MINERAL MAP OF OKLAHOMA

(Exclusive of oil and gas fields)

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Oklahoma's mineral wealth is tremendous and is evenly distributed throughout the State. Numerous and varied mineral industries are active in 76 of the 77 counties, and oil and gas have been produced in 73 counties. The annual mineral production of Oklahoma is valued at more than $1 billion, nearly 5 percent that of the entire United States, and the State is the fourth leading mineral producer in the nation. Total production since statehood (1907) is valued in excess of $26 billion. Oklahoma is well known as an oil state, and petroleum (including crude oil, natural gas, and natural-gas liquids) accounts for about 93 percent of the State's yearly mineral output. However, nonpetroleum mineral resources represent a vast reserve of future wealth. Among the leading nonpetroleum resources being produced are cement, coal, copper, granite, gypsum, helium, sand and gravel, stone (limestone, dolomite, sandstone, and chat), and zinc. Of somewhat lesser current value is production of bentonite, clays, glass sand, lead, lime, salt, silver, tripoli, and volcanic ash. Untapped resources include iron, manganese, titanium, and uranium. The State also has large stores of surface and underground water. Oklahoma ranks third among the states in production of liquefied-petroleum gas, third in natural gas, third in helium, fourth in crude oil, and fifth in gypsum.

Numbers in parentheses refer to publications (listed below) containing the best available information on geology, distribution, and/or economic development of the various mineral resources.

Aluminum

Anorthosite in the Wichita Mountains is a potential low-grade source of aluminum. Deposits in Kiowa and Comanche Counties include 3 billion tons of anorthosite (28 percent Al_2O_3) and much lesser reserves of partly kaolinized anorthosite with 20 to 30 percent Al_2O_3. Utilization of these low-grade deposits must await development of economic extraction processes. (51)

Asphaltic Material

Oklahoma has large reserves of natural rock asphalt and has produced about 3 million tons between 1891 and 1960, chiefly from the Arbuckle Mountain region. Principal deposits are petroleum-impregnated sandstone and limestone, but deposits of the asphaltites gilsonite and impsonite have also been quarried. Asphaltic oil sands are widespread throughout southeastern Okla. and have been mined to a depth of 500 feet. Deposits of asphaltite and oil seeps. Petroleum refineries now produce the large quantities of asphaltic material needed for road construction and maintenance, and all natural-rock-asphalt quarries are currently inactive. (18, 19, 24, 33)

Barite

see MISCELLANEOUS MINERALS

Bentonite

A number of small deposits of bentonitic clay (montmorillonite) are associated with, and altered from, Tertiary and Pleistocene VOLCANIC ASH, mainly in northwestern Oklahoma. One mine currently operating in Dewey County produces bentonite for use as an adsorbent clay.(2)

Celestite

see MISCELLANEOUS MINERALS

Cement

Oklahoma has abundant raw materials (LIMESTONE and CLAY) for portland-cement manufacture. Three plants are presently operating in Mayes, Pontotoc, and Rogers Counties, with a total annual capacity of nearly 9 million barrels of cement.

Chat

Chat, which consists of crushed chert, LIMESTONE, and DOLOMITE, is produced as a byproduct of milling LEAD-ZINC ores. The material is used extensively as road metal, railroad ballast, and concrete aggregate. At present there are six distributors, all of them in the LEAD-ZINC district of northern Ottawa County.

Chemicals

Basic chemicals produced from raw materials in Oklahoma include the following: ammonia, benzene, calcium carbide, carbon black, carbon dioxide, corrosion inhibitors, emulsifying agents, propylene tetramer, sodium salt, sulfur, sulfuric acid, toluene, and urea. Most of these are petrochemicals derived from petroleum or natural gas. Abundance of natural gas, petroleum, brines, and other raw materials in the State favor the expansion of chemical industries.

