

Lime

By Avery H. Reed ¹

Lime output in 1972 increased 4%, to 20.3 million tons, and set a new annual record. Total value was a record \$341.1 million, 10% above 1971.

Santa Rita Mining Co. started up its new plant near Tucson, Ariz. The plant was established to service southern Arizona's copper industry with lime and fluxing stone. The kiln is an 11- by 275-ft rotary which had previously been used at a cement plant. Capacity is 16 tons per hour.

Inland Steel Co. announced plans to construct a 1,200-ton-per-day lime plant at

Indiana Harbor, Ind. The plant is to be a Kennedy Van Saun Corp. project to serve the company's new basic oxygen furnace (BOF) steel mill at Indiana Harbor.

Paul Lime Plant, Inc. installed a new 10- by 300-ft rotary kiln at its plant near Douglas, Ariz. to supply lime to copper companies.

At Woodville, Ohio, Woodville Lime & Chemical Co. reopened its plant, which had been shut down for 10 years. A new

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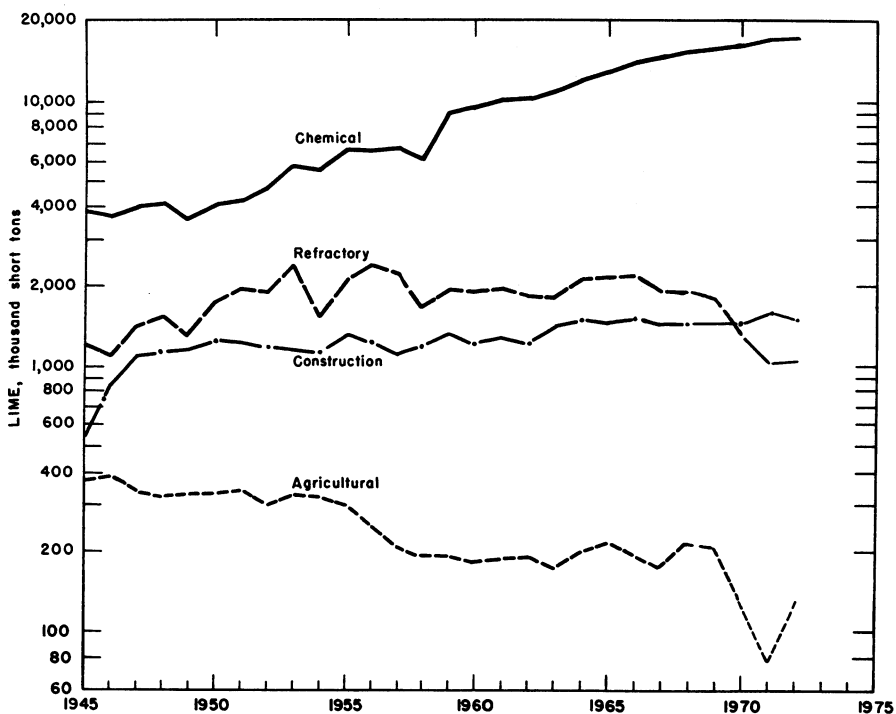


Figure 1.—Trends in major uses of lime.

Table 1.—Salient lime statistics in the United States ¹
(Thousand short tons and thousand dollars)

	1968	1969	1970	1971	1972
Number of plants.....	206	201	194	187	185
Sold or used by producers:					
Quicklime.....	14,440	15,479	15,248	15,138	16,611
Hydrated lime.....	2,364	2,364	3,126	3,446	2,604
Dead-burned dolomite.....	1,833	1,866	1,373	1,007	1,075
Total.....	18,637	20,209	19,747	19,591	20,290
Value ²	249,639	280,736	286,155	308,100	339,304
Average value per ton.....	13.39	13.89	14.49	15.73	16.72
Lime sold.....	12,054	13,113	12,718	12,337	13,353
Lime used.....	6,583	7,096	7,029	7,254	6,937
Exports ³	69	51	54	66	38
Imports for consumption ³	73	184	202	242	248

¹ Excludes regenerated lime. Excludes Puerto Rico.

² Selling value, f.o.b. plant, excluding cost of containers.

³ Bureau of the Census.

10- by 265-ft kiln was installed. Capacity is 330 tons per day.

Pfizer, Inc. added a seventh kiln at their

Gibsonburg, Ohio, plant. Capacity of the new kiln is 130,000 tons per year.

