25'	do	1.1	1.7	4.3	34.4	44.3	5.7	3.8	4.7
802	2.0	41°30'	0.0	79°30'	do	.1	.1	.3	28.6	52.7	4.1	2.2	11.9
796	5.4	39°55'	0.2	79°40'	Congl. I*	1.2	20.8	40.1	21.5	9.4	2.8	1.7	2.3
776	0.9	40°25'	3.3	78°55'	do ?	---	.2	11.9	24.1	38.4	12.6	7.1	5.5
626	3.7	39°55'	0.5	79°40'	Congl. F*	---	---	tr.	tr.	17.1	59.2	13.5	10.2
530	4.0	41°30'	2.3	79°40'	Corry	---	tr.	tr.	tr.	.2	21.7	60.9	17.2
531	4.0	41°30'	2.3	79°40'	do.	---	---	tr.	.1	.4	55.7	36.4	7.4
532	4.0	41°30'	2.3	79°40'	do	---	---	tr.	tr.	.1	13.9	70.9	15.1
550	2.1	41°30'	2.1	79°30'	do	---	---	tr.	tr.	1.1	29.2	52.0	17.7
553	3.1	41°35'	3.6	79°35'	do	---	tr.	.1	1.1	10.9	38.8	37.2	11.9
556	0.9	41°55'	2.6	79°35'	do	---	---	tr.	.1	.8	41.2	47.1	10.8

*Letter designations used by Laird in Pennsylvania Topog. and Geol. Survey Prog. Rept. 126, 1941.

Sample	Location				Formation	Size grade							
	Miles south of		Miles west of			> 2 mm.	2-1 mm.	1-.5 mm.	.5-.25 mm.	.250-.125 mm.	.125-.062 mm.	Pan	Acid + Fines
						Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
557	0.9	41°55'	2.6	79°35'	Corry	---	---	tr.	tr.	0.4	41.3	48.2	9.6
609	2.3	41°45'	0.7	80°05'	do	---	---	tr.	tr.	.1	7.5	72.0	20.4
751	0.7	41°45'	0.6	79°30'	do	0.2	0.4	0.6	7.2	54.3	18.5	9.7	9.2
752	2.7	41°55'	1.6	79°20'	do	.2	.1	.6	10.4	24.5	41.3	16.0	6.9
825	2.8	41°35'	1.6	79°15'	do	13.9	13.8	8.2	2.0	2.3	24.8	16.6	18.4
563	0.9	41°50'	4.1	79°05'	Knapp	14.9	11.9	10.2	13.6	36.2	8.3	2.6	2.3
567	2.2	41°55'	3.6	79°00'	do	2.9	8.0	41.2	9.0	6.8	14.3	8.3	9.4
568	2.2	41°55'	3.6	79°00'	do	.1	.1	.7	2.2	22.2	48.8	13.9	11.9
756	2.7	41°40'	3.6	79°00'	do	2.4	8.6	10.2	4.9	22.5	35.5	5.7	10.3
759	3.6	41°45'	2.4	79°00'	U. Knapp	.1	.4	3.7	13.6	41.7	20.3	6.5	13.7
761	0.1	41°55'	0.4	78°40'	Knapp	4.0	19.0	40.5	14.4	14.4	5.7	.6	1.5
768	0.0	41°45'	1.2	78°40'	do	---	---	tr.	.1	31.9	51.0	7.3	9.7
804	4.1	41°55'	2.7	78°55'	L. Knapp	12.8	23.0	27.0	20.0	8.9	5.2	.9	2.2
808	4.7	42°00'	1.5	79°00'	Knapp	.3	.8	1.9	21.5	62.2	10.2	1.4	1.7
809	4.0	41°55'	1.6	78°45'	do	3.0	7.9	15.9	31.9	28.1	6.3	2.1	4.8
810	5.7	41°50'	1.2	78°40'	do	.4	.7	4.0	43.9	40.2	6.3	1.8	2.7
811	1.6	41°45'	0.6	78°55'	L. Knapp	.6	.3	4.5	38.0	38.6	13.4	1.9	2.7
812	1.5	41°40'	0.5	78°45'	Knapp	6.4	6.9	23.7	38.4	18.2	3.3	.8	2.3
815	4.1	41°45'	2.2	78°50'	U. Knapp	2.7	4.7	31.3	50.5	8.2	1.3	.2	1.1
817	3.6	41°40'	3.0	79°10'	Knapp ?	.4	.9	1.2	1.6	27.4	39.8	12.8	15.9
826	4.2	41°45'	1.0	80°00'	Cussewago	---	---	.4	15.2	46.0	20.6	7.7	10.1
827	5.7	41°40'	2.2	80°05'	do *	---	---	.8	26.2	31.8	16.5	7.3	17.4
829	1.8	41°45'	0.1	80°15'	do	---	---	.2	22.3	45.5	9.7	3.4	18.9
830	4.8	41°45'	4.3	80°20'	do	---	tr.	2.8	23.1	41.1	18.2	6.8	8.0
772	1.1	40°25'	3.2	78°55'	Congl. E ?	.1	.3	4.6	59.7	22.6	4.4	2.6	5.8
773	1.1	40°25'	3.2	78°55'	Congl. E ?	---	tr.	.4	14.0	51.0	15.2	8.4	11.0
795	3.5	39°55'	0.7	79°40'	SS. "D" *	2.1	1.4	1.6	1.8	24.6	43.5	12.2	12.9
770	1.2	40°25'	3.1	78°55'	Oswego	---	---	tr.	.1	13.1	41.9	27.8	17.0
771	1.2	40°25'	3.1	78°55'	do	---	---	tr.	.1	14.2	39.6	26.9	19.2

*Letter designations used by Laird in Pennsylvania Topog. and Geol. Survey Prog. Rept. 126, 1941.

Sample	Location				Formation	Size grade							
	Miles south of		Miles west of			> 2 mm.	2-1 mm.	1-.5 mm.	.5-.25 mm.	.250-.125 mm.	.125-.062 mm.	Pan	Acid + Fines
						Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
558	1.4	41°50'	1.3	79°10'	Salamanca	21.4	11.1	7.9	6.9	22.0	17.1	8.5	5.2
754	4.8	41°45'	0.4	79°25'	do	.1	.6	2.6	6.3	27.8	51.6	5.7	5.3
806	4.1	41°55'	3.2	78°55'	do	---	---	tr.	.1	12.4	41.5	22.8	23.2
806a	4.0	41°55'	2.9	78°55'	do	---	tr.	tr.	1.5	50.2	28.9	9.7	9.7

WELL SAMPLES -- WEST VIRGINIA

Sample	Well name	Depth (in feet)	Formation	Size grade > 2 mm.	2-1 mm.	1-.5 mm.	.5-.25 mm.	.250-.125 mm.	.125-.062 mm.	Pan	Acid + Fines
				Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
A-1	Lin-397	2362-2370	Berea	---	---	0.1	4.2	30.7	44.4	15.3	5.2(m)
A-2	do	2370-2376	do	---	0.1	---	2.0	17.3	48.0	26.0	6.6(v)
BG-1	Log-60	3085-3090	do	---	---	.9	1.0	13.2	54.7	19.2	10.9(?)
BG-2	do	3095-3100	do	---	---	tr.	.6	8.3	40.0	35.3	15.8(?)
BE-1	Up-40	1943-1948	do	---	---	2.5	20.4	48.4	16.6	5.8	6.3(s)
BE-2	do	1718-1731	Pocono	1.2	6.5	13.5	21.8	24.5	14.0	10.5	7.9(s)
BE-3	do	1734-1744	do	---	1.0	6.9	16.0	33.3	26.5	9.4	6.9(?)
BE-4	do	1744-1756	do	---	---	.1	2.1	33.8	29.4	13.8	20.7(?)
BE-5	do	1762-1773	do	---	.5	3.8	7.0	32.8	39.2	9.3	7.4(?)
BE-6	do	1778-1781	do	---	---	.1	3.3	30.8	52.0	8.8	5.0(?)
BE-7	do	1792-1806	do	---	tr.	1.1	6.9	16.3	36.7	27.6	11.4(?)
BE-8	do	1806-1817	do	---	.2	3.0	31.1	34.1	18.9	6.3	6.4(?)
BE-9	do	1826-1838	do	---	tr.	.1	3.7	30.3	44.0	14.7	7.2(s)
BU-1	Log-92	3236-3238	Berea	---	---	tr.	.5	36.2	43.5	11.9	7.9(v)
BU-2	do	3247-3252	do	---	---	tr.	tr.	4.6	58.5	30.2	6.6(v)
BX-1	Log-115	3235-3245	do	---	.1	2.8	15.4	24.4	28.8	19.2	9.4(v)
BX-2	do	3245-3250	do	---	---	.2	12.2	52.4	25.2	4.8	5.3(v)
BX-3	do	3250-3260	do	---	tr.	.1	5.6	48.3	31.7	6.7	7.6(v)
BX-4	do	3260-3265	do	---	tr.	.1	10.9	55.9	20.0	4.9	8.1(v)
BX-5	do	3265-3267	do	---	---	.2	16.3	50.6	20.6	4.8	7.6(v)
C-1	Boo-580	3044-3056	do	---	.3	9.9	43.2	28.6	9.1	2.8	6.1(s)
CC-1	Kan-985	2621-2636	do	---	---	.1	10.1	55.6	19.6	6.4	8.2(s)
CH-1	Boo-459	2419-2428	do	---	tr.	1.2	28.1	44.3	14.2	4.3	7.9(?)
CH-2	do	2437-2441	do	---	tr.	.1	3.9	35.4	37.4	15.1	8.1(?)
CL-1	Jac-10	2014⅓-2020	do	---	---	tr.	.9	9.0	43.7	30.6	15.7(?)
CL-2	do	2020-2026	do	---	---	.3	1.2	2 8	63.8	19.3	12.6(?)
CL-3	do	2026-2032	do	---	---	tr.	.3	8.8	64.6	19.9	6.4(?)
CL-4	do	2032-2037	do	---	---	tr.	.3	1.4	46.4	31.8	20.1(?)
CO-1	Woo-140	2127⅓-2137	do	tr.	.4	1.3	11.4	25.1	27.3	19.3	15.2(v)
CO-3	do	2138-2144	do	---	.5	2.1	7.4	32.0	22.8	14.9	20.3(v)
CY-1	Han-45	723-730	do	---	---	tr.	1.2	32.7	29.6	24.3	12.1(v)
CZ-1	Boo-634	2499-2504	do	---	---	.4	23.5	50.0	15.6	3.5	6.9(?)

