## The Mineral Industry of Nebraska

This chapter has been prepared under a Memorandum of Understanding between the Bureau of Mines, U.S. Department of the Interior, and the Conservation and Survey Division of the University of Nebraska, Nebraska Geological Survey, for collecting information on all nonfuel minerals.

## By Robert H. Arndt1 and Raymond R. Burchett2

The value of nonfuel minerals produced in Nebraska rose in the 1978-79 biennium to a new record of about \$99 million in 1979, supported by increased unit prices and total values of most mineral commodities, but only partially supported by increased output of minerals. Total value of nonfuels increased 83% in the 5-year period, 1975-79. Output of sand and gravel in the biennium was actually lower than output in 1977, the year of highest production during 1975-79. Clays behaved similarly. Outputs of stone and cement were higher in 1979 than in 1975, although the general rise of stone output to the 1979 level was interrupted by a slight reversal in 1976. Production of lime decreased in 1975-79, but because output of lime was relatively small and average unit prices fluctuated irregularly from year to year, the value of lime had little influence on the trend in mineral value. About 1,600 workers were employed in mining nonfuel minerals in 1978, a decrease from 1,800 employed in 1977.

Legislation and Government Programs.—No attention was given to nonfuel mineral industries by the Nebraska Legislature during 1978 and 1979. The future status of these industries continued to be addressed through the program of the Nebraska Geological Survey. Geologic mapping in southeastern Nebraska was directed

Table 1.-Nonfuel mineral production in Nebraska<sup>1</sup>

	1977		1978		1979	
Mineral	Quantity	Value (thou- sands)	Quantity	Value (thou- sands)	Quantity	Value (thou- sands)
Clays thousand short tons Gem stones Sand and gravel _ thousand short tons Stone (crushed) do do tombined value of cement, lime, sand and	161 NA 216,848 4,128	\$368 11 230,566 12,974	146 NA 16,720 4,201	\$418 W 31,910 14,758	156 NA 16,197 4,995	\$454 W 33,001 19,362
gravel (industrial, 1977), and values indicated by symbol W	XX	34,174	XX	36,287	XX	46,364
Total	xx	78,093	XX	83,373	XX	99,181

NA Not available. W Withheld to avoid disclosing company proprietary data; value included in "Combined value" figure. XX Not applicable.

figure. XX Not applicable.

Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

Excludes industrial sand; value included in "Combined value" figure.

Table 2.—Value of nonfuel mineral production in Nebraska, by county<sup>1</sup> (Thousands)