DOMESTIC PRODUCTION

Lime producers sold or used 20.3 million tons, compared with 19.6 million tons in 1971. Sales of lime increased 8%, to 13.4 million tons, and were 2% above the 1969

record. Captive lime used by producers decreased 4% below the 1971 record. Output of refractory dolomite increased 7%, but was 56% below the 1956 record. The num-

Table 2.—Lime sold or used by producers in the United States, by State and kind ¹
(Thousand short tons and thousand dollars)

State	1971				1972			
	Hydrated	Quicklime	Total ²	Value	Hydrated	Quicklime	Total ²	Value
Alabama.....	137	624	761	11,454	136	603	739	11,751
Arizona.....	19	276	296	4,474	W	W	356	6,024
Arkansas.....	W	W	157	2,313	W	W	150	2,456
California.....	137	493	630	10,846	66	542	608	13,059
Colorado.....	46	146	193	3,039	W	W	187	4,070
Florida.....	W	W	159	2,958	W	W	180	3,527
Hawaii.....	7	1	8	228	W	W	7	266
Kansas.....	8	--	8	W	--	9	9	172
Louisiana.....	W	W	960	17,625	W	W	908	19,614
Maryland.....	W	W	W	W	5	11	17	W
Michigan.....	62	1,383	1,444	20,549	W	W	1,509	22,753
Montana.....	1	197	199	2,416	--	242	242	3,003
Nebraska.....	9	19	29	W	--	34	34	685
New Mexico.....	35	--	35	W	--	28	28	W
Ohio.....	267	3,740	4,007	65,258	243	4,171	4,413	75,569
Oregon.....	W	W	106	1,989	W	W	96	2,129
Pennsylvania.....	331	1,429	1,760	30,008	380	1,511	1,891	33,302
Puerto Rico.....	43	1	44	W	42	W	42	1,776
Texas.....	771	841	1,612	24,583	609	1,021	1,631	22,181
Utah.....	W	W	172	3,569	W	W	171	4,216
Virginia.....	63	696	759	11,049	69	690	758	11,739
West Virginia.....	W	W	197	3,073	W	W	W	W
Wisconsin.....	W	W	246	4,570	W	W	263	5,009
Wyoming.....	27	--	27	W	--	30	30	W
Other States ³	1,526	6,300	5,826	89,814	1,095	8,795	6,064	97,279
Total ²	3,489	16,146	19,635	309,813	2,645	17,687	20,332	341,080

W Withheld to avoid disclosing individual company confidential data; included in "Other States."

¹ Excludes regenerated lime. Includes Puerto Rico.

² Data may not add to totals shown because of independent rounding.

³ Includes Connecticut, Idaho, Illinois, Indiana, Iowa, Kentucky, Massachusetts, Minnesota, Mississippi, Missouri, Nevada, New Jersey, New York, North Dakota, Oklahoma, South Dakota, Tennessee, Washington, and States indicated by symbol W.

Table 3.—Lime sold or used by producers in the United States, by State and market ¹
(Thousand short tons)

State	1971				1972			
	Plants	Sold	Captive	Total ²	Plants	Sold	Captive	Total ²
Alabama	5	W	W	761	5	W	W	739
Arizona	7	180	117	296	8	222	133	356
Arkansas	3	W	W	157	3	W	W	150
California	15	239	391	630	15	223	385	608
Colorado	11	7	186	193	11	5	182	187
Florida	3	W	W	159	3	W	W	180
Hawaii	2	2	7	8	2	W	W	7
Kansas	1	--	8	8	1	--	9	9
Louisiana	4	W	W	960	4	W	W	908
Maryland	2	W	W	W	1	17	W	17
Michigan	10	W	W	1,444	10	W	W	1,509
Montana	4	--	199	199	3	--	242	242
Nebraska	4	--	29	29	5	--	34	34
New Mexico	1	--	35	35	1	--	28	28
Ohio	19	2,217	1,789	4,007	19	2,525	1,888	4,413
Oregon	3	W	W	106	3	W	W	96
Pennsylvania	11	W	W	1,760	11	W	W	1,891
Puerto Rico	1	43	1	44	1	42	W	42
Texas	14	853	759	1,612	15	1,061	570	1,631
Utah	6	W	W	172	5	W	W	171
Virginia	8	W	W	759	7	W	W	758
West Virginia	3	W	W	197	2	W	W	W
Wisconsin	6	W	W	246	6	263	--	263
Wyoming	3	--	27	27	3	--	30	30
Other States ³	42	8,839	3,706	5,826	42	9,028	3,446	6,064
Total ²	188	12,380	7,254	19,635	186	13,385	6,947	20,332

W Withheld to avoid disclosing individual company confidential data; included in "Other States"

¹ Excludes regenerated lime. Includes Puerto Rico.

