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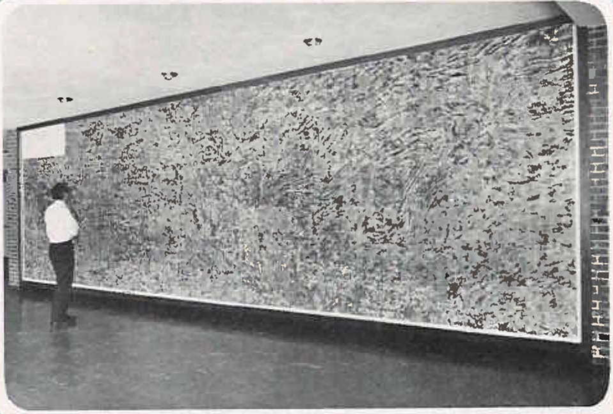

OKLAHOMA GEOLOGY NOTES

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Cover Picture

Aerial View of Southeastern Oklahoma

Space photographs of the Earth's surface provided by satellites and spacecraft have become commonplace. However, even though they give great promise of utility in regional mineral-resource studies, they are a long way from replacing the aerial photograph that is so useful to geologists.

The cover photograph is of an aerial photomosaic in the main lobby of the School of Geology and Geophysics at The University of Oklahoma. Aside from its dimensions, approximately 9 feet by 29 feet, it is of especial interest because the photographs date back to 1935, the early days of aerial photography. The mosaic was compiled from about 158 composites, each comprising 32 photographs taken at an altitude of only 12,000 feet. Allowing for overlap, the mosaic contains about 3,500 photographs, with an approximate scale of 1 inch equals 2,000 feet.

The area covered is approximately 132 miles by 39 miles, from west of the Arbuckle Mountains to the central part of the Oklahoma Ouachitas. The complex lineate pattern at the right (east) end shows the Ouachita Mountains structure, with the double-lobed Tuskahoma syncline as the most prominent feature. Along the bottom, on the south flank of the Ouachitas, the lighter toned area with rectangular patches of cultivated land is the Cretaceous overlap, which merges with the Pennsylvanian terrane that separates the Arbuckles and the Ouachitas. Near the left end, the darker toned, elongate area in front of the viewer is the Arbuckle structure, flanked by Pennsylvanian, Permian, and Cretaceous rocks.

—*Alex. Nicholson*

Statistics of Oklahoma's Petroleum Industry, 1968

John F. Roberts

Total drilling of wells related to the oil and gas industry declined during 1968, although not by as many wells as predicted. There were declines in the number of oil wells and gas wells and increases in dry holes, service wells, and exploratory wells. Sixty counties were explored for new reservoirs, and 36 had successful completions (fig. 1). The statewide success ratio for exploratory wells was 22 percent. The northwestern part of the State continued to experience the most activity as the search continued for discoveries on the north flank of and down into the Anadarko basin; the success ratio was 36 percent compared to the 1967 ratio of 40 percent. The significant discoveries were in sandstone reservoirs of Pennsylvanian age and in carbonates of Mississippian and Hunton units.

The 22 giant fields in Oklahoma are listed in table I. A giant field is one that has an estimated ultimate recovery of more than 100 million barrels of oil. These giants produced 46 percent of Oklahoma's oil during 1968; they account for 53 percent of the State's estimated ultimate yield and contain 42 percent of the remaining reserves.

Table II summarizes drilling activity during 1968. Notable is the increase in the average depth of exploratory wells to 5,780 feet; the

Table I.—Giant Oil Fields of Oklahoma, 1968

Field	1968 Production (1,000 bbls)	Cumulative Production (1,000 bbls)	Estimated Reserves (1,000 bbls)	Number of Wells
Allen	2,713	104,900	15,100	1,508
Avant	188	105,560	1,441	580
Bowlegs	755	148,293	11,707	166
Burbank	7,537	474,213	25,787	1,282
Cement	2,498	125,772	9,228	1,524
Cushing	4,565	439,498	15,502	1,851
Earlsboro	549	139,638	5,042	173
Edmond West	1,115	120,026	9,974	561
Elk City	203	59,545	40,455	266
Eola-Robberson	5,190	80,477	44,523	487
Fitts	1,422	125,470	8,640	624
Glenn Pool	3,441	294,743	25,257	1,171
Golden Trend	11,961	335,213	159,787	1,644
Healdton	3,794	260,755	19,245	2,158
Hewitt	3,039	185,665	19,335	1,441
Little River	286	133,221	1,779	113
Oklahoma City	1,963	733,706	36,294	386
Seminole	979	171,871	15,129	259
Sho-Vel-Tum	32,611	807,678	93,445	7,984
Sooner Trend	17,062	84,954	15,689	2,311
St. Louis	1,439	202,785	7,215	627
Tonkawa	394	130,081	3,250	187

Source: Oil and Gas Journal, vol. 67, no. 4, January 27, 1969.

