

SAND AND GRAVEL

Composition and properties. Sand and gravel are unconsolidated aggregates of highly siliceous, usually quartzose grains, ranging in size from material as fine as clay to material ordinarily called boulders. The finer aggregates are known as sand and the coarser as gravel. The dividing line between sand and gravel is variously placed at from 0.1 to 0.25 inches. (Ladson p. 499)

OCCURRENCE. - - Sand and gravel are widely distributed throughout the State. In the Coastal Plain or lowland region of southwest Arkansas, the gravel deposits are found either as stream deposits or higher land deposits. The higher land deposits are known as the Terrace gravels. The most persistent gravel bed in this portion of the State is known as the Pike gravel member of the Trinity formation (Lower Cretaceous). This extends irregularly across Pike, Howard, and Sevier Counties, near the northern edge of the Coastal Plain. The bed is from twenty to fifty feet thick. Another valuable bed is the Ultima Thule gravel lentil of the Trinity formation which is exposed northeast, north, and northwest of DeQueen. This lies immediately south of the Pike gravel.

Outline

The largest gravel pit in southern Arkansas is that of the Ball Benton Gravel Company at Benton, Saline County. The gravels there are for the most part well rounded, quartzite gravels and are terrace gravels of Quaternary age. They occur in beds which are in some places fifty feet in thickness.

Crowley's Ridge in eastern Arkansas contains immense quantities of gravel which are frequently exposed in road cuts and in a few of the railway cuts. In many instances, the gravel extends to the tops of the ridge. Crowley's Ridge extends through Clay, Greene, Craighead, Poinsett, Cross and St. Francis Counties.

The beds and bars of the Arkansas, Ouachita, Saline, and White Rivers furnish very great quantities of sand and gravel.

(Extract from Arkansas Bureau of Mines, Manufactures and Agriculture's "Outlines of Arkansas Geology," by Jim C. Ferguson, 1920, p. 93.)

GRAVEL

Several thick deposits of gravel are widely distributed along the north edge of the Gulf Coastal Plain. The gravels are of Lower Cretaceous, Upper Cretaceous and Quarternary age and are composed mainly of pebbles of novaculite (a variety of chert) derived from the Arkansas novaculite exposed in the Ouachita Mountain region. They are used in making concrete, in ballasting railroads and in the construction of wagon roads. The Pike gravel is the thickest and most persistent gravel bed in the area and has a larger surface distribution than any other. The thickness is rather uniform, being in most places between 20 and 50 feet, but it apparently attains 100 feet near Pike. This gravel consists of pebbles usually less than half an inch in diameter but it contains many larger ones and also many cobbles as much as ten inches in diameter. These pebbles have not been used in tube mills, but they are of such a character that it is believed well selected pebbles may be suited for this purpose.

Crowley's Ridge Gravels

The gravel beds of Crowley's Ridge in northeast Arkansas are of varying thickness, being deposited on a surface which indicates very considerable erosion at a period prior to their deposition. The gravels are made up mainly of a light-colored chert, are generally well rounded or waterworn, rarely angular and always well polished. When in place they are always rudely assorted, cross-bedded and mingled with more or less sand. The gravel is considerably above the general level of the country, reaching often to the very tops of the highest hills. Deposits occur at various points along the ridge from the Missouri border to Helena.

Arkansas River Gravels

In the bed of the Arkansas River throughout its course in Arkansas and in the beds of many of its tributaries, are gravel bars containing larger quantities of material suitable for road-building.

Gravels on the Higher Ridges

On the higher hills about Little Rock and northwest of that city are quantities of surface gravel. Similar ridges occur in Saline, Grant and Dallas counties and in other parts of southwest Arkansas.

"Gravels (road metal). Along Crowley's Ridge, in Clay, Green, Craighead, Poinsett, Cross, and St. Francis counties. On and near the border of the highlands in Randolph, Lawrence, Independence, Jackson, White, Pulaski, Saline, Hot Spring and Clark counties, and in Bradley, Calhoun, Dallas, Drew, Howard, Jefferson, Lafayette, Pike and Sevier counties. These gravels consist almost entirely of chert, quartz and novaculite pebbles and range in age from Lower Cretaceous to Quarternary."-Bulletin 624, U. S. Geol. Surv.

REFERENCES

Miser, H. D., and Purdue, A. H.-Gravel Deposits of the Caddo Gap and De Queen Quadrangles, Arkansas, U. S. Geol. Surv., Bulletin 690-B.

Branner, John C.-Crowley's Ridge, Annual Report Arkansas Geological Survey, Vol. II, 1889.

-----Road-Making Materials of Arkansas, published elsewhere in this volume.

Gravel

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Uses

The many beds and lenses of gravel, especially the basal ones, in the Tokio, Woodbine, and Trinity formations are widely distributed in the Southern parts of the quadrangles. In fact they and their residual materials form the predominating surficial deposits found in those parts of the quadrangles that are underlain by Cretaceous sediments. They consist of novaculite and other hard pebbles intermixed or interbedded with clay and sand, and although the beds range in thickness from a few inches to 100 feet, some of them maintain a thickness of between 25 and 50 feet over considerable areas. Enough sand and clay is usually mixed with the pebbles to make a firm, compact road. The gravel thus constitutes an accessible and enormous supply of good road material. Like the Bigfork chert it forms a natural macadam in those areas where it occurs on the surface.

Gravel of much the same character as that just mentioned constitutes a large proportion of the deposits along the large and small streams of the quadrangles. The larger areas of stream deposits are represented on Plate 3 and are there designated "alluvium" and "terrace deposits." Most of these are covered with a deposit of sand and loam a few feet thick. Where the gravel is thus covered the best places for obtaining road material are along slopes where the gravel crops out and from the gravel bars usually found along the streams. These bars are largest along Muddy Fork and Little Missouri and Caddo Rivers. (USUS Bull 808, p. 181)

Gravel

Distribution. The Pike gravel member is the thickest and most persistent gravel bed in the area, and has a larger surface distribution than any other. In much of its belt of outcrop it forms an even though dissected southward-dipping upland. This form is due to the resistant nature of the gravel and the ease with which the overlying unconsolidated clay and sand have been eroded. Some of the larger areas of outcrop are at or near Pike, Nathan, Muddy Forks, Dierks, Lebanon, and King. The thickness is rather uniform, being in most places between 20 and 50 feet, but it apparently attains 100 feet near Pike. The gravel thins out at a few places, as near Murfreesboro and Lebanon, where rocky headlands and islands of Carboniferous sandstone along ~~where~~ the old Cretaceous shore were not completely buried by the gravel, though they were by higher beds. The sand and clay separating the Ultima Thule and Pike gravels thin to the west and are absent just west of the State line, in consequence of which the Ultima Thule gravel rests either upon the Pike gravel or upon Carboniferous rocks. If the Pike gravel is present there it cannot be distinguished from the overlying gravel.

The Ultima Thule gravel lentil is exposed in a discontinuous crooked belt extending from a point near Ultima Thule eastward as far as Cossatot River, beyond which it is represented here and there by lenses a few feet thick. The lentil itself is also only a few feet thick just west of the Cossatot and is a short distance above the Dierks limestone and about 100 feet above the Pike

gravel. It thicknes toward the west and reaches a maximum of 40 feet near the State line. Just west of the State line it rests upon the Pike gravel or upon Carboniferous rocks. It resembles the Pike gravel except that its pebbles are usually smaller, only a few exceeding 1 inch in diameter.

Lenses of gravel as much as 25 feet thick occur above the DeQueen limestone northwest of Provo. They resemble the two gravels just described. (USGS Bull 690, p. 20)

Gravel and Sand

GCB of eastern and northeastern Arkansas

Generalized section

System	Series	Formation	Characteristics	Thick- ness
Tertiary	Pliocene ?	Lafayette	Gravels and sands; water- bearing in part	0-80
		Unconformity		
		Jackson	Sands, clays, and marls; water-bearing in part	0-200
		Unconformity		
		Claiborne	Sands, clays, lignites, and marls; water-bearing	100-200
	Eocene	Unconformity ?		
		Wilcox	Sands, clays, and lignites; water-bearing	500-1,000
		Midway	Limestones, sands, and marls; probably water-bear- ing in buried extension	22 maximum observed thickness
Unconformity				
Creta- ceous	Upper Creta- ceous	Nacatoch sand (?)	Glauconitic sands, clays, and marls; probably water- bearing in buried extension	80 maximum observed thickness
Unconformity				
(Paleozoic rocks undifferentiated)				

(USGS Water Supply Paper 399, p 34)

Gravel and Sand

Distribution

Nacatoch sand. In northeastern Arkansas the deposits regarded as representing this formation outcrop in the Grandglaise terrace in gullies and along valley slopes from near Magness and Newark in Independence County northeastward to the southern part of Lawrence County.

In southwestern Arkansas the formation outcrops in a belt 2 to 8 miles wide, extending from near Arkadelphia, Clark County, southwestward to the western part of Hempstead County. (US WSP 399, p. 36)

Midway. In Arkansas the Midway formation has been traced in surface outcrops in a belt a few miles wide, extending from a point near Rockport, on Ouachita River (west of Malvern), in Hot Spring County, northeastward along the western border of the Gulf Coastal Plain to Little Rock, Pulaski County. Northeast of Little Rock the formation has been recognized in wells and in outcrops at the following places:..Jacksonville, Pulaski County,..near Cabot, Lonoke County..questionably..Beebe, White County,..outcrop 1/2 mile wide from Bradford, White County, to Depart Creek, in southern part of Independence County. (U S WSP 399, p 46.)