² Data may not add to totals shown because of independent rounding.

³ Includes Connecticut (1 plant), Idaho (1), Illinois (5), Indiana (1), Iowa (2), Kentucky (1), Massachusetts (2), Minnesota (4), Mississippi (1), Missouri (4), Nevada (3), New Jersey (1), New York (3), North Dakota (1), Oklahoma (2), South Dakota (2), Tennessee (2), Washington (3), and States indicated by symbol W.

Table 4.—Lime sold or used by producers in the United States, by size of plant ¹
(Thousand short tons)

Size of plant	1971			1972		
	Plants	Quantity	% of total	Plants	Quantity	% of total
Less than 10,000	30	138	1	35	176	1
10,000 to 25,000	37	590	3	33	537	3
25,000 to 50,000	37	1,404	7	31	1,087	5
50,000 to 100,000	26	1,775	9	30	2,207	11
100,000 to 200,000	25	3,805	19	21	3,052	15
200,000 to 400,000	26	7,215	37	29	8,508	42
More than 400,000	7	4,708	24	7	4,765	23
Total	188	19,635	100	186	20,332	100

¹ Excludes regenerated lime. Includes Puerto Rico.

ber of plants decreased from 188 to 186 and the average output per plant increased from 104,400 tons per year to 109,300 tons. Six States, Ohio, Missouri, Pennsylvania, Texas, Michigan, and Illinois, accounted for 61% of the total output.

Leading producing companies were Marblehead Lime Co. with four plants in Illinois and one each in Indiana, Michigan, Pennsylvania, and Missouri; Mississippi Lime Co. in Missouri; Allied Chemical Corp. in New York and Louisiana; PPG Industries, Inc. in Ohio and Texas; Bethlehem Steel Corp. with two plants in Penn-

sylvania and one in New York; Martin-Marietta Chemicals in Ohio and Alabama; United States Gypsum Co. with two plants in Texas and one each in Alabama, Ohio, and Louisiana; Pfizer, Inc. in Ohio, Massachusetts, California, and Connecticut; Warner Co. with two plants in Pennsylvania; and Diamond Shamrock Chemical Co. in Ohio. These 10 companies, operating 30 plants, accounted for 45% of the total lime production.

The seven largest lime plants, each producing more than 400,000 tons per year,

accounted for 23% of the total production. There were 36 plants which produced

more than 200,000 tons per year and accounted for 65% of the total output.

CONSUMPTION AND USES

Lime was consumed in every State. For total lime, the leading consuming States were Ohio, Pennsylvania, Michigan, Texas, Indiana, and Illinois. These six States, each of which consumed more than 1 million tons, accounted for 58% of the total lime consumed.

Leading quicklime-consuming States were Ohio, Pennsylvania, Michigan, Indiana, and Texas, each of which consumed more

than 1 million tons. Combined, these five States accounted for 54% of quicklime consumption.

Texas, Pennsylvania, Ohio, Illinois, Oklahoma, and Louisiana were the leading hydrate consuming States, each of which consumed more than 100,000 tons. These six States accounted for 54% of the hydrate consumed.

Table 5.—Lime sold or used by producers in the United States, by use ¹

(Thousand short tons and thousand dollars)