COMPANY	COUNTY	PRODUCTS
Cherokee Nitrogen Co.	Mayes	Ammonia
Continental Carbon Co.	Ken	Carbon black
Kerr-McGee Chemical Co.	Pontotoc	Carbon dioxide (by-product)
Midwest Carbide Corp.	Mayes	Calcium carbide
National Farm Corp.	Marshall	Sulfur
National Zinc Co.	Washington	Sulfuric acid (by-product)
Nipak, Inc.	Mayes	Ammonia and urea
Stauffer Chemical Co.	Tulsa	Petrochemicals
Sinclair-Koppers Co.	Tulsa	Petrochemicals
Sunray DX Oil Co. (2 plants)	Stephens	Petrochemicals
	Tulsa	Petrochemicals

Clay and Shale

Clay and shale are present in almost every county in Oklahoma, and deposits suitable for manufacture of common red brick and hollow tile are widely distributed. Light-firing clays and low-grade refractory clays are present at a few localities. Clay, which on heating expands to make a lightweight aggregate, is widely distributed in the eastern half of the State. Other uses for Oklahoma clays are in making CEMENT, pottery, and ceramics. A special type of clay, BENTONITE, is present in western Oklahoma. Products currently being manufactured are brick and tile (13 plants), pottery (5 plants), and expanded clay (2 plants). These plants are located in Canadian, Creek, Custer, Grer, Oklahoma, Pontotoc, Rogers, Seminole, Tulsa, Wagoner, and Woodward Counties. (7, 35, 44, 45).

Coal

Oklahoma's vast reserves of bituminous coal range from low volatile to high volatile and are used mainly for coke. About 200 million tons of coal have been produced from hundreds of mines since mining began in 1872, and 14 mines are currently operating in Craig, Haskell, Latimer, Le Flore, Muskogee, Okmulgee, and Rogers Counties. In the large eastern Oklahoma coal field are Pennsylvanian (Desmoinesian and Missourian) coals 2 to 8 feet thick and at depths shallow enough for strip-, slope-, or shaft-mining. Other deposits in the State are a steep-dipping Pennsylvanian bituminous coal 3 to 4 feet thick in Carter County and Cretaceous lignites 6 to 18 inches thick in Bryan and Cimarron Counties. (17, 50)

Copper

Scattered occurrences of copper minerals in the Permian "redbeds" of western Oklahoma have been known for more than a century. Most deposits are small and consist of chalcocite and malachite as encrustations, impregnations, veinlets, or small nodules in shale and sandstone, and several early attempts at copper mining on this type of deposit were unsuccessful. Other occurrences of copper minerals are in the Ouachita Mountains, where chalcopyrite is present in quartz veins. Thin but extensive copper shales, containing 1 to 3 percent copper and some SILVER values, are now mined at two places in the southwest (Greer and Jackson Counties), and the concentrates are shipped to El Paso, Texas. (27, 31, 37)

Diatomite

see MISCELLANEOUS MINERALS

Dimension Stone

Oklahoma has a variety of SANDSTONES, LIMESTONES, and DOLOMITES suitable for building and for ornamental purposes, and native stone has been used extensively in residence and building construction. The quality of some sandstones in eastern Oklahoma compares favorably with any in the nation, and several of the limestones and dolomites have unusual beauty and texture. At present there are eight active quarries scattered in the southern half of the State (Caddo, Haskell, Jackson, McCurtain, Pontotoc, and Pushmataha Counties), and most of them produce crushed stone in addition to dimension stone.

Dolomite

Enormous reserves of high-purity Cambrian dolomite are in the Arbuckle Mountains and are being worked at a single quarry in Johnston County. Smaller deposits or thinner beds, generally of lower purity, are known in the Wichita Mountains, in Delaware and Osage Counties, and in widely scattered parts of western Oklahoma; these deposits are worked at three quarries for DIMENSION STONE (Caddo and Jackson Counties) and at three quarries for crushed stone (Caddo, Kiowa, and Osage Counties). Current and potential uses of dolomite are for fluxing stone, glass manufacture, refractories, dolomitic lime, magnesium metal, fertilizers, and feeds and as a soil conditioner. (4, 22, 48)

Germanium

Germanium is recovered at a germanium-processing plant (Ottawa County) from residue supplied by several ZINC smelters in northeastern Oklahoma.

