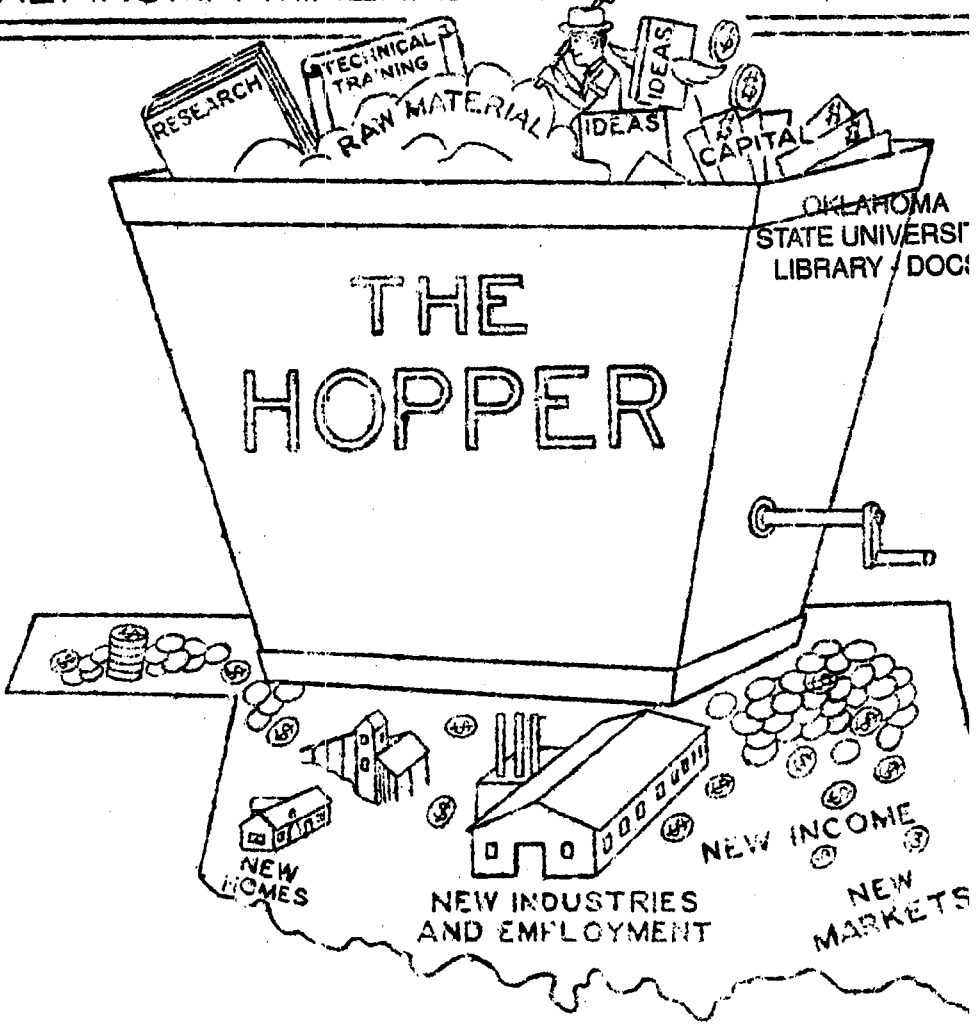
OKLAHOMA MINERAL INDUSTRIES CONFERI



PUBLISHED IN THE OFFICE OF THE
OKLAHOMA GEOLOGICAL SURVEY
Vol. VIII, No. 12 NORMAN, OKLA. December, 1948

FROM THE SURVEY STAFF

OKLAHOMA MINERALS
THE LIFE BLOOD OF KEY INDUSTRIES

By
S. B. Irelan, President
Cities Service Gas Company
(Address delivered at the Oklahoma Industrial and Mineral Industries Conference, October 12, 1948)

I was pleased to accept the invitation to appear before this Conference. My interests have always been connected with minerals—directly or indirectly. To me, minerals and natural resources are synonymous, although it is realized that the term "natural resources" is the broader.

The life blood of key industries everywhere consists of plentiful and cheap fuels combined with abundant necessary raw materials. Oklahoma has them all. With these resources Oklahoma can become an industrial manufacturing state.

Viewed in the broad sense, minerals or rather natural resources could be subdivided into three classifications:

(1) Those in the land which assist in the creation, growth and maintenance of all life.

