

OKLAHOMA GEOLOGICAL SURVEY

CARL C. BRANSON, Director

**MINERAL REPORT 36**

**The Mineral Industries of Oklahoma  
in 1957 and 1958**

Part 1. The Mineral Industries of Oklahoma in 1957  
Final Summary

by

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Part 2. The Mineral Industries of Oklahoma in 1958  
Preliminary Summary

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NORMAN

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THE MINERAL INDUSTRIES  
OF OKLAHOMA IN 1957 AND 1958<sup>1</sup>

Part I

THE MINERAL INDUSTRIES  
OF OKLAHOMA IN 1957

Final Annual Summary

by

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Oklahoma's mineral production attained a record total of \$804 million in 1957 compared with \$757 million in 1956 and \$711 million in 1955. The increase was almost entirely due to a higher unit value for petroleum. Production of 15 minerals and 5 mineral fuels was reported from 75 of the state's 77 counties. Compared with other states in 1957, Oklahoma ranked fourth as producer of natural gas, natural-gas liquids, and crude petroleum. Appreciable quantities of zinc, lead, cement, coal, gypsum, sand and gravel, and stone also were produced. Manganese was reported for the first time since World War II. New records were established in the production of liquefied petroleum gases and in the value of stone and lime.

The mineral fuels—petroleum, natural gas, natural-gas liquids, and coal—were the most important in value, furnishing 94 percent of Oklahoma's total value of mineral production. Metals and nonmetals furnished the remaining six percent. Petroleum was produced in 61 of Oklahoma's 77 counties, natural gas in 60 counties; nonmetals in 70 counties; and lead and zinc in Ottawa County only. Oil and natural gas were produced in a wide belt extending from the northeastern part of the state to the southwestern and northwestern parts; nonmetal mining was widely distributed over the northeast, north-central, and central regions, and in the Arbuckle and Wichita Mountain areas of the southern part.

<sup>1</sup> Prepared under cooperative agreements for the collection of non-fuel mineral statistics between the United States Bureau of Mines, Department of the Interior, and the Oklahoma Geological Survey.

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TABLE 1.—Mineral production in Oklahoma, 1957-58<sup>1</sup>

Mineral	1957		1958 (Preliminary)	
	Short tons (unless other- wise stated)	Value	Short tons (unless other- wise stated)	Value
Clays	640,969	\$ 641,858	655,000	\$ 657,000
Coal	2,195,259	14,165,393	1,424,000	8
Lead (recoverable content of ores, etc.)	7,183	2,054,338	3,150	749,700
Natural gas—million cubic feet	2635,000	253,300,000	732,100	63,700,000
Natural-gas liquids:				
Natural gasoline and cycle products—thousand gallons	460,644	25,329,000	444,000	24,400,000
LP-gases—thousand gallons	587,140	21,824,000	655,700	25,600,000
Petroleum (crude)—thousand 42-gallon barrels	2215,111	2651,786,000	202,409	613,299,000
Salt (common)	6,943	62,664	4,500	41,900
Sand and gravel	4,959,740	4,506,815	5,300,000	4,820,000
Stone	12,015,907	14,063,662	10,458,000	12,340,000
Tripoli	22,236	66,700	21,000	63,000
Zinc (recoverable content of ores, etc.)	14,951	3,468,632	4,180	861,080
Value of items that cannot be disclosed: Asphalt (native), bentonite, cement, gypsum, lime, manganese, and sulfur (recovered elemental)				
Total Oklahoma <sup>4</sup>		14,568,789		23,285,820
		\$803,937,000		\$767,709,000

<sup>1</sup> Production as measured by mine shipments or mine sales (including consumption by producers).

<sup>2</sup> Preliminary figure.

<sup>3</sup> Included with value of items that cannot be disclosed.

<sup>4</sup> Total adjusted to avoid duplication in values of clays and stone.

## EMPLOYMENT IN THE MINERAL INDUSTRIES

*Employment.*—Total employment in the Oklahoma mineral industries was 49,600 compared with 52,200 in 1956. Distribution of this total employment was 94 percent to oil and gas mining, 1 percent to metals, 2 percent to coal, and 3 percent to nonmetals. Total wages in 1957 for these mineral industries was \$198.6 million, a loss of 22 percent from the 1956 total.

*Injuries.*—Accidents reported in coal, metal, and nonmetal mining consisted of 2 fatal and 474 nonfatal injuries. Of these injuries, 1 fatal and 142 nonfatal were in coal mining. In the oil and gas industry (exploration drilling, production, natural gasoline, pipelines and refining) there were 7 fatal and 498 nonfatal injuries.

## CONSUMPTION AND MARKETS

Oklahoma mineral industries processed a significant part of their output into finished and semifinished products for in-state consumption and for out-of-state shipments. These industries included oil refineries, natural gasoline and cycle plants stripping natural gas of condensable liquids; zinc smelters reducing zinc concentrate mined in Oklahoma; brick, tile, pottery, glass, and cement plants using clays, shales, silica sands, and limestone of Oklahoma; and producers of building materials made of Oklahoma gypsum. Large quantities of petroleum and natural gas continued to be transmitted by pipelines to industrial sections of the Eastern and North Central states.

Demand for Oklahoma crude petroleum declined after the first quarter of the year and then regained part of the loss during the last two months. This reduction after the first quarter was attributed partly to decreased shipments of oil to western Europe when movement of Mid-East oil was resumed through the Suez Canal. These market fluctuations, however, did not change the annual demand appreciably from 1956.

The metals industry was hampered by increasing inventories, declines in lead and zinc prices, and a work stoppage at the Henryetta smelter of Eagle-Picher Co. These adversities caused two periodic suspensions of mining and milling operations. The first suspension was for a 5-day period from April 29; the second was from July 31 to November 27. The Henryetta smelter remained closed from July 1 throughout the remainder of the year.

In construction materials, production of sand and gravel was set back by heavy spring rains that retarded both output and road construction. However, the trend in other types of construction permitted gains in both stone and cement produced. Despite a 5-week cement strike that affected one Oklahoma plant, and a 30-day repair shutdown at the other plant, cement output still showed an appreciable gain over 1956. Demand for lime from the state's one plant also was up as more of this material was used for the manufacture of calcium carbide at Pryor, Oklahoma, and for municipal water treatment.