Sample	Well name	Depth (in feet)	Formation	Size grade: >2 mm.	2-1 mm.	1-.5 mm.	.5-.25 mm.	.250-.125 mm.	.125-.062 mm.	Pan	Acid + Fines
				Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
CZ-3	Boo-634	2511-2517	Berea	---	---	0.1	5.0	29.7	40.2	14.1	10.9(?)
DI-1	Pleas-224	1749-1763	Big Lime	---	tr.	0.6	2.7	26.8	38.3	15.9	15.7(v)
DI-2	do	1772-1780½	Keener	---	---	tr.	.1	3.6	41.4	34.4	20.5(m)
DI-3	do	1812-1818	Big Injun	---	tr.	.1	16.7	46.1	19.4	10.7	6.9(v)
DI-4	do	1871½-1879	do	---	tr.	tr.	12.5	52.5	20.4	8.9	5.7(s)
DI-5	do	1910-1916	do	---	tr.	.2	5.7	35.6	36.7	14.7	7.1(s)
DI-6	do	1936-1942½	Squaw	---	tr.	1.1	33.5	37.8	17.0	6.0	4.6(s)
E-1	Woo-129	2272-2279	Berea	---	---	tr.	2.5	66.3	21.2	3.2	6.8(m)
EE-1	Put-40	2146-2148	do	---	---	.4	6.7	20.3	31.3	29.8	11.4(s)
G-1	Wyo-21	3670-3680	do	tr.	.8	2.3	11.3	31.8	30.7	13.8	9.3(m)
G-2	do	3680-3685	do	---	tr.	.1	.2	8.8	71.8	12.1	7.0(v)
GI-1	Wyo-16	3473-3480	do	---	.2	3.1	21.9	28.4	26.6	12.7	7.1(m)
GI-2	do	3490-3501	do	---	.3	4.4	22.0	27.8	27.8	10.1	7.6(m)
GI-3	do	3506-3512	do	---	---	---	.7	9.1	47.2	31.2	11.9(m)
GR-1	Har-79	1560-1570	do	tr.	.1	.3	8.9	26.3	25.4	24.9	14.1(s)
GR-2	do	1605-1615	do	---	1.2	9.4	10.4	11.3	40.0	15.6	12.1(m)
GU-1	Lew-86	2111-2120	do	---	---	.1	2.4	35.6	30.0	24.7	7.2(s)
GU-2	do	2120-2131	do	---	---	.1	8.6	46.5	31.0	9.0	4.9(s)
GX-1	Mon-128	406-417	do	---	---	.3	19.0	38.1	19.3	13.9	9.4(m)
GY-1	McD-2	3762-3772	do	---	---	1.5	23.7	16.5	19.5	24.5	14.3(v)
HA-1	Pleas-183	1530-1536	do	---	tr.	.2	7.0	73.8	11.9	3.2	3.9(s)
HC-1	Tin-519	2220-2227	do	---	---	1.4	34.6	42.2	9.7	2.6	9.5(s)
HC-2	do	2227-2231	do	---	tr.	.8	4.7	44.8	39.2	5.2	5.5(m)
HC-4	do	2234-2239	do	---	---	.1	.2	14.6	59.4	16.7	9.1(s)
HE-1	Heinzman	2381-2397	do	---	.1	.2	4.8	37.8	31.7	16.8	8.6(s)
HE-2	do	2391-2397	do	---	.1	.4	6.7	44.0	29.6	11.6	7.7(s)
HI-1	Han-166	2240-2246	do	---	.1	.5	1.7	9.2	29.2	41.9	17.2(?)
HX-1	Boo-414	1980-1982	do	---	---	.3	11.4	49.1	25.7	6.5	7.0(?)
HX-2	do	1989-1993	do	---	tr.	3.5	21.0	38.7	23.2	6.2	7.4(?)
HX-3	do	1993-2000	do	---	---	.2	3.1	22.6	42.3	22.9	8.9(?)
JA-1	Mon-49	1552-1562	do	---	---	.5	8.1	35.5	39.3	8.9	7.7(m)
KR-1	Lew-53	2511-2517	do	---	---	tr.	5.0	40.7	38.3	10.9	5.1(?)

Sample	Well name	Depth (in feet)	Formation	Size grade: 2-1 mm. Pct.	1-.5 mm. Pct.	.5-.25 mm. Pct.	.250-.125 mm. Pct.	.125-.062 mm. Pct.	Pan Pct.	Acid + Fines Pct.
KZ-1	Lin-575	2178-2183	Berea	---	---	0.1	0.3	7.9	52.3	31.1	8.3(m)
KZ-2	do	2190-2195	do	---	---	tr.	.8	2.8	39.7	42.7	13.9(v)
LA-1	Jac-42	2491-2502	do	---	0.5	6.6	34.7	32.3	12.5	4.5	8.9(?)
IRP-1	Boo-362	3292-3307	do	tr.	.3	4.1	35.4	38.0	10.8	4.5	6.9(m)
McP-1	Woo-113	2285-2288	do	---	---	.2	.9	42.8	43.7	6.2	6.2(s)
MH-2	Boo-517	2029-2034	do	---	.2	1.9	18.6	40.8	21.9	7.3	9.4(v)
MH-3	do	2034-2039	do	---	---	.1	3.1	16.2	36.4	32.5	11.6(v)
MH-4	do	2039-2043	do	---	---	---	.4	12.3	37.6	33.6	16.1(v)
MX-1	Gil-636	2441-2474	do	0.5	1.8	11.3	37.0	19.6	16.1	9.1	4.6(s)
N-1	Boo-458	3111-3116	do	---	---	.7	21.4	50.8	16.1	3.8	7.4(v)
O-1	Put-196	2261-2269	do	---	---	.4	11.4	30.9	39.9	10.5	6.9(m)
PO-1	Han-22	1071-1074	do	---	---	---	1.2	29.1	30.8	29.0	9.9(?)
R-1	Bar-3	1901-1906	do	1.3	7.1	20.4	19.0	16.4	15.3	9.9	10.4(s)
R-2	do	1914-1918	do	.1	5.0	24.2	24.9	18.1	13.2	7.8	6.7(?)
R-3	do	1918-1923	do	.1	3.6	16.9	18.2	20.8	24.1	10.3	6.0(s)
RP-1	Kan-1027	1914-1919	Weir	---	tr.	3.2	32.2	39.4	15.4	5.1	4.7(s)
RP-2	do	1964-1969	do	---	tr.	2.2	27.0	35.3	19.6	7.1	8.8(s)
RP-3	do	2035-2047	do	---	tr.	2.0	31.5	37.5	18.7	4.6	5.7(s)
SH-1	Woo-138	2297-2301'3"	Berea	---	---	---	.5	72.2	21.3	1.8	4.2(s)
SI-1	Wan-690	2150-2157	do	---	tr.	tr.	4.8	29.1	29.1	20.5	16.4(?)
ST-1	Lin-354	2507-2514	do	---	.1	1.6	7.0	20.7	37.6	25.9	7.1(v)
TN-1	Woo-180	1450-1456	Sharon (GR)	---	---	tr.	6.4	81.4	8.9	1.2	2.2(n)
TN-2	do	1478-1486	do	---	---	.9	37.9	57.8	1.9	.1	1.4(n)
TN-3	do	1501-1510	do	---	.3	.5	28.9	44.7	11.3	4.3	10.0(m)
TN-4	do	1548-1560	?	6.1	21.8	24.1	31.2	9.1	3.2	1.2	3.2(m)
TN-5	do	1595-1608	?	.1	.1	4.0	62.4	27.8	3.0	.4	2.2(n)
W-1	Kan-155	1905-1906	Berea	---	tr.	1.6	28.1	19.4	16.5	14.8	19.6(m)
WC-1	Boo-355	3007-3016	do	---	.1	3.8	38.8	35.2	9.4	5.8	6.9(m)
WC-2	do	3017-3023	do	---	.3	6.9	36.1	33.1	12.3	4.5	6.8(m)
WH-1	Bro-16	1325-1327	do	---	---	tr.	5.1	57.7	22.5	8.3	6.4(?)