Antelope	County	1977	1978	Minerals produced in 1978 in order of value
Sanner   218   126   Dc.	Antelope		\$434	Sand and gravel.
Buffalo   1,722	Banner		126	
Burt	Brown			
Sulter   556   519   Do.	Buttalo		1,053	
Cass	Burt			
Selar	butier			
Thase	Codor			Cement, stone, sand and gravel, clays.
Cherry	Chara			Sand and gravel.
Cheyenne	Charry		166	
Clay	Chevenne		W	
Colfax   W   262   Do.	Clay			
Daster   265   785   Do.	Colfax			
Daster   265   785   Do.	Cuming			
Dawson	Custer	265	705	
Devel   W	Dawson	1 125	1 156	
Dixon   W	Deuel	W	1,100	
Dodge         1,165         1,050         Sand and gravel.           Douglas         W         W         Sand and gravel.           Doundy         267         267         267           Clillmore         W         W         Do.           Pranklin         1,006         1,066         Do.           Franklin         1,006         1,066         Do.           Fornitier         W         W         Do.           Fornitier         W         W         Do.           Jardeld         24         24         Do.           Jarried         24         Do.         Do.      <	Dixon			Sand and group of stone
Douglas   W	Dodge			Sand and gravel, Stone.
Dundy	Douglas	. W		Sand and gravel clave
Fillmore	Jundy		267	Sand and gravel
Cranklin	Fillmore			Do Do
Trontier	ranklin			Do.
Turnas	Frontier			Do.
Jage	Turnas			
Jardell	Gage		1 990	
Sarfield	Jarden		1,203 W	Sand and gravel, stone.
Treeley	Garfield		24	Dand and graver.
fall         1,429         1,516         Do.           lamilton         3133         W         Do.           layes         W         W         Do.           litichcock         W         W         Do.           loward         556         914         Sand and gravel, stone.           loward         235         235         Do.           loward         84         59         Sand and gravel, clays.           cerney         84         59         Sand and gravel, clays.           kerney         84         59         Sand and gravel, clays.           scith         170         110         Do.           kimball         5         5         Do.           kimball         5         5         Do.           kimball         5         819         Orb.           koup         9         97         Orb.           boup         9         97         Orb.           darrick         452         471         Orb.           derrick         452         471         Orb.           derrick         452         471         Orb.           derrick         W         W	Greelev		W	Do.
Hamilton	Hall			
Tayes   W   W   Do.	Hamilton			
Hitchcock   W   W   Do.	Hayes			
Holt	litchcock			
100ker	Holt		914	
Sand and gravel, clays.   Cearney	Hooker		8	Sand and gravel, stolle.
Sand and gravel, clays.   Cearney	Howard			Do
Sand and gravel.   Sand and gravel.   Sand and gravel.	lefferson	W		
Keith         170         110         Do.           Kimball         5         5         Do.           Knox         221         281         Do.           Knox         221         281         Do.           Knox         221         281         Do.           Lancaster         W         W         Stone, clays, sand and gravel.           Jour         9         97         Do.           Madison         1,218         1,249         Do.           Merrick         452         471         Do.           Merrick         452         471         Do.           Merrick         452         471         Do.           Merrick         403         515         Sand and gravel, lime.           Sand and gravel.         Sand and gravel.         Sand and gravel.           Value         W         W         Do.           Verkins         17         Sand and gravel, stone.           Pale         58         W         Do.           Policic         448         448         Do.           Policic         448         448         Do.           Policic         448         Do.      <	\earney			Sand and gravel
Store   Stor	Keith			
Management   Man	Cimball	5		Do.
Ancaster	Cnox	221	281	
Sand and gravel   Sand and gravel	ancaster	: W	W	
Madison	Jincoln	725	819	Sand and gravel
Addison	oup		97	Do.
Marrick	Madison	1,218	1,249	
Work    W	Merrick		471	
Value   Valu	dorrill	W		Sand and gravel, lime.
W	vance		515	Sand and gravel.
W	vemaha	W		Stone, sand and gravel.
Name         W         W         Stone.           Perkins         17         Sand and gravel.           Phelps         58         W         Do.           Pilate         448         448         Do.           Polk         1,212         1,178         Do.           Polk         W         189         Do.           ted Willow         170         299         Do.           tichardson         W         W         Stone, sand and gravel.           sock         6         W         Sand and gravel.           saline         165         52         Do.           sarpy         W         W         Stone, sand and gravel, clays.           saunders         W         W         Sand and gravel, ime.           cotts Bluff         W         W         Sand and gravel, lime.           eward         30         35         Stone.           heridan         280         265         Sand and gravel.           tanton         438         263         Do.           hayer         510         966         Do.           homas         W         W         Do.           'alley         33	Nuckolis		· W	Cement, sand and gravel, stone.
Perkins         17         Sand and gravel.           Phelps         58         W         Do.           Phelps         448         448         Do.           Plate         1,212         1,178         Do.           Polk         W         189         Do.           Polk         W         189         Do.           Ided Willow         170         299         Do.           Ided Willow         170         299         Do.           Ided Willow         W         Stone, sand and gravel.           Ider Willow         W         Sand and gravel.           Ider Willow         W         Stone, sand and gravel, clays.           Sand and gravel, stone.         Sand and gravel, stone.           Cotts Bluff         W         W         Sand and gravel, lime.           eward         30         35         Stone.           heridan         280         265         Sand and gravel.           Inhayer         510         966         Do.           homas         W         W         Do.           Valley         33         35         Do.           Valley         W         W         Do.	лое			Stone.