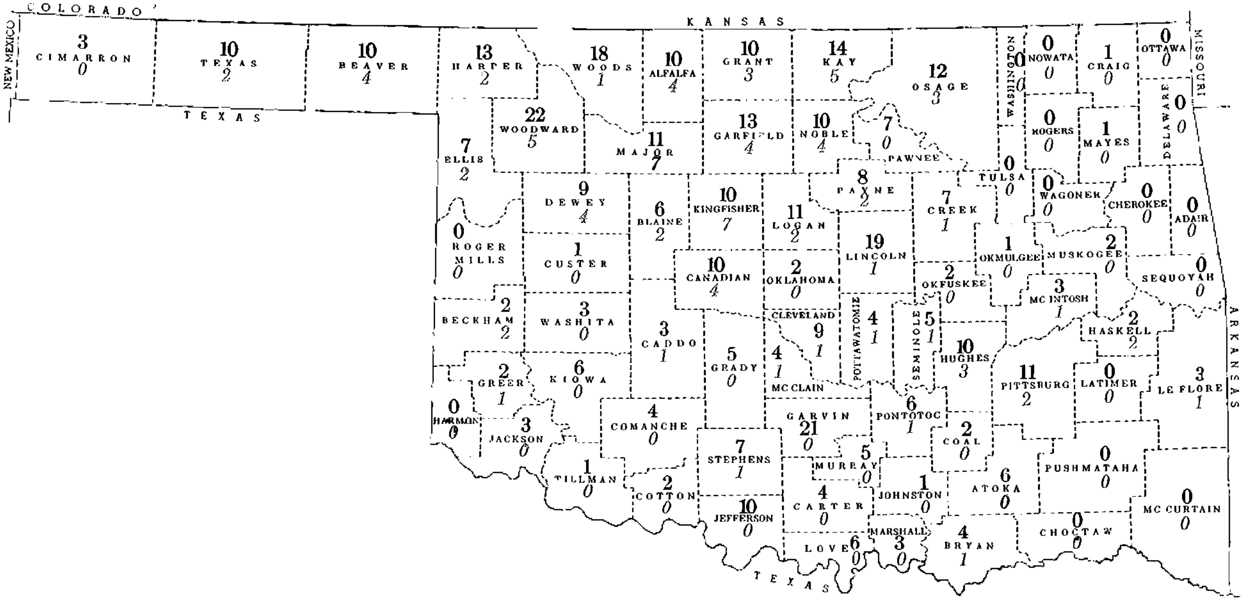


Figure 1. Exploratory drilling, by counties, during 1968. Black figures give the number of exploratory wells drilled; colored figures give the number of successful completions. Source: American Association of Petroleum Geologists in cooperation with the U. S. Bureau of Mines.

TABLE II.—DRILLING ACTIVITY IN OKLAHOMA, 1968

	1968					1967	1969
	CRUDE	GAS	DRY	SERVICE	TOTAL	TOTAL	FORECAST
All wells							
Number of completions	1,323	370	1,047	256	2,996	3,077	3,149
Footage					14,025,607	13,821,426	14,740,000
Average footage					4,681	4,492	4,681
Exploration wells							
Number of completions	52	39	331		422	419	580
Percentage of completions	12.3	9.3	78.4		100		
Footage					2,439,242	2,246,402	
Average footage					5,780	5,361	
Development wells							
Number of completions	1,271	331	716	256	2,574	2,658	2,569
Percentage of completions[1]	54.8	14.3	30.9		100		
Footage					11,009,726	11,575,024	
Average footage					4,277	4,355	

Source: Oil and Gas Journal, annual forecast and review issue, vol. 67, no. 4, January 27, 1969, and vol. 67, no. 13, March 31, 1969.
[1]Excludes service wells.

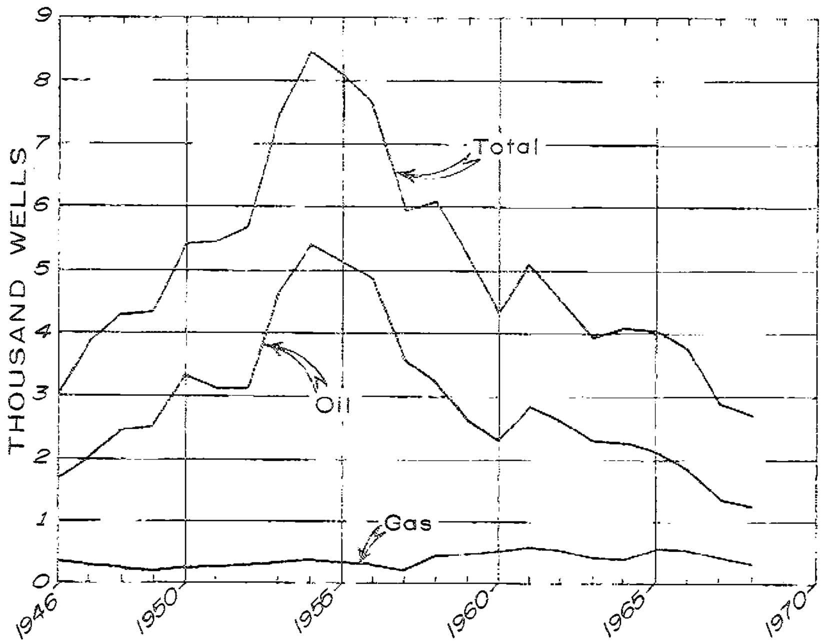


Figure 2. Graph showing total wells drilled, oil wells completed, and gas wells completed in Oklahoma, 1946-1968. Source: Oil and Gas Journal.

1967 average was 5,361 feet. The *Oil and Gas Journal* forecasts increased drilling in 1969, all in the exploratory class.

Table III lists cumulative and yearly production and value of all petroleum products to January 1, 1969. The total value of these items is $24.3 billion.

Table IV compares petroleum production of the past 2 years. The decline in crude-oil production was due to inability of wells to produce at estimated capacity rates as allowables continued at maximum levels. Natural gas and natural-gas liquids had increases in production.