Sample	Well name	Depth (in feet)	Formation	Size grade: > 2 mm.	2-1 mm.	1-.5 mm.	.5-.25 mm.	.250-.125 mm.	.125-.062 mm.	Pan	Acid + Fines
				Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
WH-3	Bro-16	1329-1331	Berea	---	tr.	tr.	2.9	66.6	11.3	2.7	16.5(v)
WH-5	do	1333-1336	do	---	tr.	tr.	.3	25.1	35.0	28.4	11.2(m)
WI-1	Fan-575	2152-2156	do	---	tr.	tr.	.8	17.8	36.0	33.4	11.9(?)
WX-1	Tyl-141	1855-1863	Big Lime	---	0.1	0.4	11.3	62.5	13.5	6.1	* (v)
WX-2	do	1869½-1874	Keener	---	---	tr.	4.9	70.7	20.7	2.0	1.6(s)
WX-3	do	1885'4"-1888'10"	Big Injun	---	tr.	.3	8.6	42.5	25.0	5.5	18.1(v)
WX-4	do	1902-1905	do	---	tr.	.1	12.4	57.5	19.5	8.2	2.4(s)
WX-5	do	1921½-1924	do	0.1	.2	1.3	34.4	46.8	12.1	2.4	2.6(s)
Y-1	Log-102	1736-1740	Berea	---	tr.	.3	3.3	19.5	43.9	20.2	12.7(v)
Y-2	do	1740-1743	do	---	---	.1	1.6	16.4	43.2	25.3	13.2(v)
Y-3	do	1743-174?	do	---	---	tr.	1.0	1.4	45.5	40.7	11.4(v)
			WELL SAMPLES -- OHIO								
AD-1	Adkins No. 6	Botton Berea	Berea	---	tr.	.1	6.3	50.4	27.0	7.9	8.3(m)
AR-1	Armstrong No. 8	755-776	do	---	---	tr.	1.6	24.3	34.8	13.2	26.0(v)
B-1	Brown No. 1	843-859	do	---	---	tr.	.1	4.7	62.7	18.7	13.7(m)
B-2	do	859-870	do	---	---	tr.	.1	4.3	61.0	26.0	8.6(m)
BR-1	Braunstein No. 1	712-721	Homeworth	---	---	tr.	.4	10.7	24.4	44.3	20.2(v)
BR-2	do	730-738	do	---	---	tr.	3.1	24.6	23.0	33.6	15.7(s)
BR-3	do	748-758	Knapp	---	.2	2.5	38.4	43.8	6.5	1.8	6.8(v)
BR-4	do	768-773	do	---	tr.	3.3	57.2	27.9	3.7	1.3	6.3(v)
BR-5	do	790-798	do	tr.	1.0	23.5	66.2	5.3	.7	.3	2.9(s)
BR-6	do	806-814	do	.2	5.5	29.2	46.5	10.6	1.6	.7	5.7(s)
CA-1	Cannel No. 1	1009-1012	Berea	---	---	tr.	.2	13.8	25.1	48.2	12.7(s)
CA-2	do	1012-1020	do	---	---	tr.	tr.	5.6	35.6	47.9	10.7(s)
CA-3	do	1025-1035	do	---	---	tr.	.5	20.4	67.1	4.1	7.9(m)
CR-1	Cramblett No. 1	1170-1176	do	---	---	tr.	.4	14.7	49.9	29.0	6.0(s)
CR-2	do	1163-1170	do	---	---	.1	.2	6.3	41.9	41.8	9.6(m)
CR-3	do	1132-1144	do	---	---	.1	1.4	21.5	36.0	31.9	9.2(s)

* 85% of sample removed as acid and fines.

Sample	Well name	Depth (in feet)	Formation	Size grade: > 2 mm.	2-1 mm.	1-.5 mm.	.5-.25 mm.	.250-.125 mm.	.125-.062 mm.	Pan	Acid + Fines
				Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
D-1	Desecker No. 1	1135-1141	Berea	---	0.1	0.2	0.4	2.2	31.2	48.9	16.9(s)
D-2	do	1150-1155	do	---	---	.1	.3	25.0	45.4	22.6	6.6(?)
D-3	do	1162-1168	do	---	---	.1	29.1	57.4	8.3	1.6	3.4(?)
D-4	do	1174-1179	do	---	tr.	.1	14.5	43.3	22.1	7.7	12.2(s)
F-1	Funk No. 1	694-696	do	---	---	---	tr.	3.0	77.6	11.0	8.4(v)
F-2	do	709-717	do	---	---	tr.	.1	.3	37.7	53.6	8.3(m)
H-9	Ullman Hrs. No.1	715-733	?	---	---	---	9.2	46.9	30.3	13.6	*
H-12	do	868-888	Injun	---	---	.4	22.7	46.9	20.0	10.0	*
H-14	do	907-935	do	---	---	.5	24.3	37.0	24.1	14.1	*
H-15	do	935-965	do	---	1.7	38.7	45.0	8.6	1.8	.6	3.6(?)
H-16	do	965-976	do	0.4	6.8	49.4	36.4	4.9	1.4	.7	*
H-18	do	995-1001	do	---	6.4	21.1	46.6	20.1	4.8	1.0	*
H-20	do	1036-1059	do	---	---	1.9	35.1	50.7	9.2	3.1	*
H-22	do	1085-1100	?	---	---	6.1	49.2	33.2	8.3	3.2	*
H-23	do	1123-1142	Squaw	---	.1	8.0	18.8	27.8	36.1	9.2	*
HB-1	Hyler No. 1	694-712	Berea	---	---	.1	1.1	20.9	34.7	27.6	15.6(m)
HM-2	Hoskins and)	Middle screw	do	tr.	.5	1.5	4.9	26.8	33.4	21.2	11.7(m)
HM-3	Midkiff)	Bottom screw	do	---	.6	1.4	3.0	18.1	47.6	16.5	12.8(m)
J-1	John No. 1	242-250	do	---	---	---	7.6**	35.7	32.8	10.5	13.4(?)
J-4	do	270-282	do	---	.4	5.8	56.1	22.7	4.3	1.3	9.4(v)
J-6	do	291-302	do	.2	.7	8.6	56.1	23.5	3.1	.7	7.1(m)
J-8	do	313-323	do	---	1.2	9.2	51.8	26.4	4.3	.7	6.4(s)
K-1	Kerr No. 1	2103-2110	do	---	---	.2	5.8	26.6	28.4	28.9	10.1(s)
LY-1	Leggett No. 1	1052-1066	do	---	---	tr.	.1	4.0	48.0	36.1	11.7(m)
LY-2	do	1090-1100	do	---	---	tr.	37.7	47.5	6.5	2.7	5.5(?)
LY-3	do	1100-1110	do	---	---	.1	19.0	68.2	6.3	2.5	4.0(?)
LY-4	do	1158-1170	do	---	---	tr.	4.9	32.6	21.8	32.0	8.6(m)
M-1	Matheny No. 3	1520-1525	Big Injun	---	---	5.1	26.1	40.3	15.8	6.3	6.3(?)
M-2	do	1550-1555	do	---	---	2.0	26.1	49.5	17.0	2.6	2.6(?)

* Except as noted, no determination made of acid loss.
** More than 0.250 mm.

Sample	Well name	Depth (in feet)	Formation	Size grade							
				> 2 mm.	2-1 mm.	1-.5 mm.	.5-.25 mm.	.250-.125 mm.	.125-.062 mm.	Pan	Acid + Fines
				Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
M-3	Matheny No. 3	1570-1575	Big Injun	---	---	8.1	28.1	42.8	9.7	4.7	6.6(?)
M-4	do	1503-1508	Keener	---	---	4.5	23.9	46.9	13.2	4.6	6.9(?)
M-5	do	1488-1493	do	---	---	2.0	25.0	53.3	10.9	2.1	7.0(?)
M-6	do	2½' into	Berea	---	---	1.4	10.1	56.8	20.4	7.0	4.3(s)
M-7	do	Next bottom	do	---	---	.1	1.3	49.6	31.6	7.6	9.8(m)
MA-1	Mahoning No. 43	849-844	do	---	tr.	.7	32.2	36.7	15.2	2.0	13.0(v)
MA-2	Mahoning No. 41	827.5-823.8	do	---	tr.	.1	22.4	42.7	22.4	4.7	7.8(?)
MI-1	Miller No. 1	957-964	do	---	---	tr.	1.1	19.0	35.0	29.0	15.8(v)
MO-1	Mobley No. 1	2014-2027	do	---	tr.	tr.	13.5	54.8	11.6	10.1	10.0(v)
NL-1	Newlon No. 3	1539-1542	do	---	0.1	.1	3.2	39.5	17.6	21.2	18.4(?)
NL-2	do	1542-1544	do	---	.1	1.1	5.5	34.1	31.2	17.3	10.7(?)
P-1	Porcher No. 1	190-195	Salt ? (GR)	---	.3	1.2	12.3	53.5	22.5	6.4	3.7(?)
P-9	do	236-242	do	---	.6	2.0	39.8	28.6	16.6	8.3	4.1(?)
P-16	do	274-279	do	---	1.4	10.8	53.3	22.7	4.5	1.9	5.4(?)
P-43	do	424-429	? (GR)	0.2	4.1	12.9	43.6	26.8	8.9	1.3	2.1(?)
P-45	do	436-441	?	4.0	7.1	11.6	42.2	29.4	4.1	.5	1.0(s)
P-47	do	448-455	?	2.1	6.3	22.9	47.4	16.6	2.5	1.0	1.2(s)
P-49	do	460-467	?	---	2.0	7.5	26.6	26.6	19.9	10.3	7.1(m)
P-51	do	474-479	Big Injun (GR)	---	.1	.7	10.2	55.4	19.3	4.7	9.6(?)
P-59	do	520-526	do	---	---	.4	13.9	44.5	19.9	3.5	17.8(?)
P-125	do	921-928	Berea (GR)	---	---	---	---	11.1	21.4	57.4	10.1(?)
P-128	do	941-948	do	---	---	---	---	2.9	27.6	53.3	16.2(?)
P-130	do	955-961	do	---	---	tr.	2.0	41.2	32.1	17.6	7.1(?)
P-133	do	973-979	do	---	---	---	.9	55.4	22.9	8.2	12.6(?)
P-138	do	1004-1009	do	---	---	---	.6	37.2	24.3	20.6	17.3(?)
PE-1	Petrek	738-748	Butler Gas	---	---	---	.1	8.7	30.8	38.0	22.4(?)
PE-2	do	748-756	do	---	tr.	1.7	10.6	32.7	21.9	16.0	17.1(v)
PE-3	do	756-766	Knapp	---	.3	9.2	56.1	22.8	4.3	1.8	5.5(m)
PE-4	do	772-779	do	---	.7	16.1	65.5	12.3	1.3	.4	3.9(s)
PE-5	do	794-807	do	.1	2.2	31.8	56.3	5.3	.6	.3	3.4(s)
PE-6	do	809-815	do	tr.	3.1	33.4	51.9	5.6	.8	.4	4.8(v)