The color of the	awnee	W		Do.
Series	rerkins	7.7		
	neips			
Yolk         W         189         Do.           ted Willow         170         299         Do.           kichardson         W         W         Stone, sand and gravel.           skichardson         W         W         Stone, sand and gravel.           saline         165         52         Do.           sarpy         W         W         Stone, sand and gravel, clays.           saunders         W         W         Sand and gravel, stone.           cotts Bluff         W         W         Sand and gravel, lime.           eward         30         35         Stone.           heridan         280         265         Sand and gravel.           tanton         438         263         Do.           hayer         510         966         Do.           homas         W         W         W           alley         33         35         Do.           /ashington         W         W         Stone.           closter         320         318         Sand and gravel.           ork         81         199         Do.           ork         81         199         Do.           ork				
Do.				
dichardson bock         W bock         Stone, sand and gravel.           baline         165         52           baline         165         52           barpy         W W Stone, sand and gravel, clays.           aunders         W W Sand and gravel, stone.           cotts Bluff         W W Sand and gravel, lime.           cward         30         35           beridan         280         265           tanton         438         263           tanton         438         263           hayer         510         966         Do.           homas         W W Do.           alley         33         35         Do.           /ashington         W W Stone.         Stone.           /ebster         320         318         Sand and gravel, lime.           sone         500         Do.         Do.           stone         Stone.         Stone.				
lock         6         W         Sand and gravel.           aline         165         52         Do.           arpy         W         W         Stone, sand and gravel, clays.           aunders         W         W         Sand and gravel, stone.           cotts Bluff         W         W         Sand and gravel, lime.           eward         30         35         Stone.           heridan         280         265         Sand and gravel.           tanton         438         263         Do.           hayer         510         966         Do.           homas         W         W         Do.           alley         33         35         Do.           /ashington         W         W         Stone.           elster         320         318         Sand and gravel.           ork         81         199         Do.           ndistributed²         58,826         62,594	ed willow			
Saing and gravel   Saing and gravel	uchardson		W	Stone, sand and gravel.
Stone, sand and gravel, clays.	loling			Sand and gravel.
Sand and gravel, stone.   Sand and gravel, stone.		165		Do.
eward         30         35         Stone.           heridan         280         265         Sand and gravel, lime.           tanton         438         263         Stone.           hayer         510         966         Do.           homas         W         W         Do.           alley         33         35         Do.           /ashington         W         W         Stone.           /ebster         320         318         Sand and gravel.           ork         81         199         Do.           ndistributed <sup>2</sup> 58,826         62,594	arpy			Stone, sand and gravel, clays.
eward         30         35         Stone.           heridan         280         265         Sand and gravel, lime.           tanton         438         263         Stone.           hayer         510         966         Do.           homas         W         W         Do.           alley         33         35         Do.           /ashington         W         W         Stone.           /ebster         320         318         Sand and gravel.           ork         81         199         Do.           ndistributed <sup>2</sup> 58,826         62,594	aunders	W		Sand and gravel, stone.
neridan     280     265     Sand and gravel.       tanton     438     263     Do.       hayer     510     966     Do.       homas     W     W     Do.       alley     33     35     Do.       /ashington     W     W     Stone.       /ebster     320     318     Sand and gravel.       ork     81     199     Do.       ndistributed²     58,826     62,594	cous Biuli			Sand and gravel, lime.
tanton     438     263     Do.       hayer     510     966     Do.       homas     W     W     Do.       alley     33     35     Do.       /ashington     W     W     Stone.       ebster     320     318     Sand and gravel.       ork     81     199     Do.       ndistributed <sup>2</sup> 58,826     62,594	heridan			
hayer	tanton			
homas         W         W         Do.           alley         33         35         Do.           /ashington         W         W         Stone.           /ebster         320         318         Sand and gravel.           ork         81         199         Do.           ndistributed <sup>2</sup> 58,826         62,594	haver			
alley	homas			
/ebster       320       318       Sand and gravel.         ork       81       199       Do.         'ndistributed2       58,826       62,594	allov			
ebster       320       318       Sand and gravel.         ork       81       199       Do.         ndistributed <sup>2</sup> 58,826       62,594	ancy			
ork 81 199 Do. indistributed 2 58,826 62,594	Abetor			
$\frac{130}{100}$ mdistributed $\frac{1}{2}$	ork			Sand and gravel.
	ork			Do.
Total <sup>3</sup> 78,093 83,373	nuistributed	98,826	62,594	
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	iotai-	78,093	83,373	