The American Petroleum Institute's Committee on Reserves and Production Capacity issued an initial report on the United States crude-oil productive capacity as of January 1, 1968, that indicated a total of 12,289,743 barrels of oil per day. Oklahoma's daily capacity was estimated to be 619,000 barrels, 5 percent of the total. As of January 1, 1969, the United States total was estimated to be 12,055,000 barrels per day, Oklahoma's 588,000 barrels remaining at 5 percent. This decline in estimated capacity was due to the inability of the wells to maintain the rates reached in late 1967. Natural-gas capacity declined, with Oklahoma and California having the only increases of significance. Oklahoma's capacity is estimated at 12,207 billion cubic feet of gas per day. Estimated natural-gas-liquids capacity increased

TABLE III.—CUMULATIVE (THROUGH 1955) AND YEARLY (1956-1968) MARKETED PRODUCTION AND VALUE OF PETROLEUM, NATURAL GAS, NATURAL GASOLINE, AND LIQUEFIED PETROLEUM GAS IN OKLAHOMA[1]

YEAR	CRUDE PETROLEUM VOLUME (1,000 BBLS)	CRUDE PETROLEUM VALUE ($1,000)	NATURAL GAS VOLUME (MMCF)	NATURAL GAS VALUE ($1,000)	NATURAL GASOLINE AND CYCLE PRODUCTS VOLUME (1,000 GALS)	NATURAL GASOLINE AND CYCLE PRODUCTS VALUE ($1,000)	LIQUEFIED PETROLEUM GAS VOLUME (1,000 GALS)	LIQUEFIED PETROLEUM GAS VALUE ($1,000)
Through 1955	7,230,010	11,443,269	12,977,332	1,378,370	14,420,482	890,729	3,673,364	120,097
1956	215,862	600,096	678,603	54,288	489,963	26,543	579,101	23,427
1957	214,661	650,423	719,794	59,743	460,644	25,329	587,140	21,824
1958	200,699	594,069	696,504	70,347	440,798	26,029	657,114	25,822
1959	198,090	578,423	811,508	81,151	448,353	29,443	675,869	27,070
1960	192,913	563,306	824,266	98,088	531,995	33,074	762,258	32,409
1961	193,081	561,866	892,697	108,016	521,237	33,358	817,082	30,141
1962	202,732	591,977	1,060,717	135,772	552,795	35,764	838,903	25,223
1963	201,962	587,709	1,233,883	160,405	555,467	35,131	810,894	28,981
1964	202,524	587,320	1,323,390	166,747	554,053	34,011	880,804	28,055
1965	203,441	587,944	1,320,995	182,297	570,129	34,561	894,665	32,208
1966	224,839	654,281	1,351,225	189,172	576,124	35,715	968,254	44,381
1967	230,749	676,095	1,412,952	202,052	568,905	35,846	1,005,633	49,276
1968[2]	226,540	670,558	1,397,400	201,226	579,180	37,371	1,055,040	49,486
Total	9,938,103	$19,347,336	26,701,266	$3,087,674	21,270,125	$1,312,904	14,206,121	$538,400

[1]Figures from: Minerals Yearbook of the U. S. Bureau of Mines. Totals for crude petroleum differ from those compiled by the U. S. Bureau of Mines and the American Petroleum Institute principally because of the exclusion from U. S. B. M. and A. P. I. compilations of an estimated production of 26,355,000 barrels for the years 1905-1906.

[2]Preliminary figures for 1968.

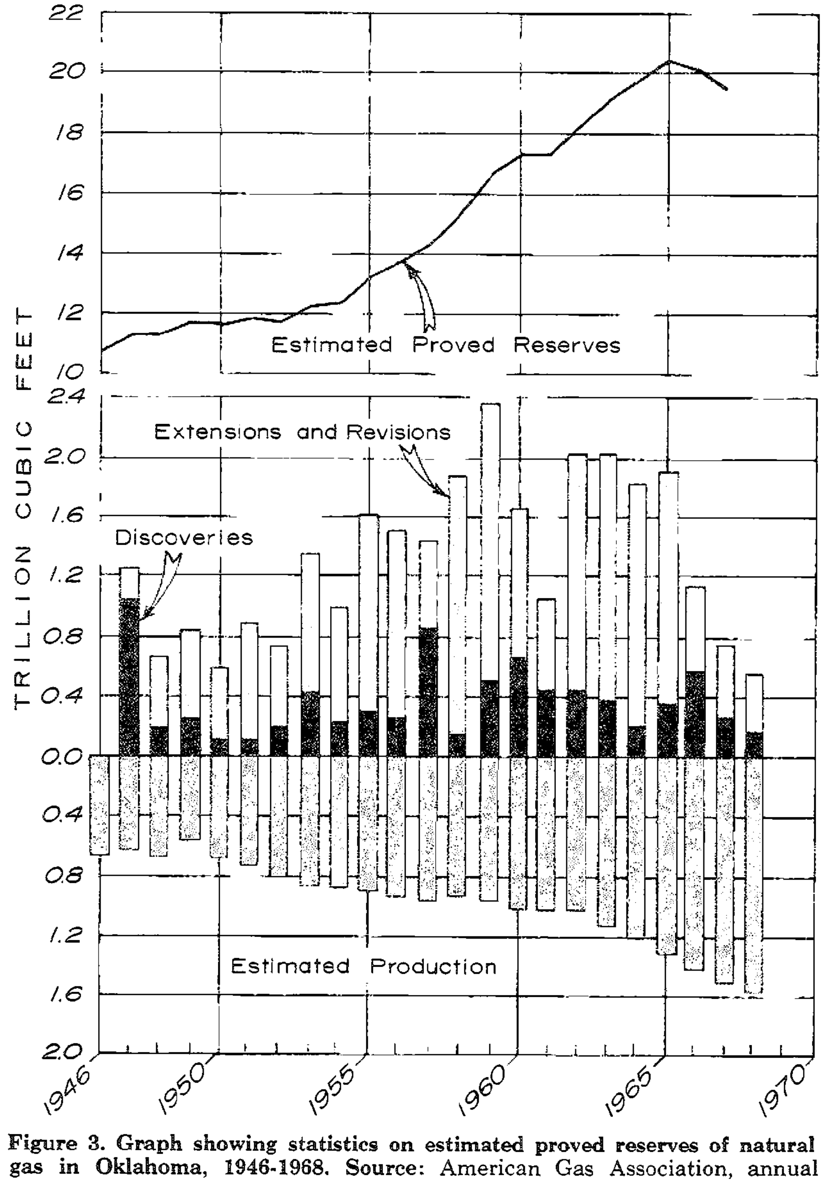


Figure 3. Graph showing statistics on estimated proved reserves of natural gas in Oklahoma, 1946-1968. Source: American Gas Association, annual reports.

