

Kansas Mineral Industry Report

1971



Kansas Geological Survey
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State Geological Survey of Kansas

University of Kansas May 1972

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Kansas Mineral Industry Report, 1971...

by Lawrence L. Brady
Margaret O. Oros
Linda A. Flueckinger
Kathleen Q. Camin
Ronald G. Hardy

with Directory of Kansas Mineral Producers

by Douglas L. Beene
Helen Wolfe

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Front Cover: Coal mining and land redevelopment in southeastern Kansas. Pittsburg & Midway Coal Mining Company's Mine 19, largest coal mine in Kansas, is illustrated in the cover photo showing the strip-mining method using "Brutus," their 90 cubic yard electric-powered shovel. Following removal of the coal, this disturbed land will be leveled, seeded, and returned to productive agricultural use.

Redevelopment of older strip-mined land is presently being accomplished by several landowners in this coal-mining belt. Morris Barnes, a leader in this redevelopment work, has leveled over 1,300 acres of this land. A portion of the Barnes ranch that has recently been redeveloped from old strip-mined land is shown in the second cover photo.

Introduction

The 1971 Mineral Industry Report summarizes the progress that Kansas has seen in its mineral industry in 1971 and develops background on some of the future problems facing the industry. Production dollar value of Kansas minerals has reached a new one-year high in 1971. This new record year is primarily the result of higher unit values of our mineral products and is not the result of increased volume production.

Petroleum production continues to dominate the Kansas mineral industry by accounting for 81.9 percent of the 1971 mineral production dollar. This production, however, is not without problems--total crude oil production continues to decline. A look at 1971 petroleum production and the past, present, and future of the Kansas petroleum industry is summarized in the article by M.O. Oros.

The topic of present and future energy needs has been generalized in numerous magazine and newspaper articles as well as in professional publications, but of direct interest to Kansans is the article by L.A. Flueckinger who takes a general overview of the energy situation, then relates these projections to Kansas and its future.

Land reclamation and redevelopment of old coal strip-mined land is presently underway in Crawford, Cherokee, and Labette counties in southeastern Kansas. The article by K.Q. Camin discusses how local citizens, through help of state and federal agencies, have combined their efforts to produce a new boost to the economic development of that area. The redevelopment of old mined land is a clear example of how initiative and hard work have overcome one of the big problems in the state--how to reclaim disturbed land for productive use.

Another problem and some possible solutions are presented in an article by R.G. Hardy concerning fly ash, the waste product generated by coal-burning facilities. Present and potential uses of fly ash resulting from research that is now underway could provide a bright future for this commodity.

Review of the Kansas Mineral Industry in 1971

Lawrence L. Brady*

Kansas mineral production for 1971 is estimated at \$624.26 million, the highest mineral production figure in Kansas history. The 1971 amount represents an increase of 2 percent over the 1970 value of mineral production. Natural gas, natural gas liquids, cement, salt, gypsum, and carbon black were the main commodities that showed an increase over their 1970 production figures. However, many commodities showed a decrease from 1970 figures in both production volume and value (Table 1). Coal production showed the greatest decrease among the various commodities, due mainly to the 6-week strike of the mine workers.

Petroleum products continue to be the most important phase of the Kansas mineral industry, accounting for 81.9 percent of the mineral industry dollar. The trend in petroleum products clearly affects the mineral industry production trend.

It is estimated that the Kansas mineral production value will increase to approximately \$630 million in 1972. Factors contributing to increased production are possible higher prices for petroleum products and large volume increases in commodities linked to the construction industry. The gypsum and salt industries should continue to show increased production and there is a large increase in coal production expected. Offsetting these increase predictions is a probable decrease in the volume of crude oil and helium production.

The petroleum industry in Kansas showed an increase of 2.3 percent from a value of \$499.6 million in 1970 to an estimated \$511.3 million in 1971. Included in the petroleum products total is crude oil, natural gas, natural gas liquids, and crude and refined helium. Among these products, natural gas liquids and natural gas showed an increase in production value; however, helium showed a production volume increase, but a decrease in total value.

Crude oil production continues to decrease with a 7.4 percent volume reduction from 84.8 million barrels in 1970 to 78.5 million barrels in 1971. Value of crude oil, however, decreased only 1.2 percent from \$279.9 million to \$276.4 million. The decrease in production should continue in 1972. Increases in the price of crude oil will help the production value, but decreases in Kansas reserves continue. Crude oil still outranks all other Kansas mineral commodities in value, and amounts to 44.3 percent of the total mineral production in 1971.

Natural gas had its greatest year in total production value in 1971 with a 2.1 percent increase over 1970. Total volume of natural gas, however, was down 1.6 percent from 1970. Value of natural gas in 1971 amounted to an estimated \$120.7 million, placing it second in value to crude oil in mineral commodities produced, and accounted for 19.3 percent of the total mineral production.

Because of strong consumer demand for natural gas, natural gas production in 1972 is expected to remain approximately the same in volume but should increase in value to a new record year.

Production of natural gas liquids in 1971 showed only a 5.3 percent volume change from 1970, but showed an estimated 25.2 percent increase in total value due to a strong pricing increase. Production volume of natural gas liquids in 1972 is expected to remain at approximately the 1971 level, however, slightly higher prices should result in a higher total production value.

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Table 1.--Mineral production and value in Kansas, 1970 and 1971.

COMMODITY	UNIT	1970		1971*		1971 % LOSS-GAIN FROM 1970	
		QUANTITY	VALUE \$1,000	QUANTITY	VALUE \$1,000	QUANTITY	VALUE
Cement: Portland	1,000 - 376 lb. bbl.	9,197	28,177	9,460	31,350	+3.0	+11.4
Masonry	1,000 - 280 lb. bbl.	328	1,029	355	1,200		
Clay and Shale [†]			10,789 (est)		10,711		- 0.7
Salt	1,000 short tons	1,230	18,206	1,270	19,050	+ 3.2	+ 4.4
Sand & Gravel	1,000 short tons	12,968	12,351	12,113	11,550	- 6.6	- 6.5
Stone	1,000 short tons	15,161	22,406	14,454	21,826	- 4.7	- 2.6
Coal	1,000 short tons	1,621	9,062	1,153	6,447	-28.9	-28.9
Miscellaneous: Gypsum (raw and calcined), carbon black, salt brine, sulfur, lime, pumicite and volcanic ash, lead and zinc							
Crude Oil	1,000 - 42 gal. bbl.	84,812	279,879	78,532	276,433	- 7.4	- 1.2
Helium: Refined Crude	1,000 CF (14.7 psia; 70°F)	354,000 2,897,005	8,137 36,213	360,000 2,905,530	7,670 34,866	+ 0.4	- 4.1
Natural Gas	1,000,000 CF (14.65 psia; 70°F)	909,413	118,224	894,451	120,751	- 1.6	+ 2.1
Natural Gas Liquids	1,000 - 42 gal. bbl.	27,186	57,180	28,626	71,564	+ 5.3	+25.2
TOTAL VALUE			612,227		624,260		+ 2.0

Sources of information: State Geological Survey of Kansas, Kansas Corporation Commission, Kansas State Department of Labor, U.S. Bureau of Mines.

*The figures for 1971 are year-end estimates and should not be used as final figures. Final figures for 1971 will be available later in 1972.

[†]Clay and shale figures include value of clay and shale products.

Helium production was down in total value but up in volume for 1971 as compared with 1970 figures. The instability in helium production can be attributed to the government position on conservation storage of helium. Since certain natural gas fields in Kansas, Oklahoma, and Texas have quantities of helium sufficient for commercial extraction, the U.S. government decided to conserve helium obtained from these fields for future use before the gas fields were depleted. The excess helium produced by four of the nine helium-producing firms in the U.S. was purchased by the Department of the Interior and stored in the Cliffside gas field in Texas. Estimates by the U.S. Bureau of Mines¹ show that U.S. helium production during 1971 was more than seven times larger than the quantity needed for domestic demand and exports.

After evaluating the program, the government terminated the helium contracts in 1971, with 11 years remaining of the 22-year contracts. Three of the firms with contracts obtained a U.S. District Court order which requires the government to continue to purchase the helium under the previous agreement. The future of helium therefore depends on further action of the courts and the Department of the Interior. Kansas would be strongly affected by this future action because 6 of the 12 helium-refining plants in the United States are located in Kansas and they produce over half of the helium that is extracted in the U.S.

A decrease in highway construction occurred in Kansas during 1971 which resulted in a tonnage and value decline in both rock products and sand and gravel production. An increase in heavy construction other than road construction helped offset the lack of road work. The decrease in 1971 Kansas production was a disappointing factor because the U.S. as a whole had a 4 to 8 percent increase in rock and sand and gravel production. Cement production, in contrast to sand and gravel and rock products, showed a gain over 1970 production.

Stone tonnage for 1971 is estimated to be 4.7 percent lower than 1970, with a total production value 2.6 percent below the 1970 value. This decline is attributed to continued economic factors that had a strong effect on production, especially in the early part of 1971. From the increase in construction contracts awarded in 1971, it appears that 1972 will experience a sharp increase in stone production that could approach a 10 to 15 percent gain over 1971.

Limestone dominates the Kansas stone market and comprises approximately 97 percent of the total stone production value. The remaining 3 percent is composed of sandstone and quartzite (a very well-cemented sandstone), with chat amounting to less than 1 percent of stone production value. Use of limestone produced in Kansas can generally be divided as follows: (1) concrete aggregate, approximately 21 percent; (2) road base, 17 percent; (3) road surfacing, 15 percent; (4) cement manufacture, 15 percent; (5) bituminous aggregate, 11 percent; (6) agricultural lime, 6 percent; (7) dimension stone, 2 percent; (8) miscellaneous purposes such as riprap and railroad ballast, 13 percent.

In 1971 limestone joined the environmental pollution fight in Kansas. The Kansas Power and Light Co. has been testing a limestone scrubber system on a small 125,000-kilowatt power unit at their station in Lawrence. A similar scrubber system was installed in 1971 in a new 430,000-kilowatt power unit. Limestone at the Kansas Power and Light Co. facility in Lawrence is injected as a fine powder into the boiler along with the finely ground coal. The gases and particulate material moving from the boiler pass through the scrubber assembly that is designed to remove particulate material (fly ash) and sulfur gases derived from the coal. Sulfur dioxide gas reacts with the calcined limestone forming a calcium sulfate. This material, plus the coal ash and unreacted lime, is then deposited in a settling basin. Limestone used for this system at the Kansas Power and Light Co. plant is provided by Hamm Quarries, Inc. and is obtained from the Plattsmouth Limestone near Lawrence.

¹U. S. Bureau of Mines, Commodity Data Summaries, January 1972, p. 67.

A scrubber system of slightly different design is planned for the new La Cygne Power Plant in Linn County. This 820,000-kilowatt station, under construction by Kansas Gas and Electric Co. and Kansas City Power and Light Co., will be a total coal-burning facility. The scrubber system at La Cygne differs from the one at Lawrence because exhaust gases are treated outside of the boiler. Whereas the Lawrence system injects limestone into the boiler, the La Cygne facility will inject finely ground limestone as a slurry outside the boiler in a separate system. Approximately 400,000 to 600,000 tons of limestone a year will be used at the La Cygne Power Plant. Bates County Rock, Inc. of Butler, Missouri, tentatively has the contract to deliver this rock, and both the Bethany Falls and Winterset Limestones will be utilized.

Sand and gravel production for 1971 is estimated to have declined 6.6 percent in volume and 6.5 percent in value. Decreased road construction in 1971 is primarily responsible for this decline. However, production of those companies supplying sand used principally in building construction should reflect an increase in 1971 over 1970. Sand and gravel production should show a strong increase in 1972; based on contracts let during 1971, it is estimated that there will be an approximate 10-percent increase in production.

According to 1970 Bureau of Mines value figures for Kansas, the construction industry consumes 92 percent of sand and gravel production. Sand and gravel used in road construction amounted to 50 percent of the total commodity value, with building construction consuming 35 percent; fill material, 5 percent; and with 2 percent used for miscellaneous purposes such as railroad ballast. Industrial sand accounted for 2 percent of the total sand and gravel value, while miscellaneous commercial gravel amounted to 6 percent of the value. The three leading counties in production values in Kansas during 1971 were Wyandotte, Sedgwick, and Johnson.

Cement production in Kansas in 1971 showed an estimated 3 percent increase in volume and an 11.4 percent increase in total value over 1970 production. Kansas has five cement plants operating in diverse locations in the state, with a combined capacity of 12.7 million barrels (376 lb. per bbl.) a year. Starting in January 1972, production will be measured in short tons rather than barrels. The increase in construction contracts awarded during 1971 should result in a strong production increase for 1972 in Kansas, especially in total volume.

Clay and shale products value in 1971 decreased an estimated 0.7 percent, down from \$10.8 million. Decrease of clay products value as compared to that of other construction products is less because of a strong connection with the building phase of construction. Approximately 57 percent of manufactured clay products are in the form of clay pipe and similar products, 41 percent of the total is brick, and approximately 2 percent miscellaneous. With most of the clay products manufactured in Kansas directly related to the construction industry, the outlook for 1972 is for a marked increase over 1971.

Salt production in Kansas is up an estimated 3.2 percent from 1970 production. Estimated value increased 4.4 percent, up from \$18.2 million in 1970 to \$19.0 million in 1971. Continued demand for evaporated salt and fine rock salt was responsible for these increases. A similar production increase in 1972 is expected.

The American Salt Corporation has added a \$3.5 million addition to its plant at Lyons, Kansas. When completed, the expansion will add 550 tons/day of evaporated salt to the plant's output, more than doubling present production of evaporated salt.

Coal production in Kansas during 1971 was down 28.9 percent in both volume and value from 1970. The large decrease in production is in sharp contrast to a trend in recent years toward increased production, and is due primarily to two temporal factors. The 6-week strike of the United Mine Workers in October and early November had the greatest effect on coal production. The second factor was an increase in the overburden/coal-seam thickness stripping ratio. Geologic factors during deposition resulted in large barren zones in some of the important coal beds. In small areas where major coal beds were very thin or absent, thin coal beds were

mined rather than moving the heavy equipment to a new location. This alternative plan, when compared to normal mining operations, resulted in removal of a larger amount of overburden for the amount of coal obtained.

Production of coal in 1972 should increase to a total similar to that of 1970, as the result of renewed mining of areas of major coal seams, and the opening of the new Midway Mine of the Pittsburg and Midway Coal Mining Co. The Midway Mine will be opened in Linn County, Kansas, to provide coal for the new La Cygne Power Plant. Plans are for it to provide at peak production 2.4 million tons of coal annually. Initially, the mine will be in Kansas along the Kansas-Missouri state line, but within a matter of months the mining will be on the Missouri side. Plans by P&M for its Midway Mine indicate that after the early work in Kansas, it will be 5 or 6 years before large amounts of coal will again be produced in Kansas.

Minerals and mineral products grouped under miscellaneous products showed an increase of 2.5 percent over 1970 figures. This change resulted in a value increase from \$10.6 million to \$10.8 million for gypsum, carbon black, salt brine, sulfur, lime, and volcanic ash. Gypsum, the commodity in this group having the largest production value, showed an estimated increase of 5 percent. Carbon black and salt brine, second and third in value in the group, also showed marked increases.

For the first time since 1877 Kansas produced no lead and zinc. With the closing of the Swalley Mine near Baxter Springs, Kansas, and the closing of Eagle-Picher Industries central mill at Cardin, Oklahoma, in 1970, the era of the illustrious Tri-State mining district came to a close. Low-grade ore, low ore prices, and new pollution standards have contributed to the termination of operation in the district. During the 94-year history of mining in this area an estimated 2.9 million tons of zinc concentrate and 690,000 tons of lead concentrate were removed from the Kansas subsurface, with a total value of over \$500 million. The Tri-State district, consisting of southeastern Kansas, northeastern Oklahoma, and southwestern Missouri, has produced lead and zinc concentrates valued at over \$2 billion and has been among the richest mining districts in the world.

Numerous research projects of interest to the mineral industry are being conducted at the Kansas Geological Survey. Studies on Kansas bentonite, utilization of fly ash, and use of Kansas minerals as fillers in various products such as casting resins are being conducted. Use of the computer in studying various geological problems is continuing at the Kansas Survey and new electronic scanning techniques are being applied to permeability and porosity studies of carbonate rocks. Various geochemical studies and evaluation of environmental problems add important data for solution of problems directly related to different phases of the mineral industry. Basic geological mapping in conjunction with ground-water studies adds important areal information for mineral producers. Areal geology and ground-water geological studies were recently completed on Ellsworth and Johnson counties.

The Mined Land Redevelopment Office in Girard has been instrumental in the reclamation of the older strip-mined areas in southeastern Kansas. This work is summarized by Camin in this publication. Research on the proposed location of the Atomic Energy Commission Radioactive Waste Repository Site is still under progress, and much of this work could provide important data for future mineral exploration. Geophysical studies of small areas having economic mineral potential have also been initiated using both gravity and magnetic studies.

Future plans of the Survey include, in addition to the continuation of the above studies, an extensive coal reserve study, and a reevaluation of Kansas limestones and their potential for quality limestone products.

Kansas Petroleum Industry Report, 1971

Margaret O. Oros*

Production

Crude oil production in Kansas decreased 7.4 percent during 1971, to 78,532,200 barrels. Natural gasoline and natural gas liquids production increased 5 percent to 28,652,786 barrels. These products, largely a by-product of the helium industry, now total 36 percent as much in quantity as crude oil produced in Kansas. Natural gas production decreased 1.6 percent to 894,450,803 thousand cubic feet. Helium production increased 0.3 percent, from 2,897,005 thousand cubic feet in 1970 to 2,905,530 thousand cubic feet in 1971.

Drilling and Discoveries

Wells reported drilled in Kansas during 1971 are tabulated by county and classification in Table 1. Kansas drilling activity dropped 2 percent to 2,413 holes reported in 1971. Twenty-seven of these were old holes that were drilled deeper. Information was also received, but not tabulated, on 71 old holes that were reworked with no additional footage drilled. Total footage drilled also decreased, from 7,689,315 feet in 1970, to 7,389,855 feet in 1971; average depth per well was 3,021 feet.

Of the 2,349 holes drilled for oil or gas, 1,211 (51%) were successful. Of 1,608 field development holes, 1,066 (66%) were completed as producing wells. There were 741 exploratory tests drilled; 145 (19%) found oil or gas. Eight (5%) of the 151 holes drilled more than 2 miles from production (new field wildcats) found oil or gas. Fifty-four (14%) of the 384 new pool wildcats, 82 (41%) of the 199 outpost extensions, and 1 (16.6%) of the 6 deep pay tests were productive. One hole was drilled as a shallow pay test, but it was dry. Significant unsuccessful exploratory tests are listed in Table 2.

Twenty-six holes changed classification between the spudding of the hole and completion. One was started as a development well and completed as a service well; the others were completed as tests for oil or gas.

The eight fields discovered more than 2 miles from production (NFW) and the three new pool discoveries (NPW) with the largest number of completions at the end of the year are listed in Table 3. By the end of 1971, Erna Northwest had 11 oil wells; Conway North, 10 oil wells; and Sutcliffe, 8 oil wells.

The producing zones in the 145 discoveries were divided among the following geologic groups: Pennsylvanian, 74; Mississippian, 42; Ordovician, 9; Arbuckle, 19; and Cambrian, 1 (Fig. 1).

Eighty new-pay zones in producing fields were also found. Two were in rocks of Permian age, 54 were Pennsylvanian, 12 were Mississippian, 3 were Ordovician, 8 were from the Arbuckle, and 1 was from Cambrian rocks.

Exploration and Research

The exploration program in the Nemaha anticline and nearby areas, begun in 1970 by McCulloch Oil Corporation, Venus Drilling Company, and Alex McCoy Company,

*Geologist, Head, Oil and Gas Division, State Geological Survey of Kansas, Lawrence, Kansas.

Table 1.--Tabulation of wells reported to the AAPG-API Committee on Statistics of Drilling during 1971.

COUNTY	Producers					Dry					Misc. wells	Total holes
	New field W. C.	New pool W. C.	Deep pay test	Out- post ext.	Dev. well	New field W. C.	New pool W. C.	Deep pay test	Shallow pay test	Out- post ext.	Dev. well	
Allen					21						6	46
Anderson					7					1		8
Atchison												0
Barber		1		1	4	2	5			2	6	21
Barton		4		1	35	1	13			3	36	94
Bourbon												1
Brown										1		0
Butler				3	41	1	10			3	31	91
Chase											1	1
Chautauqua					23	2				1	14	41
Cherokee												0
Cheyenne												0
Clark							1			1	1	3
Clay												0
Cloud												0
Coffey				1	47		3			2	10	63
Comanche					11	5	2			2		20
Cowley		1		3	26	4	12			5	19	70
Crawford					1						1	2
Decatur		3		2	12	3	2				6	28
Dickinson											1	1
Doniphan												0
Douglas					4							4
Edwards				1	10	1	4				4	20
Elk					30	1	6			2	12	52
Ellis				7	24		13			6	26	76
Ellsworth		1		1	25	3	9			4	13	57
Finney		3		1	8	1	2			1	2	19
Ford	1			1	1	1	3				1	8
Franklin	1				3		1				1	7
Geary												0
Gove		3			11	12	5			1	9	41
Graham	1	5		4	25	1	31			11	27	105
Grant					24						1	25
Gray												0

Table 1 (cont.)

COUNTY	Producers					D Dry				Misc. wells	Total holes
	New field W. C.	New pool W. C.	Deep pay test	Out- post ext.	Dev. well	New field W. C.	New pool W. C.	Deep pay test	Shallow pay test	Out- post well	
Greeley					1						1
Greenwood	1				46	2	3			21	82
Hamilton					11	1					19
Harper	1			1	5	4	1			5	20
Harvey				3	11	1	7			6	29
Haskell				1	2						
Hodgeman	2			1	11	8	15			1	5
Jackson										11	52
Jefferson											0
Jewell											0
Johnson											0
Kearny					2		1				3
Kingman				2	1		1		1		4
Kiowa					7	2	12			2	27
Labette					3	1	1			6	12
					4					2	6
Lane											
Leavenworth	3				1		6			2	12
Lincoln											0
Linn					189						0
Logan					2	1	1			2	192
										1	5
Lyon											
McPherson	1				4	3	1			3	11
Marion				3	11	1	5			6	27
Marshall					11	5	3			2	22
Meade				1	10	14					14
						1	1			6	20
Miami											
Mitchell					5	1				7	13
Montgomery						1					1
Morris					30					13	47
Morton					1						1
					3			2		3	7
Nemaha											
Neosho					5	2					2
Ness	2	8		9	38	7	29			1	9
Norton				2	4	3	3			31	130
Osage						1				3	15
											1

Table 1 (concluded)

COUNTY	Producers					Dry					Misc. wells	Total holes
	New field W. C.	New pool W. C.	Deep pay test	Out- post ext.	Dev. well	New field W. C.	New pool W. C.	Deep pay test	Out- post ext.	Dev. well		
Osborne												0
Ottawa												0
Pawnee		2		6	16	3	9		6	14		54
Phillips				5	15		2		3	4		31
Pottawatomie	1				1	11						13
Pratt				1	4	1	1		2	5		14
Rawlins		1			11	2			3	13		30
Reno				1	5		5			6		17
Republic												0
Rice				3	29	1	4		4	14	1	56
Riley												2
Rooks		3		1	25		2		3	18		61
Rush		2		3	15	1	11		3	14		49
Russell		1		1	24		6		5	14	3	54
Saline					1		1		2	1		5
Scott		1				1				1		3
Sedgwick					1	4	5		2	3		15
Seward		1	1	2	10		1		5	11		32
Shawnee												0
Sheridan					1	8	9		1	1		20
Sherman						1						1
Smith						4						4
Stafford		3		4	30		13		3	25		78
Stanton					1	1	1			1		4
Stevens					7			1	1	3		12
Sumner		1		4	23	7	20		4	13	1	73
Thomas						3			1			4
Trego	2	2		2	4		11		1	8	2	32
Wabaunsee												0
Wallace												0
Washington												0
Wichita												0
Wilson					2		1			2	4	9
Woodson					30		2		1	10	2	45
Wyandotte												0
TOTALS	8	54	1	82	1066	143	330	5	117	542	64	2413

Table 2.--Important exploratory failures in Kansas, 1971.

Operator, well number, and lease	County and location	Total depth (ft.)	Name of formation at TD	Remarks
McCulloch, Venus, & McCoy, No. 1 Staats	Marshall 27-5S-9E	1475	Precamb. granite	Holes drilled in Nemaha anticline and nearby areas, northeastern Kansas
McCulloch, Venus, & McCoy, No. 1 Sedlacek	Marshall 31-5S-9E	1914	No info.	"
McCulloch, Venus, & McCoy, No. 1 Heiman	Nemaha 29-2S-11E	925	Precamb. granite	"
McCulloch, Venus, & McCoy, No. 1 Florence	Nemaha 18-5S-11E	923	No info.	"
McCulloch, Venus, & McCoy, No. 1 Armstrong	Pottawatomie 2-6S-8E	1954	Precamb. granite	"
McCulloch, Venus, & McCoy, No. 1 Fagerberg	Pottawatomie 31-6S-8E	2150	Arkosic sand	"
McCulloch, Venus, & McCoy, No. 1 Ryan	Pottawatomie 32-6S-9E	2031	Precamb. granite	"
McCulloch, Venus, & McCoy, No. 1 Falk	Pottawatomie 8-6S-10E	1482	Precamb. granite	"
McCulloch, Venus, & McCoy, No. 1 Quigley	Pottawatomie 4-7S-9E	1906	Precamb. granite	"
McCulloch, Venus, & McCoy, No. 1 Magnett	Pottawatomie 24-7S-9E	1852	Precamb. granite	"
McCulloch, Venus, & McCoy, No. 1 Figge	Pottawatomie 14-7S-10E	1521	Precamb. quartzite	"
McCulloch, Venus, & McCoy, No. 1 Cox	Pottawatomie 30-8S-10E	1760	Precamb. granite	"
McCulloch, Venus, & McCoy, No. 1 McCoy	Pottawatomie 26-9S-8E	2195	Precamb. granite	"
McCulloch, Venus, & McCoy, No. 1 Ebert	Pottawatomie 2-9S-9E	1920	Precamb. granite	"
Petroleum Mgmt., No. 1 Overmiller	Smith 4-1S-13W	3832	Miss.	Salina basin tests
Dreiling, Cole, & Conaway, No. 1 Lyon	Smith 24-2S-14W	4220	Arbuckle	"
Dreiling, Cole, & Conaway, No. 1 Conaway	Smith 3-3S-13W	4410	Arbuckle	"
George J. Ablah No. 1 Lebanon	Smith 1-4S-11W	4258	Arbuckle	"

Table 3.--Selected list of discoveries in Kansas, 1971.

Operator, well number, and lease	County and location	Total depth (ft.)	Pay zone	Field name	Explor- atory class	Est. res.*
Icer Addis No. 1 Nordman	Barton 24-18S-15W	3534	Lans.-K.C.	Erna Northwest	NPW	D
Yucca Petroleum No. 1 Christabelle	Finney 18-21S-34W	5069	Mississippian	Christabelle	NFW	E
Beardmore Drilling No. 1 Birney	Ford 23-27S-21W	5000	Mississippian	Birney	NFW	E
Chief Drilling No. 1-A Sutcliffe	Gove 12-14S-27W	4320	Lans.-K.C.	Sutcliffe	NPW	D
Beacon Resources No. 1 Buckner	Graham 1-8S-22W	3660	Lans.-K.C.	Buckner	NFW	E
Murfin Drilling No. 1 Gibson	Ness 17-20S-25W	4489	Mississippian	Nonchalanta	NFW	E
Thunderbird and Petroleum Resources No. 1-A Horchem	Ness 21-16S-26W	4569	Mississippian	Unice	NFW	E
McCulloch, Venus, & McCoy No. 1 Casey	Pottawatomie 9-7S-12E	3600	Viola	Casey	NFW	E
Mull Drilling No. 1 Splitter	Trego 21-15S-25W	4363	Mississippian	Splitter	NFW	E
Slawson Drilling No. 1-A Weedon Trust	Trego 1-14S-22W	4250	Penn. basal conglomerate	Cedar View	NFW	E
Mack Oil No. 1 Beal	Sumner 28-30S-3W	4334	Simpson	Conway North	NPW	D

*Estimated reserves: E = between 1 and 1 million barrels; D = 1 to 10 million barrels.