Sample	Well name	Depth (in feet)	Formation	Size grade							
				>2 mm.	2-1 mm.	1-.5 mm.	.5-.25 mm.	.250-.125 mm.	.125-.062 mm.	Pan	Acid + Fines
				Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
S-2	Sommerville No.1	1165-1175	Big Injun	0.1	2.0	11.0	40.5	24.9	5.7	2.6	4.2(s)
S-5	do	1195-1205	do	---	.1	4.9	43.7	38.2	8.4	3.2	1.5(?)
S-8	do	1222-1228	do	---	1.3	18.3	55.2	18.4	2.0	.7	4.1(m)
S-11	do	1250-1260	do	.1	3.3	16.7	39.8	27.2	7.3	2.9	2.7(m)
S-13	do	1270-1279	do	.1	18.2	51.3	22.4	4.9	1.0	.4	1.7(s)
S-17	do	1307-1315	do	---	.2	2.6	19.5	38.0	30.8	6.4	2.5(s)
S-20	do	1337-1348	do	---	tr.	1.0	11.6	38.0	37.1	9.7	2.6(s)
S-23	do	1364-1372	do	---	tr.	.9	11.7	38.2	32.9	9.7	6.6(v)
S-26	do	1392-1402	do	---	.1	6.7	34.8	27.8	14.7	3.3	12.6(m)
S-29	do	1423-1430	do	---	tr.	1.6	52.3	28.8	4.2	3.2	9.9(?)
SC-3	Schrum No. 1	280-311	Maxton (GR)	1.5	2.8	6.9	42.6	34.5	8.1	2.2	1.4(?)
SC-4	do	304-350	do	1.0	8.9	11.0	23.7	46.6	4.8	1.3	2.7(?)
SC-6	do	410-476	Berea (GR)	---	tr.	1.0	21.5	43.2	20.0	7.1	7.2(m)
SM-8	Smith No. 1	142-150	Salt (GR)	---	tr.	.1	15.8	36.0	10.4	6.1	31.6(v)
SM-12	do	242-248	Maxton (GR)	---	.5	12.7	52.7	24.0	6.6	2.2	1.3(?)
SM-16	do	267-275	do	.5	1.6	19.1	44.7	17.6	5.8	1.9	8.8(?)
SM-20	do	399-406	Big Injun (GR)	---	.2	10.5	38.7	28.9	8.0	2.1	11.6(m)
SM-22	do	823-840	Berea (GR)	---	---	---	.3	35.4	41.0	11.8	11.4(?)
SM-23	do	840-860	do	---	.1	.2	1.9	49.1	25.0	9.8	13.9(?)
SM-24	do	860-870	do	---	---	.2	11.4	72.9	5.0	3.3	7.1(s)
SM-28	do	901-909	do	---	---	.1	2.5	33.1	14.2	35.3	14.8(s)
SW-1	Swytser No. 22	1274.8	do	---	---	tr.	.2	12.1	62.8	10.1	14.8(s)
SW-2	do	1280	do	---	---	tr.	.1	9.4	67.5	12.9	10.1(s)
SZ-1	Smith	720-730	?	---	---	.1	4.1	40.3	39.1	10.5	5.9(?)
SZ-2	do	730-750	do	---	---	.1	16.0	59.5	18.6	3.0	2.9(s)
SZ-3	do	750-770	do	---	---	tr.	14.5	70.6	11.0	1.2	2.7(s)
SZ-4	do	770-800	do	tr.	1.7	15.3	57.5	19.1	3.0	.5	2.9(v)
T-1	Tipton No. 1	328-342	Salt (Gr)	---	.4	13.2	56.4	23.0	4.3	1.2	1.5(?)
T-2	do	540-545	Big Injun (GR)	---	---	.2	.9	21.9	43.4	25.0	8.6(?)
T-3	do	545-?	do	---	.1	2.2	14.1	45.7	20.7	7.1	10.1(?)
T-4	do	580-618	do	---	.2	5.3	32.7	34.1	16.4	4.4	6.9(?)

Sample	Well name	Depth (in feet)	Formation	Size grade >2 mm. Pct.	2-1 mm. Pct.	1-.5 mm. Pct.	.5-.25 mm. Pct.	.250-.125 mm. Pct.	.125-.062 mm. Pct.	Pan Pct.	Acid Fines Pct.
T-10a	Tipton No. 1	1013-1019	Berea (CR)	---	---	---	0.2	8.1	25.3	50.8	15.6(?)
T-11	do	1031-1037	do	---	---	tr.	12.9	35.6	19.5	22.1	9.8(?)
T-13	do	1043-1049	do	---	---	0.7	42.9	46.9	4.3	1.3	3.8(?)
T-14	do	1058-1066	do	---	---	.2	36.5	56.4	3.8	.7	2.4(?)
WL-1	Wilson No. 1	1078-1083	do	---	0.1	.2	.5	9.0	51.5	23.2	15.5(v)
WL-2	do	1096-1101	do	---	tr.	tr.	.1	4.4	66.0	23.8	5.7(v)
			WELL SAMPLES -- PENNSYLVANIA								
AN-1	Anderson No. 1	522-536	1st Salt	---	---	.6	30.7	39.2	17.8	9.4	2.3(s)
AN-2	do	614-623	2nd Salt	---	tr.	3.0	34.7	40.1	15.1	4.4	2.6(s)
AN-3	do	680-693	Injun	---	tr.	.1	32.7	43.5	11.1	6.0	6.6(m)
AN-4	do	817-827	do	---	---	.1	10.0	51.5	21.2	9.9	7.2(m)
AN-5	do	956-968	do	---	tr.	.1	26.7	40.5	12.4	9.3	11.0(m)
AN-6	do	1010-1027	Injun ?	---	.1	tr.	1.2	29.6	34.1	24.6	10.4(s)
AN-7	do	1092-1098	do	---	---	tr.	1.5	24.3	37.8	26.8	9.5(m)
AN-8	do	1229-1235	Squaw	0.1	.8	2.4	10.0	38.2	23.1	16.9	8.3(m)
AN-9	do	1346-1352	Murrysville	.4	5.7	10.1	16.7	10.6	12.3	8.2	35.8(v)
AN-10	do	1418-1424	?	---	tr.	.3	2.5	17.1	40.3	19.1	20.8(v)
AN-11	do	1456-1464	100'	---	tr.	.6	9.7	32.8	26.2	13.2	17.4(v)
CB-1	Carothers No. 1	1222-1240	Loyalhanna	---	---	.4	17.2	32.4	33.1	16.9	54.5(v) *
CB-2	do	1246-1274	do	---	.5	8.4	22.2	20.4	29.0	19.5	57.2(v) *
CB-3	do	About 1290	Big Injun	---	---	.4	26.2	41.1	14.0	8.1	10.1(v)
CB-4	do	1364-1371	do	---	---	tr.	10.8	33.5	27.8	18.2	9.7(s)
CB-5	do	1394-1412	do	---	---	.6	29.0	33.9	20.6	11.2	4.5(s)
CB-6	do	1466-1484	do	---	---	.8	32.1	42.2	16.4	5.4	3.1(s)
CB-7	do	1532-1540	do	---	---	---	8.5	51.3	20.0	9.2	10.9(m)
CB-8	do	1690-1701	Squaw	---	---	---	9.4	54.2	24.0	9.0	3.6(s)
CB-9	do	1832-1846	2nd Gas	---	tr.	.1	2.8	11.8	42.8	33.5	9.0(s)

* Loss in entire sample; sand percentages calculated to 100% separately.