Glass Sand

Large deposits of high-purity silica sand (Ordovician Simpson Group) are worked at two places (Johnston and Pontotoc Counties) in the Arbuckle Mountains region, with plant-run sands containing 99.6 percent silica and normally only 0.01 to 0.03 percent iron oxide. Sand almost as pure is in northeastern Oklahoma, and scattered exposures of Cretaceous sands with 98.5 to 99.5 percent silica are reported south of the Arbuckles. Alluvial sand is being specially treated in Muskogee County to produce a high-purity feldspathic sand for glass manufacture; the processed sand includes about 25 percent feldspar and less than 0.04 percent iron oxide. Twelve glass-manufacturing plants (in Creek, Le Flore, Muskogee, Okmulgee, Pontotoc, Sequoyah, and Tulsa Counties) annually produce about $30 million in glass products, including bottles, jars, window panes, tumblers, tableware, and pyrex glass. Sand is also shipped from the State for glass making, foundry sands, ceramics, and the manufacture of sodium silicate. One glass-sand plant produces ground silica for use in ceramics, abrasives, and inert filler. (3, 9, 21)

Granite

Granite and similar rocks of the Wichita and Arbuckle Mountains of southern Oklahoma are extensively produced for the monument and building trades, and crushed granite is produced in considerable quantity for building aggregate and rip-rap. Colors are red, pink, gray, and black, and the textures range from fine to coarse crystalline. At present five companies are regularly producing granite from 10 quarries in Comanche, Grer, Kiowa, and Johnston Counties. (49)

Ground Silica

see GLASS SAND

Gypsum

Enormous reserves of high-purity Permian gypsum crop out in western Oklahoma. Blaine gypsums are 5 to 87 feet thick in the northwest and southwest, and the Cloud Chief gypsum of Washita-Caddo Counties is 25-100 feet thick. Anhydrite crops out only locally but is present underground where overburden is 25-100 feet or more. Oklahoma ranks fifth among the United States in crude gypsum production (1966 figures), with almost 800,000 tons produced annually by eight companies in Blaine, Caddo, Canadian, Comanche, Jackson, and Washita Counties. Present uses are for plaster, for wallboard, as a retarder in portland cement, and as a soil conditioner. In the future it may be a source of sulfur. (14, 15, 25, 43, 47)

Helium

Helium is extracted from natural gas at the U.S. Bureau of Mines plant in Cimarron County, and the State ranks third in the nation in annual output. (42)

Iron

Small deposits of limonite are known in the Arbuckle Mountains, and they have been mined to a limited extent for making special cements. Numerous thin layers of ironstone nodules containing 40 to 45 percent iron occur in thick shales in Carter County. In the Wichita Mountains, titaniferous magnetite, perhaps in minable amounts, is associated with gabbro, and small amounts of low grade hematite have been used as paint pigment. (11, 36, 38)

Lead-Zinc

Approximately 1.3 million tons of lead and 3.2 million tons of zinc have been produced in Ottawa County since 1891, and Oklahoma led the United States in zinc production almost every year from 1918 through 1945. With depletion of the higher grade ores and decline of the market price, Oklahoma production is far below that of former years but appears to be fairly steady. Sixteen mines are now operating, all in northern Ottawa County. The ores, galena and sphalerite, occur together in mineralized zones in the Mississippian Boone Formation. Other deposits of lead and/or zinc are in the Ouachita, Arbuckle, and Wichita Mountains. Three zinc smelters operate in the State (Kay, Okmulgee, and Washington Counties), with cadmium, indium, and GERMANIUM as by-products. Sulfuric acid is also recovered at one smelter. (6, 31, 46, 54)

Lime

Quicklime, made by calcining high-purity LIMESTONE, has many chemical and industrial uses, as well as being used in building and agriculture. High-calcium limestone is being mined to produce lime in Sequoyah County, and other deposits of high purity are in northeastern, south-central, and southeastern Oklahoma. (12, 13, 26, 53)