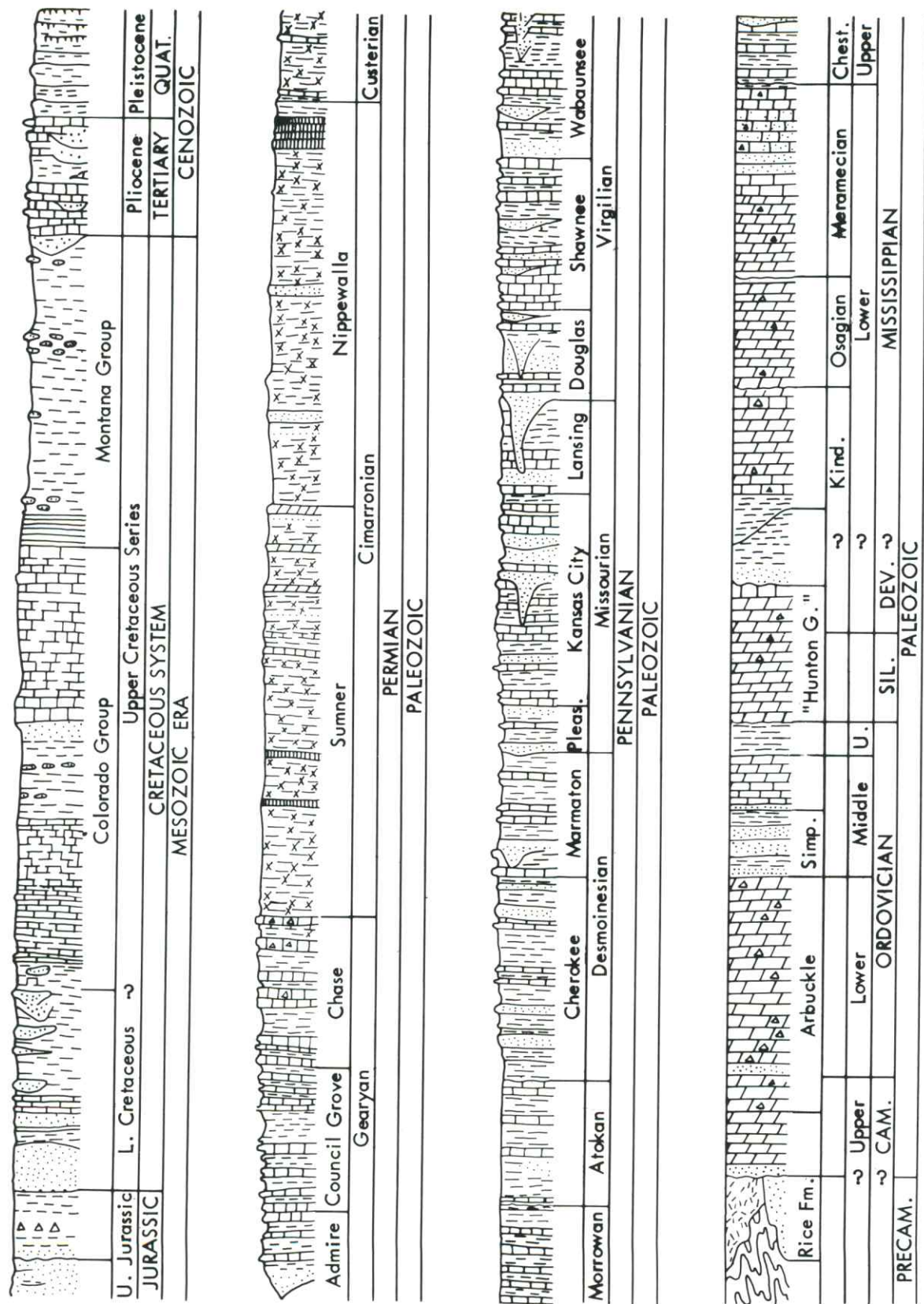


Figure 1.--Stratigraphic column (based on Plate 1, Kansas Geol. Survey Bulletin 189).

has resulted in the discovery of the Casey field. This is the first recorded production in Pottawatomie County, but only two wells have been completed in the field to date. The group is continuing to explore in northeastern Kansas, and has leased additional acreage.

Linn County, in southeastern Kansas, had the largest number of holes reported--192. With total footage of 60,219 feet, the holes averaged 314 feet in depth, and 189 were completed as oil producers. Moray Oil Company is operating an inert-gas "huff and puff" project in a "heavy" oil area. Some of the wells will alternate as gas-injection wells.

The Energy Research Center of the U.S. Bureau of Mines, Bartlesville, Oklahoma, is also attempting to develop an economic recovery method for heavy, viscous oil. It is experimenting with a fracture treatment followed with hot solvents in a Labette County project. The Center completed three experimental wells as producers from the Bartlesville (Pennsylvanian) at depths of 365 and 375 feet. The Bartlesville zone at this location in Labette County is reported to be 115 feet thick.

Changes in Production, 1950-1971

Figure 2 shows the amount of production and number of wells drilled in Kansas for the years 1950-1971. During this period, wells drilled (estimated in part) for oil and gas reached an all-time high of 8,514 holes in 1954. Production of crude oil peaked two years later at 124.7 million barrels.

Natural gas production has increased during these 22 years, and is now (with 894.5 billion cu ft) about 2.5 times greater than production during 1950 (361.9 billion cu ft). If additional large amounts of gas reserves are not found soon, the peak of natural gas production appears to have been reached.

Production of natural gasoline and natural gas liquids ranged from 4 to 7 million barrels per year prior to the start of the government's helium conservation program in the early 1960's. During 1971, LPG production was 28.6 million barrels. The change in production reflects the quantity of liquids that are stripped from natural gas in the large fractionation plants, built primarily to remove helium from the gas. Total liquid hydrocarbons production (crude oil plus LPG products) was 107.1 million barrels during 1971.

Helium Production

Helium production in Kansas has been sporadic in nature. The first plant was built in Dexter in 1927 (the town where helium was first discovered on earth). Plants were built later at Cunningham and Otis. The plant at Otis, operated by the U.S. Bureau of Mines, was the only one in Kansas for a number of years. Production ranged from about 22 to 45 million cubic feet per year in the 20 years preceding the federal helium conservation program. Three companies have plants operating under this program--the first went on stream in 1963. Since 1966, production of helium was held steady at just under 3 billion cubic feet per year. During 1971, production from the three plants with government contracts and three plants now producing helium for private sale was 2.905 billion cubic feet.

The three companies with long-term government contracts for extracting and storing helium contested the U.S. Department of Interior's 1971 termination of the contracts (Oros, 1971). All three plants operated during 1971, although the problem has not yet been resolved.

Comparison of Production and Refining, 1957-1971

A 15-year comparison of Kansas crude oil production, refinery runs, exports of crude oil from the state, and imports of oil into Kansas is given in Figure 3. In 1957, 38 million barrels of oil were imported from nearby states, and 57 million

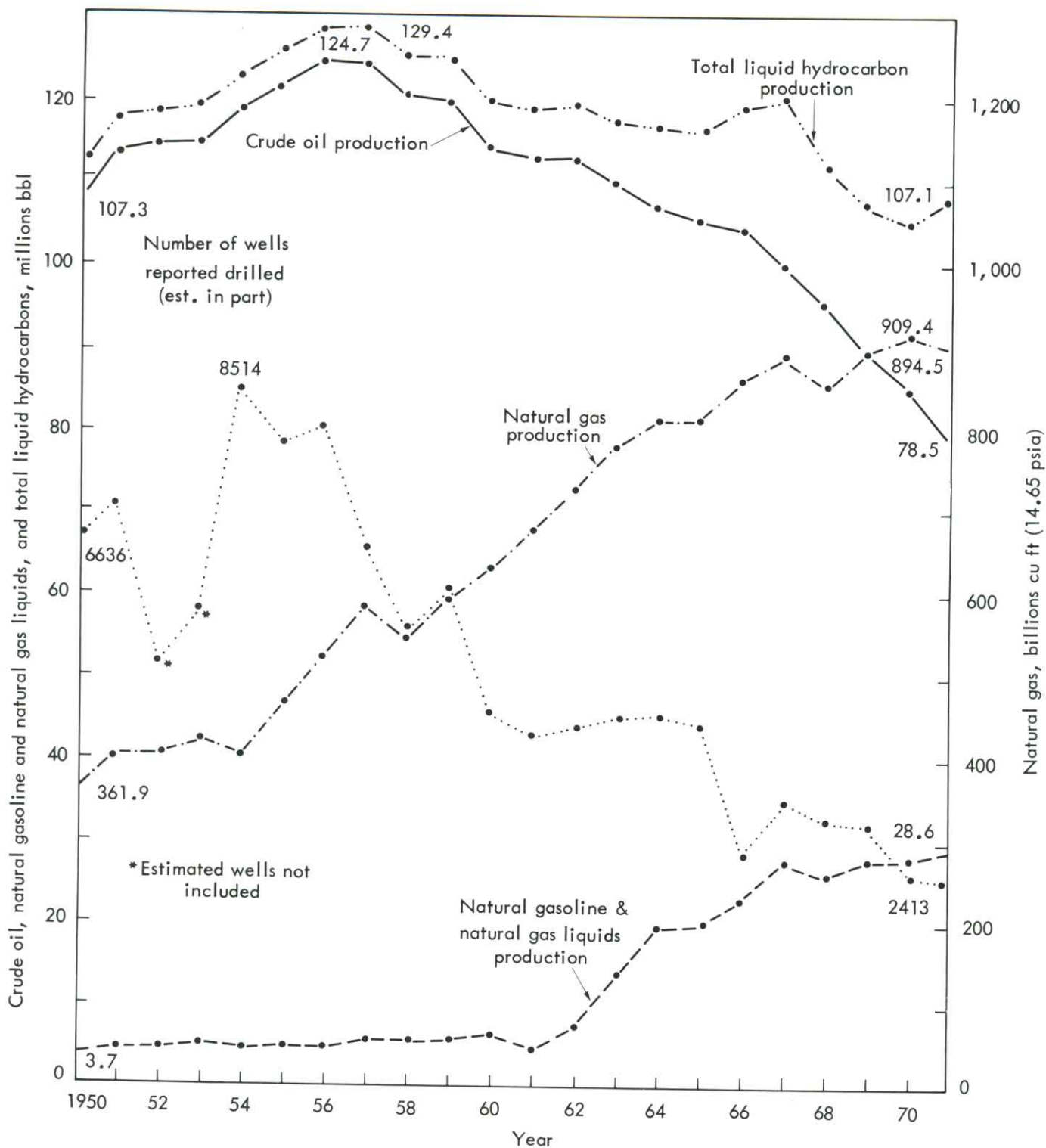


Figure 2.--Annual oil, gas, natural gasoline and natural gas liquids, total liquid hydrocarbons, and natural gas production in Kansas, 1950 to 1971. Number of holes drilled for oil and gas is also shown.

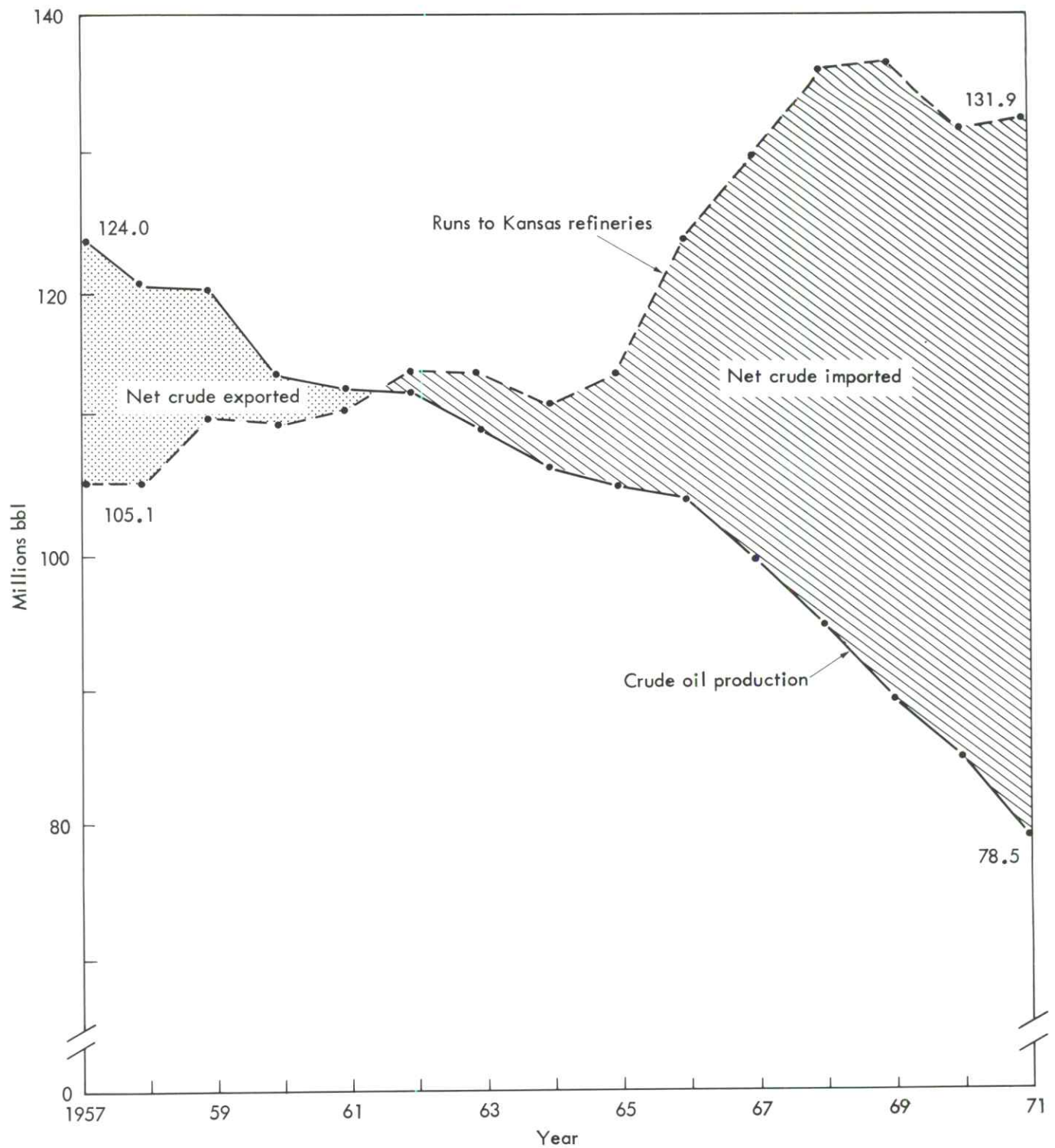


Figure 3.--Comparison of Kansas crude oil production with runs of oil to Kansas refineries, and comparison of exports of Kansas crude oil with imports of oil into Kansas, 1957 to 1971. Data from Corporation Commission of Kansas.

barrels were exported to refineries in other states (19 million barrels exports over imports). Net refinery runs in Kansas were 105 million barrels. The pattern changed over the years, due to the drop in crude oil production in Kansas and an increase in refinery capacity. During 1962, Kansas changed to a state with more refining capacity than available crude oil. In 1971, refineries processed 132 million barrels of oil, up 27 million barrels from 1957. Of this amount, only 78.5 million barrels were available from local production; exports of oil were 10 million barrels, and 64 million barrels of oil were imported.

In early 1972, Kansas refineries are importing an estimated 27 thousand barrels of crude oil daily from Canada. If the importation is continued at this rate for the year, it will total 10 million barrels. This is only a small portion of the current refinery runs, but the fact that refinery operators find it worthwhile to import foreign oil in order to keep the plants operating at capacity is significant. Transportation costs make this oil more expensive than that purchased in adjacent states.

Changes in Reserves, 1950-1971

Estimated proved recoverable reserves of crude oil and natural gas have paralleled the number of wells drilled in Kansas for the years 1950 to 1971 (Fig. 4). Reserves of oil were estimated by the American Petroleum Institute at 732.2 million barrels in 1950. A high of 998.1 million barrels of reserves was reached at the end of 1955, and had dropped to 501.6 million barrels at the end of 1971. The peak drilling year was 1954, with 8,514 wells reported drilled.

Natural gas reserves have gone from 13.8 trillion cubic feet, estimated at the end of 1950 by the American Gas Association, to a high of 20.2 trillion cubic feet in 1958. At the end of 1971, reserves, at 12.5 trillion cubic feet, were less than those estimated at the end of 1950.

Natural gas liquids estimated reserves took a "technical" jump following the start-up of the helium fractionation plants. These reserves were 163.4 million barrels at the end of 1950, and had risen to 276.6 million barrels at the end of 1971.

Total liquid hydrocarbons reserves (crude oil plus natural gas liquids) have remained quite stable because of the increase in LPG reserves. Production, which was 895.8 million barrels in 1950, increased to 1,171.3 million barrels in 1955, and dropped to a low of 778.2 million barrels at the end of 1971.

It is obvious that additions to reserves follow the pattern of drilling. During periods when large numbers of holes are drilled, reserves added exceed production. Kansas still has large areas worthy of exploration. Economic conditions--crude oil and natural gas prices versus costs of drilling and production--will determine when the next increase in drilling takes place.

The economic life of wells also depends on the wellhead price for oil and gas. Many "stripper" wells are plugged each year because the price of crude oil does not justify keeping them on production. At present, Kansas has about 42,000 producing oil wells. The majority--about 38,000--are "strippers" producing less than 10 barrels of oil per day.

Changes in Rules and Regulations

During 1971, a number of changes were made in rules and regulations for drilling and producing oil and gas. Just a few will be mentioned here.

Assessments on production and fees for supervision of plugging holes are used to pay expenses of the Conservation Division of the Corporation Commission of Kansas and of the Oil Field Section of the State Department of Health. The many duties of

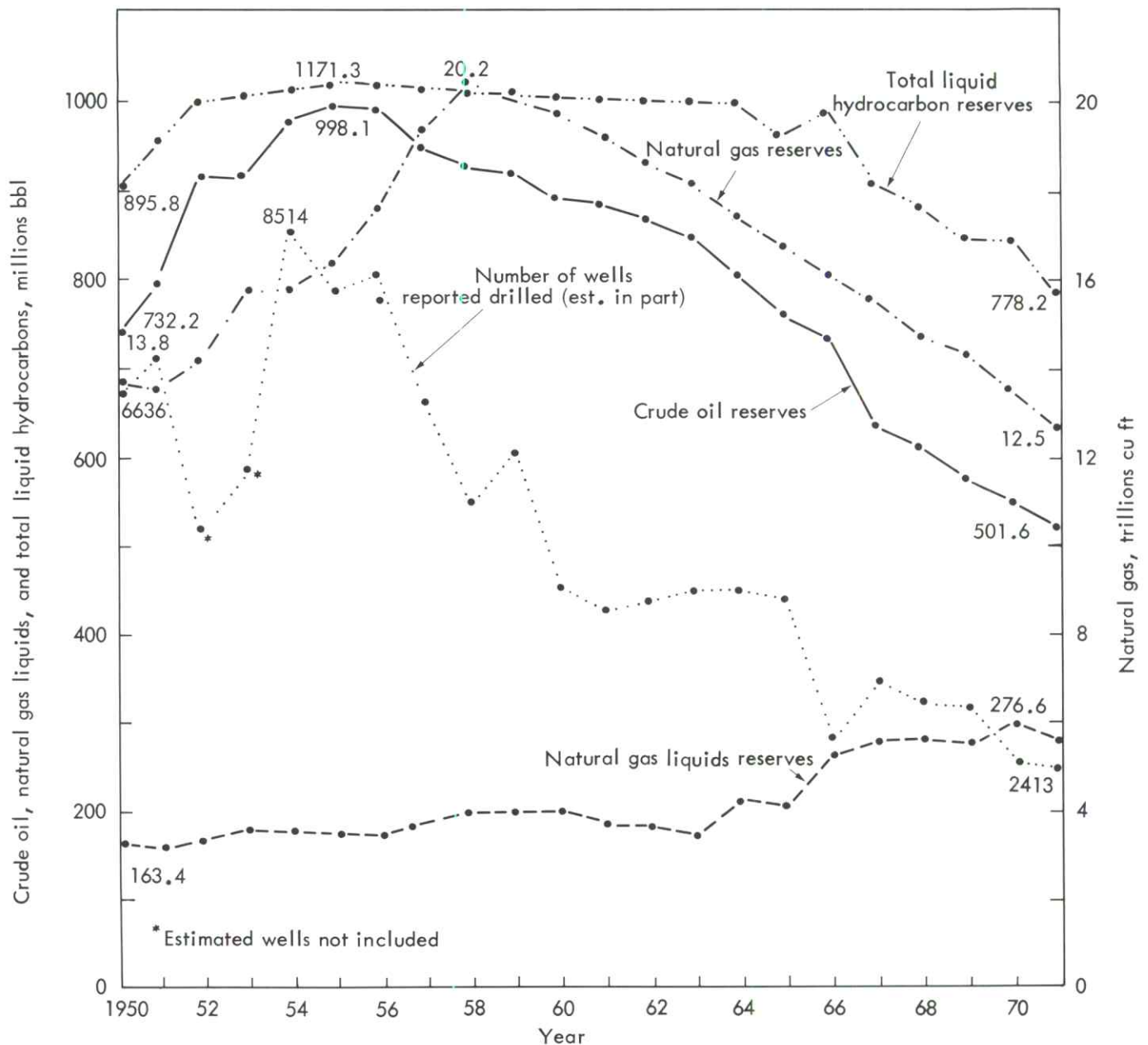


Figure 4.--Estimated proved recoverable reserves of crude oil, natural gas liquids, total liquid hydrocarbons, and natural gas in Kansas, Dec. 31, 1950, to Dec. 31, 1971. Data from American Petroleum Institute and American Gas Association. Number of holes drilled for oil and gas is also shown.

the Conservation Division include prorationing of production, well production tests, supervision of drilling, production, and plugging of wells (Ryan, 1966, and later amendments). The Oil Field Section supervises the disposal of oil-field brines and other pollution control work. Brine production has been estimated at 20 times the quantity of crude oil produced in Kansas. Much of this is injected back into the oil producing zones for secondary recovery of oil. Zones chosen for disposal are those that do not contain potable water. An excellent discussion of methods and of reasons for control was presented by Latta in 1963.

A change in Rule 82-2-116 of the Conservation Division's regulations increased an assessment on crude oil from .001¢ to .0015¢ per barrel; Rule 82-2-216 was

changed to increase the natural gas assessment from .000375¢ to .0005¢ per MCF of natural gas sold.

Rule 82-2-700 was initiated to help pay the costs of plugging old, abandoned holes. Some of these holes were abandoned years ago, and if they were plugged then, have now developed leaks. This rule provides for an assessment of .0001¢ per barrel of crude oil, and .00005¢ per MCF of natural gas to provide funds for plugging the old holes.

Producers in Kansas are also assessed on production to pay work costs incurred by the Oil Field Section. This charge is .001¢ per barrel of crude oil, and .00005¢ per MCF of natural gas produced.

Assessments for pollution control and administration of rules and regulations for drilling wells in Kansas now total .0026¢ per barrel of crude oil, and .0006¢ per MCF of natural gas produced. The increases, and new rule, took effect in late 1971. If the increases had been in effect all year, the assessments would have totaled \$204,184 on crude oil production, and \$536,670 on natural gas production.

The Conservation Division also raised its fees for the supervision of well plugging. Rule 82-2-309 was changed to increase the charge from a rate of .01¢ per foot, with a minimum charge of \$10 per well, to a rate of .0125¢ per foot, and a minimum charge of \$20 per well. This charge is in addition to the actual costs of plugging holes.

During 1971, 2,998 holes were reported plugged in Kansas (585 more than the number of holes reported drilled). At a minimum charge of \$10 per hole, this would have resulted in total fees of \$29,980.

Rule 82-2-125 on preservation of well samples and logs was initiated during 1971. This rule requires that anyone drilling wells for oil and gas in Kansas submit copies of driller's logs, electric, radioactivity, or similar wireline logs, and requested samples, to the Kansas Geological Survey, 4150 Monroe Street, Wichita, Kansas 67209. A driller's log form has been developed which will ensure uniformity of these reports.

The rule includes provisions for holding records confidential, upon request. Exceptions to the provisions of the rule may be granted in certain cases where evidence supports the need. Copies of Rule 82-2-125 have been sent to operators. The text of it was given in full by Saffels at the Interstate Oil Compact Commission meeting in Biloxi, Mississippi (Saffels, 1971).

Well samples will be available for study at the Survey's Wichita Office. Driller's logs, and the various types of electric logs, however, will be placed on open file in the offices of the Oil and Gas Division of the Survey, in Lawrence, Kansas.

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Is There an Energy Crisis?

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Current newspapers and magazines frequently carry articles discussing some phase of the "U.S. energy crisis." This phrase seems to be applied to every situation that presents problems to any energy- or fuel-producing industry regardless of whether it involves fuel demand, reserves, supplies, costs, public preference or government policy. This review will look at the generally recognized facts of our energy situation and the viewpoints and problems of different energy interest groups. It will also consider the implications of the problems, the possible solutions to them, and their timetables. The last portion will look at the Kansas energy situation.

Correct assessment of future energy resources requires both an accurate estimate of the immediate and probable future fuel supplies and a reliable estimate of the future energy demands of the population. To compound the problem for energy supplies, assessment of resources for the next 15 years requires, among other things, a reliable forecast of national and international government policy, economic conditions, and public opinion. Since all of these factors are subject to change, we can expect the energy situation to be reviewed with regularity in the future.

The so-called energy crisis was precipitated by the attempts of gas-burning utilities to assure future supplies of this clean fuel, which satisfies the pollution standards of both the government and environmental interest groups. For the two previous decades, natural gas was used only because it was cheap and available in large volumes. Initially, it was a waste product, often flared in oil fields. Due to proper promotion, however, it eventually cut into the markets of coal and oil. At that point, the Federal Power Commission (FPC) placed controls on the price of gas at the wellhead, and these controls have been in effect for the past 15 years (Weber, 1972).

The attempts of utilities to insure future supplies of natural gas revealed that the supply was not large enough to satisfy even the future demands of current users, much less new users. At the same time, many suppliers began to look toward low-sulfur residual oil, a liquid or semi-liquid product obtained as a residue from the distillation of petroleum, only to find that a similar supply situation existed (Risser, 1971).

Coal, which presently accounts for 55 percent of U.S. electric power generation, is now subject to environmental constraints because of the excessive amounts of sulfur dioxide generated from the sulfur in coal when it is burned. Coals that could meet most air pollution control standards (less than 1 percent sulfur) are abundant in the Rocky Mountain States where there is little present demand for them. Since these western coals are thick and strippable, mining costs are low, but transportation costs are high. For example: Washed Kansas utility coal (BTU content of 10,000 - 13,000) is \$5.59/ton f.o.b. mine. Wyoming coal, with a BTU content of 8,300 - 12,000, is \$2.00/ton f.o.b. mine; but, the transportation charge to eastern use centers is \$10 or more per ton (Olds, 1972). Pollution-control technology for adsorption of sulfur dioxide stack gases would appear to offer some hope for the continued utilization of eastern and midwestern coals, but it will be 5 years until this process is well developed. Even then it creates certain troublesome solid-waste disposal problems. Since the bright promise of nuclear power has not yet been realized commercially, part of the utility industry would indeed appear to be balancing on the edge of an energy crisis.

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Who is responsible for this natural gas crisis and are there any lessons to be learned from it for the future? The government is generally blamed for their poor insight into the problem. The Supreme Court ruling that the federal government should fix the price of gas, and the FPC and Congressional actions to fix gas prices at the wellhead have overprotected the consumer and at the same time allowed for rapid depletion of the supply of gas, and stifled exploration. Indeed, the FPC belatedly admits that their policy was responsible for the shortage and are now granting price increases to 25 cents per thousand cubic feet (MCF) (Slobod, 1972). Estimates exist, however, that indicate natural gas must increase in price 50¢ to 60¢/MCF to economically justify increased exploration for gas in order to improve the reserve picture (Slobod, 1972). The inadequacy of the gas supply and the government's role illustrates how faulty government decisions on price control, taxes, and interpretations of environmental aspects can have serious consequences in the development of U.S. energy resources. The diversification of private industries into alternate energy fields to stimulate interindustry competition might be one way of ensuring price controls without government intervention. Economists who have studied the FPC's role believe that the energy market should be as free as possible from artificial constraints so that the law of supply and demand can operate freely (Weber, 1971).

U.S. Natural Gas Resources

Natural gas reserves estimates are considered dubious at best since there is no common standard for assessing them worldwide (Warner, 1970). In addition, approximately one-fifth of the natural gas reserves are associated with petroleum reserves, and some natural gas is flared off as the associated liquids are recovered. Data needed for calculation of reserves in oil and gas reservoirs are kept confidential by companies. Table 1 summarizes some commonly cited estimates of U.S. natural gas reserves. The demand for natural gas in 1971 was approximately 22 billion cubic feet. A low demand forecast of 34.8 trillion cubic feet in the year 2000 represents an annual growth rate of 0.9 percent, while the high demand forecast calls for 55.7 trillion cubic feet, which represents an average annual growth rate of 3.4 percent (Warner, 1970). Other forecasts call for a doubling of the amount of gas used for all times between 1968 and the late 70's or early 80's. Predictions of the beginning of deficit years range from 1972 to 1984 (Risser, 1971; Slobod, 1972).

There is already ample evidence of a deficiency in natural gas, although at this time it is apparently a problem of distribution and available supply rather than ultimate reserves. Many industrial customers will not get the gas they need this winter (Slobod, 1972). Plans for new industry in some areas, particularly the east, have been cancelled due to inadequate supplies of natural gas (Slobod, 1972). Gas distributors are presently contracting for additional supplies at three or four times conventional costs (Weber, 1972). Many industries contract for gas on an interruptible basis and domestic customers, who will be safe for awhile, are beginning to find public letters from the gas distribution industry foretelling price rises. On the other hand, the gas-extractive industry considers predictions showing the doubling of demand by the 1980's to be unrealistic and argues that demands will undoubtedly diminish with price increases if expectations of continued drilling and gas development are not met (Weber, 1972). In the past 3 years, less new gas has been found each year than used; excluding Alaskan discoveries, only half of the amount consumed was discovered last year (Slobod, 1972).