W Withheld to avoid disclosing company proprietary data; included with "Undistributed."

¹The following counties are not listed because no nonfuel mineral production was reported: Adams, Arthur, Blaine, Boone, Box Butte, Boyd, Dakota, Dawes, Gosper, Grant, Harlan, Johnson, Keya Paha, Logan, McPherson, Sherman, Sioux, Thurston, Wayne, and Wheeler.

²Includes gem stones, sand and gravel, and values indicated by symbol W.
³Data may not add to totals shown because of independent rounding.

Table 3.—Indicators of Nebraska business activity

	1977	1978	1979 <sup>p</sup>	1978-79 percent change
Employment and labor force, annual average:				
Total civilian labor force thousands	749.0	772.0	772.0	
Unemploymentdododo	28.0	23.0	24.0	+4.3
Employment (nonagricultural):				
Mining <sup>1</sup> dodo	1.8	1.8	1.7	-5.6
Mining <sup>1</sup> dododododo	90.6	94.1	99.1	+5.3
Contract constructiondodo	32.3	33.0	33.5	+1.5
Transportation and public utilitiesdodo	42.0	43.8	46.3	+5.7
Wholesale and retail tradedodo	156.0	158.9	164.0	+3.2
Finance, insurance, real estate do	37.7	39.5	40.9	+3.5
Servicesdodo	104.1	108.8	114.3	+5.1
Governmentdodo	129.2	130.3	127.0	-2.5
Total nonagricultural employment <sup>1</sup> dodo Personal income:	593.7	<b>2</b> 609.9	626.8	+2.8
Total millions_	\$10,382	\$11.809	\$13,129	+11.2
Per capita	\$6,677	\$7,544	\$8,341	+10.6
Construction activity:	7-7	¥ · ,	¥-,	,
Number of private and public residential units authorized	11.322	310.937	9.157	-16.3
Value of nonresidential construction millions	\$106.4	\$132.6	\$169.4	+27.8
Value of State road contract awardsdodo	\$70.0	\$70.0	\$85.0	+21.4
Shipments of portland and masonry cement to and within the	******	******	*	
State thousand short tons	1,022	. 994	1,072	+7.8
Nonfuel mineral production value:	,		,	
Total crude mineral value millions	<b>\$78.1</b>	\$83.4	\$99.2	+18.9
Value per capita, resident population	\$50	\$53	\$63	+18.9
Value per square mile	\$1,011	\$1,080	\$1,284	+18.9

Preliminary.

<sup>1</sup>Includes oil and gas extraction.

toward identification of limestone resources and potential future quarry sites. Surveys were underway to show consolidated bedrock, bedrock exposures, and distribution and thickness of unconsolidated mantle rock in the Sioux City, McCook, North Platte, and Scottsbluff 2° quadrangles. The survey also made an annual inventory of surface mines, acreage disturbed and acreage reclaimed. A map of Nebraska on a scale of 1 inch = 16 miles was published in 1978, showing location of active mines, pits, quarries, and energy deposits. Fourteen accompanying small maps depict the general distribution of the nonfuel minerals, and

and gravel, quartzite, limestone, clay and shale, volcanic ash, gypsum, and bentonite. Also depicted are the reported occurrences of diatomaceous earth, sodium and potassium salts, metallic minerals, groundwater, peat, and several energy materials and related installations at or near the land surface.

Gilbert Corp. of Delaware, Inc., Omaha, was awarded a contract by the Bureau of Mines to construct an underground mine laboratory for the Bureau's Lake Lynn Laboratory at Wymps Gap, Pa. The Bureau planned to use the laboratory for research in mine fires and explosions.

<sup>&</sup>lt;sup>2</sup>Data do not add to total shown because of independent rounding. <sup>3</sup>Series revised in 1978; data not comparable with those of prior years.

Sources: U.S. Department of Commerce, U.S. Department of Labor, Highway and Heavy Construction Magazine, and U.S. Bureau of Mines.

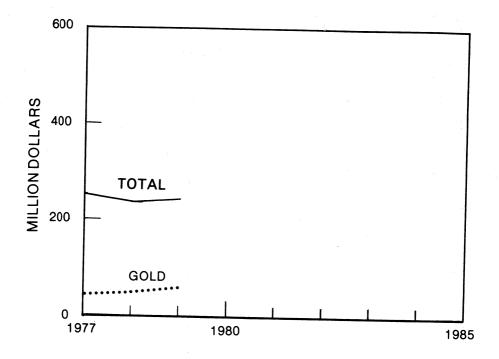


Figure 1.—Value of gold and total value of nonfuel mineral production in Nevada.

the Con-Imperial pit and protect historic houses and landmarks. Late in 1978, the company obtained the necessary State permits to operate a gold processing plant near Manhattan in Nye County. The plant will employ 60 people.

Late in 1979, Anaconda announced its decision to begin construction on a mining and milling complex to treat molybdenum ore in Nye County about 20 miles northwest of Tonapah. Development costs will approach \$22 million, and the project will employ nearly 400 people. Estimated life of the mine and open pit operation is 20 years.