Sample	Well name	Depth (in feet)	Formation	Size grade >2 mm.	2-1 mm.	1-.5 mm.	.5-.25 mm.	.250-.125 mm.	.125-.062 mm.	Pan	Acid + Fines
				Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
CB-10	Carothers No. 1	1931-1945	Murrysville	---	---	4.5	74.0	15.1	1.9	0.9	3.4(s)
CB-11	do	1998-2010	do	0.4	3.1	15.8	49.3	19.0	6.2	4.1	2.1(s)
CB-12	do	2065-2075	100'	---	tr.	1.2	14.2	41.9	30.4	7.1	5.1(m)
CB-13	do	2103-2107	do	---	.1	1.2	7.4	28.4	44.9	11.9	6.3(s)
CB-14	do	2141-2147	do	---	---	.2	13.7	41.0	31.2	6.2	7.7(s)
CB-15	do	2380-2394	Gordon	---	---	.1	4.2	31.5	47.2	9.8	7.1(s)
CB-16	do	2430-2440	4th	---	---	tr.	.8	25.6	54.4	8.7	10.5(s)
EA-1	Eaton No. 1	2102-2117	Injun	---	tr.	.4	27.6	36.8	16.7	9.4	9.1(m)
EA-2	do	2178-2195	do	---	tr.	1.4	57.3	28.9	6.4	2.2	3.6(s)
EA-3	do	2225-2235	do	---	---	1.0	28.7	33.9	17.5	7.4	11.4(v) 2
EA-4	do	2701-2710	Murrysville	---	tr.	1.7	35.9	38.8	10.3	2.9	10.3(v)
EA-5	do	2750-2770	Gantz	---	.3	3.0	13.8	27.1	30.0	14.0	11.7(v) 2
EA-6	do	2850-2868	30'	tr.	tr.	.5	2.7	23.3	36.4	19.9	17.2(v) 2
ED-1	Eddy No. 1	2198-2203	Injun	---	tr.	1.9	45.6	26.5	5.9	3.0	17.1(?)
ED-2	do	2239-2249	do	---	tr.	.2	36.1	44.2	10.2	5.0	4.3(s)
ED-3	do	2301-2318	do	---	tr.	.7	19.3	45.3	18.9	9.3	6.4(s)
ED-4	do	2399-2410	Squaw	---	tr.	1.1	13.7	40.8	20.9	12.7	10.7(s)
ED-6	do	2772-2787	50'	---	.1	.4	5.8	21.8	50.3	16.0	5.5(s)
ED-7	do	2803-2815	50'	tr.	.6	4.6	12.2	26.8	35.5	11.7	8.5(s)
ED-8	do	2852-2864	30'	tr.	.6	5.6	17.4	33.2	25.2	9.1	9.0(s)
ED-9	do	2905-2919	Gordon Stray	---	.1	.7	8.0	25.2	36.9	12.2	17.0(s)
ED-10	do	2946-2961	Gordon	---	tr.	.8	7.0	27.3	41.2	9.9	13.8(s)
GF-1	Giffin No. 2	20-30	Big Injun	---	---	.1	7.2	47.6	27.1	12.4	5.6(s)
GF-2	do	59-70	do	.2	.1	7.5	48.4	30.1	7.2	4.1	2.4(s)
GF-3	do	91-98	do	---	tr.	tr.	18.0	54.1	21.8	3.8	2.1(s)
GF-4	do	122-132	do	---	1.6	27.5	44.3	19.6	4.8	1.0	1.2(s)
GF-5	do	170-180	do	tr.	.1	11.0	61.1	17.4	5.2	3.0	2.3(s)
GF-6	do	232-250	Squaw	---	---	tr.	1.7	21.8	32.2	20.4	23.6(v)
GF-7	do	273-287	do	---	---	tr.	.6	35.1	38.2	17.8	8.2(m)
GF-8	do	337-350	do	---	---	tr.	2.3	27.6	33.2	22.4	14.5(m)
GF-9	do	357-364	do	---	---	tr.	.6	32.0	37.4	21.7	8.4(s)

Sample	Well name	Depth (in feet)	Formation	Size grade >2 mm.	2-1 mm.	1-.5 mm.	.5-.25 mm.	.250-.125 mm.	.125-.062 mm.	Pan	Acid + Fines
				Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
GF-10	Giffin No. 2	377-390	Squaw	---	---	tr.	6.8	40.6	22.1	12.2	18.3(m)
GF-11	do	430-440	do	---	---	tr.	3.0	34.7	22.7	8.7	31.0(v)
GF-12	do	445-470	do	---	0.3	1.0	2.6	29.6	35.1	20.9	10.5(v)
GF-13	do	470-480	do	0.1	2.6	11.4	25.9	33.6	13.8	6.1	6.5(m)
GF-14	do	510-515	do	---	tr.	.1	2.7	32.2	55.4	13.4	6.3(v)
GF-15	do	614-621	Murrysville	---	tr.	.1	10.0	28.6	23.3	25.6	12.2(v)
GF-16	do	650-663	do	---	.1	.3	10.0	39.9	28.6	9.5	11.7(v)
GF-17	do	688-696	do	---	1.9	20.9	46.8	21.9	4.8	2.0	1.8(s)
GF-18	do	720-730	100'	---	---	.3	2.7	19.7	48.0	21.9	7.3(s)
GF-19	do	735-745	do	---	---	.3	4.1	40.2	35.5	9.8	9.9(v)
GF-20	do	754-763	do	---	---	---	.4	21.5	44.2	22.5	11.2(m)
HS-1	Hastings No. 2	1554-1565	Injun	---	---	.1	3.1	37.7	26.6	23.0	9.4(v)
HS-2	do	1640-1655	do	---	tr.	.3	39.2	44.6	8.9	4.6	2.4(?)
HS-3	do	1724-1736	do	---	---	tr.	12.5	41.1	22.3	17.3	6.7(s)
HS-4	do	1822-1838	Squaw	---	.3	1.8	11.1	35.1	27.0	15.2	9.5(s)
HS-5	do	1890-1901	do	---	tr.	1.4	26.5	39.6	17.4	9.4	5.6(s)
HS-6	do	2228-2243	Murrysville	.2	2.9	10.7	22.5	24.5	28.8	6.4	3.8(s)
HS-7	do	2295-2307	50'	---	.1	2.5	9.1	25.3	41.0	14.5	7.5(m)
HS-8	do	2374-2382	Snee	.1	.4	2.9	24.3	44.9	15.7	6.3	5.4(s)
HS-9	do	2470-2490	Gordon	.4	.2	3.0	14.8	23.8	32.0	15.7	10.1(s)
HS-10	do	2502-2510	do	---	tr.	.3	1.7	35.7	43.0	14.7	4.6(n)
HY-1	Hayden No. 1	1585-1600	Injun	---	.1	.4	22.6	40.1	17.3	11.4	8.2(?)
HY-2	do	1664-1676	do	---	tr.	.4	49.2	30.1	8.9	5.2	6.2(s)
HY-3	do	1729-1740	do	---	tr.	.1	13.7	48.0	21.0	10.4	6.8(s)
HY-4	do	1822-1830	Squaw	---	---	tr.	2.1	29.8	23.9	6.9	37.4(v)
HY-5	do	1892-1898	do	---	---	.1	21.1	45.7	16.5	10.9	5.6(s)
HY-7	do	2053-2065	2nd Gas	---	---	tr.	.1	5.9	29.8	51.3	13.1(?)
HY-8	do	2160-2172	Murrysville	---	.1	.9	3.3	22.7	45.8	16.6	10.6(?)
HY-10	do	2280-2292	Gantz	---	tr.	.1	3.1	41.4	40.7	9.4	5.3(?)
HY-11	do	2313-2335	50'	---	.1	.3	16.0	54.9	17.2	5.8	5.7(v)
HY-12	do	2482-2494	Gordon Stray	---	---	.1	1.8	22.6	44.8	15.0	15.7(v)