Use	1971				1972			
	Sold	Used	Total ²	Value	Sold	Used	Total ²	Value
Agriculture.....	80	--	80	1,449	137	--	137	2,711
Construction:								
Soil stabilization.....	832	--	832	15,982	884	--	884	17,046
Mason's lime.....	414	W	W	9,055	W	W	411	7,924
Finishing lime.....	222	--	222	4,257	W	W	229	4,415
Other uses.....	31	--	31	604	60	--	60	1,157
Total ²	1,499	W	W	29,898	W	W	1,586	30,542
Chemical and industrial:								
Steel BOF.....	4,183	985	5,167	76,352	4,921	1,126	6,047	98,570
Alkalies.....	W	W	3,462	52,391	10	3,222	3,233	52,700
Water purification.....	W	W	1,273	19,638	W	W	1,403	22,870
Paper and pulp.....	W	W	369	13,792	W	W	787	12,830
Sugar refining.....	39	749	787	14,625	41	718	759	12,370
Steel, open-hearth.....	W	W	535	7,788	W	W	665	10,840
Steel, electric.....	W	W	560	8,221	W	W	641	10,450
Copper ore concentration.....	216	269	485	6,639	264	283	548	8,923
Sewage treatment.....	273	76	349	5,305	334	100	434	7,074
Glass.....	347	--	347	5,126	372	--	372	6,064
Aluminum and bauxite.....	W	W	364	5,012	W	W	368	5,998
Calcium carbide.....	304	233	537	7,298	W	W	357	5,819
Magnesia from sea water.....	W	W	298	4,385	W	W	316	5,151
Food.....	30	--	30	576	W	W	77	1,257
Other metallurgy.....	W	W	92	1,354	W	W	53	868
Acid mine water.....	W	W	W	W	W	W	49	791
Petroleum refining.....	49	--	49	784	47	--	47	765
Insecticides.....	32	--	32	569	30	--	30	484
Other ore concentration.....	36	--	36	404	W	W	26	424
Tanning.....	30	--	30	538	24	--	24	396
Oil well drilling.....	12	--	12	204	13	--	13	211
Fertilizer.....	W	W	W	W	9	--	9	146
Sand-lime brick.....	6	--	6	96	4	--	4	70
Paint.....	4	--	4	35	W	W	3	53
Rubber.....	2	--	2	35	W	W	3	43
Wire drawing.....	W	W	W	W	W	W	2	30
Silica brick.....	7	W	7	104	W	W	2	27
Sulfur removal from stack gases.....	W	W	W	W	W	W	1	23
Other uses ³	4,266	W	W	27,015	W	W	1,261	20,538
Total.....	9,836	W	W	258,363	W	W	17,534	285,785
Refractory dolomite.....	965	42	1,007	20,103	1,006	69	1,075	22,042
Grand total ²	12,380	7,254	19,635	309,813	13,395	6,937	20,332	341,080

W Withheld to avoid disclosing individual company confidential data.

¹ Excludes regenerated lime. Includes Puerto Rico.

² Data may not add to totals shown because of independent rounding.

³ Includes magnesite, petrochemicals, chrome, magnesium metal, precipitated calcium carbonate (1972), coke, lithium (1972), manganese and ferromanganese, explosives (1972), plastics (1972), adhesives (1972), whitening (1971), and uses indicated by symbol W.

Table 6.—Destination of shipments of lime sold or used by producers in the United States in 1972, by State ¹

(Short tons)

State	Quicklime	Hydrated lime	Total
Alabama	309,113	76,339	385,452
Arizona	323,535	20,600	344,135
Arkansas	127,524	24,520	152,044
California	683,626	110,623	794,249
Colorado	206,292	17,789	224,081
Connecticut	W	W	49,839
Delaware	15,460	12,387	27,847
District of Columbia	—	2,099	2,099
Florida	265,724	51,127	316,851
Georgia	85,968	26,396	112,364
Hawaii	W	W	6,609
Idaho	W	W	125,935
Illinois	890,832	132,135	1,023,017
Indiana	W	W	1,533,904
Iowa	62,388	18,461	80,849
Kansas	43,872	29,360	73,232
Kentucky	466,867	18,591	485,458
Louisiana	811,393	107,552	918,945
Maryland	W	W	406,934
Massachusetts	W	W	68,843
Michigan	1,609,982	44,114	1,654,096
Minnesota	W	W	139,293
Mississippi	125,759	21,761	147,520
Missouri	W	W	208,275
Montana	246,499	4,366	250,865
Nebraska	43,332	14,792	58,124
Nevada	W	W	51,639
New Jersey	56,291	88,554	144,845
New Mexico	W	W	81,122
New York	938,527	60,021	998,548
North Carolina	95,652	30,270	125,922
North Dakota	W	W	36,813
Ohio	3,488,413	166,343	3,654,756
Oregon	101,850	16,099	117,949
Pennsylvania	2,015,111	246,523	2,261,634
Rhode Island	W	W	11,976
South Carolina	36,461	7,787	44,248
South Dakota	W	W	26,277
Tennessee	93,767	42,213	135,980
Texas	1,032,812	593,015	1,625,827
Utah	W	W	139,955
Virginia	110,640	39,054	149,694
Washington	145,781	18,889	164,670
West Virginia	312,331	31,186	343,517
Wisconsin	105,636	46,763	152,399
Exports:			
Canada	9,677	11,460	21,137
Mexico	W	W	707
Other countries	W	W	35,918
Other States ²	2,825,512	514,069	415,542
Total	17,686,627	2,645,308	20,331,935

W Withheld to avoid disclosing individual company confidential data; included with "Other States."