Wilcox. The Wilcox formation outcrops in the basal portion of the east and west slopes of Crowley's Ridge and in the valley slopes of the larger streams cutting the ridge, from the vicinity of Harrisburg, Poinsett County, northward through Arkansas and Missouri to northern extremity of the ridge in Stoddard County, Mo... (U S WSP 399 p 55)

Gravel and Sand

Distribution (continued)

Claiborne. In northeastern Arkansas the Claiborne formation outcrops in the base of Crowley's Ridge to a probable maximum height of 100 feet above the adjoining lowlands, from the vicinity of Harrisburg, Poinsett County, to the southern part of Cross County.

In southern Arkansas the Claiborne is probably represented by a part of the undifferentiated Eocene mapped by Veatch, and deposits of this age have been recognized from northern Louisiana southwestward to the Rio Grande. (US WSP³⁹⁹ p 65)

Jackson. In Arkansas the Jackson formation outcrops in the base of Crowley's Ridge to a probable maximum height of 100 feet above the level of the lowlands, from the northern part of St. Francis County southward nearly to the southern extremity of the ridge in Phillips County. South of Arkansas River the terrane appears in Jefferson, Lincoln, Cleveland, Drew, and Bradley counties. (US WSP 399 p 74)

Lafayette. The Lafayette formation is present in Crowley's Ridge throughout its entire extent from Stoddard County, Mo., to Phillips County, Ark. The formation is represented along the western margin of the Mississippi embayment in Arkansas by scattered deposits of gravel and sand which overlies the Eocene deposits in the Grandglaise terrace and occupy the east-facing slopes of the hills of the Ozark province; their distribution has not been determined in detail. (US WSP³⁹⁹ p 86)

Gravel and Sand

Distribution. Several thick deposits of gravel are widely distributed along the north edge of the Gulf Coastal Plain, of which a narrow belt is embraced in the southern parts of the Caddo Gap and DeQueen quadrangles, Ark. This belt is shown on Plate I, and its location is shown on figure 5, a key map of this region. It comprises parts of Pike, Howard, and Sevier counties and a narrow strip of Hempstead County, in southwestern Arkansas, and a strip along the east edge of McCurtain County, in southeastern Oklahoma. The gravels are of Lower Cretaceous, Upper Cretaceous, and Quaternary age, and are composed mainly of pebbles of novaculite (a variety of chert) derived from the Arkansas novaculite exposed in the Ouachita Mountain region, which is north of the Gulf Coastal Plain. They are used in making concrete, in ballasting railroads, and in the washing plants of the Kimberlite Diamond Mining & Washing Co., at Murfreesboro, to assist in the disintegration of the altered peridotite which carried the diamonds. (USGS Bull 690, p. 15.)

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Sand and Gravel

Lithologic characters

Nacatoch sand

Midway. The formation in Arkansas consists of gray, more or less sandy and argillaceous limestones, some layers of which are crystalline, interbedded with calcareous sand or friable sandstone and marl. Fossil mollusks and shark teeth characterize the terrane, and in places the molluscan remains are present in great numbers, either intact, in fragments, or as casts and impressions. (USGS WSP 399, p. 47)

Wilcox. The formation in Crowley's Ridge is composed of irregularly bedded sands, locally indurated to sandstones, and quartzites, and irregularly bedded clays, with interbedded layers of lignite. From Jonesboro northward there are no exposures showing the complete sequence of strata composing the ridge, but from numerous small exposures examined in the area it seems apparent that the heavier beds of clay all occur at the base of the ridge and that beds of sand predominate above the clays. The clays vary in color from almost white to very dark, are lignitic in places, and in places are interbedded with layers of fairly

pure lignite. Silicified stumps and logs have been observed in clay at one locality in the northern part of Greene County (p. 58)

The sands where unweathered are light in color, but on weathered surfaces are varicolored, presenting many shades between white and dark red or brown. Locally the sands have been indurated to sandstones, ranging in hardness from very soft rock to extremely hard quartzites. These rocks are exposed principally along the west slope of the ridge from Craighead County northeastward to the southern part of Clay County. The distribution of the quartzites in Arkansas is discussed in detail by Call. (See also p. 61 of this report.) Marbut has described similar quartzites near the northern extremity of the ridge in Stoddard County, Mo.

As shown by the Bolivar Creek exposure, $3\frac{1}{2}$ miles north of Harrisburt (p 62), the sands in the upper part of the formation become finer and more argillaceous than those at lower levels. (USGS WSP 399, p 54 54)

Claiborne. The formation in Crowley's Ridge consists of regularly and irregularly bedded, more or less lignitiferous sands and clays, with subordinate, thin, interstratified layers of lignite. The sands are for the most part fine in texture, are commonly micaceous, and are light to dark in color. The clays are light drab to black and range in bedding from massive to thinly laminated, with fine micaceous sand partings; locally, as at Copperas Bluff, Cross County, they are strongly gypsiferous, the syngum being present as crystals and presenting numerous clusters of acicular crystals.

Concretions of iron carbonate are common in the clays of ~~the~~ the

formation, and appear in many of the exposures in Cross County. Lignite is characteristic and occurs as comminuted particles or as larger fragments. (USGS WSP 399, p 66.)

Jackson. The Jackson formation in Crowley's Ridge consists of regularly and irregularly bedded, interstratified sands, clays, and fossiliferous marls of shallow-marine origin. Where the materials are unoxidized the colors range from light gray to dark greenish or bluish gray; where oxidation has taken place the materials are variegated with red, pink, yellow, and brown. The sands are massive to cross-bedded, vary in texture from fine to coarse, and in places contain small pebbles. The clays are massive to thinly stratified or laminated. The marl consist of calcareous and glauconitic sands or clays which in places, as on Little Crow Creek east of Forrest City, contain many fossil shells.

Particles and fragments of lignite are common in the formation and thin layers of lignite have been observed at a few places.

Lafayette. The Lafayette formation in Crowley's Ridge is composed of irregularly bedded gravels and coarse sands. In general heavy beds of gravel occupy the base of the formation and consist mainly of subangular to partly waterworn pebbles and cobbles of chert, the latter rarely exceeding a foot in longest dimension. (See Pl. VIII, A) The pebbles and cobbles were derived from the cherty limestones of the Ozark province, as indicated by the contained fossils of Paleozoic age. In places

fragments of sandstone and quartzite, more or less waterworn, are mixed through the gravels; these fragments were derived in part from the quartzites of the Wilcox formation exposed in the northern part of Crowley's Ridge, and in part from the Paleozoic rocks of the Ozark province. At most of the exposures of gravel occasional small, smooth, waterworn pebbles of quartz may be found. (See p. 99)

At some of the exposures revealing the thicker parts of the formation the basal gravels are overlain by coarse cross-bedded sands with numerous lenses and layers of gravel of greater or less extent; locally thin layers of laminated clay have been noted in the sands. At some places the gravels and sands are intermixed with lumps of mechanically derived clay.

Both the sands and gravels are varicolored and have been strongly oxidized. At many places the basal gravels have been cemented by iron oxide into hard, ferruginous conglomerate, and at a few places the sands have been observed partially indurated to red sandstones. These indurated masses have formed where percolating waters carrying iron oxide in solution have had their downward circulation checked by compact layers of clay or other impervious materials.

Uses. Arkansas sand is used principally for glass sand, building sand, engine sand, and paving sand, and, to a lesser degree, for molding sand and railroad ballast.

Arkansas gravel is used principally for paving gravel and railroad ballast, and to a lesser degree, for building gravel.

Glass sand is the main constituent of glass. (See Glass Sand.)

Building sand and gravel are used for making mortar and concrete and sand-lime brick. Engine sand is used on locomotives and street cars to keep the wheels from slipping on wet or slick rails. Paving sand and gravel are used in various ways in road and walk making. Molding ~~sands~~ sands are siliceous sandy materials used in foundries for making molds and cores for casting metal. Railroad-ballast sand and gravels have usually but one requirement, bulk, although coherence is a desirable quality.

SAND AND GRAVEL

USES. - - Arkansas sand is used as a concrete aggregate, with mortar, as a base for brick pavements, for railway braking, etc. (See also "Glass Sand.")

Sand and gravel are used principally as a road material, as railroad ballast, and as a concrete aggregate.

Outline 1

Uses. Arkansas sand has been used for the following purposes:

- ① y X Building sand is used for making mortar and concrete and sand-lime brick.
- ① X Engine sand is used on locomotives and street cars to keep the wheels from slipping on wet or slick rails.
- omit Fire sand is a highly refractory silica sand, for lining furnaces and ladles used to contain molten metal
- ① omit Furnace sand is a highly refractory silica sand used for lining and patching reverberatory and other furnaces, cupolas, and ladles used to contain molten metal.
- ① Molding sands are siliceous sandy materials used in foundries for making molds and cores for casting metal.
- ① y Paving sand, ^{of gravel} is a ~~designation applied to sand~~ used in various ways in road and walk making.
- ① y X Railroad-ballast sand and gravel have usually but one requirement, bulk, although coherence is a desirable quality

Gravel

Use.....They are used in making concrete, in ballasting railroads, and in the construction of wagon roads. Very small quantities of pebbles are also used in the washing plant of the Kimberlite Diamond Mining & Washing Co., at Murfreesboro, to assist in the disintegration of the altered peridotite which carries the diamonds. Interest in possible American sources of flint pebbles or substitutes therefor to be used in tube mills, in which minerals, ores, cement materials, and clinker are extensively ground in this country, has been aroused since the beginning of the present world war. This interest is due to the partial interruption of imports of flint pebbles from Denmark and France, which have supplied most of the pebbles used in this country. The main reason for the preparation of this report are at present a description of the gravels under discussion and to indicate the possibility of their use in tube mills. (USGS Bull 690, p. 15.)