Substitutes for Natural Gas

Public and industrial preference for gas and environmental considerations have stimulated the development of synthetic gases comparable to the natural product. The synthetic natural gas (SNG) being considered for use today has a heat value of 900 - 1,100 BTU/cu ft, compared to 300 BTU/cu ft for the blue water gas developed during the latter half of the 19th century (Elliot and Linden, 1966). The potential substitutes for natural gas include synthetic gas manufactured from naphtha, heavy oil,

Table 1.--U.S. natural gas reserves estimates.

Source	Probable gas reserves (trillion cu ft)	Limits	Potential and speculative gas reserves (trillion cu ft)	Limits
American Gas Association	275.1		no estimate	
Potential Gas Committee	287.0	Supplies that probably exist in known fields	1,227.0	Depths not exceeding 30,000 ft on land and 1,500 ft under water
U.S. Geological Survey	2,400.0	Recoverable under current economics and technology and under less than 656 ft water	4,340.0	Marginal and submarginal not recoverable under current economics; including water up to 8,200 ft
Petroleum Press Service	260.0		1,178.0	U.S. onshore and offshore
USEM (1971)	265.0			

Sources: Warner, 1970, p. 118.
Harper and Fanelli, 1971, p. 723.
Petroleum Press Service, 1972, p. 43.

and coal. While it is reported that a substitute gas from naptha will be available as early as 1973, a step-up in the timetable for making gas from coal appears to be closing the gap (Prescott, 1971). In this process, two-thirds of the methane will be produced by reacting coal directly with hydrogen at high temperatures and one-third by the catalytic reaction of carbon oxides and hydrogen. The first pilot plant was put into operation during July 1971, producing 1 million cu ft/day. The first full-scale plant is expected, by 1977, or possibly by 1976, to produce 250 million cu ft/day (Sheldrick, 1971).

The present cost of SNG from coal is 59¢/million BTU compared with 35¢ to 40¢/million BTU for natural gas; but, by the end of the decade, SNG is expected to be competitive with natural gas (Sheldrick, 1971). To offset the predicted deficit of 25 trillion cu ft/year of natural gas by the 1990's, the Institute of Gas Technology is forecasting construction of a dozen coal gas plants by the early 1980's producing over 1 trillion cu ft/year (Sheldrick, 1971). The capital costs for 12 such plants producing 250 million cu ft/day would be roughly \$1.2 billion. Seventy-two million tons of coal would be required per year for this purpose alone, representing a 50-percent increase in present production. The prime sites for gasification plants are expected to be in the western United States in areas where thick coals and sufficient water supplies exist, and in areas such as Illinois and the Appalachian Basin which have plentiful coal supplies. Western coals have the advantage in that they do not tend to agglomerate at high temperatures and therefore do not require pretreatment (Sheldrick, 1971). Trends for the future will be forecast next year when some consumers in New York, Ohio, Michigan, and Massachusetts will begin using small amounts of synthetic gas mixed with the usual natural gas supply. The gas mixture will have the same characteristics to the consumers, but the price will slowly increase over a long period of time (Benedict, 1972).

U.S. Petroleum Reserves

Petroleum currently supplies 47 percent of the world's energy demand and 40 percent of the U.S. demand. Fifty-five percent of this is used for transportation and 20 percent is utilized for household and commercial heating (Meadows, 1970). The petroleum-producing industry predicts that oil's share of the energy market will increase as industries using gas and coal shift fuels (Weber, 1972).

According to Weber (1972, p. 127), "worldwide, oil is still in plentiful supply and recoverable reserves plus prospects for more, indicate no shortage for years to come. Again, we are in no apparent danger of running out of oil--but we are looking at an end to cheap oil. Everywhere." For the U.S., large future supplies of petroleum have been discovered in northern Alaska, but the demands of environmentalists have all but eliminated hopes that this oil will bring down average costs per barrel in the U.S. (Weber, 1972). The North Slope Field is probably the largest ever discovered in the United States, with a low estimate of 5 to 10 billion barrels (Meadows, 1970). U.S. production in 1971 was 3.37 billion barrels. Prospects for finding new oil and gas supplies in the continental U.S. are considered to improve with depths below which drilling has been most intensive (Weber, 1972). Estimates of reserves are shown in Table 2. It is important to note that these estimates are perhaps of less significance than the economic and technological factors that influence the discovery of resources and their conversion to the class of proved reserves (Meadows, 1970).

Demand for petroleum is expected to increase at the rate of 3.0 percent for the next 10 to 15 years. Other estimates indicate an overall increase of as much as 22 percent by 1975 (American Geological Institute, 1972). Beyond that to the year 2000, the demand is uncertain and will depend upon such factors as federal action on taxes, federal leases, imports, availability of natural gas, and growth of nuclear energy. U.S. Bureau of Mines estimates indicate cumulative requirements at 195 - 308 billion barrels by 2000, of which 155 - 245 billion barrels would be supplied by domestic sources. For the year 2000, forecasts range from a high of 16.4 to a low of 7.3 billion barrels using annual growth rates of 1.3 to 3.8 percent respectively (Weber, 1972). If the domestic oil industry cannot provide suf-

Table 2.--U.S.* petroleum and liquid natural gas reserves estimates
(billions of barrels).

Source	Discoveries	Produced to date	Remaining recoverable reserves	Possible recoverable reserves	Limits	Reserves of natural gas liquids
Oil and Gas Journal (1972)	425.0	93.0	29.0	303.0		
American Petroleum Institute (1968)			38.0			
U.S. Geological Survey (recent)			463.0	2,280.0	continent up to 565 ft and water to 8,200 ft deep	69.0 (probable) 130.0 (possible)
American Gas Assoc. (1968)						8.6

*Excluding Alaska; extent of field unknown but estimated to be 5 to 75 billion barrels.

Sources: Weber, 1972, p. 130
Meadows, 1970, p. 154-156

ficient supplies of petroleum either from conventional sources or from oil shales, tar sands, or heavy oil, an additional 2.4 - 9.4 billion barrels in supplemental sources will be required in the year 2000. Some estimates show a petroleum deficit in the U.S. as early as the late 70's or early 80's (Weber, 1972).

U.S. Coal Resources

U.S. coal supplies are large enough to meet the projected high demand until well into the next century, or beyond. Table 3 summarizes various estimates of coal resources. The ratio of recoverable reserves to production for coal is 2,620, compared to 9.9 for petroleum and 15.0 for natural gas. In 1967, a comparison on a uniform BTU basis indicated that coal constituted 73 percent of the total estimated recoverable fossil fuel as compared to 9 percent for petroleum and natural gas together, and 17 percent for the oil in oil shale (Averitt, 1969). This balance is further disturbed by the fact that petroleum and natural gas are being consumed at a rate 2 1/2 times that of coal (Averitt, 1969). U.S. production of bituminous coal and lignite in 1970 was 603 million tons, the third highest total in our history (Osborn, 1971). Seventy million tons valued at \$1 billion was exported.

Of the total U.S. coal resources estimate of 3,210 billion tons, approximately 4 percent is strippable coal. Using various recoverable coal reserves estimates, approximately 13 to 17 percent is strippable. In 1970, 35 percent of the total U.S. production was strip-mined and this trend, begun in 1917, is expected to steadily increase (Averitt, 1969). The amount of strippable reserves remaining is 29 times the cumulative production since the beginning of strip-mining and 690 times the 1969 U.S. strip coal production of 185 million tons. If the U.S. Bureau of Mines figure of 45 billion tons of recoverable reserves proves to be more realistic, the recoverable reserves are 240 times the 1969 production.

From the mining point of view, strip-mining has significant economic advantages. Output per man-day is 100 percent greater than in underground mining, average recovery 60 percent higher, and operating costs are 25 - 30 percent lower (Averitt, 1970). However, strip-mining is facing increasing pressure and cost due to safety legislation, and regulations governing strip-mine reclamation and acid pollution control. Enactment of the Federal Mine Health and Safety Act has added \$1.50 to \$3.00 per ton to the cost of mining coal since its inception on March 30, 1970 (Olds, 1972).

Nuclear Power

Presently, nuclear power generation appears to hold the greatest promise for the future. It is estimated that nuclear fuel will account for 30 percent of our energy consumption by 1980, and perhaps for as much as 50 percent by 2000 (De Carla and Shortt, 1970). Estimates of present energy supplied by nuclear fuels range from 0.6 (Weber, 1972) to 2.0 percent (Olds, 1972).

The extent to which this schedule will be met depends upon solution of nuclear technology problems as well as policy decisions on certain environmental questions. For the first generation of nuclear reactors, the so-called lightwater reactors, problems include questions of thermal pollution, radwaste (radioactive disposal), safety in reactor operation and repair, sufficient water for cooling capacity, large capital and labor costs, and lead times of 7 1/2 to 10 years (Weber, 1972). While the situation has improved this year (27 nuclear plants were ordered or slated for order in 1971), the number of megawatts (mw) predicted has fallen far behind previous predictions (Olds, 1972). For example, in 1967, 25,000 mw of nuclear power were scheduled to be on line for 1971. In 1969, this figure was revised downward to 18,000 mw and then similarly revised in 1970 to 15,000 mw. In 1971, only 10,000 mw of nuclear power were on line. These plants are located in Wisconsin, Minnesota, and South Carolina (Jacobson, 1972).

Table 3.--U.S. coal resources estimates.

Total estimated coal resources of the United States
(billions of short tons)

Source	Determined 0-3000'	Probable 0-3000'	Probable 3000-6000'	Recoverable
U.S. Geological Survey	671			335.5
Bituminous	428			214.1
Subbituminous				(50% rate)
Lignite	<u>447</u>	<u> </u>	<u> </u>	<u>223.8</u>
Total	1,560	1,313	337	773.4
U.S. Bureau of Mines				928-982* (60-63.5% rate)
*380 billion tons at present prices and technology.				

Source: Hunter, 1970, p. 42

Estimated stripping-coal resources of the United States
(billions of short tons)

Source	Limits	Remaining strippable coal	Recoverable under present limitations	Recoverable reserves by sulfur content
U.S. Geological Survey (Jan. 1, 1970)	0-150' overburden	128		
U.S. Bureau of Mines (Jan. 1, 1968)	0-120' overburden	118	45 (after loss from cleaning-39.6)	<1% - 32 1-2% - 4 >2% - 9

Source: Averitt, 1970, p. 1
U.S. Bureau of Mines, 1971, p. 1

The lightwater reactor can only solve our energy problems temporarily, however, since such reactors require uranium reserves (U_3O_8) which themselves are limited. The use of breeder reactors, one of which is currently generating electric power at the Argonne National Laboratories near Chicago, Illinois, would relieve many of these fuel problems. A demonstration model of the breeder reactor is scheduled for operation in 1985 and commercial operations may be feasible by the 1990's.

Serious technical problems still remain with breeder reactors. These include the technology of handling liquid metals, such as sodium, and sodium fires, and analytical equipment for continuously monitoring impurities in the liquid metal heat exchange medium as a method of detecting system leakages, plus most of the problems mentioned previously in connection with the lightwater reactors. Fusion reactors, which would eliminate many of the fuel and environmental problems, are still in the planning stages and are considered to be 30 to 50 years into the future.

The trend toward nuclear power is illustrated by the fact that, in 1971, for the first time, orders for nuclear steam-generating facilities in terms of capabilities exceeded orders for fossil-fuel plants (Jacobson, 1972). The Atomic Energy Commission approved continued operation of 5 units and construction of 39. In 1972 the first nuclear unit is expected to be ordered for operation offshore of the east coast. Costs for nuclear plants are given at \$244 per kilowatt/electricity (kwe) as compared to \$185/kwe for coal-fired plants, but power companies are expected to rate the costs of nuclear power less than that of meeting environmental control standards with fossil-fuel plants (Jacobson, 1972). Of the holdout areas of the U.S., the Rocky Mountain region continues to rely on large strip-coal resources, but the Southwest is expected to turn to nuclear power as gas reserves are depleted (Jacobson, 1972).

Other Energy Sources

The additional sources of energy most frequently considered include oil from shale and bitumen-impregnated sandstones, the so-called tar sands; geothermal power; garbage; animal manure; solar energy; and others such as wood, wind, peat, batteries, fuel cells, and radioisotopes. The quantity of oil available in U.S. oil shale reserves is estimated at 1,140 billion barrels (Averitt, 1970), 345 times the U.S. 1968 crude oil production of 3.3 billion barrels. Oil shale is presently expected for use in the early 1980's at a cost of 75¢-95¢/million BTU's (Prescott, 1971). By contrast, U.S. reserves of bitumen-impregnated sandstones can provide only 2 billion barrels of oil, although Canada has enormous reserves of this material at Athabasca in northern Alberta.

Geothermal power, which is generated from natural steam occurring deep within the earth, is presently developed in the U.S. only by Pacific Gas and Electric Co. with a 192,000 kw-capacity plant at The Geysers, California (Gambs and Routh, 1971). There are currently 90 known areas in the U.S.--in California, Idaho, Nevada, and Oregon--where geothermal steam could be harnessed for electric power (Thrush, 1968). If all known U.S. geothermal steam fields were to be tapped, an estimated 100 million kw could be generated annually. This minor amount equals only one-third of the electricity used in 1970 by the leather tanning and finishing industry alone (Gambs and Routh, 1971). Frequently, usable geothermal fields are in non-industrialized areas where transportation costs to highly populated areas would be high.

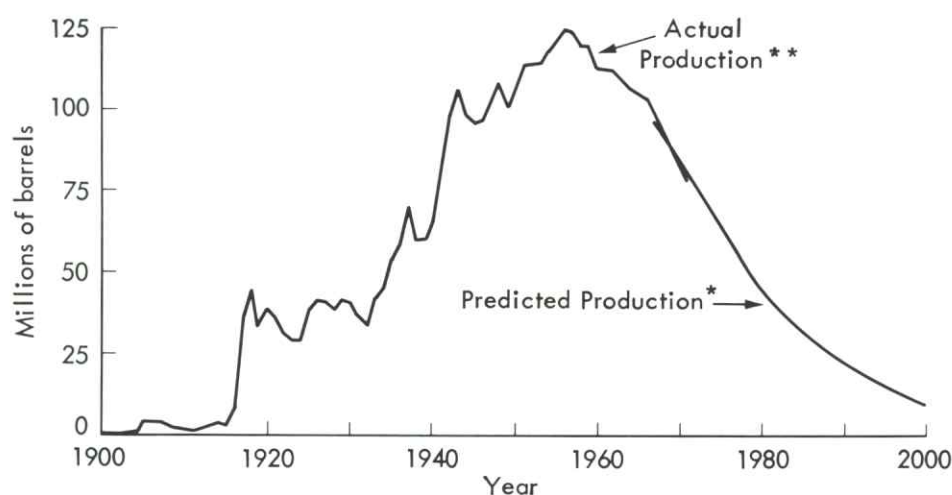
Small amounts of energy may be generated by the burning of refuse as a method of disposing of municipal wastes. Late in 1971, Union Electric of St. Louis was scheduled to begin use of a 90:10 mixture of coal and refuse (based on heat value) in a modified boiler (Gambs and Routh, 1971). This method will dispose of approximately 30 percent of St. Louis's refuse. The U.S. Bureau of Mines and Union Carbide Corporation, among others, have also developed commercial systems for deriving energy from garbage.

Research scientists at the U.S. Bureau of Mines Energy Research Center at Pittsburgh, Pennsylvania, have recently developed a method of deriving oil from animal waste or other forms of cellulosic waste. In this process, 1 dry ton of manure will yield 1 net barrel of fuel oil. If all U.S. agricultural wastes, amounting to roughly 2.5 billion tons per year, could be utilized, such a process would have a large potential. For Kansas, it has been estimated that if all animal feedlot wastes, 12,505,000 tons, could be converted, it would comprise 5.5 to 11 percent of the State's 1970 net electric power generation (Flueckinger and Camin, 1971). Research is presently under way to develop this process in Kansas.

Among other miscellaneous energy sources, solar energy remains a bright hope, but requires extensive research for which there is little money presently available. Regardless of how little other sources are used today, they are considered in estimates of future energy consumption. Power generated by wood, wind, batteries, fuel cells, radioisotopes, tidal action, vegetable matter, and refuse is expected to provide roughly .05 percent of our energy needs in the year 2000.

Kansas Petroleum Resources

In 1969, Kansas produced 2.6 percent of total U.S. crude petroleum compared to 3.7 percent in 1965. As of December 31, 1969, Kansas reserves of crude oil were 566 million barrels, approximately 1.9 percent of the nation's crude oil reserves. Kansas production has decreased about 4 percent annually since the peak year of 1956 (Fig. 1). Proved reserves reached a peak of 998 million barrels in 1955 and



* Calculated by Owen T. Spitz, Chief, Operations Research Section, Kansas Geological Survey

** Interstate Oil Compact Commission (1971)

Figure 1.--Annual Kansas crude oil production 1900-1971 and predicted production to 2000.

have also been declining since that time at an average rate of approximately 3 percent. By comparing the curve of cumulative production with that of cumulative proved discoveries (cumulative production and proved reserves) shown in Figure 2, it is apparent that Kansas has been on a collision course in petroleum production since 1956. The delay between the time oil discoveries are classed as proved and the time they are produced is decreasing at an accelerating rate. Eventually the two will cross and we will be using up Kansas petroleum without any new additions. Figure 1 shows the predicted rate of decline in production based upon a logistic

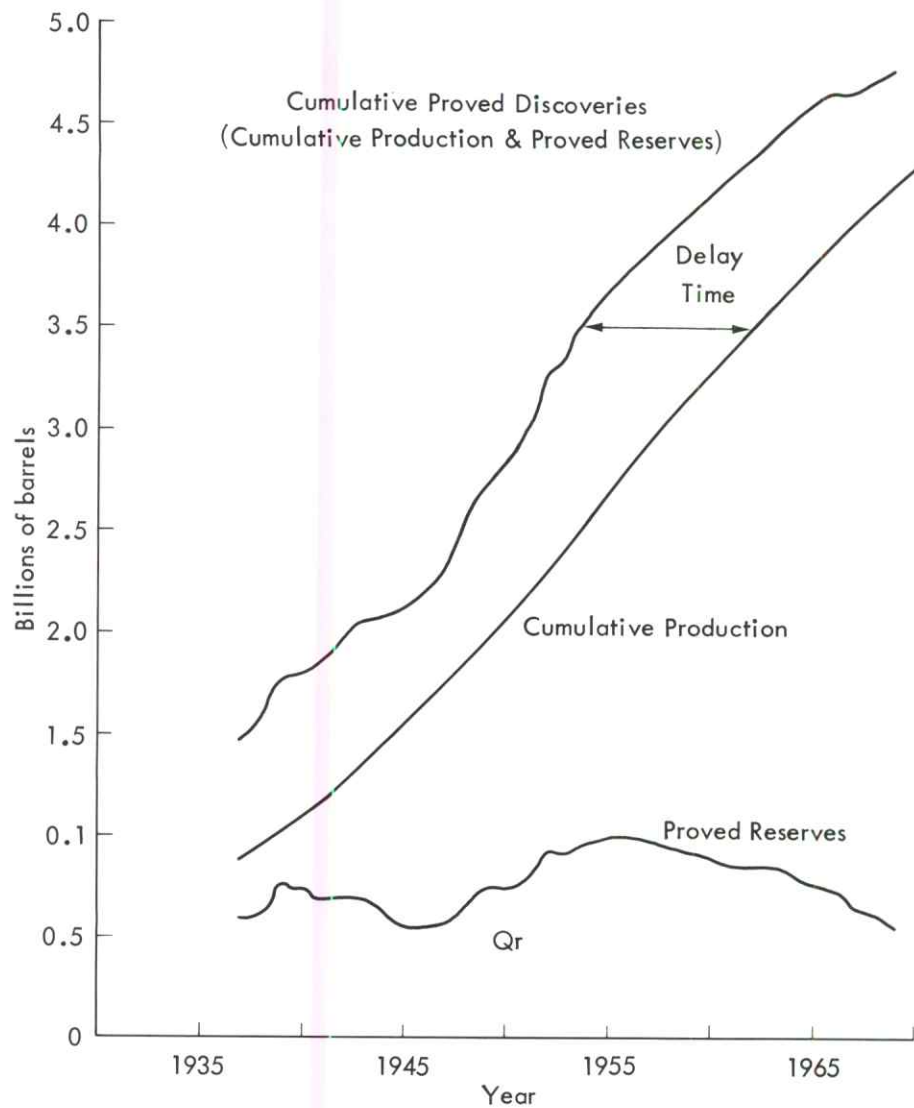


Figure 2.--Cumulative production, proved discoveries, and proved reserves of Kansas crude oil 1937-1971.

mathematical model¹ which takes into account the rate of decline for past years. If this prediction is valid, production in 1980 will be half of 1970's production of 84 million barrels, and production in 2000 will be only 0.9 million barrels. The predicted ultimate cumulative production is 5,508 million barrels.

Let us examine the situation to see what impact this will have on the Kansas economy. The value of petroleum production in 1971 was estimated by the U.S. Bureau of Mines to be \$274,314,000, compared to \$277,469,000 in 1970. Emerson (1969) has determined that establishments engaged in operating oil and gas field properties and in drilling wells for oil or gas or geophysical, geological, and other exploration work contributed \$488,204,000/year to the Kansas economy up to 1968. According

¹Calculated by Owen T. Spitz, Chief, Operations Research Section, State Geological Survey of Kansas.

to Emerson's economic analysis, if the demand for the services mentioned above decreases by \$1.00, the output of other Kansas industries will decrease by \$1.46 - \$1.49. In addition, a \$1.00 decrease in output of these industries results in a loss of \$.38 in additional income to other Kansas industries and households for the crude oil and natural gas sector and \$.97 for the oil and gas field services sector.

Is there any way of reversing this downward trend in Kansas exploration and production? Probably not, since large exploration programs and oil discoveries would be necessary. However, it may be possible to slow this downward trend. One of the best hopes for new resources is considered to be deep exploration in western Kansas. Policies governing all production over which the state has control should be carefully evaluated to assure that they are not detrimental to this industry.

Kansas Natural Gas Resources

Kansas ranks fifth in the U.S. in natural gas resources, with 14.51 trillion cubic feet, 5.1 percent of the total U.S. proved reserves (Harper and Fanelli, 1971). Natural gas production in Kansas in 1970, 904,476 million cubic feet, represents 4.1 percent of the total U.S. production of 21,921,000 million cubic feet. In 1970, intrastate consumption amounted to 68.3 percent of Kansas production while 29.9 percent was shipped out of state; 0.6 percent was stored and 1.15 percent was lost during transmission (U.S. Bureau of Mines, 1970).

Natural gas production has enjoyed an upward trend since the late 1930's. The decrease for 1971 may indicate the leveling off and subsequent downturn in production. The ratio of reserves to production has declined to 15 from a value of 48 in 1949. Using the logistic mathematical model mentioned earlier, the predicted productions (see Fig. 3) for 1980 and 2000 respectively would be 719 and 158 billion

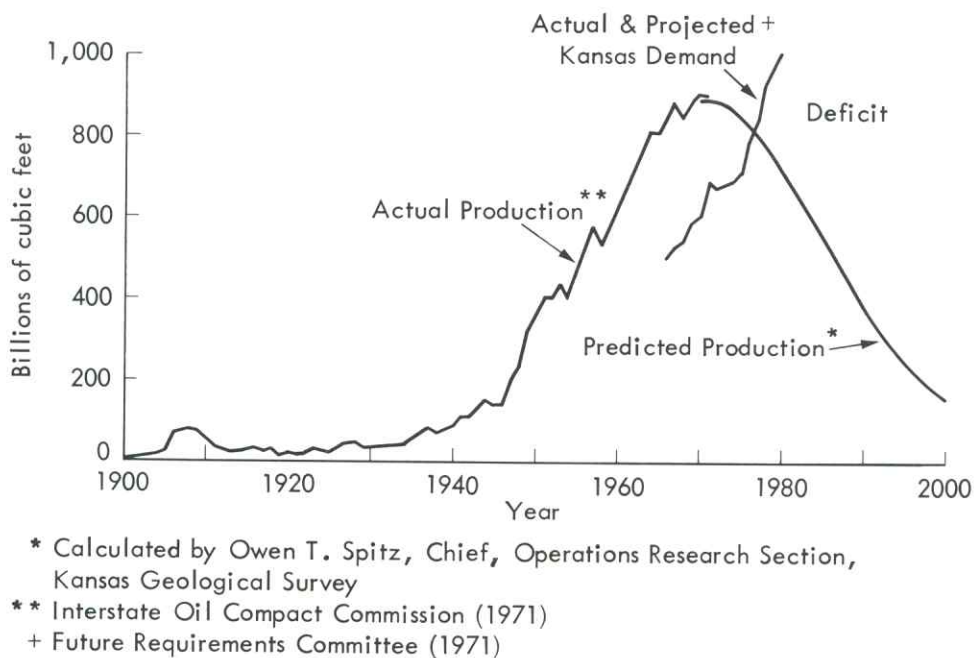


Figure 3.--Annual Kansas natural gas production 1900-1971, predicted production to 2000, and actual and predicted Kansas demand to 1980.

cubic feet. When the predictive curve is superimposed upon the Kansas demand curve formulated by the Future Requirements Committee (1971), a deficit is indicated for 1977. This 1977 date is based on 100 percent in-state consumption of Kansas natural

gas production--a highly unlikely development. Kansas Gas and Electric Co., in seeking a fuel supply for a new power plant at La Cygne, Kansas, to be completed in 1973, was not able to acquire a guaranteed supply after 1975 and thus turned to coal for the \$190,000,000 plant owned jointly with Kansas City Power and Light Co. (Hall, 1971). Situations of this type will be complicated by the fact that consumers who cannot readily convert to other fuels will be willing to pay a high price for the limited supply of natural gas available. Natural gas distributors are already placing public letters in local Kansas newspapers informing of the low supply of natural gas. Kansas has long supplied the natural gas needs of other areas, but will these areas aid Kansas when our supplies are depleted? If they do, the price will certainly be high. In a Kansas Geological Survey publication by Clark (1970) which traces the decline of the economy of southeastern Kansas, the rise in price of natural gas was suggested as one of several prime factors in the development of the noncompetitive position of industries in that area. Looking ahead, some elements of this problem may be repeated again for Kansas in the future. One redeeming feature of this situation is that at the present time, although the production of natural gas in Kansas may be decreasing, the value of the product has been increasing and probably will continue to do so. In 1971 the value increased approximately 2 percent over the 1970 value of \$120,750,000.

Coal Resources in Kansas

Coal-bearing areas of Kansas cover approximately 18,800 square miles or 23 percent of the total area of the State (Averitt, 1969). The coals consist of both bituminous and subbituminous coals or lignites. Their distribution is shown in Figure 4. The first bituminous coal mine in Kansas is believed to have opened in

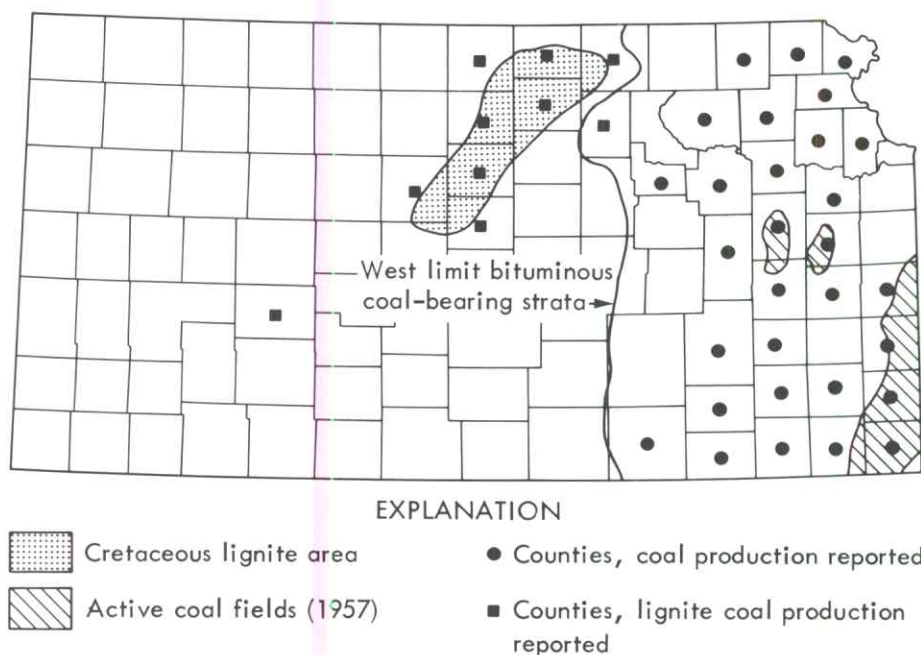


Figure 4.--Distribution of coal-producing counties in Kansas (from Schoewe, 1958, p. 377).

