

The Mineral Industry of Hawaii

This chapter has been prepared under a Memorandum of Understanding between the Bureau of Mines, U.S. Department of the Interior, and the Department of Land and Natural Resources of the State of Hawaii for collecting information on all nonfuel minerals.

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Hawaii's nonfuel mineral production reached a record high, mainly as a result of cement production. Nonfuel mineral production totaled \$53 million in 1978 and \$64 million in 1979. Use of mineral commodities—cement, stone, sand and gravel, and pumice— was directly related to the construction industry. Portland cement replaced stone as the leading value commodity produced, reflecting an upsurge in exports to west coast ports in response to mainland shortages.

Cement was manufactured at two plants in Honolulu County. Pumice and volcanic cinder was mined in Hawaii, Kauai, and Maui Counties. Sand and gravel was mined in Hawaii, Kauai, and Maui Counties. Crushed stone was produced from quarries in Hawaii, Honolulu, Kauai, and Maui Counties. Vermiculite imported from Montana was exfoliated in Honolulu County. Gem stone material, black, pink, and gold coral for use in making jewelry, was harvested from the waters surrounding the Hawaiian Islands.

Pacific Concrete & Rock Co., Ltd., closed its rock quarry and ready-mix facility at Honokohau, near Kona. The company will continue supplying customers from rock quarries at Waimanalo and Makakilo, and from its main concrete facilities in the Sand Island area of Honolulu.

Ameron Honolulu Construction and Drayage, Ltd., was granted a 20-year exten-

sion to its special-use permit for rock quarrying and processing at its Puunene quarry in Maui County. The permit now includes 194 acres.

Ocean Minerals Co. of Mountain View, Calif., a consortium of Lockheed Missiles and Space Co., Amoco Minerals Co., and two Dutch companies, announced that its ship had successfully recovered manganese nodules in 17,000 feet of water 800 to 1,000 miles southeast of Hawaii. Nearly 1,000 tons were mined in a continuous stream in the first successful test of a mining system at that depth. Ocean Mining Associates (United States Steel Corp., Union Miniere, S.A., and Sun Oil Co.), in its test program, successfully raised manganese nodules from a 3-mile depth at design capacity of 50 tons per hour. Another consortium of companies from Germany, Japan, the United States, and Canada, operating as Ocean Management, Inc., announced it too had successfully demonstrated continuous mining of nodules. Despite successful tests, mining of the sea floor has been postponed until the Law of the Sea can be clarified.

The long-term effort to codify the Law of the Sea, at sessions of the Law of the Sea Conference, has not materialized. The deep seabed mining issue, including the right of private companies to engage in commercial production of manganese nodules, has been a stumbling block. A deep sea mining bill was introduced in the U.S. Congress. The

proposed bill is intended as an interim measure for orderly development of deep seabed mining until an international agreement has been reached by the United Nations' Law of the Sea Conference. Until the issue can be resolved, private companies are reluctant to proceed. Investments in ocean mining already exceed \$100 million.

As part of its Deep Ocean Mining Environmental Study (DOMES) Project, the National Oceanic and Atmospheric Agency (NOAA) is conducting a study of potential

environmental effects involved in building a processing plant for manganese nodules in various States, among them, Hawaii. Under a grant from NOAA, the Hawaii Department of Planning and Economic Development is investigating possible effects that a nodule processing industry might have on the State. The State is actively encouraging potential nodule mining companies to consider locating their processing facilities in Hawaii.

Table 1.—Nonfuel mineral production in Hawaii¹

Mineral	1977		1978		1979	
	Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement:						
Portland— thousand short tons—	320	\$16,315	441	\$25,626	469	\$29,346
Masonry— do—	10	607	11	828	12	1,077
Pumice— do—	260	574	272	658	359	1,240
Sand and gravel— do—	771	2,452	706	1,582	1,081	3,063
Stone:						
Crushed— do—	5,758	19,876	6,027	23,845	6,868	28,969
Dimension— do—	1	4	W	W	1	W
Combined value of other nonmetals—	XX	152	XX	209	XX	209
Total—	XX	39,980	XX	52,748	XX	63,904

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

¹ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

Table 2.—Value of nonfuel mineral production in Hawaii, by county

(Thousands)

County	1977	1978	Minerals produced in 1978 in order of value
Hawaii—	W	\$3,780	Stone, pumice, sand and gravel.
Honolulu—	W	W	Cement, stone.
Kauai—	W	W	Stone, sand and gravel, pumice.
Maui—	\$3,756	W	Stone, sand and gravel, pumice, lime, gem stones.
Total—	39,980	52,748	

W Withheld to avoid disclosing company proprietary data; included in "Total."