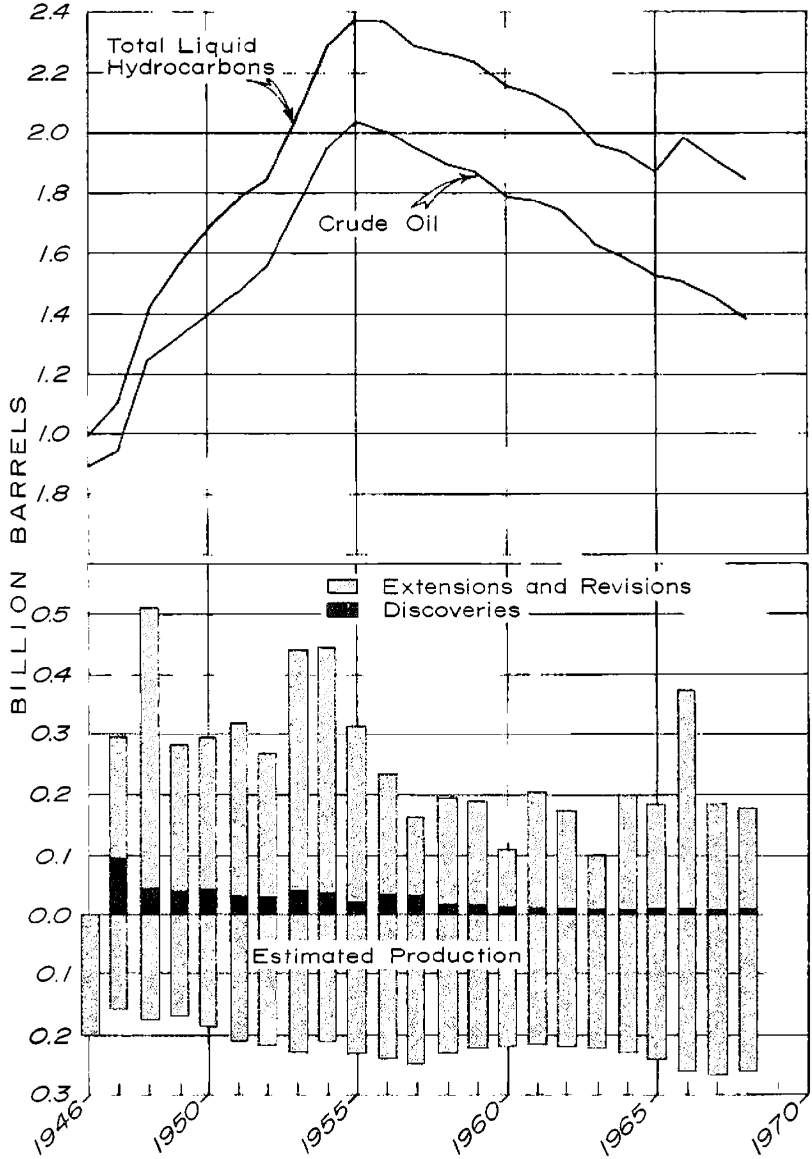


Figure 4. Graph showing statistics on estimated proved reserves of total liquid hydrocarbons in Oklahoma, 1946-1968. Source: American Petroleum Institute, annual reports.

TABLE IV.—HYDROCARBON PRODUCTION IN OKLAHOMA

	1967	1968
Crude oil and lease condensate		
Total annual production (1,000 bbls)[1]	230,749	226,540
Value ($1,000)[1]	676,095	670,558
Cumulative production 1891-year (1,000 bbls)	9,711,563	9,938,103
Daily production (bbls)[2]	634,521	616,779
Total number of producing wells[2]	80,971	80,999
Daily average per well (bbls)	7.8	7.6
Oil wells on artificial lift (estimated)[2]	76,971	76,999
Natural gas		
Total annual marketed production (MMCF)[1]	1,412,952	1,397,400
Value ($1,000)[1]	202,052	201,226
Total number of gas and gas-condensate wells[2]	7,726	8,144
Natural-gas liquids		
Total annual marketed production (1,000 gals)[1]	1,574,538	1,634,220
Value ($1,000)[1]	85,122	86,857

[1]Item for 1967 is U. S. Bureau of Mines final figure. Item for 1968 is U. S. Bureau of Mines preliminary figure.

[2]World Oil, annual forecast and review issue, vol. 168, no. 3, February 15, 1969.

nationwide, Oklahoma leading in the gain with 266 thousand barrels per day.

The same API committee estimated ultimate recoveries according to reservoir lithology and type of entrapment. Oklahoma estimates are as follows:

	ESTIMATED ULTIMATE RECOVERY	RESERVOIR LITHOLOGY		TYPE ENTRAPMENT	
		SANDSTONE (%)	CARBONATE (%)	STRATIGRAPHIC (%)	STRUCTURAL (%)
Crude oil (1,000 bbls)	11,223,654	92	8	52	48
Natural gas (MMCF)	49,345,416	76	24	69	31

Oklahoma continues to rank third in the nation in production and estimated reserves of natural gas and fourth in reserves and production of crude oil.

Flood-Prone Areas in Urban Oklahoma

The favorable topography and convenient access to waterways provided by flood plains has led to the concentration of a large percentage of the nation's population and tangible property in flood-prone areas. Despite the fact that a stream may spill out of its banks almost every other year on the average, the increasing value of the land needed for a growing urban population has lead to a progressive occupation of such areas. Zoning, flood-proofing, channel-improvement, flood-control, and other methods have been used to minimize the risk of occupancy, but flood losses continue to mount as man's works encroach upon and even obstruct nature's floodways.