1854 in Leavenworth County near Leavenworth, Kansas. In 1865 the first commercial mine opened at Fort Scott, Kansas, in Bourbon County (U.S. Bureau of Mines, 1971). Underground mining continued until 1961 when the Blue Ribbon Coal Co. mine in Crawford County and the Bell Coal Co. mine in Osage County were closed.

Strip-mining of coal in the U.S. is thought to have originated in 1877 near Pittsburg, Kansas (U.S. Bureau of Mines, 1971). Mining innovations such as the fully revolving steam shovel are also known to have been used first near Pittsburg. Record U.S. overburden to coal thickness ratios of 30 or even 35 to 1 have been established by Kansas stripping operations. The "softness" of the overburden in some places has made this possible. At present all Kansas coal is mined by various stripping methods and has been subject to land reclamation since July 1, 1969.

In the bituminous coal-bearing areas, 53 seams have been named and described, however, only 15 seams are known to be of minable thicknesses and are used in resource calculations. The average thickness of these minable seams is 22 inches. These coals are medium- and high-volatile bituminous coals with a high sulfur and ash content. For this reason, sales to steam-electric generating stations constitute the main market for them. Their continued use will require pollution control devices; probably sulfur dioxide adsorption from flue gases using powdered limestone. The Kansas City Power and Light Co. plant near Lawrence, Kansas, is the first in the U.S. to use this process on a commercial scale and as such is being watched with interest by other utility companies.

The Kansas lignites and subbituminous coals were mined in 12 counties in the center of Kansas (Fig. 4) between 1875 and 1940, mainly for domestic and railroad purposes. They range in thickness between 12 and 40 inches; lignite thicknesses less than 30 inches are not recognized as resources by the U.S. Geological Survey due to the vast supply of thick lignites in North Dakota and the limited present use of these coals. Kansas lignites range from a low to high sulfur content (0.48 - 6.28%) with a maximum BTU content of 7,290 BTU/lb (U.S. Bureau of Mines, 1971). The original reserves of lignite have been estimated as 198 million tons, but a reliable evaluation of lignite resources is not possible with the data available. Data on lignite should continue to be collected because of the future potential for lignite as a source of gas or other fuel energy.

Coal production (Fig. 5), which was intimately tied to the early development of Kansas and was significant during the World Wars, reached its lowest level for 80 years in 1961 at 666,800 short tons. However, by 1970, production had increased

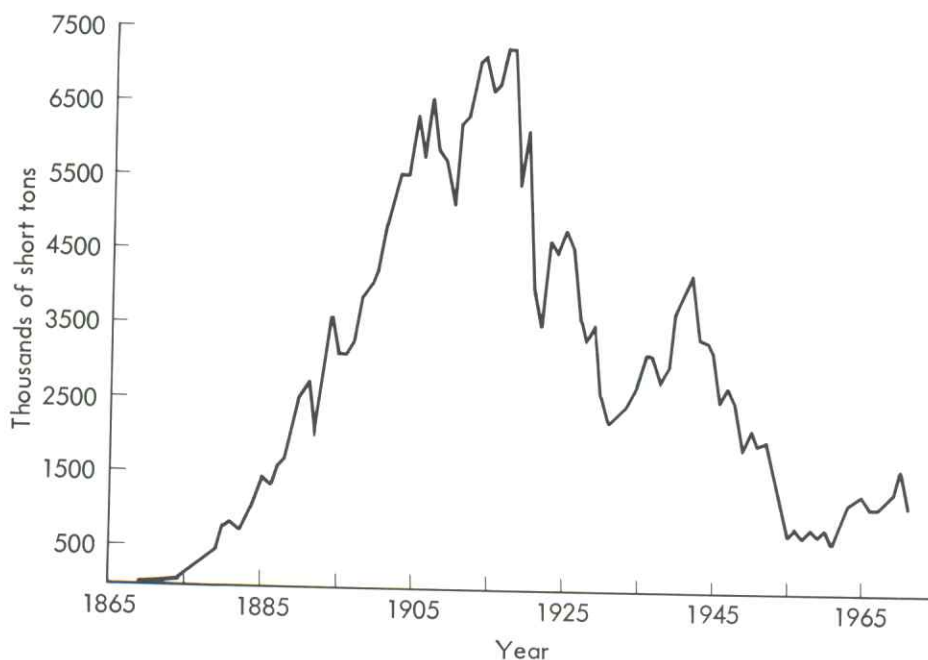


Figure 5.--Kansas coal production 1869-1971.

Table 4.--Kansas coal resources estimates*
(millions of short tons).

Source & Date	Original reserves	Remaining reserves	Estimated additional resources	Recoverable reserves (50% rate)	Remaining strippable resource	Strippable reserves	Lignite
U.S.G.S. (1967) ¹	600 ² (stripping coal)	18,682	4,000	11, 343			small resources in beas generally less than 30" thick
U.S.G.S. (1970)	500 (stripping coal)						
U.S.G.S. (1971) ³ (Stroup & Falvey)				830.0	215		
U.S.B.M. (1971) ⁴					1,388	375.5	
Kansas Geological Survey	198 (lignite)			918.3		60 (1947) ⁵	

¹Bituminous coals > 14" thick; subbituminous coal & lignites > 2.5'; overburden 0-3000'.

²Overburden less than 100'.

³Strippable coals: overburden ratios 20-25 yd³/ton coal; minimum thickness > 1' unless mined with thicker seams; minable thickness 24" at < 250' and 48" at < 500'.

⁴Bituminous only; max. overburden 120'; economic stripping ratio = 15:1 (ft. to ft. based on maximum feet of overburden thickness at the highwall per foot of coal bed thickness).

⁵Overburden < 60'.

*Sources: Averitt (1969, 1970)
Stroup and Falvey (1969)
U.S. Bureau of Mines (1971)
Schoewe (1958)

again to 1,621,093 short tons and the construction of the minemouth electric plant at La Cygne alone will guarantee a continued increasing trend.

In order to determine how long this trend can continue, it is necessary to look at the coal resources of Kansas. All of the various estimates of Kansas coal reserves are based upon data collected early in the century. The estimates are summarized in Table 4. Many of the estimates are unrealistic with regard to mineable reserves, since technologic and economic conditions are constantly changing. A reappraisal by the U.S. Bureau of Mines (Stroup and Falvey, 1969) is presently the most acceptable estimate of Kansas coal reserves based on the data available (Table 5). Comparison with the strippable reserves estimate made by the Bureau

Table 5.--Summary of Kansas coal resources, in decreasing order of importance by county* (million of short tons).

County	Total reserves	Strippable reserves (1969)	Remarks
Crawford	263.9	45.0 (94.409) ⁺	Reserves in Weir-Pittsburg seam at depth.
Cherokee	183.5	48.7 (80.565)	P&M Mine; one of largest mines west of Mississippi.
Labette	176.3	Negligible	Relatively deep; unexploited basin deposit of Weir-Pittsburg seam.
Linn	129.0	77.5 (100.100)	4' thick and 500' deep, strip-pable areas of Mulberry (to be mined by P&M for La Cygne plant).
Osage	38.7	24.0 (23.776)	Strippable areas of Nodaway seam; 12 million tons mined underground previously.
Bourbon	27.0	19.4 (160.955)	Some strippable areas.
Leavenworth	5.0	Negligible (6.258)	Thin seams in lower Cherokee at 700-1000'.
Atchison	2.0	" (2.054)	Upper seams too thin.
Brown	2.0	" (4.568)	Limited stripping for local use.
Franklin	1.5	0.3 (0.402)	Possible stripping of Williamsburg and Blue Mount seams for local use.
Elk	1.0	0.3	Limited stripping of Elmo and Nodaway seams for local use.
Jefferson	1.0	Negligible	Possible areas of stripping for local use.
Chautauqua	Negligible	"	Seams too thin.
Coffey	"	" (1.371)	Possible stripping for local use.

Table 5 (cont.)

County	Total reserves	Strippable reserves	Remarks
Cowley	Negligible	Negligible (1.015)	Seams too thin.
Doniphan	"	"	No evidence Cherokee coals are thick enough to be reserves.
Douglas	"	"	Seams too thin.
Jackson	"	"	Seams too thin.
Lyon	"	"	Seams too thin.
Montgomery	"	"	Insufficient evidence on thickness of Weir-Pittsburg seam.
Nemaha	"	"	Seams too thin.
Neosho	"	"	Outcrops and Thayer coal.
Shawnee	"	"	Seams too thin.
Wilson	"	"	Seams (Thayer) too thin.
Woodson	"	"	Seams too thin.
Total	830.9	215.2 (475.473)	

*Summarized from Stroup and Falvey, 1969, p. 16-17.

⁺1968 U.S. Bureau of Mines estimates in parentheses (U.S. Bureau of Mines, 1971).

in 1971 (figures in parentheses, Table 5) indicates some disagreement between estimates. The Mineral Resources Section of the Kansas Geological Survey is now carrying on a program with the cooperation of Kansas coal mining companies to secure the necessary data to complete our knowledge of these resources.

According to Stroup and Falvey (1969), outcropping seams are too thin to mine in 13 counties but some coal may be available in these counties for small-scale operations and local use (Table 5). Significant reserves (215.2 million tons) of strippable coals are present in Crawford, Cherokee, Linn, Osage, and Bourbon counties. Some of these reserves in Linn, Crawford, and Cherokee counties are marked for development by coal companies presently operating in Kansas. According to the 1969 study, areas for possible future underground mining include parts of the Weir-Pittsburg seam west of old workings in Crawford and Cherokee counties, extensions of previously mined deposits of the Nodaway Coal in Osage County, and deeper deposits of the Weir-Pittsburg seam in Labette County. At the present rate of production (1,153,000 short tons in 1970) and present technology, strippable resources could be expected to exist in Kansas for 187 years, disregarding certain economic conditions or considerations. For example, the mineable deposits are scattered so as to preclude the use of low-cost mining equipment. Since production will increase with the opening of the Midway Mine in Linn County, perhaps double in some years, it is difficult to estimate the point at which a coal deficit would be reached. It appears at first glance that Kansas could easily meet the requirements for several 100,000-kw steam-powered electric generating stations--13 million tons each over a 50-year life span. Following is a list of other factors which Stroup and Falvey (1969) considered important in the coal-energy picture for Kansas:

1. Power plants will continue to buy coal by contract on the open market, assuring the mining of less favorably situated coal resources.
2. Fuel oil is too expensive to use in Kansas for power generation except for emergencies.
3. Kansas coals must be used near their source since their market value cannot support high transportation costs.
4. The number of small plants using local resources will decrease in the future.
5. If technological advances such as the development of a longwall system to mine coal 20 inches or more thick (now underway in England) or a system for augering into seams can be perfected, the potential for production of Kansas coal would increase greatly.
6. Central and western Kansas will continue to use gas for power generation even at higher costs, while in eastern Kansas use of gas will not increase; efficiency of fuel in large units will become important.
7. Fuel costs will increase as it becomes necessary to strip-mine thinner coals with thicker overburden.
8. More Oklahoma coals will be imported as freight rates become more acceptable.

In general Stroup and Flavey (1969) conclude that, under the present technological conditions and with the exception of the development of local seams of thicknesses of 4 feet, the expansion of the coal industry in Kansas is probably not imminent.

Nuclear Power in Kansas

One nuclear power plant is currently in the planning stage for Kansas. According to Mr. E. S. Hall, Vice-President for Operations, Kansas Gas and Electric Co. (Hall, 1971), KG&E has applied for water rights at John Redmond Reservoir in Coffey and Lyon counties for a nuclear plant that will probably come on line around 1980. Most parts of Kansas have insufficient water supplies for nuclear plants since an estimated 7,000 gallons per minute is required for a 1,000-mw plant. Required cooling pond size is considered as 1-2 acres/mw (Olds, 1972).

Jointly owned nuclear plants appear to be the only solution to the scale problem in Kansas in which the economic necessity of a large plant must be balanced against capital investment capabilities of individual Kansas utility companies. Studies by KG&E show nuclear power competitive in Kansas as early as 1973, but too few partners have been found to supply the large amounts of capital necessary for an 800-mw plant, the absolute minimum size deemed competitive for Kansas (Hall, 1971).

In other developments concerning nuclear power in Kansas, five utility companies supplying roughly 80 percent of Kansas power are participating in an association organized to provide financial support for research and development of nuclear power generation (Kansas Electric Power Suppliers, 1971). Southwest Atomic Energy Associates has completed construction of a facility in Fayetteville, Arkansas, for experimentation concerning the safety of the fast breeder type of nuclear reactor in order to help develop future power generation of this type. Those companies involved include Kansas Gas and Electric Co., Central Kansas Power Co., Empire District Electric Co., the Western Power Division of Central Telephone and Utilities Corporation, and Kansas Power and Light Co.

Outlook for the Future

Estimates of U.S. energy resources just summarized testify to the fact that the U.S. problem is not one of lack of resources, but rather a complicated problem of satisfying demands for cheap power, a clean environment, health and safety of miners, i.e., the most efficient use on one hand, and solving the critical technologic, distribution, and manpower problems on the other. As such, the current situation is probably more accurately termed an energy "crunch" instead of a "crisis." The exception to this and a key problem is our natural gas supply. Continued use of gas, highly preferred today, will depend primarily on economic stimulation of exploration, on supply and demand, and on the development of synthetic pipeline gases from other fuels. Increased demand for limited supplies of fossil fuels that can satisfy pollution-control demands with a minimum disturbance to the environment will lead to a continued energy "crunch" until a variety of technologic problems can be solved. This demand, along with processing of lower quality fuels to meet environmental demands, will mean increased costs for energy passed down the line to the consumer.

In general we can expect to see extensive evaluation of various aspects of our energy sources and readjustment of the proportions of different fuels making up the total U.S. energy supply. There will be increasing interchangeability of energy resources reflected by continued diversification of energy companies. Hopefully, more thought will be given to the best use of presently known fuels at the same time development of new uses or sources is taking place. Computer-based energy models, such as Total Energy Resource Analyses (TERA) being built by the American Gas Association, should be useful in accurately predicting future supply and demand.

For the first time, government and industry representatives will be examining the interrelationships among the uses of various fuels and the policies which affect them. At the present time, the Committee on Interior and Insular Affairs of the U.S. Senate is attempting to answer the following questions with regard to a whole range of policy issues relating to natural gas (Committee on Interior and Insular Affairs, 1972): What is the supply and demand for natural gas and how adequate are the industry's resource and reserves estimates? What are the costs and problems associated with alternative sources or substitutes for natural gas? What are the areas of jurisdictional problems of federal and state government in regulatory policy, and which of these policies, if any, can reconcile conflicting national goals regarding natural gas? What, if any, controls should be placed on the end use of gas and what modifications of oil and gas leasing policies would encourage exploration and development? Finally, can the U.S. transportation and distribution system be restructured to allow greater flexibility of supply and avoid local emergencies? The answers received to these questions and the appropriate actions are likely to have a great influence on the energy picture for some time to come.

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Strip Mine Redevelopment Provides New Land Use in Southeast Kansas

Kathleen Q. Camin*

The Kansas Mined Land Reclamation and Conservation Law, which requires coal companies to level and seed land immediately after it is mined, went into effect on January 1, 1969. Although current and future devastation of the land by strip-mining is prevented by proper enforcement of this law, nothing was done about the 50,000 acres that had been disturbed by strip-mining before 1969.

Governor Robert Docking appointed a Mineral Resources Task Group of 10 people to "encourage the redevelopment of the 50,000 acres whose surface had been disturbed by mining prior to 1969." These Task Group members are concerned individuals who serve without pay and at their own expense. Members of the Task Group are: R. W. Fowler, Chairman, a banker from Weir who is also a member of the Forestry, Fish and Game Commission; Ronald G. Hardy, Chief of the Mineral Resources Section of the Kansas Geological Survey; Maurice Barnes, a McCune farmer and rancher who has successfully reclaimed over 1,300 acres of mined land to grassland; Dr. Fred W. Boren, Superintendent in charge of the Southeast Kansas Branch Experiment Station; Delno Bass, Coordinator of the Governor's Committee on Manpower Planning; John W. Mackie, Jr., President of Clemens Coal Co.; Meade Gibbs, Crawford County farmer; Fred Weaver, Cherokee County farmer and State Representative from the First District; George E. Nettels, Chairman of the Board of McNally Pittsburg Manufacturing Corporation; and Darrell Carlton, Kansas Commissioner of Labor, who, by law, serves as chairman of the Mined Land Conservation and Reclamation Board.

The State Geological Survey was asked for aid in seeking financial and technical assistance in redeveloping these "old" or "pre-law" spoil banks (Fig. 1). For the past 3 years the Ozarks Regional Commission has provided funds, by means of a grant to the State Geological Survey of Kansas, for a technical staff to assist the Mineral Resources Task Group. These technical assistance grants started in September 1969, and amounted to approximately \$27,000 in 1969-70; \$54,000 in 1970-71; and \$54,000 in 1971-72. During each of these years the State Geological Survey has added \$27,000 of contributed services to this Mined Land Redevelopment Project.

The technical staff established, in the Crawford County Courthouse in Girard, Kansas, a project office known as the Mined Land Redevelopment Office, under the direction of Dr. Kathleen Q. Camin. The technical staff collected information on the location and ownership of all mined land. They also gathered information on the impact of strip-mining on county taxes, and on the economic profitability of reclaiming this land for grassland.

Ninety percent of the 50,000 acres of land whose surface was disturbed by mining is located in two counties, Crawford and Cherokee, with the rest in Bourbon, Labette, and Linn counties. The distribution of this acreage is shown in Table 1; type of owner is shown in Table 2.

*Research Associate, State Geological Survey of Kansas, and Associate Professor of Economics, Wichita State University.



Figure 1.--Spoil banks in Crawford County, typical of the 50,000 acres of land disturbed by coal strip-mining before 1969.



Figure 2.--Dozer operations, the initial step in reshaping the spoil banks.



Figure 3.--Land form and condition during dragging operations.



Figure 4.--The final result of the redevelopment program--productive land.

Table 1.--Acres strip-mined for coal prior to January 1, 1969,
and acres covered by lead and zinc tailings.

<u>Coal</u>	
Bourbon County	3,000 acres
Cherokee County	20,000 acres
Crawford County	22,000 acres
Labette County	<u>1,000 acres</u>
Total	46,000 acres*

<u>Lead & Zinc Tailings</u>	
Cherokee County	2,000 acres
TOTAL: Coal, Lead & Zinc	48,000 acres*

*Linn County has approximately 2,000 acres of land strip-mined for coal prior to 1969, but is not included in the report as it is outside the area of this project.

Table 2.--Ownership of land strip-mined for coal prior to January 1, 1969.

	Cherokee	Crawford	Bourbon	Labette	Total	Percent
Individual	11,250	15,300	2,750	850	30,150	68
Mining Companies:						
Clemens Coal Co.		5,300			10,800	24
Gulf Oil Co.	5,500					
State of Kansas	2,100	1,250			3,350	7
Cherokee County Sportsman Club	<u>350</u>	<u> </u>	<u> </u>	<u> </u>	<u>350</u>	<u>1</u>
TOTAL	19,200	21,850	2,750	850	44,650	100

In compiling information on the feasibility of redeveloping the disturbed land into grassland, the Task Group depended heavily upon Maurice Barnes' experience in reclaiming about 1,300 acres in Cherokee County for his ranching operation. Based upon his information, it is estimated that a \$200 per acre investment in leveling, liming, fertilizing, and seeding will average an 8 percent return over a 10- to 12-year period.

Redeveloping mined land into grassland involves many steps, the first of which is the leveling or shaping process (Fig. 2). The peaks of the spoil banks are pushed over into the low places between the spoil banks. Trees can be cut or simply pushed over into the low areas and then covered with soil and shale. This shaping of the land must provide for proper drainage and access to the water pits.

It is a common misconception that reclamation involves filling the water pits with the spoil material. Only in rare instances where there is a small, shallow pit are these water areas filled with soil. If anything, reclamation improves accessibility to these excellent fishing holes.

After bulldozing, the ground must be dragged with a heavy I-beam drag (Fig. 3) and offset disked. A second dragging is recommended. At this point, the ground is ready for regular seedbed preparation. Soil tests are taken and lime and fertilizer are added. Then the soil is seeded.

Because of the extreme variation in the pH of spoil-bank material, one composite soil sample per acre is needed. Each of these composite samples should consist of four individual soil samples. The Mined Land Redevelopment staff recommends that sampling be done on a grid pattern. This method of soil sampling allows the delineation of two or three areas which may require different amounts of lime. Soil tests for fertilizer requirements may be based upon the testing of a sample which is a composite of all the pH samples.

Most of the grass plantings are fall plantings of fescue (Kentucky 31) with wheat used as a nurse crop. The wheat is planted only during the first year and is harvested the following summer. Cash income from the wheat crop during the first year is an important factor in the economic feasibility of redeveloping mined land to grassland.

Grazing of cattle can begin in the middle of September approximately 1 year after seeding (Fig. 4). Fescue is a cool-season grass and grazing should normally take place only between September 15 and May 15. Management of grassland after its establishment is crucial to economic success.

A few years following reclamation, an acre of grassland should produce approximately 175 pounds of beef per year (based on M. Barnes' experience). This increase in beef production alone means that gross income per acre will increase by \$41.25 (from \$2.50/acre to \$43.75/acre) per year. The "cattle multiplier" from Interindustry Structure of the Kansas Economy¹ indicates reclamation of 20,000 acres to grassland would lead to a \$2 million increase in gross income for the area.

In order to demonstrate to landowners that redevelopment of mined land is feasible, two programs were undertaken that were financed by the Ozarks Regional Commission. One program established four 40-acre research and demonstration sites. The Ozarks Regional Commission, through the Kansas State Cooperative Extension Service, provided \$16,000 to pay approximately half of the costs of leveling and seeding the four sites. The Tennessee Valley Authority provided fertilizer at reduced cost, and the cooperating farmer paid the remaining costs.

Economic and agronomic research is being conducted at these sites. In addition to the cattle grazing studies (of a weigh-in--weigh-out nature) on the 40-acre area, there are smaller research plots where different grass species, different amounts of lime, and different combinations of fertilizer are being tested and evaluated.

One of the four sites was leveled in February 1971, and seeded to oats and fescue in March. The other three plots were seeded in the fall of 1971.

The second program funded by the Ozarks Regional Commission is a large-scale demonstration project involving approximately 60 sites in 4 counties with a total of 1,000 acres. Areas receiving cost-share funds vary in size from 5 to 20 acres.

¹Emerson, M. J., The Interindustry Structure of the Kansas Economy, Kansas Department of Economic Development, 1969.

The Ozarks Regional Commission provided the Southeastern Kansas Resource, Conservation and Development Project (See-Kan RC&D), a non-profit organization, with \$65,000 to cost-share the leveling of 1,000 acres. The Agricultural Stabilization and Conservation Service's (ASCS) Rural Environmental Assistance Program (REAP) provided \$20,000 to cost-share the liming, fertilizing, and seeding of these 1,000 acres.

Anyone was eligible to apply who owned land whose surface was disturbed by mining prior to 1969. Cooperators were selected by the county soil conservation district's board of supervisors. Criteria included site location (with the sites most easily accessible to public viewing receiving top priority), responsibility of the cooperator, land use, and willingness of the cooperator to reclaim additional acres without cost-sharing.

The majority of the acreage included in this "Thousand Acres" project is being converted to grassland. Other productive uses of reclaimed land are eligible, however, and four have been approved to date. Three involve the recreational use of mined land and are located in Crawford County. A 20-acre site near Galena in Cherokee County has been approved for an industrial park.

The recreational potential of mined land is large. Almost all of the strip pits contain water suitable for fish and most pits are stocked with fish. Until now, the excellent strip-pit fishing has been restricted to local residents because of the lack of camping or rental facilities. It is hoped that with the addition of these facilities, fishermen and campers from other regions such as Wichita and Kansas City will bring recreational dollars into the region. The strip-pit areas provide "instant wilderness" for those people within easy driving distance.

Dorothy Parker of McCune, Kansas, is developing fishing and camping grounds 1 mile north of U.S. Highway 160. This 76-acre camping area will be known as "Cottonwood," because cottonwoods have always been the dominant tree species in strip-pit areas. Camping facilities will be available by August 1972, and a heated fishing dock will be installed for winter fishing. A small acreage has been designated for development by the local Boy Scouts. The area is designed for family outings. Mrs. Parker's goal is to combat the four pollutions: noise, air, water, and land.

Two recreational areas for fishing and camping are in the development stage by "Red" Fox of Girard, Kansas. These areas include some 700 acres, of which 500 acres are mined land. One area is set up for short-term visitors and has extensive camping and fishing facilities, while the second area is a primitive camping area available on an annual membership basis.

A motorcycle park where European-style motocross races are featured every 2 weeks is the most unusual use of reclaimed land. The park is known as Freddy Van's Cycle Land and is located 4 miles east and 3 miles north of Pittsburg, Kansas. The track was designed to provide maximum spectator viewing and the first races (for cash and trophies) were held March 19, 1972.

The State Geological Survey's Mined Land Redevelopment Project, a short-term (3 years), action-oriented research program, has been active for 2 1/2 years. Before the project started, only 600 acres had been reclaimed. To date, 3,000 additional acres have been restored to productive use, and in the remaining 6 months before the project is completed, we estimate another 1,000 acres will be reclaimed. Cost-sharing applied to only 1,160 of these acres, but these were crucial demonstrations which led to additional reclamation. It is hoped that many more landowners will reclaim their old mined land now that demonstration work has been accomplished and cost data determined.

Fly Ash--Pollutant or Benefactor?

Ronald G. Hardy*

One of the more noxious products of power plants and other coal-burning installations is fly ash, a fine, abrasive, glassy particulate material. Most of the fly ash is removable with electrostatic precipitators, but the problem is what then to do with it.

Widespread use of burners for pulverized coal by electric utilities has produced significant amounts of fly ash that have found relatively little use. In the United States an estimated 300 million tons of fly ash have been produced, of which only 3 percent is utilized. It is apparent that continued effort to develop new fly ash outlets and expand existing ones is desirable.

Approximate total amounts of fly ash produced and utilized in the United State during 1967 are given in Table 1.

Table 1.--Utilization of Fly Ash in the United States in 1967.

Markets	Fly Ash	
	Tons	Percent
Road and construction fill	300,000	20
Concrete addition	600,000	39
Lightweight aggregate	150,000	10
Stabilization for road base	120,000	7
Cement manufacture	150,000	10
Asphalt filter	120,000	7
Miscellaneous	<u>120,000</u>	7
Utilized	1,560,000	
Produced	18,500,000	

Data from National Ash Association, Washington, D. C.

Kansas coal, along with coal from Missouri and Oklahoma, is utilized for power generation with fly ash resulting as a by-product. At the present time there is only a limited market for fly ash. In locations where power generating plants are being enlarged (Lawrence, Kansas) or new ones installed (La Cygne, Kansas), fly ash disposal problems become of major or even critical importance.

The Kansas Geological Survey has initiated some test work in an attempt to find additional markets for fly ash produced in this region. One of the first ex-

*Chief, Mineral Resources Section, State Geological Survey of Kansas, Lawrence, Kansas.

periments was the use of fly ash as a filler for polyurethane plastic. This combination has been very successful as a mix for cast door panels, decorative art objects, etc. Experiments to date suggest that large panels simulating shingle, clapboard, etc. could also be made from this mix.

Fly ash as a filter medium for algae and as a means of clarifying farm ponds is also being investigated.

Based on previous work by other researchers, and in cooperation with Kansas State University and the U.S. Bureau of Mines, a study of fly ash utilization to promote plant growth has been undertaken. Initial tests have been on land disturbed by surface mining for coal. Coal is extracted from the land, pulverized and burned to generate electrical power, and the resulting fly ash is returned to the mined land as a soil additive. Redevelopment of the fly ash-treated reclaimed land includes planting with suitable grasses, legumes, or grains. To date the results of treating the soil with fly ash and then planting it with grass have been very encouraging; water retention and soil fertility have, in general, been improved. The fly ash also provides a source of trace elements often required by plants.

Future generation of fly ash in a region 50 miles on either side of the Kansas-Missouri line will probably be on the order of 1 million tons annually. It is possible that through additional research, fly ash, now largely a solid pollutant, will become a benefactor of this region.