Resumption of large-scale tungsten mining near Imlay, in Humboldt County, was announced by Utah International in 1979. The company submitted an application to the State for permission to construct the \$50 million facility.

Drilling exploration for metals and nonmetals continued at an alltime high for both years. The principal metal ores involved were gold, silver, tungsten, and molybdenum; barite, gypsum, and clay were the principal nonmetallics. Several exploration

companies are reevaluating and drilling in and along the Roberts Mountain thrust fault. This mineralized zone in the fault system extends from the southwest to the northwest in north-central Nevada. Freeport Minerals Co. announced in April 1978, the discovery of a substantial gold deposit in Jerritt and Marlboro Canyons, within the Humboldt National Forest in Elko County. This deposit is significant; the company staked claims covering 42 square miles. A company called Freeport Gold Co., a subsidiary of Freeport Minerals and FMC, was formed to continue evaluation of the property and to be the operator. In late 1979, environmental baseline studies commenced for a draft environmental impact statement on the mine. Under an option agreement, Freeport was also exploring a block of claims of the Owyhee Syndicate, near Tuscarora. Geochemical surveys and rotary drilling indicate that measurable gold values are present over much of the area.

Amselco Minerals, Inc., a wholly owned U.S. subsidiary of Selection Trust Ltd. of London, anounced a major gold discovery

from the manufacturers. About 75% of the cement was shipped by truck; almost all of the remainder went by rail.

Clays.—Nebraska's small clay output fluctuated in the 5 years (1975-79). Production increased modestly in 1979 from that of 1978, the lowest in the 5-year period. Meanwhile, the value of produced clay increased during the biennium to the highest level of the period. This was a consequence of almost steady growth in the unit value of clay from just over \$2 per ton in 1975 to almost \$3 per ton in 1979. Four producing firms mined common clay and shale in Cass, Douglas, Jefferson, Lancaster, and Sarpy Counties in the southeastern part of the State. Face brick and common brick were manufactured in Douglas, Lancaster, and Sarpy Counties.

Lime.—Output of lime by Great Western Sugar Co. during the biennium was less than that in the 3 previous years. The value of lime also fell below that of 1975 and fluctuated irregularly during 1976-79. In 1979, lime values rose to the highest level experienced after 1975. Lime was prepared in kilns at the firm's sugar plants at Bayard, Scottsbluff, Gering, and Mitchell. The output of lime relates generally to the size of the sugar beet crop to be processed to sugar at the firm's four plants, where lime is used to generate carbon dioxide and as a purifier in the refining process. Limestone for the industry came from the firm's quarry near Horse Creek, Wyo., and from a commercial supplier in the vicinity of Rapid City, S. Dak. The firm requires stone that contains a minimum of 95% calcium carbonate.

Sand and Gravel.-Sand and gravel led all raw mineral commodities produced in Nebraska during the biennium both in quantity and value. Although output in the biennium was reduced from that of 1977, it exceeded by far that output in 1975 and 1976. The value of the output, on the other hand, experienced continued growth during the biennium to more than \$33 million in 1979, almost twice the total value in 1975. Growth in value was supported by the increase in output and the increase in the average unit price of sand and gravel from nearly \$1.50 per ton in 1975 to \$2.04 per ton in 1979. The combined output from Douglas, Saunders, Hall, Cass, Madison, and Buffalo Counties in 1978, and the output from Douglas, Saunders, Dodge, and Hall Counties in 1979 exceeded 35% of the State's total output of sand and gravel each year. One hundred and sixty-five firms produced sand and gravel in 1978. In 1975, 153 firms were active. That year, two firms supplied about 30% of the State's sand and gravel, and more than 50% of the State's output came from the combined output of seven firms. Sand and gravel was recovered in 69 counties in 1978-79, from 263 deposits in 1978 and 237 deposits in 1979. Individual company output both years ranged from less than 200 tons to more than 2 million tons. Fifty percent of the output of sand and gravel in 1978 was from deposits that yielded less than 100,000 tons during the year. In 1979, about 40% of the output came from 206 deposits that supported operations in the same size range. By contrast, almost 35% of the output in 1978 came from deposits that individually yielded over 200,000 tons; in 1979, 14 deposits in that production category provided nearly 40% of the State's total output. Thirty-four deposits yielded 100,000 to 200,000 tons in 1978, and 17 had similar yields in 1979. The distribution of streams and associated deposits of sand and gravel in streambeds, flood plains, and alluvial terraces relate directly to production. Sand and gravel operations are prominent along the Platte, Republican, Niobrara, Elk Horn, Blue, Big Sandy, and many other rivers, and in the interstream areas along the northern border of the State and in the western part of the State. Almost 58% of the State's total tonnage and 56% of the value of sand and gravel produced in 1978 were derived from counties that adjoin the Platte River. Output increased in 1979 to more than 68% of the State total and almost 66% of the value. Combined output of sand and gravel from counties adjacent to the Republican and Platte Rivers was about 66% of the State's total output in 1978 and almost 72% of that in 1979. Relatively large production from the counties adjacent to the Platte and Republican Rivers was achieved because of the abundant presence of the materials, the presence of at least 11 of the major cities in Nebraska, including Omaha, in those counties, and to the traditional use of the Platte valley as an eastwest corridor across the State for construction and maintenance of railways and highways. These factors supported abundant construction and heavy demands for sand and gravel, a primary construction material. Major uses of sand and gravel are as aggregates, roadbases, fill, concrete products, plaster and gunite sands, snow and ice control, and railroad ballast. Construction aggregates, the largest single use, required almost 49% of the total output in 1978 and