Sample	Well name	Depth (in feet)	Formation	Size grade >2 mm.	2-1 mm.	1-.5 mm.	.5-.25 mm.	.250-.125 mm.	.125-.062 mm.	Pan	Acid + Fines
				Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
HZ-1	Hillis No. 1	938-950	Injun	---	0.4	13.1	57.2	20.1	5.3	1.8	2.0(?)
HZ-2	do	1026-1039	do	---	---	.4	29.2	42.5	11.6	4.8	11.4(s)
HZ-3	do	1120-1134	do	---	---	tr.	1.6	31.4	28.1	18.7	20.2(s)
HZ-4	do	1244-1256	Squaw	---	---	tr.	3.2	52.6	24.3	12.2	7.7(s)
HZ-5	do	1289-1303	do	0.2	1.1	5.2	36.2	28.5	14.5	6.7	7.6(s)
HZ-6	do	1343-1347	50'	---	.1	.4	20.1	27.3	20.6	10.5	20.8(s)
HZ-7	do	1539-1541	50'	---	---	.1	.7	19.5	58.8	14.3	6.6(s)
HZ-8	do	1570-1575	50'	.2	2.2	19.8	23.4	23.2	19.2	3.9	9.0(s)
JC-1	Jacobs Cr. No. 2	447-457	Injun	---	---	.1	16.8	50.4	18.3	10.6	5.7(?)
JC-2	do	578-592	do	---	---	.1	31.5	46.6	13.1	4.6	4.1(?)
JC-3	do	714-745	do	---	.1	.1	1.9	33.7	30.0	24.5	9.7(s)
JC-4	do	800-815	Squaw	---	tr.	.1	2.4	26.0	25.0	31.7	14.8(s)
JC-5	do	929-946	2nd Gas	---	.1	.5	1.3	5.8	39.8	40.2	12.2(m)
JC-6	do	1013-1030	Murrysville	---	1.6	5.3	5.5	21.4	36.8	17.3	12.0(s)
JC-7	do	1086-1094	100'	1.9	2.5	4.6	13.7	28.8	28.0	14.3	6.1(?)
JC-8	do	1284-1291	30'	---	.2	.2	1.0	10.7	36.2	33.9	17.8(s)
L-1	Linnenbrink No.1	935-942	Berea	---	---	.1	11.4	44.8	30.6	4.4	8.7(s)
L-2	do	956-960	Berea	---	---	.1	9.7	37.6	33.6	11.9	7.0(s)
L-3	do	967-985	Gas Sand	---	.1	1.5	48.2	37.4	7.3	2.1	3.4(s)
L-4	do	1005-1011	Gas Sand	---	.7	5.8	33.8	40.4	12.9	3.9	2.5(s)
LE-1	Lemley No. 1	2170-2180	Injun	---	---	2.8	36.4	38.0	15.9	4.1	2.6(?)
LE-2	do	2221-2230	do	---	---	.3	23.8	52.7	15.8	4.1	3.4(?)
LE-3	do	2276-2286	do	---	---	.7	18.9	39.8	20.2	8.0	12.4(s)
LE-4	do	2370-2382	Squaw	---	.1	.1	3.5	31.2	29.5	21.3	14.3(s)
LE-5	do	2582-2599	Murrysville	.1	tr.	.1	.7	11.2	29.3	49.5	9.1(s)
LE-6	do	2704-2714	Gantz	---	.4	8.4	22.4	31.5	23.1	4.8	9.3(m)
LE-8	do	2849-2860	30'	---	tr.	2.4	19.0	34.1	26.4	6.1	12.0(s)
LE-9	do	2960-2970	Gordon	---	.1	.7	.3	15.3	49.2	18.5	15.9(s)
McC-1	McCluferty	514-524	1st Salt ?	---	.1	3.2	58.5	28.2	4.0	1.9	4.0(m)
McC-1a	do	632-638	Injun	---	---	.2	21.6	51.6	20.5	4.9	1.2(n)

Sample	Well name	Depth (in feet)	Formation	Size grade >2 mm.	2-1 mm.	1-.5 mm.	.5-.25 mm.	.250-.125 mm.	.125-.062 mm.	Pan	Acid + Fines
				Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
McC-2	McClaferty	675-681	Injun	---	tr.	0.1	28.5	43.4	13.2	9.4	5.4(s)
McC-2a	do	736-742	do	---	---	tr.	3.5	51.9	23.9	15.4	5.3(s)
McC-2b	do	792-798	do	---	---	tr.	9.1	60.3	18.7	8.0	3.9(s)
McC-3	do	820-826	do	---	tr.	1.2	44.6	34.4	9.5	3.4	6.7(s)
McC-4	do	888-894	do	---	---	tr.	3.8	36.5	36.0	16.7	6.9(s)
McC-5	do	995-1000	Squaw	---	---	tr.	1.6	35.0	32.0	20.4	10.9(m)
McC-6	do	1030-1038	do	---	---	tr.	1.3	26.0	31.3	28.0	13.5(m)
McC-7	do	1045-1056	do	---	---	tr.	.1	14.3	41.0	17.9	26.6(v)
McC-8	do	1072-1082	do	---	---	tr.	.5	26.0	39.6	23.5	10.4(v)
McC-9	do	1112-1118	do	---	1.9	18.8	32.3	26.5	9.9	4.5	6.0(m)
McC-10	do	1254-1260	Murrysville	---	---	.2	16.5	71.4	8.5	.7	2.7(s)
McC-11	do	1291-1300	do	---	tr.	.2	6.4	37.0	42.5	10.3	3.6(s)
McC-12	do	1342-1348	do	0.1	.2	1.5	5.7	28.9	47.9	12.3	3.4(m)
McC-13	do	1426-1432	100'	---	tr.	.2	7.9	42.4	39.2	6.9	3.3(s)
McC-14	do	1438-1444	100'	2.0	20,2	42.7	23.1	5.6	.9	.1	5.4(v)
McC-15	do	1467-1474	100'	---	tr.	.1	2.5	19.3	38.7	27.5	11.9(m)
McC-16	do	1514-1520	30'	---	.1	.1	3.6	37.5	34.4	12.1	12.2(v)
SG-1	Sangston No. 1	1737-1750	Injun	---	---	tr.	8.6	39.8	29.1	16.4	6.1(s)
SG-2	do	1784-1792	do	---	---	.2	33.8	45.5	13.6	3.5	3.3(s)
SG-3	do	1820-1828	do	---	tr.	.1	31.2	47.9	10.9	2.6	7.2(s)
SG-4	do	1929-1941	Squaw	---	---	tr.	tr.	15.8	26.6	42.6	14.9(v)
SG-5	do	1957-1967	do	---	---	---	3.6	34.7	40.3	15.3	6.1(m)
SG-6	do	2000-2010	do	---	---	.7	23.2	37.8	18.0	11.5	8.8(s)
SG-7	do	2287-2304	Gantz or 50'	---	.9	8.3	17.8	19.7	29.8	13.1	10.4(m)
SG-8	do	2311-2326	do	.1	1.6	7.6	14.2	20.0	30.5	15.2	10.6(v)
SG-9	do	2352-2369	do	.3	tr.	.3	.9	13.7	45.6	22.6	16.5(v)
SG-10	do	2394-2403	do	---	.1	.1	5.4	23.6	38.2	15.4	17.2(s)
SO-1	Sorg No. 2	204-209		---	---	tr.	10.7	58.0	22.3	7.3	1.6(?)
SO-2	do	216-222		---	.1	.8	6.4	24.1	34.4	22.7	11.5(?)
SO-4	do	290-296		---	---	.2	3.3	18.3	32.9	11.2	33.9(v)
SO-5	do	306-312		---	tr.	.6	4.8	28.2	42.0	15.9	8.5(s)
SO-6	do	334-339		---	---	.1	2.6	46.5	32.8	9.5	8.6(s)

Sample	Well name	Depth (in feet)	Formation	Size grade							
				>2 mm.	2-1 mm.	1-.5 mm.	.5-.25 mm.	.250-.125 mm.	.125-.062 mm.	Pan	Acid + Fines
				Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
SO-7	Sorg No. 2	367-374		---	tr.	tr.	5.2	27.1	38.2	17.5	11.7(s)
SO-8	do	396-401		---	0.1	0.1	.4	21.7	47.6	18.2	12.0(s)
SO-9	do	406-412		---	---	.1	2.5	45.3	33.5	9.2	9.3(s)
SO-10	do	425-433		---	.3	1.2	3.0	23.3	40.4	16.5	15.3(m)
SO-11	do	569-579		---	tr.	.1	.1	2.9	24.9	54.1	17.9(?)
SO-12	do	604-609		---	tr.	tr.	.1	7.0	33.4	49.7	9.8(?)
SO-13	do	617-623		---	tr.	tr.	tr.	9.3	41.8	42.2	6.8(?)
SO-14	do	742-747		---	---	tr.	.1	12.4	38.2	17.6	31.8(v)
SO-15	do	874-884		---	---	.2	1.9	11.2	46.8	23.3	16.3(m)
SO-16	do	954-962		---	.1	.1	1.0	14.4	44.3	20.2	19.8(v)
SO-17	do	1028-1031		tr.	.6	1.7	6.7	23.9	31.9	15.2	20.0(s)
SO-18	do	1051-1059		---	.1	.7	6.3	38.9	39.2	10.2	4.4(s)
SO-19	do	1079-1080		---	tr.	1.3	8.0	36.6	40.8	11.2	2.1(s)
SO-20	do	1096-1104		---	.1	.6	6.9	35.2	35.7	10.8	10.7(m)
SY-1	Schmittau	757-763	Pottsville (GR)	---	---	.1	26.8	54.5	10.7	1.7	6.3(s)
SY-2	do	774-777	Loyalhanna (GR)	---	---	tr.	4.0	22.2	20.2	5.5	48.2(v)
SY-3	do	795-799	do	---	---	---	tr.	1.4	29.4	30.8	38.2(v)
SY-4	do	810-815	Injun	---	tr.	tr.	1.3	40.5	28.7	16.9	12.6(m)
SY-6	do	893-899	do	---	---	.3	38.2	40.7	11.3	5.5	4.0(s)
SY-8	do	1014-1019	do	---	---	tr.	3.0	34.0	34.2	22.0	6.8(s)
SY-9	do	1082-1084	Squaw	---	---	tr.	8.7	42.0	21.6	18.2	9.3(s)
SY-11	do	1129-1131	do	---	---	tr.	1.8	44.6	27.8	16.2	9.5(s)
SY-12	do	1165-1170	do	---	---	.2	32.2	46.6	11.1	4.3	5.6(s)
SY-13	do	1195-1200	do	---	---	tr.	.5	3.3	43.0	36.1	17.1(s)
SY-14	do	1385-1390	Murrysville	---	---	tr.	tr.	33.0	39.2	19.2	8.6(s)
SY-16	do	1406-1412	do	---	---	.7	15.0	19.6	10.8	2.9	51.0(s)
SY-18	do	1432-1437	do	---	---	.1	6.7	61.3	20.3	5.8	5.8(s)
TE-1	Tennis Hrs. No.1	693-711	Berea	---	tr.	tr.	.2	1.8	34.2	52.7	11.1(s)
WE-1	Wells No. 1	1512-1537	Injun	---	tr.	1.8	28.7	39.6	14.9	8.8	6.2(s)
WE-2	do	1581-1597	do	---	tr.	4.7	55.0	25.8	7.3	4.1	3.0(s)
WE-3	do	1634-1655	do	---	tr.	.7	41.5	36.8	10.1	5.1	5.9(s)