Limestone

Limestone is abundant in northeastern Oklahoma, in the Wichita and Arbuckle Mountain areas, and in southeastern Oklahoma. It is used mainly as aggregate (crushed stone) in building roads and in other construction but is also used in making CEMENT, DIMENSION STONE, and chemical-grade LIME. In western and Panhandle districts extensive deposits of caliche are acceptable substitutes for some purposes, and at other places DOLOMITE is quarried for crushed stone. At present 23 companies are quarrying limestone for various purposes at 27 places in Atoka, Carter, Cherokee, Choctaw, Coal, Kay, Kiowa, Murray, Nowata, Osage, Pittsburg, Seminole, Sequoyah, Texas, Tulsa, and Washington Counties. (1, 12, 13, 23, 26, 32, 52, 53)

Manganese

Small deposits of manganese oxide occur in the eastern Arbuckle Mountains and eastern Ouachita Mountains. (29, 31, 39)

Phosphate

see MISCELLANEOUS MINERALS

Quartz

see MISCELLANEOUS MINERALS

Salt

Thick sequences of rock salt (NaCl) underlie most of western Oklahoma at depths ranging from 30 feet to more than 3,000 feet. Individual salt beds are 5 to 25 feet thick and are interbedded with thinner layers of shale and anhydrite. The several salt plants in the State are fed by natural brine springs. Oklahoma's vast reserves, estimated at 20 million million tons, are virtually untapped. Current production, coming from two solar-evaporation plants in Harmon and Woods Counties, is used mainly for stockfeed and water softening. Current and past major potential uses include chemical industries, highway, caustic soda, soda ash, and sodium), human consumption, and snow removal. Underground storage facilities are easily and economically made by dissolving salt and forming cavities in salt beds. (34, 47)

Sand and Gravel

Sand and gravel are available in almost all parts of Oklahoma. Principal deposits are along present-day major rivers, in terrace-like remnants of Pleistocene river beds, and in Tertiary deposits covering much of the northwest. Gravels are common in the western third of the State, in and around the Wichita and Arbuckle Mountains, and in Cretaceous rocks south of the Arbuckle and Ouachita Mountains. At present, 62 companies are operating more than 80 quarries in about three-fourths of the counties, with an annual output of about 6 million tons of material valued at about $7.5 million.

Sandstone

Sandstone is a common rock type in almost all parts of Oklahoma. Deposits in the eastern half of the State are mostly hard and are gray, brown, or buff, and some are suitable for DIMENSION STONE or aggregate. Those in the western half of the State are mostly soft or loose, are reddish-brown, and are only locally suitable for building material. Sandstone is quarried as dimension stone in Haskell and Pushmataha Counties.

Silver

Silver is recovered from concentrates of COPPER ores mined in southwestern Oklahoma and has been recovered from or reported in several other "redbeds" copper deposits in the past.

Titanium

Titanium occurs in ilmenite in alluvial sands around the Wichita Mountains, with some of the sands containing 3 to 7 percent ilmenite. Lower grade deposits of titaniferous magnetite are mentioned under IRON resources. (11, 20, 36)

Tripoli

Major deposits of tripoli, a lightweight, soft form of silica rock used chiefly as an abrasive, are being mined by two companies in Ottawa County. Smaller deposits are in nearby Cherokee, Craig, and Mayes Counties (2, 41)

Uranium

Uranium, mostly disseminated in gray sandstones and gray to black shales, occurs in small low-grade deposits scattered in southwestern and south-central Oklahoma and in Pawnee County. Shows on the map are those deposits containing 0.01 to about 1.0 percent uranium as well as several places where crude oil or asphalt contain much more than normal amounts of uranium. (5, 16, 30)

Volcanic Ash

Large deposits of uncemented Tertiary and Pleistocene volcanic ash occur in western and east-central Oklahoma. Some ash deposits are altered in part to BENTONITE. Volcanic ash is used as an abrasive and as an admixture in pozzolan cement, and it is suitable as an insulating compound. Two quarries are operating in Beaver and Custer Counties. (2, 8, 10)

Zinc

see LEAD-ZINC

Miscellaneous Minerals

Several other minerals are present in small or very large deposits.