In recognition of this problem, the U. S. Congress recently recommended a nationwide, three-phase program:

1. An inventory of cities having flood problems.
2. Delineation of principal flood-prone areas by the U. S. Geological Survey.
3. Preparation of detailed reports and maps on flood hazards by the U. S. Army Corps of Engineers.

The Oklahoma part of the second phase was initiated by the Oklahoma District Office of the U. S. G. S. Water Resources Division during the past year, and maps of the flood-prone areas in the vicinity of Oklahoma City and Tulsa have been completed. Work is continuing on maps for several other cities of more than 2,500 population for which topographic maps are available. Generally, the maps show the flood boundaries of the larger rivers in an urban area; however, the information is also given for smaller streams that have drainage areas of 25 square miles or more.

The maps are on U. S. G. S. 7½-minute topographic bases, printed in black and white. The following quadrangles have been completed:

Oklahoma City	**Tulsa**
Arcadia	Avant SE
Bethany	Bixby
Bethany NE	Collinsville
Britton	Jenks
Edmond	Leonard
Jones	Mingo
Midwest City	Sand Springs
Mustang	Sapulpa N
Oklahoma City	Sperry
Piedmont	Tulsa
Spencer	Wekiwa

In the Oklahoma City area, the major streams for which flood boundaries are shown are the North Canadian River and Deep Fork. North Canadian tributaries that have occasional flooding are Mustang and Crutcho Creeks; flood-prone Deep Fork tributaries are Coffee, Soldier, and Coon Creeks, northeast of the city. Also shown on the maps are flood-prone areas in the Cimarron River drainage north of the city along Deer, Walnut, Bluff, and Chisholm Creeks.

The main flood-prone areas in the vicinity of Tulsa are along the Arkansas River and three of its tributaries, Polecat, Snake, and Duck Creeks. North of Tulsa, in the Verdigris River drainage, Bird Creek, with several of its tributaries, and Caney River are shown to have large flood-prone areas.

Only a limited number of the maps has been printed, but copies are available to interested organizations at the offices of the U. S. Geological Survey, Room 4301, Federal Building, 200 NW 4th St., Oklahoma City 73102, or at the Oklahoma Geological Survey, The University of Oklahoma, 830 South Oval, Room 163, Norman, Oklahoma 73069.

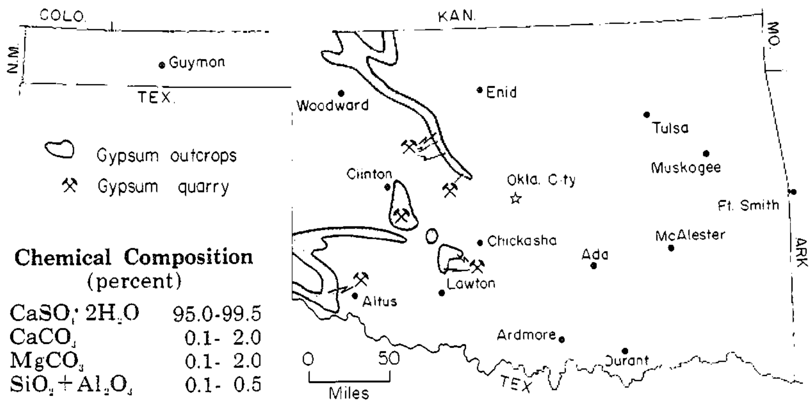
Oklahoma Mineral Raw Materials for Chemical Industry (Exclusive of Petroleum and Coal)

Kenneth S. Johnson

Oklahoma has vast reserves of certain high-purity minerals suitable as raw material for various chemical industries. Major deposits of limestone, dolomite, and silica sand are in the south-central and eastern parts of the State, whereas gypsum and salt are widespread in the west. These resources are currently being worked on a limited scale, chiefly for nonchemical products. However, ample room for major expansion into chemical fields is available, with potential sources for caustic soda, soda ash, chlorine, sulfur, sulfuric acid, lime, sodium silicate, and other chemical products. Oil, natural gas, and water are plentiful in most parts of the State, and bituminous coal is abundant in eastern Oklahoma. Most mineral deposits are near railroads (fig. 2). Completion of the Arkansas River navigation project in 1970 or 1971 will open eastern Oklahoma to low-cost barge transportation on the Mississippi River.

GYPSUM

High-purity gypsum is widely distributed in western Oklahoma (fig. 1) and is now quarried at eight localities for manufacture of wallboard, plasters, and portland cement. Much of the stone has a purity of 97 to 99 percent gypsum, with calcium and magnesium carbonates being the chief impurities. Mineable beds of gypsum are 10 to 100 feet thick and are nearly horizontal. They extend for miles along the outcrop and, in many sections of land, would yield 25 to 50 million tons of stone from beneath little or no overburden. Total reserves in the State within 100 feet of the surface are estimated at 50 billion short



Chemical Composition
(percent)

$CaSO_4 \cdot 2H_2O$	95.0-99.5
$CaCO_3$	0.1- 2.0
$MgCO_3$	0.1- 2.0
$SiO_2 + Al_2O_3$	0.1- 0.5

Figure 1. Distribution of gypsum deposits in Oklahoma. Estimated reserves are 50 billion tons in layers 10 to 100 feet thick with potential yields of 25 to 50 million tons per square mile. Potential uses: ammonium sulfur, sulfur, sulfuric acid.