Sample	Well name	Depth (in feet)	Formation	Size grade								
				>2 mm.	2-1 mm.	1-.5 mm.	.5-.25 mm.	.250-.125 mm.	.125-.062 mm.	Pan	Acid + Fines	
				Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	
WE-5	Wells No. 1	1765-1770	Squaw	---	---	tr.	2.8	40.8	30.4	15.7	10.2(m)	
WE-6	do	2186-2195	50'	---	0.1	7.0	27.5	32.6	21.8	4.4	6.5(v)	
WE-7	do	2202-2207	50'	tr.	.1	.2	2.1	20.8	55.1	15.5	6.2(s)	
WE-8	do	2230-2235	50'	---	.1	2.2	21.6	44.5	16.1	6.4	9.1(s)	
WS-1	Wise No. 1	499-515	Salt	---	tr.	2.0	48.0	36.4	7.4	2.3	3.9(s)	
WS-2	do	535-540	do	---	---	tr.	3.8	39.0	28.2	22.8	6.3(s)	
WS-3	do	604-617	Loyalhanna	---	tr.	tr.	9.7	42.9	34.8	12.7	54.5(v)	2*
WS-4	do	642-652	do	---	tr.	1.1	43.7	30.8	15.7	8.8	39.3(v)	2*
WS-5	do	663-668	Injun	---	tr.	tr.	1.7	33.2	33.0	25.9	6.2(s)	
WS-6	do	695-703	do	---	---	tr.	5.1	60.7	18.2	12.3	3.8(s)	
WS-7	do	813-819	do	---	tr.	2.2	32.0	40.1	11.4	9.0	5.2(s)	
WS-8	do	842-848	do	---	.2	10.5	42.5	29.1	11.6	3.9	2.2(s)	
WS-9	do	900-906	do	---	---	.1	21.0	50.2	16.4	6.9	5.5(s)	
WS-10	do	964-970	(?)	---	---	tr.	4.8	37.0	33.5	16.8	7.9(s)	
WS-11	do	1005-1011	Squaw	---	---	tr.	2.2	27.7	32.9	25.5	11.7(m)	
WS-12	do	1030-1036	do	---	---	tr.	.2	26.3	37.1	25.6	10.7(s)	
WS-13	do	1064-1070	do	---	---	---	.2	17.1	28.2	42.6	11.9(s)	
WS-14	do	1106-1117	do	---	---	---	.5	24.9	37.3	27.2	10.2(m)	
WS-15	do	1126-1133	do	---	tr.	tr.	3.5	18.1	28.9	29.6	19.9(v)	
WS-16	do	1307-1311	Murrysville	---	.1	.9	14.8	36.4	28.9	10.2	8.7(m)	
WS-17	do	1336-1340	100'	---	---	.1	.9	20.2	57.8	14.7	6.3(s)	
WS-18	do	1364-1372	100'	0.5	.7	2.4	13.6	19.9	16.9	9.2	36.7(v)	2
WS-19	do	1393-1400	100'	---	1.3	7.4	11.8	29.8	28.2	13.6	7.7(s)	
WS-20	do	1405-1410	100'	---	.8	3.8	6.6	17.9	32.5	23.9	14.6(v)	
WS-21	do	1432-1445	(?)	---	.1	1.1	9.2	21.9	27.2	13.3	27.2(v)	
WS-22	do	1505-1511	30'	---	tr.	.3	16.5	51.5	23.3	4.2	4.2(s)	
WS-23	do	1723-1730	Gordon	---	.1	tr.	.7	15.2	41.3	29.0	13.7(s)	

* Loss in entire sample; sand percentages calculated to 100% separately

TABLE 2 -- Names and locations of wells from which samples were analyzed.

Symbol	Well Name	Company*	Township	County	Permit	Location			
						Miles south of		Miles west of	
			WEST VIRGINIA WELLS						
A	J. V. Alford No. 4	S. Penn.	Duval	Lincoln	397	4.50	38°20'	0.98	81°55'
BC	Boone Co. Coal Corp. No. 15	B.C.C.C.	Logan	Logan	60	5.57	38°00'	2.31	81°50'
BE	I. M. Bennett No. 1 (336)	Col. Carb.	Warren	Upshur	40	1.71	39°05'	3.49	80°10'
BU	Buffalo Creek C. & C. No. 1	S. Penn.	Triadelphia	Logan	92	5.12	37°50'	2.35	81°45'
BX	Buffalo Creek C. & C. No. 2	S. Penn.	Triadelphia	Logan	115	3.07	37°50'	0.30	81°45'
C	J. E. Crause No. 2	S. Penn.	Crook	Boone	580	0.27	38°00'	1.26	81°45'
CC	Coalburg Colliery No. 10	S. Penn.	Cabin Creek	Kanawha	985	5.30	38°15'	1.09	81°25'
CH	F. B. Chambers No. 4	Hope	Scott	Boone	459	5.61	38°10'	1.89	81°50'
CL	Andrew L. Click No. 1	Heck Oil	Union	Jackson	10	4.00	38°55'	1.35	81°50'
CO	R. N. Corbit Hrs. No. 1	W. Va. Gas	Union	Wood	140	1.25	39°20'	3.08	81°20'
CY	W. Va. Conservation Commission (H. J. Balser No. 1)	Caley	Clay	Hancock	45	2.77	40°35'	0.52	80°35'
CZ	Courtney No. 14 (5374)	UFG	Scott	Boone	634	4.10	38°10'	0.88	81°55'
DL	Stephen Delong No. 19	S. Penn.	Washington	Pleasants	224	2.21	39°25'	0.08	81°00'
E	Wm. Eschbacher No. 9	S. Penn.	Walker	Wood	129	0.64	39°15'	0.25	81°25'
EE	East End Land Co. No. 1	Teavee	Coon Creek	Putnam	40	2.48	38°30'	2.41	82°00'
G	John Gilbert No. 3 (1076)	Cabot	Baileysville	Wyoming	21	3.31	37°35'	4.30	81°35'
GI	John Gilbert No. 1 (1068)	Cabot	Huff Creek	Wyoming	16	3.29	37°35'	0.26	81°45'
GR	C. S. Gribble (8517)	Hope	Grant	Harrison	79	0.58	39°10'	4.28	80°15'
GU	Perry C. Gum No. 3 (8853)	Hope	Freemont Creek	Lewis	86	3.31	39°10'	1.09	80°35'
GX	H. C. Greer et al	Hope	Morgan	Monongalia	128	0.44	39°35'	1.18	79°50'
GY	John Gilbert No. 2 (1069)	Cabot	Browns Creek	McDowell	2	0.43	37°30'	2.03	81°35'
HA	H. G. Hammat et al No. 2 (G.W.463)	Col. Carb.	Grant	Pleasants	183	3.75	39°25'	1.51	81°15'
HC	Horse Cr. L. & M. Co.No. 47 (5462)	UFG	Duval	Lincoln	519	0.81	38°10'	1.60	81°55'
HE	J. W. Heinzman No. 4053	UFG	Curtis	Roane	---	3.37	38°50'	0.25	81°30'
HI	J. A. Hill No. 1	B-T	Jefferson	Kanawha	166	0.15	38°20'	4.30	81°40'

* Full names of companies are at end of table.