Sand

Uses.

Sand suitable for plaster and cement is abundant in the Trinity and Tokio formations in the southern parts of the quadrangles; in other parts it may be obtained along the streams where it has collected during high stages of the water. (USGS Bull 808. "DeQueen and Caddo Gap Quadrangles, Arkansas," by Hugh D. Miser and A. H. Purdue, p. 178.)

Mining methods. Mining operations vary in size and complexity from the simple roadside pit, where a few tons a day are loaded by hand methods without any form of milling, to very large plants, where thousands of tons of sand and gravel are excavated, washed, and sized each day. (Ladoo, p. 499)

SAND AND GRAVEL

Prices. Average annual prices of sand and gravel in Arkansas, per short ton, according to U. S. Geological Survey and U. S. Bureau of Mines, have been as follows:

<u>Year</u>	<u>Price</u>
1904	\$0.529
1905	.412
1906	.486
1907	.494
1908	.350
1909	.230
1910	.217
1911	.182
1912	.323
1913	.391
1914	.412
1915	.378
1916	.312
1917	.303
1918	.465
1919	.466
1920	.609
1921	.534
1922	.621
1923	.525
1924	.530
1925	.523
1926	.554
1927	.569
1928	.588
1929	.463
1930	.571
1931	.671
1932	.587
1933	.475
1934	.503
1935	.430
1936	.529
1937	.224
1938	.459

GRAVEL

Unit prices for Arkansas from USGS and USBM

<u>Year</u>	<u>Kind of gravel</u>	<u>Production short tons</u>	<u>Value</u>	<u>USBM UP sh. ton</u>	<u>Est. UP cu. yd.</u>
1913	Gravel	533,885	\$209,711	\$0.39	\$0.585
1914	Gravel	673,924	278,876	.41	.615
1915	Gravel	831,668	314,003	.38	.57
1916	Gravel	42,142	22,109	.52	.78
1917	Gravel	17,646	11,677	.66	.99
1918	Gravel	18,613	21,192	1.14	1.71
1919	Gravel	281,880	163,724	.58	.87
1920	Paving gravel	80,202	44,770	.56	.84
1921	Paving gravel	704,580	409,220	.58	.87
1922	Paving gravel	257,483	150,742	.59	.885
1923	Paving gravel	485,386	283,028	.58	.87
1924	Paving gravel	669,185	401,845	.60	.90
1925	Paving gravel	665,799	326,720	.49	.735
1926	Paving gravel	217,929	110,567	.51	.765
1927	Paving gravel	281,493	161,575	.57	.855
1928	Paving gravel	586,902	354,544	.60	.90
1929	Paving gravel	1,293,636	741,859	.57	.855
1930	Paving gravel	1,194,199	658,879	.55	.825
1931	Paving gravel	809,301	624,152	.77	1.155
1932	Paving gravel	195,952	135,035	.69	1.035
1933	Paving gravel	612,145	290,548	.47	.705
1934	Paving gravel	-	-	.66 ^{a/}	.705 ^{b/}
1935	Paving gravel	741,376	206,959	.279	.705 ^{b/}
1936	Paving gravel	373,131	191,739	.51	.705 ^{b/}
1937	Paving gravel	2,083,226	294,943	.14	.51 ^{c/}

^{a/} Value per short ton in United States. Arkansas figures not given.

^{b/} Used 1933 estimated unit price per cu. yd.

^{c/} Used 1935 unit price for paving and building gravel and railroad ballast of 34 cents per short ton or 51 cents per cu. yd.

SAND

Unit prices for Arkansas from USGS and USBM

<u>Year</u>	<u>Kind of sand</u>	<u>Production short tons</u>	<u>Value</u>	<u>USBM UP sh. ton</u>	<u>Est. UP cu. yd.</u>
1913	Paving sand	115,319	\$ 45,779	\$0.40	\$0.60
1914	Building sand	90,689	37,625	.41	.615
1915	Building sand	76,334	33,749	.44	.66
1916	Building sand	78,392	26,371	.34	.51
1917	Building sand	166,013	63,568	.38	.57
1918	Building sand	82,602	49,479	.60	.90
1919	Building sand	128,989	82,441	.64	.96
1920	Paving sand	49,602	38,179	.77	1.155
1921	Paving sand	75,726	69,697	.92	1.38
1922	Paving sand	71,831	61,090	.85	1.275
1923	Paving sand	89,493	61,479	.69	1.035
1924	Paving sand	188,065	128,565	.68	1.02
1925	Paving sand	149,300	69,231	.46	.69
1926	Paving sand	92,602	55,083	.59	.885
1927	Paving sand	141,724	81,859	.58	.87
1928	Paving sand	190,720	132,709	.70	1.05
1929	Paving sand	363,903	210,272	.58	.87
1930	Paving sand	413,326	249,641	.60	.90
1931	Paving sand	397,572	205,469	.52	.78
1932	Paving sand	88,818	42,219	.47	.705
1933	Paving sand	133,455	68,080	.51	.765
1934	Paving sand	-	-	.57 ^{a/}	.765 ^{b/}
1935	Paving & building	208,344	118,859	.57	.765 ^{b/}
1936	Paving	119,576	60,613	.51	.765 ^{b/}
1937	Paving	593,524	90,469	.15	.855 ^{c/}

a/ Value per short ton in United States. Arkansas figures not given.

b/ Used 1933 estimated unit price per cu. yd.

c/ Used 1935 estimated unit price for paving and building sand of 57 cents per short ton or 85.5 cents per cu. yd.

SAND AND GRAVEL

Unit prices for United States, from USGS and USBM figures.

	<u>1915</u>	<u>1916</u>	<u>1917</u>	<u>1918</u>	<u>1919</u>	<u>1920</u>	<u>1921</u>	<u>1922</u>	<u>1923</u>
Glass sand	\$0.85	\$0.97	\$1.38	\$1.94	\$1.97	\$2.19	\$1.81	\$1.62	\$1.84
Molding sand	.59	.69	.92	1.04	1.10	1.46	1.29	1.17	1.21
Bldg. sand	.30	.32	.39	.50	.56	.68	.65	.60	.61
Grinding & pol. sd.	.46	.65	1.04	1.60	1.34	1.80	1.61	1.46	1.62
Fire or furnace sd.	.34	.90	1.15	1.48	1.23	1.81	1.56	1.42	1.45
Engine sand	.32	.37	.59	.76	.77	.82	.86	.76	.76
Paving sand	.32	.36	.41	.54	.66	.68	.63	.61	.59
Filter sand	-	.90	.76	1.47	1.48	1.27	1.11	1.99	1.20
RR ballast	.13	.13	.17	.22	.30	.32	.33	.36	.29
Gravel	.25	.32	.46	.57	.66	.81	.75	.72	.72
All kinds S & G	.30	.33	.46	.61	.65	.80	.71	.68	.65

	<u>1924</u>	<u>1925</u>	<u>1926</u>	<u>1927</u>	<u>1928</u>	<u>1929</u>	<u>1930</u>	<u>1931</u>
Glass sand	\$1.71	\$1.64	\$1.59	\$1.50	\$1.49	\$1.71	\$1.74	\$1.66
Molding sand	1.13	1.08	1.06	1.06	1.06	1.03	1.06	.99
Bldg. sand	.57	.58	.55	.54	.53	.57	.56	.54
Grinding & pol. sd.	1.54	1.38	1.35	1.30	1.30	1.41	1.45	1.82
Fire or furnace sd.	1.23	1.14	1.06	1.10	1.18	1.10	1.29	1.49
Engine sand	.66	.62	.61	.63	.64	.64	.69	.63
Paving sand	.56	.55	.54	.50	.49	.52	.51	.50
Filter sand	2.01	2.34	2.13	2.08	1.99	2.00	2.09	2.17
RR ballast gravel	.31	.33	.34	.33	.30	.31	.33	.36
Gr. excl of RR bal.	.70	.70	.70	.69	.65	.68	.63	.59
All kinds S & G	.62	.63	.61	.59	.57	.60	.58	.56

1931 1932 1933 1934 1935 1936

COMMERCIAL OPERATIONS

Sand

Glass	\$1.66	\$1.65	\$1.69	\$1.75	\$1.76	\$1.70
Molding	.99	.94	.91	.95	.98	1.04
Building	.54	.51	.50	.56	.53	.53
Paving	.50	.44	.51	.57	.56	.53
Gr. & Pol.	1.82	1.52	1.29	1.75	1.47	1.38
Fire or fur.	1.49	1.48	1.14	1.55	1.18	1.20
Engine	.63	.60	.59	.75	.63	.65
Filter	2.17	1.36	2.14	2.00	1.90	2.10
Other	.36	.33	.45	.80	.46	.70
Total	.57	.53	.61	.69	.66	.64

Gravel

Building	.72	.73	.68	.67	.67	.70
Paving	.64	.59	.59	.68	.63	.60
RR ballast	.33	.27	.36	.41	.28	.27
Total	.62	.58	.59	.64	.56	.58

Total sand & gravel	.59	.56	.60	.66	.61	.61
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NONCOMMERCIAL OPERATIONS

Sand

Building	.31	.46			.50
Paving	.55	.46			.24
Total	.55	.47	.33	.40	.29

Gravel

Building	.76	.25			.43
Paving	.38	.28			.27
Total	.39	.28			.27

Total sand & gravel	.40	.29			.27
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COMMERCIAL & NONCOMMERCIAL OPERATIONS

Sand	.57	.53			.64
Gravel	.56	.45			.43
Grand total	.56	.48	.49	.57	.50

Heavel

Prod commercially in
Ashley
Bafler
Benton
Boone
Brosley
Calhoun
Carrise
Chicot
Clark
Clay
Cleveland
Columbia
Craighead
Crawford
Cross
Dallas
Hrew
Laukner
Franklin
Fulton
Garland
Grant
Greene

Travel (cont)

Hempstead
Hot Spring
Howard
Indep
Izard
Jackson
Jefferson
Johnson
Lafayette
Lawrence
Lincoln
Little River
Logan
Madison
Marion
Miller
Mont
Newson
Ouachita
Perry
Phillips
Pitce
Poinsett
Palm

Gravel (cont)

Randolph
St Francis

Saline

Scott

Self

Sewier

Sharp

Stone

Wash

White

Woodruff

Yell

(59)

Decide whether to send list
from unnumbered book
& list of producers for 1938 -
or

from Books 19-20-21.