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CEMENT PRODUCERS LISTED ALPHABETICALLY

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
PORTLAND CEMENT					
ASH GROVE CEMENT CO.	CHANUTE, KANSAS 66720	316-431-4500	NEOSHO	24-27-18E 25-27-18E 08-27-18E 18-27-18E 18-27-18E	
GENERAL PORTLAND CEMENT CO. TRINITY DIVISION	BOX 479 FREDONIA, KANSAS 66736	316-378-2189	WILSON	24-29-14E 19-29-15E	
IDEAL CEMENT CO.	BOX 228 SUPERIOR, NEBRASKA 68978	402-879-3267	JEWELL	06-01-07W	IDEAL CEMENT
~~IOLA INDUSTRIES INC.~~	IOLA KANSAS 66749	316-365-5462	ALLEN	02-25-18E	
LOVE STAR INDUSTRIES, INC.	BOX 297 BONNER SPRINGS KANSAS 66012	913-422-1050	WYANDOTTE	NW 28-11-23E	
MONARCH CEMENT CO.	HUMBOLDT KANSAS 66748	316-473-2223	ALLEN	SE 09-26-18E NE 16-26-18E	
UNIVERSAL ATLAS CEMENT DIVISION, U.S. STEEL CORP.	BOX 428 INDEPENDENCE, KANSAS 67301	316-331-0200	MONTGOMERY	NW 04-33-16E NE 05-33-16E NE 32-32-16E NW 05-33-16E SE 05-33-16E SW 04-33-16E	

CLAY AND SHALE PRODUCERS LISTED ALPHABETICALLY

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
ACME BRICK CO.	S. WASHINGTON ST. WEIR, KANSAS 66781	316-396-8217	CHEROKEE	SW 17-32-25E 34-31-24E	WILKINSON ACME BRICK
BRICK, BRICK + TILE	BOX 98 KANOPOLIS, KANSAS 67454	913-634-5211	ELLSWORTH	W SE 28-15-07W SE NE 29-15-07W SW 34-16-08W W 23-14-07W N 25-15-07W	ANDREWS ANDREWS BOGGS REMLEY SPARKS
CLOUD CERAMICS DIVISION GENERAL FINANCE INC.	P.O. BOX 417 CONCORDIA, KANSAS 66901	913-243-1284	CLOUD	NE 13-06-03W SW 32-07-02W NW 05-08-02W SE 30-07-02W	
EXCELSIOR CLAY PRODUCTS, INC.	FREDONIA, KANSAS 66736	316-378-2174	WILSON	04-29-14E 10-29-14E 11-29-14E	
HUMBOLDT BRICK + TILE CO.	910 NEW YORK HUMBOLDT, KANSAS 67951	316-473-2211	ALLEN	34-25-18E	
KANSAS BRICK + TILE CO., INC.	BOX 414 HOISINGTON, KANSAS 67544	316-653-2157	BARTON	E 20-18-13W W 15-16-09W	SMITH HOCHMAN
LIGHTWEIGHT AGGREGATE					
BUILDEX, INC.	BOX 62299 PITTSBURG, KANSAS 66762 BOX 15 OTTAWA, KANSAS 66067 BOX 87 MARQUETTE, KANSAS 67464	316-231-1050 913-242-2177 913-546-2276	FRANKLIN MCIPHERSON	23-17-19E 01-17-05W	BUILDEX, INC. BUILDEX, INC.

POTTERY

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
PITTSBURG POTTERY	BOX 5 PITTSBURG, KANSAS 66726	316-231-3920	CHEROKEE	SW 17-32-25E	WILKINSON, INC.

SEWER PIPE

W.S. DICKEY CLAY MANUFACTURING CO.	PITTSBURG, KANSAS 66762	316-231-1400	CRAWFORD	E SE 16-29-25E	W.S. DICKEY
				NE SW 09-30-25E	W.S. DICKEY
				W SW 22-30-25E	FERGUSON
				SW 17-32-25E	WILKINSON, INC.
				SW 10-30-25E	PRICE

COAL PRODUCERS LISTED ALPHABETICALLY

THE CLEMENS COAL CO.	BOX 62299 PITTSBURG, KANSAS 66762	316-231-1050	CRAWFORD	21-28-25E NO. 22 02-31-25E NO. 25
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PITTSBURG-MIDWAY COAL MINING CO.	TENMAIN CENTER KANSAS CITY, MO. 64105	816-842-5430	CHEROKEE	13-33-21E	P + M
				14 + 15-32-22E	P + M
				22 + 23-32-22E	P + M
				24-32-22E	P + M
				19-32-23E	P + M

WILKINSON INC.	WEIR, KANSAS 66781	316-396-8411	CHEROKEE	20-32-25E	WILKINSON
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GYPSUM PRODUCERS LISTED ALPHABETICALLY

GEORGIA PACIFIC CORP. BESTWALL GYPSUM DIVISION	BLUE RAPIDS, KANSAS 66411	913-226-6331	MARSHALL	NW 16-04-07E
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NATIONAL GYPSUM CO.	MEDICINE LODGE, KANSAS 67104	316-886-5613	BARBER	09-31-15W 16-31-15W
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MISCELLANEOUS INDUSTRIAL MINERAL PRODUCERS LISTED ALPHABETICALLY

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
DIATOMACEOUS MARL					
N L INDUSTRIES, INC.	BOX 158 EDSON, KANSAS 67733	913-899-2131	WALLACE	W 01-11-38W 2 + 03-11-38W NW NE 10-11-38W 11-11-38W	COGSWELL COGSWELL COGSWELL COGSWELL

VOLCANIC ASH

ERNEST HANZLICEK	WILSON, KANSAS 67490	913-658-4172	LINCOLN	SW 27-13-10W	HANZLICEK
SAN ORE CONSTRUCTION CO.	BOX 417 MCIPHERSON, KANSAS 67460	316-241-2240	LOGAN MCIPHERSON NORTON	NW 12-13-35W NE 32-17-02W SE 32-03-24W	SCHERTZ PATRICK BRUNSON

STATE HIGHWAY COMMISSION
DIVISION III

NORTON, KANSAS 67654	913-927-3315	NORTON	S 32-03-24W	BRUNSON
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WYANDOTTE U.A.S.F. CORP.

WYANDOTTE MICH. 48192	313-282-3300	NORTON	SW 25-02-22W	MILLER
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SALT PRODUCERS LISTED ALPHABETICALLY

AMERICAN SALT CORP

3142 BROADWAY KANSAS CITY, MO. 64105	816-753-7100	RICE	10-20-08W
LYONS, KANSAS 67554	316-267-2361		

THE BARTON SALT CO.

BOX 1403 HUTCHINSON, KANSAS 67501	316-663-2141	RENO	23-23-06W
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THE CAREY SALT CO.
SUBSIDIARY OF INTERPACE CORP

1800 CAREY BLVD. HUTCHINSON, KANSAS 67501	316-662-3341	RENO	16-23-05W
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COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
CARGILL,	BOX 183 PAWNEE ROCK, KANSAS 67547	316-982-4382	BARTON	SW 28-20-15W	CARGILL, INC.
INDEPENDENT SALT CO.	KANDOPOLIS, KANSAS 67454	913-634-5221	FLLSWORTH	NW 29-15-07W	
MORTON SALT CO. DIV. MORTON-NORWICH PRODUCTS	110 N. WACKER DR. CHICAGO, ILLINOIS 60606 BOX 1547 HUTCHINSON, KANSAS 67501	312-621-5200 316-662-4441	RENO	14+ 23-23-06W	
VULCAN MATERIALS COMPANY CHEMICALS DIVISION	BOX 545 WICHITA, KANSAS 67201	316-524-4211	SEDGWICK	20-29-02W	VULCAN MAT,LS. CO.
SAND AND GRAVEL PRODUCERS ----- LISTED ALPHABETICALLY -----					
ABILENE SAND, INC.	BOX 524 ABILENE, KANSAS 67410	913-263-3492	DICKINSON	SE 25-13-01E	WILSON
JOHN H. ALSOP SAND CO.	11TH + M ST. BOX 345 BELLEVILLE, KANSAS 66935	913-527-2248	CLAY REPUBLIC	SW 02-08-02E SE 07-03-04E NW 20-03-04E	DIITMAR RUNFT RUNFT
ALSOP + SONS SAND CO.	1107 GILLESPIE GARDEN CITY, KANSAS 67846	316-276-3130	FINNEY	NE 19-26-32W	CITY OF GARDEN CITY
AMERICAN SAND + MATERIAL CO. INC.	4600 SPEAKER ROAD KANSAS CITY, KANSAS 66106	913-342-4208	WYANDOTTE	18-11-25E	KANSAS RIVER
ARENSMAN SAND + GRAVEL CO.	CHASE KANSAS 67524 RAYMOND KANSAS 67573	316-938-2532 316-534-2822	RICE	NE 29-20-10W	HAGEN
ARKANSAS SAND CO., INC.	BOX 742 GREAT BEND, KANSAS 67530	316-793-9458	BARTON	NE 04-20-13W	G.D. PETERS
ASSOCIATED MATERIAL SUPPLY CO., INC.	6015 N. BROADWAY BOX 4064316-744-0433 N. WICHITA STA. 67204 4405 W. 52ND WICHITA, KANSAS 67204	316-722-0281	SEDGWICK	N N 23-26-01W	CLARK

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
BARTON CO. ROAD DEPT	BOX 46 GREAT BEND, KANSAS 67530	316-453-4571	BARTON	05-20-11W SE 32-19-13W 32-19-14W	=620 =622 =624
ROD BENTLEY SAND + GRAVEL	SHIELDS, KANSAS 67874	316-397-5669	GOVE	SW 24-15-28W	BENTLEY
BENTLEY SAND CO.	BENTLEY KANSAS 67016	316-432-5235	SEDGWICK	NW 13-25-02W NE 17-25-01W	WOLFE VOGT
BIG THREE SAND + GRAVEL CO.	6000 W. 21ST STREET WICHITA, KANSAS 67212	316-943-6361	SEDGWICK	SE 03-27-01W	RITCHIE CONSTRUCTION
BLUE RIVER SAND + GRAVEL CO.	BOX 38 BLUE RAPIDS, KANSAS 66411	913-226-8881	MARSHALL	SW 19-04-07E SE 27-04-07E	STRYKER SMITH
BOWERSUCK MILLS + POWER CO.	BOX 218 LAWRENCE, KANSAS 66044	913-843-1051	DOUGLAS	6TH + NEW YORK	KANSAS RIVER
BRUCE + SMITH, INC.	BOX 9 LARNED, KANSAS 67550	316-285-2189	PAWNEE	SE SE 05-22-16W	BAHLS
BRYANT SAND + GRAVEL CO.	RT. 1 BOX 218 BURTON, KANSAS 67020 RT 2 BOX 218 BURTON, KANSAS 67020	316-463-5621 316-463-2711	HARVEY HARVEY	NE 06-24-03W 27-23-03W	
BUILDERS SAND CO.	78TH + HOLLIDAY DRIVE KANSAS CITY, KANSAS 66106	913-375-1414	JOHNSON WYANDOTTE	05-12-24E SW 32-11-24E	THE DEN GARRETT
CHASE CO. ROAD DEPT	COTTONWOOD FALLS, KANSAS 66845	316-273-6386	CHASE	VARIOUS	VARIOUS
CHEYFNE CO. ROAD DEPT	ST. FRANCIS, KANSAS 67756	913-332-2621	CHEYENNE	19-01-41W 16-02-42W 09-05-37W 19-01-38W	PALMER MORRIS NELSON RAMSEY

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
CLARK CO. ROAD DEPT	ASHLAND, KANSAS 67831	316-635-2832	CLARK	SE 12-32-22W 27-32-23W 12-32-25W 18-31-22W NW 13-30-23W NE 18-33-22W	DORSEY ABELL SMITH YOUNG BROS. PYLE RHODES
HOWARD CLEVINGER	LEOTI, KANSAS 67861	316-375-2575	WICHITA	SE 32-18-37W	
COMANCHE CO. ROAD DEPT	COLDWATER, KANSAS 67029	316-582-7231	COMANCHE	28-32-16W NW 14-32-17W 06-32-18W 12-35-19W 30-33-16W	WAITE LENERTZ GARD DEGOLYER BURNETT
CONSUMERS SAND CO., INC.	924 W. RAILROAD STREET TOPEKA, KANSAS 66608 4120 NE BELMONT STREET TOPEKA, KANSAS 66616	913-232-5117 913-232-1414	SHAWNEE SHAWNEE	SW 23-11-16E KAW HALF-BREED RESERVE	NEWMAN KS. RIVER
HOWARD COVERT	ALTON, KANSAS 67623	- -	ROOKS	NW 22-07-17W	RIFFE
DAVIS + SONS SAND SALES	RT. 1 DODGE CITY, KANSAS 67801	316-227-6301	FORD	SW 31-26-25W	BAILEY
DODGE CITY SAND CO.	500 E. CHERRY DODGE CITY, KANSAS 67801	316-227-6091	FORD	36-26-25W	
DOLESE BROTHERS CO.	BOX 1841 WICHITA, KANSAS 67212	316-262-1428	SEDGWICK	NW 07-27-01E	
EAKIN SAND + GRAVEL CO.	BOX 48 LARNED, KANSAS 67550	316-285-3916	PAWNEE	SW 05-22-16W NW 08-22-16W	EAKIN
EDWARDS CO. HIGHWAY DEPT.	P.O. BOX 187 KINSLEY, KANSAS 67547	316-659-2188 316-659-2632	EDWARDS	35-24-19W	FELDMAN

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
ELK CO. ROAD DEPT	HOWARD, KANSAS 67349	316-374-2580	ELK	31-28-09E	BARNES
ELLIS CO. ROAD DEPT	HAYS, KANSAS 67601	913-625-7334	ELLIS	23-15-19W	DINGES
ELLSWORTH CO. ROAD DEPT.	ELLSWORTH, KANSAS 67439	913-472-4003	ELLSWORTH	SE SW 30-14-10W NE SW 30-14-10W W SW 22-15-09W SE NW 10-15-09W NE 35-15-10W SW 18-15-08W NW 22-15-08W SW SW 35-15-08W SE SW 23-16-07W NW SW 36-16-06W SW 27-15-08W SW 23-15-09W NE NW 03-14-10W	MCEVOY BORRELL ROOT BURMEISTER URBANFK CROY HOMULKA HOFFMAN PEPPIAT BUFFINGTON THIELEN DALECHEK PEJSHA
FINLAYSON GRAVEL + READY-MIX	BARNES, KANSAS 66933	- -	WASHINGTON	NE 18-03-05E	
FORD CO. ROAD DEPT.	DODGE CITY, KANSAS 67801	316-225-4861	FORD	NW 12-27-24W S NW 01-27-21W	FORD CO. MOLLITOR
FOUNTAIN SAND + GRAVEL PIT	ARLINGTON, KANSAS 67514	316-538-2393	RENO	SE 06-25-07W	FOUNTAIN
FYFE SAND + GRAVEL CO.	BOX 331 CONCORDIA, KANSAS 66902	913-243-4249	CLOUD	26-05-03W	
BURL GAUNT	106 W. HACKNEY MEDICINE LODGE, KANSAS 67104	316-886-4187	BARBER	E NW 07-32-11W	PALMER
GLOBE CONSTRUCTION CO. INC.	1041 N. WATER MICHITA, KANSAS 67203	316-265-2623	SEDGWICK	SE 02-27-01W	STEWART
GOVE CO. ROAD DEPT.	GOVE, KANSAS 67736	913-938-2871	GOVE	VARIOUS	VARIOUS
GRAVEL PRODUCTS, INC.	NICKERSON, KANSAS 67561	316-422-3249	RENO	SW 15-22-07W	PAULSON

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
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GRAY CO. ROAD DEPT.

CIMARRON, KANSAS 67835 316-855-3815

GRAY

35-25-29W

GREELEY CO. ROAD DEPT.

TRIBUNE, KANSAS 67869 316-376-4253

GREELEY

VARIOUS VARIOUS

HAIGH SAND + GRAVEL

BELOIT, KANSAS 67420 913-738-2367

MITCHELL

NW 10-07-07W HAIGH

HAMILTON CC. ROAD DEPT.

SYRACUSE, KANSAS 67878 316-384-5135

HAMILTON

VARIOUS VARIOUS

HARPER CO. ROAD DEPT.

COURTHOUSE ANTHONY, KANSAS 67003 316-842-5240

HARPER

02-34-06W WELSH
23-34-05W MAYO
05-31-09W JACOBS
09-32-08W HOYT
33-33-07W MONTAGUE
34-33-07W CLARK
09-31-07W BARBER
36-31-06W WINTERS
28-32-09W JOHNSON

HASKELL CO. ROAD DEPT.

SUBLETTE, KANSAS 67877 316-375-2234

HASKELL

20-30-34W BRYANT

HAVEN SAND CC.

HAVEN, KANSAS 67543 316-465-7738

RENO

NE 20-24-04W MOUNT

HAYNES SAND + GRAVEL

RT 1, 1300 W. MADISON AVE - -
ARKANSAS CITY, KANSAS 67005
1800 W. CHESTNUT 316-442-2000
ARKANSAS CITY, KANSAS 67005

COWLEY

NE 26-34-03E ANDREWS

HAYS CONCRETE PRODUCTS CO.

HAYS, KANSAS 67601 913-625-2716

ELLIS

SEL 12-15-20W MILLARD MOORE

HEINZELMAN CONSTRUCTION CO.

506 S. 10TH 913-562-3577
MARYSVILLE, KANSAS 66508
RT. 1 913-226-7374
BLUE RAPIDS, KANSAS 66411

MARSHALL

18-04-07E RUSSELL HAMILTON

HODGEMAN CC. ROAD DEPT.

JETMORE, KANSAS 67854 316-357-4355

HODGEMAN

VARIOUS VARIOUS

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
HOLLIDAY SAND + GRAVEL CO.	6811 W. 63RD OVERLAND PARK, KANSAS 66202	913-236-5920	JOHNSON	32-11-23E	SCHYT
	BONNER SPRINGS, KANSAS 66012	913-422-3095	WYANDOTTE	27-11-23E	H.S.G.
	EDWARDSVILLE, KANSAS 66022	913-422-3080	WYANDOTTE	29-11-24E	H.S.G.
	MUNCIE, KANSAS 66057	913-299-2263	DOUGLAS	20-12-20E	HAYDEN + NUNEMAKER
	LAWRENCE, KANSAS 66044	913-843-8717			
HOSKINSON SAND + GRAVEL CO.	RT. 1 HUTCHINSON, KANSAS 67501	316-662-7783	RENO	SE 08-23-06W	HOSKINSON
CONCRETE MIX + CONSTRUCTION	HAYS, KANSAS 67601	913-625-3459	ELLIS	NW 29-15-18W	WERTH
HY-GRADE CONSTRUCTION + MATERIALS, INC.	ST. PAUL, KANSAS 66771	316-449-2575	NEOSHO	SE 15-29-20E	HY-GRADE
J + R SAND CO., INC.	1141 S. PERSHING LIBERAL, KANSAS 67901	316-624-5287	SEWARD	28, 33 34-32-33W	LEMERT
JEWELL CO. ROAD DEPT.	MANKATO, KANSAS 66956	913-378-3431	JEWELL	10-01-06W	HEITMAN
ROBERT W. PENNOCK	BOX 102 MEDICINE LODGE, KANSAS 67104	316-886-5213	BARBER	NW 08-32-11W	KAMINSKA
KANSAS SAND + CONCRETE, INC.	531 N. TYLER TOPEKA, KANSAS 66608	913-235-6284	SHAWNEE	KS. RIVER	N. TOPEKA DRAIN. BRD
KEARNY CO. ROAD DEPT.	BOX 346 LAKIN, KANSAS 67860	316-355-6571	KEARNY	10-25-36W 11-25-36W 24-25-35W	PUCKETT BEYMER TACKETT
WALT KEELER CO., INC.	826 E. LINCOLN WICHITA, KANSAS 67211	316-265-1601	SEDGWICK	SW 02-28-01W	
KERSHAW REDI-MIX CONCRETE + SAND CO., INC.	BOX 668 MANHATTAN, KANSAS 66502	913-776-8811	RILEY	S 05-10-08E SE 30-10-08E	

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
KINGMAN CO. ROAD DEPT.	KINGMAN, KANSAS 67068	316-532-3771	KINGMAN	03-28-08W 02-28-06W 28-28-10W 14-30-08W 17-27-10W	MCKENNA OSNER STERNEKER BROWN VOSS
KINSLEY SAND + GRAVEL, INC.	KINSLEY, KANSAS 67547	316-659-3401	EDWARDS	02-25-19W	OWENS
KIOWA CO. ROAD DEPT.	GREENSBURG, KANSAS 67054	316-723-2531	KIOWA	03-29-17W 02-29-16W	HULME STARKEY
LANE CO. ROAD DEPT.	DIGHTON, KANSAS 67839	316-397-2401	LANE	NW 15-20-30W	HOLLINGSWORTH
LARNED SAND + GRAVEL	BOX 227 LARNED, KANSAS 67550	316-285-3236	PAWNEE	SE 04-22-16W	BUSTER

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
LINCOLN CO. ROAD DEPT.	LINCOLN, KANSAS 67455	913-524-4443	LINCOLN	28-13-10W 30-12-09W 17-12-09W 19-10-09W 26-10-09W 03-10-08W 12-10-08W 25-10-07W 29-10-06W 34-12-07W 29-12-06W 08-13-07W 33-12-06W 29-10-06W 36-10-06W 20-10-07W 26-10-07W 28-10-07W 25-10-08W 20-12-08W 03-10-09W 01-11-06W 06-11-06W 27-11-08W 06-11-09W 14-11-09W 05-12-06W 08-12-09W 29-12-06W 04-12-07W 23-12-07W 26-12-07W 26-12-07W 29-12-08W 04-12-09W 18-12-09W 35-12-09W 07-12-10W 28-12-10W 28-12-10W 33-12-10W 32-12-06W 05-13-07W 14-13-09W 34-13-10W	PEJSHA BUZICK O. NELSON DETTING JENSEN HEALY D. JONES M. JONES HARTZELL RITTMANN GARRISON MOLTING HOEH MYERS KELLY MCCLURE BRUS. GOOD MARSHALL TROMBLE WIEKE LUCK ESTATE NITSCH GRIMES KOWALKE BRUCE DETTING H. NELSON SCHMINT REES MORRICAL LEMONS WALTERS BOLTE GOURLEY MELLI BLOCK BECKER + NELSON LEPITZ MEITLER HLAD E. HYNES THAEMERT NEEL L. VONFANGE F. WACKER SOUKUP
LOGAN CO. ROAD DEPT.	RUSSELL SPRINGS, KANSAS 67755	913-846-2266	LOGAN	22-13-35W	
LUCAS GRAVEL CO.	RT. 2, BOX 136 LEON, KANSAS 67074	316-745-3350	RUTLER	NW NE 14-28-06E	LUCAS

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
~~LYONS MATERIALS, INC.~~	302 PEYTON, BOX 425 EMPORIA, KANSAS 66801	316-342-2047	LYON	NE 21-19-11E	JONES
~~LYONS MATERIAL, INC.~~	648 DAK STREET EMPORIA, KANSAS 66801	316-342-7233	LYON	E 06-20-13E W 06-20-13E	MCKINNEY HOLFORTY
MCFARLAND GRAVEL	RT. 2 ARKANSAS CITY, KANSAS 67005	316-442-9580	COMLEY	12-34-04E 17-34-04E 18-34-04E	DUNCAN MCFARLAND MCFARLAND
MCPHERSON CO. ROAD DEPT.	MCPHERSON, KANSAS 67460	316-241-0466	MCPHERSON	16-18-04W 16-18-04W	AELMORE LARSON
MARSHALL CO. HIGHWAY DEPT.	MARYSVILLE, KANSAS 66508	913-443-4941	MARSHALL	29-01-06E	KRUSE
MEADF. CO. ROAD DEPT.	MEADE, KANSAS 67864	316-873-2481	MEADE	20-33-28W	BORCHER
MILES SAND, INC.	4857 N. MERIDAN WICHITA, KANSAS 67204	316-838-3362	SEDGWICK	25-26-01W	
GOODLAND RED-E-MIX	GOODLAND, KANSAS 67735	913-899-7232	SHERMAN	NW 29-08-40W	ELLIOTT
MISSOURI VALLEY SAND, INC.	BOX 89 LEAVENWORTH, KANSAS 66048	913-682-3621	LEAVENWORTH	NE 01-09-22E	MISSOURI RIVER
MORE SAND CO., INC.	RT. 3 JUNCTION CITY, KANSAS 66441	913-238-6922	GEARY	NW 35-11-05E	MORE
MORTON CO. ROAD DEPT.	316-592-2166				
	RICHFIELD, KANSAS 67953	- -	MORTON	S 21-33-41W	
MORTON SAND + GRAVEL	BOX 213 OBERLIN, KANSAS 67749	913-475-3245	RAWLINS	W SW 14-02-32W	MARTIN

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
MT. HOPE SAND CO.	RT. 1, BOX 11 HAVEN, KANSAS 67543	316-465-3447	RENO	4+D4 36-24-04W	
MUELLER SAND + GRAVEL CO., INC.	HANOVER, KANSAS 66945	913-337-2252	WASHINGTON	SW 05-02-05E NE 18-02-05E SE 07-03-05E S 28-01-04E NW 08-02-04E NE 07-02-05E	MUELLER MUELLER MUELLER SPITTSNOGLE MUELLER MUELLER
MULVANE SAND CO., INC.	6015 N BROADWAY BOX 4064 WICHITA, KANSAS 67208 MULVANE, KANSAS 67110	316-744-0433 316-777-1421	SUMNER	31-29-02W	BUTTS
GEORGE M. MYERS, INC.	BOX 238 ELDRADO KANSAS 67042	316-442-9120	COMLEY	SW 06-35-03E	MEYERS, INC.
NESS CO. ROAD DEPT.	NESS CITY, KANSAS 67560	913-798-3350	NESS	31-17-23W 32-16-22W 01-16-25W 35-20-23W 02-16-24W 23-20-26W 30-17-23W	HORCHER MUSSELMAN CLYNE FRUSHER HARRIS GOODMAN PIEFER
~~NEW ERA SAND + GRAVEL CO.~~	~~401 S. RIVER ST. ST. FRANCIS, KANSAS 67756~~	~~913-332-2147~~	CHEYENNE	21-03-40W	NEW ERA S + G
DATVILLE SAND + GRAVEL	4100 W. 31ST SOUTH WICHITA, KANSAS 67217	316-942-3871	SEDGWICK	NE 11-28-01W	LEENDERSTE
OSBORNE CC. ROAD DEPT.	OSBORNE, KANSAS 67473	913-346-2153	OSBORNE	28-07-14W	MCREYNOLDS
OXFORD SAND + GRAVEL CO. DIV. OF FEASTER BRDS. INC.	BOX 266 OXFORD, KANSAS 67119	316-455-3545	COMLEY	SW 07-32-03E	OXFORD
~~P-K SAND CO.~~	BOX 582 GARDEN CITY, KANSAS 67846	316-276-8020	FINNEY	SW 25-32-24W	MORRIS
ALBERT PARTIN SAND + GRAVEL CO	BOX 274 STAFFORD, KANSAS 67578	316-234-5445	STAFFORD	SE 04-25-11W	

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
PAVING CONTRACTORS, INC.	6405 E. KELLOGG WICHITA, KANSAS 67207 8700 S. HYDRAULIC WICHITA, KANSAS 67207	316-684-6161 316-788-0412	SEDGWICK	NW 15-29-01E	COSTIN
PAWNEE CO. ROAD DEPT.	LARNED, KANSAS 67550	316-285-3761	PAWNEE	03-22-16W	BALDWIN
CARROLL PAXSON	1220 MIAMI BURLINGTON, KANSAS 66839	316-364-2161	COFFEY	SE 10-22-15E	PAXSON
PECK-WOLFE SAND AND MATERIAL CO.	7301 KAW DRIVE KANSAS CITY, KANSAS 66111	913-299-3342	WYANDOTTE	SE 21-11-24E SW 31-11-24E	
PHILLIPS CO. ROAD DEPT.	PHILLIPSBURG, KANSAS 67661	913-543-2912	PHILLIPS	NW 13-05-18W	MCKINLEY
POPEJOY CONSTRUCTION CO., INC.	BOX 385 ULYSSES, KANSAS 67880	316-356-2404	KEARNY	SW 03-25-36W 09-25-36W	BEYMER BAHNIGE
PRAIRIE CO. ROAD DEPT.	PRAIRIE, KANSAS 67124	316-672-2441	PRAIRIE	29-28-11W 10-27-12W SE 15-29-15W 35-27-14W SE 04-28-13W 21-27-12W	ARMISTEAD STUDER HOGARD EUBANK WHITFIELD MAAS
QUINTER RED-MIX CO.	QUINTER, KANSAS 67752	913-754-3361	SHERIDAN	SE 27-10-28W	MILLER
RAWLINS CO. ROAD DEPT.	ATWOOD, KANSAS 67730	913-626-3726	RAWLINS	30-03-32W 25-04-34W 11-02-32W	ANDERSON REEVES KOGEL
CHARLES REISE CONTRACTOR	614 S. 6TH STREET SENECA, KANSAS 66538	913-336-2819	NEMAH	NE 32-01-13E	PERKINS