¹ Excludes regenerated lime. Includes Puerto Rico.

² Includes Alaska, Maine, New Hampshire, Oklahoma, Puerto Rico, Vermont, Wyoming, and destinations indicated by symbol W.

Lime sold by producers was used for chemicals (80%), construction (11%), refractories (8%), and agriculture (1%).

Captive lime used by producers was 34% of the total, compared with 37% in 1971 and 36% in 1970.

Leading individual uses were basic oxygen steel furnaces, alkalis, water purification, and refractories, which together ac-

counted for 58% of the total consumption, compared with 56% in 1971.

Lime used in agriculture reversed the downward trend of recent years and expanded 72%. Lime used for refractory dolomite also reversed the downward trend and increased 7%. Construction uses continued to expand, increasing 2%. Lime for chemical and industrial use also continued to expand, increasing 9%.

PRICES

The average value of lime sold or used by producers in 1972 was \$16.78 per ton, an increase of 6% over the 1971 value of \$15.78 per ton.

Values for quicklime ranged from \$15.76 for agricultural lime to \$16.08 for chemical lime, \$16.90 for construction, and \$20.52

for refractory dolomite, and averaged \$16.35 per ton. Each of these values was higher than in 1971.

Values for hydrated lime ranged from \$19.45 for construction lime to \$19.66 for chemical lime and \$21.32 for agricultural lime, averaging \$19.60 per ton.

FOREIGN TRADE

Exports of lime decreased 43%, to 37,659 tons, and were 45% below the 1968 record. Of the total quantity exported, Canada received 68%, Surinam 14%, and Mexico 7%. The remaining 11% went to 35 countries, listed in order as follows: Panama, Jamaica, British Bahamas, Haiti, Indonesia, West Germany, the United Kingdom, Japan, Belgium, British Honduras, Sweden, Nicaragua, Venezuela, Argentina, Ecuador, the Philippines, Leeward and Windward Islands, Denmark, Austria, Brazil, Chile, Honduras, Thailand, New Zealand, Colombia, Australia, the Netherlands Antilles, the Dominican Republic, Iceland, Pacific

Trust Islands, India, the Republic of South Africa, Hungary, Italy, and Zambia.

Imports of lime, mainly from Canada, increased to 248,500 tons, 3% above the 1971 record. Small quantities were imported from the Dominican Republic (1,088 tons), Mexico (231 tons), France (102 tons), and West Germany (52 tons).

Table 7.—U.S. exports of lime

Year	Short tons	Value (thousands)
1970.....	53,876	\$1,391
1971.....	65,862	1,971
1972.....	37,659	1,242

Table 8.—U.S. imports for consumption of lime

Year	Hydrated lime		Other lime		Total	
	Short tons	Value (thousands)	Short tons	Value (thousands)	Short tons	Value (thousands)
1970.....	34,158	\$479	167,432	\$1,946	201,590	\$2,425
1971.....	39,807	618	202,477	2,690	242,284	3,308
1972.....	37,468	724	210,995	3,224	248,463	3,948

WORLD REVIEW

Canada.—During 1972 there were 22 active lime plants in Canada: nine in Ontario, four in Quebec, four in Alberta, three in Manitoba, one in British Columbia, and one in New Brunswick. Of the 80 kilns in operation, 55 were vertical, 21 were rotary, 3 were rotary grate, and 1 was vibratory grate. Output in 1972 was 1,606,000 tons.

Companies active in Ontario were Algoma Steel Corp. Ltd., Allied Chemical Canada Ltd., Canadian Gypsum Co. Ltd., Cyanamid of Canada Ltd., Chromasco Corp. Ltd., Domtar Chemicals Ltd., Reiss Lime Co. of Canada Ltd., and The Steel Co. of Canada Ltd.

Active companies in Quebec were Do-

minion Lime Ltd., Domtar Chemicals Ltd., Gulf Oil Canada Ltd., and Quebec Sugar Refinery. Dominion Lime announced plans for a new 100-ton-per-day kiln.