TABLE 2. Average unit value of mineral commodities produced in Oklahoma, 1953-57

Commodity	1953	1954	1955	1956	1957
Asphalt, native—					
short ton -----	\$ 4.75	\$ 4.75	\$ 4.75	\$ 4.75	\$ 4.75
Cement:					
Portland—376-pound barrel -----	2.54	2.64	2.72	2.89	3.00
Masonry—376-pound barrel -----	---	---	---	13.81	3.93
Clays:					
Miscellaneous—					
short ton -----	1.02	<sup>2</sup> 1.09	1.01	.99	.99
Bentonite—short ton -----	9.64	10.00	4.50	4.50	4.50
For cement—short ton -----	1.00	1.00	1.00	1.00	1.00
Coal—short ton -----	6.10	5.88	5.86	6.15	6.45
Gypsum—short ton -----	2.76	2.81	2.94	2.93	3.14
Lead—pound -----	.131	.137	.149	.157	.143
Lime—short ton -----	8.67	9.85	9.55	11.02	10.41
Natural gas—					
1,000 cubic feet -----	.069	.070	.074	.080	.084
Natural-gas liquids:					
Natural gasoline and cycle products—					
per gallon -----	.065	.051	.057	.054	.055
LP-gases—gallon -----	.036	.030	.028	.040	.037
Petroleum—					
42-gallon barrel -----	2.70	2.79	2.78	2.78	3.03
Pumice—short ton -----	9.54	8.36	---	10.00	10.44
Salt (common)—					
short ton -----	7.47	7.62	7.83	8.99	9.03
Sand and gravel—					
short ton -----	.85	.79	.76	.81	.91
Stone:					
Granite (dimension)					
—short ton -----	102.34	60.40	67.91	<sup>2</sup> 102.99	101.33
Sandstone—short ton -----	.60	1.45	1.16	1.49	1.22
Limestone—short ton -----	1.07	1.08	1.15	1.23	1.18
Miscellaneous (crushed)—					
short ton -----	.41	.34	.47	.58	.53
Sulfur (recovered elemental)—short ton -----	<sup>1</sup> 26.74	26.50	26.50	<sup>3</sup> 26.64	<sup>3</sup> 25.82
Tripoli—short ton -----	5.00	3.00	3.00	3.00	3.00
Vermiculite (ex-foliated)—short ton -----	---	---	---	---	<sup>1</sup> 69.99
Zinc—pound -----	.115	.108	.123	.137	.116

<sup>1</sup> First year reported.

<sup>2</sup> Revised figure.

<sup>3</sup> Calculated on a sulfur content basis.

## TRENDS AND DEVELOPMENTS

Recoverable petroleum reserves underwent another slight reduction despite widespread drilling and many impressive discoveries especially in the northwestern corner, south central counties, and in the pre-Permian area of the Panhandle.

The trend toward increased refinery capacity for premium-grade motor fuel and toward higher octane rating of motor fuels was continued. The competitive race for upgrading motor fuels was evidenced by new installations of catalytic cracking units and catalytic reformers at refineries at West Tulsa, Duncan, and Ponca City.

Closely related to the refining industry was the rise of petrochemicals in the state. An ammonia plant with a capacity of 65,800 tons yearly, was operating at Pryor. Adjuncts to two refineries at Ponca City and Duncan were producing benzene, toluene, and propylene hydrocarbons. At Ponca City, Continental Oil Co. completed construction of its atomic radiation laboratory designed to improve petrochemical products and processes. A new addition to the metals industry was the opening of the \$6.5-million plant of Fansteel Metallurgical Corp. at Muskogee. This tantalum-columbium plant was expected to boost the nation's supply of tantalum by 50 percent. Also at Muskogee, a high-energy fuel plant was under construction. This plant will utilize boron as an ingredient in the manufactured fuel.

Facilities for petroleum research in the state took a forward step in 1957 as two major oil companies opened extensively-equipped new laboratories at Tulsa and Bartlesville.

## REVIEW BY MINERAL COMMODITIES

### MINERAL FUELS

Oklahoma continued to be a leading domestic producer of the nation's crude petroleum and natural gas in 1957 and remained a major supplier of refined products. Native asphalt and a substantial quantity of a low-ash bituminous coal also were produced.

*Asphalt (Native).*—Output of native rock asphalt (bituminous limestone and bituminous sandstone) for road surfacing was reported from Murray County in 1957. Production in 1957 was down 33 percent from the previous year partly because continuous rains during the spring season hindered both quarrying and construction work.

*Coal.*—Coal production in Oklahoma gained about 9 percent in 1957. Part of the gain was due to renewal of Lone Star Steel Co. mining near McCurtain following shutdowns from two explosions in 1956. The state had 30 operators in 9 counties. Rogers, Sequoyah, Haskell, LeFlore, and Pittsburg Counties were the 5 principal producers, each reporting over \$2 million in value. Total output in 1957 was 2.2 million short tons valued at \$14.2 million.

A Federal and State Geological Survey report estimated the coal reserve of Oklahoma to be 3,245 million short tons as of January 1, 1953.

TABLE 3. Coal production, 1948-52 (average) and 1953-57

Year	Thousand short tons	Value	
		Total (thousand dollars)	Average per ton
1948-52 (average) ----	2,716	\$14,598	\$5.38
1953 -----	2,168	13,227	6.10
1954 -----	1,915	11,265	5.88
1955 -----	2,164	12,668	5.86
1956 -----	2,007	12,341	6.15
1957 -----	2,195	14,165	6.45

*Natural Gas.*—Oklahoma continued to rank fourth in the nation in marketed production of natural gas. Marketed production was 635 billion cubic feet valued at \$53.3 million, a 6-percent loss in volume and a 2-percent loss in value compared to 1956. Production was reported from 60 counties of which Texas, Garvin, Beaver, Oklahoma, and Beckham Counties led in the order named. The industry pressed its search for gas reserves by completing 234 gas wells out of a total 6,235 wells of all types as reported by the Oil and Gas Journal. Exploratory drilling alone accounted for 31 gas discoveries out of 747 exploratory tests. Most promising of this exploratory drilling was in northwestern Oklahoma and in the Panhandle where 5 gas discoveries were made in Beaver, 2 in Harper, and 1 in Ellis Counties. Elsewhere, Lincoln and Grant Counties scored three gas discoveries each; renewed interest in the southeastern section led to a gas completion in Coal County and a completion in the old gas area of Sequoyah and LeFlore Counties.

*Natural-Gas Liquids.*—Production of natural-gas liquids from Oklahoma's 66 natural gasoline plants totaled 1,048 million gallons in 1957 and was valued at \$47.2 million. This was a year of widening markets for LP-gases (propane and butane) not only for domestic heating fuel, but for production of petrochemicals, particularly polyethylene, and for air conditioning. Use of LP-gases as a motor fuel for farm and industrial tractors and for drilling rigs also was expanded. At the Short Junction oilfield in Cleveland County, Continental Oil Co.'s new natural-gasoline plant was recovering propane and butane for intermittent injection with natural gas, as a "miscible-phase sweep," into the Hunton limestone formation to increase the recovery of oil.

TABLE 4. Marketed production of natural gas, 1948-52 (average) and 1953-57<sup>1</sup>

Year	Million cubic feet	Value	
		Total (thousand dollars)	Per thousand cubic feet, cents
1948-52 (average) ----	498,197	\$25,158	5.0
1953 -----	599,955	41,397	6.9
1954 -----	616,355	43,145	7.0
1955 -----	614,976	45,508	7.4
1956 -----	678,603	54,288	8.0
1957 <sup>2</sup> -----	635,000	53,300	8.3

<sup>1</sup> Comprises gas either sold or consumed by producers including losses in transmission, amounts added to storage, and increases in gas pipelines.