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
WALT RHOADS SAND + GRAVEL CO.	615 W. 10TH GOODLAND, KANSAS 66735	913-899-3425	SHERMAN	S 15-10-41W NE 11-07-39W NW 16-08-41W SW 22-06-41W	ROCKWELL = 1 YARGER = 2 ERRINGTON = 3 ENFIELD = 4
RIVER SAND CO., INC.	BOX 4044, 3220 WATER WKS TOPEKA, KANSAS 66604	913-233-3877	SHAWNEE	N 26-11-15E	KAWRIVER
DALE ROBERTS	PARK, KANSAS 67751	913-754-3519	GOVE	E 25-13-28W	ROBERTS
ROBINS SAND + GRAVEL	323 W. 2ND MINNEAPOLIS, KANSAS 67467	913-392-2087	OTTAWA	NW 02-11-04W W 20-10-04W NE 34-10-04W 08-09-04W 17-09-04W	MATSON STRATTON BARCUS PAYNE PAYNE
ROCK HILL STONE + GRAVEL CO. INC.	STERLING, KANSAS 67579	316-278-3514	RICE	NE 27-21-08W	ROCK HILL
ROTTINGHAUS ROCK + GRAVEL CO.	BAILEYVILLE, KANSAS 66404	913-336-2056	NEMAHA	NW 16-01-11E SE 28-04-14E	OTOOLF
RUSH CO. ROAD DEPT.	LA CROSSE, KANSAS 67548	913-222-3118	RUSH ELLIS	36-19-19W 20-19-20W 33-15-16W 26-15-19W 26-15-19W	ANSCHUTZ SCHLEGEL URBAN ZIMMERMAN BIEKER
RUSSELL CC. ROAD DEPT.	BOX 415 RUSSELL, KANSAS 67560	913-483-4032	RUSSELL	12-15-15W 21-11-14W 05-12-15W 26-12-13W 01-15-15W 29-14-12W 30-14-11W 02-13-14W 08-15-15W 35-14-14W	BENDER BUNKER BRUMITT K.C.CORPS OF ENG. DUMLER EHRlich HERBER MAJOR TRUAN DUMLER

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
SALINA SAND CO., INC.	MENTOR, KANSAS 67465	913-823-2932	SALINE	SE 07-15-02W NW 19-16-02W	JENNEY MORSE
~~SAN BRE CONSTRUCTION Co., Inc.~~	~~BOX 417 MCPHERSON, KANSAS 67460~~	~~316-241-2240~~	~~MCPHERSON HARVEY SALINE SHERIDAN NESS~~	~~NE 34-19-03W N 27-23-03W S 26-13-03W NE 34-10-28W NW 28-10-30W S 01-16-21W~~	~~WEST ESTATE BRYANT CRAWFORD HOWKA BALMAN SARVIS~~
SCOTT CO. ROAD DEPT.	SCOTT CITY, KANSAS 67871	316-872-2202	SCOTT	VARIOUS	VARIOUS
SEACAT SAND + EXCAVATION	409 W. LINCOLN GREENSBURG, KANSAS 67054	316-723-2396 316-723-2995	KICMA	SW 03-29-17W	SEACAT
SEDGWICK SAND CO.	SEDGWICK, KANSAS 67135	316-766-0456	SEDGWICK	10-26-01W	NICHOLSON
SEWARD CO. ROAD DEPT.	LIBERAL, KANSAS 67901	316-624-3401	SEWARD	02-33-33W 01-35-31W	
J.H. SHEARS, SONS, INC.	819 W. 1ST STREET HUTCHINSON, KANSAS 67501	316-662-3307	RENO	SE 14-23-05W	SHEARS
SHERIDAN CO. ROAD DEPT.	HOXIE, KANSAS 67740	913-675-3621	SHERIDAN	07-09-27W 12-06-30W 20-07-26W 30-10-30W 15-06-27W 23-10-26W	DCHS ZODROW CURRIER ROBERTS WAGNER MCWILLIAM
SHERMAN CO. ROAD DEPT.	GODDLAND, KANSAS 67735	913-899-5253	SHERMAN	VARIOUS	VARIOUS

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
SIEBERT SAND CO., INC.	BOX 10 NESS CITY, KANSAS 67560	913-798-2224	LOGAN PHILLIPS SHERMAN THOMAS	SW 12-13-34W NE 29-04-17W NW 18-08-41W N 32-10-31W NE 31-10-32W NE 27-09-34W NW 33-14-23W SW 11-13-40W SW 29-17-23W	LUTHER MCCOMB ERRINGTON MILLER SIEBERT THEIMIOR WILES POTTS LYNCH
SMITH SAND CO., INC.	BOX 391, 1206 E. FULTON GARDEN CITY, KANSAS 67846	316-276-3771	FINNEY	NW 17-24-33W	
STAFFORD CO. ROAD DEPT.	BOX 224 ST. JOHN, KANSAS 67576	316-549-3597	STAFFORD	06-24-13W	FISHER
~~STANTON SAND & GRAVEL~~	~~RANSOM, KANSAS 67572~~	~~913-731-2475~~	~~TREGO~~	~~25-14-24W~~	~~FARM~~

COMPANY ADDRESS TELEPHONE COUNTY LOCATION LEASE

STATE HIGHWAY COMMISSION
DIVISION 3 MAT,LS. ENG. 309 S. SECOND
NORTON, KANSAS 67654 913-927-2178

CHEYENNE
DECATUR
GRAHAM
LOGAN
NORTON
OSBORNE
PHILLIPS
RAWLINS
ROCKS
RUSSELL
SHERIDAN
SHERMAN
SMITH
THOMAS
TREGO
WALLACE
N 13-05-38W
W 29-05-39W
SE 29-04-27W
S 22-03-29W
NE 08-08-22W
SE 07-08-22W
SE 35-14-32W
SW 04-15-32W
18-12-36W
SE 19-05-25W
SW 09-05-23W
SW 14-07-13W
SE 19-07-11W
NW 23-05-18W
NW 34-02-20W
NE 26-02-20W
SE 26-02-33W
NW 06-03-32W
NW 08-11-17W
NW 22-07-17W
NW 02-13-14W
03-15-14W
N 33-10-28W
09-09-28W
SE 08-06-29W
NW 17-07-39W
NE 35-08-39W
SE 13-08-42W
SW 04-05-15W
NW 05-05-13W
34-10-32W
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NE 32-06-33W
SW 17-07-32W
SE 34-13-22W
NE 33-12-23W
NE 05-15-23W
SE 10-13-40W
SE 10-13-42W
10-15-40W
BUSSE
BUCKINGHAM
RITTER
TILDEN
STUCHLIK
DAVIS
CRISTY EST.
DEARDEN
KELLEY
LINDEN
CLYDESDALE
UBELAKER
WALL
MADDOX
NYLAND
GREIVING
NIERMEIER
MEYER
CARMICHAEL
MCCONNELL
OLIVER
BECKER
KAISER
BILLINGER
RICHTER
LUKEN
DAVIS
BRABHAM
SWEAT
JOHNSON
FULTON
BARNETT
GROVER
SHULL
SEARS
CARLSON
TINKLER
HILLE
LACEY
GUNZELMAN
HEISE

STATE HIGHWAY COMMISSION
DIVISION 4 MAT,LS. ENG. 411 W. 14TH
CHANUTE, KANSAS 67720 316-431-0102

STATE HIGHWAY COMMISSION
DIVISION 5 MAT,LS. ENG. 500 N. HENDRICKS
HUTCHINSON, KANSAS 67501 316-665-8222

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
STATE HIGHWAY COMMISSION DIVISION 6 MATLS. ENG.	BOX 619 GARDEN CITY, KANSAS 67846	316-276-2255			
J.E. STEELE SAND	1400 N. HALSTAD HUTCHINSON, KANSAS 67501	316-662-5741	RENO	S NW 09-23-05W	STEELE
STEWART SAND + MATERIAL CO.	4049 PENNSYLVANIA KANSAS CITY, MO. 64111	816-753-3920 913-375-1377	WYANDOTTE	SE 29-11-24E	MORRIS PLANT
	MORRIS KANSAS	913-287-7059	WYANDOTTE	SS 23-11-24E	MEAGER
	TURNER KANSAS 66087	913-287-8212	WYANDOTTE	SW 12-11-24E	
	MUNCIE KANSAS 66057				
STEVENS CO. ROAD DEPT.	BOX 1167 HUGOTON, KANSAS 67951	316-544-4782	HASKELL STEVENS	29-30-34W 29-31-38W	BRYANT CIMARRON RIV.
STONE SAND CO.	BOX 872 GREAT BEND, KANSAS 67530	316-793-7864	BARTON	SW 33-19-13W	STONE
SUMNER CO. ROAD DEPT.	WELLINGTON, KANSAS 67152	316-326-2791	SUMNER	36-32-02E	DONLEY
SUPERIOR SAND CO., INC.	6500 W. 21ST WICHITA, KANSAS 67212	316-722-0592	SEDGWICK	NW 03-27-01W	SUPERIOR SAND CO.
SUPERIOR SAND + GRAVEL CO.,	BOX 11145 KANSAS CITY, KANSAS 66111 88TH + WOODLAND KANSAS CITY, KANSAS 66111	913-289-6525 913-441-2800	WYANDOTTE	31-11-24E	
THOMAS CO. ROAD DEPT.	CULRY, KANSAS 67701	913-462-2122	THOMAS	24-09-34W	WELAND
TINKLE SAND CO.	CLAFLIN KANSAS 67525	316-587-3942	BARTON	NE 06-20-11W	KNOP
	ELLINWOOD, KANSAS 67526	316-564-3166			
TUBIAS + BIRCHENCUGH, INC.	BOX 470 LYONS, KANSAS 67554	316-257-2161	RICE	NE 16-20-08W N NE 21-29-08	TUBIAS

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
TOPEKA SAND CO.	RT. 4 TOPEKA, KANSAS 66603	913-233-9849	SHAWNEE	SE 23-11-16E	
TREGG CO. ROAD DEPT.	WAKEENEY, KANSAS 67672	913-743-6441	TREGG	VARIOUS	VARIOUS
TRI COMPANY CONSTRUCTION, INC.	6700 S. HYDRAULIC WICHITA, KANSAS 67233	316-524-8631	SEDGWICK	NW 34-28-01E	BLOOD
VIC, S SAND + GRAVEL CO.	6600 W. 21ST WICHITA, KANSAS 67212	316-943-4372	SEDGWICK	NW 01-27-01W	
VICTORY SAND + CONCRETE, INC.	BOX 281 TOPEKA, KANSAS 66601	913-233-3285	SHAWNEE	NW 25-11-15E	KANSAS RIVER
WABAUNSEE CO. ROAD DEPT.	ALMA, KANSAS 66401	913-765-3712	WABAUNSEE	VARIOUS	VARIOUS
WAKEENEY READY-MIX, INC.	BOX 835 WAKEENEY, KANSAS 67672	913-743-2810	TREGG	SE 33-12-23W	TINKLER
WAMEGO SAND CO., INC.	BOX 119 WAMEGO, KANSAS 66547	913-456-9888	POTTAWATOMIE	NW 10-10-10E	
RAY WELLS SAND + GRAVEL	RT. 1 KINGMAN, KANSAS 67068	316-532-2088	KINGMAN	NE 01-28-08W SW 01-28-08W	COLEMAN WELLS
WHITE CONSTRUCTION CO.	KANDPOLIS, KANSAS 67454	913-634-5350	LINCOLN ELLSWORTH	N 26-12-07W SW 36-15-08W NW 03-16-07W NW 19-15-08W 25-15-08W	BOLTE HOFFMAN BATES GRUBB WHITE
WHITFIELD SAND + CONCRETE, INC.	BOX 66 PRATT, KANSAS 67124	316-672-3181	PRATT BARBER	SE 04-28-13W SE 24-31-12W	BARNES
WICHITA BIG RIVER SAND CO.	990 N. WESTLINK WICHITA, KANSAS 67212 4100 S. SENECA WICHITA, KANSAS 67212	- - 316-524-0691	SEDGWICK	18-28-01E	DAVIS CORP.

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
WICHITA CO. ROAD DEPT.	LEOTT, KANSAS 67861	913-375-2814	WICHITA	E 08-19-36W	WILLIS
WILSON BROTHERS	RT. 3 ARKANSAS CITY, KANSAS 67005	316-442-4956	COWLEY	32-34-04E	WILSON
CRUSHED ROCK PRODUCERS	LISTED ALPHABETICALLY				
~~ANDERSON-OSANDALE CO.~~	BOX 425 HERINGTON, KANSAS 67449	913-258-3415	CLAY DICKINSON JACKSON MITCHELL MORRIS NEMAHIA POTTAWATOMIE WASHINGTON	SW 24-09-03E E 02-16-04E N 01-06-12E SW 10-07-08W SW 22-06-09W SE 17-16-06E NW 14-01-14E SE 11-01-14E SE 34-06-10E NE 08-02-04E	FORSYTH JONES PICKETT FOBES MEGLIE ATKINSON BECHTELHEIMER, D. BECHTELHEIMER, H. FALK KOEHLER
DEPARTMENT OF THE ARMY	FORT RILEY BRANCH JUNCTION CITY, KANSAS 66442	913-239-3728	RILEY	SE 03-11-06E	CAMPBELL HILL QY.
AUBEL ASPHALT, INC.	RT. 1, BOX 151 HAYS, KANSAS 67601	913-625-3105	ELLIS	17-13-18W	CITY OF HAYS
ROY BAKER QUARRY, INC.	BOX 100 BALLEY FALLS, KANSAS 66088	913-945-3213	JEFFERSON	NE 20-08-18E	BAKER
RATES COUNTY ROCK, INC.	BOX 70 BUTLER, MO. 64730	816-679-4123 913-352-8811	LINN	NW 24-21-24E	PLEASANTON QY.
AYER CONSTRUCTION CO., INC.	BOX 889, 509 YUMA MANHATTAN, KANSAS 66502	913-776-8839	CLAY RILEY	NW 04-09-04E S 28-10-09E NE 29-10-08E SE NE 06-06-07E SE 06-06-07E NW 26-08-06E E 17-02-09E NE 06-04-07E SE 10-05-09E	MARTIN MOORE REICHLING SMERCHER SMERCHER WOODWORTH JONES (BEATTIE) HAMMITT LEINWEBER

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
BENEDICT ROCK + LIME CO.	BENEDICT, KANSAS 66714	316-698-2102	WILSON	NE SE 02-28-15E	BENEDICT R + L
HARRY BYERS + SONS, INC.	500 N. PLUMMER CHANUTE, KANSAS 66731	316-431-0700	NECSHC	NW 19-27-18E	BYERS
CULLER LIMESTONE CO., INC.	20TH + SIDNEY FORT SCOTT, KANSAS 66701	316-223-4250	BOURBON	NW 02-25-26E SE 17-24-23E SE 09-26-22E SE 08-26-22E E 26-23-24E	JOHNSON WOMELSDORF DRAKE DRAKE DOTSON
DANIELS STONE CO.	R.F.D. 3 WINFIELD, KANSAS 67156	316-221-9060	COWLEY	33-32-04E	DANIELS
DEITZ HILL DEVELOPMENT CO.	BOX 4 KANSAS CITY, MISSOURI 64141	816-221-1311 913-764-2127	JOHNSON	SE 09-14-23E	C-B-H RANCH
EAGLE-PICHER INDUSTRIES, INC.	BOX 910 MIAMI, OKLAHOMA 74354	918-673-1740	CHEROKEE	10-35-24E	
EAGLE-PICHER INDUSTRIES, INC. CHEMICALS + METALS DIV.	BOX 910 MIAMI, OKLAHOMA 74354	918-673-1740 - -	CHEROKEE	NE 10-35-24E	BALLARD
ELLIS CO. ROAD DEPT.	HAYS, KANSAS 67601	913-625-7334	ELLIS	- -	
EVERETT QUARRIES CO., INC.	WATHENA, KANSAS 66090	913-989-4921	DONIPHAN	20-03-22E	THOMPSON
FOGLE QUARRY CO., INC.	18TH + MAIN OTTAWA, KANSAS 66067	913-242-4864	FRANKLIN	NE 12-17-19E	FOGLE
GREENWOOD CO. ROAD DEPT.	EURFKA KANSAS 67045	316-583-6241	GREENWOOD	21-26-11E NE 31-22-13E 11-28-11E NE 48-27-10E	HUGHES CHRISTY JORDON ANSBAUGH

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
GRUSSHANS + PETERSEN, INC.	BOX 350 MARYSVILLE, KANSAS 66508	913-562-2301	GEARY	NE 08-12-06E	PETERSEN EQUIP.
HALLETT CONSTRUCTION CO.	BOX 296 MARION, KANSAS 66861	316-382-3330	CHASE DICKINSON MCIPHERSON MARION RICE	SW 26-20-07E SE 10-14-04E SW 11-18-02W NE 06-21-04E SW 11-20-06W	MOTT RUHNKE HOLM SCHEUBER CONRAD
N.R. HAMM QUARRY, INC.	PERRY, KANSAS 66073	913-597-2890	JEFFERSON	SE 35-11-19E SE 03-11-18E NW 29-11-19E SW 16-11-17E SW 21-09-19E SW 02-11-18E SW 01-09-19E SE 02-09-21E SW 23-12-21E SW 29-19-25E NE 15-10-15E SW 08-12-17E SW 13-10-15E NE 13-10-13E SE 16-11-17E SW 23-12-13E SE 08-11-15E 21-18-14E 16-18-14E 20-18-14E	HECK RICHTER HAMM HAMM MEYER REID WALLACE (M) BROMWELL QUINLAN MOKKIS HAMM HAMM HAMM HAMM HAMM HUMMER HAMILTON DOYLE JONES PETERSON PETERSON
L.W. HAYES, INC.	BOX 236 PAOLA, KANSAS 66071	913-294-4011	MIAMI	SE 18-17-23E	
HOLLAND QUARRIES, INC.	BOX 5283 LENEXA, KANSAS 66215	913-888-5277	JOHNSON	SE 06-13-24E	(M) JOHNSON
HOPPER BROTHERS QUARRIES	PANNEE CITY, NEB. 68420	402-852-2031	CLOUD MARSHALL REPUBLIC WASHINGTON	SW 25-07-05W NW 06-01-08E NE 18-04-05W SE 34-03-03W SE 28-02-05E SE 02-03-01E	JURDEN PRIATYL WOODS CHAMBERS NIEMEIER CHAMBERS

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
HUNT ROCK CO.	RT. 3 GARNETT, KANSAS 66032	913-448-5962	ANDERSON	12-20-18E 31-21-21E	BRUMMEL LOUK
JEWELL CO. ROAD DEPT.	MANKATO, KANSAS 66956	913-378-3431	JEWELL	VARIOUS	VARIOUS
WALT KEELER QUARRY	FLORENCE, KANSAS 66851	316-878-4352	MARION	SE 06-21-05E	
HARRY KEITH	COFFEYVILLE, KANSAS 67337	316-251-9416	LABETTE	SW 35-34-17E	KEITH
KILLCUGH-CLARK, INC.	BOX 623 OTTAWA, KANSAS 66067	913-242-4535	ANDERSON	SE 32-21-19E NW 01-23-19E NE 15-15-18E SW 27-14-20E NE SW 13-16-19E SE NW 17-16-21E NW NW 30-16-24E NW 04-17-17E	STARK PENLAND CLARK HOLMES EDWARDS KILLCUGH CRAWFORD LACEY
LABETTE CO. ROAD DEPT.	OSWEGO KANSAS 67356 ALTAMONT, KANSAS 67330	316-795-4812 316-784-5449	LABETTE	SE 29-32-19E	DUVALL
MCADAM LIMESTONE PRODUCTS, INC	RT. 1 GARNETT, KANSAS 66032	913-448-3179	ANDERSON	ESWNE 01-20-19E	BEMUS

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
MARTIN-MARIETTA CORP CONCRETE MATERIALS DIVISION	1305 W. 42ND TOPEKA, KANSAS 66609	913-266-5556	ATCHISON DONIPHAN	NW 08-05-17E SW 10-03-22E SW NE 21-02-20E W NW 20-13-21E W NW 12-31-10E W SE 06-17-20E NW 11-11-18E NW 31-09-23E N SW 23-19-21E LYCN 12-19-12E NEMAH 24-03-14E OSAGE 34-17-16E NW 35-16-15E NW 15-10-09E SE 29-10-09E RILEY 18-12-17E SHAWNEE 14-10-15E SE SE 20-13-16E WABAUNSEE 30-12-12E	HORTON QY. LIAPPLE SINKER EUDORA QY. MOLINE QY. OTTAWA QY. LEECH-BALL LANSING QY. RUES CORYELL BARBER MELVERN QY. FARNSWORTH ST. GEORGE QY. ZEANDALE QY. E. TOPEKA QY. N. TOPEKA QY. MCQUEEN SCHAEFFER
MIDWEST MINERALS, INC.	~~BOX 7~~ GIRARD, KANSAS 66743	316-724-8283	CHEROKEE	NE 13-32-22E S 21-31-23E NW 24-28-24E SW 31-28-24E SE 12-30-23E SE 01-31-20E SW 06-35-21E NW 32-34-17E NW 29-31-17E S 17-32-14E S 04-33-16E S 06-32-15E S 05-32-15E S 18-30-16E S 18-29-16E S 26-29-14E	SHERMAN CITY QY. CHEROKEE QY. ENGLEVALE QY. FARLINGTON QY. GIRARD QY. PARSONS QY. CHETOPA QY. COFFEYVILLE QY. CHERRYVALE QY. ELK CITY QY. INDEPENDENCE QY. INDEPENDENCE QY. INDEPENDENCE QY. NEODESHA QY. ALTOUNA QY. FREDONIA QY.
GEORGE W. MYERS, INC.	BOX 289 EL DORADO, KANSAS 67042	316-321-4040	BUTLER	NW 08-27-04E	LEFEVER
NELSON QUARRIES	LA HARPE, KANSAS 66751	-	ALLEN LINN	SW 20-23-19E SW 20-23-19E SW 28-20-23E NE 20-21-22E NE 10-31-17E SE 05-25-17E	STRICKLER COX FOWLER HEFFEREN

709 N. Locust
Box 7
Girard, Kansas 66743
Pittsburg, KS 66762

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
NEUSHO CO. ROAD DEPT.	ERIE, KANSAS 66733	316-244-3203	NEOSHO	30-28-19E 27-27-20E 33-29-19E 23-27-19E	NEELY BEBBINGTON JONES REINHARDT
O'BRIEN ROCK CO., INC.	BOX 217 ST. PAUL, KANSAS 66771	316-449-2257	LABETTE NEOSHO	NW 06-35-21E E NE 04-29-21E	PICKERING O'BRIEN
QUARTZITE STONE CO., INC.	LINCOLN, KANSAS 67455	913-524-4494	LINCOLN	SE 14-12-08W S SW 11-20-08W 07-12-07W SE 23-12-08W 13-12-08W NE 14-12-08W	LEWICK BRYAN HEIRS WILSON BROTHERS MARY ZIER BOLTE JOHN MULLOY
RENO CONSTRUCTION CO., INC.	BOX 4278 OVERLAND PARK, KANSAS 66204	913-681-2381	JOHNSON	SE 18-14-25E SW 25-12-23E	STANLEY BLESSING
ROBINS SAND + GRAVEL	323 W. 2ND MINNEAPOLIS, KANSAS 67467	913-390-2087	LINCOLN OTTAWA	E SE 08-11-06E W SW 09-11-06E SW 15-09-04E	LANCASTER LANCASTER WARNOW
J.D. SCHWARCK QUARRIES OF KANSAS INC.	BOX 147 HILL CITY, KANSAS 67642	913-627-3771	GRAHAM	NW 34-07-24W	SMITH
SCOTT CO. ROAD DEPT.	SCOTT CITY, KANSAS 67871	316-872-2202	SCOTT	SE 02-17-33W	PATTON
SCOTT ROCK CO.	NEEDSHA, KANSAS 66757	316-325-2298	MONTGOMERY	23-31-15E	DUN WOOD
SEDAN LIMESTONE CO., INC.	SEDAN, KANSAS 67361	316-725-3404	CHAUTAUQUA ELK GREENWOOD WOODSON	33-33-11E NE 36-29-12E NW 04-30-11E NE 21-31-12E NE 10-28-11E SE 34-25-11E N NE 31-22-13E SE 25-25-13E	SMYLIE RANKIN MCLELLAN FOSTER BLAKE BLAKE CHRISTIE PASKE

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
SERVAES BROTHERS QUARRY	ATCHISON, KANSAS 66002	913-367-0705	ATCHISON DONIPHAN	32-06-21E 12-04-19E 19-35-20E	(M) SERVAES BURKE BOOS
SOUTHWEST ROCK + CHAT CO., INC	703 W. 12 ST., BOX 30 BAXTER SPRINGS, KANSAS 66713	316-856-2192	CHEROKEE	SE 02-35-23E	EARLY BIRD MINE
THOMPSON-STRAUSS QUARRIES	7000 HOLLIDAY DRIVE KANSAS CITY, KANSAS 66106	913-375-1016	WYANDOTTE	SW 23-11-24E	(M) INLAND UNDERGROUND
J.A. TOBIN CONSTRUCTION CO.	BOX 3270 KANSAS CITY, KANSAS 66103	913-342-6770	WYANDOTTE	07-11-25E	(M) TOBIN CONST. CO.
UNION QUARRIES INC.	P.O. BOX 4540 OVERLAND PARK, KANSAS 66204 95TH + OGG ROAD LENEXA, KANSAS 66215	- - 913-888-3838	JOHNSON	NW 31-12-24E	(M) IVAN LERBERG
MADE AGRICULTURAL PRODUCTS	BOX 38 LA CYGNE, KANSAS 66040	- -	LINN MIAMI	NW 19-22-24E SW 28-18-25E	
WALKER STONE CO., INC.	BOX 247 CHAPMAN, KANSAS 67431	913-922-4711	DICKINSON GEARY	SW 27-12-04E 28-12-04E SW 02-11-05E SW 04-13-05E NE 04-13-05E NE 36-12-04E SE 36-12-04E SW 36-12-04E NW 02-11-05E ALL 32-11-05E S 28-12-04E NW 28-12-04E NE 26-15-02E	WALKER WALKER HUSTON CASPAR JANICK SCHULER HASSELMAN BEFLER ZUMBRUNN GORMAN DETRICH GANTENDEIN
WEST LAKE QUARRY + MATERIAL CO	RT. 1, BOX 206 BRIDGECTON, MO. 63042	314-739-1122	DONIPHAN	10-02-20E	SCHNEIDER

BUILDING STONE PRODUCERS LISTED ALPHABETICALLY

COMPANY	ADDRESS	TELEPHONE	COUNTY	LOCATION	LEASE
BAYER STONE, INC.	ST. MARYS, KANSAS 66536	913-776-6282	CHASE POTTAWATOMIE RILEY	SE NE 29-18-07E SW 15-07-12E NE NE 29-10-08E NW NW 28-10-08E	HALEY BAYER BAYER BAYER
H.J. BORN STONE, INC.	BOX 45 SILVERDALE, KANSAS 67139	316-442-5750	COMLEY	ALL 2+ 03-35-05E ALL 04-35-05E N 14-35-05E ALL 11-35-05E NW 32-34-05E	DUNN BORN HART HART BORN
	901 W. 35TH N. WICHITA, KANSAS 67219	316-838-7788	CHASE	SE 12-19-06E S 07-19-07E S 13-19-06E	THUT BORN BORN
J.D. SCHWARCK QUARRIES OF KANSAS, INC.	BOX 147 HILL CITY, KANSAS 67642	913-627-3900	GRAHAM	NW 34-07-24W	SMITH

SAND AND GRAVEL PRODUCERS...LISTED BY COUNTY ALPHABETICALLY

COMPANY	ADDRESS	TELEPHONE	LOCATION	LEASE
BARBER				
HURL GAUNT	106 W. HACKNEY MEDICINE LODGE, KANSAS 67104	316-886-4187	E NW 07-32-11W	PALMER
ROBERT W. PENNOCK	BOX 102 MEDICINE LODGE, KANSAS 67104	316-886-5213	NW 08-32-11W	KAMINSKA
WHITFIELD SAND + CONCRETE, INC.	BOX 66 PRATT, KANSAS 67124	316-672-3181	SE 24-31-12W	
BARTON				
ARKANSAS SAND CO., INC.	BOX 742 GREAT BEND, KANSAS 67530	316-793-9458	NE 04-20-13W	G.C. PETERS
BARTON CO. ROAD DEPT	BOX 46 GREAT BEND, KANSAS 67530	316-453-4571	05-20-11W SE 32-19-13W 32-19-14W	=620 =622 =624
STONE SAND CO.	BOX 872 GREAT BEND, KANSAS 67530	316-793-7864	SW 33-19-13W	STONE
TINKLE SAND CO.	CLAFLIN KANSAS 67525 FILLWOOD, KANSAS 67526	316-587-3942 316-564-3166	NE 06-20-11W	KNOP
BUTLER				
LUCAS GRAVEL CO.	RT. 2, BOX 136 LEON, KANSAS 67074	316-745-3350	NW NE 14-28-06E	LUCAS
CHASE				
CHASE CO. ROAD DEPT	COTTONWOOD FALLS, KANSAS 66845	316-273-6386	VARIOUS	VARIOUS
CHEYENNE				
CHEYENNE CO. ROAD DEPT	ST. FRANCIS, KANSAS 67756	913-332-2621	19-01-41W 16-02-42W 09-05-37W 19-01-38W	PALMER MORRIS NELSON RAMSEY
NEW ERA SAND + GRAVEL CO.	401 S. RIVER ST. ST. FRANCIS, KANSAS 67756	913-332-2147	21-03-40W	NEW ERA S + G