Sand and Gravel

Production. According to U. S. Geological Survey and U. S. Bureau of Mines figures, the annual production and value of sand and gravel in Arkansas, has been as follows:

Year	Sand		Gravel		Total	
	Short tons	Value	Short tons	Value	Short tons	Value
1905	117,239	\$ 45,385	5,125	\$ 5,100	122,364	\$ 50,485
1906	206,225	95,524	8,200	8,688	214,425	104,212
1907	142,583	64,127	22,530	17,550	165,113	81,677
1908	132,335	57,102	119,652	31,750	251,987	88,852
1909	262,964	89,576	825,651	162,470	1,088,615	252,046
1910	238,799	80,424	822,238	150,256	1,061,037	230,680
1911	279,303	73,508	728,286	110,389	1,007,589	183,897
1912	302,066	120,731	915,674	272,908	1,217,740	393,639
1913	287,571	110,928	533,885	209,711	821,456	320,639
1914	115,447	46,484	673,924	278,876	789,371	325,360
1915	99,648	38,954	831,668	314,003	931,316	352,957
1916	501,760	147,959	42,142	22,109	543,902	170,068
1917	564,407	165,246	17,646	11,677	582,053	176,923
1918	211,726	86,098	18,513	21,192	230,239	107,290
1919	389,448	243,078	281,880	163,724	871,328	406,802
1920	219,794	156,686	689,213	397,317	909,007	554,003
1921	222,070	84,666	1,241,937	598,146	1,464,007	782,812
1922	229,761	209,329	610,012	312,792	839,773	522,121
1923	345,869	266,966	1,226,272	559,338	1,572,240	826,304
1924	287,722	239,598	2,656,300	1,320,781	2,944,022	1,560,379
1925	323,108	234,314	1,736,785	843,989	2,059,893	1,078,303
1926	264,057	188,980	1,265,427	658,597	1,529,484	847,579
1927	408,580	274,623	1,053,113	557,897	1,461,693	832,520
1928	525,400	352,552	1,157,984	638,856	1,683,384	991,408
1929	714,796	454,770	3,277,540	1,396,985	3,992,336	1,851,755
1930	713,324	489,372	2,007,432	1,066,036	2,729,756	1,555,408
1931	564,307	323,301	990,928	720,975	1,555,235	1,044,276
1932	153,332	78,509	311,228	194,504	464,560	273,013
1933	234,988	122,315	1,029,754	478,683	1,264,742	600,998
1934	a/	a/	a/	a/	1,122,099	565,190
1935	290,452	206,316	898,968	305,694	1,189,420	512,010
1936	a/	a/	a/	a/	1,068,224	565,478
1937	a/	a/	a/	a/	3,370,634	757,162
1938	354,489	250,094	1,343,111	529,125	1,697,600	779,219
1939					2646,793	1,030,270
1940					2,664,178	1,068,701
					48,891,270	22,973,441

a/ Not available

SAND AND GRAVEL

Production. Annual production and value of sand and gravel in Arkansas, according to U. S. Geological Survey and U. S. ~~and state severance tax reports,~~ Bureau of Mines, has been as follows:

<u>Year</u>	<u>Short tons</u>	<u>Value</u>
1904	19,500	\$ 10,322
1905	122,364	50,485
1906	214,425	104,212
1907	165,070	81,645
1908	249,922	87,555
1909	1,084,805	249,734
1910	1,061,037	230,680
1911	1,007,589	183,897
1912	1,217,740	393,639
1913	821,456	320,639
1914	789,371	325,360
1915	931,316	352,957
1916	543,902	170,068
1917	582,053	176,923
1918	230,239	107,290
1919	871,328	406,802
1920	909,007	554,003
1921	1,464,007	782,812
1922	839,773	522,121
1923	1,572,240	826,304
1924	2,944,002	1,560,379
1925	2,059,893	1,078,303
1926	1,529,484	847,579
1927	1,461,693	832,520
1928	1,683,384	991,408
1929	3,992,336	1,851,755
1930	2,720,756	1,555,408
1931	1,555,235	1,044,276
1932	464,560	273,013
1933	1,264,742	600,998
1934	1,122,099	565,190
1935	1,189,420	512,010
1936	1,068,224	565,478
1937	3,370,634	757,162
1938	1,697,600	779,219
1939	1,294,865	1,122,324
	42,947,847	20,874,470

Debit 1939 Incl Los.

and 301,061.58 340,199.59

Mr

983,804.37	782,124.47
<u>1,294,865.95</u>	<u>1,222,324.06</u>
8	

1.5

1,927,298.93 sh. tons

SAND AND GRAVEL

Production. Annual production and value of sand and gravel in Arkansas, according to U. S. Geological Survey and U. S. Bureau of Mines, ^{4 sec. 104.} has been as follows:

<u>Year</u>	<u>Short tons</u>	<u>Value</u>	
1904	19,500	\$ 10,322	.529
1905	122,364	50,485	.412
1906	214,425	104,212	.486
1907	165,070	81,645	.494
1908	249,922	87,555	.350
1909	1,084,805	249,734	.230
1910	1,061,037	230,680	.217
1911	1,007,589	183,897	.182
1912	1,217,740	393,639	.323
1913	821,456	320,639	.391
1914	789,371	325,360	.412
1915	931,316	352,957	.378
1916	543,902	170,068	.312
1917	582,053	176,923	.303
1918	230,239	107,290	.465
1919	871,328	406,302	.466
1920	909,007	554,003	.609
1921	1,464,007	782,812	.534
1922	839,773	522,121	.621
1923	1,572,240	826,304	.525
1924	2,944,002	1,560,379	.530
1925	2,059,893	1,078,303	.523
1926	1,529,484	847,579	.554
1927	1,461,693	832,520	.569
1928	1,683,384	991,408	.588
1929	3,992,336	1,851,755	.463
1930	2,720,756	1,555,408	.571
1931	1,555,235	1,044,276	.671
1932	464,560	273,013	.587
1933	1,264,742	600,998	.475
1934	1,122,099	565,190	.503
1935	1,189,420	512,010	.430
1936	1,068,224	565,478	.529
1937	3,370,634	757,162	.224
1938	1,697,600	779,219	.459