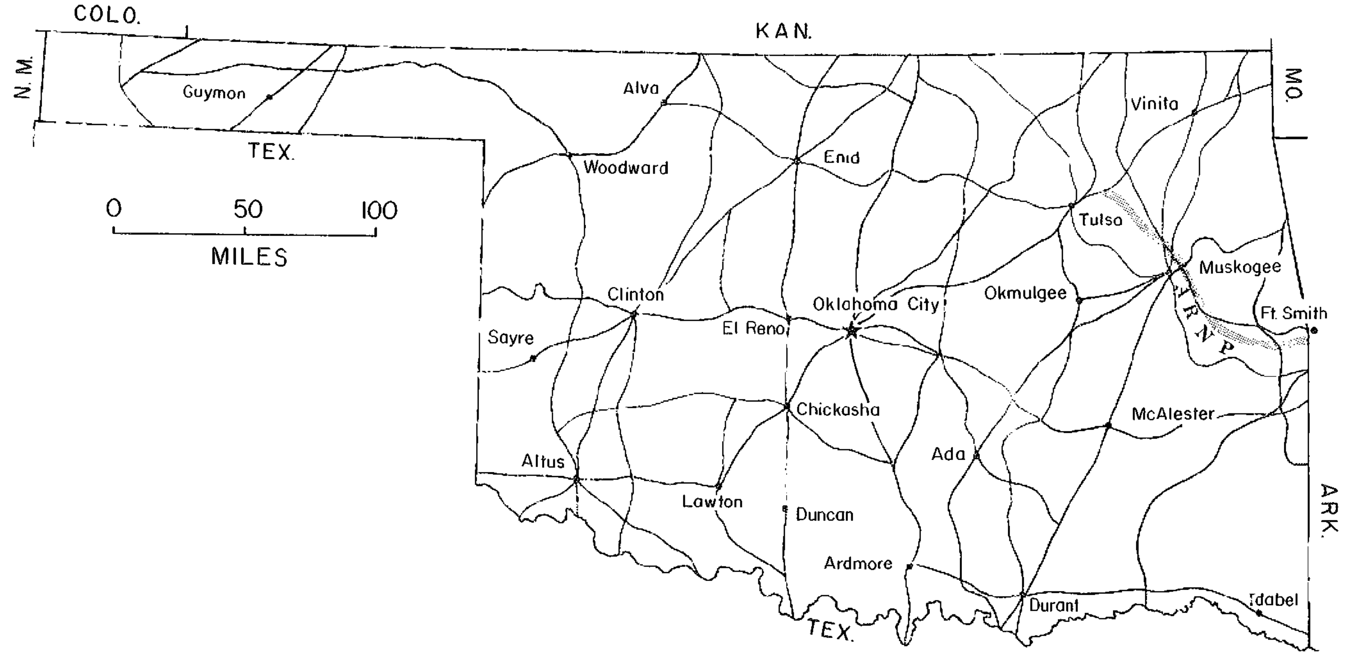


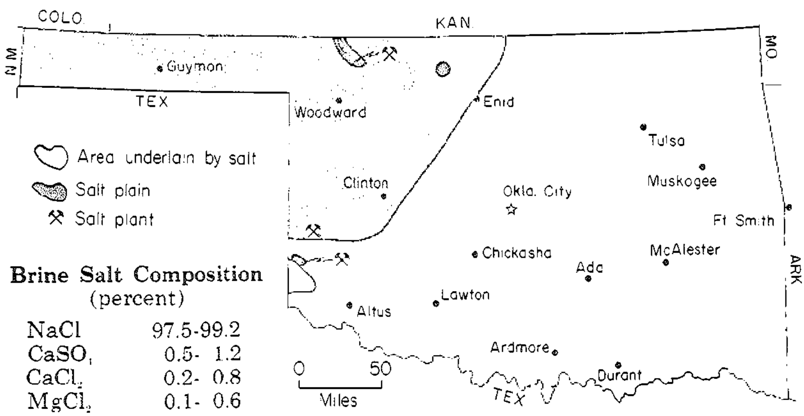
Figure 2. Map of Oklahoma showing network of railroads and location of Arkansas River Navigation Project (ARNP), which will be open to Mississippi River barge traffic in 1970 or 1971.

tons. Mineable anhydrite, in beds 10 to 50 feet thick, is locally present at shallow depth.

The future use of gypsum is undoubtedly in the chemical industries. The stone is the largest potential source of sulfur in the United States, pure gypsum being 18.6 percent sulfur and pure anhydrite, 23.5 percent sulfur. One plant is being built in the United States that will recover elemental sulfur from gypsum, whereas processes for making sulfuric acid and ammonium sulphate from anhydrite have been used in other parts of the world for many years. Either improved technology or increases in the price of sulfur, or both, should help make these processes generally competitive in the United States with the Frasch process for mining native sulfur.

SALT

Thick sequences of interbedded rock salt and shale underlie most of western Oklahoma at depths of 30 to several thousand feet below the Earth's surface (fig. 3). At several places brines nearly saturated with sodium chloride emerge from natural springs and form salt plains, and minor amounts of salt are currently produced from these brines for stockfeed and water softeners. Commercial salts produced from brines in Oklahoma are 97.5 to 99.2 percent NaCl, and minor quality-control



Brine Salt Composition
(percent)

NaCl	97.5-99.2
$CaSO_4$	0.5- 1.2
$CaCl_2$	0.2- 0.8
$MgCl_2$	0.1- 0.6

Figure 3. Distribution of salt deposits in Oklahoma. Estimated reserves are 20 trillion tons in layers 2 to 40 feet thick at depths of 30 to 3,000 feet. Potential uses: soda ash, caustic soda, hydrochloric acid, chlorine, sodium salts.