Table 3.—Indicators of Hawaii business activity

	1977	1978	1979 ^P	1978-79 percent change
Employment and labor force, annual average:				
Total civilian labor force— thousands—	402.0	400.0	399.0	-0.3
Unemployment— do—	30.0	31.0	25.0	-19.4
Employment (nonagricultural):				
Mining— do—	(¹)	(¹)	(¹)	--
Manufacturing— do—	23.2	23.7	23.6	-4
Contract construction— do—	19.7	20.7	22.9	+10.6
Transportation and public utilities— do—	28.2	28.8	30.4	+5.6
Wholesale and retail trade— do—	92.2	97.9	104.5	+6.7
Finance, insurance, real estate— do—	25.6	28.8	30.3	+5.2
Services— do—	284.8	290.3	298.4	+9.0
Government— do—	85.7	87.1	86.5	-7
Total nonagricultural employment— do—	359.4	377.3	396.6	+5.1

See footnotes at end of table.

Table 3.—Indicators of Hawaii business activity —Continued

	1977	1978	1979 ^P	1978-79 percent change
Personal income:				
Total ----- millions	\$6,746	\$7,490	\$8,474	+13.1
Per capita -----	\$7,669	\$8,465	\$9,353	+10.5
Construction activity:				
Number of private and public residential units authorized -----	7,916	9,475	10,887	+14.9
Value of nonresidential construction ----- millions	\$128.8	\$179.3	\$253.3	+41.3
Value of State road contract awards ----- do.	\$51.0	\$41.0	\$41.4	+1.0
Shipments of portland and masonry cement to and within the State ----- thousand short tons	318	392	434	+1.1
Nonfuel mineral production value:				
Total crude mineral value ----- millions	\$40.0	\$52.7	\$63.9	+21.2
Value per capita, resident population -----	\$45	\$59	\$70	+18.6
Value per square mile -----	\$6,198	\$8,177	\$9,908	+21.2

^PPreliminary.¹Included with "Services."²Includes mining.

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

Basic or bench-model research efforts related to the processing of nodules have been carried out at various places. The most likely site for pilot plant testing of processes deemed attractive by researchers is in Hawaii. Ocean Minerals Co. announced plans to build a \$4 million pilot plant at Campbell Industrial Park on Oahu.

Against this background, Hawaii is emerging as a favored site for a possible manganese nodule mining and processing center. The black, potato-sized nodules, which contain 25% manganese and 3% combined nickel, copper, and cobalt,

are found in vast areas southeast of Hawaii in 14,000 to 18,000 feet of water. As the nearest land, Hawaii is the logical site for a processing plant, provided environmental problems can be resolved or mitigated, and adequate land, water, and energy resources can be made available. Initial estimates indicate such a plant could provide employment for more than 1,200 people and produce annual revenue of \$250 to \$350 million.

Hawaii's economic dependence on tourism and Federal spending increases the importance of a new industry for the State.

REVIEW BY NONFUEL MINERAL COMMODITIES

NONMETALS

Cement.—Kaiser Cement & Gypsum Corp. and Cyprus Hawaiian Cement Corp. operated cement plants in Honolulu County, Oahu Island. Value of production of portland cement was greater than value of production of other nonfuel mineral commodities. Plant operations differ: Kaiser employs a wet process and Cyprus employs a dry process. Both plants use fuel oil for their kilns. Electricity for the Cyprus plant is purchased; Kaiser generates its own.

Portland cement was used by building material dealers, concrete product manufacturers, ready-mix companies, government agencies, and miscellaneous customers including exporters. More than 80% of sales were to ready-mix consumers.

Gem Stones.—Black, pink, and some gold

coral was harvested from waters surrounding the Hawaiian Islands to provide raw materials for jewelry. The main source of precious coral has been the bed off Makapuu. A newly discovered bed found about 40 miles northwest of Nihoa, one of the leeward islands 290 miles northwest of Honolulu, is reported to be larger than that off Makapuu. Coral has been harvested from the waters off Maui and Kauai Islands by independent scuba divers. Maui Divers of Hawaii Ltd., acquired by Helena Rubenstein in 1977 through its wholly owned subsidiary, Deepwater Explorations, Ltd., handles diving and coral collection operations. The company uses a deep-diving submarine to depths of 1,200 feet.