Notes - 1937 224 1938 224 1939 224 1940 224 1941 224 1942 224 1943 224 1944 224 1945 224 1946 224 1947 224 1948 224 1949 224 1950 224 1951 224 1952 224 1953 224 1954 224 1955 224 1956 224 1957 224 1958 224 1959 224 1960 224 1961 224 1962 224 1963 224 1964 224 1965 224 1966 224 1967 224 1968 224 1969 224 1970 224 1971 224 1972 224 1973 224 1974 224 1975 224 1976 224 1977 224 1978 224 1979 224 1980 224 1981 224 1982 224 1983 224 1984 224 1985 224 1986 224 1987 224 1988 224 1989 224 1990 224 1991 224 1992 224 1993 224 1994 224 1995 224 1996 224 1997 224 1998 224 1999 224 2000 224 2001 224 2002 224 2003 224 2004 224 2005 224 2006 224 2007 224 2008 224 2009 224 2010 224 2011 224 2012 224 2013 224 2014 224 2015 224 2016 224 2017 224 2018 224 2019 224 2020 224 2021 224 2022 224 2023 224 2024 224 2025 224 2026 224 2027 224 2028 224 2029 224 2030 224 2031 224 2032 224 2033 224 2034 224 2035 224 2036 224 2037 224 2038 224 2039 224 2040 224 2041 224 2042 224 2043 224 2044 224 2045 224 2046 224 2047 224 2048 224 2049 224 2050 224 2051 224 2052 224 2053 224 2054 224 2055 224 2056 224 2057 224 2058 224 2059 224 2060 224 2061 224 2062 224 2063 224 2064 224 2065 224 2066 224 2067 224 2068 224 2069 224 2070 224 2071 224 2072 224 2073 224 2074 224 2075 224 2076 224 2077 224 2078 224 2079 224 2080 224 2081 224 2082 224 2083 224 2084 224 2085 224 2086 224 2087 224 2088 224 2089 224 2090 224 2091 224 2092 224 2093 224 2094 224 2095 224 2096 224 2097 224 2098 224 2099 224 2100 224 2101 224 2102 224 2103 224 2104 224 2105 224 2106 224 2107 224 2108 224 2109 224 2110 224 2111 224 2112 224 2113 224 2114 224 2115 224 2116 224 2117 224 2118 224 2119 224 2120 224 2121 224 2122 224 2123 224 2124 224 2125 224 2126 224 2127 224 2128 224 2129 224 2130 224 2131 224 2132 224 2133 224 2134 224 2135 224 2136 224 2137 224 2138 224 2139 224 2140 224 2141 224 2142 224 2143 224 2144 224 2145 224 2146 224 2147 224 2148 224 2149 224 2150 224 2151 224 2152 224 2153 224 2154 224 2155 224 2156 224 2157 224 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2380 224 2381 224 2382 224 2383 224 2384 224 2385 224 2386 224 2387 224 2388 224 2389 224 2390 224 2391 224 2392 224 2393 224 2394 224 2395 224 2396 224 2397 224 2398 224 2399 224 2400 224 2401 224 2402 224 2403 224 2404 224 2405 224 2406 224 2407 224 2408 224 2409 224 2410 224 2411 224 2412 224 2413 224 2414 224 2415 224 2416 224 2417 224 2418 224 2419 224 2420 224 2421 224 2422 224 2423 224 2424 224 2425 224 2426 224 2427 224 2428 224 2429 224 2430 224 2431 224 2432 224 2433 224 2434 224 2435 224 2436 224 2437 224 2438 224 2439 224 2440 224 2441 224 2442 224 2443 224 2444 224 2445 224 2446 224 2447 224 2448 224 2449 224 2450 224 2451 224 2452 224 2453 224 2454 224 2455 224 2456 224 2457 224 2458 224 2459 224 2460 224 2461 224 2462 224 2463 224 2464 224 2465 224 2466 224 2467 224 2468 224 2469 224 2470 224 2471 224 2472 224 2473 224 2474 224 2475 224 2476 224 2477 224 2478 224 2479 224 2480 224 2481 224 2482 224 2483 224 2484 224 2485 224 2486 224 2487 224 2488 224 2489 224 2490 224 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2713 224 2714 224 2715 224 2716 224 2717 224 2718 224 2719 224 2720 224 2721 224 2722 224 2723 224 2724 224 2725 224 2726 224 2727 224 2728 224 2729 224 2730 224 2731 224 2732 224 2733 224 2734 224 2735 224 2736 224 2737 224 2738 224 2739 224 2740 224 2741 224 2742 224 2743 224 2744 224 2745 224 2746 224 2747 224 2748 224 2749 224 2750 224 2751 224 2752 224 2753 224 2754 224 2755 224 2756 224 2757 224 2758 224 2759 224 2760 224 2761 224 2762 224 2763 224 2764 224 2765 224 2766 224 2767 224 2768 224 2769 224 2770 224 2771 224 2772 224 2773 224 2774 224 2775 224 2776 224 2777 224 2778 224 2779 224 2780 224 2781 224 2782 224 2783 224 2784 224 2785 224 2786 224 2787 224 2788 224 2789 224 2790 224 2791 224 2792 224 2793 224 2794 224 2795 224 2796 224 2797 224 2798 224 2799 224 2800 224 2801 224 2802 224 2803 224 2804 224 2805 224 2806 224 2807 224 2808 224 2809 224 2810 224 2811 224 2812 224 2813 224 2814 224 2815 224 2816 224 2817 224 2818 224 2819 224 2820 224 2821 224 2822 224 2823 224 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Sand lime brick Dugels

1939 +
1940

21,610

\$172,946

SAND & GRAVEL by provinces to 1940

WGCP 43%	21,023,246 s.t.	\$9,878,580
MAV 21	<u>10,267,167,</u>	<u>4,824,422</u>
64	31,290,413	14,703,002
Ozark 7%	3,422,389	1,608,141
Ark V 8%	3,911,301	1,837,875
Oua 21	<u>10,267,167</u>	<u>4,824,423</u>
36	17,600,857	8,270,439
		Y
100	48,891,270	22,973,441

SAND & GRAVEL

	<i>sh tons</i>		
USBM to 1938	43,580,299	\$20,874,470	
1939	<u>2,646,793</u>	<u>1,030,270</u>	
	46,227,092	21,904,740	
1940	<u>2,664,178</u>	<u>1,068,701</u>	40.1¢
	48,891,270	22,973,441	

SAND AND GRAVEL

Production and Value

U.S. Bureau of Mines

Sand and gravel

1904

5,070 00 *est 26 90*
14430 44 *est 74 90*
 19,500 \$10,322 *2684 7638 10322*

1905

1906 p 998

Short
tons

Value

Molding sand
 Building sand
 Engine sand
 Other sand
 Gravel

*117239
 5125*

58
 97,431
 13,500
 6,250
5,125
 122,364

41
 37,244
 5,600
 2,500
5,100
 50,485

*453 85
 5100*

1906

1906 p 999

Molding sand
 Building sand
 Engine sand
 Other sand
 Gravel

*206225
 8200*

545
 125,680
 51,975
 28,025
8,200
 214,425

520
 62,752
 14,521
 17,731
8,688
 104,212

*955 24
 8688*

1907

1907 p 554

Glass sand
 Molding sand
 Building sand
 Engine sand
 Other sand
 Gravel

*142,583
 43
 142,540*

*142,583
 22,530*

43
 43
 120,434
 20,356
 1,707
22,530
 165,113

32
 20
 57,197
 6,208
 670
17,550
 81,677

*64,127
 32
 64,095*

*64127
 17550*

1908

1909 p 520

Glass sand
 Molding sand
 Building sand
 Engine sand
 Other sand
 Gravel

*132,335
 2065
 130,270*

*132,335
 119,652*

2,065
 1,790
 96,936
 8,586
 22,958
119,652
 251,987

1,297
 1,136
 44,910
 3,211
 6,548
31,750
 88,852

*57102
 1297
 55805*

*57102
 31750*

Glass sand
Molding sand
Building sand
Engine sand
Other sand
Gravel

3810 1909 1909-522
677
245,510 ✓
8,650 ✓
4,317 ✓
825,651
1,088,615

Value

(2,575 2189
(386
80,578
2,975
3,448
162,470
252,046

1910 1910-604

Molding sand
Building sand
Engine sand
Other sands
Gravel

600
212,318
18,370
7,511
822,238
1,061,037

515
68,791
5,140
5,978
150,256
230,680

1911 1911-587

Molding sand
Building sand
Engine sand
Paving sand
Other sands
Total sand
Gravel
Total sand & gravel

197
129,271
32,865
48,830
a/
279,303
728,286
1,007,589

170
42,813
7,277
12,900
a/
73,508
110,389
183,897

1912 1912-624

Molding sand
Building sand
Paving sand
Other sands
Gravel

291
266,994
7,383
27,398
915,674
1,217,740

291
108,909
4,093
7,438
272,908
393,639

262964
3810
259154

4487
3810
777

89576
2312
87264

897580

80424
100256

63160
10348
73508

120731
272908

1913 1913p330

	Short tons	Value
Molding sand	1,214	708
Building sand	42,914	16,272
Paving sand	115,319	45,779
Other sands	287571 128,124	48,169
Gravel	533,885	209,711
	821,456	320,639

1914 1915p216

Molding sand	90689	a/	a/	37,625	37,625
Building sand	24758	90,689	a/		8,859
Engine sand		a/	a/		
Paving sand	115447	a/	a/		46,484
Other sands	673924	a/	a/		278876
Gravel		673,924		278,876	
		789,371		325,360	

1915 1915p216

Glass sand	76334	a/	a/	33,749	33,749
Molding sand		a/	a/		5205
Building sand	99648	76,334	a/		38954
RR ballast sand		a/	a/		
Gravel		831,668		314,003	
		931,316		352,957	

76334
23314
99648

1916 1917p385

	Short tons	Value
Molding sand	78392	a/
Building sand	423,368	78,392
Engine sand	501760	a/
Paving sand		aa/
RR ballas sand & gravel		a/
Gravel		42,142
		543,902
		\$26,371
		22,902
		170,068

1917 1917 p 385

Glass sand	a/	a/	64096
Molding sand	1,058	528	6974
Building sand	166,013	63,568	71070
Engine sand	a/	a/	
Paving sand	a/	a/	
Other sands,	a/	a/	
RR ballast sand & gravel	361,824	94,176	105.85
Gravel	17,646	11,677	
	582,053	176,923	

1918 1918 p 154

Glass sand	a/	a/	40,479
Molding sand	a/	a/	29,501
Building sand	82,602	49,479	78980
Grinding & polishing sand	a/	a/	
Engine sand	a/	a/	
Paving sand	a/	a/	
RR ballast sand & gravel	105,484	7,118	
Gravel	18,513	21,192	28310
	230,239	107,290	

1919 1919 p 154

Glass sand	a/	a/	82,441
Molding sand	a/	a/	66,868
Building sand	128,989	82,441	149309
Grinding & polishing sand	a/	a/	
Engine sand	a/	a/	
Paving sand	a/	a/	
Other sands	a/	a/	
RR ballast sand & gravel	382,661	93,769	257493
Gravel	281,880	163,724	
	871,328	406,802	

1920 1920 p 172

Building sand	219,029	159,027	113,607
Engine sand	165	10,400	4,800
Paving sand		49,602	38,179
Other sand		a/	a/- 100
	219,194	219,194	156,686
Building gravel		87,064	109,568
Roofing gravel	689,213	a/	a/- 1800
Paving gravel	600	293,289	181,806
RR ballast gravel		308,860	104,143
Total gravel	689,813	689,813	397,317
Total sand & gravel		909,007	554,003

1921 1921p150

	<u>Short tons</u>	<u>Value</u>
Building sand	143,744	113,769
Engine sand	2,600	1,200
Paving sand	75,726	69,697
Total sand	<u>222,070</u>	<u>184,666</u>
Building gravel	79,635	67,444
Roofing gravel	1,050	1,550
Paving gravel	704,580	409,220
Railroad ballast	456,672	119,732
Total gravel	<u>1,241,937</u>	<u>598,146</u>
Total	<u>1,464,007</u>	<u>782,812</u>