(2) Water is a mineral-bearing natural resource. It enters into and plays a frequently underestimated part in every activity and the growth of all life. Water is the earth's full time gatherer, transporter, and depositor of minerals.

(3) Those deposited within the earth's crust and which are mined in various ways and used as raw materials in the multitudinous manufacturing processes that are often highly technical and unbelievably expensive. These, among others, are commonly referred to as natural resources.

These minerals, however, are seldom used in their natural state. The labor, ingenuity, and inventive genius of man are more and more required to

make those things with which minerals are associated, or the minerals themselves useful.

From one point of view, the earth's total store of minerals decreases very slowly, if at all. The part where we live was once covered by the sea and during that time various mineral deposits were made. Now, other parts, where people, plants and animals may have formerly lived are under the oceans. Mineral deposits are known to be in present oceans and even now are being deposited out of the water from vegetable and animal life. Some of these presently underwater areas will, no doubt, emerge to support plant, animal and mineral life, so that over the ages total mineral stores of the earth could remain constant or might even increase.

These three sub-divisions of minerals will be further considered in the order in which they have been mentioned.

(1) Those contained in the land.

Earliest history speaks of corn as food for men and animals. Until comparatively recent years when a field became too poor to raise a satisfactory crop, people abandoned that field and cleared other virgin soil to start all over again. We now fertilize that original field by adding minerals such as lime, potash, and other manufactured materials commonly called phosphates.

(2) Water - mineral-bearing natural resource.

Cutting of too much timber without planting sufficient replacements, plowing millions of acres of land that should probably have remained in native grasses, and farming methods which fail to preserve and hold the land in place have allowed water to carry to the sea enormous amounts of our rich top soil along with minerals contained in it.

(3) Minerals mined from the earth--more commonly called Natural Resources.

Class 1. Those occurring in great abundance in most places, whose utilization is dependent chiefly on local market and generally on a supply

of fuel. Examples include lead, zinc, cement materials, brick shales, sand and gravel, and crushed stone. Finished products generally have a low unit value.

Class 2. Those minerals that are very rare on the earth, yet which have such desirable properties that deposits will be worked even though not located near consuming centers, nor close to cheap fuel and power. Such minerals command a relatively high unit price. We may cite as examples optical grade calcite for microscopes, titanium minerals like rutile, refractories like chromite, and beryllium minerals such as beryl. Rarely, are large industries or groups of industries established in an area because of the occurrence of any one of these minerals.

Class 3. Minerals of certain specifications that are relatively rare, but which are absolutely necessary in a vast array of chemical, metallurgical, and other industries. Those areas having an abundance of these resources, especially if abundant fuel for processing is conveniently located, are particularly favored for industrialization. Chemical grade limestone, high purity silica sands, coking coals and kaolinite china clays are good examples.

In Class I we fine materials which, although having a low unit value, are the highly essential backbones and ribs of the construction industries. Abundance of these materials and the ease with which they can be mined and processed with cheap fuel and power, have a direct bearing on the economic welfare of any region, and certainly no state can be really prosperous without them. Conversely, it may be said that growth and activity of construction faithfully reflects regional prosperity.

Oklahoma not only has these materials in abundance but has been producing them at an annual value of about ten million dollars in recent years with every reason to believe that only the surface has been scratched in our vast reserves. In this

category we produce cement, crushed stone, gypsum, sand and gravel, brick shales, and mineral wool for insulation. We have two cement plants, two gypsum plants, twelve brick plants, and a host of producers of crushed stone, sand, and gravel. In mineral wool we have one producer but plans have been laid for a second and much larger plant.

As for reserves, sand and gravel, construction stone, brick shale, and mineral wool materials are widely distributed throughout Oklahoma; gypsum is abundant in western Oklahoma; and cement materials are available in the eastern half of the State. For most of these raw materials quantity available is so large that no attempt has been made to calculate tonnage of reserves for the State as a whole. For gypsum such an estimate has been made, and it reaches the astronomical figure of 125 billion tons.

From the above list we can pick four--cement, gypsum, brick shales, and mineral wool, that require a cheap fuel for processing the raw material into valuable consumer products and intermediates. Here in Oklahoma we have used natural gas because it is convenient and cheap, but the important part for consideration is that the natural gas is actually available at prices below the costs of fuels that sometimes compete with it and forms, with the raw materials, a sound and mutually advantageous partnership. Without natural gas it is probable that our production of these materials would be scarcely half its present value and there would be little prospects for future development.