Local jewelry manufacturing employs more than 500 people. The major jewelry producer is Helena Rubenstein.

Lime.—The Hawaiian Commercial & Sugar Co., Ltd., produced lime hydrate at Paia, Maui County. Quantity produced remained fairly constant; however, value received increased considerably.

Pumice and Volcanic Cinder.—Pumice and volcanic cinder was extracted in Hawaii, Kauai, and Maui Counties. Fifteen operators recovered material from 16 pits for use as concrete aggregate, in road construction, and as fill. Output of pumice and volcanic cinder is contingent upon requirements of the construction industry.

Sand and Gravel.—Six plants processed sand and gravel obtained from seven pits in Hawaii, Kauai, and Maui Counties. Two-thirds of the material produced came from Maui County. Main uses for the product were in concrete aggregate, fill, asphaltic aggregate, roadbase, and concrete production. Based on quantity, in excess of 70% of the material produced was used for concrete aggregate and fill. Of the total quantity produced, approximately 82% was transported by truck; the remainder was used onsite.

Table 4.—Hawaii: Construction sand and gravel sold or used, by major use category

Use	1977			1978			1979		
	Quantity (thousand short tons)	Value (thousands)	Value per ton	Quantity (thousand short tons)	Value (thousands)	Value per ton	Quantity (thousand short tons)	Value (thousands)	Value per ton
Concrete aggregate	263	\$1,137	\$4.32	197	\$584	\$2.97	W	W	W
Plaster and gunitite sands	NA	NA	NA	--	--	--	--	--	--
Concrete products	2	9	3.89	31	2	3.46	--	--	--
Asphaltic concrete	113	748	6.61	W	W	W	334	\$1,395	\$4.18
Roadbase and coverings	71	120	1.71	85	151	1.79	362	903	2.49
Fill	322	438	1.36	322	438	1.36	W	W	W
Other uses	--	--	--	102	407	3.98	--	--	--
Total or average	771	2,452	3.18	706	1,582	2.24	1,081	3,063	2.83

NA Not available. W Withheld to avoid disclosing company proprietary data; included in "Other uses" and/or "Total or average."

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

	1977			1978			1979		
	Quantity (thousand short tons)	Value (thousands)	Value per ton	Quantity (thousand short tons)	Value (thousands)	Value per ton	Quantity (thousand short tons)	Value (thousands)	Value per ton
Sand	369	\$1,527	\$4.14	W	W	W	540	\$1,515	\$2.81
Gravel	402	925	2.30	W	W	W	542	1,548	2.86
Total¹ or average	771	2,452	3.18	706	\$1,582	\$2.24	1,081	3,063	2.83

W Withheld to avoid disclosing company proprietary data; included in "Total or average."

¹Data may not add to totals shown because of independent rounding.

Stone.—Crushed and dimension stone were produced from 32 quarries in Hawaii, Honolulu, Kauai, and Maui Counties. More than 75% of the crushed stone came from Honolulu County. All material was transported to users by truck. Quarry production ranged from less than 25,000 tons per year to more than 900,000 tons annually. Approximately 93% of total production came from quarries producing 100,000 tons per year or more.

Expansion of the Puunene quarry of Ameron Honolulu Construction and Drayage, Ltd., is scheduled for 1980. The Maui Planning Commission approved a 20-year extension to its special use permit for rock quarrying and permitted expansion of the quarry from 28 to 194 acres. The original 28-acre parcel is nearly exhausted; additional reserves are needed to supply rock and concrete products to the construction industry on Maui.

Pacific Concrete & Rock Co., Ltd., in November 1978, sold its rock quarry and ready-mix facility at Honokohau near Kona to Allied Aggregates of Hilo. Pacific Concrete & Rock will continue supplying its customers from a block manufacturing plant at Campbell Industrial Park, rock quarries at Waimanalo and Makakilo, and from its main facility in the Sand Island area of Honolulu.

Twenty-one companies were engaged in mining stone. Principal producers, with more than 100,000 tons per year, included

Ameron Honolulu Construction and Drayage, Ltd.; Lone Star Industries; Pacific Concrete & Rock Co., Ltd.; Cyprus Hawaiian Cement Corp.; Herbert Tanaka Co.; Kaiser Cement & Gypsum Corp.; Grove Farm Co., Inc.; James W. Glover, Ltd.; Hawaiian Bitumuls & Paving Co.; Hilo Coast Processing Co.; and Yamada and Sons, Inc. The principal uses for stone—consumption in excess of 500,000 tons per year—were in concrete aggregate, roadbase, cement manufacturing, roadstone, bituminous aggregate, and sand.