1922 1922p188

Glass sand	a/	a/	
Building sand	129,718	97,807	158,897
Engine sand	a/	a/	50,432
Paving sand	201,549 18,212	61,090	
Other sands	<u>229,761</u>	a/	<u>209,329</u>
Building gravel	82,359	75,362	
Paving gravel	257,483	150,742	
Railroad ballast	610,012 839,773	86,688 <u>522,121</u>	<u>312,792</u> 522,121

1923 1924p256

Glass sand	276,155	a/	a/	189,396
Molding sand	69,813	a/	a/	77,570
Building sand	345,968	151,065	111,061	266,966
Engine sand		35,597	16,856	
Paving sand		89,493	61,479	
Other sands		a/	a/	
Building gravel		11,105	9,571	
Paving gravel		485,386	283,028	
Railroad ballast	1226272	729,781	266,739	559338
		<u>1,572,240</u>	<u>826,304</u>	
Total sand		345,968	266,966	
Total gravel		<u>1,226,272</u>	<u>559,338</u>	
		<u>1,572,240</u>	<u>826,304</u>	

1924 1924 p259

		Short tons	Value	
Glass sand	240,641	a/	a/	170,231
Molding sand	47,081	a/	a/	69,367
Building sand		152,576	41,666	
Paving sand	287,722	188,065	128,565	239598
Engine sand		a/	a/	
Other sands		a/	a/	
Building gravel	2656300	68,458	51,817	
Paving gravel		669,185	401,845	
Railroad ballast gravel		1,918,657	867,119	1320781
		2,944,022	1,560,379	

1925 1926 p284

Glass sand	265,530	a/	a/	151,835
Molding sand	57,578	a/	a/	82,479
Building sand	323,08	116,230	82,604	234314
Paving sand		149,300	69,231	
Engine sand		a/	a/	
Building gravel	1.736.785	38,480	42,400	
Paving gravel		665,799	326,720	
Railroad ballast gravel		1,032,506	474,869	843989
		2,059,893	1,078,303	

1926 1926 p284

Glass sand	174,614	a/	a/	104,525
molding sand	89443	a/	a/	84,455
Building sand	264,057	82,012 ✓	49,442	188980
Paving sand		92,602 ✓	55,083	
Engine sand		a/	a/	
Other sands		32,781 e	9,834 d	
Building gravel	1265427	75,250	81,212	
Paving gravel		217,929	110,567	658599
Railroad ballast gravel		972,248	466,820	
		1,529,484	847,579	

1927 1928 p279

Glass sand	309,024	a/	a/	274,623
Molding sand	99,556	aa/	a/	109,989
Building sand	408580	167,300	82,775	274623
Paving sand		141,724	81,859	
Grinding & polishing sand		a/	a/	
Fire or furnace sand		a/	a/	
Engine sand		a/	a/	
Other sands		a/	a/	
Building gravel	1053113	50,512	44,676	
Paving gravel		281,493	161,575	557897
Railroad ballast gravel		721,108	351,646	
		1,461,693	832,520	

1928

1928 p 283

		Short tons	Value	
Glass sand	381,318	a/	a/	254,618
Molding sand	144,082	a/	a/	97,934
Building sand	525400	168,191	110,128	352552
Paving sand		190,720	132,709	
Grinding & polishing sand		a/	a/	
Engine sand		22,407	11,781	
Other sands		a/	a/	
Building gravel		37,530	37,498	638856
Paving gravel	1,157,984	586,902	354,544	
Railroad ballast gravel		533,552	246,814	
		1,683,384	991,408	

1929

1929 p 377

Glass sand	651,428	a/	a/	367,682
Molding sand	250,584	a/	a/	264064
Building sand	902012	266,554	148,568	631746
Paving sand		363,903	210,272	
Grinding & polishing sand		a/	a/	
Engine sand		20,971	8,842	
Other sands		187,216	176,976	264064
Paving gravel		1,293,636	741,859	1220009
RR ballast gravel	3090324	1,796,688	478,150	
		3,992,336	1,851,755	

1930

1930 p 380

Glass sand	633,474	a/	a/	405,288
Molding sand	79,850	a/	a/	84,084
Building sand	713,324	203,656	146,715	489372
Paving sand		413,326	249,641	
Grinding & polishing sand		a/	a/	
Engine sand		16,492	8,932	
Other sands		a/	a/	
Building gravel		247,006	212,153	1066036
Paving gravel		1,194,199	658,879	
RR ballast gravel	2007432	566,227	195,004	
		2,720,756	1,555,408	

1931

1931 p 246

Glass sand	491,379	a/	a/	262,072
Molding sand	72928	a/	a/	61,229
Building sand	564307	86,418	52,231	323301
Paving sand		397,572	205,469	
Engine sand		7,389	4,372	
Other sands		a/	a/	
Building gravel		a/	a/	
Paving gravel		809,301	624,152	720975
RR ballast gravel	990928	181,627	96,823	
		1,555,235	1,044,276	

✓
sand

Prod
Gravel

Total

1933 234,988 1,029,754 1,264,742

1935 290,452 898,968 1,189,420

525,440 1,928,722 2,454,162

22% 78%

1934 246,862 875,237 1,122,099

est 22% 78%

value 124,342 440,848 565,190

1932 1932 p 293

	Short tons	Value	
Building sand	35,729	22,543	
Paving sand	88,818	42,219	
Engine sand	12,685	7,097	153332
Other sands	16,100	6,650	
Building gravel	22,208	15,124	
Paving gravel	195,952	135,035	
RR ballast gravel	93,068	44,345	311228
	464,560	273,013	78509

1933 1934 p 30

Building sand	220,830	87,450	450,531	46,861	
Paving sand	14,158	2,133,455	2,68,080		
Engine sand	234,988	a/	a/		122315
Other sand		a/	a/	7,374	
Building gravel		241,767	99,751		
Paving gravel		612,145	290,548		
RR ballast gravel	1029754	175,842	88,384		478683
		1,264,742	600,998		

1934

1,122,099

565,190

1935 1937-1216

Glass sand	208,344	a/	a/		
Molding sand	82,108	a/	a/		118,859
Building sand		100,595	61,437		87457
Paving sand	290452	107,749	57,422		
Engine sand		a/	a/		206316
Filter sand		a/	a/		
RR ballast sand		a/	a/		
Other sand		a/	a/		
Building gravel		54,753	48,957		
Paving sand		741,376	206,959		
RR ballast gravel	898968	102,839	49,778		305694
		1,189,420	512,010		

a/ Included under which

1936 1939 p 16

	Short tons	Value
Glass sand	a/	a/
Molding sand	a/	a/
Building sand	290,763	\$85,018
Paving sand	93,337	60,613
Engine sand	384,100	145,631
Railroad ballast sand	a/	other 99,242
Building gravel	a/	244,873
Paving gravel	60,736	39,723
Railroad ballast gravel	373,131	191,739
Other gravel	250,257	89,143
	a/	320,605
	1,068,224	565,478

1937 1939 p 16

Glass sand	a/	a/
Molding sand	a/	a/
Building sand	692,489	988,965
Paving sand	201,431	593,524
Engine sand	893,920	90,469
Railroad ballast sand	a/	a/
Other	a/	a/
Building gravel	19,274	9,510
Paving gravel	2,083,226	294,943
Railroad ballast gravel	374,214	95,757
Other gravel	a/	a/
	3,370,634	757,162

1938 1939 p 1171

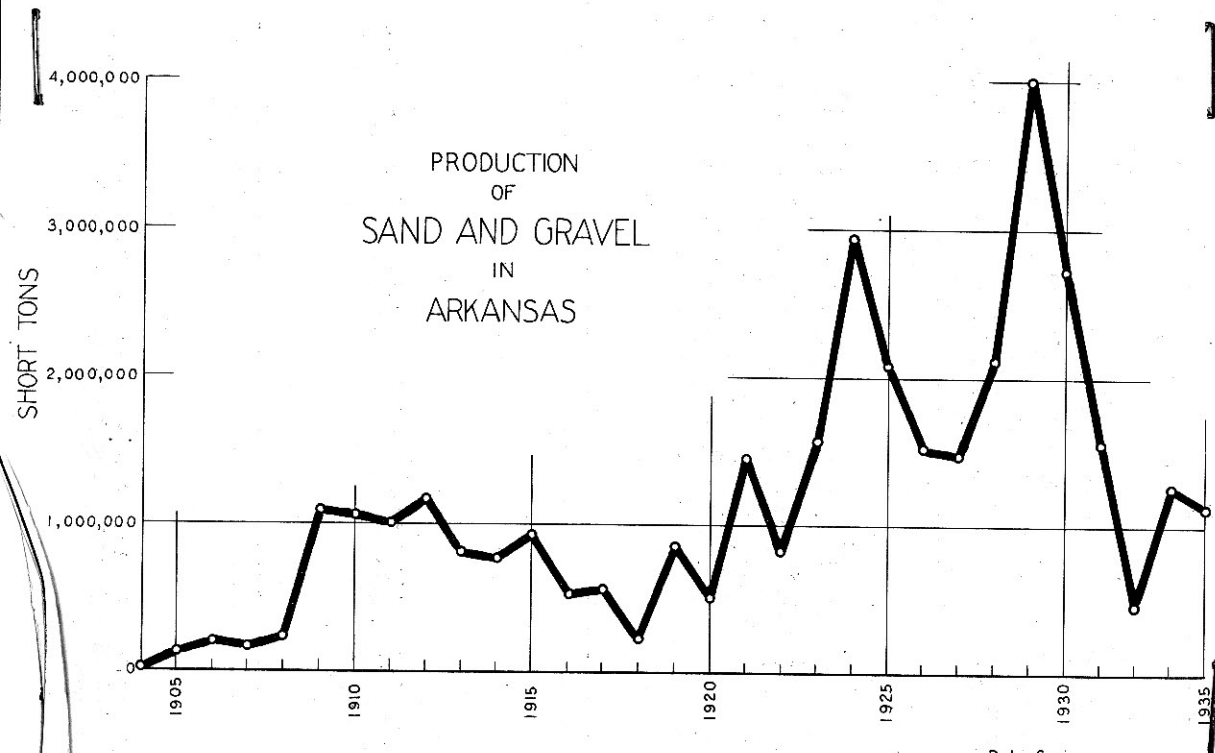
Glass sand	a/	a/
Molding sand	a/	a/
Building sand		
Commercial	94,360	139,755
Noncommercial	203,215	25,845
Paving sand	270,472	55,854
Commercial	84,017	74,517
Noncommercial	354,489	87,595
Engine sand		31,981
Building gravel		168,617
Commercial	28,839	18,764
Noncommercial	32,200	3,300
Paving gravel	216,769	150,950
Commercial	817,680	250,578
Noncommercial	247,623	92,097
Railroad ballast	a/	a/
Other	220,729	
Total		
Commercial	820,789	492,623
Noncommercial	876,811	286,596
	1,697,600	779,219