What about prospects for future development? We can say at once that it does not depend altogether on quantity or availability of raw materials. It depends on general trends in construction industries which in turn depend on general prosperity, population growth, and the attitude of the people and government toward encouragement of industry. Happily we can say that our state administrations

have in recent years been aggressive in promoting better conditions for industry, with the result that industrial growth is now on a sound basis.

In Class 2 are those minerals that are so rare that they are listed as strategic or critical in today's unsettled world. Radio-grade quartz, sheet mica, long-fiber asbestos, and industrial diamonds may be added to the ones cited. Oklahoma, like most other states, has few of these, so that they offer little probability for future development. One notable exception is grahamite, a solid hydrocarbon found as veins in the Ouachita Mountains, which can be used in making paints, and whose ash contains a relatively high percentage of vanadium.

If Oklahoma has few or no rare non-metallic minerals, and if the State has reached nearly its limit for producing the construction materials of Class 1 under existing conditions, what can we turn to for encouragement in future expansion? Obviously it must lie in the Class 3 minerals—those that possess certain chemical specifications, that occur in considerable abundance, and which are used in large amounts in numerous chemical and metallurgical industries. In this field Oklahoma has something definite to offer, real attractions for a group of industries that are just beginning to be established in this region. We point with pride to the following list of minerals that have already given us a start and that may well develop into the life blood of more key industries. These minerals are chemical grade limestone, coking coals, high purity silica sand, chemical grade dolomite, and salt.

The Oklahoma Geological Survey at Norman has performed a highly commendable work in compiling data covering the State's natural resources. The subject is too complex to be discussed here, but those desiring detailed information can obtain it through the Survey. I have found them to be very cooperative in supplying requested data.

As I have stated previously, my interests have been connected with natural resources, although my experience primarily has involved crude oil and natural gas. The solution of problems encountered in discovery, development, production, transportation and marketing of these two resources certainly is an enduring task. With the belief that many of you are interested in oil and gas, which are the most abundant and important minerals in our state, I present in Tables I-V, statistics showing the position held by the State of Oklahoma among her sister states and in the nation at large, in production and reserves. These are the largest reserves for any one date in the history of the oil business.

Wildcat drilling would proceed many times faster if sufficient tubular goods were available. Better distribution of refined products will come soon after sufficient steel can be obtained for additional transportation facilities.

Oil conservation practices are being developed and applied rapidly through cooperation between the industry and state governments. Aside from the period of World War II oil requirements, the oil business has not been burdened and harassed by Federal Regulation - thanks in large measure to the efficiency and indirect power of the Interstate Oil Compact Commission.

Not so many years ago any gas transportation company that had a safe supply to meet the peak requirements of domestic and commercial requirements of the coming winter was looked upon as a most fortunate one. Many companies seldom made that classification, others made it during mild winters and a few were regularly that successful. The latter were those having the foresight and financial ability to, and who did acquire large gas reserves in relation to their current and prospective markets. That was accomplished by the ownership of

gas producing properties, the acquisition of large reserves through the medium of long-term gas purchase contracts and, in the case of those gas transportation systems to which the addition of proper sized underground gas storage projects is a real operating asset, the ownership, development and wise use of such fields for meeting peak load and emergency needs.

The gas reserve picture is now vastly changed. At January 1, 1948, the estimated, proven, recoverable gas reserves of the entire United States was approximately a 37 years supply at the 1947 rate of gas production. (Table IV). The Oklahoma part of that reserve was nearly 7 percent of the total, something over a 22 year supply at the 1947 rate of its production. (Table V).

There is a total gas main trunk pipeline mileage in the entire United States of some 240,000 miles with over 14,000 additional miles on which applications for Certificates of Public Convenience and Necessity have been made to the Federal Power Commission. That 14,000 mile figure does not include lines being built by intrastate companies.

The total amount of gas sold in the United States increased from one trillion cubic feet in 1935 to four trillion cubic feet in 1947. This came about through the construction of trans-continental gas pipe lines to large seaboard cities both on the Atlantic and Pacific coasts, and to other large pipe lines serving the Great Lakes Area; the breakdown of coal supplies resulting from frequent and long strikes; the high fuel demands of war and insistent demand for more natural gas by war-booming cities and towns then supplied, as well as others not formerly supplied with natural gas.