Table 4Nebraska:	Construction sand and	gravel sold or used,
t y	by major use category	

	1977			1978			1979		
Use	Quantity (thousand short tons)	Value (thou- sands)	Value per ton	Quantity (thousand short tons)	Value (thou- sands)	Value per ton	Quantity (thousand short tons)	Value (thou- sands)	Value per ton
Concrete aggregate Plaster and gunite	4,804	\$9,445	\$1.97	4,745	\$9,297	\$1.96	3,814	<b>\$7,</b> 526	\$1.97
sands	NA	NA	NA	144	258	1.78	117	208	1.78
Concrete products	984	2,282	2.32	767	1,738	2.27	1,005	2.189	2.18
Asphaltic concrete Roadbase and	3,331	6,459	1.94	3,396	6,834	2.01	2,697	5,492	2.04
coverings	4.955	8.975	1.81	5,275	10,607	2.01	7,010	15,404	2.20
Fill	2,605	3,123	1.20	2,342	3,009	1.28	1,452	1.921	1.32
Snow and ice control	NA	NA	NA	16	22	1.36	24	44	1.83
Railroad ballast	w	w	W			1.00	40	149	3.74
Other uses	167	281	1.75	33	141	4.28	38	67	1.78
Total <sup>1</sup> or average	16.848	30,566	1.81	16,720	31,910	1.91	16,197	33,001	2.04

NA Not available.  $\;\;$  W Withheld to avoid disclosing company propri  $^1\mathrm{Data}$  may not add to totals shown because of independent rounding. W Withheld to avoid disclosing company proprietary data; included in "Total."

Table 5.—Nebraska: Construction sand and gravel sold or used by producers

	1977			1978			1979		
	Quantity (thousand short tons)	Value (thou- sands)	Value per ton	Quantity (thousand short tons)	Value (thou- sands)	Value per ton	Quantity (thousand short tons)	Value (thou- sands)	Value per ton
SandGravel	6,043 10,805	\$10,843 19,724	\$1.79 1.83	6,984 9,735	\$12,739 19,167	\$1.82 1.97	5,459 10,738	\$10,070 22,931	\$1.84 2.14
Total <sup>1</sup> or average _	16,848	30,566	1.81	16,720	31,910	1.91	16,197	33,001	2.04

<sup>&</sup>lt;sup>1</sup>Data may not add to totals shown because of independent rounding.

more than 40% in 1979. Roadbases accounted for almost 32% of the product use in 1978 and more than 43% in 1979. Requirements for fill and concrete products were considerably smaller, whereas those for plaster and gunite sand, snow and ice control, railroad, and all other uses individually accounted for less than 1% of the total output. The modes of transportation of sand and gravel reflected the proximity of the exploited deposits to the point of use. During the biennium, about 89% of the sand and gravel was transported by truck, 7.5% to 9.0% was moved by rail, only a minute quantity was moved in any other manner; and 4% to 5% was used at the source.