<sup>2</sup> Preliminary figures.

TABLE 5. Estimated proved reserves of crude oil, natural-gas liquids, and natural gas<sup>1</sup>

	Proved reserves, Dec. 31, 1956	Changes in proved reserves, due to extensions and new discoveries in 1957	Proved reserves, (production was deducted) Dec. 31, 1957	Percent change from 1956
Crude oil—				
thousand barrels --	2,009,798	143,170	1,941,521	--3
Natural-gas liquids <sup>2</sup> —				
thousand barrels --	355,588	21,152	342,643	--4
Natural gas <sup>3</sup> —				
million cubic feet ..	13,775,049	1,416,920	14,259,480	+4

<sup>1</sup> Proved Reserves of Crude Oil, Natural Gas Liquids and Natural Gas, (published by American Gas Association, American Petroleum Institute, and Canadian Petroleum Association) pp. 9, 10, and 19.

<sup>2</sup> Includes condensate, natural gasoline, and LP-gases.

<sup>3</sup> Proved recoverable reserves.

TABLE 6. Natural-gas liquids produced, 1948-52 (average) and 1953-57

Year	Natural gasoline and cycle products		LP-gases		Total	
	Thousand gallons	Value thousand dollars	Thousand gallons	Value thousand dollars	Thousand gallons	Value thousand dollars
1948-52 (average) --	339,788	\$25,008	286,446	\$10,858	626,234	\$35,866
1953 -----	433,650	28,066	414,036	14,886	847,686	42,952
1954 -----	478,590	24,332	453,810	13,506	932,400	37,838
1955 -----	504,692	28,770	512,320	14,297	1,017,012	43,067
1956 -----	489,963	26,543	579,101	23,427	1,069,064	49,970
1957 -----	460,644	25,329	587,140	21,824	1,047,784	47,153

Sunray Mid-Continent Oil Co. completed a gas products plant near Carney, Oklahoma, and was processing approximately 14 million cubic feet of wet gas daily. The plant was designed to extract a total of 575 barrels of propane, butane, and natural gasoline daily.

Production of natural gasoline and cycle products was about 6 percent less than in 1956 partly because of surplus stocks at the beginning of the year. However, improved technology for processing natural-gas liquids at refineries tended to strengthen the market. Refinery capacity was being increased to reform catalytically the heavier fractions of natural gasoline, an operation which improves the octane rating and widens the use of natural gasoline in motor fuels. Natural gasoline and cycle products furnished 44 percent of the quantity and 54 percent of the value; LP-gases furnished the remainder.

*Petroleum.*—Oklahoma remained the nation's fourth largest producer of petroleum in 1957 with an output of 215 million barrels valued at \$651.8 million. The state regulatory body under the Interstate Oil Compact reduced the allowable production of oil slightly below the 1956 allowable to conform with the indicated demand for Oklahoma petroleum and to permit a gradual reduction of monthly stocks. Total production, however, remained about the same as in 1956 as over half of it came from non-allocated fields which include secondary-recovery projects. According to a report made for the first time by the State Oil & Gas Conservation Department, Oklahoma had 449 waterflooding (secondary-recovery) projects in 1957 and these furnished about 20 percent of the annual production. Petroleum was reported from 61 counties and the leading 5 producers were Garvin, Osage, Stephens, Carter, and Creek.

The average price per barrel of petroleum at the wells was \$3.03 in 1957 compared with the 1956 average of \$2.78. The search for more oil led to the drilling of 747 exploratory wells in 1957, third highest in the nation. The test wells totaled 3,350,237 feet drilled, or an average of 4,485 feet each compared with an average of 4,540 feet each in 1956. Field-development wells totaled 18,244,372 feet drilled, or an average of 3,324 feet each compared with an average of 3,322 feet each in 1956.

TABLE 7. Production of petroleum (crude), 1948-52 (average) and 1953-57

Year	Thousand 42-gallon barrels	Value	
		At wells (thousand dollars)	Average per barrel
1948-52 (average) ----	169,604	\$435,504	\$2.57
1953 -----	202,570	546,940	2.70
1954 -----	185,851	518,520	2.79
1955 -----	202,817	563,830	2.78
1956 -----	215,862	600,096	2.78
1957 <sup>1</sup> -----	215,111	651,786	3.03

<sup>1</sup> Preliminary figures.

Prospecting crews worked 1,285 crew-weeks compared with 1,746 crew-weeks in 1956. Seismograph work was particularly extensive in the vast Anadarko basin where Caddo and Grady Counties received most attention.

Many impressive discoveries were made during the year. Success was widespread in the deep area of south central Oklahoma, and in the pre-Permian areas of the northwestern counties and of the Panhandle. Counties adjacent to the Nemaha granite ridge, such as Grant and Garfield, also were the scenes of continued exploratory drilling. Osage County, again first in both total exploratory and field-development wells, accounted for 7 discoveries out of 95 tests. Beaver County, credited with 13 successful tests, owing to the intense drive for natural gas, was followed by Grant with 9 and Stephens, Cleveland, Harper, and Lincoln with 7 successful tests each.

The state's depth record of 20,426 feet was made by Magnolia Petroleum Co. in the Cement field, Caddo County, but production tests were unsuccessful. However, other tests in the deep trough of the Anadarko basin proved productive. In the Carter-Knox field of Grady and Stephens County, British-American Oil Producing Co. tapped the state's deepest production in the Oil Creek-Ordovician sands at a depth of 16,546 feet. Several other wells in this field were producing from depths below 15,000 feet and more were planned. Also, first production was reported in Blaine, Dewey, and Woodward Counties. At the year end an exploratory well being drilled on the Fort Cobb anticline in Caddo County, was aimed for the world's new depth mark of 24,000 feet. Revival of oil and gas activity in eastern Oklahoma received another boost in 1957 when a large natural gas reserve was opened in northern LeFlore County.

At the beginning of 1957, Oklahoma had 15 operating refineries which had a daily crude oil capacity that totaled 352,000 barrels, and 2 nonoperating refineries.

In the refining industry of the state, upgrading of motor fuels was continued by the installation of more cracking and reforming capacity.

D-X Sunray Oil Co.'s \$10 million expansion program at its Tulsa and Duncan refineries reached the first state of completion during May, 1957. The expansion at Tulsa called for (1) a 12,000 barrel-a-day catalytic reforming unit, (2) a 12,000 barrel-a-day hydrogenation unit augmented by a 2,500 barrel-a-day alkylation plant, and (3) a 1,500 barrel-a-day butane-isomerization unit. At the Duncan refinery, a 6,000 barrel-a-day unifier was under construction.

At Ponca City, Cities Service Oil Co. installed a Rexformer unit to reform catalytically petroleum components to higher octane fuels. The program included an increase in refinery capacity from 23,000 to 30,000 barrels daily.

At Cyril, Oklahoma, the refinery capacity of Anderson-Prichard Oil Corp. was being increased by 2,000 barrels daily. Also, an 11,000-barrel per day fluid catalytic cracking unit, and a 600-barrel per day hydrofluoric acid alkylation unit were being added.