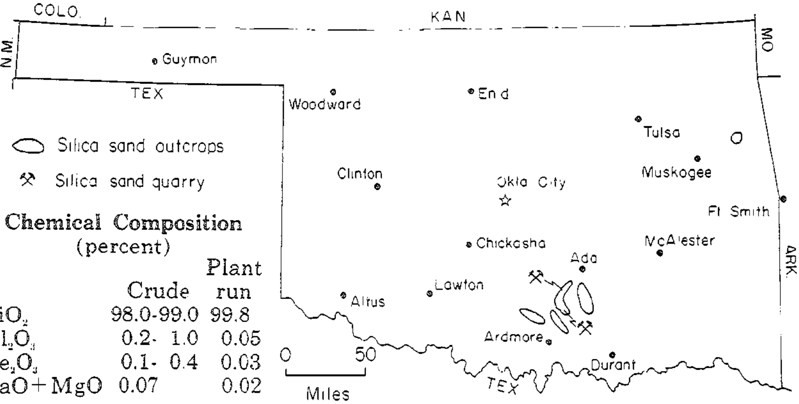
efforts would increase the purity markedly. Salt beds 20 to 25 feet thick were cored at one place and comprise 92 to 95 percent NaCl.

Statewide reserves are estimated at nearly 20 trillion short tons. Horizontal layers of rock salt 2 to 40 feet thick are open to either underground or solution mining. The semiarid climate and generally high winds of Oklahoma favor solar-evaporation production of salt from either natural or artificial brines.

Almost two-thirds of all salt produced in the United States is used in the chemical industries; about 40 percent of the total goes for making chlorine or hydrochloric acid and caustic soda, 20 percent for soda ash, and 5 percent for other chemicals.

SILICA SAND

Principal deposits of high-purity silica sand crop out in the Arbuckle Mountains of south-central Oklahoma and in a small area of northeastern Oklahoma (fig. 4). Loose sand, in gently to moderately



Chemical Composition
(percent)

	Crude	Plant run
SiO_2	98.0-99.0	99.8
Al_2O_3	0.2- 1.0	0.05
Fe_2O_3	0.1- 0.4	0.03
CaO+MgO	0.07	0.02

Figure 4. Distribution of silica sand in Oklahoma. Estimated reserves are nearly a billion tons in deposits up to 50 feet thick. Potential yields are 10 to 20 million tons per square mile. Potential uses: glass, sodium silicate, foundry sand, fiberglass.

dipping beds 150 to 400 feet thick, has been mined hydraulically in various parts of the Arbuckles since 1913; it has been used in making various types of glass and sodium silicate and also has been used as an abrasive and as foundry sand. These uses, along with the manufacture of fiberglass and silicon products, are the major potential uses of Oklahoma's high-purity silica sands.

Oklahoma's silica sands are generally 98 to 99 percent SiO_2, but these have been readily beneficiated to 99.8 percent SiO_2 with simple washing. They are beneath 5 to 20 feet of loose overburden. Total reserves are estimated at almost 1 billion short tons, and individual deposits comprise 10 to 20 million tons per square mile.

HIGH-CALCIUM LIMESTONE

Oklahoma has enormous reserves of limestone in the eastern and southern parts of the State, but most of the rock is insufficiently pure for making a good grade of lime. Figure 5 shows the vast outcrops of moderately pure limestone within which are sparse deposits of high-purity limestone (more than 95 percent $CaCO_3$). Magnesium carbonate is the chief impurity in most of the State's high-calcium limestones,

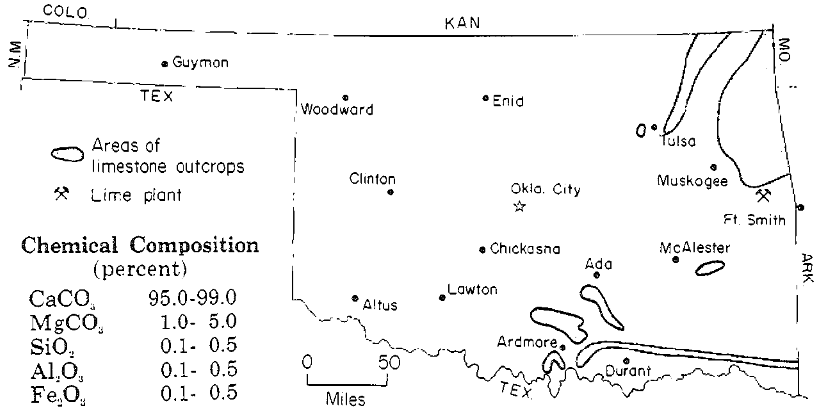


Figure 5. Distribution of high-calcium limestone in Oklahoma. Estimated reserves may be a billion tons or more in deposits 20 to 50 feet thick with potential yields of 25 to 50 million tons per square mile. Potential uses: lime, fluxing stone, soda ash, calcium carbide, glass manufacture.

with silica, iron, and alumina also being present in varying amounts.

Thicker beds of high-calcium limestone are 20 to 50 feet thick. Most deposits are nearly horizontal, are amenable to either stripping or underground mining, and may locally contain 25 to 50 million short tons of stone per square mile.

High-calcium limestone is used principally in making lime, soda ash, calcium carbide, and glass and as a fluxing material in metallurgy.

HIGH-PURITY DOLOMITE

Major deposits of dolomite more than 95 percent pure are centered

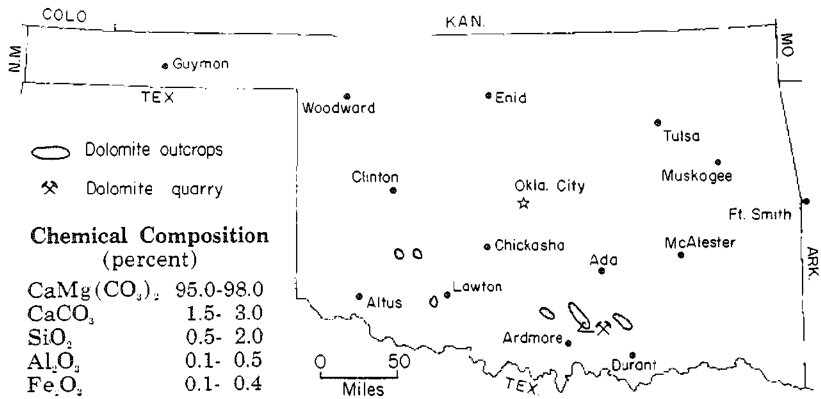


Figure 6. Distribution of high-purity dolomite in Oklahoma. Estimated reserves are several hundred million tons in deposits 20 to 50 feet thick with potential yields of 25 to 50 million tons per square mile. Potential uses: lime, fluxing stone, refractories, glass manufacture.

in the Arbuckle Mountains, and possibly other large deposits exist farther west in the Wichita Mountains (fig. 6). A single mine is now processing stone for glass manufacture. Dolomite beds are 20 to 50 feet thick and could be mined above or below ground from deposits locally containing 25 to 50 million short tons per square mile.