1939 1940 p1213

	Short tons	Value
Glass sand	a/	a/
Molding sand	aa/	a/
Building sand		
Commercial	142,633	74,638
Government and contractor	295	330
Paving sand		
Commercial	123,031	97,434
Government and contractor	2,777	1,062
Engine sand	a/	a/
Building gravel		
Commercial	55,702	39,253
Government and contractor	22,957	8,478
Paving gravel		
Commercial	149,459	113,153
Government and contractor	1,551,802	443,986
Railroad ballast gravel	502,058	145,579
Other gravel	a/	a/
Total		
Commercial	1,068,962	576,414
Government and contractor	1,577,831	452,856
	2,646,793	1,030,270

1940 1941 p1181

Glass sand	a/	a/
Molding sand	a/	a/
Building sand		
Commercial	235,653	126,108
Government and contractor	56,223	641
Paving sand		
Commercial	150,946	69,543
Government and contractor	1,979	903
Engine sand	a/	a/
Other sand	a/	a/
Building gravel		
Commercial	89,217	67,075
Government and contractor	13,564	674
Paving commercial	336,602	207,504
Government and contractor	1,076,930	308,627
Railroad ballast	548,968	149,329
Other gravel	28,290	10,858
Total		
Commercial	1,515,482	757,856
Government and contractor	1,148,696	310,845
	2,664,178	1,068,701



Data from
U.S. Bureau of Mines

Figure 28

Arkansas Geological Survey-1936

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1889

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	7,4	8	8.6	9	
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		5,5	9	1.4	3
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7	9,1	2	8.5	6	
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	7,8	9	3.2	7	
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		6,6	0	0.0	0
5	9,5	4	7.3	1	
2	8	7,0	6	2.8	7 *
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		3	9	6.1	5
		1	7	4.3	6
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1	3	4,1	5	9.1	2
2	8	4,4	8	4.0	4 *
		6,2	3	0.0	6
		4,4	1	9.0	9
			8	4.0	0
1	5,7	0	6.0	8	
2	6,4	3	9.2	3	6 *
1	6	9,6	4	0.1	4
		5,8	7	8.2	5
		1,7	5	7.3	9
		2,9	6	0.4	8
		5	1	0.5	8
5	0	7,4	8	6.6	9
1	6	4,4	6	2.3	6
8	5	2,6	9	5.8	9 *
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			8	9	9.9
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		3	3,1	4	1.2
		6	5,0	7	4.1
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		1	2,3	8	1.6
			6	4.0	2
1	0	7,1	5	1.8	9 *
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			2	9	9.2
8	9	7,9	5	9.9	2 *

Feederance tax value to 1939. Used to figure percentage in Provinces.

	Gravel	Gravel 20s	Sand	Sand 20s	Total			
<u>West Hill</u>								
Ashley	\$ 5563698	-	\$ 239904					
Bridley	18214399	-						
Calhoun	33241237	-3139	1133139					
Clark	29643914	\$ 12986732	3084582	\$ 6672556				
Cleveland	21341797	2456758	-	1405702				
Columbia	36300942	10872	1018872					
Dallas	15668782	-	-					
Drew	17003124	-	-					
Grant	6730360	-	-					
Hempstead	2680676	-	-					
Hot Spring	66138920	-	811131					
Howard	4804581	-	-					
Lafayette	78394515	-	10399498					
Lubbock	34922838	-	-					
Little River	29822603	5074017	8016800	11392360				
Miller	7891444	-	-					
Nevada	57502603	-	4362037					
Quachita	73533784	187373489	1630031	1238169				
Sevier	22072779	-	2141330					
Union	-	-	-					
Various	-	52241	-	6402				
30	561472996	207943237	31837324	10715189	811968746	43%	4310	
<u>Miss. Alluvial Plain</u>								
Arkansas	-	-	-	-				
Chicot	1628433	11443272	747393	15331838				
Clay	28852757	-	-	-				
Craighead	97148850	-	63589	-				
Crittenden	-	-	-	-				
Cross	49651322	9234	555919	-				
Desha	-	2888708	-	16939142				
Greene	24307034	-	-	-				
Jackson	603870	5758113	-	16447968				
Jefferson	2017670	4483317	-	37631245				
Let	-	-	-	-				
Lonsdale	-	-	-	-				
Mississippi	-	-	-	142855				
Monroe	-	-	-	-				
Phillips	225600	11800567	-	3273016				
Poinsett	5399410	-	-	-				
Prairie	-	-	-	29928				
St. Francis	48797991	-	1600596					
Woodruff	20880	-	-	-				
	258049947	36383211	17372897	89795992	401602047	21%	2132	
					1213570793	64%	6432	

3558
6442
10000

	Gravel	Gravel cos	Sand	Sand cos	Gravel total
<u>Ozark Mountain</u>					
✓ Baxter	\$2262866	\$5186803	\$2091630	\$189058	
✓ Benton	1036005	-	-	-	
✓ Boone	1011270	-	-	-	
✓ Carroll	5142440	-	-	-	
✓ Fulton	297743	-	-	-	
✓ Independence	69016930	3136280	3480000	2535506	
✓ Izard	1562006	-	-	-	
✓ Laurence	2686576	17936390	-	7912856	
✓ Madison	627290	-	-	-	
✓ Marion	1317053	-	487267	-	
✓ Newton	-	-	-	-	
✓ Randolph	3628932	-	559143	-	
✓ Searcy	4990993	-	-	-	
✓ Sharp	734099	-	-	-	
✓ Stoyl	748869	-	-	-	
✓ Washington	1206892	-	-	-	
	96269964	26259473	6618040	10637420	139784897 770

<u>Arkansas Valley</u>					
✓ Cleburne	657657	-	-	-	
✓ Conway	292942	-	623006	-	
✓ Crawford	481290	4012822	441909	16964014	
✓ Faulkner	1160066	-	-	-	
✓ Franklin	3499205	1445102	-	587825	
✓ Johnson	213741	22510	8400	175739	
✓ Logan	789327	39615	-	296048	
✓ Payne	-	17436	-	51058	
✓ Sebastian	14997328	9495007	1570608	50748669	
✓ Van Buren	-	-	-	-	
✓ White	660000	-	-	-	
✓ Yell	5954731	13415912	-	16446236	
	28706287	28448404	2643923	85269589	1445068203 870

<u>Quachita Mts</u>					
✓ Barlow	562733	-	-	-	
✓ Montgomery	6642623	-	1613377	-	
✓ Perry	4433311	-	-	-	
✓ Price	47457761	-	5220090	-	
✓ Polk	7435876	-	-	-	
✓ Pulaski	89994	121233	3314122	96867285	
✓ Saline	205179526	-	6507418	-	
✓ Scott	23100	-	-	-	
	271824924	121233	16655007	96867285	385468449 2070 42
					670321549 3670 1883892342