One Bureau of Mines report on oil recovery techniques, prepared in cooperation with the State of Oklahoma, was published.

TABLE 3. Capacity of petroleum refineries and cracking plants in Oklahoma, January 1, 1957  
(Barrels per day)

Company	Location	County	Type of Plant	Crude oil capacity		Cracked gasoline capacity	
				Operating	Shutdown	Operating	Shutdown
Allied Materials Corp.	Stroud	Lincoln	S-A	3,000	---	---	---
Anderson-Prichard Oil Corp.	Cyril	Caddo	S-C-A	11,000	---	4,000	---
Bell Oil and Gas Co.	Grandfield	Tillman	S-C	8,000	---	5,800	---
Ben Franklin Refining Co.	Ardmore	Carter	S-C-A	13,000	---	8,000	---
Champlin Refining Co.	Enid	Garfield	Comp.	20,000	---	12,400	---
Cities Service Oil Co.	Ponca City	Kay	do	23,000	---	7,400	---
Continental Oil Co.	do	do	do	58,000	---	16,690	1,650
D-X Sunray Oil Co.	Duncan	Stephens	do	37,000	6,000	28,000	---
Do	West Tulsa	Tulsa	S-C-L	73,000	---	34,500	1,000
Kerr-McGee Oil Industries, Inc.	Cleveland	Pawnee	S-C	---	6,500	1,800	3,500
Do	Cushing	Payne	Comp.	22,000	---	5,250	---
Do	Wynnewood	Garvin	S-C-A	17,000	---	4,900	---
Midland Cooperatives, Inc.	Cushing	Payne	S-C	12,000	---	5,140	---
Monarch Refineries, Inc.	Oklahoma City	Oklahoma	S-A	1,000	---	---	---
Phillips Petroleum Co.	Okmulgee	Okmulgee	S-C	19,000	---	4,300	---
The Texas Co.	West Tulsa	Tulsa	do	35,000	---	22,500	---
Tide Water Associated Oil Co.	Drumright	Creek	do	---	15,000	---	4,300
Total	---	---	---	352,000	27,500	160,680	10,450

The following symbols indicate the type of plant:

- S-A Skimming and asphalt
- S-C-A Skimming, cracking, and asphalt
- S-C Skimming and cracking
- Comp. Complete
- S-C-L Skimming, cracking, and lube

## NONMETALS

Oklahoma, endowed with abundant resources of nonmetals, yielded a record of \$32 million worth of these commodities in 1957 compared with \$28.6 million in 1956 and with the previous record \$31.3 million established in 1955. Despite the adverse affects of heavy spring rains on both sand and gravel production and road construction, overall construction gained so that the 1957 value of nonmetals still remained 12.3 percent higher than the 1956 value.

Commodities that established individual alltime high values in 1957 were stone and lime.

**Cement.**—Cement, the second leading product in terms of value of nonmetals produced in Oklahoma, underwent a 13-percent production gain in 1957. Two plants, at Dewey in Washington County and at Ada in Pontotoc County, produced cement in 1957.

Ideal Cement Co. experienced a work stoppage in the general 5-week cement strike. This plant also was undergoing a \$14-million expansion that included a new 12- by 450-foot kiln to increase cement capacity from about 2,200,000 to 3,700,000 barrels yearly. Dewey Portland Cement Co. was closed 30 days for repairs, but shipments of cement were continued from stock.

**Clays.**—Oklahoma has extensive clay resources. Production in 1957 was used primarily in the manufacture of brick and tile, and to a lesser extent for the manufacture of portland cement and lightweight expanded clay products. Brick and tile were produced in Creek, Custer, Garfield, Greer, Lincoln, Oklahoma, Pittsburg, Seminole, and Tulsa Counties. Bentonite was produced in Dewey County. Expanded lightweight aggregate was made from clay in Tulsa and Oklahoma Counties.

Clays sold or used in 1957, including clay used for cement, was 641 thousand tons, valued at \$642,000. This tonnage was 9 percent less than that of 1956.

Winart Pottery, Miami, Okla., installed a new kiln to double production. Six new pieces and a new color were added to the pottery line.

TABLE 9. Clays sold or used by producers  
1948-52 (average) and 1953-57

Year	Short tons	Value
1948-52 (average)	523,524	\$ 479,361
1953	577,556	637,082
1954	452,050	1,282,848
1955	724,156	726,856
1956	705,061	701,038
1957	1640,969	1641,858

<sup>1</sup> Excludes bentonite.

**Gypsum.**—Tonnage and value of gypsum recorded in Oklahoma in 1957 remained relatively high, slightly less than in 1956, in response to continued demands for wallboard, plasters, and portland cement. Most of the production was from Blaine County, where the United States Gypsum Co. operated quarries and plants to manufacture wallboard and plasters at Southard. Universal Atlas Cement Co. operated a quarry near Watonga,

TABLE 10. Sand and gravel sold or used by producers, 1948-52 (average) and 1953-57

Year	Commercial			Government-and-contractor			Total sand and gravel			Average value per ton
	Thousand short tons	Value thousand dollars	Thousand short tons	Value thousand dollars	Thousand short tons	Value thousand dollars	Thousand short tons	Value thousand dollars		
1948-52 (average)	1,876	\$1,610	1,157	\$ 431	3,033	\$2,041	3,033	\$2,041	\$ .67	
1953	2,998	2,928	2,014	1,331	5,011	4,259	5,011	4,259	.85	
1954	3,211	3,380	2,213	885	5,424	4,266	5,424	4,266	.79	
1955	3,654	3,719	2,640	1,067	6,294	4,786	6,294	4,786	.76	
1956	3,417	3,886	2,530	957	5,947	4,843	5,947	4,843	.81	
1957	3,297	3,608	1,663	899	4,960	4,507	4,960	4,507	.91	

TABLE 11. Stone sold or used by producers, 1953-57, by kinds

Year	Granite			Limestone			Sandstone			Total
	Short tons	Value	Short tons	Value	Short tons	Value	Short tons	Value		
1953	6,862	\$ 702,250	5,654,022	\$ 6,029,258	228,897	\$137,407	228,897	\$137,407	\$ 7,930,737	
1954	11,022	665,753	16,974,697 <sup>2</sup>	17,527,413 <sup>2</sup>	160,883	233,469	160,883	233,469	19,146,995 <sup>2</sup>	
1955	576,187	1,276,088	18,826,553 <sup>2</sup>	110,123,738 <sup>2</sup>	236,778	275,702	236,778	275,702	212,295,274	
1956	35,074	3522,570	18,626,450 <sup>2</sup>	110,603,022 <sup>2</sup>	152,518	227,464	152,518	227,464	212,416,886	
1957	35,497	3557,020	10,237,730 <sup>2</sup>	112,041,047 <sup>2</sup>	305,749	373,213	305,749	373,213	214,063,662	

<sup>1</sup> Excludes dimension limestone.