Symbol	Well Name	Company	Township	County	Permit	Location			
						Miles south of		Miles west of	
HY	Julian Hill No. 7812	Hope	Washington	Boone	414	2.82	38°05'	1.99	81°50'
JA	J. L. Jamison No. 1	Pa. C. C.	Grant	Monongalia	49	4.04	38°40'	3.25	79°55'
KR	Joseph Krenn No. 10	S. Penn.	Freemans Creek	Lewis	58	4.97	39°10'	0.08	80°40'
KZ	Koontz Realty Co. No. 2 (705)	O.L.O.	Harts Creek	Lincoln	575	2.00	38°03'	1.95	82°00'
LA	G. W. Lathey No. 1 (G. W. 423)	Col. Carb.	Ripley	Jackson	42	0.90	38°45'	1.10	81°45'
LRP	LaFallette, Robson & Prichard ("A" Tract No. 43)	Pure Oil	Sherman	Boone	362	4.82	38°10'	2.62	81°30'
McP	M. McPherson No. 8	S. Penn.	Walker	Wood	113	1.06	39°15'	4.43	81°20'
MH	Mohler Lumber Co. No. 14 (5345)	UFG	Scott	Boone	617	5.32	38°15'	0.63	81°50'
MX	Porter Maxwell No. 7 (8849)	Hope	Troy	Gilmer	636	1.98	39°05'	2.62	80°45'
N	H. Nunnenkamp No. 2	Hope	Washington	Boone	458	2.80	38°00'	4.42	81°45'
O	W. T. Oxley No. 1	S. Penn.	Curry	Putnam	196	5.07	38°25'	0.63	82°00'
PO	J. Bennett Porter No. 1	Braden	Grant	Hancock	22	4.90	40°40'	2.96	80°35'
R	Annette Riley No. 7840	Hope	Elk	Barbour	3	0.67	39°10'	0.29	80°10'
RP	Robson-Prichard No. 5 (5278)	UFG	Cabin Creek	Kanawha	1027	4.90	38°15'	3.63	81°20'
SH	C. H. Shattuck No. 24	S. Penn.	Walker	Wood	138	0.54	39°15'	4.33	81°20'
SI	Siler Coal Land Co. No. 7	O.L.O.	Washington	Kanawha	690	2.35	38°15'	2.31	81°45'
ST	Stephenson et al No. 4	S. Penn.	Duval	Lincoln	354	4.62	38°20'	1.30	81°55'
TN	B. H. Tennant et al No. 1 (524)	W. Va. Gas	Harris	Wood	180	4.06	39°15'	2.72	81°40'
W	Mary C. Wingfield No. 1	B-T	Elk	Kanawha	155	1.12	38°25'	2.52	81°30'
WC	Williams Coal Co. No. 269	Pure Oil	Sherman	Boone	355	5.01	38°10'	2.35	81°30'
WH	Wheeling Steel Corp. No. 102	Wheeling	Cross Creek	Brooke	16	5.56	40°25'	0.62	80°35'
WI	Garnet Wisman et al No. 1 (551)	O.L.O.	Washington	Kanawha	575	5.78	38°25'	0.07	81°50'
WX	Joseph Williams No. 7	S. Penn.	Ellsworth	Tyler	141	4.43	39°35'	1.14	80°50'
Y	Yawkey-Freeman Coal Co. No. 85	S. Penn.	Chapmanville	Logan	102	2.20	38°00'	3.10	81°55'
			OHIO WELLS						
AD	Cesco Adkins No. 6	Walker	35 Orange	Meigs		2.79	38°20'	1.89	82°15'
AR	J. H. Armstrong No. 8	Ohio Oil	14 Wooster	Wayne		4.10	40°50'	3.57	81°50'
B	Isaac Brown No. 1	Ohio Oil	24 Thorn	Perry		2.90	39°55'	1.60	82°15'
BR	J. Braunstein No. 1	E. Ohio	16 Springfield	Mahoning		3.24	41°00'	0.30	80°35'
CA	F. M. Cappel No. 1	Lyons	37 Washington	Tuscarawas		4.26	40°20'	2.85	81°25'
CR	J. L. Cramblett No. 1	E. Ohio	22 Stock	Harrison		1.66	40°25'	0.10	81°10'
D	R. E. Desecker No. 1	Brendel	14 Fairfield	Tuscarawas		2.57	40°35'	3.35	81°15'
F	R. B. Funk No. 1	N.O.I.	20 Falls	Hocking		4.56	39°35'	3.49	82°25'

Symbol	Well Name	Company	Township	County	Permit	Location			
						Miles south of		Miles west of	
H	J. Ullman Heirs No. 1	Galey	21 Elk	Noble		1.23	39°40'	3.11	81°15'
HB	I. J. Hyler	C. W. White	34 Lake	Stark		0.86	40°55'	1.16	81°20'
HM	Hoskins and Midkiff	CFG	3 Bedford	Meigs		1.85	39°10'	3.24	81°55'
J	John No. 1 (D. Giovannoma)	Magnolia	20 Lordstrom	Trumbull		0.98	41°10'	0.41	80°50'
K	L. Kerr No. 1	S. Penn.	6 Center	Monroe		4.00	39°50'	2.85	81°05'
LY	C. T. Leggett No. 1	B-T	34 Goshen	Tuscarawas		0.51	40°30'	0.11	81°25'
M	Matheny No. 3	Herlan	32 Independence	Washington		2.67	39°30'	4.05	81°10'
MA	Mahoning Valley Canal No. 41	U.S.T.D.	Warren	Trumbull		0.85	41°20'	0.23	80°50'
MA	Mahoning Valley Canal No. 43	U.S.T.D.	Champion	Trumbull		3.28	41°20'	1.84	80°50'
MI	Lydia Miller No. 1	Kenova	Hardy	Holmes			40°35'		81°50'
MO	T. H. Mobley No. 1	Nat. Gas	19 Smith	Belmont		3.38	40°00'	2.55	80°55'
NE	Newton No. 3	McKee	15 Noble	Noble		2.63	39°50'	1.17	81°30'
P	J. P. Porcher No. 1	B-T	11 Warwick	Tuscarawas		1.06	40°25'	1.34	81°25'
PE	J. & A. Petrek	E. Ohio	36 Springfield	Mahoning		0.96	40°55'	1.81	80°30'
S	Maud Summerville No. 1	Cody	Anderson	Gallia		3.25	38°55'	4.21	82°05'
SC	Schrum No. 1	Magnolia	4 Smith	Mahoning		1.64	41°00'	2.49	81°00'
SM	G. Smith No. 1	Col. Carb.	9 Franklin	Tuscarawas		2.55	40°40'	1.76	81°30'
SW	C. E. Swytser No. 22	Pure Oil	28 York	Morgan		0.75	31°45'	3.59	81°55'
SZ	G. B. & R. Smith	E. Ohio	35 Springfield	Mahoning		0.45	40°55'	2.07	80°30'
T	S. W. Tipton et ux No. 1	Brendel	9 Monroe	Carroll		4.94	40°35'	3.63	81°10'
WL	Elza. Wilson No. 1	Bell	24 Knox	Guernsey		0.28	40°05'	1.15	81°40'
			PENNSYLVANIA WELLS						
AN	Wm. O. Anderson No. 1 (3298)	PNG	Armstrong	Indiana		4.86	40°40'	4.37	79°10'
CB	Gertrude R. Carothers No. 1 (3466)	PNG	Patton	Allegheny		3.58	40°30'	1.56	79°45'
EA	Daniel Eaton et ux No. 1 (3316)	PNG	Jefferson	Greene		1.01	39°55'	3.03	80°00'
ED	S. H. Eddy et ux No. 1 (3304)	PNG	Wayne	Greene		4.51	39°50'	0.33	80°15'
GF	C. Giffin No. 2 (3452)	PNG	Fairfield	Westmoreland		5.63	40°15'	3.71	79°10'
HS	F. L. Hastings No. 2 (3285)	PNG	Deemston Borough	Washington		3.90	40°05'	0.86	80°00'
HY	Kate A. Hayden No. 1 (3312)	PNG	Forward	Washington		2.38	40°15'	1.30	79°50'
HZ	Wm. G. Hillis et al No. 1 (3317)	PNG	Hemfield	Westmoreland		2.08	40°15'	3.21	79°30'
JC	Jacobs Cr. Oil Co. No. 2 (3360)	PNG	S. Huntington	Westmoreland		3.88	40°10'	1.97	79°40'

Symbol	Well Name	Company	Township	County	Permit	Location			
						Miles south of		Miles west of	
L	Abbie Linnenbrink No. 1	Col. Fuel	Rochester	Beaver		3.14	40°45'	2.82	80°15'
LE	J. & H.B. Lemley et al No. 1 (3329)	PNG	Percy	Greene		4.17	39°50'	2.64	80°05'
McC	Wm. T. McClaferty No. 3275	PNG	Plum Creek	Armstrong		2.87	40°45'	0.02	79°25'
SG	D. H. Sangston et ux No. 1 (3359)	PNG	German	Fayette		0.23	39°55'	0.65	79°50'
SO	J. H. Sorg No. 2	Wasson	North Union	Fayette		4.20	39°55'	4.13	79°35'
SY	George Schmittau	Galey	Hampton	Allegheny		4.26	40°40'	0.78	79°55'
TE	J. L. Tennis heirs No. 1	Galey	S. Beaver	Beaver		5.72	40°50'	2.12	80°25'
WE	David H. Wells No. 1 (3407)	PNG	Rostraver	Westmoreland		2.04	40°10'	0.02	79°50'
WS	H. E. Wise No. 1 (3287)	PNG	Allegheny	Westmoreland		3.04	40°40'	0.50	79°35'

*Bell	Bell Brothers
B-T	Benedum-Trees Oil Co.
B.C.C.C.	Boone County Coal Co.
Braden	R. J. Braden Co.
Brendel	Brendel Producing Co.
Cabot	Godfrey L. Cabot, Inc.
Cody	
Col. Carb.	Columbian Carbon Co.
Col. Fuel	Columbian Fuel Co.
E. Ohio	East Ohio Gas Co.
Galey	John T. Galey
Heck Oil	Heck Oil Co.
Herlan	
Hope	Hope Natural Gas Co.
Kenova	Kenova Gas and Oil Co.
Lyons	Frank Lyons et al
Magnolia	Magnolia Petroleum Co.
McKee	McKee Syndicate Gas Co.
Nat. Gas	Natural Gas Co. of W. Va.
N.O.I.	Northern Ordnance, Inc.
O.F.G.	Ohio Fuel Gas Co.
Ohio Oil	Ohio Oil Co.
O.L.O.	Owens, Libbey-Owens Gas Dept.
Pa. C. G.	Pennsylvania Counties Gas Corp.
P.N.G.	Peoples Natural Gas Co.
Pure	Pure Oil Co.
S. Penn.	South Penn Natural Gas Co.
Teavee	Teavee Oil and Gas Co.
U.F.G.	United Fuel Gas Co.
U.S.E.D.	United States Engineer Dept.
Walker	H. B. Walker and Co.
Wasson	Wasson and Co.
W. Va. Gas	West Virginia Gas Corp.
Wheeling	Wheeling Steel Corp.