Stone.-Preparation of aggregates and cement are the principal uses for stone, which ranked second in both quantity and value among the raw nonfuel minerals produced in Nebraska. Output in 1979 was the highest in the period 1975-79. It followed relatively low production in 1976 and 1977 and recovering production in 1978. The value of produced stone increased steadily to \$19.4 million in 1979, the highest value in the 5-year period. Both increased production and a growth in the average unit value

of stone from about \$2.40 per ton for crushed stone in 1975 to \$3.88 per ton in 1979 supported the high value of Nebraska stone output. The value of crushed stone used for specific purposes ranged from less than \$2 per ton to more than \$11 per ton in 1979. Growth of the average unit value between 1975 and 1979 was almost 60%.

Counties along the eastern boundary of the State, especially near Omaha, and in the southeast were the main sources of stone. Dixon County in the northeast had a small stone industry in both years of the biennium, and Holt County in the northcentral part of the State supplied stone in 1978. Cass, Washington, and Saunders Counties were the most productive counties, providing more than 85% of the output and value of stone in the State during the biennium. Stone was produced in 14 counties from a total of 24 quarries and by 15 firms in 1978. The 12 source counties in 1979 had 22 quarries; 13 firms were active. Quarry operations ranged in size from about 1,000 tons per year to 1 million tons per year. Four quarries exceeded 500,000 tons output in both years. Four had production between 100,000 and 500,000 tons per

year in 1978, and six had similar production in 1979. Sixteen quarries in 1978 and 12 in 1979 had production of less than 100,000 tons per year. Output from quarries in this category was just over 12% of the State's total output in 1978 and almost 8% in 1979. By contrast, the four largest producing quarries supplied more than 68% of the State's total production in both years.

Only limestone was quarried. It was marketed as crushed stone. During the biennium, almost two-thirds of the crushed stone was used as aggregates, including those to be used with concrete and bituminous materials for surface treatment of roads and other unspecified activities. Oth-

er uses—agricultural stone, riprap and jetty stone, and mineral foods—required from 1% to 5% of total output. Quantities of crushed stone sold for flux, dense roadbase, railroad ballast, asphalt filler, and filter stone were each generally less than 1%. As a commodity of relatively low value, stone tends to be produced as close to the market as possible. Thus, about 84% of all the stone transported in the State was shipped by truck. Railroads handled almost 14% of the stone. About 2% of the stone was carried by waterway, principally, on the Missouri River. Less than 0.5% of the stone was carried by other means.

Table 6.—Nebraska: Crushed limestone<sup>1</sup> sold or used by producers, by use

(Thousand short tons and thousand dollars)

	1977		1978		1979	
Use	Quantity	Value	Quantity	Value	Quantity	Value
Agricultural limestone	196	509	157	478	167	589
Poultry grit and mineral food	w	W	w	W	257	2,867
Concrete aggregate	1,253	4,034	1.432	4,992	1,154	4,696
Dense-graded roadbase stone	187	579	40	w	· w	· w
Surface treatment aggregate	604	1,776	812	2.951	829	3,408
Other construction aggregate and road-	001	2,		,		-,
stone	331	1.142	209	785	910	3,594
Riprap and jetty stone	68	195	209	907	189	871
	90	w	200	201	100	17
Flux stone	41	287	w	$\bar{\mathbf{w}}$	w	ŵ
Asphalt filler						
Other uses¹	1,442	4,451	1,343	4,645	1,486	3,321
Total <sup>2</sup>	4,128	12,974	4,201	14,758	4,995	19,362

W Withheld to avoid disclosing company proprietary data; included with "Other uses."

<sup>2</sup>Data may not add to totals shown because of independent rounding.

Talc.—Cyprus Industrial Minerals Co. ground talc from southwestern Montana at its Grand Island mill. The ground talc was sold for use in manufacturing a wide range of personal, ceramic, plastic, and other products.

Vermiculite.—W. R. Grace & Co., Construction Products Division, exfoliated vermiculite from Libby, Mont., in its plant near Omaha. Exfoliated vermiculite was used as concrete and plaster aggregate, loose fill and block insulation, for horticulture and soil conditioning, and in fireproofing.

## **METALS**

Lead bullion from smelters was processed

at the Omaha refinery of ASARCO Inc., to produce refined and antimonial lead and refined bismuth. The refinery also recovered antimony, antimony oxide, dore containing silver and gold, copper, and zinc. Late in 1978, the firm completed construction and put onstream an automated, enclosed, and environmentally clean plant designed to produce 2,700 tons of antimony oxide per year. Total rated annual capacity of the refinery is 180,000 tons of metal.