Oklahoma in 1935 sold a total of 274 billion cubic feet of gas, but by 1947 that figure had increased to 490 billion cubic feet. In 1935, Okla-

homa used 258.6 billion and exported 25 billion cubic feet. In 1945 (last year's accurate figures) Oklahoma used a total of 249.9 billion and exported 122 billion cubic feet.

Field prices being paid for gas are rising sharply. This will show up some in 1948 and much more in later years. That is true nationwide and in Oklahoma. Prices received for industrial gas are likewise trending upward, but are still far behind those of competitive fuels. Trends of consumer costs of domestic gas are declining, but that trend on a national basis is likely to be halted as more and more natural gas is sold in the higher priced markets of northern and northeastern portions of the country where the heating season is both longer and colder.

For several years through 1945 Oklahomans have enjoyed the cheapest weighted average domestic gas delivered in the entire United States excepting West Virginia. Its average cost of industrial gas was lower than any other state excepting Texas.

For each one of several recent years statistics show the Oil and Gas Businesses have paid to the State of Oklahoma close to one-half of its total tax receipts.

In conclusion, I wish to state emphatically that I believe Oklahoma offers very alluring prospects for present and future industries based on its minerals. These resources are known to exist within the state in immeasurable quantities, and with judicious production methods, will supply our requirements for many years. Undoubtedly, additional reserves may be discovered as development proceeds. Fuels are plentiful and comparatively cheap, the weather is conducive to high production, labor conditions are wholesome and the pioneer spirit still exists. Oklahoma offers bounteous reward to its people.

TABLE I

OIL RESERVES OF THE UNITED STATES
(American Petroleum Institute)

Year	Reserves Millions Barrels	Production Millions Barrels	Ratio of Reserve to Production	Production Percentage of Reserve
1935	12,177.	2,096.	6	17.2
1937	13,063.	1,279.	10	9.8
1938	15,507.	1,214.	13.8	7.8
1939	17,348.	1,265.	14	7.3
1940	18,483.	1,353.	14	7.3
1941	19,025.	1,402.	14	7.4
1942	19,589.	1,387.	14	7.1
1943	20,083.	1,506.	13	7.5
1944	20,064.	1,678.	12	8.4
1945	19,785.	1,714.	12	8.7
1946	19,942.	1,733.	11.5	8.7
1947	20,874.	1,850.	11.3	8.9
1948	21,487.*			

TABLE II

OKLAHOMA OIL RESERVES AND ANNUAL PRODUCTION

1945		139.379		
1946	888.839	136.809	6.5	15.4
1947	898.186	142.094	6.3	15.8
1948	952.990			

*Note: In addition to the oil reserves shown for Jan. 1, 1948, there are in the entire United States estimated reserves amounting to 3,253,975,000 bbls. of natural gas liquid out of which total amount 155,003,000 bbls. is allocated to Oklahoma.

TABLE III
REFINERY CAPACITIES OF OKLAHOMA AND UNITED STATES

		Capacity
Oklahoma	25 plants	260,200 bbls.
United States	391 plants	6,084,490 bbls.

TABLE IV
GAS RESERVE ESTIMATES & ANNUAL MARKETED PRODUCTION UNITED STATES

Estimate by	Year	Reserves Trillion Cu. Ft.	Production Trillion Cu. Ft.	Ratio of Reserve to Production
Shaw	1919	15.0	.746	20
unknown	1926	23.0	1.313	17
E.P.Hindes	1931	46.0	1.686	27
E.P.Hindes	1935	62.0	1.917	32
R.E.Davis	1938	66.0	2.296	29
L.F.Terry	1939	70.0	2.477	28
R.E.Davis	1941	85.0	2.813	30
P.A.W.	1942	113.8	3.053	37
P.A.W.	1943	110.0	3.415	32
A.M.Crowell	1944	130.0	3.711	35
P.A.W.	1945	133.5	3.919	34
A.G.A.	1946	147.8	4.030	37
A.G.A.	1947	160.6	4.330	37
A.G.A.	1948	165.9		

TABLE V
OKLAHOMA GAS RESERVES AND ANNUAL PRODUCTION

Year	Reserve Trillion Cu. Ft.	Production Trillion Cu. Ft.	Ratio of Reserve to Production	Production Percentage of Reserve
1935	–	.276	–	–
1945	9.457	.358	26	3.8
1946	10.080	.438	23	4.3
1947	10.735	.490	22	4.6
1948	11.351			