<sup>2</sup> Includes limestone used in cement and lime.

<sup>3</sup> Includes crushed granite.

and S. A. Walton a quarry near Southard. Production also was reported from Caddo County. A report on the geology and gypsum resources of the Carter area, southeastern Beckham County, Okla., was published by the Oklahoma Geological Survey. The report shows a gypsum reserve accessible by open-cut mining estimated at 375 million tons. Moreover, reserves of anhydrite to a depth of 130 feet are estimated at 1,140 million tons.

**Lime.**—Lime production in the state, all by the St. Clair Lime Co. in Sequoyah County, was 9 percent more than in 1956. The record production was attributed to increased consumption by chemical plants at Pryor and for treating water at municipal plants.

**Pumice (volcanic ash).**—There was a marked increase in the production of pumice during 1957, reported by one operator in Beaver County, although total tonnage was relatively small. No pumice was produced in 1955.

**Salt.**—Output of salt, reported by 3 producers in 3 counties, declined 30 percent from 1956. At Sayre in Beckham County, salt continued to be produced by injecting fresh water through wells into a salt bed and recovering the brine for surface evaporation. In Woods County, salt was produced from surface encrustations on the Big Salt Plain of the Cimarron River; and in Harmon County, it was recovered by solar evaporation of brine from springs. Principal uses were for stock food and for recharging of water softeners.

**Sand and Gravel.**—Sand and gravel deposits, suitable for concrete aggregate and road surfacing, occur along and adjacent to most of the larger streams in Oklahoma. Production was reported from 55 counties in the state in 1957. Tulsa, Johnston, Cherokee, LeFlore, Pontotoc, Logan, Kiowa, and Oklahoma were the leading counties, accounting for more than half of the total value.

Most of the sand and gravel produced in Oklahoma was used for paving concrete and mortar. Second in tonnage and value was high-purity glass sand, produced by two plants in the Arbuckle Mountain district. In addition to glass manufacturing, a small part of the high-purity sand was used as foundry sand and for making sodium silicate.

Sand and gravel (including glass sand) produced in Oklahoma during 1957 totaled 5 million tons valued at \$4.5 million.

**Stone.**—Oklahoma stone producers in 1957 reported 12 million tons of crushed limestone, crushed granite, dimension granite, dimension sandstone, dimension limestone, crushed sandstone, and miscellaneous stone. The reported value (\$14 million) was a 13-percent gain over 1956. Production was reported from 49 counties; Tulsa, Comanche, Murray, and Ottawa supplied most of the stone tonnage in the state. Crushed limestone was reported by 15 producers at 25 quarries in 1957, and by 15 construction contractors including the State Highway Department. The material was used principally for cement and for concrete aggregate, and road construction; to a lesser extent as agricultural limestone.

**Chat.**—Chat, included with miscellaneous stone, denotes the coarse tailings from milling of zinc and lead ores. The material is mostly chert or microcrystalline silica, and small quantities of limestone, sphalerite, galena, marcasite, and pyrite.

Most of the chat sold was used for railroad ballast, concrete aggregate, and road surfacing. In 1957, operators in Ottawa County reported 41 percent less tonnage than in 1956.

*Granite.*—The dimension granite industry of Oklahoma was centered in the Wichita Mountains, in the southwestern part of the state, where 5 producers operated 5 quarries in Greer and Kiowa Counties in 1957. One quarry was operated in Johnston County in the Arbuckle Mountains. Crushed granite was produced at a quarry in Jackson County, and by the State Highway Department in Beckham County.

Production was from Precambrian granites which are predominantly pink and red. Dimension granite was used mostly for monumental stone and partly for exterior trim. Much of the stone was finished in plants in the Wichita Mountains, and some was shipped as rough rock to other states. In 1957, dimension granite production was reported to be 5,497 tons with a value of \$557,020.

*Limestone and Dolomite.*—In 1957, limestone and dolomite were quarried in 36 counties; the largest production was from Tulsa, Comanche, and Murray Counties.

Chemical-grade limestone was quarried at Marble City in Sequoyah County for limemaking, for use as flux in glass manufacturing, and for fertilizers, and mineral food.

Dimension limestone was quarried for building stone in Pontotoc, Caddo, and Johnston Counties; limestone for portland cement was quarried in Washington and Pontotoc Counties.

*Sandstone.*—Dimension sandstone produced in Oklahoma was used for building and veneer stone in building construction. The stone was cut in slabs 1½ to 6 inches thick from shallow, open-face quarries in Okmulgee and Mayes Counties. Approximately 300 tons valued at \$4,000 was produced in 1957.

*Stone, Crushed (Government-and-Contractor).*—Stone crushed by municipal, county, and state agencies included limestone and sandstone obtained from local quarries through the state.

*Sulfur (Recovered Elemental).*—Decreases of about 67 percent on both tonnage and value of sulfur, produced from waste natural gases by Central Chemical Co. at Madill, Marshall County, were reported in 1957.

*Tripoli.*—Tripoli, mined in eastern Ottawa County in 1957, was 12 percent more than that produced in 1956. All of the tripoli mined was shipped to Seneca, Mo., where it was processed by the American Tripoli Division of the Carborundum Co. and sold chiefly for buffing compounds and in minor amount for foundry use.

*Vermiculite.*—Exfoliated vermiculite, produced from ores mined in western states, was reported for the first time from Oklahoma County. The material was used mainly in concrete and plaster.

## METALS

Output of metals minerals in 1957 declined for the third consecutive year.

*Cadmium, Germanium, Indium, and Gallium.*—These minor metals, occur as trace elements in the lead and zinc concentrates of Oklahoma, and were recovered from the flue and zinc dusts of zinc retort smelters and

from the precipitates of electrolytic zinc smelters. Production of these metals could not be assigned to state of origin, because they were recovered at the smelters from the accumulated flue dusts and residues of ores from various domestic and foreign sources.

*Lead.*—Mine production of lead in 1957, all from Ottawa County, was 43 percent less than in 1956 in terms of concentrates and 42 percent less in terms of recoverable metal. The value of recoverable lead produced was \$2.1 million, a loss of 47 percent from the 1956 value. Largest producer of lead in the state was Eagle-Picher Co., followed by Potter-Sims Mining Co., Wesah Mining Co., Contact Mining Co., and Searcy Henderson.

The price of lead opened the year at 16.0 cents per pound, New York, dropped gradually to 13.0 cents on December 2, and then remained unchanged to the end of the year.

*Manganese.*—A small quantity of manganese ore was mined in McCurtain County in the course of exploration and prospecting.

*Silicon.*—According to the 1957 Annual Report of Eagle-Picher Co., the Mining and Smelter Division during 1957 expanded its Rare Metals Plant at Miami, Okla., to increase production of elemental silicon. The plant also has been producing germanium.

*Titanium.*—The Federal Bureau of Mines examined the alluvial sands of the Otter Creek Valley, in Kiowa County, Okla., as a possible source of titanium minerals. Study and analysis of data had not been completed, but preliminary examination indicated that the ilmenite-bearing sand has an average thickness between 10 and 30 feet, underlies silty clay overburden averaging about 20 feet in thickness, and has an average width of about ¾ of a mile.