COMPANY	ADDRESS	TELEPHONE	LOCATION	LEASE
STATE HIGHWAY COMMISSION DIVISION 3 MATLS. ENG.	309 S. SECOND NORTON, KANSAS 67654	913-927-2178	N 13-05-38W W 29-05-39W	BUSSE BUCKINGHAM
CLARK				
CLARK CO. ROAD DEPT	ASHLAND, KANSAS 67831	316-635-2832	SE 12-32-22W 27-32-23W 12-32-25W 18-31-22W NW 13-30-23W NE 18-33-22W	CORSEY ABELL SMITH YOUNG BRUS. PYLE RHODES
CLAY				
JOHN H. ALSOP SAND CO.	11TH + N ST. BOX 345 BELLEVILLE, KANSAS 66935	913-527-2248	SW 02-08-02E	CLITMAR
CLOUD				
FYFE SAND + GRAVEL CO.	BOX 311 CONCORDIA, KANSAS 66902	913-243-4249	26-05-03W	
COFFEY				
CARROLL PAXSON	1220 MIAMI BURLINGTON, KANSAS 66839	316-364-2161	SE 10-22-15E	PAXSON
COMANCHE				
COMANCHE CO. ROAD DEPT	COLDWATER, KANSAS 67029	316-582-7231	28-32-16W NW 14-32-17W 06-32-18W 12-35-19W 30-33-16W	WAITE LENERIZ GARD DECOLYER BURNETT
COWLEY				
HAYNES SAND + GRAVEL	RT 1, 1300 W. MADISON AVE. ARKANSAS CITY, KANSAS 67005 1800 W. CHESTNUT ARKANSAS CITY, KANSAS 67005	- - 316-442-2000	NE 26-34-03E	ANDREWS
MCFARLAND GRAVEL	RT. 2 ARKANSAS CITY, KANSAS 67005	316-442-9580	12-34-04E 17-34-04E 18-34-04E	DUNCAN MCFARLAND MCFARLAND

COMPANY	ADDRESS	TELEPHONE	LOCATION	LEASE
GEO. M. MYERS, INC.	BOX 238 ELDORADO KANSAS 67042	316-442-9120	SW 06-35-03E	MEYERS, INC.
OXFORD SAND + GRAVEL CO. DIV. OF FEASTER BRUS. INC.	BOX 266 OXFORD, KANSAS 67119	316-455-3545	SW 07-32-03E	OXFORD
WILSON BROTHERS	RT. 3 ARKANSAS CITY, KANSAS 67005	316-442-4956	32-34-04E	WILSON
DECATUR				
STATE HIGHWAY COMMISSION DIVISION 3 MATLS. ENG.	309 S. SECOND NORTON, KANSAS 67654	913-927-2178	SE SE 29-04-27W S 22-03-29W	RIITTER TILDEN
DICKINSON				
ABILENE SAND, INC.	BOX 524 ABILENE, KANSAS 67410	913-263-3492	SE 25-13-01E	WILSON
DONIPHAN				
J.D. SCHWARCK QUARRIES OF KANSAS, INC.	RT. 1, BOX 206 BRIDGETON, MO. 63042	314-739-1122	10-02-20E	SCHNEIDER
DOUGLAS				
BOMERSOCK MILLS + POWER CO.	BOX 218 LAWRENCE, KANSAS 66044	913-843-1051	6TH + NEW YORK	KANSAS RIVER
HOLLIDAY SAND + GRAVEL CO.	6811 W. 63RD OVERLAND PARK, KANSAS 66202	913-236-5920		
	LAWRENCE, KANSAS 66044	913-843-8717	20-12-20E	HAYDEN + NUNEMAKER
EDWARDS				
EDWARDS CO. HIGHWAY DEPT.	P.O. BOX 187 KINSLEY, KANSAS 67547	316-659-2188	35-24-19W	FELDMAN
	KINSLEY, KANSAS 67547	316-659-3401	02-25-19W	OWENS
ELK				
ELK CO. ROAD DEPT	HOWARD, KANSAS 67349	316-374-2580	31-28-09E	BARNES

COMPANY -----	ADDRESS -----	TELEPHONE -----	LOCATION -----	LEASE -----
ELLIS				
ELLIS CO. ROAD DEPT	HAYS, KANSAS 67601	913-625-7334	23-15-19W	DINGES
HAYS CONCRETE PRODUCTS CO.	HAYS, KANSAS 67601	913-625-2716	SEL 12-15-20W	MILLARD MOORE
CONCRETE MIX + CONSTRUCTION	HAYS, KANSAS 67601	913-625-3459	NW 29-15-18W	WERTH
RUSH CO. ROAD DEPT.	LA CROSSE, KANSAS 67548	913-222-3118	33-15-16W 26-15-19W 26-15-19W	URBAN ZIMMERMAN BIEKER
ELLSWORTH				
ELLSWORTH CO. ROAD DEPT.	ELLSWORTH, KANSAS 67439	913-472-4003	SE SW 30-14-10W NE 30-14-10W W SW 22-15-09W SE NW 10-15-09W NE 35-15-10W SW 18-15-08W NW 22-15-08W SW SW 35-15-08W SE SW 23-16-07W NW SW 36-16-06W SW 27-15-08W SW 23-15-09W NE NW 03-14-10W	MCEVOY BORRELL ROOT BURMEISTER URBANER CROY HOMOLKA HOFFMAN PEPIATT BUFFINGTON THIELEN DALECHEK PEJSHA
WHITE CONSTRUCTION CO.	KANOPOLIS, KANSAS 67454	913-634-5350	SW 36-15-08W NW 03-16-07W NW 19-15-08W 25-15-08W	HOFFMAN BATES GRUBB WHITE
FINNEY				
ALSOR + SCNS SAND CO.	1107 GILLESPIE GARDEN CITY, KANSAS 67846	316-276-3130	NE 19-26-32W	CITY OF GARDEN CITY
P-K SAND CO.	BOX 582 GARDEN CITY, KANSAS 67846	316-276-8020	SW 25-32-24W	MORRIS
SMITH SAND CO., INC.	BOX 391, 1206 E. FULTON GARDEN CITY, KANSAS 67846	316-276-3771	NW 17-24-33W	
FORD				
DAVIS + SCNS SAND SALES	RT. 1 DODGE CITY, KANSAS 67801	316-227-6301	SW 31-26-25W	BAILEY

COMPANY -----	ADDRESS -----	TELEPHONE -----	LOCATION -----	LEASE -----
DODGE CITY SAND CO.	500 E. CHERRY DODGE CITY, KANSAS 67801	316-227-6091	36-26-25W	
FORD CO. ROAD DEPT.	DODGE CITY, KANSAS 67801	316-225-4861	NW 12-27-24W S NW 01-27-21W	FORD CO. MOLLITOR
GEARY -----				
MORE SAND CO., INC.	RT. 3 JUNCTION CITY, KANSAS 66441	913-238-6922	NW 35-11-05E	MORE
GOVE -----				
ROD BENTLEY SAND + GRAVEL	SHIELDS, KANSAS 67874	316-397-5669	SW 24-15-28W	BENTLEY
GOVE CO. RCAD DEPT.	GOVE, KANSAS 67736	913-938-2871	VARIOUS	VARIOUS
DALE ROBERTS	PARK, KANSAS 67751	913-754-3519	E 25-13-28W	ROBERTS
GRAHAM -----				
STATE HIGHWAY COMMISSION DIVISION 3 MATLS. ENG.	309 S. SECOND NORTON, KANSAS 67654	913-927-2178	NE 08-08-22W SE 07-08-22W	STUCHLIK DAVIS
GRAY -----				
GRAY CO. RCAD DEPT.	CIMARRON, KANSAS 67835	316-855-3815	35-25-29W	
GREELEY -----				
GREELEY CO. ROAD DEPT.	TRIBUNE, KANSAS 67869	316-376-4253	VARIOUS	VARIOUS
HAMILTON -----				
HAMILTON CO. ROAD DEPT.	SYRACUSE, KANSAS 67878	316-384-5135	VARIOUS	VARIOUS

COMPANY	ADDRESS	TELEPHONE	LOCATION	LEASE
HARPER				
HARPER CO. ROAD DEPT.	COURTHOUSE ANTHONY, KANSAS 67003	316-842-5240	02-34-06W 23-34-05W 05-31-09W 09-32-08W 33-33-07W 34-33-07W 09-31-07W 36-31-06W 28-32-09W	WELSH MAYO JACOBS HOYT MONTAGUE CLARK BARBER WINTERS JOHNSON
HARVEY				
BRYANT SAND + GRAVEL CO.	RT. 1 BOX 218 BURRTON, KANSAS 67020	316-463-5621	NE 06-24-03W	
BRYANT SAND + GRAVEL CO.	RT 2 BOX 218 BURRTON, KANSAS 67020	316-463-2711	27-23-03W	
SAN ORE CONSTRUCTION CO., INC.	BOX 417 MCPHERSON, KANSAS 67460	316-241-2240	N 27-23-03W	BRYANT
HASKELL				
HASKELL CO. ROAD DEPT.	SUBLETTE, KANSAS 67877	316-375-2234	20-30-34W	BRYANT
STEVENS CO. ROAD DEPT.	BOX 1167 HUGOTON, KANSAS 67951	316-544-4782	29-30-34W	BRYANT
HODGEMAN				
HODGEMAN CO. ROAD DEPT.	JETMORE, KANSAS 67854	316-357-4355	VARIOUS	VARIOUS
JEWELL				
JEWELL CO. ROAD DEPT.	MANKATO, KANSAS 66956	913-378-3431	10-01-06W	HEITMAN
JOHNSON				
BUILDERS SAND CO.	78TH + HOLLIDAY DRIVE KANSAS CITY, KANSAS 66106	913-375-1414	05-12-24E	THEDEN

COMPANY	ADDRESS	TELEPHONE	LOCATION	LEASE
HOLLIDAY SAND + GRAVEL CO.	6811 W. 63RD OVERLAND PARK, KANSAS 66202	913-236-5920		
	BONNER SPRINGS, KANSAS 66012	913-422-3095	32-11-23E	SCHYT
KEARNY				
KEARNY CO. ROAD DEPT.	BOX 346 LAKIN, KANSAS 67860	316-355-6571	10-25-36W 11-25-36W 24-25-35W	PUCKETT BEYMER TACKETT
POPEJOY CONSTRUCTION CO., INC.	BOX 385 ULYSSES, KANSAS 67880	316-356-2404	SW 03-25-36W 09-25-36W	BEYMER BAHNIGGE
KINGMAN				
KINGMAN CO. ROAD DEPT.	KINGMAN, KANSAS 67068	316-532-3771	03-28-08W 02-28-06W 28-28-10W 14-30-08W 17-27-10W	MCKENNA OSNER STERNEKER BROWN VOSS
RAY WELLS SAND + GRAVEL	RT. 1 KINGMAN, KANSAS 67068	316-532-2088	NE 01-28-08W SW 01-28-08W	COLEMAN WELLS
KIOWA				
KIOWA CO. ROAD DEPT.	GREENSBURG, KANSAS 67054	316-723-2531	03-29-17W 02-29-16W	HULME STARKEY
SEACAT SAND + EXCAVATION	409 W. LINCOLN GREENSBURG, KANSAS 67054	316-723-2396 316-723-2995	SW 03-29-17W	SEACAT
LANE				
LANE CO. ROAD DEPT.	DIGHTON, KANSAS 67839	316-397-2401	NW 15-20-30W	HOLLINGSWORTH
LEAVENWORTH				
MISSOURI VALLEY SAND, INC.	BOX 89 LEAVENWORTH, KANSAS 66048	913-682-3621	NE 01-09-22E	MISSOURI RIVER

COMPANY	ADDRESS	TELEPHONE	LOCATION	LEASE
LINCOLN				
LINCOLN CO. ROAD DEPT.	LINCOLN, KANSAS 67455	913-524-4443	28-13-10W 30-12-09W 17-12-09W 19-10-09W 26-10-09W 03-10-08W 12-10-08W 25-10-07W 29-10-06W 34-12-07W 29-12-06W 08-13-07W 33-12-06W 29-10-06W 36-10-06W 20-10-07W 26-10-07W 28-10-07W 25-10-08W 25-10-08W 20-12-08W 03-10-09W 01-11-06W 06-11-06W 27-11-08W 06-11-09W 14-11-09W 05-12-06W 08-12-09W 29-12-06W 04-12-07W 23-12-07W 26-12-07W 26-12-07W 29-12-08W 04-12-09W 18-12-09W 35-12-09W 07-12-10W 28-12-10W 33-12-10W 32-12-06W 05-13-07W 14-13-09W 34-13-10W	PEJSHA BUZICK O. NELSON OETTING JENSEN HEALY C. JONES M. JONES HARTZELL RITTMANN GARRISON MOLTING HOEH MYERS KELLY MCCLURE BROS. GOOD MARSHALL TROMBLE WIEBKE LUCK ESTATE NITSCH GRIMES KOWALKE BRUCE OETTING H. NELSON SCHMIDT REES MORRICAL LEMONS WALTERS BOLTE GOURLEY MEILI BLOCK BECKER + NELSON LIEPITZ MEITLER HLAD E. HYNES THAEMERT NEEL L. VONFANGE F. WACKER SOUKUP
WHITE CONSTRUCTION CO.	KANOPOLIS, KANSAS 67454	913-634-5350	W 26-12-07W	BOLTE

COMPANY	ADDRESS	TELEPHONE	LOCATION	LEASE
LOGAN				
LOGAN CO. ROAD DEPT.	RUSSELL SPRINGS, KANSAS 67755	913-846-2266	22-13-35W	
STHERT SAND CO., INC.	BOX 10 NESS CITY, KANSAS 67560	913-798-2224	SW 12-13-34W	LUTHER
STATE HIGHWAY COMMISSION DIVISION 3 MATLS. ENG.	309 S. SECOND NORTON, KANSAS 67654	913-927-2178	SE 35-14-32W SW 04-15-32W 18-12-36W	CRISTY EST. DEARDEN KELLEY
LYON				
LYON MATERIALS, INC.	302 PEYTON, BOX 425 EMPORIA, KANSAS 66801	316-342-2047	NE 21-19-11E	JONES
LYONS MATERIAL INC.	648 OAK STREET EMPORIA, KANSAS 66801	316-342-7233	E 06-20-13E W 06-20-13E	MCKINNEY HOLFORTY
MCPHERSON				
MCPHERSON CO. ROAD DEPT.	MCPHERSON, KANSAS 67460	316-241-0466	16-18-04W 16-18-04W	AELMORE LARSON
SAN ORF CONSTRUCTION CO., INC.	BOX 417 MCPHERSON, KANSAS 67460	316-241-2240	NE 34-19-03W	WEST ESTATE
MARSHALL				
BLUE RIVER SAND + GRAVEL CO.	BOX 38 BLUE RAPIDS, KANSAS 66411	913-226-8881	SW 19-04-07E SE 27-04-07E	STRYKER SMITH
HEINZELMAN CONSTRUCTION CO.	506 S. 10TH MARYSVILLE, KANSAS 66508 RT. 1	913-562-3577 913-226-7374	18-04-07E	RUSSELL HAMILTON
MARSHALL CO. HIGHWAY DEPT.	MARYSVILLE, KANSAS 66508	913-443-4941	29-01-06E	KRUSE
MEADE				
MEADE CO. ROAD DEPT.	MEADE, KANSAS 67864	316-873-2481	20-33-28W	BORCHER

COMPANY	ADDRESS	TELEPHONE	LOCATION	LEASE
MITCHELL				
HAIGH SAND + GRAVEL	BELUIT, KANSAS 67420	913-738-2367	NW 10-07-07W	HAIGH
MORTON				
MORTON CO. ROAD DEPT.		316-592-2166		
NEMAHA			S 21-33-41W	
CHARLES REISE CONTRACTOR	614 S. 6TH STREET SENECA, KANSAS 66538	913-336-2819	NE 32-01-13E	PERKINS
ROTTINGHAUS ROCK + GRAVEL CO.	BAILEYVILLE, KANSAS 66404	913-336-2056	NW 16-01-11E SE 28-04-14E	OTDOLE
NEOSHO				
HY-GRADE CONSTRUCTION + MATERIALS, INC.	ST. PAUL, KANSAS 66771	316-449-2575	SE 15-29-20E	HY-GRADE
NESS				
NESS CO. ROAD DEPT.	NESS CITY, KANSAS 67560	913-798-3350	31-17-23W 32-16-22W 01-16-25W 35-20-23W 02-16-24W 23-20-26W 30-17-23W	HORCHEM MUSSSELMAN CLYNE FRUSHER HARRIS GOODMAN PIEFER
SAN ORE CONSTRUCTION CO., INC.	BOX 417 MCPHERSON, KANSAS 67460	316-241-2240	S 01-16-21W	SARVIS
SIEBERT SAND CO., INC.	BOX 10 NESS CITY, KANSAS 67560	913-798-2224	SW 29-17-23W	LYNCH
NORTON				
STATE HIGHWAY COMMISSION DIVISION 3 MAT'L.S. ENG.	309 S. SECOND NORTON, KANSAS 67654	913-927-2178		
			SE 19-05-25W SW 09-05-23W	LINDEN CLYDESDALE

COMPANY	ADDRESS	TELEPHONE	LOCATION	LEASE
OSBORNE				
OSBORNE CO. ROAD DEPT.	OSBORNE, KANSAS 67473	913-346-2153	28-07-14W	MCREYNOLDS
STATE HIGHWAY COMMISSION DIVISION 3 MAT'L.S. ENG.	309 S. SECOND NORTON, KANSAS 67654	913-927-2178	SW 14-07-13W SE 19-07-11W	UBELAKER WALL
OTTAWA				
ROBINS SAND + GRAVEL	323 W. 2ND MINNEAPOLIS, KANSAS 67467	913-392-2087	NW 02-11-04W W 20-10-04W NE 34-10-04W 08-09-04W 17-09-04W	WATSON STRATTON BARCUS PAYNE PAYNE
PAWNEE				
BROCE + SMITH, INC.	BOX 9 LARNED, KANSAS 67550	316-285-2189	SE SE 05-22-16W	HAPLS
EAKIN SAND + GRAVEL CO.	BOX 48 LARNED, KANSAS 67550	316-285-3916	SW 05-22-16W NW 08-22-16W	EAKIN
LARNED SAND + GRAVEL	BOX 227 LARNED, KANSAS 67550	316-285-3236	SE 04-22-16W	BUSTER
PAWNEE CO. ROAD DEPT.	LARNED, KANSAS 67550	316-285-3761	03-22-16W	BALDWIN
PHILLIPS				
PHILLIPS CU. ROAD DEPT.	PHILLIPSBURG, KANSAS 67661	913-543-2912	NW 13-05-18W	MCKINLEY
SIEBERT SAND CO., INC.	BOX 10 NESS CITY, KANSAS 67560	913-798-2224	NE 29-04-17W	MCCOMB
STATE HIGHWAY COMMISSION DIVISION 3 MAT'L.S. ENG.	309 S. SECOND NORTON, KANSAS 67654	913-927-2178	NW 23-05-18W NW 34-02-20W NE 26-02-20W	MACDOX NYLAND GREIVING
POTTAWATOMIE				
WAMEGO SAND CO., INC.	BOX 119 WAMEGO, KANSAS 66547	913-456-9888	NW 10-10-10E	

COMPANY	ADDRESS	TELEPHONE	LOCATION	LEASE
PRATT				
PRATT CO. ROAD DEPT.	PRATT, KANSAS 67124	316-672-2441	29-28-11W 10-27-12W SE 15-29-15W 35-27-14W SE 04-28-13W 21-27-12W	ARMISTEAD STUDER HOGARD EUBANK WHITFIELD MAAS
WHITFIELD SAND + CONCRETE, INC.	BOX 66 PRATT, KANSAS 67124	316-672-3181	SE 04-28-13W	BARNES
RAWLINS				
MORTON SAND + GRAVEL	BOX 213 OBERLIN, KANSAS 67749	913-475-3245	W SW 14-02-32W	MARTIN
RAWLINS CO. ROAD DEPT.	ATWOOD, KANSAS 67730	913-626-3726	30-03-32W 25-04-34W 11-02-32W	ANCERSON REEVES KOGI
STATE HIGHWAY COMMISSION DIVISION 3 MAT'L S. ENG.	309 S. SECOND NORTON, KANSAS 67654	913-927-2178	SE 26-02-33W NW 06-03-32W	NIERMEIER MEYER
RENO				
FOUNTAIN SAND + GRAVEL PIT	ARLINGTON, KANSAS 67514	316-538-2393	SE 06-25-07W	FOUNTAIN
GRAVEL PRODUCTS, INC.	NICKERSON, KANSAS 67561	316-422-3249	SW 15-22-07W	PAULSON
HAVEN SAND CO.	HAVEN, KANSAS 67543	316-465-7738	NE 20-24-04W	MOUNT
HOSKINSON SAND + GRAVEL CO.	RT. 1 HUTCHINSON, KANSAS 67501	316-662-7783	SE 08-23-06W	HOSKINSON
MT. HOPE SAND CO.	RT. 1, BOX 11 HAVEN, KANSAS 67543	316-465-3447	4+D4 36-24-04W	
J.H. SHEARS, SONS, INC.	819 W. 1ST STREET HUTCHINSON, KANSAS 67501	316-662-3307	SE 14-23-05W	SHEARS
J.E. STEELE SAND	1400 N. HALSTEAD HUTCHINSON, KANSAS 67501	316-662-5741	S NW 09-23-05W	STEELE

COMPANY	ADDRESS	TELEPHONE	LOCATION	LEASE
REPUBLIC				
JOHN H. ALSOP SAND CO.	11TH + W ST. BOX 345 BELLEVILLE, KANSAS 66935	913-527-2248	SE 07-03-04E NW 20-03-04E	RUNFT RUNFT
RICE				
ARENSMAN SAND + GRAVEL CO.	CHASE KANSAS 67524 RAYMOND KANSAS 67573	316-938-2532 316-534-2822	NE 29-20-10W	HAGEN
ROCK HILL STONE + GRAVEL CO. INC.	STERLING, KANSAS 67579	316-278-3514	NE 27-21-08W	ROCK HILL
TOBIAS + BIRCHENROUGH, INC.	BOX 470 LYONS, KANSAS 67554	316-257-2161	NE 16-20-08W N NE 21-29-08	TOBIAS
RILEY				
KERSHAW RED-MIX CONCRETE + SAND CO., INC.	BOX 668 MANHATTAN, KANSAS 66502	913-776-8811	S 05-10-08E SE 30-10-08E	
ROOKS				
HOWARD COVERT	ALTON, KANSAS 67623	- -	NW 22-07-17W	RIFFE
STATE HIGHWAY COMMISSION DIVISION 3 MATLS. ENG.	309 S. SECOND NORTON, KANSAS 67654	913-927-2178 - -	NW 08-11-17W NW 22-07-17W	CARMICHAEL MCCONNELL
RUSH				
RUSH CO. ROAD DEPT.	LA CROSSE, KANSAS 67548	913-222-3118	36-19-19W 20-19-20W	ANSCHUTZ SCHLEGEL
RUSSELL				
RUSSELL CO. ROAD DEPT.	BOX 415 RUSSELL, KANSAS 67560	913-483-4032	12-15-15W 21-11-14W 05-12-15W 26-12-13W 01-15-15W 29-14-12W 30-14-11W 02-13-14W 08-15-15W 35-14-14W	BENDER BUNKER BRUMITT K.C. CORPS OF ENG. DUMLER EHRLEICH HERBER MAJOR TRUAN DUMLER

COMPANY	ADDRESS	TELEPHONE	LOCATION	LEASE
STATE HIGHWAY COMMISSION DIVISION 3 MAT'L S. ENG.	309 S. SECOND NORTON, KANSAS 67654	913-927-2178	NW 02-13-14W 03-15-14W	OLIVER BECKER
SALINE				
SALINA SAND CO., INC.	MENTOR, KANSAS 67465	913-823-2932	SE 07-15-02W NW 19-16-02W	JENNEY MORSE
SAN ORE CONSTRUCTION CO., INC.	BOX 417 MCPHERSON, KANSAS 67460	316-241-2240	S 26-13-03W	CRAWFORD
SCOTT				
SCOTT CO. ROAD DEPT.	SCOTT CITY, KANSAS 67871	316-872-2202	VARIOUS	VARIOUS
SEDGWICK				
ASSOCIATED MATERIAL SUPPLY CO., INC.	6015 N. BROADWAY BOX 4064 N. WICHITA STA. 67204 4405 W. 52RD WICHITA, KANSAS 67204	316-744-0433 316-722-0281	N N 23-26-01W	CLARK
BENTLEY SAND CO.	BENTLEY KANSAS 67016	316-432-5235	NW 13-25-02W NE 17-25-01W	WOLFE VOGT
BIG THREE SAND + GRAVEL CO.	6000 W. 21ST STREET WICHITA, KANSAS 67212	316-943-6361	SE 03-27-01W	RITCHIE CONSTRUCTION
DOLESE BROTHERS CO.	BOX 1841 WICHITA, KANSAS 67212	316-262-1428	NW 07-27-01E	
GLOBE CONSTRUCTION CO. INC.	1041 N. WATER WICHITA, KANSAS 67203	316-265-2623	SE 02-27-01W	STEWART
WALT KEELER CO., INC.	826 E. LINCOLN WICHITA, KANSAS 67211	316-265-1601	SW 02-28-01W	
MILES SAND, INC.	4857 N. MERIDAN WICHITA, KANSAS 67204	316-838-3362	25-26-01W	
DAIVILLE SAND + GRAVEL	4100 W. 31ST SOUTH WICHITA, KANSAS 67217	316-942-3871	NE 11-28-01W	LEENDERSTE
PAVING CONTRACTORS, INC.	6405 E. KELLOGG WICHITA, KANSAS 67207 8700 S. HYDRAULIC WICHITA, KANSAS 67207	316-684-6161 316-788-0412	NW 15-29-01E	COSTIN

COMPANY -----	ADDRESS -----	TELEPHONE -----	LOCATION -----	LEASE -----
SEDGWICK SAND CO.	SEDGWICK, KANSAS 67135	316-766-0456	10-26-01W	NICHOLSON
SUPERIOR SAND CO., INC.	6500 W. 21ST MICHITA, KANSAS 67212	316-722-0592	NW 03-27-01W	SUPERIOR SAND CO.
TRI COMPANY CONSTRUCTION, INC.	6700 S. HYDRAULIC MICHITA, KANSAS 67233	316-524-8631	NW 34-28-01E	RLCOO
VIC, S SAND + GRAVEL CO.	6600 W. 21ST MICHITA, KANSAS 67212	316-943-4372	NW 01-27-01W	
WICHITA BIG RIVER SAND CO.	990 N. WESTLINK MICHITA, KANSAS 67212 4100 S. SENECA MICHITA, KANSAS 67212	316-524-0691	18-28-01E	CAVIS CORP.
SEWARD -----				
J + R SAND CO., INC.	1141 S. PERSHING LIBERAL, KANSAS 67901	316-624-5287	28, 33 34-32-33W	LEWERT
SEWARD CO. ROAD DEPT.	LIBERAL, KANSAS 67901	316-624-3401	02-33-33W 01-35-31W	
SHAWNEE -----				
CONSUMERS SAND CO., INC.	924 W. RAILROAD STREET TOPEKA, KANSAS 66608	913-232-5117	SW 23-11-16E	NEWMAN
CONSUMERS SAND CO., INC.	4120 NE BELMONT STREET TOPEKA, KANSAS 66616	913-232-1414	KAW HALF-BREED RESERVE	K.S. RIVER
KANSAS SAND + CONCRETE, INC.	531 N. TYLER TOPEKA, KANSAS 66608	913-235-6284	K.S. RIVER	N. TOPEKA DRAIN. BRD
RIVER SAND CO., INC.	BOX 4044, 3220 WATER TOPEKA, KANSAS 66604	913-233-3877	N 26-11-15E	KAW RIVER
TOPEKA SAND CO.	RT. 4 TOPEKA, KANSAS 66603	913-233-9849	SE 23-11-16E	
VICTORY SAND + CONCRETE, INC.	BOX 281 TOPEKA, KANSAS 66601	913-233-3285	NW 25-11-15E	KANSAS RIVER
SHERIDAN -----				
QUINTER RED-MIX CO.	QUINTER, KANSAS 67752	913-754-3361	SE 27-10-28W	MILLER
SAN CRE CONSTRUCTION CO., INC.	BOX 417 MC PHERSON, KANSAS 67460	316-241-2240	NE 34-10-28W NW 28-10-30W	HOWKA BAALMAN