Barite nodules, veins, and concretions are sparse in some shales and sandstones south of the Wichita Mountains and in central and south-central Oklahoma. At a few localities there are surface concentrations of high-grade nodules that have possibilities for limited production. (28)

Celestite and minor amounts of strontianite are associated with dolomite and sandstone in eastern Washita and Custer Counties, but these deposits are apparently not economic.

Diatomite deposits are small and of low grade and are widely scattered in western Oklahoma.

Phosphate occurs as nodules, plates, and lenses in several limestones and black shales of eastern Oklahoma and the Arbuckle Mountains. The P_2O_5 content of nodules and plates is generally 15 to 30 percent, whereas that of the whole rock is commonly 1 to 10 percent. (40)

Quartz occurs as large vein deposits in the Ouachita Mountains, especially in central McCurtain County. (31)

MAP SYMBOLS

Map symbols showing mines, plants, and mineral deposits. Dot at edge of symbol gives location. Company name is alongside symbol of active mines and plants. Compiled from published sources and information in the files of the Oklahoma Geological Survey and the U.S. Bureau of Mines. Information posted December 1968: subsequent changes in ownership and locations of mines and plants are given in annual *Directory of Mineral Producers in Oklahoma.*

- Open-face quarry or pit (active).
- Underground mine (active).
- Plant: where not located at mine, quarry, or pit.
- Inactive mine, quarry, or pit (the numerous inactive coal mines and sand-gravel pits are not shown).
- Prospect or mineral deposit (includes inactive sand and gravel pits).

COAL

Approximate area where coal-bearing rocks crop out or are within 3,000 feet of the surface.

DOLOMITE

Principal outcrops of dolomite; narrow outcrops or thin beds shown by dashed line.

GLASS SAND

Approximate outcrops of high-purity quartz sand suitable for glass manufacture.

GRANITE

Outcrops of granite and related igneous rocks.

GYPSUM

Principal outcrops of thick gypsum beds.

LEAD-ZINC

Area of lead and zinc production in Tri-State district.

LIMESTONE

Principal outcrops of limestone; narrow outcrops or thin beds shown by solid line.

SALT

Approximate area underlain by salt (light green); numbers indicate depth (in feet) to top of shallowest salt bed; salt plains shown by dark green.

Black symbols: nonmetallic deposits

Purple symbols: metallic deposits

Red symbols: asphalt and coal deposits

- Al Aluminum
- As Asphalt
- Be Bentonite
- Ce Cement
- Ch Chat
- Ch Chemicals
- Cl Clay
  - Cb Brick
  - Ce Expanding clay
  - Cs Fire clay
  - Cr Refractory or light-firing clay
- Co Coal
- Cu Copper
- Di Dimension stone
  - Dd Dolomite
  - Dl Limestone
  - Ds Sandstone
- Do Dolomite
- Ge Germanium
- Gp Glass plant
- Gs Glass sand
- Gr Granite
- Gy Gypsum
- He Helium
- Ir Iron
  - Ih Hematite
  - Il Limonite
  - Im Magnetite
- La Lead
- Ld Lead-Zinc
- Le Lime
- Ls Limestone
- Mn Manganese
- Sa Salt
- Sa Sand and gravel
- Ti Titanium
- Tr Tripoli
- U Uranium
- V Volcanic ash
- Zn Zinc

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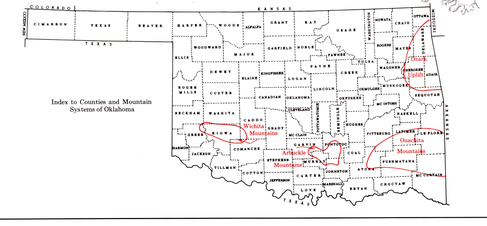
Index to Counties and Mountain Systems of Oklahoma



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