*Uranium.*—Prospecting for radioactive minerals was conducted in Roger Mills County by The Western Oklahoma Uranium Partnership, Oklahoma City, Okla. Radioactivity was reported in 2 of 5 test holes drilled. In Custer County, limited prospecting was done near Foss by Red Rock Co., Hammon, Okla.

*Zinc.*—Mine production of recoverable zinc in 1957, all from Ottawa County, declined 46 percent from the previous year to 14,951 tons owing to increased inventories and to a 6-month work stoppage at the Henryetta smelter. Zinc output, valued at \$3.5 million, declined 53 percent from the 1956 value. Eagle-Picher Co. was the principal producer in the state, followed by Mark Twain, Buffalo Mining Co., C. & M. Mining, and Potter-Sims Mining Co.

Zinc metal price at the beginning of 1957 was quoted at 13.5 cents per pound, East St. Louis, dropped gradually in May and June to 10.0 cents per pound on July 1 and remained stable to the end of the year.

Two custom mills (in Oklahoma and Kansas) treated lead-zinc ores mined in both states, and 2 mine mills treated lead-zinc ores from company mines only.

Three smelting companies operated 3 horizontal zinc retort plants in Oklahoma in 1957. These were the plants of American Metal Climax, Inc., at Blackwell, Kay County; National Zinc Co. at Bartlesville, Washington County; and Eagle-Picher Co. at Henryetta, Okmulgee County. Only the Henryetta smelter treated domestic ores exclusively. Output efficiency at these plants was improved by installing mechanical chargers and cleaners.

TABLE 12. Mine production of lead and zinc, 1948-52 (average), 1953-57, and total 1891-1957, in terms of concentrates and recoverable metals<sup>1</sup>

Year	Lead concentrate (galena)		Zinc concentrate (sphalerite)		Recoverable metal content <sup>2</sup>	
	Short tons	Value	Short tons	Value	Lead Short tons	Zinc Short tons
1948-52 (average)	23,979	\$ 4,654,523	90,742	\$ 9,169,118	17,842	48,592
1953	12,213	1,915,195	61,896	4,541,616	9,304	33,413
1954	19,004	3,194,245	84,444	5,466,727	14,204	43,171
1955	19,555	3,368,713	78,726	5,997,071	14,126	41,543
1956	17,971	3,225,015	52,993	4,485,122	12,350	27,515
1957	10,198	1,896,207	27,702	2,288,457	7,183	14,951
1891-1957	1,667,593	461,871,652	9,721,769	481,537,733	1,279,459	5,125,848

<sup>1</sup> Based on Oklahoma ore ("dirty") and old tailings treated at mills during calendar year indicated.

<sup>2</sup> In calculating metal content of the ores from assays, allowance has been made for smelting losses, of both lead and zinc. In comparing the values of concentrate ("ore") and metal, it should be borne in mind that the value given for the concentrate is that actually received by the producer, whereas the value of the lead and zinc is calculated from the average price for all grades.

TABLE 13. Value of mineral production in Oklahoma by counties, 1956-57<sup>1</sup>

County	1956	1957	Minerals produced in 1957 in order of value
Atoka -----	257,951	353,800	Stone, petroleum
Beaver -----	2,936,262	3,962,483	Natural gas, petroleum, pumice.
Beckham -----	22,683,546	14,978,798	Petroleum, natural gas, salt, stone.
Blaine -----	"	1,328,525	Gypsum, sand and gravel, natural gas, petroleum.
Bryan -----	1,840,464	2,126,922	Petroleum, sand and gravel, stone, natural gas.
Caddo -----	13,831,911	14,933,724	Petroleum, natural gas, stone, gypsum, sand and gravel.
Canadian ---	328,248	279,425	Petroleum, natural-gas liquids, natural gas, sand and gravel, stone.
Carter -----	61,641,664	67,007,569	Petroleum, natural-gas liquids, natural gas.
Cherokee ----	534,420	384,200	Sand and gravel, stone.
Choctaw ----	23,449	14,666	Sand and gravel.
Cimarron ---	1,647,715	2,024,758	Natural gas, petroleum.
Cleveland ---	13,684,376	22,694,614	Petroleum, natural gas, natural-gas liquids, sand and gravel.
Coal -----	1,978,215	2,220,726	Petroleum, stone, natural gas, sand and gravel.
Comanche ---	2,517,057	2,582,034	Stone, petroleum.
Cotton -----	4,418,543	4,913,586	Petroleum, natural gas.
Craig -----	221,153	439,820	Coal, stone, sand and gravel, petroleum, natural gas.
Creek -----	31,031,687	33,373,127	Petroleum, natural-gas liquids, natural gas, clays, sand and gravel, stone.
Custer -----	367,402	309,566	Natural-gas liquids, clays, sand and gravel, stone.
Delaware ----	18,090	36,250	Sand and gravel.
Dewey -----	"	105,290	Bentonite, sand and gravel, petroleum.
Ellis -----	"	2,818	Natural gas.
Garfield ----	7,783,835	8,604,804	Petroleum, natural-gas liquids, natural gas, clays.
Garvin -----	99,725,969	103,524,113	Petroleum, natural-gas liquids, natural gas, stone, sand and gravel.
Grady -----	21,789,241	21,465,109	Petroleum, natural gas, sand and gravel, stone.
Grant -----	1,991,254	3,081,385	Petroleum, natural gas, stone.
Greer -----	509,539	584,753	Petroleum, clays, stone, sand and gravel.
Harmon -----	18,200	17,600	Salt, sand and gravel.
Harper -----	43,549	427,090	Petroleum, natural gas, stone.
Haskell ----	2,617,127	2,593,846	Coal, natural gas, stone.
Hughes ----	10,603,304	10,142,807	Petroleum, natural gas, natural-gas liquids, sand and gravel.
Jackson ----	1,006,593	1,168,369	Petroleum, stone, natural gas.
Jefferson ---	3,205,422	3,605,448	Petroleum, natural gas, stone.
Johnston ---	1,812,645	1,788,635	Sand and gravel, stone.
Kay -----	12,119,080	13,929,526	Petroleum, natural-gas liquids, stone, natural gas, sand and gravel.
Kingfisher --	875,729	1,238,486	Petroleum, sand and gravel, natural gas, stone.
Kiowa -----	1,143,126	2,308,747	Stone, petroleum, natural gas, sand and gravel.
Latimer ----	389,150	814,201	Coal, sand and gravel, natural gas, stone.
LeFlore ----	2,380,770	2,980,745	Coal, natural gas, sand and gravel.
Lincoln ----	25,064,864	24,166,804	Petroleum, natural-gas liquids, natural gas, stone, clays.
Logan -----	10,932,125	12,421,767	Petroleum, natural gas, natural-gas liquids, sand and gravel, stone.
Love -----	1,132,533	2,584,021	Petroleum, natural gas, sand and gravel.