In Alberta three companies produced lime, Canadian Sugar Factories Ltd., Steel Brothers Canada Ltd., and Summit Lime Works, Ltd. Steel Brothers constructed a second rotary kiln in 1972 which doubled the plant capacity. Steel Brothers Canada Ltd. and The Manitoba Sugar Co. Ltd. were active in Manitoba. Texada Lime, Ltd. built a calcimatic kiln in British Columbia. Havelock Lime Works Ltd. installed a 100-ton rotary kiln at Havelock, New Brunswick.

Germany, West.—West Germany ranked

third in world lime production, accounting for 11% of the world total. Most of the lime was consumed in Germany.

Israel.—Even Vesid, Ltd. announced plans for a 200-ton-per-day rotary kiln to be built at Shfeya.

U.S.S.R.—The U.S.S.R. was the leading lime producing country in the world, accounting for 22% of the world total. The lime was used for construction (51%), iron and steel (25%), chemicals (13%), and sugar (11%).

Table 9.—Quicklime and hydrated lime, including dead-burned dolomite:
World production by country

(Thousand short tons)

Country ¹	1970	1971	1972 ^p
North America:			
Canada	r 1,648	1,519	1,606
Costa Rica	11	12	13
Guatemala	24	e 25	e 25
Puerto Rico	41	44	42
United States (sold or used by producers)	19,747	19,591	20,290
South America:			
Brazil ^e	1,800	2,200	2,200
Colombia ^e	1,100	1,100	1,100
Paraguay	23	26	26
Peru	11	e 11	e 11
Uruguay	67	53	e 55
Europe:			
Austria ²	820	741	788
Belgium	3,187	3,311	3,168
Bulgaria	1,036	e 1,047	e 1,047
Czechoslovakia ³	2,368	2,485	e 2,590
Denmark	197	197	e 198
Finland	254	254	259
France	4,819	e 4,900	e 4,900
Germany, East	2,946	3,097	e 3,200
Germany, West	11,812	11,641	12,031
Hungary	719	671	e 661
Ireland	65	60	55
Italy	e 6,400	4,630	e 4,400
Norway	r 105	e 105	e 105
Poland	3,875	4,142	4,456
Portugal	233	e 243	e 243
Romania	2,217	2,481	e 2,535
Spain	r 451	e 550	e 550
Sweden	897	907	e 915
Switzerland	160	157	165
U.S.S.R. ^e	23,700	23,100	24,300
Yugoslavia	1,662	1,755	1,888
Africa:			
Algeria ^e	22	22	22
Ethiopia (including Eritrea)	20	15	19
South Africa, Republic of (sales)	r 1,189	1,205	1,316
Tanzania	7	6	e 4
Tunisia	183	183	187
Uganda	23	e 20	e 20
Zambia	115	e 115	e 115
Asia:			
Cyprus	r 87	118	132
India	508	590	373
Iran ^e	1,100	1,100	1,100
Israel	143	198	198
Japan	10,110	10,934	11,166
Jordan	--	--	2
Kuwait	1	e 1	e 1
Lebanon	143	138	132
Mongolia ^e	44	44	44
Philippines	179	246	312
Saudi Arabia	24	e 24	e 24
Taiwan	141	188	195
Oceania:			
Australia ^{e 4}	r 231	254	259
Fiji Islands	3	--	4
Total	106,668	106,456	109,447

^e Estimate. ^p Preliminary. ^r Revised.

¹ Lime is produced in many other countries besides those listed. Zaire, Mexico, Nicaragua, Venezuela and United Kingdom are among the more important countries for which official data are unavailable.

² Includes lime for agriculture for 1970, excludes lime for agriculture for 1971 and 1972.

³ Excludes output by small producers.

⁴ Year ending June 30 of that stated.

TECHNOLOGY

Tarmac Roadstone Holdings, Ltd. of England, successfully converted a shaft-type lime kiln to the use of liquid butane.

Air pollutants from a rotary lime kiln are dependent on the stone charged and the fuel used. The gaseous effluent usually consists of water vapor, carbon dioxide, and nitrogen, and may contain sulfur oxides. The particulate emissions usually include flyash, lime dust, limestone dust and

tars, and may include unburned coal. The quantity of dust from a lime kiln may range up to 15% of the kiln feed.

New environmental regulations require the abatement of these air pollutants or forced closure of the plant. Present applications use the wet scrubber, fabric filter, or electric precipitator. Alternate methods, which will also control the gaseous emissions, are being studied.