PRODUCTION AND VALUE OF SAND AND GRAVEL IN ARKANSAS, 1904-1940

U. S. Bureau of Mines figures

Year	SAND							GRAVEL						Total sand and gravel
	Building	Engine	Class	Molding	Paving	Undis-tributed	Total	Building	Paving	Railroad ballast	Roofing	Undis-tributed	Total	
1904	-	-	-	-	-	5,070 ^a	5,070	-	-	-	-	14,430 ^a	14,430	19,500
1905	97,431	13,500	-	58	-	6,250	117,239	-	-	-	-	5,125	5,125	122,364
1906	125,680	51,975	-	545	-	28,025	206,225	-	-	-	-	8,200	8,200	214,425
1907	120,434	20,356	43	43	-	1,707	142,583	-	-	-	-	22,530	22,530	165,113
1908	98,936	8,586	2,065	1,790	-	22,958	132,335	-	-	-	-	119,652	119,652	251,987
1909	245,510	8,650	3,810	677	-	4,317	262,964	-	-	-	-	825,651	825,651	1,088,615
1910	212,318	18,370	-	600	-	7,511	238,799	-	-	-	-	822,238	822,238	1,061,037
1911	129,271	32,365	-	197	48,830	68,140	279,303	-	-	-	-	728,286	728,286	1,007,589
1912	266,994	-	-	291	7,383	27,398	302,066	-	-	-	-	915,674	915,674	1,217,740
1913	42,914	-	-	1,214	115,319	128,124	287,571	-	-	-	-	533,885	533,885	821,456
1914	90,689	b/	-	b/	b/	24,758	115,447	-	-	-	-	673,924	673,924	789,371
1915	76,334	-	b/	b/	-	23,314 ^d	99,648	-	-	-	-	831,668	831,668	931,316
1916	178,392	b/	b/	b/	b/	423,368 ^d	501,760	-	-	b/	-	42,142	42,142	543,902
1917	166,013	b/	b/	b/	b/	35,512	202,583	-	-	361,824 ^c	-	17,646	379,470	582,053
1918	82,602	b/	b/	b/	b/	23,640 ^d	106,242	-	-	105,484 ^c	-	18,513	123,997	230,239
1919	128,989	b/	b/	b/	b/	77,798 ^d	206,787	-	-	382,661 ^c	-	281,880	664,541	871,328
1920	159,027	10,400	-	-	49,602	165	219,194	87,064	293,289	308,860	600	-	689,813	909,007
1921	143,744	2,600	-	-	75,726	-	222,070	79,635	704,580	456,672	1,050	-	1,241,937	1,464,007
1922	129,718	b/	b/	-	71,831	28,212	229,761	82,359	257,483	270,170	-	-	610,012	839,773
1923	151,065	35,597	b/	b/	89,493	69,813	345,968	11,105	485,386	729,781	-	-	1,226,272	1,572,240
1924	52,576	b/	b/	b/	188,065	47,081	287,722	68,458	669,185	1,918,657	-	-	2,656,300	2,944,022
1925	116,230	b/	b/	b/	149,300	57,578	323,108	38,480	665,799	1,032,506	-	-	1,736,785	2,059,893
1926	82,012	b/	b/	b/	92,602	89,443	264,057	75,250	217,929	972,248	-	-	1,265,427	1,529,484
1927	167,300	b/	b/	b/	141,724	99,556 ^{d,e}	408,580	50,512	281,493	721,108	-	-	1,053,113	1,461,693
1928	168,191	22,407	b/	b/	190,720	144,082 ^d	525,400	37,530	586,902	533,552	-	-	1,157,984	1,683,384
1929	266,554	20,971	b/	b/	363,903	250,584 ^d	902,012	-	1,293,636	1,796,688	-	-	3,090,324	3,992,336
1930	203,656	16,492	b/	b/	413,326	79,850 ^d	713,324	247,006	1,194,199	566,227 ^d	-	-	2,007,432	2,720,756
1931	86,418	7,389	b/	b/	397,572	72,928	564,307	b/	809,301	181,627	-	-	990,928	1,555,235
1932	35,729	12,685	-	-	88,818	16,100	153,332	22,208	195,952	93,068	-	-	311,228	464,560
1933	87,375	b/	-	-	133,455	14,158	234,988	241,767	612,145	175,842	-	-	1,029,754	1,264,742
1934	-	-	-	-	-	246,862 ^f	246,862	-	-	-	-	875,237 ^f	875,237	1,122,099
1935	100,595	b/	b/	b/	107,749	82,108 ^{d,g}	290,452	54,753	741,376	102,839	-	-	898,968	1,189,420
1936	171,187	b/	b/	b/	119,576	93,337 ^{d,h}	384,100	60,736	373,131	250,257	-	h/	684,124	1,068,224
1937	98,965	b/	b/	b/	593,524	201,431 ^{d,h}	893,920	19,274	2,083,226	374,214	-	h/	2,476,714	3,370,634
1938	165,600	b/	b/	b/	104,872	84,017 ^d	354,489	61,039	1,034,449	247,623	-	h/	1,343,111	1,697,600
1939	142,928	b/	b/	b/	125,808	96,081 ^d	364,817	78,657	1,701,261	502,058	-	h/	2,281,976	2,646,793
1940	291,876	b/	b/	b/	152,925	125,806	570,607	102,781	1,413,532	548,968	-	28,290	2,093,571	2,664,178
	4,781,253	282,843	5,918	6,473	3,822,123	2,807,082	11,705,692	1,418,614	15,614,254	12,632,934	1,650	6,764,971	36,432,423	48,138,115
Value														
1904	-	-	-	-	-	\$2,684 ^d	\$2,684	-	-	-	-	\$7,638 ^d	\$7,638	\$10,322
1905	\$37,244	\$5,600	-	\$- 41	-	2,500	45,385	-	-	-	-	5,100	5,100	50,485
1906	62,752	14,521	-	-520	-	17,731	95,524	-	-	-	-	8,688	8,688	104,212
1907	57,197	6,208	\$- 32	20	-	670	64,127	-	-	-	-	17,550	17,550	81,677
1908	44,910	3,211	1,297	1,136	-	6,548	57,102	-	-	-	-	31,750	31,750	88,852
1909	80,578	2,975	2,189	386	-	3,448	89,576	-	-	-	-	162,470	162,470	252,046
1910	68,791	5,140	-	515	-	5,978	80,424	-	-	-	-	150,256	150,256	230,680
1911	42,813	7,277	-	170	\$12,900	10,348	73,508	-	-	-	-	110,389	110,389	183,897
1912	108,909	-	-	291	4,093	7,438	120,731	-	-	-	-	272,908	272,908	393,639
1913	16,272	-	-	708	45,779	48,169	110,928	-	-	-	-	209,711	209,711	320,639
1914	37,625	b/	-	b/	b/	8,859	46,484	-	-	-	-	278,876	278,876	325,360
1915	33,749	-	b/	b/	-	5,205 ^d	38,954	-	-	-	-	314,003	314,003	352,957
1916	26,371	b/	-	b/	b/	120,795 ^d	147,166	-	-	b/	-	22,902	22,902	170,068
1917	63,568	b/	b/	b/	528	6,974	71,070	-	-	\$94,176 ^d	-	11,677	105,853	176,923
1918	49,479	b/	b/	b/	b/	29,501	78,980	-	-	7,118 ^d	-	21,192	28,310	107,290
1919	82,441	b/	b/	b/	b/	66,868 ^d	149,309	-	-	93,769 ^c	-	163,724	257,493	406,802
1920	113,607	4,800	-	-	38,179	100 ^d	156,686	\$109,568	\$181,806	104,143	\$1,800	-	397,317	554,003
1921	113,769	1,200	-	-	69,697	-	184,666	67,644	409,220	119,732	1,550	-	598,146	782,812
1922	97,807	b/	b/	-	61,090	50,432	209,329	75,362	150,742	86,688	-	-	312,792	522,121
1923	111,061	16,856	b/	b/	61,479	77,570	266,966	9,571	283,028	266,739	-	-	559,338	826,304
1924	41,666	b/	b/	b/	128,565	69,367	239,598	51,817	401,845	867,119	-	-	1,320,781	1,560,379
1925	82,604	b/	b/	b/	69,231	82,479	234,314	42,400	326,720	474,869	-	-	843,989	1,078,303
1926	49,442	b/	b/	b/	55,083	84,455	188,980	81,212	110,567	466,820	-	-	658,599	847,579
1927	82,775	b/	b/	b/	81,859	109,989 ^{d,e}	274,623	44,876	161,575	351,646	-	-	557,897	832,520
1928	110,128	11,781	b/	b/	132,709	97,934 ^d	352,552	37,498	354,544	246,814	-	-	638,856	991,408
1929	148,568	8,842	b/	b/	210,272	264,064 ^d	631,746	-	741,859	478,150	-	-	1,220,009	1,851,755
1930	146,715	8,932	b/	b/	249,641	84,084 ^d	489,372	212,153	658,879	195,004	-	-	1,066,036	1,555,408
1931	52,231	4,372	b/	b/	205,469	61,229	323,301	b/	624,152	96,823	-	-	720,975	1,044,276
1932	22,543	7,097	-	-	42,219	6,650	78,509	15,124	135,035	44,345	-	-	194,504	273,013
1933	46,861	b/	-	-	68,080	7,374	122,315	99,751	290,548	88,384	-	-	478,683	600,998
1934	-	-	-	-	-	124,342 ^f	124,342	-	-	-	-	440,848 ^f	440,848	565,190
1935	61,437	b/	b/	b/	57,422	87,457 ^{c,g}	206,316	48,957	206,959	49,778	-	-	305,694	512,010
1936	85,018	b/	b/	b/	60,613	99,242 ^{c,h}	244,873	39,723	191,739	89,143	-	h/	320,605	565,478
1937	51,286	b/	b/	b/	90,469	215,197 ^{c,h}	356,952	9,510	294,943	95,757	-	h/	400,210	757,162
1938	106,498	b/	b/	b/	62,119	94,913 ^d	263,530	22,064	401,528	92,097	-	h/	515,639	779,219
1939	74,968	b/	b/	b/	98,496	106,357 ^d	279,821	47,731	557,139	145,579	-	h/	750,449	1,030,270
1940	126,749	b/	b/	b/	70,446	127,439	324,634	67,749	516,131	149,329	-	10,858	744,067	1,068,701
	2,538,432	108,812	3,518	4,315	1,975,910	2,194,390	6,825,377	1,082,510	6,998,959	4,704,022	3,350	2,240,540	15,029,381	21,854,758

a/ Separate figures not available. Estimated at 26 per cent sand and 74 per cent gravel.

b/ Included under Undistributed.

c/ Includes railroad ballast sand.

d/ Includes grinding and polishing sand.

e/ Includes fire or furnace sand.

f/ Separate figures not available. Estimated at 22 per cent sand and 78 per cent gravel.

g/ Includes filter sand.

h/ Included under undistributed sand.

Railroad ballast gravel included under Undistributed sand