TABLE 13. Value of mineral production in Oklahoma by counties, 1956-57<sup>1</sup> (continued)

County	1956	1957	Minerals produced in 1957 in order of value
Major -----	2,310,055	1,957,484	Petroleum, natural-gas liquids, natural gas, sand and gravel.
Marshall ----	8,007,989	8,721,740	Petroleum, natural-gas liquids, natural gas, sand and gravel, recovered sulfur, stone.
Mayes -----	7,009	23,967	Stone, sand and gravel, petroleum.
McClain ----	7,274,912	10,038,360	Petroleum, natural gas, natural-gas liquids, sand and gravel, stone.
McCurtain --	136,025	79,559	Sand and gravel, manganese, stone.
McIntosh ---	680,503	580,938	Coal, natural gas, sand and gravel, petroleum.
Murray -----	2,140,311	2,592,518	Stone, petroleum, asphalt, sand and gravel.
Muskogee ---	937,479	864,356	Petroleum, sand and gravel, stone, natural gas.
Noble -----	9,676,220	9,781,474	Petroleum, natural gas, natural-gas liquids, sand and gravel.
Nowata -----	15,681,295	15,230,491	Petroleum, stone, natural gas.
Okfuskee ---	10,132,686	11,117,032	Petroleum, natural-gas liquids, natural gas, sand and gravel.
Oklahoma ---	35,065,312	30,033,325	Petroleum, natural-gas liquids, natural gas, sand and gravel, stone, clays.
Okmulgee ---	7,821,495	7,957,790	Petroleum, coal, stone, natural gas, sand and gravel.
Osage -----	68,558,343	81,009,593	Petroleum, natural-gas liquids, stone, natural gas, sand and gravel.
Ottawa -----	12,511,898	6,054,064	Zinc, lead, stone, tripoli, sand and gravel.
Pawnee -----	7,946,312	8,242,510	Petroleum, sand and gravel, natural gas, stone.
Payne -----	13,448,121	15,166,521	Petroleum, natural gas, stone, natural-gas liquids.
Pittsburg ---	2,373,938	2,642,451	Coal, stone, natural gas, sand and gravel, clays, petroleum.
Pontotoc ---	17,436,733	17,547,261	Petroleum, cement, stone, natural-gas liquids, sand and gravel, natural gas, clays.
Pottawatomie	16,227,843	11,962,650	Petroleum, natural-gas liquids, natural gas, sand and gravel.
Pushmataha -	53,763	2,062	Sand and gravel.
Rogers -----	5,649,402	6,887,366	Petroleum, coal, stone, clays, natural gas, sand and gravel.
Seminole ----	28,532,761	31,465,563	Petroleum, natural-gas liquids, natural gas, sand and gravel, clays.
Sequoyah ---	2,786,748	3,462,054	Coal, lime, stone, natural gas.
Stephens ----	59,003,172	71,528,115	Petroleum, natural-gas liquids, natural gas, sand and gravel, stone.
Texas -----	26,852,160	23,967,803	Natural gas, natural-gas liquids, petroleum, sand and gravel.
Tillman ----	1,638,025	2,379,124	Petroleum, sand and gravel, natural gas.
Tulsa -----	7,082,548	7,198,975	Petroleum, stone, sand and gravel, clays, natural gas.
Wagoner ----	1,165,168	1,596,165	Petroleum, natural gas, sand and gravel.
Washington -	16,749,979	18,553,788	Petroleum, cement, stone, clays, natural gas.
Washita ----	1,694,564	1,396,625	Petroleum, natural gas.
Woods -----	665,988	432,443	Natural gas, petroleum, sand and gravel, stone, salt.
Woodward --	2,855	8,815	Sand and gravel, natural gas, petroleum.
Undistributed	1,393,122	214,566	
Total -----	\$757,116,000	\$803,937,000	

<sup>1</sup> Adair and Roger Mills Counties not listed because no production was reported.

<sup>2</sup> Included with "Undistributed" to avoid disclosing individual company confidential data.

## Part II

# THE MINERAL INDUSTRIES OF OKLAHOMA IN 1958 Preliminary Summary

by

PETER GRANDONE and WILLIAM E. HAM

Total value of 1958 mineral production in Oklahoma is estimated at \$767.7 million, 4.5 percent less than the 1957 record value of \$803.9 million. Mineral fuels accounted for more than 95 percent of this total 1958 value, nonmetals for 4 percent, and metals for less than 1 percent. Compared with 1957, substantial losses were reported for petroleum, coal, zinc, and lead, and these losses were not offset by modest increases for natural gas, liquefied petroleum gases, cement, and sand and gravel.

## MINERAL FUELS

*Coal.*—Coal production declined in Oklahoma in 1958. The estimated 1,424,000 tons reported in 1958 was from 12 counties, the largest tonnage being from Rogers County. Lone Star Steel Co. at McAlester idled 113 mine workers and reduced the work week to 4 days; the coal is used in the form of coke in the company's Texas plant in making steel drill pipe, for which the oil and gas industry had less requirements during 1958.

*Natural Gas.*—Marketed production of natural gas in 1958, about 15 percent more than in 1957, was estimated at 732,100 million cubic feet valued at \$63.7 million. More than 50 counties in Oklahoma reported natural gas, Texas County being the principal producer. Gas reserves were extended as more prolific gas wells were drilled, especially in Harper, Texas, and Cimarron Counties.

The Secretary of Interior stated that a long-term contract has been signed with the Colorado Interstate Gas Co. giving the Bureau of Mines exclusive rights to extract helium from natural gas produced by the company in the Keyes field, Cimarron County. Construction of a \$14-million helium extracting plant capable of processing 40 million cubic feet of gas per day was started near Keyes. After removal of the helium (two percent), the gas will be returned to Colorado Interstate Gas Co. for regular commercial use.

*Natural-Gas Liquids.*—The value of natural-gas liquids produced in Oklahoma in 1958 was estimated at \$50 million. Total output gained slightly over 1957 as markets for LP-gases remained strong; production of natural gasoline declined slightly.

Greenville Gasoline Corp. was constructing a four-unit natural gasoline plant near Marietta, Love County. The plant will have a capacity production of approximately 12,000 gallons of gasoline, butane, and propane, and will process 3 to 5 million cubic feet of gas per day.

Sun Oil Co. awarded a contract to build a 100-million cubic foot per day natural gasoline plant at Laverne, Harper County. The plant, scheduled for completion by July, 1959, will cost approximately \$3.5 million. Gas from the big Laverne field will be processed for pipeline transmission to Detroit and Milwaukee.

Total capacity for underground storage of LP-gases in Oklahoma was 300,000 barrels in 1958. The fuel was being stored in abandoned oil wells in Pontotoc County, in a salt formation in Beckham County, and in a shale mine in Seminole County.