Table 6.—Hawaii: Crushed stone¹ sold or used by producers, by use

(Thousand short tons and thousand dollars)

Use	1977		1978		1979	
	Quantity	Value	Quantity	Value	Quantity	Value
Agricultural limestone	22	90	30	125	16	85
Poultry grit and mineral food	3	14	2	13	2	W
Concrete aggregate	1,074	4,329	1,445	6,943	1,642	8,448
Bituminous aggregate	656	2,493	741	3,183	480	2,107
Dense-graded roadbase stone	1,604	4,490	1,039	2,710	1,329	3,920
Surface treatment aggregate	147	565	223	842	146	597
Other construction aggregate and roadstone	561	1,602	838	2,766	1,454	5,082
Riprap and jetty stone	W	W	77	329	43	W
Railroad ballast	--	--	2	6	2	W
Filter stone	--	--	2	6	--	--
Manufactured fine aggregate (stone sand)	595	3,183	705	4,626	783	5,755
Cement manufacture	734	1,777	895	2,155	935	2,490
Chemicals	6	33	7	36	W	W
Bedding materials	21	93	W	W	W	W
Porcelain	1	W	--	--	--	--
Other uses ²	335	1,206	21	110	36	486
Total ³	5,758	19,876	6,027	23,845	6,868	28,969

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

¹Includes limestone, traprock, and miscellaneous stone.

²Includes macadam aggregate, fill (1977), terrazzo and exposed aggregate (1977), lime manufacture (1977-78), and roofing granules.

³Data may not add to totals shown because of independent rounding.

Vermiculite.—Vermiculite of Hawaii, Inc., exfoliated vermiculite from Montana at its Honolulu plant in Honolulu County. In descending order of quantity, the product was used in plaster aggregate, roofing ag-

gregate, soil conditioning, loose fill insulation, and concrete aggregate.

¹State mineral specialist, Bureau of Mines, Spokane, Wash.

Table 7.—Principal producers

Commodity and company	Address	Type of activity	County
Cement:			
Cyprus Hawaiian Cement Corp --	1600 Kapiolani Blvd. Honolulu, HI 96814	Cement plant -----	Honolulu.
Kaiser Cement & Gypsum Corp --	Waianae Plant 300 Lakeside Dr. Oakland, CA 94666	-----do -----	Hawaii.
Lime:			
Hawaiian Commercial & Sugar Co., Ltd.	Box 266 Puunene, HI 96784	Rotary kiln and continuous hydrator.	Maui.

Table 7.—Principal producers —Continued

Commodity and company	Address	Type of activity	County
Pumice and volcanic cinder:			
James W. Glover, Ltd -----	Box 275 Hilo, HI 96720	Open pit mine -----	Hawaii.
HC & D, Ltd -----	Box 190 Honolulu, HI 96810	-----do -----	Maui.
Laupahoehoe Sugar Co -----	Papaaloa, HI 96780	-----do -----	Hawaii.
Hilo Coast Processing Co -----	Papeekee, HI 96783	-----do -----	Do.
Sand and gravel:			
Amelco Corp -----	645 Halekauwila St. Honolulu, HI 96813	Plant and pit -----	Maui.
Stone:			
HC & D, Ltd -----	Box 190 Honolulu, HI 96810	Quarry -----	Hawaii and Maui.
Lone Star Industries -----	400 Alabama St. San Francisco, CA 94110	-----do -----	Hawaii.
Pacific Concrete & Rock Co., Ltd ..	2344 Pahounui Dr. Honolulu, HI 96819	-----do -----	Honolulu and Maui.
Cyprus Hawaiian Cement Corp ..	1600 Kapiolani Blvd. Honolulu, HI 96814	-----do -----	Honolulu.
Kaiser Cement & Gypsum Corp ..	300 Lakeside Dr. Oakland, CA 94666	-----do -----	Hawaii.
Grove Farm Co., Inc -----	Puhi Rural Station Puhi, HI 96766	-----do -----	Kauai.
James W. Glover, Ltd -----	Box 275 Hilo, HI 96720	-----do -----	Hawaii.
Hawaiian Bitumuls & Paving Co., Ltd	Box 2240 Honolulu, HI 96804	-----do -----	Honolulu.
Vermiculite (exfoliated):			
Vermiculite of Hawaii, Inc -----	842-A Mapunapuna St. Honolulu, HI 96819	Exfoliating plant -----	Do.