<sup>&</sup>lt;sup>1</sup>Includes stone used in bituminous aggregate, railroad ballast, filter stone (1977-78), cement manufacture, and data indicated by symbol W.

<sup>&</sup>lt;sup>1</sup>State mineral specialist, Bureau of Mines, Denver, Colo.

<sup>&</sup>lt;sup>2</sup>Research geologist, Nebraska Geological Survey, Lincoln, Nebr.

Table 7.—Principal producers

Commodity and company	Address	Type of activity	County
Cement:			
Ash Grove Cement Co. <sup>1</sup>	920 Main St. Suite 1000	Plant	Cass.
Ideal Basic Industries, Inc., Ideal Cement Co.	Kansas City, MO 64105 420 Ideal Cement Bldg. Denver, CO 80202	do	Nuckolls.
Clays: Endicott Clay Products Co	Box 17	Open pit and plant	Jefferson.
Yankee Hill Brick Manufacturing Co_	Fairbury, NE 68352 Route 1	do	
, .	Lincoln, NE 68502	do	Lancaster.
Lead, refined: ASARCO, Inc. <sup>2</sup>	5th and Douglas Sts. Omaha, NE 68102	Refinery	Douglas.
Lime:		T01 ·	
Great Western Sugar Co	Box 5038 Denver, CO 80217	Plants	Morrill and Scotts Bluff.
Sand and gravel: Ace Sand & Gravel Co	Box 865	Pits and plants	Nance and Platte
	Columbus, NE 68601	• .	
Behrens Construction Co	Box 188 Beatrice, NE 68310	do	Gage.
Central Sand & Gravel Co	Box 626 Columbus, NE 68601	do	Butler, Madison, Platte.
Elkhorn Construction Co	Box 168	do	Madison.
Gayman Sand & Gravel Co	Norfolk, NE 68701 Tryon Route Box 2	Pit and plant, dredge and	Lincoln and Scott Bluff.
Hartford Sand & Gravel Co	North Platte, NE 69101 Box Z Valley, NE 68064	plant. Dredge and pits	Dodge and
Kirkpatrick Sand & Gravel Co	Box 6	Pit and plant	Douglas. Dawson.
Luther & Maddox Gravel Co	Lexington, NE 68850 3000 South Blaine St. Grand Island, NE 68801	Pits and plants	Hall.
Lyman-Richey Sand & Gravel Corp	4315 Cuming St. Omaha, NE 68161	do	Cass, Dodge, Douglas, Morrill, Platte,
Midwest Bridge and Construction	Box 787 Norfolk, NE 68701	do	Saunders. Holt, Pierce,
Nichols Construction Co	Geneva, NE 68361	do	Stanton. Fillmore and Thayer.
Olson Sand & Gravel Co Overland Sand & Gravel Co	Alma, NE 68920 Box 307 Stromsberg, NE 68666	Pit Pits and plants	Franklin. Hamilton, Merrick, Nance
Stalp Gravel Co	Route 3 West Point, NE 68788	Pit and plant	Polk. Cuming.
Western Sand & Gravel Co	Box 80268 Lincoln, NE 68501	Pits and plants $\_\_$	Cass, Dodge, Saunders.
Stone: City Wide Rock & Excavation Co	3863 Mason St.	Quarries and	Sarpy.
Fort Calhoun Stone Co	Omaha, NE 68105 1255 South St.	plants. do	Washington.
Hopper Brothers Quarries	Blair, NE 68008 Box 383 Weeping Water, NE 68463	do	Cass, Gage, Nemaha, Nuckolls.
Voufoud I importante Co	P 494		Otoe, Pawnee, Richardson, Saunders.
Kerford Limestone Co	Box 434 Weeping Water, NE 68463	Quarry and plant	Cass.
Talc, ground: Cyprus Industrial Minerals Co., Talc Div.	Box 1502	Concentrator	Hall.
Vermiculite, exfoliated: W. R. Grace & Co., Construction Products Div.	Grand Island, NE 68801 62 Whittemore Ave. Cambridge, MA 02140	Plant	Douglas.

 $<sup>^1\!\</sup>text{Also}$  clays and stone.  $^2\!\text{Also}$  antimonial lead, bismuth, antimony oxide, dore containing silver and gold, copper, and zinc.