*Petroleum.*—Production of crude oil in Oklahoma decreased 6 percent in 1958 to an estimated 202 million barrels from 1957 production. This quantity made the state the fourth largest oil producer in the nation for the 13th consecutive year. Crude oil production was valued at \$613 million and was 80 percent of Oklahoma's total mineral value in 1958. Production was reported from 62 of the state's 77 counties, and Osage and Garvin Counties were the leading producers. Oklahoma's oil allowable of 600,000 barrels daily at the beginning of the year was cut to 504,000 barrels daily in March; in July, it was raised to 560,000 barrels daily where it was permitted to remain to the year end.

According to the Oil and Gas Journal, total wells drilled (5,764) for the first 11 months of the year showed little change from the same period in 1957; however, the 789 exploratory wells drilled was 15 percent less than for the same period in 1957. Drilling interest was continued in the Anadarko Basin. In the Elk City field, Beckham County, Shell Oil Co. drilled the second deepest test well in the world to a total depth of 23,400 feet. The first oil discovery in Blaine County, 16 miles southwest of the North Cooper Gas field, was expected to boost exploration in the region.

In the refining industry upgrading of motor fuels was continued. Kerr-McGee Oil Industries, Inc. completed a multimillion-dollar expansion at its Wynnewood refinery. This will give the company an additional supply of high-octane gasoline for its retail stations in a 19-state marketing area. D-X Sunday Oil Co. opened four new processing units at its West Tulsa refinery. These units, costing \$12 million, will not increase the refinery's present capacity (75,000 barrels of crude oil daily) but are designed to boost the gasoline rating beyond the 105 octane range.

Closely related to petroleum refining was the completion of Callery Chemical Co.'s new \$38 million high-energy fuel plant at Muskogee. Production of "HiCal", the plant's product, will require substantial quantities of sodium, boric acid, hydrogen, and ethylene. The fuel will be used in jet-propulsion systems.

The estimated value of nonmetals (exclusive of mineral fuels) produced in Oklahoma in 1958 was \$31.9 million, slightly less than the 1957 value. Losses were shown for all nonmetals except cement, clays, gypsum, pumice, sand and gravel, and sulfur.

*Asphalt (Native).*—Output of native asphalt from Murray County in 1958 was one-fifth less in both quantity and value than in 1957.

*Cement.*—Cement production in 1958 in Oklahoma gained 6 percent over 1957 to keep pace with total construction in the state. Dewey Portland Cement Co., Dewey, was closed from March 25 to May 5 to reduce cement stock on hand and to install new electrical equipment. The company also announced plans to build a \$10-million cement plant 4 miles east of Tulsa. Initial capacity will be 1,250,000 barrels yearly and about 250 persons will be employed.

Ideal Cement Co. began producing cement at its new \$20-million plant in Ada. The fire was lighted in the new plant's 12- x 450-foot rotary kiln on October 23. Construction of the second kiln of the same size and other related equipment will be completed by May 1959. With a combined capacity of 5.5 million barrels annually, Ada will be the largest single unit of the Ideal Cement Co. A 5½ mile conveyor system between the company's quarry at Lawrence and the Ada plant will be the longest permanent belt conveyor ever constructed.

*Clays.*—Production of clays in Oklahoma in 1958 was estimated to be 655,000 tons valued at \$657,000, a gain of 2 percent in both tonnage and value compared with 1957.

*Gypsum.*—Output of gypsum, all from Blaine and Caddo Counties, gained about 3 percent in 1958 in both production and value compared with 1957.

*Lime.*—Lime production in 1958 decreased slightly although demand for chemical lime and building materials continued unchanged. St. Clair Lime Co. in Sequoyah County remained the only lime producer in Oklahoma.

*Pumice (Volcanic Ash).*—Production and value of pumice (volcanic ash), all from Beaver County, were about twice the 1957 figures.

*Salt.*—Salt was reported from Beckham, Harmon, and Woods Counties by three producers. The 1958 output and value were approximately two-thirds of the 1957 figures.

*Sand and Gravel.*—The output of sand and gravel operations in 1958 in Oklahoma was an estimated 5.3 million tons valued at \$4.8 million. Production trend of this construction material had been increasing steadily during the 5-year period ending in 1956, declined in 1957, and gained again in 1958.

*Stone.*—Stone output in Oklahoma decreased 13 percent in 1958 when an estimated 10.5 million tons valued at \$12 million was produced. The most important commodities in this group are crushed limestone, chat, and dimension granite.

*Sulfur.*—Sulfur recovered from sour natural gases in Marshall County gained about two-thirds in 1958.

*Tripoli.*—Output and value of tripoli produced in Ottawa County were slightly less than the 1957 figures.

## METALS

*Cadmium, Germanium, and Indium.*—Several minor metals as cadmium, germanium, and indium occur in minute quantities in the lead and zinc ores of Oklahoma and are recovered in varying amounts from the flue dusts of the zinc smelting operations. It is impossible to assign the state origin of these minor metals, since their minute quantities in the ores precludes competent assay data and because the flue dusts from which these metals are recovered are the combined dusts of both domestic and imported ores.

*Lead.*—An estimated 3,150 tons of recoverable lead valued at \$749,700 was produced in Oklahoma in 1958. This was 56 percent less in quantity and 64 percent less in value than 1957.

*Zinc.*—Mine production of recoverable zinc in Oklahoma declined 72 percent to an estimated 4,180 tons in 1958 from 1957 output, a decline trend that prevailed throughout the Tri-State District because of oversupply on world markets. Oklahoma zinc was valued at \$861,000 compared to the 1957 value of \$3.5 million.

*Smelters.*—Three retort smelters were operating in Oklahoma in 1958; the Bartlesville smelter of National Zinc Co., Inc., the Henryetta smelter of the Eagle-Picher Co. and the Blackwell smelter of American Metal Climax, Inc. The Henryetta smelter reopened December 1 after a 9-month work stoppage which idled about 600 employees. Installation of automatic charging machines will replace about 100 employees. The Bartlesville smelter was closed from May 31 to June 5 because of a dispute over a new union contract. Effective February 22, zinc production at the Blackwell smelter was cut by 2,000 tons of slab zinc a month.

*Tri-State District.*—Mine production in the Tri-State District of southwest Missouri, Oklahoma, and Kansas was an estimated 511,000 tons of zinc-lead ores. This yielded 15,066 tons of zinc concentrate containing 8,090 tons of recoverable zinc and 5,698 tons of lead concentrate yielding 4,070 tons of recoverable lead. Oklahoma accounted for about 52 percent of the District's recoverable zinc and about 77 percent of the recoverable lead; Kansas accounted for the remainder as southwest Missouri had no production. These 1958 figures for recoverable metal in the Tri-State District represent a 62-percent decline for lead and a 73-percent decline for zinc from 1957. The declines resulted mainly from a 6-month shutdown of mining and milling operations because world supply continued to exceed demands.

Metal prices showed some weaknesses during the first half of the year, but gained during the second half. Zinc opened at 10 cents per pound, East St. Louis, then rose to 10.5 cents on October 2 and to 11.5 cents on November 7. Lead opened at 13 cents per pound, dropped steadily to 10.75 cents on August 4, and then gained steadily to 13 cents on October 14.