COMPANY -----	ADDRESS -----	TELEPHONE -----	LOCATION -----	LEASE -----
SHERIDAN CO. ROAD DEPT.	HOXIE, KANSAS 67740	913-675-3621	07-09-27W 12-06-30W 20-07-26W 30-10-30W 15-06-27W 23-10-26W	DCHS ZOCROW CURRIER ROBERTS WAGONER MCWILLIAM
STATE HIGHWAY COMMISSION DIVISION 3 MATLS. ENG.	309 S. SECOND NORTON, KANSAS 67654	913-927-2178 -- --	N 33-10-28W 09-09-28W SE 08-06-29W	KAISER BILLINGER RICHTER
SHERMAN -----				
GOODLAND RED-E-MIX	GOODLAND, KANSAS 67735	913-899-7232	NW 29-08-40W	ELLIOTT
WALT RHDADS SAND + GRAVEL CO.	615 W. 10TH GOODLAND, KANSAS 66735	913-899-3425	S 15-10-41W NE 11-07-39W NW 16-08-41W SW 22-06-41W	ROCKWELL = 1 YARGER = 2 ERRINGTON = 3 ENFIELD = 4
SHERMAN CO. ROAD DEPT.	GOODLAND, KANSAS 67735	913-899-5253	VARIOUS	VARIOUS
SIEBERT SAND CO., INC.	BOX 10 NESS CITY, KANSAS 67560	913-798-2224	NW 18-08-41W	ERRINGTON
STATE HIGHWAY COMMISSION DIVISION 3 MATLS. ENG.	309 S. SECOND NORTON, KANSAS 67654	913-927-2178 -- --	NW 17-07-39W NE 35-08-39W SE 13-08-42W	LUKEN DAVIS BRABHAM
SMITH -----				
STATE HIGHWAY COMMISSION DIVISION 3 MATLS. ENG.	309 S. SECOND NORTON, KANSAS 67654	913-927-2178 -- --	SW 04-05-15W NW 05-05-13W	SWEAT JOHNSON
STAFFORD -----				
ALBERT PARTIN SAND + GRAVEL CO	BOX 274 STAFFORD, KANSAS 67578	316-234-5445	SE 04-25-11W	
STAFFORD CO. ROAD DEPT.	BOX 224 ST. JOHN, KANSAS 67576	316-549-3597	06-24-13W	FISHER

COMPANY -----	ADDRESS -----	TELEPHONE -----	LOCATION -----	LEASE -----
STEVENS -----				
STEVENS CO. ROAD DEPT.	BOX 1167 HUGOTON, KANSAS 67951	316-544-4782	29-31-38W	CIMARRON RIV.
SUMNER -----				
MULVANE SAND CO., INC.	6015 N BRADWAY BOX 4064 MICHITA, KANSAS 67208 MULVANE, KANSAS 67110	316-744-0433 316-777-1421	31-29-02W	BUTTS
SUMNER CO. ROAD DEPT.	WELLINGTON, KANSAS 67152	316-326-2791	36-32-02E	DONLEY
THOMAS -----				
STIEBERT SAND CO., INC.	BOX 10 NESS CITY, KANSAS 67560	913-798-2224	N 32-10-31W NE 31-10-32W NE 27-09-34W	MILLER STIEBERT THEIMIOR
STATE HIGHWAY COMMISSION DIVISION 3 MAT'L.S. ENG.	309 S. SECOND NORTON, KANSAS 67654	913-927-2178	- - 34-10-32W E SW 20-06-32W E 19-07-34W NE 32-06-33W SW 17-07-32W	FULTON BARNETT GROVER SHULL SEARS
THOMAS CO. ROAD DEPT.	COLBY, KANSAS 67701	913-462-2122	24-09-34W	WIELAND
TREGO -----				
STIEBERT SAND CO., INC.	BOX 10 NESS CITY, KANSAS 67560	913-798-2224	NW 33-14-23W	WILES
STANTON SAND + GRAVEL	RANSOM, KANSAS 67572	913-731-2475	25-14-24W	FARM
STATE HIGHWAY COMMISSION DIVISION 3 MAT'L.S. ENG.	309 S. SECOND NORTON, KANSAS 67654	913-927-2178	- - SE 34-13-22W NE 33-12-23W NE 05-15-23W	CARLSON TINKLER HILLE
TREGO CO. ROAD DEPT.	WAKENNEY, KANSAS 67672	913-743-6441	VARIOUS	VARIOUS
WAKEFNEY REDT-MIX, INC.	BOX 835 WAKEFNEY, KANSAS 67672	913-743-2810	SE 33-12-23W	TINKLER

COMPANY	ADDRESS	TELEPHONE	LOCATION	LEASE
WABAUNSEE				
WABAUNSEE CO. ROAD DEPT.	ALMA, KANSAS 66401	913-765-3712	VARICUS	VARIOUS
WALLACE				
SIEBERT SAND CO., INC.	BOX 10 NESS CITY, KANSAS 67560	913-798-2224	SW 11-13-40W	POTTS
STATE HIGHWAY COMMISSION DIVISION 3 MAT'L S. ENG.	309 S. SECOND NORTON, KANSAS 67654	913-927-2178	SE 10-13-40W SE 10-13-42W 10-15-40W	LACEY GUNZELMAN HEISE
WASHINGTON				
FINLAYSON GRAVEL + READY-MIX	BARNES, KANSAS 66933	- -	NE 18-03-05E	
MUELLER SAND + GRAVEL CO., INC.	HANDOVER, KANSAS 66945	913-337-2252	SW 05-02-05E NE 18-02-05E SE 07-03-05E S 28-01-04E NW 08-02-04E NE 07-02-05E	MUELLER MUELLER MUELLER SPITSNOGLE MUELLER MUELLER
WICHITA				
HOWARD CLEVENGER	LEOTT, KANSAS 67861	316-375-2575	SE 32-18-37W	
WICHITA CO. ROAD DEPT.	LEOTT, KANSAS 67861	913-375-2814	E 08-19-36W	WILLIS
WYANDCTTE				
AMERICAN SAND + MATERIAL CO. INC.	4600 SPEAKER ROAD KANSAS CITY, KANSAS 66106	913-342-4208	18-11-25E	KANSAS RIVER
BUILDERS SAND CO.	78TH + HOLLIDAY DRIVE KANSAS CITY, KANSAS 66106	913-375-1414	SW 32-11-24E	GARRETT
HOLLIDAY SAND + GRAVEL CO.	6811 W. 63RD OVERLAND PARK, KANSAS 66202	913-236-5920		
	EDWARDSVILLE, KANSAS 66022	913-422-3080	27-11-23E	H.S.G.

COMPANY -----	ADDRESS -----	TELEPHONE -----	LOCATION -----	LEASE -----
HOLLIDAY SAND + GRAVEL CO.	6811 W. 63RD OVERLAND PARK, KANSAS 66202	913-236-5920		
	MUNCIE, KANSAS 66057	913-299-2263	29-11-24E	H.S.G.
PECK-WCOLE SAND AND MATERIAL CO.	7301 KAW DRIVE KANSAS CITY, KANSAS 66111	913-299-3342	SE 21-11-24E SW 31-11-24E	
STEWART SAND + MATERIAL CO.	4049 PENNSYLVANIA KANSAS CITY, MO. 64111	816-753-3920		
	MORRIS KANSAS	913-375-1377	SE 29-11-24E	MORRIS PLANT
STEWART SAND + MATERIAL CO.	4049 PENNSYLVANIA KANSAS CITY, MO. 64111	816-753-3920		
	TURNER KANSAS 66087	913-287-7059	SS 23-11-24E	MEAGER
STEWART SAND + MATERIAL CO.	4049 PENNSYLVANIA KANSAS CITY, MO. 64111	816-753-3920		
	MUNCIE KANSAS 66057	913-287-8212	SW 12-11-24E	
SUPERIOR SAND + GRAVEL CO.,*	BOX 11145 KANSAS CITY, KANSAS 66111 88TH + WOODLAND KANSAS CITY, KANSAS 66111	913-289-6525 913-441-2800		
			31-11-24E	

CRUSHED ROCK PRODUCERS...LISTED BY COUNTY ALPHABETICALLY. (M) = UNDERGROUND MINE

COMPANY	ADDRESS	TELEPHONE	LOCATION	LEASE
ALLEN				
NELSON QUARRIES	LA HARPE, KANSAS 66751	- -	SW 20-23-19E 20-23-19E	STRICKLER
ANDERSON				
HUNT ROCK CO.	RT. 3 GARNETT, KANSAS 66032	913-448-5962	12-20-18E 31-21-21E	BRUMMEL LOUK
KILLEUGH-CLARK, INC.	BOX 623 OTTAWA, KANSAS 66067	913-242-4535	SE 32-21-19E NW 01-23-19E	STARR PENLAND
MCADAW LIMESTONE PRODUCTS, INC.	RT. 1 GARNETT, KANSAS 66032	913-448-3179	ESMNE 01-20-19E	HEMUS
ATCHISON				
MARTIN-MARIETTA CORP CONCRETE MATERIALS DIVISION	1305 W. 42ND TOPEKA, KANSAS 66609	913-266-5556	NW 08-05-17E	HORTON QY.
SERVAES BROTHERS QUARRY	ATCHISON, KANSAS 66002	913-367-0705	32-06-21E	(M) SERVAES
BOURBON				
CULLER LIMESTONE CO., INC.	20TH + SIDNEY FORT SCOTT, KANSAS 66701	316-223-4250	NW 02-25-26E SE 17-24-23E SE 09-26-22E SE 08-26-22E E 26-23-24E	JOHNSON HOWELSDORF DRAKE DRAKE DOTSON
BUTLER				
GEORGE W. MYERS INC.	BOX 289 FL DORADO, KANSAS 67042	316-321-4040	NW 08-27-04E	LEFEVER
CHASE				
HALLETT CONSTRUCTION CO.	BOX 296 MARION, KANSAS 66861	316-382-3330	SW 26-20-07E	MOTT

COMPANY	ADDRESS	TELEPHONE	LOCATION	LEASE
CHAUTAUQUA				
SEDAN LIMESTONE CO., INC.	SEDAN, KANSAS 67361	316-725-3404	33-33-11E	SMYLYE
CHEROKEE				
EAGLE-PICHER INDUSTRIES, INC.	BOX 910 MIAMI, OKLAHOMA 74354	918-673-1740	10-35-24E	
EAGLE-PICHER INDUSTRIES, INC. CHEMICALS + METALS DIV.	BOX 910 MIAMI, OKLAHOMA 74354	918-673-1740		
MIDWEST MINERALS, INC.	BOX 7 GIRARD, KANSAS 66743	316-724-8283	NE 13-32-22E S 21-31-23E	SHERMAN CITY QY. CHEROKEE QY.
SOUTHWEST ROCK + CHAT CO., INC.	703 W. 12 ST., BOX 30 BAXTER SPRINGS, KANSAS 66713	316-856-2192	SE 02-35-23E	EARLY BIRD MINE
CLAY				
ANDERSUN-OSANDALE CO.	BOX 425 HERINGTON, KANSAS 67449	913-258-3415	SW 24-09-03E	FORSYTH
BAYER CONSTRUCTION CO., INC.	BOX 889, 509 YUMA MANHATTAN, KANSAS 66502	913-776-8839	NW 04-09-04E	MARTIN
CLOUD				
HOPPER BROTHERS QUARRIES	PAWNEE CITY, NEB. 68420	402-852-2031		
COWLEY				
DANIELS STONE CO.	R.F.D. 3 WINFIELD, KANSAS 67156	316-221-9060	33-32-04E	DANIELS
CRAWFORD				
MIDWEST MINERALS, INC.	BOX 7 GIRARD, KANSAS 66743	316-724-8283	NW 24-28-24E SW 31-28-24E SE 12-30-23E	ENGLEVALE QY. FARLINGTON QY. GIRARD QY.

COMPANY -----	ADDRESS -----	TELEPHONE -----	LOCATION -----	LEASE -----
DICKINSON				
ANDERSON-OXANDALE CO.	BOX 425 HERINGTON, KANSAS 67449	913-258-3415	E 02-16-04E	JONES
HALLETT CONSTRUCTION CO.	BOX 296 MARION, KANSAS 66861	316-382-3330	SE 10-14-04E	RUFNKE
WALKER STONE CO., INC.	BOX 247 CHADMAN, KANSAS 67431	913-922-4711	SW 27-12-04E 28-12-04E	WALKER WALKER
DCNIPHAN				
EVERETT QUARRIES CO., INC.	WATHENA, KANSAS 66090	913-989-4921	20-03-22E	THOMPSON
MARTIN-MARIETTA CORP CONCRETE MATERIALS DIVISION	1305 W. 42ND TOPEKA, KANSAS 66609	913-266-5556	SW SW 10-03-22E SW NE 21-02-20E	LIAPPLE SINKER
SERVAES BROTHERS QUARRY	ATCHISON, KANSAS 66002	913-367-0705	12-04-19E 19-35-20E	BURKE BOOS
WEST LAKE QUARRY + MATERIAL CO	RT. 1, BOX 206 BRIDGETON, MO. 63042	314-739-1122	10-02-20E	SCHNEIDER
DOUGLAS				
KILLCUGH-CLARK, INC.	BOX 623 OTTAWA, KANSAS 66067	913-242-4535	913-242-4535	
MARTIN-MARIETTA CORP CONCRETE MATERIALS DIVISION	1305 W. 42ND TOPEKA, KANSAS 66609	913-266-5556	W NW 20-13-21E	EUCORA QY.
ELK				
MARTIN-MARIETTA CORP CONCRETE MATERIALS DIVISION	1305 W. 42ND TOPEKA, KANSAS 66609	913-266-5556	12-31-10E	MOLINE QY.
SEDAN LIMESTONE CO., INC.	SEDAN, KANSAS 67361	316-725-3404		
ELLIS				
AUBEL ASPHALT, INC.	RT. 1, BOX 151 HAYS, KANSAS 67601	913-625-3105	17-13-18W	CITY OF HAYS

COMPANY	ADDRESS	TELEPHONE	LOCATION	LEASE
ELLIS CO. ROAD DEPT.	HAYS, KANSAS 67601	913-625-7334	- -	
FRANKLIN				
FUGLE QUARRY CO., INC.	18TH + MAIN OTTAWA, KANSAS 66067	913-242-4864	NE 12-17-19E	FUGLE
KILLCUGH-CLARK, INC.	BOX 623 OTTAWA, KANSAS 66067	913-242-4535	NE SW 13-16-19E SE NW 17-16-21E	EDWARDS KILLCUGH
MARTIN-MARIETTA CORP CONCRETE MATERIALS DIVISION	1305 W. 42ND TOPEKA, KANSAS 66609	913-266-5556	W SE 06-17-20E	OTTAWA QY.
GEARY				
GROSSHANS + PETERSEN, INC.	BOX 350 MARYSVILLE, KANSAS 66508	913-562-2301	NE 08-12-06E	PETERSEN EQUIP.
WALKER STONE CO., INC.	BOX 247 CHAPMAN, KANSAS 67431	913-922-4711	SW 02-11-05E NE 04-13-05E NE 36-12-04E SE 36-12-04E SE SW 36-12-04E NW 02-11-05E ALL 32-11-05E S 28-12-04E NW 28-12-04E NE 26-15-02E	HUSTON CASPAR JANICKE SCHULER HASSELLMAN REELER ZUMBRUNN GORMAN DETTRICH GANTENBEIN
GRAHAM				
J.D. SCHWARK QUARRIES OF KANSAS INC.	BOX 147 HILL CITY, KANSAS 67642	913-627-3771	NW 34-07-24W	SMITH
GREENWOOD				
GREENWOOD CO. ROAD DEPT.	EUREKA KANSAS 67045	316-583-6241	21-26-11E NE 31-22-13E 11-28-11E NE 48-27-10E	HUGHES CHRISTY JORDON ANSPAUGH
SEDAN LIMESTONE CO., INC.		316-725-3404		
	SEDAN, KANSAS 67361	- -	NE 10-28-11E SE 34-25-11E N NE 31-22-13E	BLAKE BLAKE CHRISTE

COMPANY -----	ADDRESS -----	TELEPHONE -----	LOCATION -----	LEASE -----
JACKSON -----	ANDERSON-UXANDALE CO. BOX 425 HERINGTON, KANSAS 67449	913-258-3415	N 01-06-12E	PICKETT
JEFFERSON -----	ROY BAKER QUARRY, INC. BOX 100 BALLEY FALLS, KANSAS 66088	913-945-3213	NE 20-08-18E	BAKER
N.R. HAMM QUARRY, INC.	PERRY, KANSAS 66073	913-597-2890	SE 35-11-19E SE 03-11-18E NW 29-11-19E SW 16-11-17E SW 21-09-19E SW 02-11-18E SW 01-09-19E	HECK RICHTER HAMM HAMM MEYER KEID WALLACE
MARTIN-MARIETTA CORP CONCRETE MATERIALS DIVISION	1305 W. 42ND TOPEKA, KANSAS 66609	913-266-5556	NW 11-11-18E	LEECH-BALL
JEWELL -----	JEWELL CO. ROAD DEPT. MANKATO, KANSAS 66956	913-378-3431	VARIOUS	VARIOUS
JOHNSON -----	DEITZ HILL DEVELOPMENT CO. BOX 4 KANSAS CITY, MISSOURI 66141	816-221-1311 913-764-2127	SE 09-14-23E	C-B-H RANCH
HOLLAND QUARRIES, INC.	BOX 5283 LENEXA, KANSAS 66215	913-888-5277	SE 06-13-24E	(M) JOHNSON
RENO CONSTRUCTION CO., INC.	BOX 4278 OVERLAND PARK, KANSAS 66204	913-681-2381	SE 18-14-25E SW 25-12-23E	STANLEY BLESSING
UNION QUARRIES INC.	P.O. BOX 4540 OVERLAND PARK, KANSAS 66204 95TH + 066 ROAD LENEXA, KANSAS 66215	- - 913-888-3838	NW 31-12-24E	(M) VAN LERBERG
LABETTE -----	HARRY KEITH COFFEYVILLE, KANSAS 67337	316-251-9416	SW 35-34-17E	KEITH

COMPANY	ADDRESS	TELEPHONE	LOCATION	LEASE
LABETTE CO. ROAD DEPT.	OSWEGO KANSAS 67356	316-795-4812		
	ALTAMONT, KANSAS 67330	316-784-5449	SE 29-32-19E	DUVALL
MIDWEST MINERALS, INC.	BOX 7 GIRARD, KANSAS 66743	316-724-8283	SE 01-31-20E SW 06-35-21E	PARSONS QY. CHETOPA QY.
O'BRIEN ROCK CO., INC.	BOX 217 ST. PAUL, KANSAS 66771	316-449-2257	NW 06-35-21E	PICKERING
LEAVENWORTH				
N.R. HAWM QUARRY, INC.	PERRY, KANSAS 66073	913-597-2890	SE 02-09-21E SW 23-12-21E	(M) BROMMELL QUINLAN
MARTIN-MARIETTA CORP CONCRETE MATERIALS DIVISION	1305 W. 42ND TOPEKA, KANSAS 66609	913-266-5556	NW 31-09-23E	LANISING QY.
LINCOLN				
QUARTZITE STONE CO., INC.	LINCOLN, KANSAS 67455	913-524-4494	SE 14-12-08W S SW 11-20-08W 07-12-07W SE 23-12-08W MARY ZIER 13-12-08W NE 14-12-08W	LEWICK BRYAN HEIRS WILSON BROTHERS JOHN MULLOY
ROBINS SAND + GRAVEL	323 W. 2ND MINNEAPOLIS, KANSAS 67467	913-390-2087	E SE 08-11-06E W SW 09-11-06E	LANCASTER LANCASTER
LIN				
BATES COUNTY ROCK, INC.	BOX 70 BUTLER, MO. 64730	816-679-4123 913-352-8811	NW 24-21-24E	PLEASANTON QY.
N.R. HAWM QUARRY, INC.	PERRY, KANSAS 66073	913-597-2890	29-19-25E	MORRIS
MARTIN-MARIETTA CORP CONCRETE MATERIALS DIVISION	1305 W. 42ND TOPEKA, KANSAS 66609	913-266-5556	N SW 23-19-21E	RUES
NELSON QUARRIES	LA HARPE, KANSAS 66751	-	17-22-23E SW 28-20-23E NE 20-21-22E	COX
MADE AGRICULTURAL PRODUCTS	BOX 38 LA CYGNE, KANSAS 66040	-	NW 19-22-24E	

COMPANY	ADDRESS	TELEPHONE	LOCATION	LEASE
LYON				
MARTIN-MARIETTA CORP CONCRETE MATERIALS DIVISION	1305 W. 42ND TOPEKA, KANSAS 66609	913-266-5556	12-19-12E	CORYELL
MCPHERSON				
HALLETT CONSTRUCTION CO.	BOX 296 MARION, KANSAS 66861	316-382-3330	SW 11-18-02W	HOLM
MARION				
HALLETT CONSTRUCTION CO.	BOX 296 MARION, KANSAS 66861	316-382-3330	NE 06-21-04E	SCHLEHUBER
WALT KEELER QUARRY	FLORENCE, KANSAS 66851	316-878-4352	SE 06-21-05E	
MARSHALL				
BAYER CONSTRUCTION CO., INC.	BOX 889, 509 YUMA MANHATTAN, KANSAS 66502	913-776-8839	E 17-02-09E NE 06-04-07E SE 10-05-09E	JONES (BEATTIE) HAMMITT LEINWEBER
HOPPER BROTHERS QUARRIES	PAWNEE CITY, NEB. 68420	402-852-2031	NW 06-01-08E	PRIBYL
MIAMI				
L.W. HAYES, INC.	BOX 236 PADLA, KANSAS 66071	913-294-4011	SE 18-17-23E	
KILLCUGH-CLARK, INC.	BOX 623 OTTAWA, KANSAS 66067	913-242-4535	N NW 30-16-24E	CRAWFORD
WADE AGRICULTURAL PRODUCTS	BOX 38 LA CYGNE, KANSAS 66040	-	SW 28-18-25E	
MITCHELL				
ANDERSON-OXANDALE CO.	BOX 425 HERINGTON, KANSAS 67449	913-258-3415	SW 10-07-08W SW 22-06-09W	FORES MEGLIF

COMPANY	ADDRESS	TELEPHONE	LOCATION	LEASE
MONTGOMERY				
MIDWEST MINERALS, INC.	BOX 7 GIRARD, KANSAS 66743	316-724-8283	NW 32-34-17E 29-31-17E S 17-32-14E S 04-33-16E S 06-32-15E S 05-32-15E	COFFEYVILLE QY. CHERRYVALE QY. ELK CITY QY. INDEPENDENCE QY. INDEPENDENCE QY. INDEPENDENCE QY.
NELSON QUARRIES	LA HARPE, KANSAS 66751	- -	NE 10-31-17E 17-32-14E	FOWLER
SCOTT ROCK CO.	NEOSHO, KANSAS 66757	316-325-2298	23-31-15E	DON WOOD
MORRIS				
ANDERSON-OXANDALE CO.	BOX 425 HERINGTON, KANSAS 67449	913-258-3415	SE 17-16-06E	ATKINSON
NEMAHA				
ANDERSON-OXANDALE CO.	BOX 425 HERINGTON, KANSAS 67449	913-258-3415	NW 14-01-14E SE 11-01-14E	BECHTELHEIMER, D. BECHTELHEIMER, H.
MARTIN-MARIETTA CORP CONCRETE MATERIALS DIVISION	1305 W. 42ND TOPEKA, KANSAS 66609	913-266-5556	NE 24-03-14E	BARBER
NEOSHO				
HARRY BYERS & SONS, INC.	500 N. PLUMMER CHANUTE, KANSAS 66731	316-431-0700	NW 19-27-18E	BYERS
NEOSHO CO. ROAD DEPT.	ERIE, KANSAS 66733	316-244-3203	30-28-19E 27-27-20E 33-29-19E 23-27-19E	NEELY REBBINGTUN JONES REINHARDT
O'BRIEN ROCK CO., INC.	BOX 217 ST. PAUL, KANSAS 66771	316-449-2257	E NE 04-29-21E	O'BRIEN
OSAGE				
N.R. HAMM QUARRY, INC.	PERRY, KANSAS 66073	913-597-2890	21-18-14E 16-18-14E 20-18-14E	JONES PETERSON PETERSON

COMPANY -----	ADDRESS -----	TELEPHONE -----	LOCATION -----	LEASE -----
KILLCUGH-CLARK, INC.	BOX 623 OTTAWA, KANSAS 66067	913-242-4535 913-242-4535	NW 04-17-17E	LACEY
MARTIN-MARIETTA CORP CONCRETE MATERIALS DIVISION	1305 W. 42ND TOPEKA, KANSAS 66609	913-266-5556	SW 34-17-16E NW 35-16-15E	MELVERN QY. FARNSWORTH
OTTAWA -----				
ROBINS SAND + GRAVEL	323 W. 2ND MINNEAPOLIS, KANSAS 67467	913-390-2087	SW 15-09-04E	WARNO
POTTAWATOMIE -----				
ANDERSON-OSANDALE CO.	BOX 425 HERINGTON, KANSAS 67449	913-258-3415	SE 34-06-10E	FALK
MARTIN-MARIETTA CORP CONCRETE MATERIALS DIVISION	1305 W. 42ND TOPEKA, KANSAS 66609	913-266-5556	15-10-09E	ST. GEORGE QY.
REPUBLIC -----				
HOPPER BROTHERS QUARRIES	PAWNEE CITY, NEB. 68420	402-852-2031 - -	NE 18-04-05W S SE 34-03-03W	WOODS CHAMBERS
RICE -----				
HALLETT CONSTRUCTION CO.	BOX 296 MARION, KANSAS 66861	316-382-3330	SW 11-20-06W	CONRAD
RILEY -----				
DEPARTMENT OF THE ARMY	FORT RILEY BRANCH JUNCTION CITY, KANSAS 66442	913-239-3728	SE 03-11-06E	CAMPBELL HILL QY.
BAYER CONSTRUCTION CO., INC.	BOX 889, 509 YUMA MANHATTAN, KANSAS 66502	913-776-8839	S 28-10-09E NE 29-10-08E SE NE 06-06-07E NE SE 06-06-07E NW 26-08-06E	MOORE REICHLING SMERCHER SMERCHER WOODWORTH
MARTIN-MARIETTA CORP CONCRETE MATERIALS DIVISION	1305 W. 42ND TOPEKA, KANSAS 66609	913-266-5556	SE 29-10-09E	ZEANDALE QY.

COMPANY	ADDRESS	TELEPHONE	LOCATION	LEASE
SCOTT				
SCOTT CO. ROAD DEPT.	SCOTT CITY, KANSAS 67871	316-872-2202	SE 02-17-33W	PATTON
SHAWNEE				
N.R. HAMM GUARRY, INC.	PERRY, KANSAS 66073	913-597-2890	NE 15-10-15E SW 08-12-17E SW 13-10-15E NE 13-10-13E SE 16-11-17E SW 23-12-13E SE 08-11-15E	HAMM HAMM HAMM HAMM HUMMER HAMILTON COYLE
MARTIN-MARIETTA CORP CONCRETE MATERIALS DIVISION	1305 W. 42ND TOPEKA, KANSAS 66609	913-266-5556	18-12-17E 14-10-15E SE SE 20-13-16E	E. TOPEKA QY. N. TOPEKA QY. MCQUEEN
WABAUNSEE				
MARTIN-MARIETTA CORP CONCRETE MATERIALS DIVISION	1305 W. 42ND TOPEKA, KANSAS 66609	913-266-5556	NW 30-12-12E	SCHAEFFER
WASHINGTON				
ANDERSON-CRANDALE CO.	BOX 425 HERINGTON, KANSAS 67449	913-258-3415	NE 08-02-04E	KOEHLER
HOPPER BROTHERS QUARRIES	PAWNEE CITY, NEB. 68420	402-852-2031	SE 28-02-05E SE 02-03-01E	NIEMEIER CHAMBERS
WILSON				
BENEDICT ROCK + LIME CO.	BENEDICT, KANSAS 66714	316-698-2102	NE SE 02-28-15E	BENEDICT R + L
MIDWEST MINERALS, INC.	BOX 7 GIRARD, KANSAS 66743	316-724-8283	S 18-30-16E S 18-29-16E S 26-29-14E	NEODESHA QY. ALTOONA QY. FREDONIA QY.
WOODSON				
NELSON QUARRIES	LA HARPE, KANSAS 66751	- -	SE 05-25-17E	HEFFEREN

COMPANY	ADDRESS	TELEPHONE	LOCATION	LEASE
SEDAN LIMESTONE CO., INC.	SEDAN, KANSAS 67361	316-725-3404	SE 25-25-13E	PASKE
WYANDOTTE		-		
THOMPSON-STRAUSS QUARRIES	7000 HOLLIDAY DRIVE KANSAS CITY, KANSAS 66106	913-375-1016	SW 23-11-24E	(M) INLAND UNDERGROUND
J.A. TOBIN CONSTRUCTION CO.	BOX 3270	913-342-6770	07-11-25E	(M) TOBIN CONST. CO.

COMMODITY	1971 ESTIMATED VALUES \$1000	1971 PERCENT OF TOTAL VALUE	1971 PERCENT LOSS OR GAIN FROM 1970
Crude Oil	\$276,433	44.3	- 1.2
Natural Gas	120,751	19.3	+ 2.1
Natural Gas Liquids	71,564	11.5	+ 25.2
Helium	42,536	6.8	- 4.1
Cement	32,550	5.2	+ 11.4
Stone	21,826	3.5	- 2.6
Salt	19,050	3.1	+ 4.4
Sand and Gravel	11,550	1.9	- 6.5
Miscellaneous Minerals (Combined)	10,842	1.7	+ 2.5
Clay and Shale	10,711	1.7	- 0.7
Coal	6,447	1.0	- 28.9
TOTAL	\$624,260	100.0	+ 2.0
1970	\$612,227		Percent Increase over 1970 production