Potential uses of Oklahoma stone, in addition to glass manufacture, include refractories, fluxing stone, and lime.

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Ham, W. E., 1949, Geology and dolomite resources, Mill Creek-Ravia area, Johnston County, Oklahoma: Okla. Geol. Survey, Circ. 26, 104 p.

Wanted: Sooner Geologists

Graduates in geology from The University of Oklahoma may not be aware of a relatively new semiannual publication, *Sooner Geologist*, from the School of Geology and Geophysics. This alumni magazine contains features on activities and developments at the school and on campus, information about the Oklahoma Geological Survey, and a large section on alumni news.

Two regular features contain special interest for alumni. "Professors' Notebook" carries information on individual faculty members and new faculty appointments, and "Geology Alumni Notes" has the latest available news on personal and professional activities of geology alumni.

More than 3,000 graduates now receive *Sooner Geologist*, and their news provides the basis for the magazine. For further information and receipt of the *Sooner Geologist*, alumni may write to the School of Geology and Geophysics, The University of Oklahoma, 830 South Oval, Room 107, Norman, Oklahoma 73069.

NOTE

The picture of the East Timbered Hills that appeared on the cover of the June 1969 issue of **Oklahoma Geology Notes** is copyrighted by F. A. Melton. The proper acknowledgment was inadvertently omitted.

OKLAHOMA ABSTRACTS

THE UNIVERSITY OF OKLAHOMA

Effect of Diagenesis Upon Clay-Mineral Content of Interlaminated Desmoinesian Sandstones and Shales in Oklahoma

DAVID P. BUCKE, JR., The University of Oklahoma, Ph.D. Dissertation, 1969

Closely interlaminated sandstones and shales from Desmoinesian deltaic strata have been investigated to determine the relative importance of diagenetic and detrital origin of constituent clay minerals. Close association of the two lithologic types eliminates many parameters that could otherwise have varying effects upon mineral content. Subsurface samples were studied using various x-ray-diffraction and x-ray-fluorescence techniques in addition to thin-section observation.

Authigenic mineral formation is quantitatively unimportant. Bulk chemical analyses show little variance between sands and shales other than those associated with expected detrital differences. Permeability is the basic factor controlling the amount of diagenesis that occurs.

Consistent differences in relative amounts of chlorite, illite, and kaolinite are present between sands and shales. Illite and chlorite are of detrital origin, whereas a significant portion of the kaolinite has been formed diagenetically. Illite is the dominant clay mineral in all shales and most sands investigated but is relatively more abundant in shales and in finer size fractions of both sands and shales. Chlorite distribution is variable, not directly related to grain size, because this mineral is present both as clay and in metamorphic rock fragments. Kaolinite is a much more important constituent in sands, a difference attributed to authigenic formation of this mineral in the more permeable sands.

Authigenic kaolinite formation was possible because four coexisting factors were present—organic material to help maintain a low pH through bacterial activity, potassium feldspars as a source of aluminum and silicon, partly degraded illite as an efficient "sink" for potassium released during feldspar decomposition, and water-filled pore space allowing aqueous-solution chemistry to proceed and to provide growth space for the kaolinite. The formation of authigenic kaolinite did not require long-distance transport of necessary ions, all ingredients being present in situ.

Additional minerals were formed during diagenesis, especially in the sands. The sequence of formation of these authigenic components is quartz overgrowths, kaolinite, calcite, dolomite, and finally pyrite-siderite. An additional initial authigenic mineral, "hydrotroilite," is proposed.

OKLAHOMA ABSTRACTS is intended to present abstracts of recent unpublished papers on Oklahoma geology. The editors are therefore interested in obtaining abstracts of formally presented or approved documents, such as dissertations, theses, and papers presented at professional meetings, that have not yet been published.

Columbia University

Stratigraphy and Structure, Part of Athens Plateau, Southern Ouachitas, Arkansas

BENNIE HARRELL WALTHALL, Columbia University, Ph.D. dissertation, 1966

Upper Mississippian-Lower Pennsylvanian flysch deposits of the frontal and central Ouachitas of Oklahoma and the Athens Plateau of Arkansas are amenable to common stratigraphic subdivisions and nomenclature. Regional comparisons show the Jackfork to coarsen and thicken to the south and southeast. Several fossil-mold zones occur within the Jackfork of the Athens Plateau. Faunas collected from the Johns Valley and basal Atoka sandstones establish an early Morrowan age for those rocks.

A narrow, east-west trending geosyncline situated between the craton and an unidentified southerly positioned landmass was the site of the deposition of the Late Paleozoic flysch sequence of the Ouachitas and the Athens Plateau. The interbedded relationship between the deep-water shales and the shallow-water subgraywackes is attributed to masses of unconsolidated sand slumping from a nearshore, shallow-water environment into deeper water. Rock fragments contained in some subgraywackes establish a metamorphic terrain as the provenance of these clastics.

Structurally, the area under investigation is a series of ruptured east-west trending folds. Fault blocks derived from rupturing of the anticlines have ridden forward, to the north, destroying the simpler structures. These faults, like the "thrusts" on the north flank of the Ouachitas, dip steeply southward. Strike-slip movement, if present, is minor.

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